DRAFT
Environmental Assessment

RESTORING FRESHWATER INFLOW TO STAR LAKE WITH A SIPHON

2024-0027939-NEPA-001

Prepared for:

United States Fish and Wildlife Service
Texas Chenier Plain NWR Complex,
Anahuac, Texas

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*Construction drawings have been removed from Appendix documents C, D, and E in order to streamline the Environmental Assessment and remove duplication of documents. When referred to project construction drawings in those appendices, please refer to Appendix A of this Environmental Assessment instead.

List of Acronyms (Alphabetical)	
BE	Biological Evaluations
BMP	Best Management Practices
CFR	Code of Federal Regulations
DM	Department Manual
DU	Ducks Unlimited
EA	Environmental Assessment
EFH	Essential Fish Habitat
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
EMST	Ecological Mapping Systems of Texas
FR	Federal Register
FW	Fish and Wildlife
FONSI	Finding of No Significant Impact
GIWW	Gulf Intracoastal Waterway
GOA	Gulf of America
GMFMC	Gulf of Mexico Fishery Management Council
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
JNNWR	Jocelyn Nungaray National Wildlife Refuge
MBCA	Migratory Bird Conservation Act
MMPA	Marine Mammal Protection Act
MNWR	McFaddin National Wildlife Refuge
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	National Resources Conservation Service
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
NWRSAA	National Wildlife Refuge System Administration Act
PCB	Polychlorinated Biphenyls
PL	Public Law
SHPO	State Historic Preservation Office
SH	State Highway
SWQMS	Surface Water Quality Monitoring Station
TCEQ	Texas Commission on Environmental Quality
TDSHS	Texas Department of State and Health Services
TGLO	Texas General Land Office

List of Acronyms (Alphabetical)	
THC	Texas Historical Commission
TPNWR	Texas Point National Wildlife Refuge
TPWD	Texas Parks and Wildlife Department
TMMSN	Texas Marine Mammal Stranding Network
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	U. S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

This Environmental Assessment (EA) is being prepared to evaluate the effects associated with this proposed action and complies with the National Environmental Policy Act (NEPA) in accordance with Department of the Interior (43 CFR 46; 516 DM 8) and U.S. Fish and Wildlife Service (550 FW 3) regulations and policies. NEPA requires examination of the effects of proposed actions on the natural and human environment[1].

2.0 PROPOSED ACTION

Consistent with the United States Fish and Wildlife Service's (USFWS) Texas Chenier Plain Refuge Complex (Refuge Complex) *Final Environmental Impact Statement, Comprehensive Conservation Plan and Land Protection Plan* (USFWS 2008), USFWS is proposing to improve reservoir management and marsh conditions within Big Reservoir and the Star Lake Unit of McFaddin National Wildlife Refuge (MNWR) (**Figure 1**) by restoring freshwater flow into Star Lake with a siphon. A set of inverted siphons will be installed under the GIWW from Big Reservoir on the north side of the GIWW into the MNWR on the south side of the GIWW. A water conveyance ditch would be constructed within the refuge on the south side of the GIWW to connect the siphon outlet to the Star Lake Unit of MNWR and facilitate water inflow and outflow. Water will be diverted east from the Star Lake Unit via an existing water control structure on 5-mile cut and on into Clam Lake which feeds into the rest of the Salt Bayou watershed or can be diverted west across the Star Lake Unit near the western end of the watershed.

This project will result in significant flows of freshwater being reintroduced into the Salt Bayou watershed at its upper end and flowing its way through the watershed, mimicking historic flows and restoring historic salinity gradients. The redirection of water with this project will improve reservoir management on the north side of the GIWW to meet migrating waterfowl needs, as well as significantly improve marsh conditions on the south side of the GIWW in the refuge which have deteriorated through time as a result of saltwater intrusion exacerbated by dissection of the landscape with the creation of the GIWW.

The proposed siphon project will assist in the hydrologic restoration of approximately 3,182 acres of estuarine wetlands.

3.0 PROJECT AREA

The footprint of the Star Lake GIWW Siphon Project is located within the MNWR on both the north and south sides of the GIWW, and traverses under the GIWW via directional boring. The

[1] Executive Order 14154, Unleashing American Energy (Jan. 20, 2025), and a Presidential Memorandum, Ending Illegal Discrimination and Restoring Merit-Based Opportunity (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq. Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023). Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. The USFWS verifies that it has complied with the requirements of NEPA, including the Department's regulations and procedures implementing NEPA at 43 C.F.R. Part 46 and Part 516 of the Departmental Manual, consistent with the President's January 2025 Order and Memorandum.

project location is approximately 1 mile east of Spindletop Gully on the GIWW, near Star Lake and Big Reservoir. **Figures 1 and 2** depict the project location and footprint. The project includes construction or work activities on federal lands and waters.

4.0 BACKGROUND

MNWR is a 67,472-acre coastal refuge located approximately 11.5-miles west of Sabine Pass, Texas. The refuge is divided by the GIWW in the middle, with the southern portion bordered by the Gulf of America (GOA), formerly known in the United States as the Gulf of Mexico, and the northern portion bordered by private lands north of the GIWW.

MNWR is part of the Texas Chenier Plain Refuge Complex (Refuge Complex). The Refuge Complex contributes to the conservation of wildlife and their habitats in the Texas Gulf Coast Ecosystem. The individual NWRs in the Refuge Complex encompass a diversity of ecosystems: aquatic habitats (open water and near shore Gulf habitats), freshwater to saline marshes, riparian habitats, coastal woodlots, rice fields, native prairies, cheniers and coastal beach and dune habitats. These areas host a multitude of plant, invertebrate and vertebrate species including over 300 bird species, 75 species of freshwater fish, and 400 species of salt and brackish water fish and shellfish. In addition, the Refuge Complex protects quality habitats for migrating, wintering, and breeding waterfowl; shorebirds; and waterbirds. It also provides strategic and crucial resting areas for neotropical migratory songbirds migrating across the GOA.

Natural processes such as tidal ingress and egress, wave action, storms, and hurricanes have resulted in erosion and land loss along shorelines and within interior marshes in the MNWR and larger Refuge Complex. Erosion is a natural process, however, a severe sediment deficit in the Gulf's littoral system resulting from altered hydrologic regimes (i.e. construction of navigation channels, jetties, and upstream dams on rivers) has greatly accelerated rates of shoreline retreat. Rising sea levels and land subsidence are also causative factors in the accelerated loss of coastal habitats, as is wave action produced by shipping traffic in the GIWW, which poses a major threat to wetland and upland habitats on refuges within the complex.

Shoreline erosion along major and minor waterways within the refuge is resulting in the loss of salty prairie habitat and threatens interior marshes with saltwater intrusion. This occurs via the widening and new development of side channels and streams that lead to interior marshes. Increased saltwater intrusion negatively impacts plant productivity and diversity in MNWR marshes.

This project will result in significant flows of freshwater being reintroduced into the Salt Bayou watershed at its upper end and flowing its way through the watershed, mimicking historic flows and restoring historic salinity gradients.

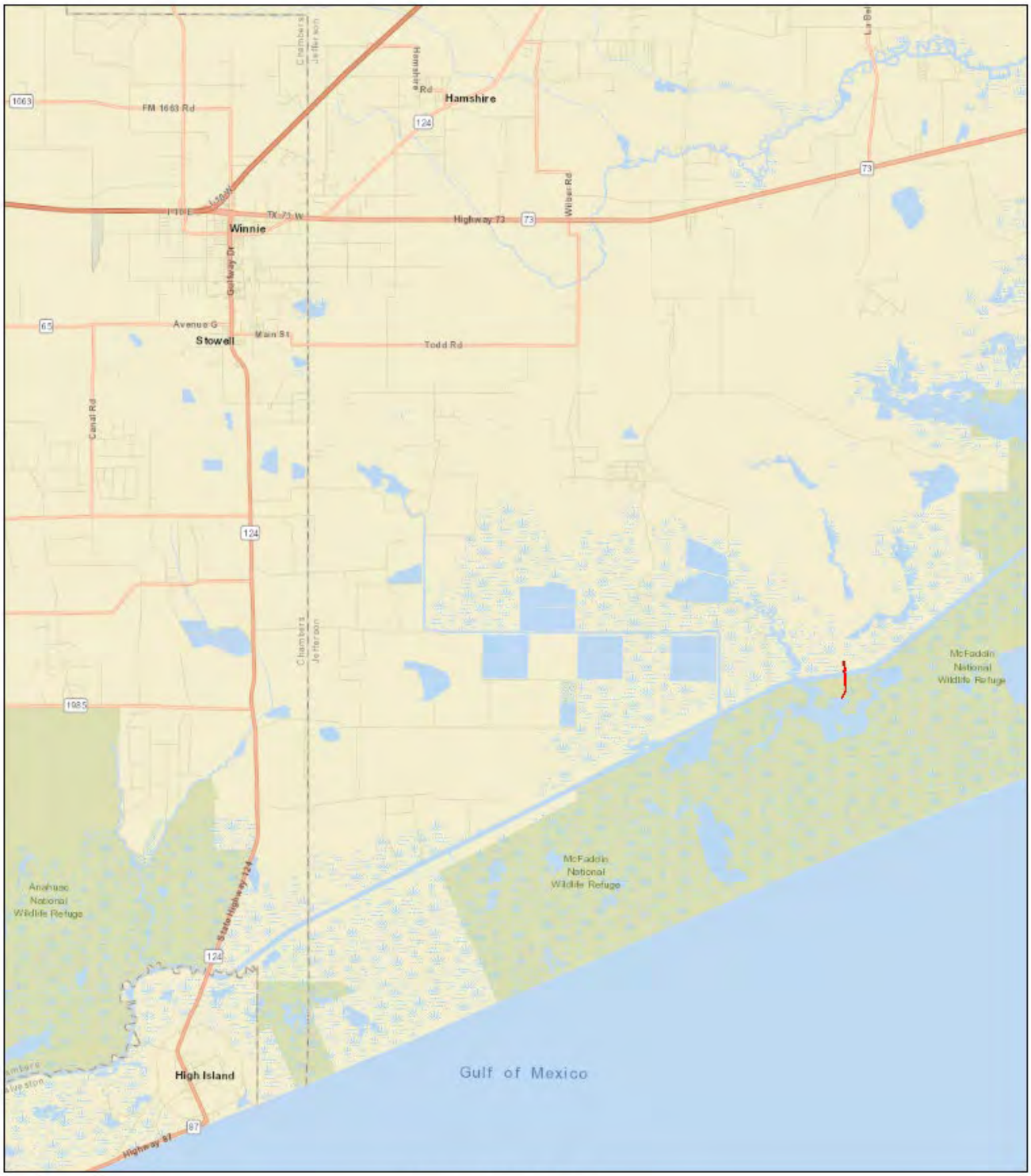

Figure 1: Vicinity Map
Star Lake GIWW Siphon Project
Ducks Unlimited - McFaddin National Wildlife Refuge

Jefferson County, Texas

Map Base: ESRI World Streetmap
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: April 4, 2025

Legend

Project Area

N

1:168,000

0 0.5 1 2 Miles

Figure 2: Project Location
Star Lake GIWW Siphon Project
Ducks Unlimited - McFaddin National Wildlife Refuge

Jefferson County, Texas

Map Base: 2022 NAIP Aerial Imagery from TNRIS
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: April 4, 2025

Legend

Project Location

N

1:6,000

DISCO

0 125 250 500 Feet

5.0 REGULATORY COMPLIANCE

National Wildlife Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The primary authority in establishing MNWR (May 1, 1980) was the Migratory Bird Conservation Act (MBCA) of 1929 (16 U.S.C. 715d), "…for use as an inviolate sanctuary, and for any other management purposes, for migratory birds." The refuge is administered by the USFWS as units of the National Wildlife Refuge System. Lands or certain interests in lands added to the MNWR since its original establishment were also acquired under the authority of the MBCA, with the same establishment purpose. Lands have been added to the NWR under three additional authorities, with the following purposes:

> "… the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions…" 16 U.S.C. 3901(b), 100 Sta. 3583 (Emergency Wetlands Resources Act);
>
> "…suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species…" 16 U.S.C. 460K-1 (Refuge Recreation Act); and,
>
> "…for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon,…" 16 U.S.C. 661-667e (Fish and Wildlife Coordination Act).

The mission of the NWRS, as outlined by the National Wildlife Refuge System Administration Act (NWRSAA), as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is:

"... to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

The proposed Star Lake Siphon Project would achieve this mission by providing adequate water management within Big Reservoir, allowing for the reintroduction of freshwater into the Star Lake Unit of the MNWR and larger Salt Bayou watershed, and improving marsh conditions in areas of the MNWR that have degraded over time due to saltwater intrusion.

6.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the Star Lake Siphon Project is to improve reservoir management and restore freshwater flows into the Star Lake Unit of the MNWR and larger Salt Bayou watershed, thereby restoring and enhancing coastal wetlands. The project site is comprised of a mix of uplands, freshwater emergent wetlands, and open water that provide habitat for a variety of coastal plants and animals. The site also serves as a nursery ground for various species of fish and aquatic invertebrates.

The bisecting of the refuge and habitat by the GIWW in the 1940s blocked the natural flow of water from the north to the south within the hydrological system. As such, inputs into the marshes and the Salt Bayou watershed south of the GIWW have been primarily driven by rainfall, with little input of freshwater from elsewhere in the system. Saltwater intrusion into the ecosystem occurs through inputs in the marsh that connect via the GIWW as well through overwash during extreme storm events.

The need for the proposed action is to improve reservoir management on the north side of the GIWW in Big Reservoir and improve freshwater flow south of the GIWW, which would enhance marsh plant communities and provide critical habitat improvements for wetland-dependent fauna by restoring degraded freshwater emergent marshes. This would help meet USFWS's priorities and mandates as outlined by the NWRSAA 16 U.S.C. 6688dd(a)(4) as follows:

- Provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRS;
- Ensure that the biological integrity, diversity, and environmental health of the NWRS are maintained for the benefit of present and future generations of Americans; and
- Ensure that the mission of the NWRS described at 16 U.S.C. 668dd(a)(2) and the purposes of each refuge are carried out.

Without the Star Lake GIWW Siphon Project, saltwater intrusion within the Salt Bayou watershed would continue to raise the salinity within the system, altering the composition of the ecosystem from plant species to reducing the diversity of freshwater dependent fauna, potentially losing those native species completely within the system.

7.0 ALTERNATIVES CONSIDERED

7.1 Alternative A (Proposed Action) – Construct the Star Lake GIWW Siphon Project:

Alternative A is the Proposed Action and consists of restoring freshwater flows from the north side of the GIWW to the south side of the GIWW into the 60,000-acre Salt Bayou watershed in southern Jefferson County. Under this alternative, a set of inverted siphons will be installed below the GIWW from Big Reservoir on the north side of the GIWW to the MNWR on the south side of the GIWW. The siphon system will consist of four 36" diameter high density polyethylene pipes, approximately 850 linear feet in length, to be bored under the GIWW at a safe depth, well below the mud line. Inflow and outflow require the construction of an added water conveyance

ditch within the refuge on the south side of the GIWW. This ditch will be approximately 2,600-feet-long and will connect the siphon outlet to the Star Lake Unit of MNWR. From this Unit, water will be diverted east into the project area via an existing water control structure on 5-mile cut and on into Clam Lake which feeds into the rest of the Salt Bayou watershed or can be diverted west across the Star Lake Unit near the western end of the watershed.

Inverted gravity flow siphons will work by taking advantage of water level differences between the north and south side of the GIWW. Water levels on the north side are 12-18 inches above water levels south of the GIWW. This will create a sufficient amount of head pressure to carry water and operate the siphons sufficiently. The flow capacities for each siphon system are calculated to be 30 cfs with a freshwater head of +0.5' and 100 cfs with a freshwater head of +3.0'.

Temporary staging areas alongside the project will be required for material and equipment storage. The north side laydown area will allow the contractor to fuse the HDPE pipes together before directionally drilling them under the GIWW. To construct the outfall ditch, temporary timber mats will be placed alongside the western portion of the project area footprint to allow easy movement of construction equipment and to avoid a nearby pipeline.

Project features are depicted in the construction drawings in **Appendix A.**

Table 1 shows the total material quantities and impact areas for Star Lake Siphon Project.

Table 1. Star Lake Siphon Project Quantities and Impact Areas

	Cubic Yards (Excavation and Embankment)	**Permanent Impacts (Acres)**	**Temporary Impacts (Acres)**
PEM Wetlands	10,012	3.788	2.85
Open Water	2,510	0.101	0.011
Entire Project	10,522	3.889	2.861

Table 2 reflects the surface ownership information for the project area and adjacent tracts.
Figure 3 reflects the surface ownership in relation to the project area.

Table 2. MNWR Star Lake GIWW Siphon Project Legal Description

Prop ID	**GEO ID**	**Owner Name**	**Legal Description**	**Address**
406984	300285-000-005000-00000	United States of America	TR 6 AB 285 T&NO 76.159AC	USFWS SRV DIV Of Realty PO Box 1306 ABQ, NM 87103-1306
139915	300336-000-001000-00000	United States of America	ABS 336 282 521 899 TR 1 & ABS 283 529 TR 2 T&TNO 502.079 AC H/F	USFWS SRV DIV Of Realty

				PO Box 1306 ABQ, NM 87103-1306
139773	300285-000-003000-00000	US Fish and Wildlife	TR 4 285 T&NO 40 Lot 4	PO Box 1306 ABQ, NM 87103-1306
141369	300560-000-002000-00000	US Fish and Wildlife	TRS 2 & 5 560 W J Bryan 861.01 Lot 2 5	PO Box 1306 ABQ, NM 87103-1306
143170	300900-000-001000-00000	US Fish and Wildlife	TR 1 900 W PH McFaddin 663 LOT 1	PO Box 1306 ABQ, NM 87103-1306
141365	300560-000-000500-00000	Chevron Environmental Mgmt Co	AB 285 T&NO TR 5 14.430 AB 528 LB Pipkin TR 2.140 560 W J Bryan TR 1 276.256	Port Arthur, Tx 77640
141040	300529-000-002000-00000	US Fish and Wildlife	TR 3 529 T&NO 319.20 Sabine Pass	PO Box 1306 ABQ, NM 87103-1306
139772	300285-000-002000-00000	The Conservation Fund	TR 2 AB 285 TNO 30.756 AC	1655 N. Fort Myer Dr. Ste 1300 Arlington, VA 22209-3199
141039	300529-000-001000-00000	United States of America	TR 1 AB 529 T&NO TR 7 AB 285 T&NO TR 4 AB 523 T&NO TR 4 AB 283 T&NO 415.505 AC	Port Arthur, TX 77640
139771	300285-000-001000-00000	Pipkin Ranch Holdings LP	TR 1 285 T&NO 281.030	23347 Big hill Rd Beaumont, TX 77705

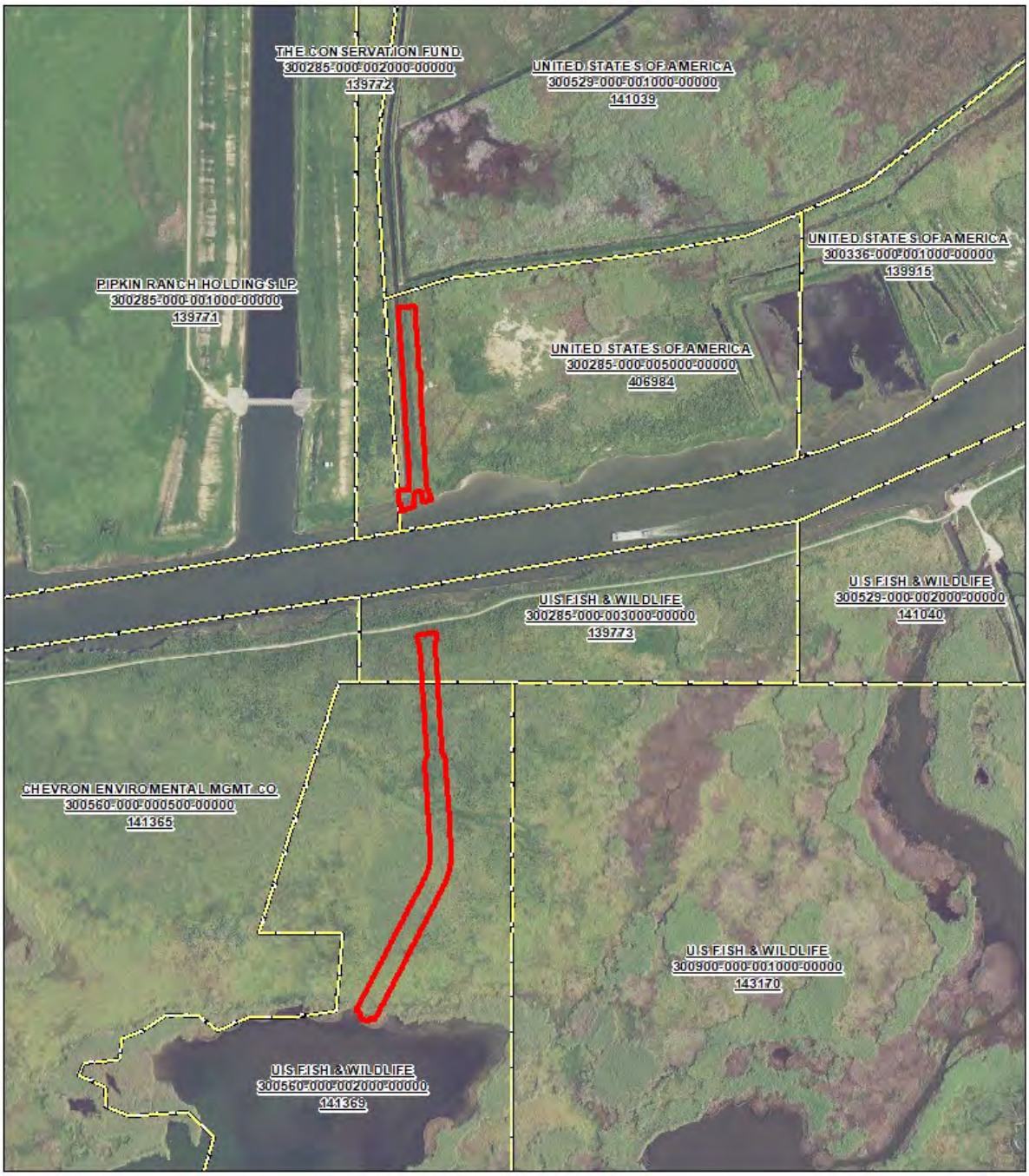

Figure 3: Surface Ownership Map
Star Lake GIWW Siphon Project
Ducks Unlimited - McFaddin National Wildlife Refuge

Jefferson County, Texas

Legend

Project Location

Surface Ownership Parcels (TNRIS)

Map Base: 2022 NAIP Aerial Imagery from TNRIS
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: April 4, 2025

1:6,000

0 250 500 Feet

7.1.2 Project Timing

Project timing will be dependent on regulatory permit timeframes associated with obtaining all necessary authorizations, as well as contractor availability. The duration of construction will likely be 12 months. For the purpose of assessing potential effects to listed species in this EA, year-round project operations are assumed.

Conservation measures will be incorporated into operations for the protection of sensitive species/resources.

7.2 Alternative B – No Action Alternative:

Under the No Action Alternative, the Star Lake GIWW Siphon Project would not be constructed. Freshwater flow from Big Reservoir south to the Salt Bayou watershed would not be restored and habitat quality of freshwater emergent marshes in the area south of the GIWW would continue to degrade over time. Freshwater marshes within the Salt Bayou Unit and larger Salt Bayou watershed would continue to be converted to brackish or saltwater ecosystems over time, and/or eventually be lost to open water. Conversion and/or loss of habitat within the MNWR could impact many species of fauna, including but not limited to the federally endangered eastern black rail.

8.0 AFFECTED ENVIRONMENT AND CONSEQUENCES OF THE ACTION

This section is organized by affected resource categories and for each affected resource discusses both (1) the existing environmental baseline in the action area for each resource, and (2) the reasonably foreseeable effects (direct and indirect) and impacts of the proposed action and any alternatives on each resource. The effects and impacts of the proposed action considered here are changes to the human environment, whether adverse or beneficial, that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives and may include effects that are later in time or farther removed from the proposed action. This EA includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an "affected resource." Any resources that will not be more than negligibly impacted by the action have been dismissed from further analyses.

8.1 General Project Environment

MNWR is one of 567 refuges comprising the National Wildlife Refuge System, which is a national network of lands and waters set aside to protect iconic species and provide recreational opportunities. Established in 1980, MNWR is a 58,861-acre refuge in Jefferson County, Texas. Along with its sister refuges in the Texas Chenier Plain Refuge Complex, it is dominated by fresh and intermediate tidal marshes as well as salt and brackish low tidal marshes. In addition, other habitats such as fresh and intermediate tidal shrub wetlands; hardwood fringe forests; live oak fringe forests; salt and brackish high tidal coastal marshes; deep sand grasslands; coastal prairie

pond shores; salty prairies; and disturbed areas such as Chinese tallow forests and salt cedar shrublands are also present within the refuge. The MNWR provides important foraging, nesting, and refuge habitat for migrating and wintering populations of waterfowl, in addition to providing primary habitat for thousands of other bird, fish, mammal, reptile, amphibian, and invertebrate species.

This refuge entrance is located along SH 87 in the southeast Texas, near the Louisiana border. It lies approximately 11.5 miles west-southwest of the town of Sabine Pass, 17 miles southwest of Port Arthur, and 90 miles east of Houston. The refuge is bounded on the south by the GOA, on the east by private property and Sea Rim State Park, on the north and west by private property. It is within a bio-geographical region known as the Chenier Plain, which extends from Vermillion Bay in southwestern Louisiana to East Galveston Bay in southeastern Texas (Gosselink et al., 1979b). The highly biodiverse Chenier Plain ecosystem was created over 5,000 years of sedimentation from the Mississippi River and other riverine systems in this region. It's comprised of a mixture of open water, wetlands and uplands with approximately six separate drainage basins. Upland ridges in this region typically parallel the shoreline and are comprised of barrier islands or spits, river mouth accretion ridges, or recessional beach ridges. Each are subject to erosion and subsidence from various inputs (Gosselink et al., 1979a).

The proposed action is located more centrally within the refuge, adjacent to the GIWW and Star Lake (**Figure 1**). Habitat within this area can be described as Chenier Plain: Fresh and Intermediate Tidal Marsh; Chenier Plain: Salt and Brackish Low Tidal Marsh; Gulf Coast: Salty Prairie; and Open Water (Elliot et al. 2014).

For more information regarding the affected environment, please see Chapter 3: Affected Environment in Volume 1 of the Texas Chenier Plain Refuge Complex *Final Environmental Impact Statement Comprehensive Conservation Plan and Land Protection Plan*. (USFWS 2008).

8.2 Factors Considered in Assessment of Other Reasonably Foreseeable Effects on Resources

Refuge operations/management and recreational use, development, changes in hydrology, natural processes, and past and planned coastal restoration and enhancement projects, are all factors that were considered in the assessment of other reasonably foreseeable impacts under each resource.

Refuge Operations/Management and Recreational Use

Refuge management of the MNWR (in accordance with the mission and goals of the NWRS, the purposes of the MNWR, Service policy, and laws) offers protection to refuge resources (infrastructure, species, and habitats) that may otherwise not be afforded. Hunting, fishing, wildlife viewing, and other recreational uses are permitted in MNWR**.** However, these uses must be accomplished in accordance with Refuge and state regulations and guidelines designed for management/protection of each applicable resource. For purposes of analysis, Refuge management/operations are considered to have a beneficial contribution to other reasonably foreseeable effects on any given resource.

Development
Oil and gas projects including seismic exploration and well pad, pipeline, and infrastructure development projects have occurred in the past and will likely occur in the future within the MNWR and/or the Texas Chenier Plain NWR Complex. Development of this nature can impact refuge habitats/resources by displacing species and resulting in temporary or permanent impacts to resources such as vegetation, soils, and water resources. USFWS evaluates proposed development through the NEPA process and conditions all authorizations with measures designed for protection of Refuge resources to minimize the likelihood of adverse direct, indirect, or other reasonably foreseeable effects.

Changes in Hydrology
Alterations to hydrology in the region have been on-going for over 125 years or more. The Texas portion of the GIWW is approximately 423 miles long from Brownsville to the Louisiana border and is part of the overall 1,300-mile dredged channel that eventually terminates at St. Marks, FL. The discovery of the Spindletop oilfield near Beaumont spurred the development of the GIWW, which had begun in spurts for the last century (Leatherwood, 2024). By 1905 Congress authorized monies to expand the GIWW with the canal extending from New Orleans to Brownsville by 1949. It receives inflow from various rivers, creeks, bays, and other waterways that terminate at or intersect the GIWW. The major function of the GIWW is to provide access for the transportation of goods along to other waterways including the GOA and Mississippi Rivers, reaching inland domestic regions as well as foreign ports (Leatherwood, 2024). Nearby, improvements to the Sabine and Neches Rivers began in 1873 with other projects continuing through the end of that century. In 1896 the mouth of the Sabine River was deepened, and jetties were constructed to prevent the silting in of the channel, which was being used for industrial purposes. As with the GIWW, the Spindletop oil discovery prompted the need for more deep-water navigation and by 1972 the Sabine-Neches Waterway was 40 feet deep and 440 feet wide (Wooster, 1995). The Sabine-Neches shipping district is the second largest in the state, behind the Galveston-Houston shipping district.

Within MNWR, several levees, canals, and weirs have been built for various reasons by both the landowners prior to refuge ownership, and during historic and current refuge management activities. Some of these were built for ease of access into interior marsh locations, such as the White, Perkins, and O-Ditch levees, and others are used for water management activities to control water flow between fresh and saltwater habitats, as is with the weirs.

Natural Processes
Natural processes such as tidal ingress and egress, wave action, storms, and hurricanes have resulted in erosion and land loss along the GOA shoreline, posing a major threat to wetland and upland habitats within the Refuge Complex. Shoreline erosion is a natural process; however, a severe sediment deficit in the Gulf's littoral system resulting from altered hydrologic regimes (i.e. construction of navigation channels, jetties and upstream dams on rivers) has greatly accelerated rates of shoreline retreat. Rising sea levels and land subsidence are also causative factors in the accelerated loss of coastal habitats.

Shoreline erosion along the GOA is resulting in loss of salty prairie habitat and threatens interior marshes with saltwater intrusion. Increased saltwater intrusion negatively impacts plant

productivity and diversity in interior marshes. When plants die, the root systems that help to hold sediment are lost, and sediment is washed away.

Several hurricanes have impacted the Texas coast and MNWR in the recent past, including Hurricane Rita in 2005, Hurricane Humberto in 2007, Hurricane Ike in 2008, Hurricane Harvey in 2017, Hurricane Laura in 2020, and most recently Hurricane Beryl in July of 2024. These hurricanes resulted in devastating impacts to refuge infrastructure and introduced large volumes of saltwater into interior fresh and intermediate marsh areas.

The area was also impacted by winds and storm generated waves from Tropical Storms Edouard (August 3, 2008), Lee (September 2, 2011), Cindy (June 22, 2017), Beta (September 2020), and Delta (October 9, 2020).

Effects of the hurricanes and other storm events resulted in impacts to, conversion of, and loss of shoreline and wetland habitats. Future hurricane and storm events are expected to continue to impact the project area over time.

Past and Planned Coastal Restoration and Enhancement Projects

Construction of the Star Lake GIWW Siphon Project is just one of several projects designed to protect the resources and assets important to the management of the MNWR and larger Texas Chenier Plain NWR Complex. The USFWS, in conjunction with GLO, recently completed a beach renourishment project along approximately 19 miles of MNWR's beach shoreline and another beach nourishment project is planned along Texas Point NWR's (TPNWR) shoreline in the near future. In addition, the USFWS has recently undertaken several actions that will aid in the management and conservation of Refuge resources using funds appropriated for Hurricane Harvey Recovery under Bipartisan Budget Act of 2018 (Public Law 115-123). These actions include repair of interior levees and water control structures within the complex that were damaged due to Hurricane Harvey. The Cattlewalk Levee, Lone Tree Levee, Frozen Point Levee, East Bay Bayou Levee, and associated water control structures were repaired/replaced within Jocelyn Nungaray NWR (JNNWR); the Perkins Levee, White's Levee, and O-Ditch Levee, and their associated water control structures were repaired within MNWR; and the Texas Point Cattlewalk Levee as well as four rock weirs were repaired within TPNWR. The USFWS also constructed breakwaters in the GIWW along the shoreline of MNWR and in East Bay along the shoreline of JNNWR utilizing the afore-mentioned funding to slow and/or prevent erosion. USFWS plans to construct similar breakwaters in the GIWW along the JNNWR shoreline in the near future.

A levee system on the East Bay Bayou Unit of JNNWR was recently repaired to facilitate more effective marsh management (funded through a Refuge Deferred Maintenance appropriation), and the USFWS is planning to restore and/or enhance a total of 540.11 acres of deteriorated marsh habitat within the Roberts Mueller Unit of the JNNWR through beneficial use of dredged material. Funding for the engineering design and environmental compliance coordination for this project was provided through the Deep Water Horizon (DWH) Oil Spill Natural Resource Damage Assessment, Texas Trustee Implementation Group (TIG), Final 2017 Texas Restoration Plan/Environmental Assessment: Restoration of Wetlands, Coastal, and Nearshore Habitats; and Oysters (TX TIG RP/EA) (TX TIG 2017). Funding for implementation of this project will be

provided in support of a partnership between the USFWS and Ducks Unlimited (DU) through the Additional Supplemental Appropriations for Disaster Relief Act, 2019 (PL 116-20), which provided funds to restore and rebuild National Wildlife Refuges and increase resiliency and capacity of coastal habitat and infrastructure to withstand storms and reduce the amount of damage caused by such storms. These specific projects have been approved by DOI under the Service's Recovery Plan.

In addition, breakwaters will be constructed along the Moody NWR shoreline for protection (funding through NOAA's Damage Assessment, Remediation, and Restoration Program).

8.3 Air Quality

8.3.1 Description of Affected Environment

The Clean Air Act (CAA), as amended (42 U.S.C. 7401 et seq.), requires Federal actions to conform to an approved state implementation plan (SIP) designed to achieve or maintain an attainment designation for air pollutants as defined by the National Ambient Air Quality Standard (NAAQS). The NAAQS were designed to protect public health and welfare. The criteria pollutants include carbon monoxide (CO), ozone (O3), nitrogen dioxide (NO2), sulfur dioxide (SO2), particulate matter (PM2.5 and PM10; particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 and 10 microns), and lead (Pb). Volatile organic compounds (VOCs) are also regulated due to their role in ozone formation.

The U.S. Environmental Protection Agency (40 CFR § 81.310) designates air quality compliance on a county level. The Texas Commission on Environmental Quality (TCEQ) is the state agency responsible for regulating air quality in Texas. MNWR is within Beaumont-Port Arthur (BPA) area, which includes Hardin, Jefferson, and Orange counties. Local industry, including petroleum and chemical production, shipping, and agriculture are major sources of air pollution in the region. The BPA area is designated as Attainment/Unclassifiable for National Ambient Air Quality Standards (NAAQS) criteria pollutants that are tracked by TCEQ, with continuous efforts to reduce emissions from industrial sources (TCEQ, 2024a).

Additionally, TCEQ administers the Outdoor Burning Rule (Title 30, Texas Administrative Code, Sections 111.201 – 111.221), which regulates prescribed burning within the state. TCEQ is responsible for issuing authorizations to conduct prescribed burns, defining the conditions when burning will be permitted, and determining what materials may be burned. Prescribed burning is used frequently for land management activities within the Texas Chenier Plain NWR Complex and in the region to improve pasture and control undesirable vegetation. While prescribed burning is essential for land management, it is carefully regulated to minimize emissions of particulate matter and CO, with burn plans reviewed by TCEQ to ensure compliance with air quality standards.

8.3.2 Direct and Indirect Impacts on Air Quality

Alternative A
The Proposed Action may result in some minimal, short-term, negative impacts to air quality as a result of the use of heavy equipment and support vehicles to construct the Star Lake GIWW Siphon Project. While carbon monoxide and particulate emissions at the project site during construction may be considered undesirable, they would be short-term, minimal, and localized. These emissions primarily originate from the burning of fossil fuels by construction equipment and will subside upon cessation of operation of heavy equipment, as will any project related dust. No air quality permits are required for this project.

Construction of the project would result in protection of the interior freshwater marsh ecosystems within MNWR, which serve as carbon reservoirs through sequestration of carbon in the marsh grass root zone. By increasing the health and functions of the wetlands within MNWR, the net volume of carbon sequestration that would occur naturally within the wetlands is expected to far offset the temporary impacts to air quality produced during construction of the project.

Alternative B
Under the No Action Alternative, the project would not be constructed, so there would be no direct impacts to air quality. However, the continued broken connection of the hydrologic regime in the system would allow increased saltwater intrusion from the GIWW into the Salt Bayou ecosystem, which, over time, could lead to death of the freshwater marsh plants, potentially fragmenting the marsh and allowing open water conversion and habitat loss to occur. This would diminish the functions and values of the wetlands and contribute to the loss of the total volume of natural carbon sequestration that occurs throughout the Refuge Complex.

8.3.3 Other Reasonably Foreseeable Impacts on Air Quality

Other past and reasonably foreseeable impacts on air quality within the vicinity of the project area have occurred and will continue to occur because of emissions associated with refuge management/operations, coastal restoration projects, public use, development, and industrial activities in the region. Emissions of criteria pollutants, greenhouse gases, and other hazardous air pollutants resulting from these sources contribute to regional emissions and collectively have the potential to negatively affect air quality. However, the other reasonably foreseeable effects of these actions are mitigated by regulatory controls and the natural sequestration provided by preserved, enhanced, and/or restored wetlands.

Creation of the Star Lake GIWW Siphon Project through construction of the Proposed Action, combined with other actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2** above) should result in neutral or beneficial other reasonably foreseeable effects on air quality based on the preservation of wetlands that naturally sequester carbon. The net benefit of this project should outweigh the minimal short-term adverse air quality impacts associated with dust and equipment emissions during construction.

8.4 Geology and Soils

8.4.1 Description of Affected Environment

The geologic formations within the project area is Beaumont Formation, Alluvium, and Fill and Spoil. The Beaumont Formation is a Holocene and Pleistocene epoch formation made mostly of clay, silt and sand and can be found on stream channels, natural levees, backswamps, and relict river channels. Alluvium is a Holocene epoch formation made up of clay, silt, and sand as well as other organic matter. It can be found along streams, where there are low terrace deposits comprised of sand, silt, clay, and gravel. It is frequently found along the backside of barrier island where lagoons and tidal flats are located and is a mix of sand, clay, and decomposed shell material. Fill material is a Holocene epoch formation that consists of material dredged when raising land, above the alluvial layer in an effort to create new land formations. Spoil consists of the dredged material spread along waterways. (USGS 2024).

The USDA NRCS Web Soil Survey Report on the project area showed the soil types to be Franeau clay, 0 to 1 percent slopes, occasionally flooded; Harris clay, 0 to 1 percent slopes, frequently flooded; and Neel clay, 2 to 5 percent slopes, occasionally flooded, tidal. All three soil types are not considered prime farmland. Franeau and Harris clays are found in poorly drained, flat topographic regions, and slightly saline to strongly saline environments. Neel clays can be found on mounded topographic regions in slightly saline to strongly saline environments. (NRCS 2023).

8.4.2 Direct and Indirect Impacts on Affected Resource on Geology and Soils

Alternative A
The Proposed Action would result in direct disturbance of soils/substrates within the project area.

The use of heavy equipment for construction, installation of the siphon structures, and excavation of wetlands within the footprint of the ditch proposed to facilitate the movement of water flow from the north side of the GIWW to the Star Lake Unit of the MNWR are all actions that will result in sediment disturbance and/or compaction. Most impacts associated with construction will be temporary and localized; however, long-term direct impacts on the physical environment at the project site would result from excavation of wetlands within the footprint of the proposed ditch, which is a critical, permanent feature of the project. Excavation of the ditch would change the topography within the footprint and would result in minor, temporary increases in sedimentation within Star Lake during construction. Sediments would settle once construction is complete, and vegetation is expected to re-establish naturally over time in any areas of the ditch that are not permanently inundated. The roots of the vegetation will hold sediments in place, reducing/preventing runoff into Star Lake.

To minimize adverse impacts to geology and soils, the contractor will employ standard Best Management Practices (BMPs) to reduce erosion and loss of sediments during construction, including but not limited to the use of board mats in temporary work areas.

While the project may have some minor, short-term, adverse effects on substrate/soils based on dredging and/or placement of material in the nearshore and offshore environments, it is expected

to have long-term beneficial effects based on the creation, preservation, and enhancement of beach/shoreline and nearshore habitats.

Alternative B
Under the No Action Alternative, there would be no direct impacts to soils or geology; however, indirect impacts would include redistribution and/or loss of sediments in Star Lake and/or the larger Salt Lake watershed due to continued erosion as a result of natural processes.

8.4.3 Other Reasonably Foreseeable Impacts on Geology and Soils

As mentioned earlier, hydrologic modification combined with natural processes such as tidal ingress and egress, saltwater intrusion, subsidence, rising sea levels, storms, and hurricanes have resulted in erosion and land loss within the Star Lake Unit of the MNWR and larger Salt Bayou watershed and will continue to do so.

Creation of the Star Lake GIWW Siphon Project through construction of the Proposed Action, combined with other actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2** above) should result in beneficial other reasonably foreseeable effects on geology and soils by slowing wetland erosion and conversion.

8.5 Water Resources

8.5.1 Description of Affected Environment

The Star Lake GIWW Siphon Project site is north of and adjacent to Salt Bayou and Star Lake, with several unnamed waterways on private property flowing from the north into the GIWW near the northern portion of the Project Area. The GIWW bisects MNWR in what was once historically a contiguous watershed, creating northern and southern portions of wetland habitat within the refuge. Most of MNWR is subject to frequent tidal and freshwater flooding. Marsh habitats on the refuge include fresh, intermediate, brackish, and saline marshes, with intermediate and brackish marsh being the predominant marsh types (USFWS 2008). Surface water quality in the region and the Refuge Complex is influenced by industrial and agricultural practices as well as saltwater intrusion. The movement of saltwater from the GOA and bays inland through the bayou and marsh systems varies depending upon tidal action, storms, and storm runoff. Construction of the GIWW and channelization of other natural waterways have facilitated the movement of saltwater further inland than what occurred historically, or what would occur under natural conditions. The level and impacts of saltwater intrusion vary by area (USFWS, 2008).

Hydrology within the Project Area and greater region derives its inputs from several sources, rain being a primary method. A rain surplus driving surface water inputs on the Chenier Plain occurs December through April, with deficits in May through July due to evaporation and transpiration. Coastal waters are typically in constant motion with wave driven currents, as well as rainfall inputs and freshwater inflows from rivers mixing with the saline GOA waters. This latter exchange causes high turbidity which results in the muddy waters that are characteristic of this region. Tidal exchanges, as well as wind and its intensity, drive overall water circulation patterns

between the ocean and estuary interfaces. Also, freshwater inflow rates affect salinities. Longshore currents are typically driven to the west along the coast. Southeastern winds also control deposition of sediments and erosion along the shoreline. Winds from winter storm fronts and hurricanes often produce large offshore waves and affect the modification of transport of sediments along the coast. Mudflats can develop due to sedimentary inputs from westward drifts (Gosselink et al., 1979a).

Groundwater is also a source of hydrological influence within the Chenier Plain. The Gulf Coast Geosyncline allows for groundwater recharge into the aquifer, through rain surpluses which feed into the Gulf Coast Aquifer. Downward seepage from wetlands also contributes to groundwater recharges (Gosselink et al., 1979a). The overall Gulf Coast Aquifer is comprised of the Jasper, Evangeline, and Chicot aquifers, with two confining units, the Burkeville and Catahoula. The sand thickness in this region is 700-1300 feet thick. Aquifers are used for various municipal, industrial, and irrigation purposes. The drawing of groundwater has contributed to significant subsidence issues in nearby Harris, Galveston, and Fort Bend counties (George et al. 2011). Groundwater along the coast affects estuaries chemically and ecologically, particularly because groundwater is enriched with more minerals than surface water derived from rainfall. Groundwater has been more difficult to track and is less studied than surface water, but it can drive freshwater flows in coastal areas (Mace et al. 2006).

The nearest water quality segment identified and monitored by the TCEQ is segment 0702, Intracoastal Waterway Tidal, in the Neches-Trinity Coastal Basin. The closest TCEQ Surface Water Quality Monitoring Station (SWQMS) to the project is 18687 (TCEQ 2024b). This GIWW segment is a category 5c impaired waterbody on the Draft 2024 Texas Integrated Report - Texas 303(d) List. It has been listed since 2010 due to dioxin and PCBs in edible tissue (TCEQ 2024c).

Due to the proximity to the GIWW and the tidally influenced waters into the marsh, it is likely the restoration project area, like the GIWW, would fall under a Texas Department of State and Health Services (TDSHS) consumption advisory (ADV-50) for all species of catfish due to PCBs and dioxins in edible tissue. ADV-50 advises that women of childbearing age and children under 12 years of age do not eat any species of catfish and women past childbearing age and men only consume 1 meal per month (TDSHS, 2013).

The GIWW segment is also under TDSHS consumption advisory ADV-46 for gafftopsail catfish due to polychlorinated biphenyls (PCBs). ADV-46 advises adults should limit consumption to three eight-ounce meals per month and pregnant women, and children less than 12 years of age, should have a limit of one four-ounce meal per month (TDSHS 2011). For this reason, Fish Consumption Use is not supported.

8.5.2 Direct and Indirect Impacts on Water Resources

Alternative A

The project would have minor, short-term adverse impacts to water quality from increased turbidity in the surrounding wetlands due to removal of fill and creation of the embankment to create the siphon structures and proposed ditch. Temporary impacts would occur in the workspace within the project area adjacent to the permanent impacts. Fill material will eventually settle into

the embankment areas and turbidity would settle once natural recruitment of plants occurred to stabilize the embankments and ditch. However, long-term benefits would also occur from the restoration of the flow of freshwater between the bisected wetland habitats north and south of the GIWW, providing a linkage within the broader coast and nearshore ecosystem, where water, sediments, energy, and nutrients can move among habitats.

Any adverse project effects on water resources and/or water quality as a result of the Proposed Action are expected to be minimal, short-term, and localized.

Alternative B
There would be no direct effects to water resources and/or quality as a result of the No Action Alternative. Accelerated land loss and wetland fragmentation would continue and result in greater increases in turbidity and sedimentation over time. This could negatively impact water quality in and around the project area due to continued particle suspension in the water column and could allow increased saltwater intrusion into interior marshes.

8.5.3 Other Reasonably Foreseeable Impacts on Water Resources

Other past and reasonably foreseeable impacts on water resources and/or quality within the proposed project area have occurred and will continue to occur because of changes in hydrology, creation of navigation channels, tropical storms, and natural processes, as discussed in **Section 8.2**. Water quality impacts have occurred within the project area in the past, both before and after these lands were acquired for MNWR.

Creation of the Star Lake GIWW Siphon Project through construction of the Proposed Action, combined with other actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2** above) should result in beneficial other reasonably foreseeable effects on water quality by increasing the rate of freshwater into the Star Lake system, in-turn providing the proper salinities needed to maintain the ecosystem that is dependent upon this type of water quality, thereby resulting in higher quality freshwater marsh habitat for the wildlife species that utilize the refuge for foraging, nesting, and refuge.

8.6 Vegetation

8.6.1 Description of Affected Environment

The project area is located within the Gulf Prairies and Marshes ecoregion, which is comprised of slow draining plains along the coast with less than 150 feet of elevation above sea level. Barrier islands dominate along the coastline, with freshwater and saltwater marshes along the estuaries and riverine ecosystems that drain the northern ecoregions into the coastal habitats and later, into the GOA (TPWD, 2024a). The Texas Parks and Wildlife Department's (TPWD) Ecological Mapping Systems of Texas (EMST) was developed to further refine the ecoregions to assist with better management and conservation of the ecological resources of Texas. There are four EMST habitat types defined within the project area: Chenier Plain: Fresh and

Intermediate Tidal Marsh; Chenier Plain: Salt and Brackish Low Tidal Marsh; Gulf Coast: Salty Prairie, and Open Water (Elliott et al, 2014).

The Chenier Plain: Fresh and Intermediate Tidal Marsh can be found within recent alluvial deposits along bay margins and near coastal river outlets where there is sufficient freshwater flowing into the marsh ecosystem. Open water may intersperse some of these marshes. This grass dominated system is comprised of maidencane (*Panicum hemitomon*), seashore paspalum (*Paspalum vaginatum*), marshmillet (*Zizaniopsis miliacea*), marshhay cordgrass (*Spartina patens*), alongside other species such as arrowheads (*Sagittaria spp.*), water primroses (*Ludwigia spp.*) and with low shrubs such as bigleaf sumpweed (*Iva frutescens*) and baccharis (*Baccharis halimifolia*).

The Chenier Plain: Salt and Brackish Low Tidal Marsh is characterized as a regularly flooded tidal marsh system. The dominant vegetated species within this habitat type is typically smooth cordgrass *Spartina alterniflora*). Other species noted within this habitat type include marshhay cordgrass (*Spartina patens*), gulf cordgrass (*Spartina spartinae*), saltgrass (*Distichlis spicata*), saltwort (*Batis martima*), glassworts (*Salicornia spp.*), sea ox-eye daisy (*Borrichia frutescens*), groundseltree (*Baccharis halimifolia*), and various bulrushes (*Schoenoplectus spp.*). This habitat type is found along coastlines and in aquatic habitats where tidal influences result in higher salinities within the water column.

The Gulf Coast: Salty Prairie habitat is typically dominated by gulf cordgrass (*Spartina spartinae*) and can be found within floodplains along mostly level ecosystems. These habitats are found in highly saline areas, where frequent flooding and evaporation leaves salt at the surface of the soils. Where there are other plant species interspersed with the gulf cordgrass, species that may be found include seashore dropseed (*Sporobolus virginicus*).

Open water habitat within the project area as defined by the EMST is unvegetated.

8.6.2 Direct and Indirect Impacts on Vegetation

Alternative A

This project would have direct, permanent impacts to the marsh or upland vegetation that currently exists within the footprint of the siphon structures and downstream ditch as vegetation would be removed, crushed, or killed as a result of building the siphon structure and excavation of the ditch. However, vegetation would naturally recruit over a matter of months to years within and around the footprint of the structure and ditch in areas where no permanent structures exist. Species composition within the project footprint may be different post-project, as natural recruitment of species that thrive in drier conditions would occur on the embankment and depending on the amount of water flowing through the ditch at any given time, aquatic vegetation species may grow within the water column in areas once dominated by wetland vegetation.

In the long term, implementation of the project would preserve vegetation quality within the Star Lake Unit of MNWR and larger Salt Bayou watershed by restoring freshwater flow and slowing deterioration, erosion, conversion, and/or loss of freshwater ecosystems due to salt water intrusion.

Alternative B
There would be no direct impacts to vegetation as a result of the No Action Alternative; however, freshwater ecosystem and associated vegetation would continue to deteriorate, erode, and/or be converted over time to saltwater ecosystems due to lack of freshwater inflow and salt water intrusion.

8.6.3 Other Reasonably Foreseeable Impacts on Vegetation

Vegetated habitats within the MNWR and larger Salt Bayou watershed are being lost as a result of several natural processes, including but not limited to changes in hydrology, sea level rise, subsidence, and natural disasters. Construction of the GIWW cut off freshwater flow from Big Reservoir to the Star Lake Unit of the MNWR. Several hurricanes have impacted the Texas coast and MNWR, resulting in devastating impacts to refuge infrastructure and introducing large volumes of saltwater into interior fresh marsh areas, resulting in impacts, conversion, and/or loss of vegetated wetland habitats. Sea level rise over time will impact coastal and estuarine zones, resulting in loss/conversion of vegetated habitat, as well. By restoring freshwater flows into the system, the Proposed Action enhances resilience against sea-level rise and extreme weather events.

While the Proposed Action will result in the loss of vegetated habitat within the footprint of the siphon structure/features and the ditch, these losses would be offset by the preservation and/or enhancement of vegetated wetland habitat within the MNWR and larger Salt Bayou watershed.

Construction of the Star Lake GIWW Siphon Project through implementation of the Proposed Action, combined with other reasonably foreseeable actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2** above) should result in beneficial effects on vegetation over time.

8.7 Wildlife Resources

8.7.1 Wintering and Resident Waterfowl

MNWR is located within the Central Flyway and is a host for a plethora of over-wintering waterfowl during their annual migratory flights each year. Waterfowl from adjacent flyways (Mississippi, Atlantic, and Pacific) may also find their way to the refuge to overwinter. The 2021 USFWS Central Flyway Mid-Winter Survey results for waterfowl indicated that approximately 7,752,392 waterfowl used the Central Flyway with approximately 3,382,760 (43%) of those individuals wintering in Texas (Dubovsky, 2021).

On the Texas Chenier Plain NWR Complex, monthly aerial surveys have shown that waterfowl use areas closed to hunting at higher rates than those open to hunting. These closed areas are important to migratory waterfowl, and their overall health, size, and habitat quality affects use of these areas by waterfowl. Historic surveys have identified 27 species of waterfowl found on the Refuge Complex (USFWS, 2008). Waterfowl species observed within the Refuge Complex and/or on adjacent properties include but are not limited to black-belled whistling ducks,

(*Dendrocygna autmnalis*), blue-winged teals (*Spatula discors*), green-winged teals (*Anas crecca*), lesser scaups (*Aythya affinis*), northern shovelers (*Spatula clypeata*), and gadwalls (*Mareca strepera*). Goose species that may utilize the refuge and adjacent habitats include snow goose (*Anser caerulescens*), Ross' goose (*A. rossii),* and more rarely cackling goose (*Branta hutchinsii*), and Egyptian goose (*Alopochen aeyptiaca*) (iNaturalist, 2024a).

Mottled ducks are residents in coastal habitats along the Upper Texas Coast, with two distinctive populations in the GOA region, a Florida population and a Western Gulf Coast population, and each population does not intermix. The species uses fresh, intermediate, and brackish marshes within the Refuge Complex as well as agricultural lands adjacent to and within the Refuge Complex. Historic surveys have indicated that most mottled duck populations are focused on the nearby JNNWR and that mottled duck numbers are on the decline overall within the Refuge Complex (USFWS, 2008).

8.7.2 Shorebirds, Wading Birds, Marsh, and Waterbirds

Shorebirds, wading birds, and other marsh water birds use MNWR for feeding, breeding, and rest. Three of the four Highly Imperiled shorebird species (snowy plover, piping plover, long-billed curlew) and 11 of 13 species of High Concern (American golden-plover, Wilson's plover, American oystercatcher, whimbrel, Hudsonian godwit, marbled godwit, ruddy turnstone, red knot, sanderling, buff-breasted sandpiper, and Wilson's phalarope) listed by the 2000 US Shorebird Conservation Plan can be found within the MNWR, Refuge Complex, and/or adjacent lands.

Historically, shorebird counts have been conducted within the Refuge Complex and other areas along the Upper Texas Coast between March 22 and May 17 with peak counts occurring between March 22 and April 12 at these sites. Birds observed during these counts include species such as American avocet (*Recurvirostra americana*), western sandpiper (*Calidris mauri*), pectoral sandpiper (*Calidris melanotos*), semi-palmated sandpiper (*Calidris pusilla*), least sandpiper (*Calidris minutilla),* black-belled plover, snowy plover (*Charadrius alexandrines),* dunlin (*Calidris alpina*), sanderling (*Calidris alba*), and willet (*Catoptrophorus semipalmatus*).

Colonial nesting birds are often found within rookeries within the Refuge Complex. Those wading birds include great egret (*Ardea alba*), snowy egret (*Egretta thula*), cattle egret (*Bubulcus ibis*), green heron *(Butorides virescens*), great blue heron (*Ardea harerodias*), black-crowned night heron (*Nycticorax nycticorax*), yellow-crowned night heron (*Nyctanass violacea*), and roseate spoonbill (*Platalea ajaja*). Ground nesting colonial species found on beaches and washovers, and sometimes on man-made surfaces include least terns and black skimmers. Six North American rail species are also known to occur in marshes and wet prairies on the Refuge Complex, including the federally threatened eastern black rail (*Laterallus jamaicensis jamaicensis*) (USFWS, 2008).

8.7.3 Migratory and Resident Landbirds

The Refuge Complex and MNWR are prime locations for migratory passerines that winter in Central and South America, returning to North America to nest or to pass through on their way to further, northern destinations. The Refuge Complex serves as a first landfall place for these

species to orient themselves, nourish, and rest after the long migration across the GOA. Some of these species include various species of warblers, vireos, tanagers, thrushes, and buntings as well as larger landbirds and raptors such as the red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), turkey vulture (*Cathartes aura*), American kestrel (*Falco sparverius*), white-tailed kite (Elanus leucurus), Mississippi kite (*Ictinia mississippiensis*), northern harrier (*Circus cyaneus*), and short-eared owl (*Asio flammeus*). These species can all be found hunting for prey or using the woodlots for perching purposes during rest. Fringe grassland habitats may provide nesting opportunities for species such as dickcissel (*Spiza americana*) and eastern meadowlarks (*Sturnella magna)* as well as wintering habitat for LeConte's sparrow (*Ammodramus leconteii*) and seaside sparrows (*Ammodramus maritimus*). Current Refuge Complex programs include periodic surveys in marshes, prairies, and woodland habitat on the refuges for these species as well as participating in the annual Audubon Christmas Bird Count (USFWS, 2008).

8.7.4 Mammals

A wide array of common terrestrial mammals reside within the Refuge Complex and within MNWR. Those species include but are not limited to include raccoon (*Procyon lotor*), river otter (*Lutra canadensis*), bobcat (*Lynx rufus*), nine-banded armadillo (*Dasypus novemcinctus*), swamp cottontail rabbit (*Sylvilagus aquaticus*), Virginia opossum (*Didelphis virginiana*), muskrat (*Ondatra zibethicus*), nutria (*Myocaster coypus*), coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), and feral hog (*Sus scrofa*). Marsh habitats are especially important for muskrat populations, and the Refuge Complex is home to some of the highest quality habitat for this species within the region. Marine mammals may use estuarine waterways within marsh habitats. Bottlenose dolphins (*Tursiops truncatus*) are frequently seen in nearshore waters, the GIWW, and occasionally live or dead-stranded animals wash up on refuge beaches (USFWS 2008).

8.7.5 Reptiles, Amphibians, and Invertebrates

Common reptiles within Refuge Complex and region include the American alligator (*Alligator mississippiensis*), pond slider (*Trachemy scripta*), western ribbon snake (*Thamnophis Proximus*), DeKay's brownsnake (*Storeria dekayi*), northern cottonmouth (*Agkistrodon piscivorus*), saltmarsh snake (*Nerodia clarkiiI*), green anole (*Anolis carolinensis*) speckled kingsnake (*Lampropeltis getula*), common snapping turtle (*Chelydra serpentina*), and more rarely along the coast, diamondback terrapin (*Malaclemys terrapin*) (iNaturalist 2024b).

Common amphibians include the American bullfrog (*Rana catesbeianus*), green tree frog (*Hyla* cinerea), Gulf Coast toad (*Bufo valliceps*), southern leopard frog (*Rana sphenocephala*), eastern narrow-mouthed toad (*Gastrophryne carolinensis*), squirrel treefrog (*Hyla squirella*), and less commonly seen are the green frog (*Lithobates clamitans*) and Cajun chorus frog (*Pseudoacris fouquettei*) (iNaturalist 2024c). More elusive and seldom-seen are the lesser siren (*Siren intermedia*) and three-toed amphiuma (*Amphiuma tridactylum*) (USFWS 2008).

A wide-variety of invertebrate species are considered an essential food resource for migratory birds, mammals, and other estuarine dwelling species. Insects that may be seen living or as

transients in the refuge while nectaring/feeding and breeding include species of dragonflies such as blue dashers (*Pachydiplax* longipennis), eastern pondhawks (*Erythemis simplicicollis)*, Rambur's forktail (*Ischnura ramburii*), seaside dragonlet (*Erythrodiplax berenice*), and common green darner (*Anax junius*), as well as butterflies such as the phaon crescent (*Phyciodes phaon*), monarch (*Danaus plexippus*), gulf fritillary (*Dione vanillae*), eastern giant swallowtail (*Papilio cresphontes*), and red admiral (*Vanessa atalanta*) (iNaturalist 2024c). In addition, various species of cicadas, spiders, grasshoppers, mosquitoes, biting flies and chiggers are also present. Various amphipods, midges, mysid shrimp, grass shrimp, crayfish, and numerous crabs are present within marsh habitats in the project area. Some of these invertebrate populations occur in very large quantities as they support the fisheries ecosystem within the wetlands.

Various mollusks such as eastern oysters (*Crassostrea virginica*), Atlantic rangia (*Rangia cuneata*), various Ark species (*Noetia sp., Anadara sp., and Lunarca sp.*) and many other species have been documented within MNWR and the greater Refuge Complex (iNaturalist 2024e). The Atlantic ghost crab (*Ocypode quadrata*) and fiddler crab (*Minuca longisignalis*), Atlantic blue crab (*Callinectes sapidus*), thinstripe hermit crab (*Clibanarius vittatus*) and red swamp crayfish (*Procambarus clarkii*) may be found in beach and marsh locations (iNaturalist 2024d).

8.7.6 Direct and Indirect Impacts on Wildlife Resources

Alternative A

Despite a wide variety of fauna occurring within MNWR, only a small number of resident and transient species are likely to be present within the project area during operations.

Noise from construction and the presence of crews could temporarily displace wildlife into adjacent habitat and/or temporarily alter the normal behavior of certain species. Use of MNWR habitats by migratory birds, including waterfowl, shorebirds, wading birds, and songbirds would likely be temporarily reduced within the immediate vicinity of the project area. In general, habitat exists for wildlife to emigrate from the immediate vicinity of the project area to similar adjacent habitats, which will be unaffected by project operations.

Additionally, wildlife could be injured or killed by the passage of equipment, excavation of the ditch, and/or placement of fill/structures within the project footprint. The likelihood of impacting any mobile species during construction is low based on the slow pace of heavy equipment travel and excavation/fill activities. Mobile species should be able to move out of harm's way. Slow moving microfauna, invertebrates, and nesting species have the highest likelihood of being injured or killed by project activities. While individuals may be impacted by operations, no adverse effects on populations of any species are anticipated.

Direct impacts on any migratory or resident wildlife present within or adjacent to the project area will be minimal, short-term, and localized to the construction zone. Displaced species are expected to return to suitable habitats within the project area upon completion.

The short-term minor adverse effects to wildlife would be offset by the long-term benefits that would be realized through preservation/enhancement of valuable wetland habitats. Restoring freshwater flow to the Star Lake Unit of the MNWR and larger Salt Bayou watershed will slow

erosion of valuable freshwater ecosystems, making them available to migratory and resident birds, mammals, reptiles, and amphibians, and invertebrates foraging and sustaining their reproductive life cycles for years to come.

Alternative B
Under the No Action Alternative, there would be no direct effects to wildlife; however, erosion would continue to occur in the project area, resulting in accelerated conversion and/or loss of wetland habitats suitable for a wide range of bird, mammal, reptile, and invertebrate species within the MNWR and larger Salt Bayou
watershed year after year.

8.7.7 Other Reasonably Foreseeable Impacts on Wildlife Resources

Various species of wildlife have been impacted in the past and will continue to be impacted by hydrologic modification, recreational and commercial uses (including fishing and hunting), and natural processes that result in disturbance, habitat modification, and/or loss of habitat. The Proposed Action and other reasonably foreseeable temporary uses of the project area are expected to result in minor, temporary, adverse effects to wildlife during construction/use, primarily in the form of disturbance/displacement into adjacent suitable habitats, and no long-term adverse effects are anticipated.

The Proposed Action combined with other reasonably foreseeable actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2 above**), would slow erosion and result in the availability of larger quantities of divers, higher quality wildlife habitat over time. This should result in beneficial effects on wildlife resources over the long-term.

8.8 Fisheries Resources

The GOA and its fisheries have historically been vital to the economy, natural heritage, and culture of the states bordering it. Covering more than 5 million acres, the wetlands that comprise the transition zone between land and ocean are vital to a wide array of fish and to sport and commercial fisheries (USEPA 2025).

Estuarine marshes support over 95% of the GOA commercial and recreational fisheries during at least some portion of their lifecycle. These estuarine wetlands serve as nurseries for early and juvenile stages of many fish species and estuarine health is often directly correlated to the health of offshore fisheries. Four commercial fisheries within the GOA, menhaden (*Brevoortia patronus*), shrimp (*Farfantepenaeus aztecus*), oyster (*Crassostrea virginica*), and blue crab (*Callinectes sapidus*), rely heavily on estuaries. Shrimp fisheries in the GOA are considered to be largest and most valuable in the United States, with wetland alterations and water quality affecting the long-term viability of this fishery. Recreationally important fish species present within and adjacent to the MNWR and include red drum (*Sciaenops ocellatus*), black drum (*Pogonias cromis*), southern flounder (*Paralichthys lethostigma*), and spotted sea trout (*Cynoscion nebulosus*).

The quality of estuarine and marine wetlands within MNWR and the larger Refuge Complex make them vitally important to fisheries in estuarine adjacent waterways and the GOA as well as to socioeconomics in the region. As such, fisheries and aquatic resources management is a high priority for MNWR land managers.

Essential Fish Habitat (EFH)

Habitats for fisheries within the Refuge Complex include freshwater, estuarine and marine aquatic habitats. Some fish species can only survive and thrive in certain habitat types including seagrasses, mangroves, rocky shorelines, coral reefs, bays, wetlands, and riverways that connect to ocean resources (NOAA 2024).

According to the Gulf of Mexico Fishery Management Council (GMFMC), EFH encompasses all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities), including the sub-tidal vegetation (seagrasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves). In marine waters, EFH encompasses all marine waters and substrates (mud, sand, shell, rock, hard bottom, and associated biological communities) from the shoreline to the seaward limit of the exclusive economic zone (EEZ). **Table 3** below includes a list of designated EFH by species/management unit that are present in the project action areas according to the Southeast Inland EFH mapper. Not all managed species (or species life stages) depicted in **Table 3** are likely to be present within the proposed action areas.

Table 3: Inland EFH, Species/Management Units Identified in Proposed Action Areas Based on EFH Mapper Results

Species	Life Stage(s)	NOAA Fisheries Management Plan	Management Council
Shrimp			
Farfantepenaeus aztecus Brown shrimp	Postlarvae, juveniles, subadults	Shrimp Fishery	Estuarine/Inland
Farfantepenaeus duorarum Pink shrimp	Juveniles, subadults	Shrimp Fishery	Estuarine/Inland
Litopenaeus setiferus White shrimp	Postlarvae, juveniles, subadults, adults, spawning adults	Shrimp Fishery	Estuarine/Inland
Fishes			
Family Lutjanidae – Snappers			
Lutjanus griseus Gray (mangrove) snapper	Adults	Reef Fish Fishery	Estuarine/Inland
Lutjanus synagris Lane snapper	Larvae, postlarvae, juveniles	Reef Fish Fishery	Estuarine/Inland
Family Sciaenidae – Drums and Croakers			
Sciaenops ocellatus Red drum	Eggs, larvae, postlarvae, early juveniles, late juveniles, adults	Red Drum Fishery	Estuarine/Inland
Family Serranidae – Groupers			

Table 3: Inland EFH, Species/Management Units Identified in Proposed Action Areas Based on EFH Mapper Results			
Species	**Life Stage(s)**	**NOAA Fisheries Management Plan**	**Management Council**
Epinephelus itajara Goliath grouper	Juveniles	Reef Fish Fishery	Estuarine/Inland
Epinephelus morio Red grouper	Early juveniles	Reef Fish Fishery	Estuarine/Inland
Mycteroperca interstitalis Yellowmouth grouper	Juveniles	Reef Fish Fishery	Estuarine/Inland
Family Scombridae - Mackerels			
Scomberomorus maculatus Spanish mackerel	Early juveniles, late juveniles, adults	Coastal Migratory Pelagic Resources	Estuarine/Inland
Family Rachycentridae - Cobias			
Rachycentron canadum Cobia	Eggs, larvae	Coastal Migratory Pelagic Resources	Estuarine/Inland

8.8.1 Direct and Indirect Impacts on Fisheries Resources

Alternative A

DESCO conducted an EFH assessment on behalf of USFWS to describe how the Proposed Action may affect EFH designated by NMFS and the GMFMC within the project area. DESCO's assessment included a description of the Proposed Action; a summary of EFH, associated Fishery Management Plans (FMPs), and associated federally managed species within the Proposed Action area; and an analysis of the direct, indirect, and other reasonably foreseeable effects of the Proposed Action on EFH for managed species.

Based on DESCO's EFH assessment, the USFWS (action agency) determined that the Star Lake Siphon Project will not substantially adversely affect EFH or federally managed fisheries in the project action area, including waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity.

The USFWS initiated EFH consultation with NMFS under the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Magnuson-Stevens Act) via email on April 15, 2024, and concurrence was received from NMFS on April 22, 2024 (**See Appendix C**). Below is a summary of findings of the EFH Assessment.

Project construction would have short-term, adverse effects as well as long-term beneficial effects on EFH and fisheries that are managed by NMFS in the project area. Larger, mobile species would likely avoid the area for the duration of project construction, avoiding injury or mortality. However, less mobile benthic species may be injured or killed as a result of excavation of the linear ditch within the Star Lake Unit of MNWR. Permanent impacts to EFH would include the conversion of approximately 3.889 acres of estuarine wetlands into open water that would flow north to south into Star Lake. The project would also temporarily impact an additional 2.862 acres of EFH during construction. The direct impacts through habitat conversion would, in the long

term, be beneficial to the Star Lake and Salt Bayou watersheds by restoring the flow of freshwater into these regions that have been separated from the northern marshes above the GIWW for decades. In turn, those species that rely on a regulated salinity from freshwater inputs would be able to thrive in optimal conditions.

Effects to non-managed species are expected to be similar to those of managed species, as outlined above and in the EFH assessment.

Alternative B
Direct impacts to EFH would not occur under the No Action Alternative. Over time, indirect, long-term detrimental impacts may occur to fisheries habitats as the salinity continues to rise, slowly changing the current freshwater ecosystems into saltwater marsh ecosystems, which would in turn change the overall makeup and quality of estuarine habitat within the region. The acceleration of freshwater to saltwater marsh conversion would have impacts to the downstream food web as it would impact bird and mammals species that forage on the fisheries, as well as potentially impact commercial and recreational fisheries in the longer term.

8.8.2 Other Reasonably Foreseeable Impacts on Fisheries Resources

Fisheries resources, including EFH and managed species, in the vicinity of the project area have been impacted in the past and will continue to be impacted primarily by commercial and recreational fishing in the region and natural processes that result in habitat modification, and/or loss of EFH. Rapid erosion of valuable estuarine habitat within the MNWR and along the Texas Coast negatively affects species that rely on these habitats for various life stages. Coastal enhancement and restoration projects, such as the Proposed Action and others described in **Section 8.2**, are likely to result in minor, adverse effects on fisheries resources, primarily in the form of temporary increases in turbidity and decreases in dissolved oxygen levels in localized areas of construction; however, these effects would be of short duration and would be offset by the benefits of these types of projects.

Construction of the Star Lake GIWW Siphon Project through implementation of the Proposed Action, combined with other actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2** above) should result in beneficial effects on essential fish habitat by would decrease salinities in interior marshes and help to slow shoreline and wetland erosion/loss, including areas designated as EFH. This should result in beneficial effects on fisheries resources within the MNWR and the region.

8.9 Threatened, Endangered, and Other Special Status Species

In the assessment of threatened and endangered species and other special status species within the proposed Star Lake GIWW Siphon project area, a review was conducted of USFWS, NMFS, and TPWD databases and websites, and other government and state organizations for other scientific data, literature and unpublished reports to determine species profiles, distributions, and habitat requirements. Federal and state agencies were also consulted where necessary. Literature sources reviewed included federal status reports and recovery plans, peer-reviewed journals, unpublished survey data and test findings, and environmental documents.

The following is a list of species protected under the ESA and/or MMPA with potential for occurrence within the project area based on USFWS IPaC (December 18, 2023) information as well as an assessment of the presence/absence of potentially suitable habitat for each species within the project area.

1. Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) – E
2. Hawksbill Sea Turtle (*Eretemochelys imbricata*) – E
3. Leatherback Sea Turtle (*Dermochelys coriacea*) – E
4. Green Sea Turtle (*Chelonia mydas*) - T
5. Loggerhead Sea Turtle (*Caretta caretta*) - T
6. Eastern Black Rail (*Laterallus jamaicensis spp. jamaicensis*) – T
7. Piping Plover (*Charadrius melodus*) – T
8. Rufa Red Knot (*Calidris canutus rufa*) – T
9. Whooping Crane (*Grus americana*) - E
10. West Indian Manatee (*Trichechus manatus*) – T
11. Monarch Butterfly (*Danaus plexippus*) – PT
12. Tricolored Bat (*Perimyotis subflavus*) - PE

8.9.1 Direct and Indirect Impacts on Threatened, Endangered, and Other Special Status Species

Alternative A

DESCO prepared a Biological Evaluation (**Appendix D**) to fulfill USFWS and NMFS requirements as outlined under Section 7(c) of the ESA of 1973, as amended. The BE evaluated potential impacts that the Star Lake GIWW Siphon project may have on federally listed endangered, threatened, or proposed species, and/or designated or proposed critical habitat, and describes the avoidance, minimization, and conservation measures proposed by USFWS and NMFS. The information provided within the BE also serves to comply with statutory requirements to use the best scientific and commercial information available when assessing the risks to listed and proposed species and their designated or proposed critical habitat.

Based on analysis in the BE, the proposed action would have the following effects on species protected under the ESA and/or Marine Mammal Protection Act (MMPA).

Sea Turtles

Three species of sea turtles, the Kemp's ridley, leatherback, and hawksbill are federally listed as endangered, and two species, the loggerhead and green sea turtles, are federally listed as threatened. All five species occur in the nearshore GOA waters and the Kemp's ridley and green sea turtles can be found in East Bay adjacent to JNNWR. The likelihood of presence is greater in the summer months than in the winter months. There is no suitable sea turtle nesting habitat within the Star Lake GIWW Siphon project area, so there is no effect under the consolation role of USFWS consultation.

Similarly, there would be no effect to any of the listed sea turtles under NMFS purview, as operations would not be conducted in waters deep enough to support sea turtle usage. Pipes would

be directionally drilled under the GIWW and chances of sea turtles occurring in portions of the project area within the MNWR are discountable due to the extremely shallow water levels, tidal mud flats, and vegetated freshwater marshes an individual would have to navigate to reach the project area. This alternative would have no effect to any sea turtle species due to lack of suitable habitat.

Piping Plover and Rufa Red Knot

The red knot, listed as threatened under the Endangered Species Act, has the potential to occur within the Texas Chenier Plain NWR Complex during the migration and winter months. While sightings have been recorded within the Complex, information on these sightings is limited entirely to coastal beach areas. While there are records of red knot usage on mudflats in fresher water systems, occurrence within the project area is highly unlikely due to the lack of suitable habitat in the project area.

The piping plover, a federally listed threatened species, occurs along the Texas Gulf Coast in large wintering populations. Piping plovers are normally only observed in small numbers wintering on the beaches and mudflats of the Texas Chenier Plain NWR Complex between October and March.
There is no suitable habitat or designated critical habitat for this species within the project area.

Historically, MNWR conducted some short duration population surveys consisting of two types of surveys, an annual full beach survey and a monthly survey that was done on select preferred habitat areas. The annual survey route was conducted during the middle of the piping plover wintering season on the Texas Gulf Coast (November), at low tide, and ran the entire length of the beach in the proposed area. For a project need on the beach bordering 3 miles of MNWR, bi-monthly surveys were conducted on two main areas, one on the east end of the route and one on the west end of the route. These surveys were conducted from July-April from 2014 to 2016. Results from Dec 2014-April 2016 show an average of nine Piping Plovers on the McFaddin beach per survey. The McFaddin beach birds are approximately 7 miles from this project area. No survey work has been conducted on McFaddin since 2016.

The project area is located approximately 2.8 miles from the Gulf beaches at its nearest point and 150 feet from the Gulf Intracoastal Waterway at its closest point. The nearest designated Critical Habitat is approximately 20 miles to the southeast in Louisiana at Sabine Pass. This alternative would have no effect to either species due to lack of suitable habitat.

Whooping Crane

The whooping crane is designated as endangered under the Endangered Species Act. The species utilizes a variety of habitats to breed, overwinter, migrate, and forage. These habitats include coastal marshes and estuaries, inland marshes, open ponds, shallow bays, salt marshes, sand or tidal flats, rivers, and pastures and agricultural fields.

There are four geographically distinct populations, with the only natural and self-supported population being the Aransas Wood Buffalo Population that migrates between Aransas National

Wildlife Refuge on the Texas Coastal Bend to Wood Buffalo National Park in Alberta, Canada. Three experimental populations were established between 1993-2011, a Central Florida non-migratory population, an Eastern migratory population, and a White Lake, Louisiana non-migratory flock. The current populations of Whooping Cranes in existence today come from the all-time low population of 15 individual Whooping Cranes that were overwintering at Aransas National Wildlife Refuge in 1941.

The nearest critical habitat for the species is located approximately 180 miles southwest of the project site in the vicinity of Aransas National Wildlife Refuge. Whooping cranes have been seen and documented within the upper Texas coast region in recent years. Observations on iNaturalist show the nearest reported sighting to the project area as approximately 10-miles away. Additional clustered sightings have occurred further west between the towns of Anahuac and Winnie from 2017-2023 (iNaturalist 2024e). More recently, several whooping cranes were seen near the project area for approximately four days from approximately March 23-26, 2025. They left the area and have not been seen since (Tim Cooper, Refuge Complex Manager, personal communication, March 26, 2025).

There is no suitable habitat for Whooping Cranes in the project area. Salinities are too high for the species. According to Tim Cooper, Texas Chenier NWR Complex Manager (personal communication, May 30, 2023), whooping cranes in Jefferson and Chambers County are using rice fields further inland. While there is a possibility for whooping cranes to occur as a transient species in adjacent marshes near the project area, the likelihood of occurrence in the project's area of effect is so low that it is discountable. This project would have no effect on the species due to lack of suitable habitat.

Eastern Black Rail

The eastern black rail has been listed as threatened under the Endangered Species Act and is thought to occur within the Texas Chenier Plain NWR Complex year-round. Eastern black rails along the Gulf Coast are known to inhabit freshwater and brackish/saltwater persistent emergent marsh habitats.

There were 8.42 acres of suitable habitat mapped by USFWS within the project area during formal consultation efforts, however the project area was recently burned during a wildfire and is currently being mowed by MNWR every 4-5 months. The USFWS conducted formal consultation with the Clear Lake Ecological Services Office with regard to potential effects of Refuge projects within the Texas Chenier Plain NWR Complex on the Eastern Black Rail. During consultation efforts, habitat that is burned or mowed was deemed unsuitable for Eastern Black Rail for a year post-burn; therefore, Eastern Black Rails would not be present in the project area during construction. Mowing will continue until the project is complete.

Currently, there are no official records of Eastern Black Rails documented within or near the project area. There is some potential for equipment noise issues creating secondary effects to any Eastern Black Rails present in suitable habitat in the adjacent marsh, but the effects of noise are all speculative and not supported in publications for this species or similar cryptic marsh birds.

Black rails have been found near roadways, pumping stations, and other noisy equipment, indicating that they do not abandon areas subjected to industrial noise.

This project is expected to have no effect on this species due to lack of suitable habitat within the project area. Once the Star Lake GIWW Siphon Project is complete and historic freshwater flow and recharge is restored, there will be 60,000 acres within the Star Lake watershed that would be preserved and/or enhanced, offering higher quality potentially suitable Eastern Black Rail habitat within MNWR. Interior marsh areas protected from further open water conversion would provide crucial habitat for many species of native flora and fauna within the refuge, including Eastern Black Rail.

The following conservation measures would also be implemented for protection of Eastern Black Rail:

Explanation of actions to be implemented to reduce adverse effects:

1. Borrow materials necessary for construction will not be taken from Eastern Black Rail habitat and efforts will be made to ensure borrow materials are free of potential invasive species.
2. When equipment is needed, the project area will be marked prior to construction with flagging to assure that no work affects Eastern Black Rail habitat that may be adjacent to the APE.
3. Operators would avoid multiple passes over the same area to the extent practicable to limit damage to existing vegetation.
4. A coordination meeting will be conducted prior to all work adjacent to Eastern Black Rail habitat to assure that employees or contractors work within the established footprint of the project.
5. Marking the project boundary will be conducted in cases where there is a risk of damage to areas outside the APE.
6. Efforts will be made to mitigate noise and vibration in areas adjacent to Eastern Black Rail habitat, especially during the breeding season. These efforts include planning and performing work outside of peak breeding call times (i.e., dawn and dusk) for Eastern Black Rail.
7. Construction crews would be educated on the identification and potential presence of the Eastern Black Rail in the vicinity of the project area and instructed to halt operations if an Eastern Black Rail is observed and consult with USFWS staff on any necessary protective actions prior to proceeding.

West Indian Manatee

There have been several confirmed transient sightings of West Indian manatees along the Texas Coast in the past; therefore, there is potential for individuals to be present in the adjacent GIWW during operations. The Refuge Complex has had no sightings or reports since their establishment within this area, with the exception of the 2016 carcass that likely floated in from some other location. The animal was found in an advanced state of decomposition with >95% of its epidermis sloughed off. Manatee food resources are not present in the project area except in trace amounts, and any vagrant manatee that passes through this area would continue moving elsewhere to find

the required sea grasses or aquatic vegetation. The odds that a manatee will be encountered passing through the area during construction of this project are so remote as to be discountable.

Due to the unlikelihood of a West Indian manatee being sighted within the project area, this project is likely to have no effect on the species under this alternative.

Monarch Butterfly

The monarch butterfly, a proposed species for listing under the ESA, may be a transient species within the project area during its spring and fall migratory path north and individuals and/or their host plants have the potential to be impacted by project activities.

Adult monarchs are mobile and are expected to move out of harm's way during construction and the likelihood of impacts to eggs and/or host plants is low because there are limited milkweed species that can grow in estuarine marsh habitats. Monarchs may obtain nectar from flowering plants in the marsh, such as sea ox-eye daisy, baccharis, or camphor daisy, and these plant species could be impacted by project activities; however, there is an abundance of similar habitat adjacent to the project area that will remain undisturbed during the project construction and be preserved and/or enhanced after project construction.

Due to the minimal, short-term, localized nature of project impacts to potentially suitable habitat of the monarch butterfly in relation to the vast geographic range of the species, impacts are expected to be negligible, and the proposed project would not jeopardize the continued existence of the monarch butterfly.

Tricolored Bat

The tricolored bat is a proposed species for listing under the Endangered Species Act. Named for their unique tricolored fur that fades from dark to light and to dark again, adult tricolored bats are often yellowish to near orange. These bats are insectivorous and are one of the smallest bats in eastern North America. Tricolored bats can be found in the southern extents of four Canadian Provinces, 39 States in the Central and Eastern U.S., as well as Mexico, Guatemala, Honduras, Belize, and Nicaragua. During the spring, summer, and fall months tricolored bats can be found in forested habitats and predominantly roost amidst the leaves of live or recently dead deciduous hardwoods. In the winter months tricolored bats hibernate in caves and mines, however, in the southern U.S. where caves are sparse, they utilize culverts, tree cavities, abandoned water wells, and other man-made structures. Additionally, when winters are less harsh tricolored bats may break hibernation to feed on warm nights. It is common for many tricolored bats to return year after year to the same hibernation site.

The tricolored bat's greatest threat is white-nose syndrome, which is estimated to have caused a 90% decline in affected tricolored bat colonies throughout its range. Tricolored bat populations require a matrix of interconnected habitats that support spring migration, summer maternity colony formation, fall swarming, and winter hibernation. They prefer forested areas, tree corridors, and forest aggregation. This alternative would have no effect on the tricolored bat due to the lack of suitable habitat.

Alternative B
There would be no direct or indirect effects on threatened, endangered, and other special status species as a result of the No Action Alternative. Without implementation of the project, salinity levels in Refuge wetlands would continue to rise and Refuge habitats would continue to erode rapidly over time, reducing the amount of suitable foraging/wintering/nesting habitat available for several protected species, particularly for the eastern black rail, which could have adverse effects over the long term.

8.9.2 Other Reasonably Foreseeable Impacts on Threatened, Endangered, and Other Special Status Species

Threatened, endangered, and special status species have been impacted in the past and will continue to be impacted by development, recreation, and commercial uses (including fishing and hunting), and natural processes that result in disturbance, habitat modification, and/or loss of habitat.

Construction of the Star Lake GIWW Siphon Project through implementation of the Proposed Action, combined with other actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2** above) should result in beneficial effects on threatened, endangered, and other special status species. This project and others will protect, create, and enhance a variety of habitats utilized by several protected species, and Refuge management of the area will help to ensure protection of those species.

8.10 Cultural Resources

DESCO reviewed records maintained by the Texas Archeological Research Laboratory (TARL) and the online Texas Historic Sites Atlas within a 1-mile radius of the project area. Site file research resulted in the finding of no known cultural resources sites, and three previous archaeological projects. No sites were discovered in the project's APE or nearby during the previous undertakings.

Shell middens are the primary cultural resource identified through previous project-specific surveys in MNWR. Typically, shell middens are often hardly noticeable except for those located along eroded shorelines because they are buried under dense vegetation and are typically not identified until a field survey is initiated.

Data concerning previously recorded sites in the project vicinity and examination of USGS Topo Maps and historic aerial imagery (1939, 1953, 1966, 2020), suggest that much of the project area exhibits low probability for containing historic and prehistoric resources. However, DESCO believed there was moderate potential for presence of sites in the south terminus area of the APE at the north rim of Star Lake based upon the distribution of known sites in the area and the presence of comparable environmental settings in the APE (i.e., areas bordering natural waterways and/or lakes).

DESCO conducted a pedestrian survey of the project's area of potential effect (APE), consisting of 8.78 total acres (3.55 hectares), in March of 2024 to identify any cultural resources that could potentially be impacted by the project and determine if those resources would be eligible for inclusion in the National Register of Historic Places or listing as State Antiquities Landmarks. The survey consisted of visual inspection and probing, where appropriate, and was carried out by Ashley Chapman, DESCO Archaeological Principal Investigator. No cultural resources were encountered within the project area as a result of DESCO's survey.

8.10.1 Direct and Indirect Impacts on Cultural Resources

Alternative A

No cultural resources were encountered within the APE as a result of DESCO's field survey or previous surveys conducted in the area; therefore, DESCO believes the proposed work would not adversely affect archaeological sites or historic properties and recommended that the work be allowed to proceed as planned.

DESCO submitted cultural resources survey findings and recommendations to the USFWS Regional Historic Preservation Officer, who initiated Section 106 Consultation with THC and requested concurrence on DESCO's findings on April 16, 2024.

The THC concurred with DESCO's findings that no historic properties are present or affected by the project as proposed on May 16, 2024, concluding Section 106 Consultation efforts. Documentation of Section 106 Consultation and Concurrence is included in **Appendix E**.

Alternative B

There would be no direct impacts to cultural resources as a result of the no action alternative. Left unprotected, cultural resource sites within the Star Lake Unit of MNWR and the larger Salt Bayou watershed would be subject to continued erosion, resulting in a loss of cultural resources over time.

8.10.2 Other Reasonably Foreseeable Impacts to Cultural Resources

Cultural Resources within the MNWR have been impacted in the past and will continue to be impacted primarily as a result of natural erosional processes. Continued erosion of wetlands within the MNWR threatens the integrity of any sites within the Refuge and larger Salt Bayou watershed.

Construction of the Star Lake GIWW Siphon Project through implementation of the Proposed Action, combined with other actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2** above) should result in beneficial effects on cultural resources by preserving sites that would otherwise be lost as wetlands convert to open water over time.

8.11 Socioeconomic Resources

MNWR encompasses two counties, Chambers and Jefferson, with the majority of the Refuge residing within Jefferson County. The nearest cities to the project site are Sabine Pass and Port Arthur. Population estimates from the US Census Bureau reflect that the population of Jefferson County was estimated to be 251,601 in 2022. The largest population centers in Jefferson County are Beaumont and Port Arthur, with populations of 112, 089 and 55,579, respectively. The 2018-2022 estimated median household income for Jefferson County was $57,294, and approximately 18.8% of people were estimated to be living in poverty. The median household income for Jefferson County is less than the estimated national average of $72,149 for the same period, and the percentage of people living in poverty is higher than the national average of 11.5% (USCB, 2024).

The Beaumont-Port Arthur region has significant petrochemical manufacturing corporations, hospital facilities, regional airports, school districts, and hospitality services, amongst other industries. Major businesses in or near Port Arthur include but are not limited to BASF, Chevron, and Motiva Enterprises.

MWNR is open for hunting, fishing, wildlife observation, photography, and other wildlife dependent recreation. MNWR also plays a role in the local economy, especially in areas easily accessible from Sabine Pass and Port Arthur, as visitors support the local economy with purchases of fuel, food, services, etc., and refuge employees typically live in the surrounding communities, own property, and support local businesses through routine purchases.

8.11.1 Direct and Indirect Impacts on Socioeconomics

Alternative A
Under the Proposed Action, the economic and social condition of the local area would remain relatively stable over the long term. Short-term beneficial impacts of the Proposed Action on socioeconomics would include increased revenue in the local economy as a result of the influx of workers on the project during the construction phase, particularly for temporary housing, meals, and supplies. Labor and materials would also be sourced locally to the extent possible. Short term negative effects for this alternative may include increased noise during construction that could deter a small number of recreationists who would otherwise utilize the GIWW and/or wetlands within and adjacent to the APE for fishing, hunting, and/or wildlife viewing. That being said, the APE has not historically been heavily utilized by recreationists and impacts due to noise and construction are expected to be minimal to negligible.

Alternative B
There would be no direct impacts to socioeconomic resources as a result of the no action alternative. Without construction of the Star Lake Siphon project, the Star Lake Unit of the MNWR and larger Salt Bayou watershed would be subject to continued salinity increases and erosion of habitats utilized by hunters, fishermen, birders, and other recreationists. This could result in indirect impacts to socioeconomics in the local area over time due to loss of revenue from recreational use. Because the MNWR is not heavily used by recreationists due to lack of

access, particularly in the project location, any direct or indirect effects from the no action alternative on socioeconomics are expected to be minimal to negligible.

8.11.2 Other Reasonably Foreseeable Impacts on Socioeconomics

While there is some public use that occurs within the MNWR, public use within the project area is very limited, as is revenue generated by public use of this area. There is very limited development within the MNWR and not much development is anticipated in the reasonably foreseeable future, with the exception of potential oil and gas projects required to allow mineral interest holders to capitalize on their interests. Development projects have/would result in short-term increases in revenue for businesses in the vicinity of the project area(s) due to crew expenditures; however, projects of this nature may also deter hunters and fishermen from using the area due to crew presence and noise during construction, which could result in a short-term decrease of expenditures related to public use.

Construction of the Star Lake GIWW Siphon Project through implementation of the Proposed Action, combined with other actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2** above) should result in short-term beneficial effects on socioeconomics due to crew expenditures. Additional revenue could potentially result from preservation and/or enhancement of habitat due to increased visitor use over time; however, impacts of this nature are expected to be minimal to negligible.

8.12 Public Use and Recreation

MNWR provides an array of recreational opportunities for the public when visiting, including hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Refuge Complex goals as outlined by the *Texas Chenier Plain Refuge Complex Final EIS, Comprehensive Conservation Plan, and Land Protection Plan* (2008) show that these activities fit Goal 5 of the Plan, which is to provide local, national, and international visitors a safe and high-quality outdoor experience when on Refuge Complex properties. Approximately 170,000 annual visitors use the MNWR facilities. There are five miles of roadways within MNWR that allow visitors to access interior refuge marsh ecosystems for boating, hunting, and wildlife observation (USFWS 2008).

Hunting

Four hunting zones are present within MNWR, with access into these units coming from levees and roads, including Whites and Perkins levees, as well as via access from the beach along the south boundary of the refuge at the GOA. Other access points include boat ramps in and around Clam Lake, Tenmile Cut, and Fivemile Cut. Hunters are subject to the pertinent hunting season regulations for waterfowl.

Fishing

Salt and freshwater fishing opportunities within and adjacent to the project area exist within the GIWW, Star Lake, Fivemile Cut, and Clam Lake, as well as further afield in the GOA or along the beach access points in the refuge for surf fishing. The local fisheries are considered some of the most important in the region. Data spanning 1998-2008 compiled by TPWD creel surveys estimated 9,511 private trips and 625 party boat trips along the Texas Gulf coast. Anglers surveyed reported targeting spotted sea trout (*C. nebulosus*) and red drum (*Sciaenops occelatus*) approximately 79% of the time with a total of 869,050 sea trout and 229,332 red drum landings between private boat anglers and guided boat tours (Birchfield, 2013).

Wildlife Observation and Photography

Recreationists, birders, and photographers are able to access the MNWR via the eight miles of roadway within the refuge as well as the Whites and Perkins levees, in addition to boat ramp access to observe wildlife and take photographs via watercraft.

As outlined in **Section 8.7** Wildlife Resources, wildlife within the coastal marshes, prairies and woodlands on MNWR is abundant and diverse. Spring and fall are prime seasons for migrating shorebirds and songbirds as they return or leave North America. Migrating shorebirds primarily use beach areas and mudflats on MNWR. Small and colorful neotropical songbirds can be found in the small woodlands or riparian corridors leading into and within MNWR. Of special interest to the birding community, secretive rails occupy refuge marshes and all six species of North American rails can be found within MNWR. In addition, resident waterbirds are visible in wetland habitats throughout the year. The MNWR, Texas Ornithological Society's Sabine Woods Sanctuary, Sabine Pass Battleground State Historic Site, Sea Rim State Park, and Texas Point National Wildlife Refuge are all part of the Sabine Loop of TPWD's Upper Texas Coast portion of the Great Texas Coastal Birding Trail (TPWD, 2024b).

Environmental Education and Interpretation

Chenier Plain NWR Complex staff provide interpretive information and programs upon request. Special events are held throughout the year to promote awareness and understanding of the important natural resources found along the upper Texas coast. MNWR visitors contribute to local and regional economies through tourism-related purchases and expenditures. Nature tourism is an important and growing industry in Texas, especially within the coastal region.

8.12.1 Direct and Indirect Impacts on Public Use and Recreation

Alternative A

Under this alternative, visitors who typically access MNWR for recreational uses could experience short-term negative impacts during construction such as access issues via the levee road that parallels the GIWW, as it would be closed for safety reasons. Noise affecting those recreating in other areas of the refuge isn't expected to be any louder than noise generated by typical visitor and oil and gas operations closer to the Clam Lake area of the refuge. Noise impacts would be short-term and localized to the construction zone.

The Proposed Action would have long-term positive impacts to public use and recreation over time as the flora and fauna would benefit from the increased freshwater flows coming into the Salt Bayou watershed. This would provide higher quality habitat for wildlife, thus promoting better opportunities for waterfowl hunting, recreation fishing, birding, wildlife photography, and educational opportunities.

Alternative B
Under the No Action Alternative, there would be long-term negative impacts to public use and recreation as the quality of the marshes within the refuge would continue to degrade over time, thus decreasing the quality of wildlife dependent recreation. Waterfowl hunting may ultimately decline compared to the levels it is currently at as the marshes converted from freshwater to saltwater, potentially leading to open water conversion and habitat fragmentation within the system.

Fishing on the refuge would likely experience short term positive impacts as additional open water habitat is created but would collapse as open water habitats become more common. Open water habitat is the least used of any of the coastal fisheries habitat present on the Gulf Coast. Long-term impacts under this alternative would be negative overall as marsh habitat continued to convert to open water.

8.12.2 Other Reasonably Foreseeable Impacts on Public Use and Recreation

As mentioned earlier, while there is public use that occurs within the MNWR, public use within the APE is very limited. In absence of the proposed action, access would become limited even further, as habitat would continue to be lost over time.

Creation of the Star Lake GIWW Siphon Project through the implementation of the Proposed Action, combined with other actions designed to create, preserve, and enhance shoreline and/or wetland habitats within the Texas Chenier Plain NWR Complex (discussed in **Section 8.2** above) should result in beneficial effects on public use and recreation within the refuge. Preservation and enhancement of refuge habitats would be beneficial for flora and fauna, maintaining and potentially increasing diversity of species, which would enhance recreational opportunities such as fishing, hunting, birding, and wildlife photography within MNWR.

9.0 MITIGATION MEASURES AND CONDITIONS

Conservation measures included below for species under USFWS jurisdiction were developed through Intra-Service Section 7 consultation efforts between the Tim Cooper, Texas Chenier Plain NWR Complex Manager, and the USFWS Clear Lake Ecological Services Office and are consistent with measures included in the USFWS Intra-Service Section 7 BE included in **Appendix D**.

- Borrow materials necessary for construction will not be taken from Eastern Black Rail habitat and efforts will be made to ensure borrow materials are free of potential invasive species.
- When equipment is needed, the project area will be marked prior to construction with

flagging to assure that no work affects Eastern Black Rail habitat that may be adjacent to the project area.

- Operators would avoid multiple passes over the same area to the extent practicable to limit damage to existing vegetation.
- A coordination meeting will be conducted prior to all work adjacent to Eastern Black Rail habitat to assure that employees or contractors work within the established footprint of the project.
- Marking the project boundary will be conducted in cases where there is a risk of damage to areas outside the project area.
- Efforts will be made to mitigate noise and vibration in areas adjacent to Eastern Black Rail habitat, especially during the breeding season. These efforts include planning and performing work outside of peak breeding call times (i.e., dawn and dusk) for Eastern Black Rail.
- Construction crews would be educated on the identification and potential presence of the Eastern Black Rail in the vicinity of the project area and instructed to halt operations if an Eastern Black Rail is observed and consult with USFWS staff on any necessary protective actions prior to proceeding.
- The permittee will instruct all personnel associated with the project of the potential presence of sea turtles and manatees in the project area.
- The permittee and all personnel associated with the project will be informed that there are civil and criminal penalties for harming, harassing, or killing sea turtles and/or manatees, which are protected under the Endangered Species Act.
- Project activities would adhere to NMFS Vessel Strike Avoidance Measures and Reporting for Mariners (Revised: February 2008) and Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office (Revised: May 24, 2021).
- As a general condition of operations, trash would be contained within work vessels and taken out daily to prevent trash from entering waterways and being ingested and/or resulting in entanglement of protected species.
- If dead or injured protected species are observed, either related or unrelated to the project, they will be reported to USFWS, the National Marine Fisheries Service's Protected Resources Division (727-824-5312), and the local authorized sea turtle stranding/rescue organization.
- Any collision with or injury of a federally listed bird species should be reported immediately to the Texas Coastal Ecological Service Field Office at 281-286-8282.
- Any collision with and/or injury to a sea turtle shall be reported immediately to the NMFS's Protected Resources Division at 727-824-5312 and the local stranding/rescue organization at 1-866-TURTLE-5.
- Any collision with or injury to a manatee shall be reported immediately to the Texas Marine Mammal Stranding Network (TMMSN) Hotline at 1-800-9-MAMMAL and the Texas Coastal Ecological Service Field Office at 281-286-8282.

10.0 MONITORING

No long-term monitoring is necessary for this project. As long as the siphon is in place, it should function as planned, redirecting water from the north side of the GIWW to the south side

in order to improve reservoir management and to improve marsh conditions within the MNWR and larger Salt Bayou ecosystem.

11.0 SUMMARY OF ANALYSIS

The purpose of this EA is to briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

11.1 Alternative A – Proposed Action Alternative

As described above, the proposed action may result in minor, short-term adverse impacts on air quality, geology and soils, water resources, vegetation, wildlife and aquatic resources (including EFH and threatened, endangered, and sensitive species), and public use and recreation during construction. However, construction of the Star Lake Siphon Project will reconnect the flow of water from the north side of the GIWW to the south side which will increase the flow of freshwater into the Salt Bayou ecosystem. This will result in long-term beneficial impacts to vegetation, soils, wildlife, including threatened and endangered species, wetlands, and water resources. The beneficial impacts of the proposed action far outweigh the temporary, adverse impacts during construction of this project.

11.2 Alternative B – No Action Alternative

As described above, the no action alternative would have no direct impacts on any resources of concern. However, the no action alternative would result in long-term, adverse indirect impacts to vegetation, soils, wildlife, aquatic species, threatened and endangered species, wetlands, water resources, and visitor use and experience due to continued loss of wetland habitats.

12.0 LIST OF PREPARERS/REVIEWERS

Table 3 contains a list of individuals who prepared and/or reviewed all or portions of this draft EA.

Table 4: List of Preparers and Reviewers

NAME	TITLE	AFFILIATION
Misti Little	Biologist III/GIS Specialist	DESCO Environmental Consultants, LP
Tanya Matcek	President/Project Principal	DESCO Environmental Consultants, LP
Blake Stanley	Biologist	DESCO Environmental Consultants, LP
Tim Cooper	Refuge Complex Manager	USFWS, Texas Chenier Plain National Wildlife Refuges
Douglas Head	Refuge Manager	McFaddin National Wildlife Refuge

Table 4: List of Preparers and Reviewers		
NAME	**TITLE**	**AFFILIATION**
David Certain	Chief, Planning Division	USFWS Region 2, Southwest
Kevin Hartke	Manager of Conservation Programs	Ducks Unlimited

13.0 STATE COORDINATION

The Salt Bayou Watershed Restoration Plan, prepared by the Salt Bayou Marsh Workgroup composed of Jefferson County, GLO, TPWD, Texas Water Development Board (TWDB) representatives as well as federal representatives from NOAA, USACE, and USFWS highlighted the proposed project as one of four major projects to address the fundamental problems affecting the region.

As lead federal agency for this project, the USFWS coordinated with the Texas State Historical Preservation Office (SHPO) for compliance with Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. § 306108) and its implementing regulations (36 CFR 800). A summary of Section 106 coordination efforts is included in **Section 8.10** and documentation is included in **Appendix E.**

Other state agencies, including but not limited to the TPWD and TCEQ, were provided with an opportunity to comment on the project through the Public Notice process associated with USFWS's Individual Permit application for the Star Lake GIWW Siphon Project (SWG-2024-00766). A Joint Public Notice was issued by the USACE on December 10, 2024, with a comment deadline of January 13, 2025. On February 12, 2025, the comments received from the public were provided to USFWS. The only comments received were from NOAA NMFS and TPWD, which raised no objections to the Star Lake GIWW Siphon Project and supported the benefits to the ecosystem that the project would provide.

The USFWS certified that the project was consistent with the TGLO Coastal Management Program (CMP) and provided documentation of such to the USACE as part of the permit process.

TCEQ 401 Water Quality Certification was identified by the USACE as a requirement for this project. Coordination with the TCEQ began on December 10, 2024 with the filing of a 401 State Certification Pre-Filing Meeting Request. TCEQ responded that the 401 Water Quality Certification Request formally be submitted 30 days or more after this date and will be submitted to TCEQ on or after January 10, 2025. A formal 401 Water Quality Certification Request was submitted to TCEQ on April 3, 2025.

State agencies will have another opportunity to comment on the Proposed Action during USFWS's 30-day public comment period on this draft of the EA and the USFWS will coordinate with state agencies, as necessary, to address any comments/concerns received during the public comment period.

14.0 TRIBAL CONSULTATION

As the lead federal agency for this project, the USFWS conducted Tribal consultation for the Star Lake GIWW Siphon Project. On June 16, 2025, the agency sent correspondence describing the proposed project and asking for concerns or input to the following six tribes that have expressed interests in Jefferson county, Texas:

1. Alabama Coushatta Tribe of Texas
2. Alabama Quassarte Tribal Town
3. Apache Tribe of Oklahoma
4. Comanche Nation of Oklahoma
5. Coushatta Tribe of Louisiana
6. Tonkawa Tribe of Oklahoma
7. Wichita and Affiliated Tribes

The USFWS initiated consultation with Tribes traditionally associated with the lands in the area of the proposed action, and no responses were received. No known ethnographic resources or concerns have been identified to date. In addition, there are no known impacts to the rights of Tribal Nations that have been reserved through treaties, statutes, or Executive Orders. There are no known Indian Sacred Sites within or adjacent to the proposed project area(s) that would be affected, either directly (impacts to physical integrity) or indirectly (through limitations of access or ceremonial use), as a result of the Proposed Action.

15.0 OTHER APPLICABLE STATUTES, EXECUTIVE ORDERS & REGULATIONS

Other statutes, executive orders, and/or regulations that are applicable to the proposed action and were considered during its development are included in **Appendix B**.

16.0 REFERENCES

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17.0 DETERMINATION

This section will be filled out upon completion of any public comment period and at the time of finalization of the Environmental Assessment.

☐ The Service's action will not result in a significant impact on the quality of the human environment. See the attached "Finding of No Significant Impact".

☐ The Service's action may significantly affect the quality of the human environment and the Service will prepare an Environmental Impact Statement.

Preparer Signature: _____Date:_____

Name/Title/Organization: _____

_____

Reviewer Signature: _____Date:_____

Name/Title: _____

APPENDIX A

Star Lake GIWW Siphon Project

Construction Drawings

INDEX OF DRAWINGS

LJA Engineering, Inc.

2615 Calder Avenue, Suite 500
Beaumont, Texas 77702

Phone 409.833.3363
Fax 409.833.0317
FRN - F-1386

PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES &
OUTFALL STRUCTURE AT
STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
INDEX OF DRAWINGS

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	–	
Sheet	1 Of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\1 INDEX OF DRAWINGS.DWG

LJA Engineering, Inc.

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FRN - F-1386

PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
PROJECT LOCATION MAP

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	NTS	
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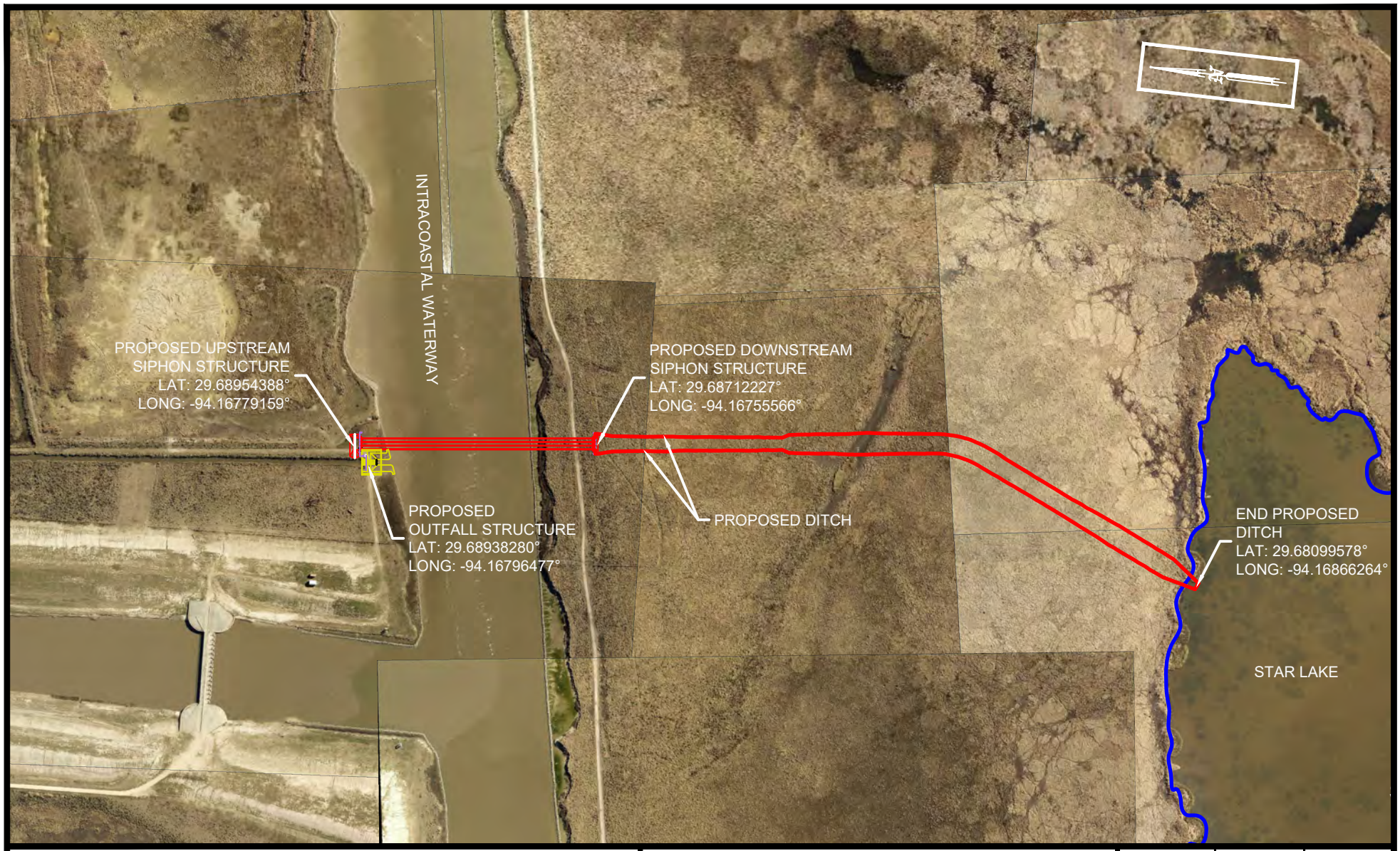
O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\2 PROJECT LOCATION MAP.DWG



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Fax 409.833.0317
FRN - F-1386

PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
ENLARGED PROJECT LOCATION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	1"=500'	
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O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\3 ENLARGED PROJECT LOCATION.DWG

WATERS_NAME	SHEET NO.	COWADIN_CODE	AREA (ACRES)	LATITUDE DD (NAD83)	LONGITUDE DD (NAD83)	LOCAL_WATERWAY
WAA1	5	PEM1		29.69136198	-94.16779690	GIWW
WAA2	6	PEM1		29.69010109	-94.16768343	GIWW
WAA3	6	PEM1		29.68931337	-94.16760535	GIWW
WAA4	6	PEM1	0.006	29.68929479	-94.16783343	GIWW
WAA5	6	PEM1	0.001	29.68927287	-94.16791578	GIWW
WAA6	6	E1UBL	0.092	29.68922882	-94.16798939	GIWW
WAA7	6	E1UBL	0.008	29.68944370	-94.16797731	GIWW
WAA8	7	PEM1	0.764	29.68630615	-94.16752913	GIWW
WAA9	8	PEM1	1.418	29.68428365	-94.16735297	GIWW
WAA10	9	PEM1	1.102	29.68248170	-94.16784048	GIWW
WAA11	10	PEM1	0.498	29.68139048	-94.16847374	GIWW
WAA12	10	E1UBL		29.68107778	-94.16874822	GIWW

LOCATION	SHEET NO.	EXCAVATION (CY)	EMBANKMENT (CY)	PERMANENT IMPACT (AC)	TEMPORARY IMPACT (AC)
WAA1	5	-	-	-	0.577
WAA2	6	-	-	-	0.099
WAA3	6	-	-	-	-
WAA4	6	-	12	0.006	-
WAA5	6	3	-	0.001	-
WAA6	6	250	222	0.092	-
WAA7	6	35	-	0.008	-
WAA8	7	3,548	-	0.764	0.605
WAA9	8	2,222	726	1.418	0.737
WAA10	9	2,029	388	1.102	0.551
WAA11	10	774	313	0.498	0.281
WAA12	10	-	-	-	0.011
TOTAL		**8,861**	**1,661**	**3.889**	**2.861**

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STAR LAKE
SIPHON CONTROL STRUCTURES &
OUTFALL STRUCTURE AT
STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
WATERS UPLOAD & SUMMARY SHEET

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
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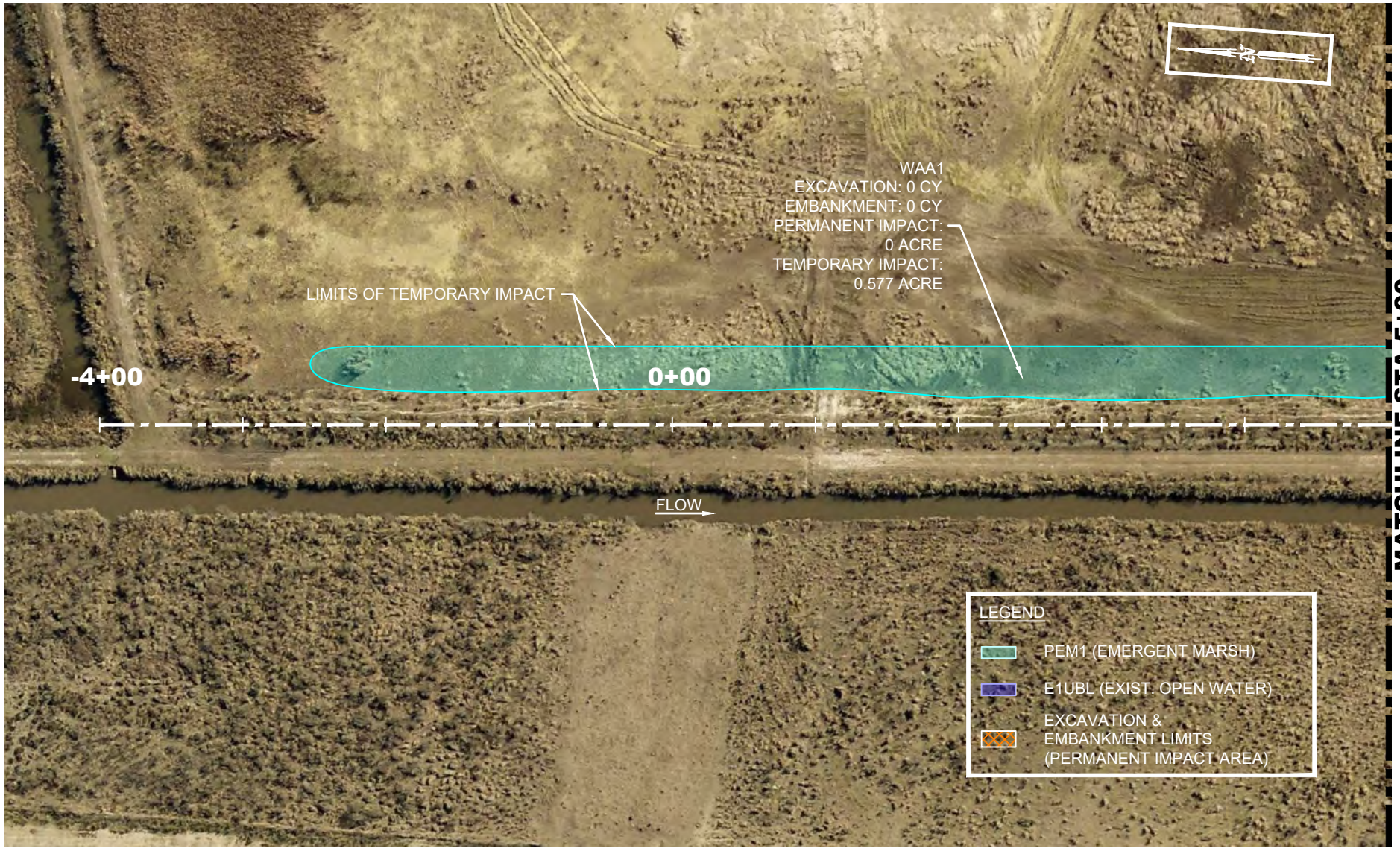
O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\3 WATERS UPLOAD SHEET.DWG



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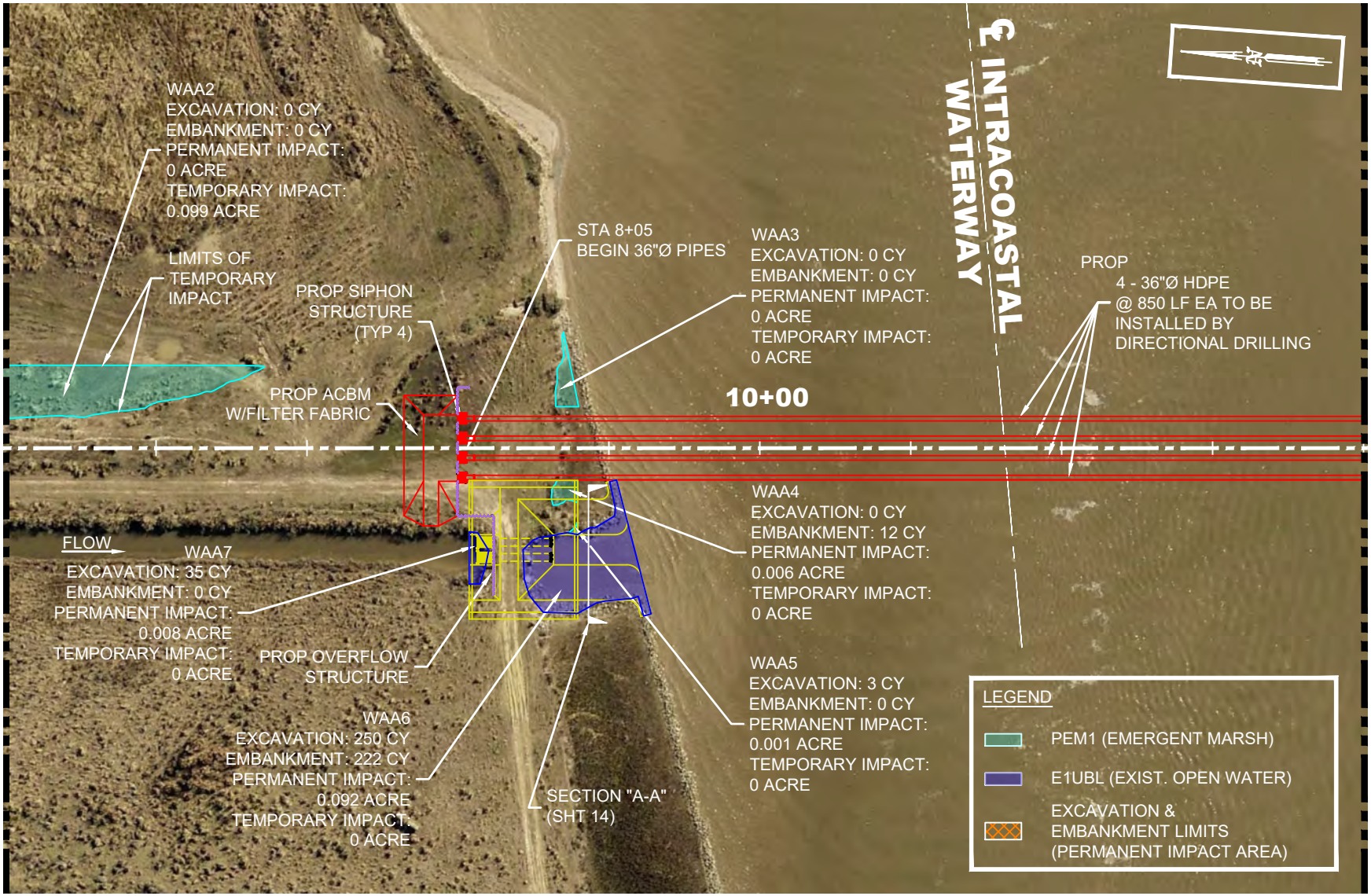
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE GULF INTRACOASTAL WATERWAY JEFFERSON COUNTY, TEXAS
PLAN SHEET

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	1"=100'	
Sheet	5 of 38	

O:\PROJECTS LJA B000 – BXXX\B1275 – DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\PLAN SHEETS.DWG



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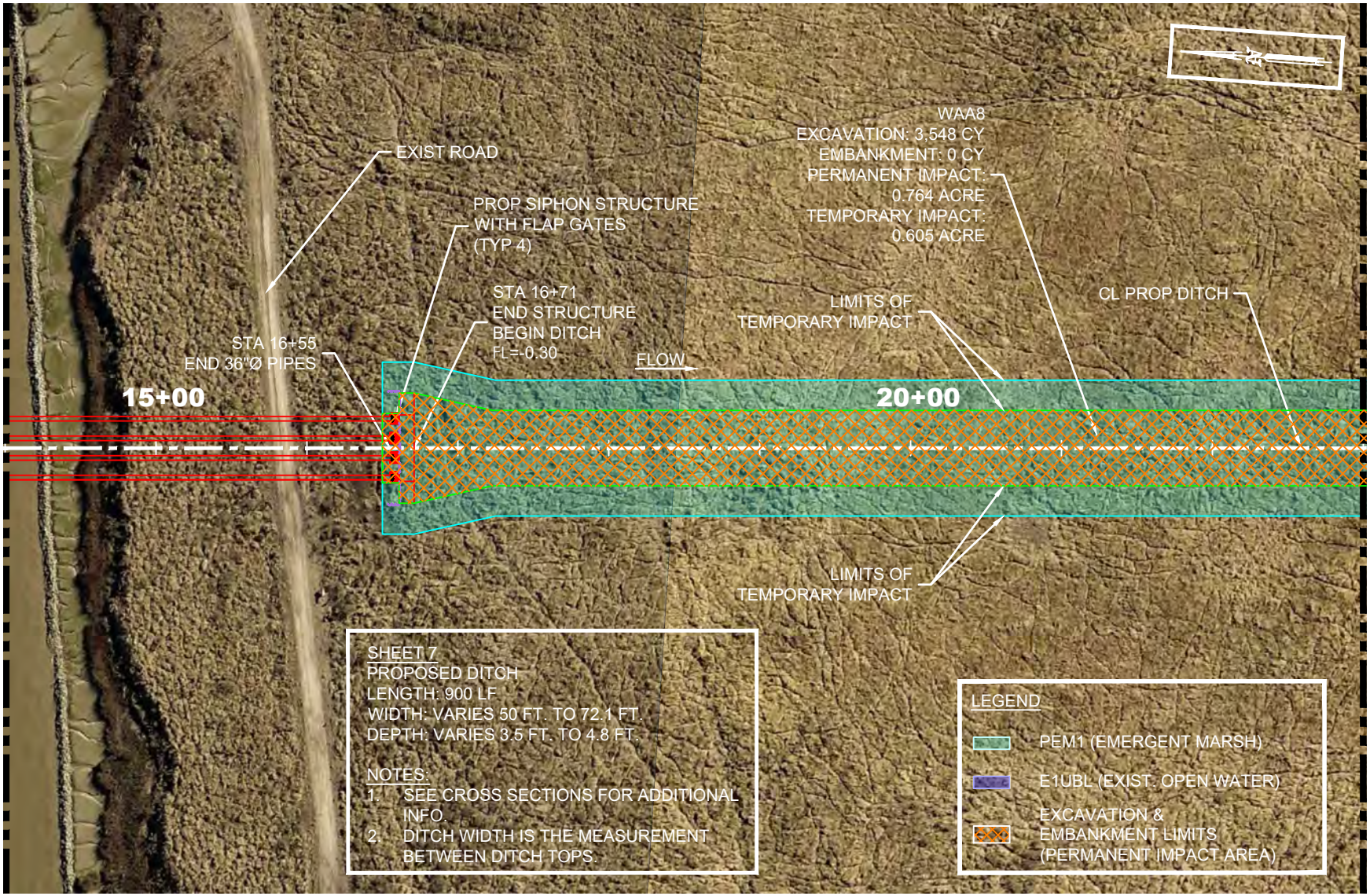
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
PLAN SHEET

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	1"=100'	
Sheet	6 Of 38	

O:\PROJECTS LJA B000 – BXXX\B1275 – DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\PLAN SHEETS.DWG



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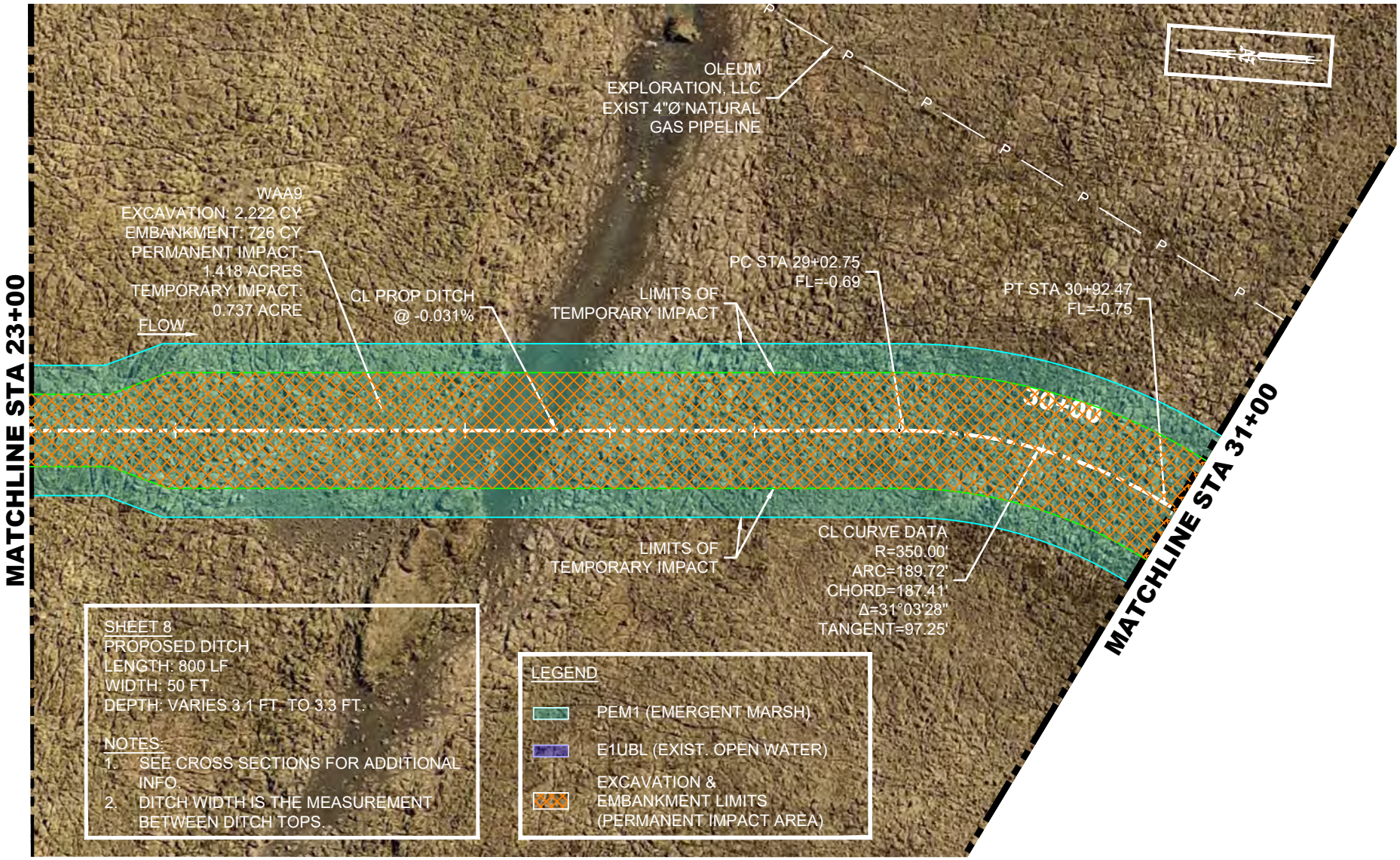
STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
PLAN SHEET

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	1"=100'	
Sheet	7 Of 38	

O:\PROJECTS LJA B000 – BXXX\B1275 – DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\PLAN SHEETS.DWG



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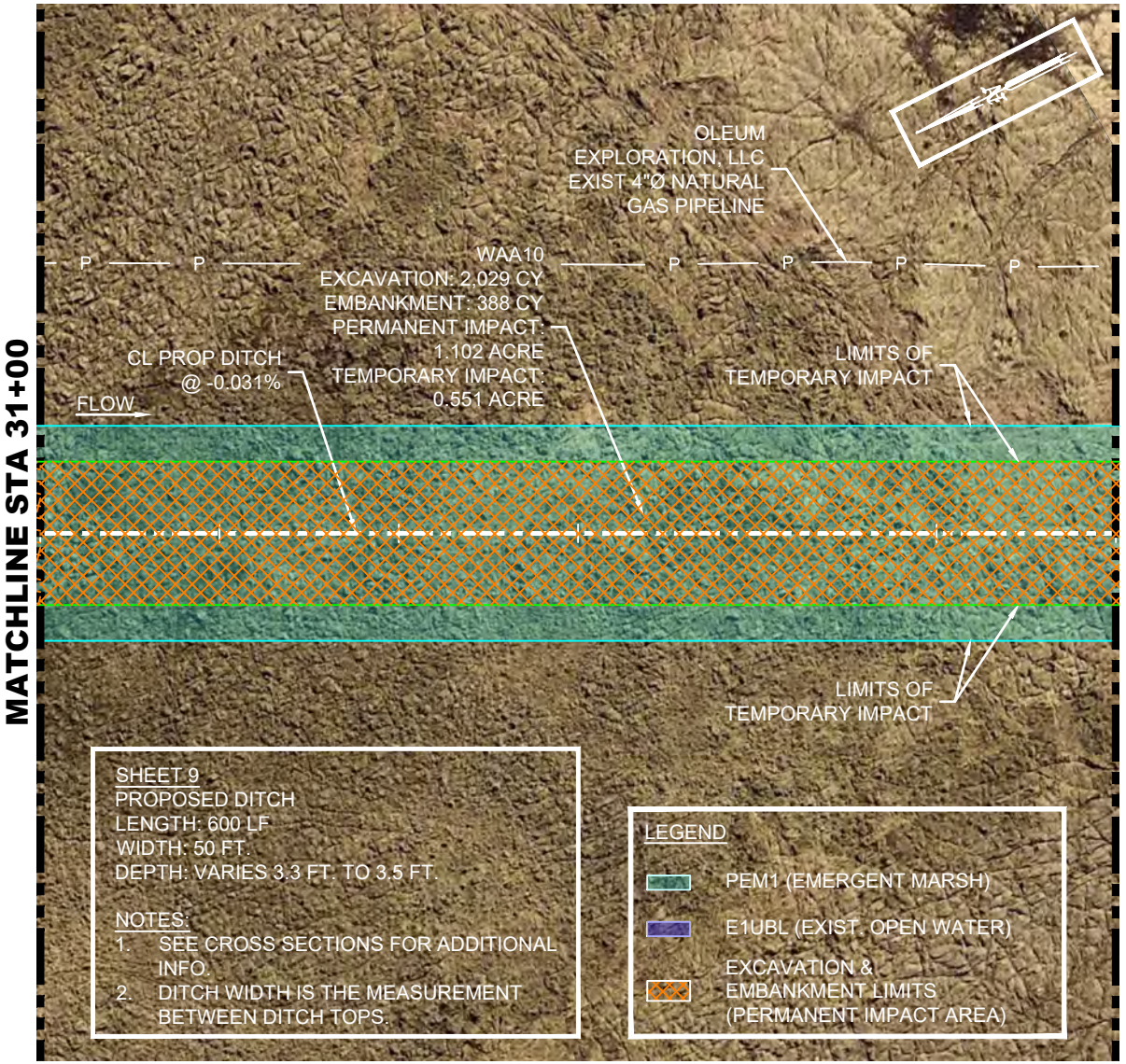
PLOT DATE: *11/22/2023*

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
PLAN SHEET

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	1"=100'	
Sheet	8 Of 38	

O:\PROJECTS LJA B000 – BXXX\B1275 – DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\PLAN SHEETS.DWG



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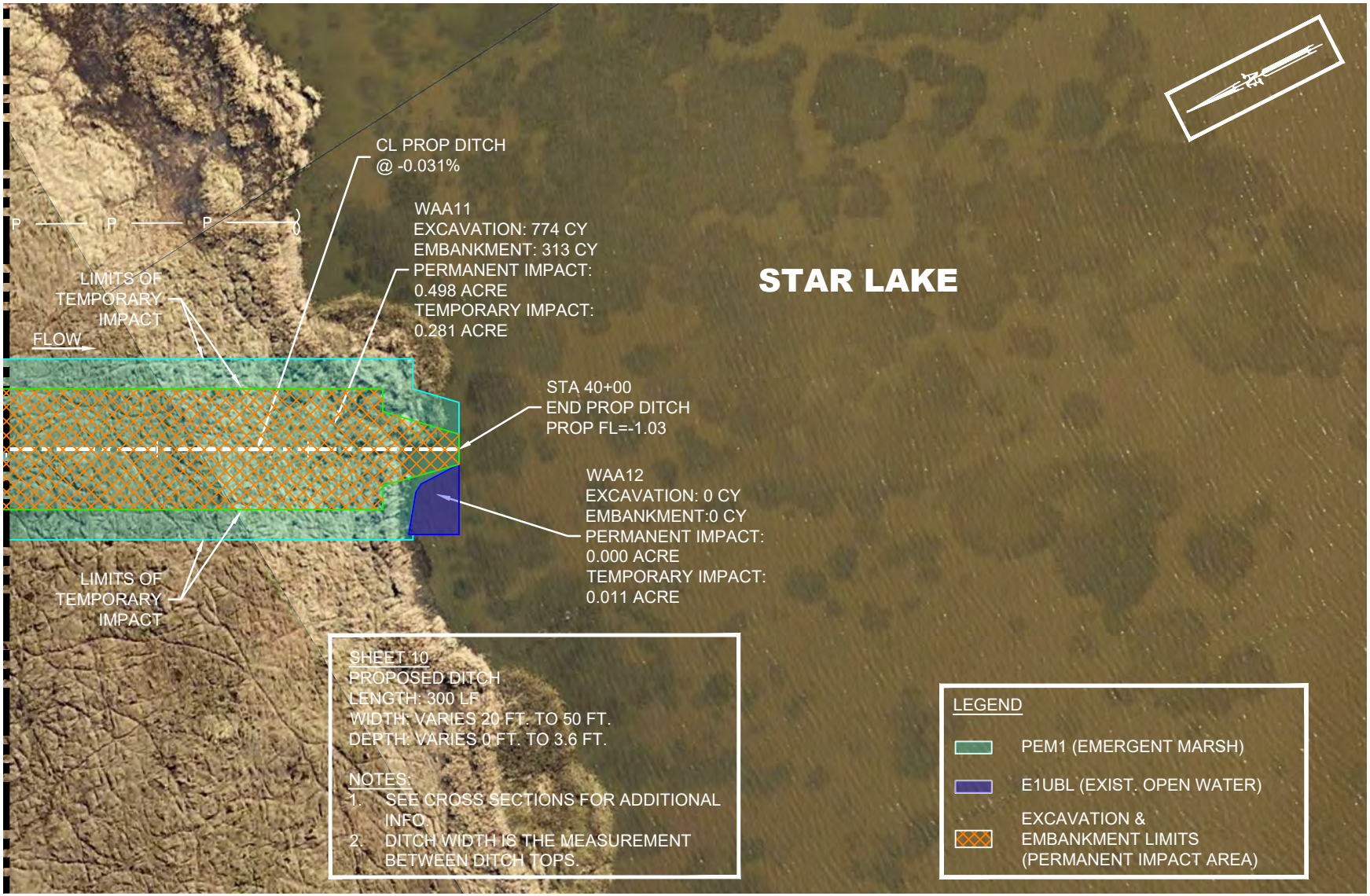
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
PLAN SHEET

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	1"=100'	
Sheet	9 Of 38	

O:\PROJECTS LJA B000 – BXXX\B1275 – DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\PLAN SHEETS.DWG



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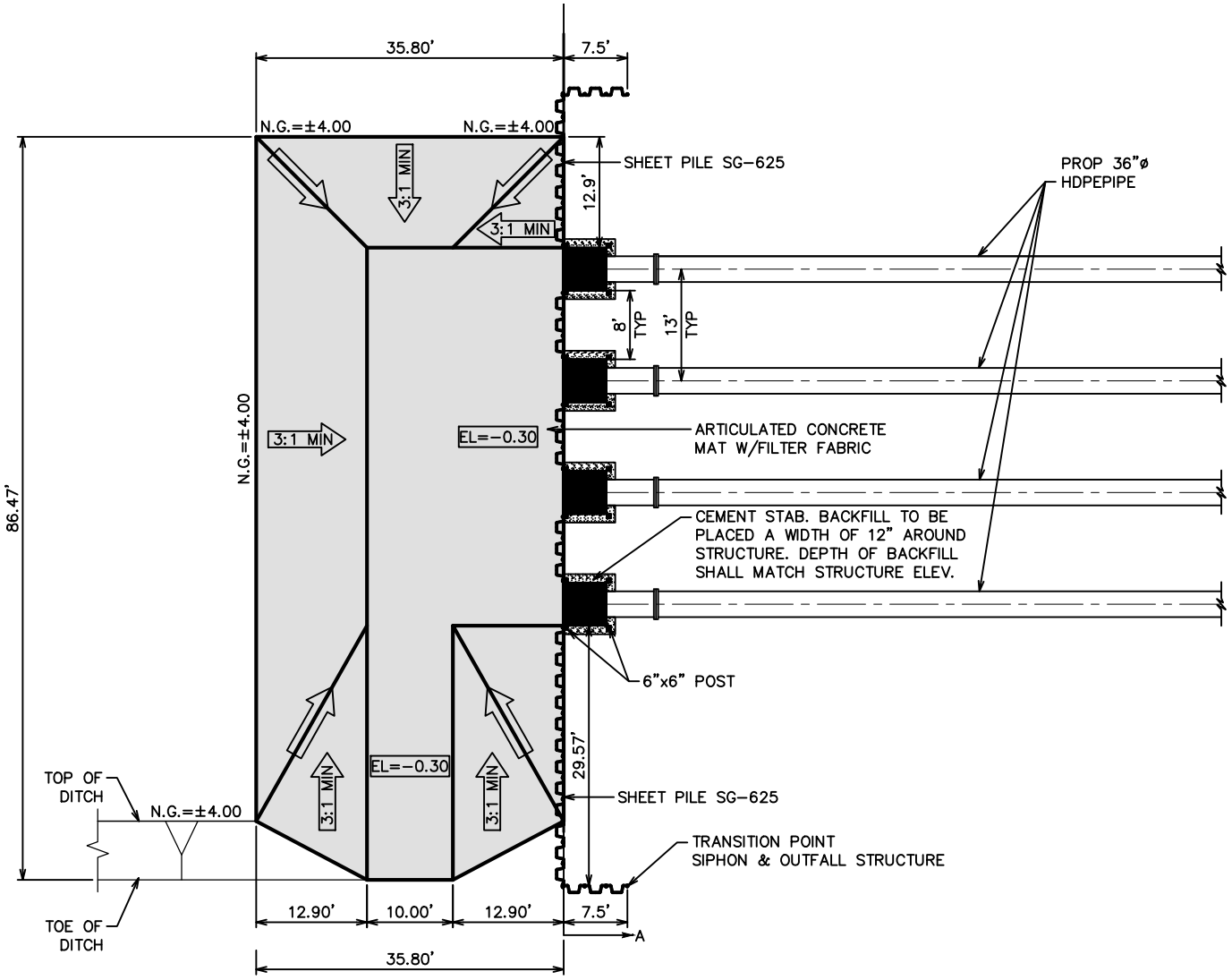
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
PLAN SHEET

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	1"=100'	
Sheet	10 Of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\PLAN SHEETS.DWG



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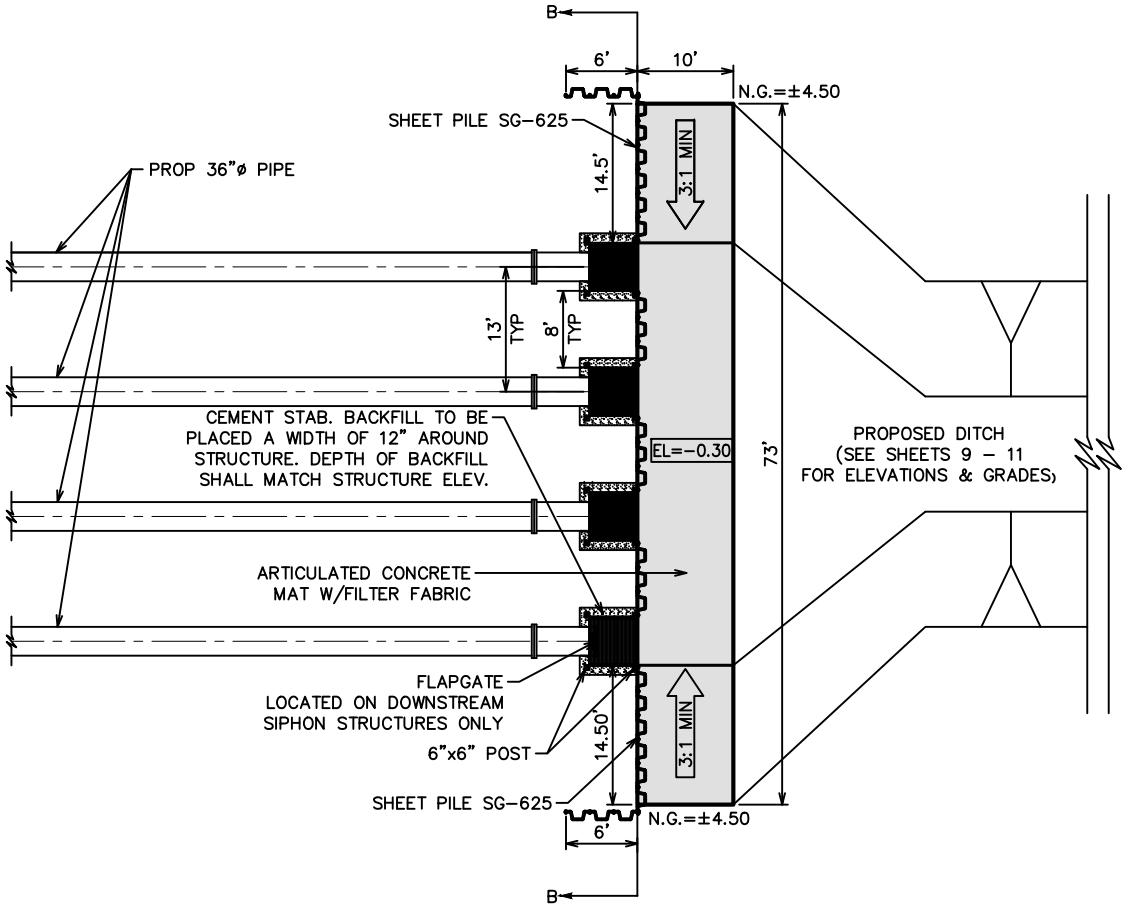
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
UPSTREAM SIPHON STRUCTURE

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	NTS	
Sheet	11 Of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\11 - 12 SIPHON DETAILS.DWG



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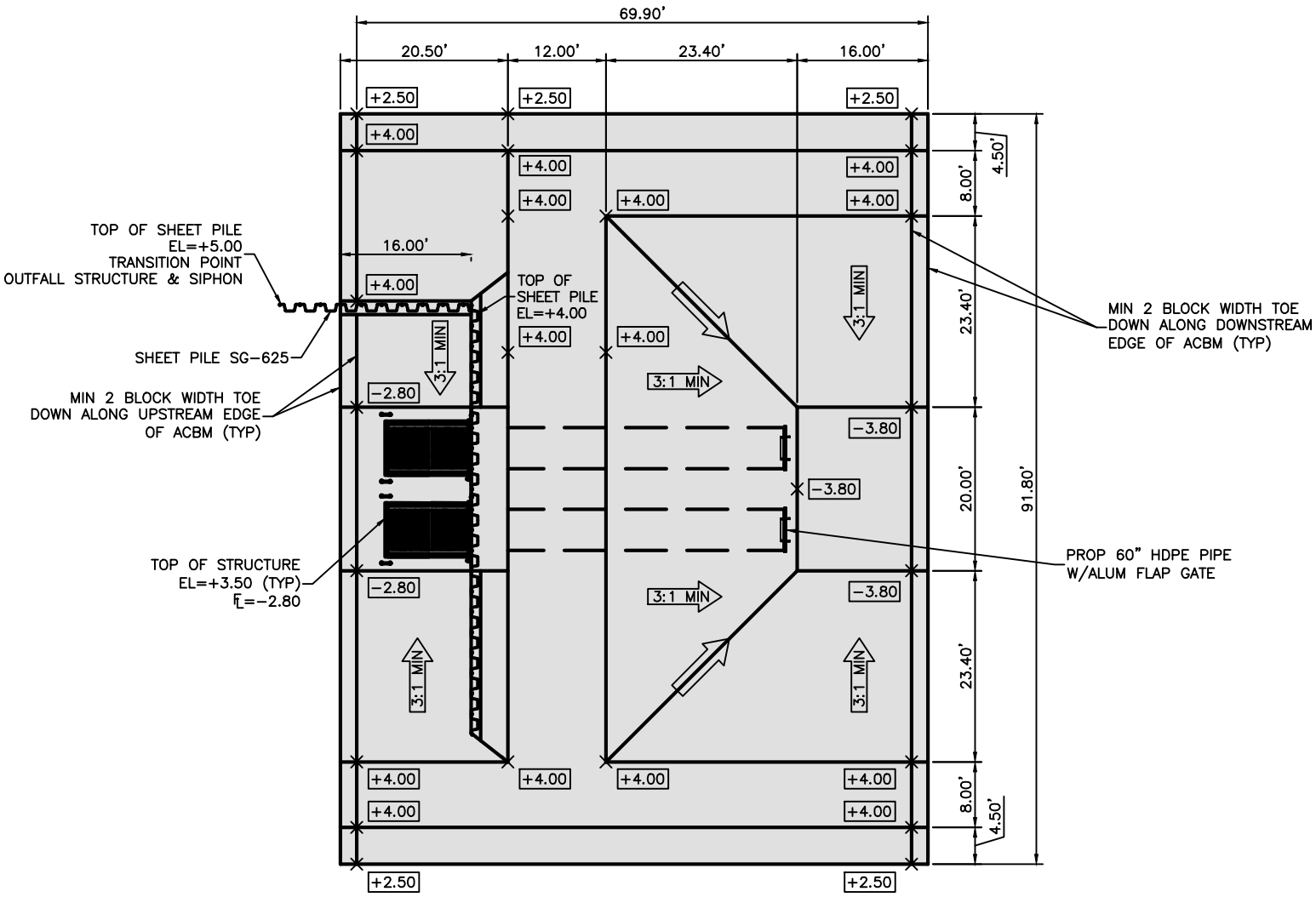
STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DOWNSTREAM SIPHON STRUCTURE

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	-	
Scale	NTS	
Sheet	12 Of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\11 - 12 SIPHON DETAILS.DWG



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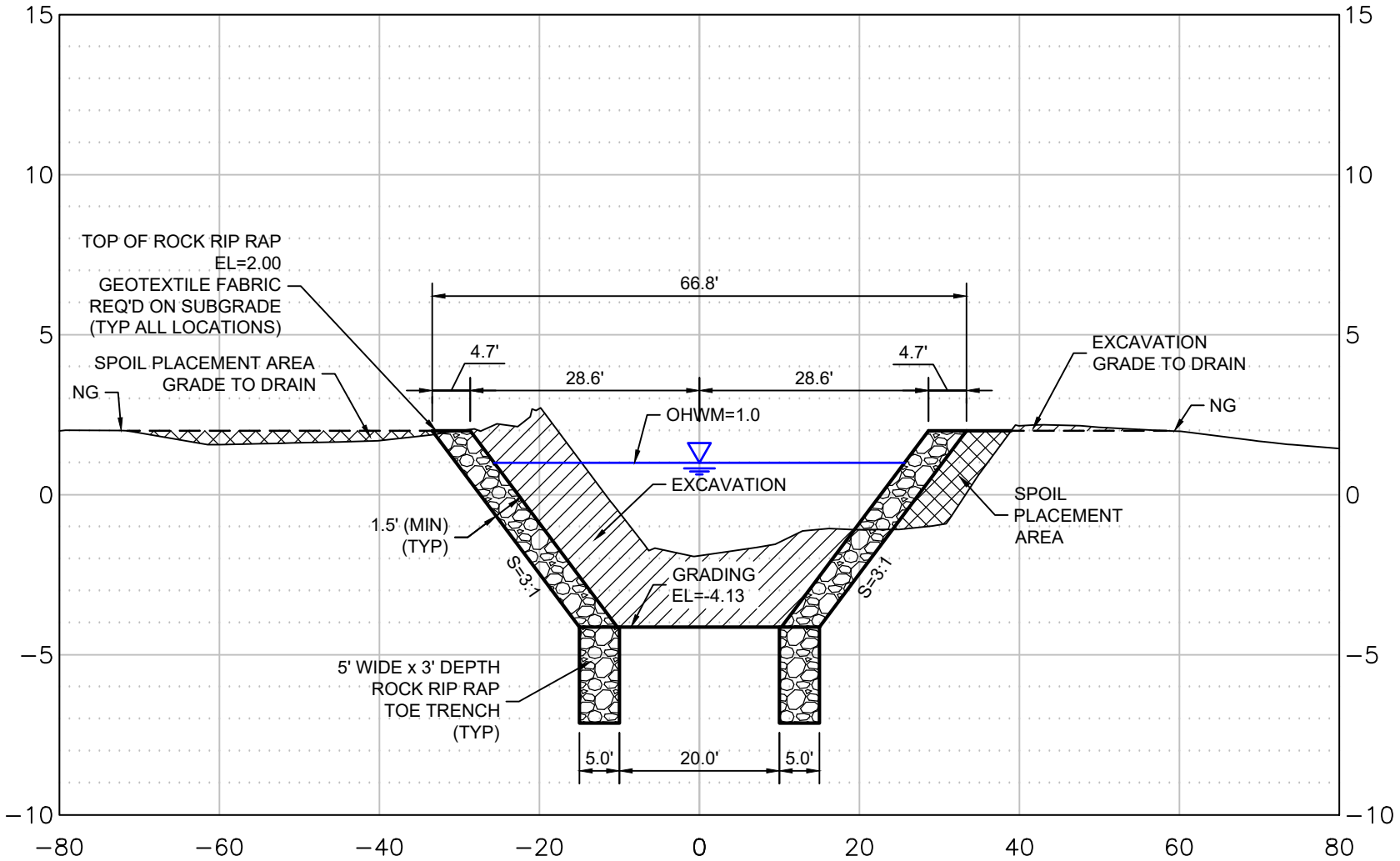
STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
OUTFALL STRUCTURE

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	1"=20'	
Sheet	13 Of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\13 OUTFALL STRUCTURE.DWG



SECTION "A−A"

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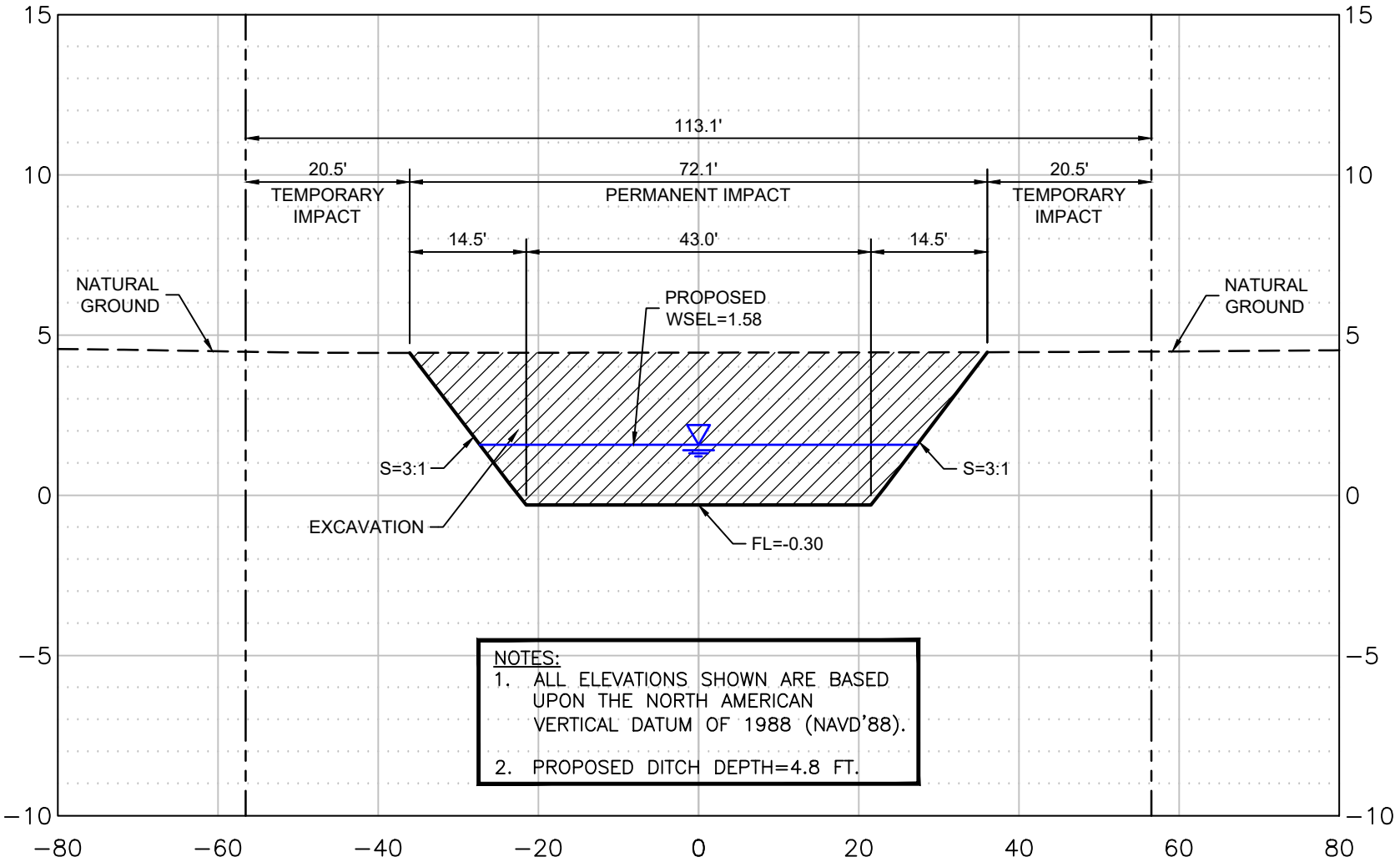
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES &
OUTFALL STRUCTURE AT
STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
CROSS SECTION OUTFALL CHANNEL

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	14 Of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\14 CROSS SECTION OUTFALL CHANNEL.DWG



STA 16+71

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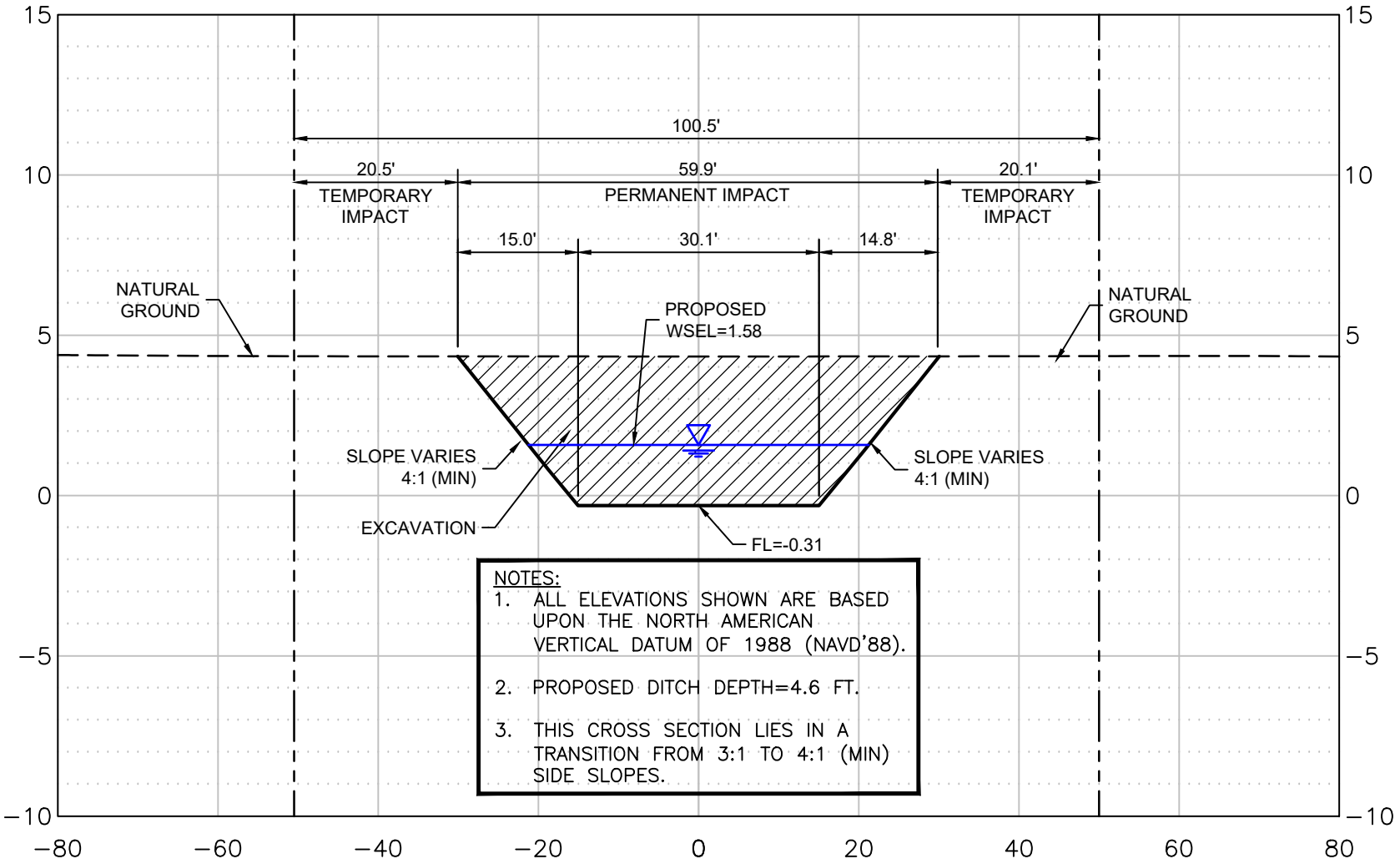
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	15 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=4.6 FT.
3. THIS CROSS SECTION LIES IN A TRANSITION FROM 3:1 TO 4:1 (MIN) SIDE SLOPES.

STA. 17+00

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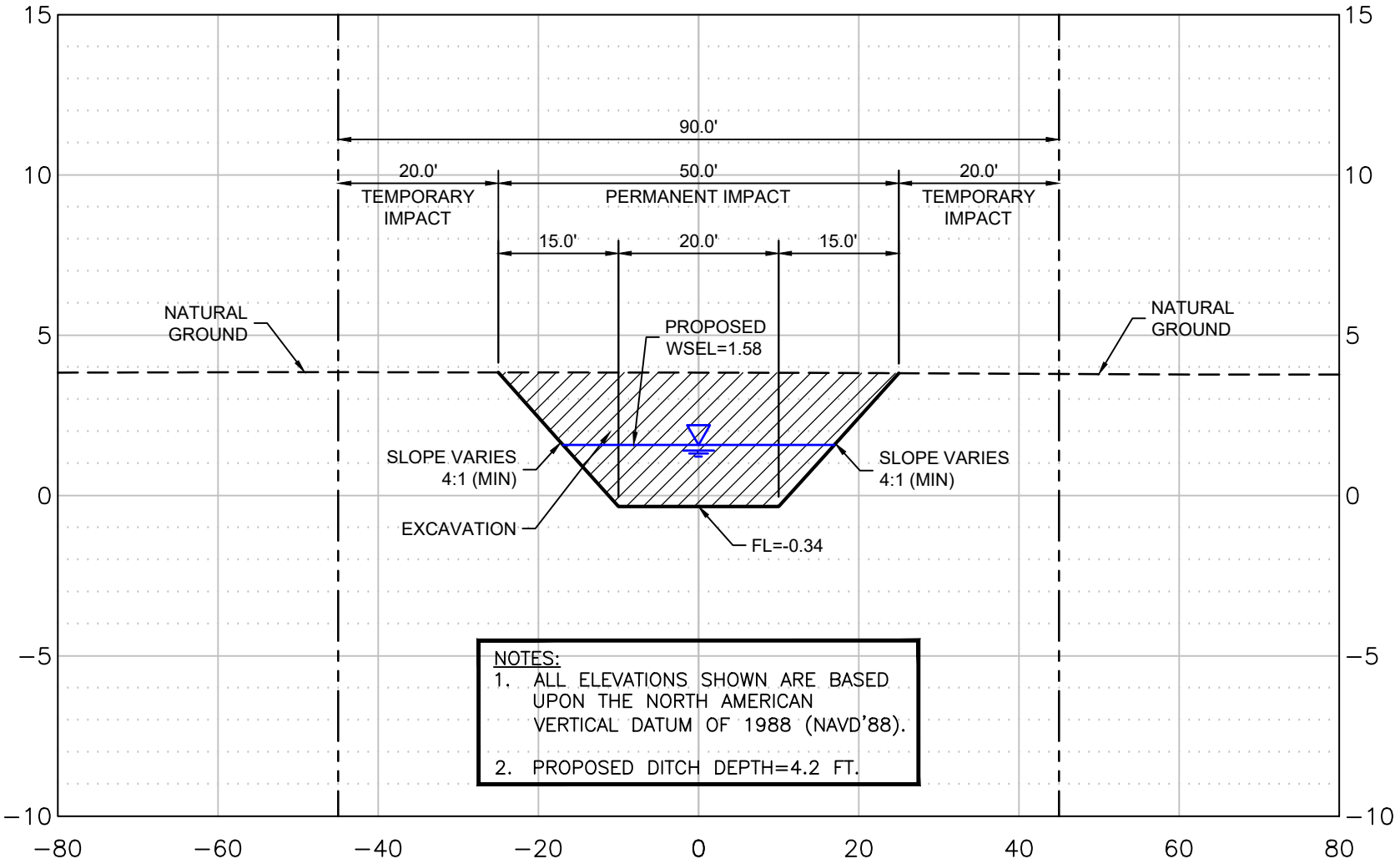
STAR LAKE SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE GULF INTRACOASTAL WATERWAY JEFFERSON COUNTY, TEXAS DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	16 Of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



STA. 18+00

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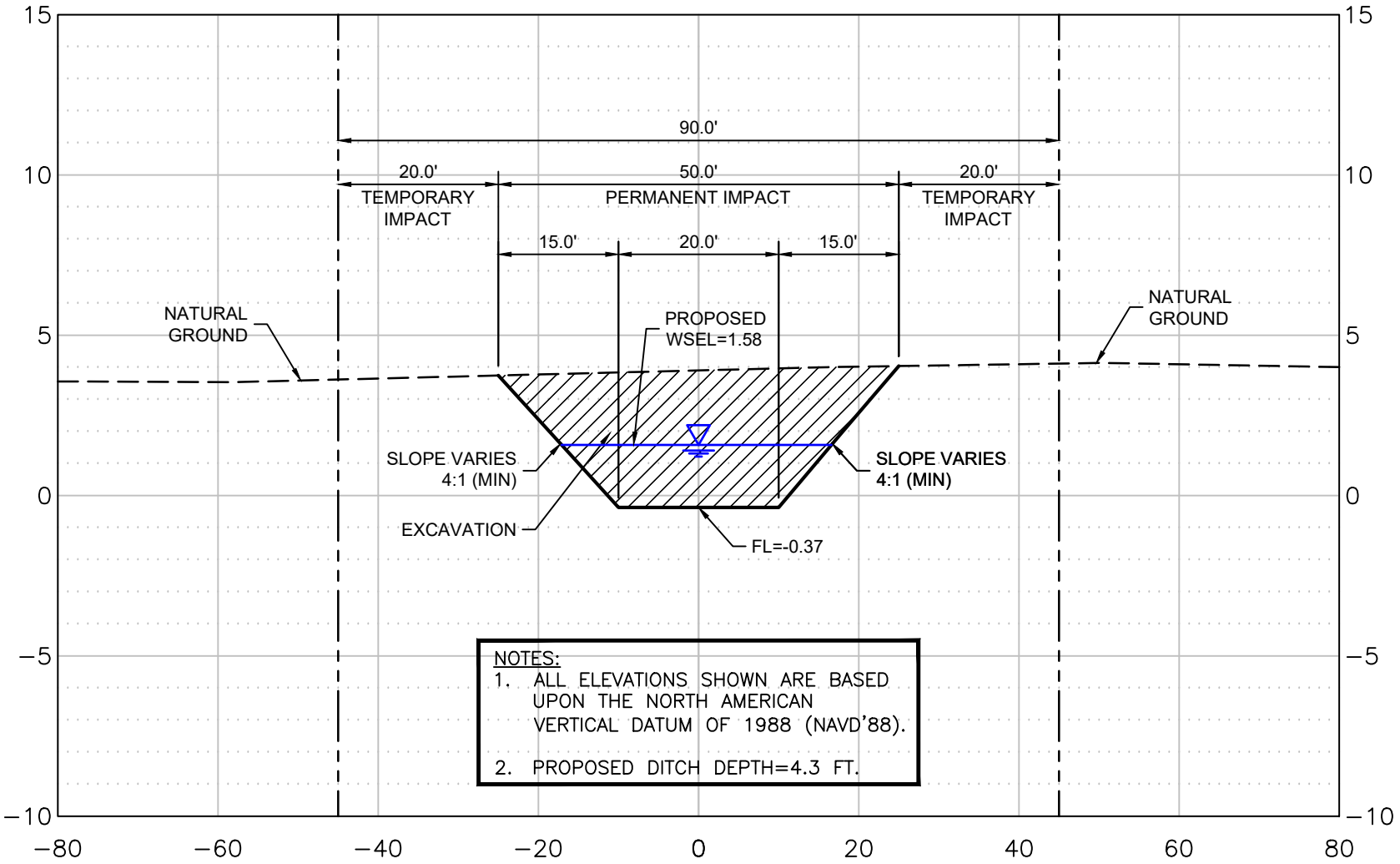
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES &
OUTFALL STRUCTURE AT
STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	17 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



STA. 19+00

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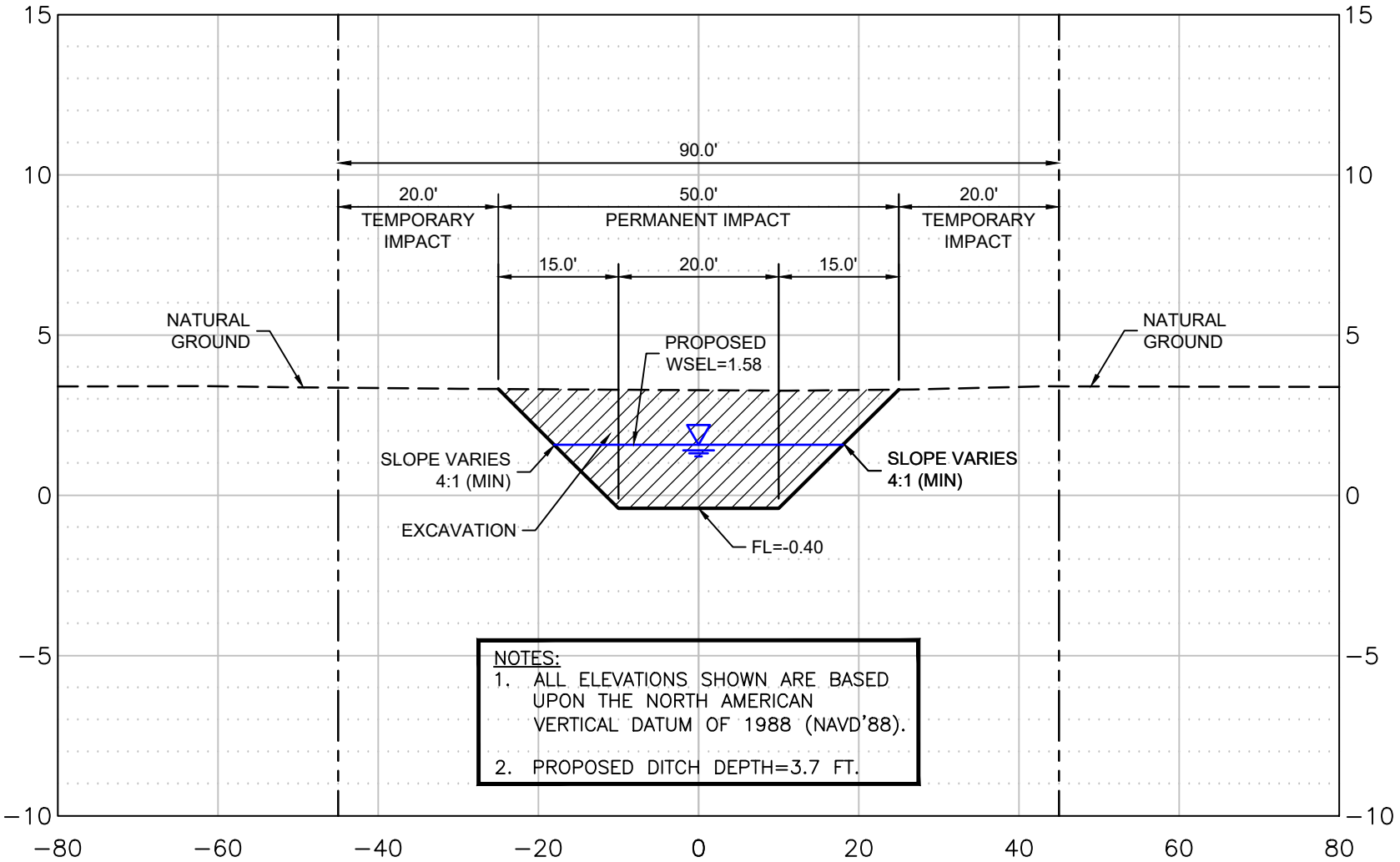
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	18 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



STA. 20+00

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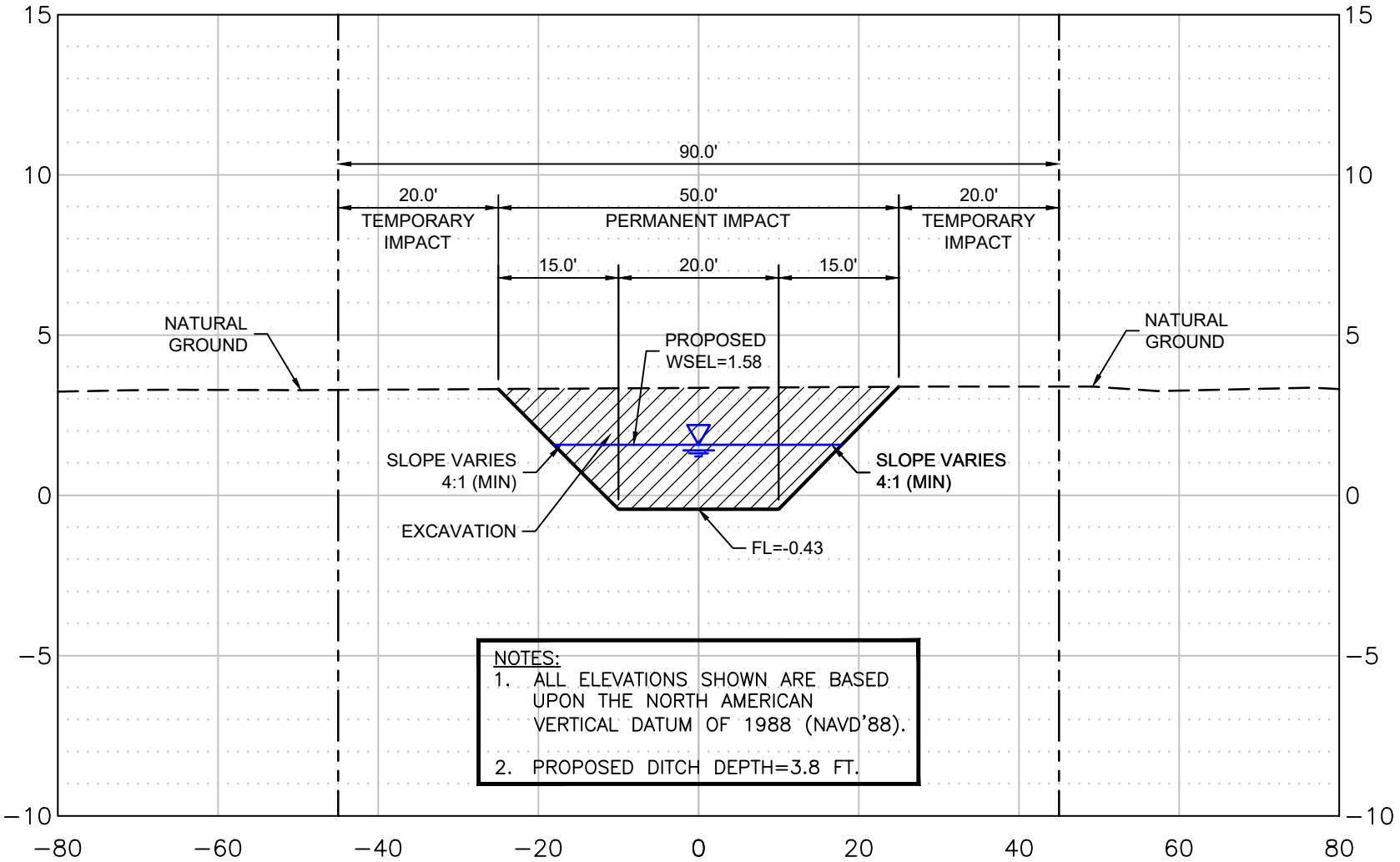
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	19 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



STA. 21+00

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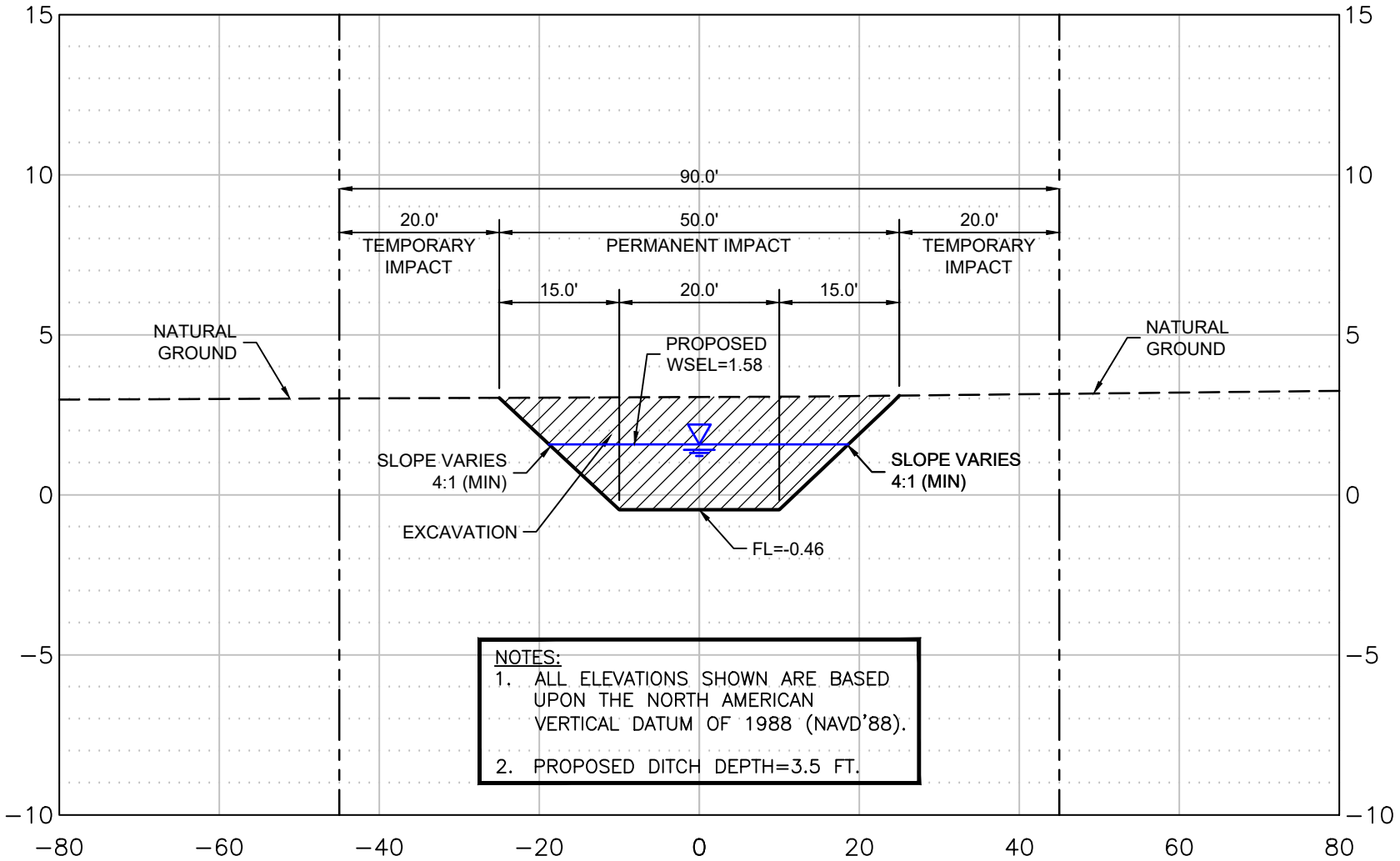
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	20 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



STA. 22+00

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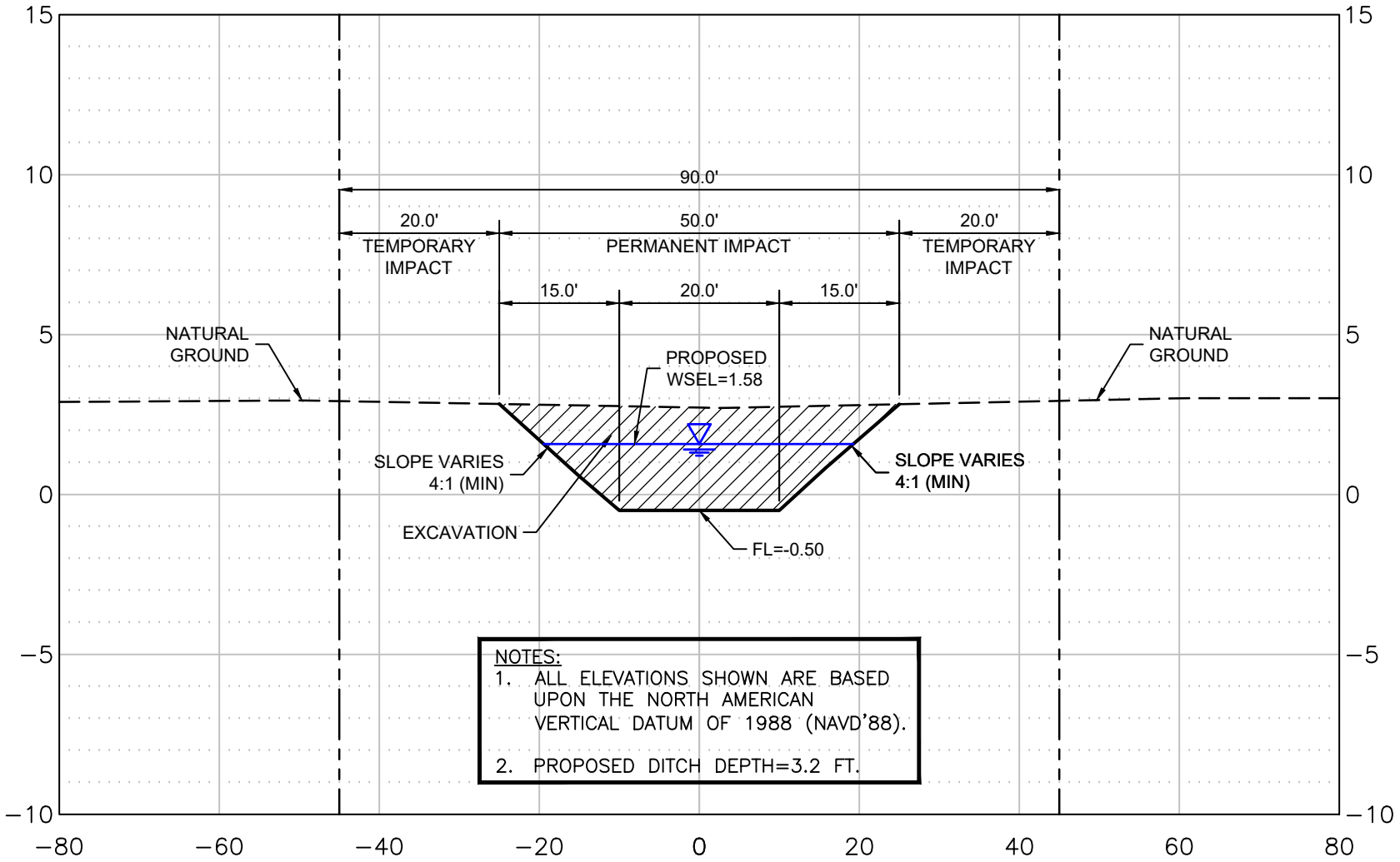
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	21 Of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



STA. 23+00

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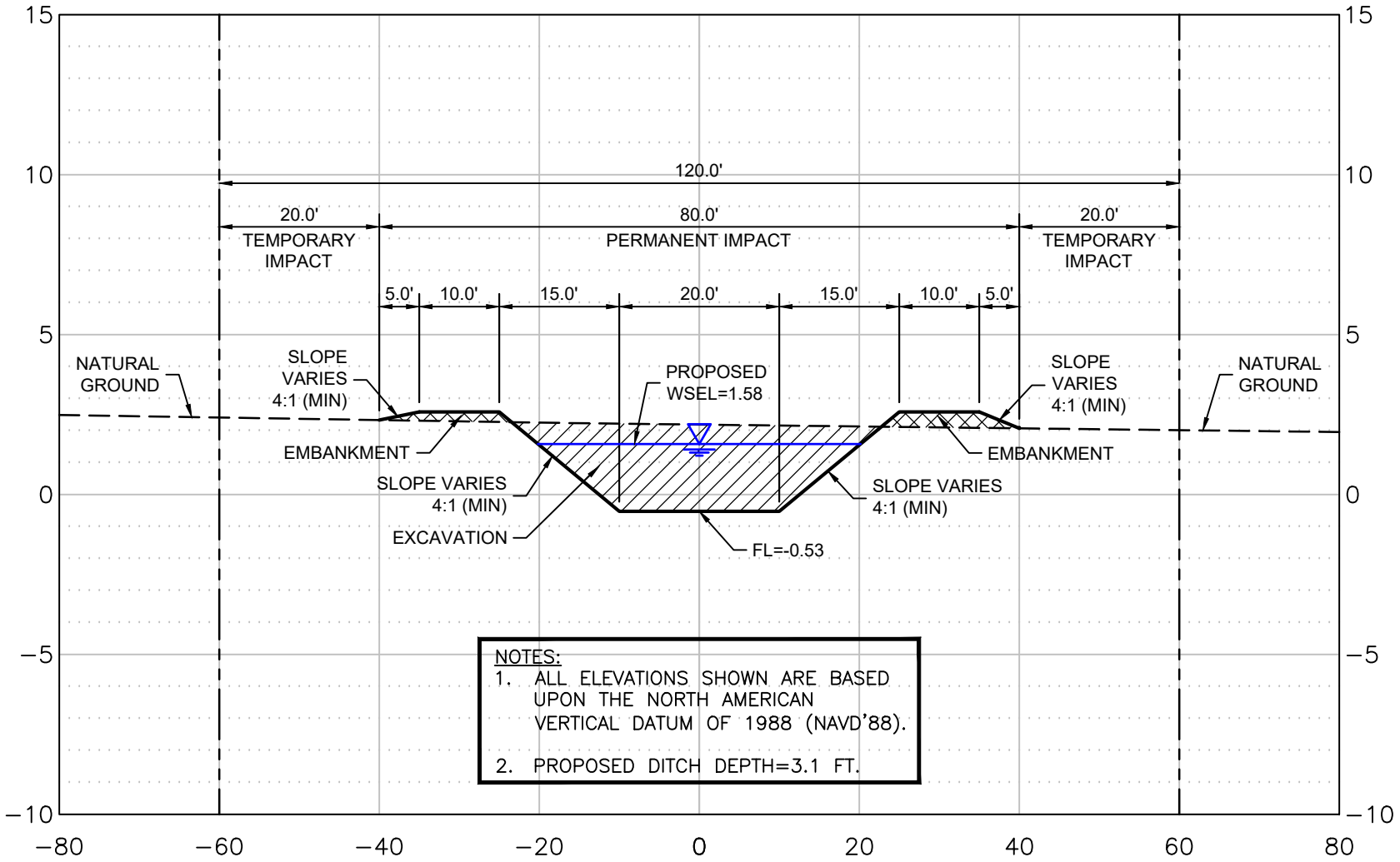
STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	22 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.1 FT.

STA. 24+00

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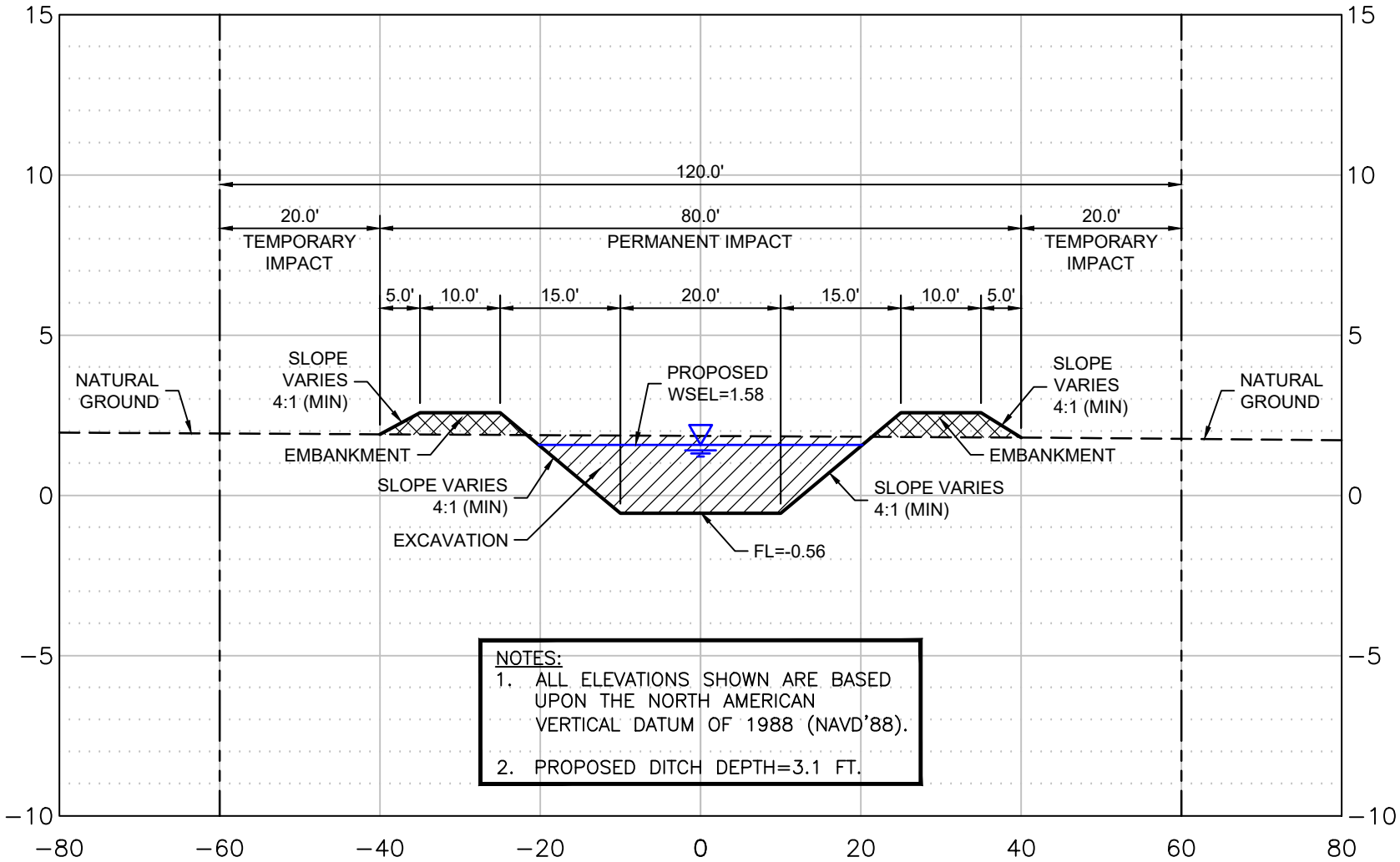
STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	23 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.1 FT.

STA. 25+00

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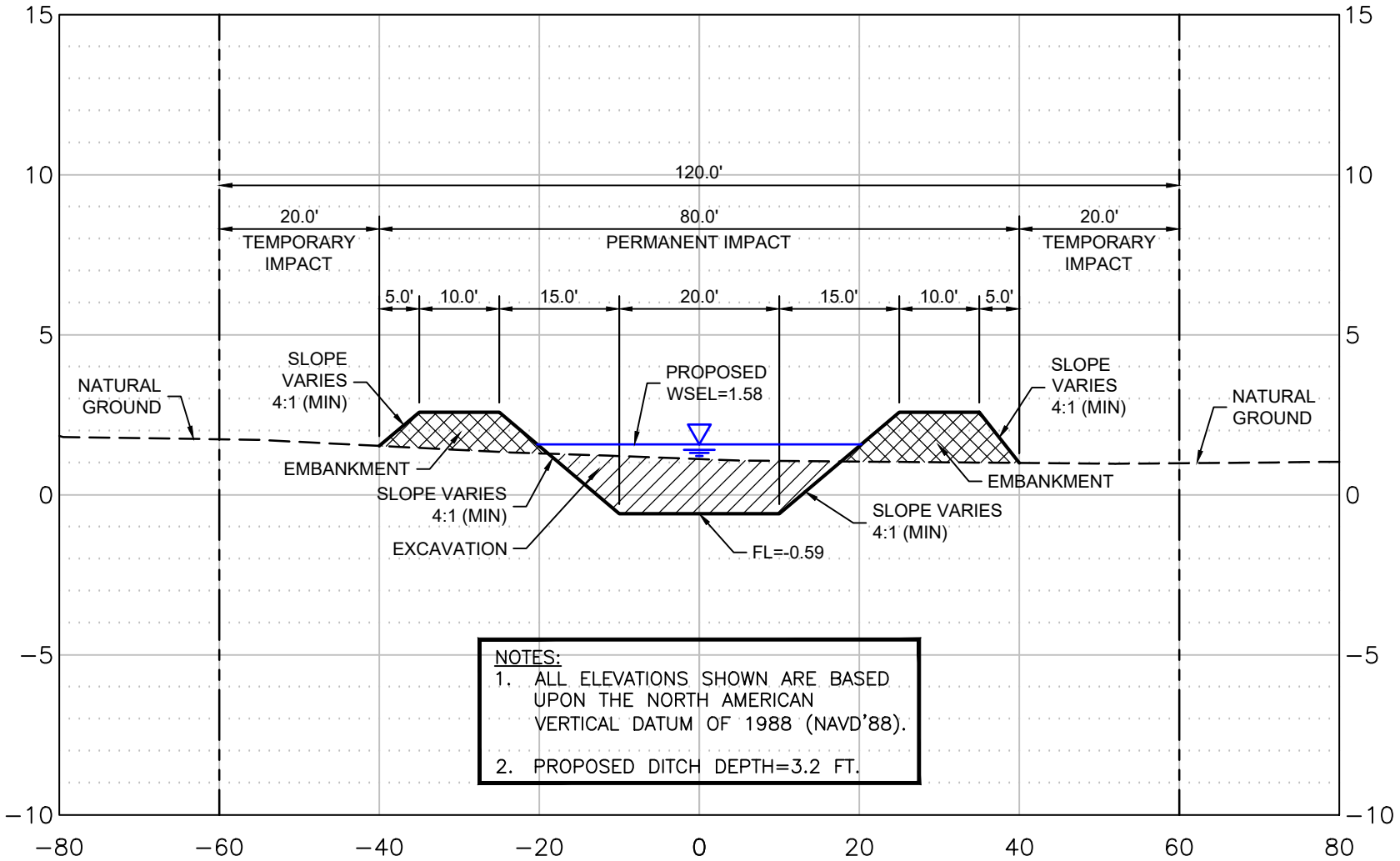
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE GULF INTRACOASTAL WATERWAY JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	24 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.2 FT.

STA. 26+00

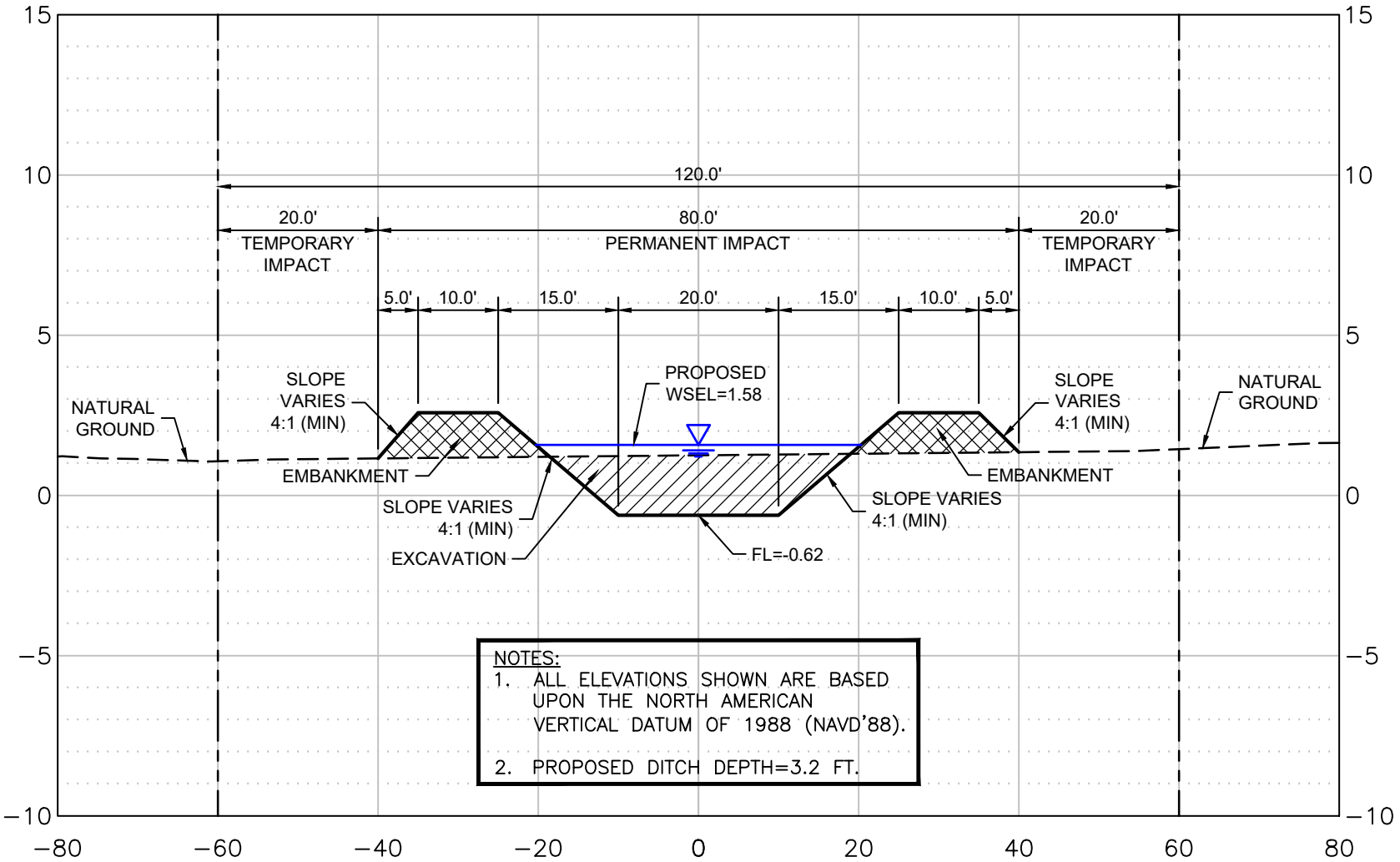
LJA Engineering, Inc.
2615 Calder Avenue, Suite 500
Beaumont, Texas 77702
Phone 409.833.3363
Fax 409.833.0317
FRN - F-1386

PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	25 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.2 FT.

STA. 27+00

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PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE GULF INTRACOASTAL WATERWAY JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
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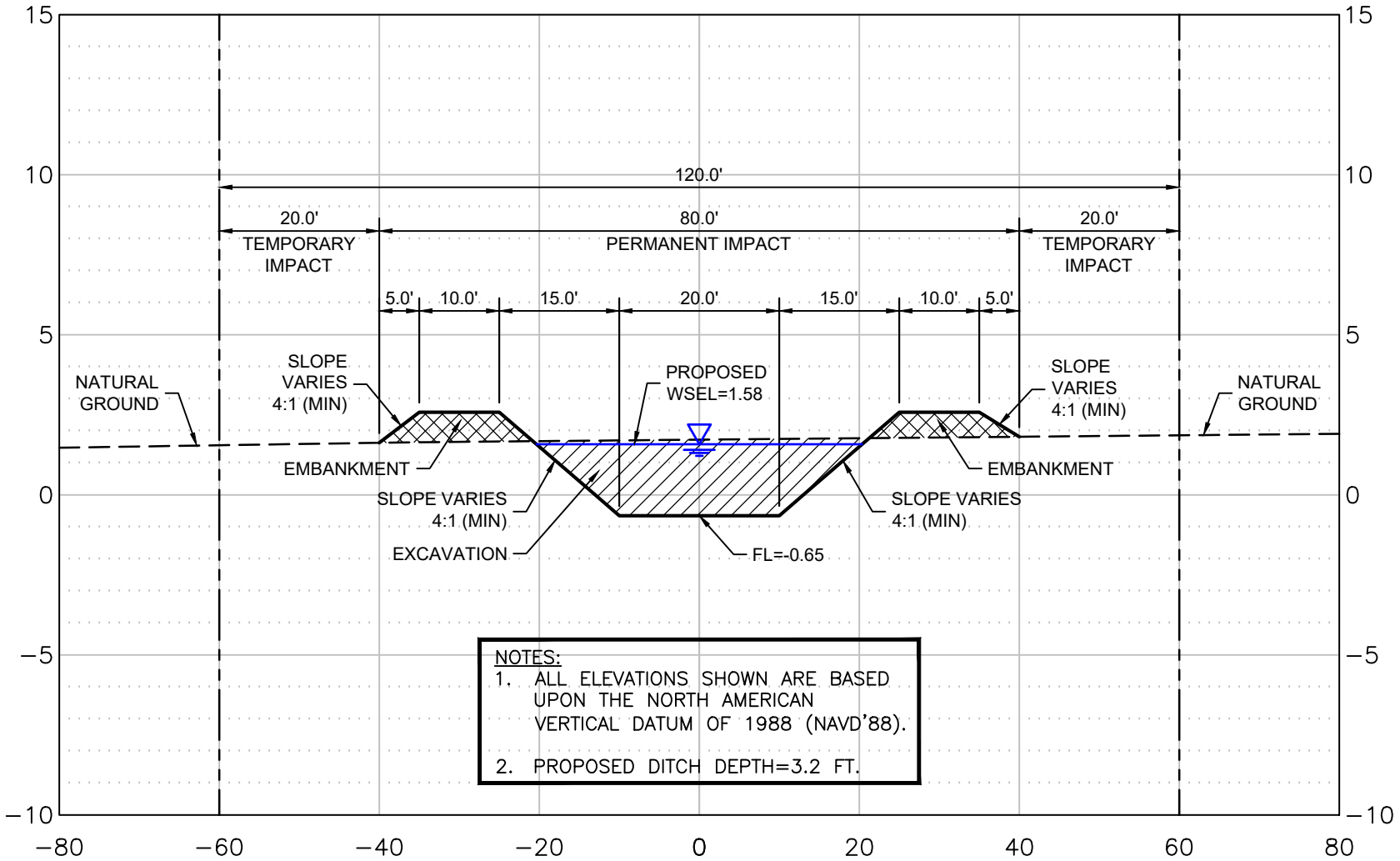
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	26 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.2 FT.

STA. 28+00

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DITCH CROSS SECTION

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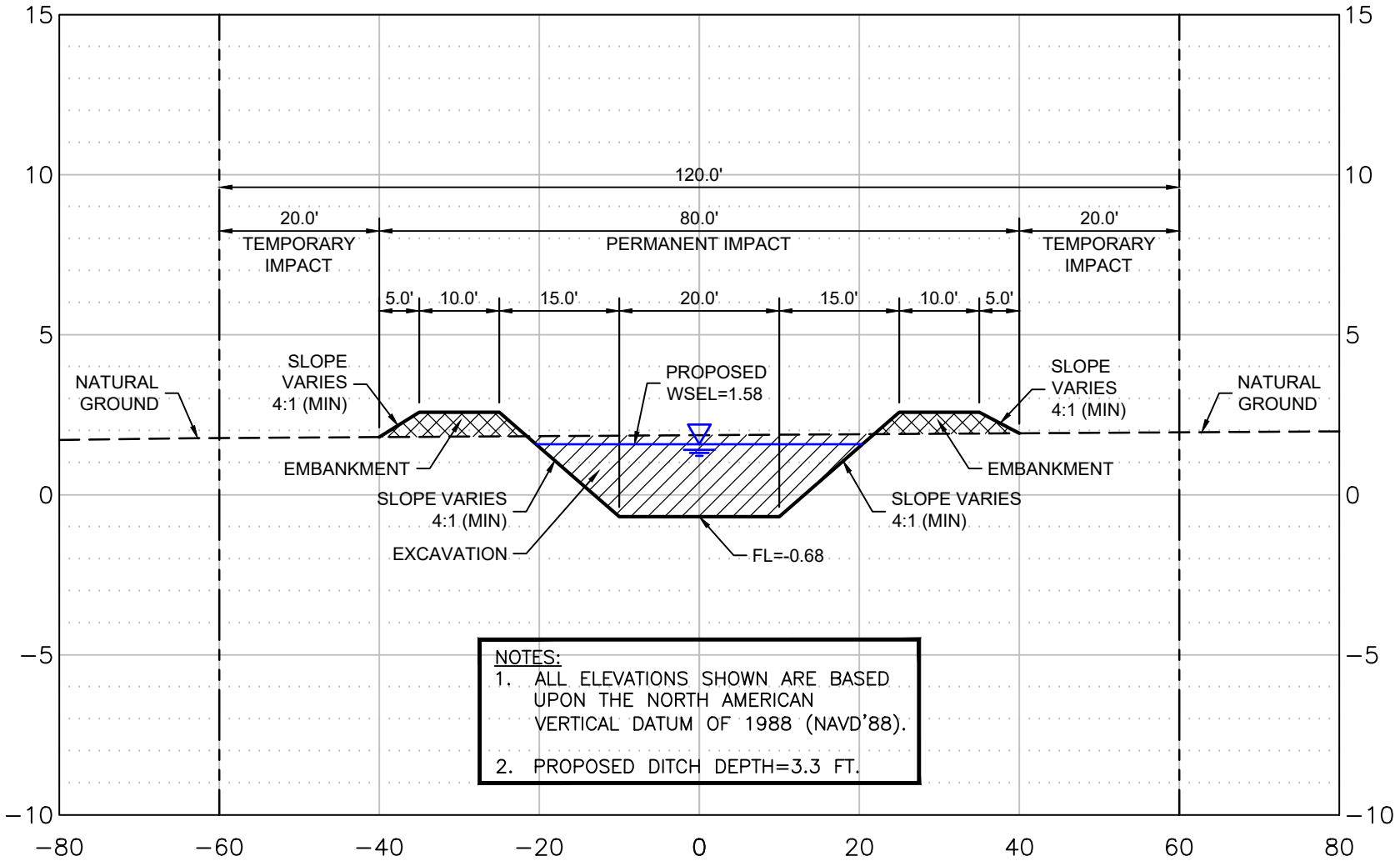
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	27 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.3 FT.

STA. 29+00

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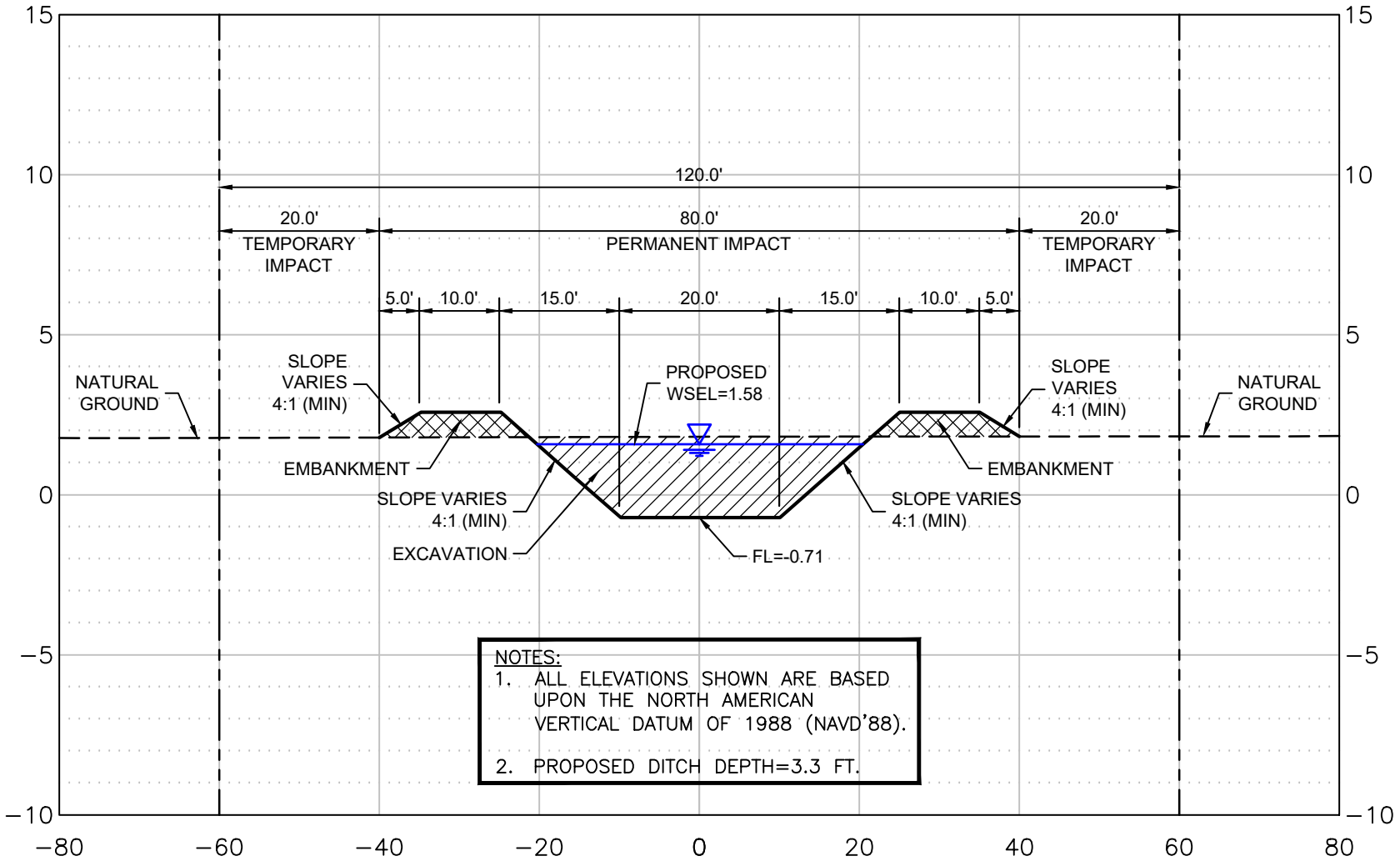
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	28 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.3 FT.

STA. 30+00

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STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
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Drawn	BDS	10/23
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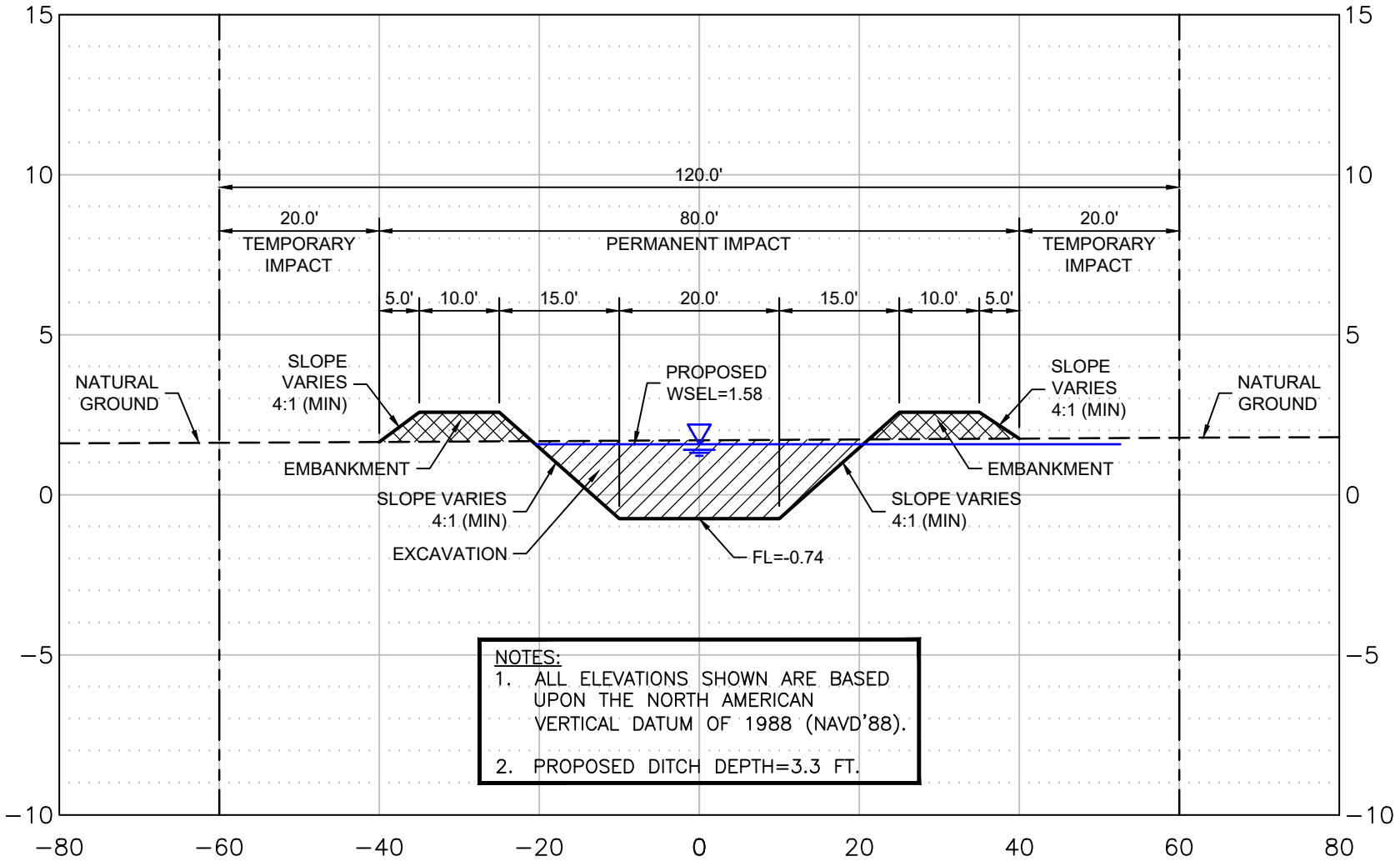
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	29 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.3 FT.

STA. 31+00

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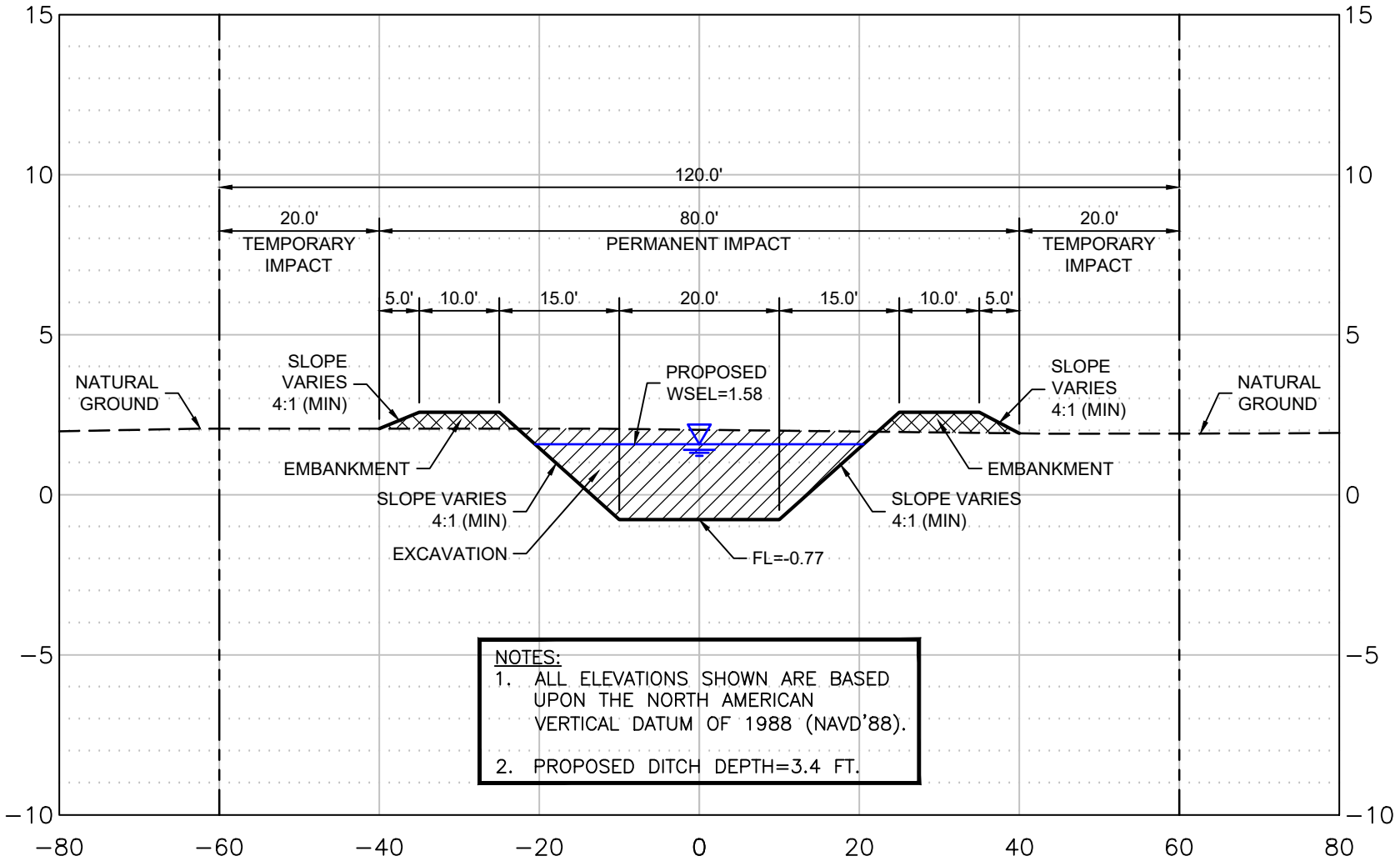
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	30 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.4 FT.

STA. 32+00

LJA Engineering, Inc.
2615 Calder Avenue, Suite 500
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FRN - F-1386

PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE GULF INTRACOASTAL WATERWAY JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	31 of 38	

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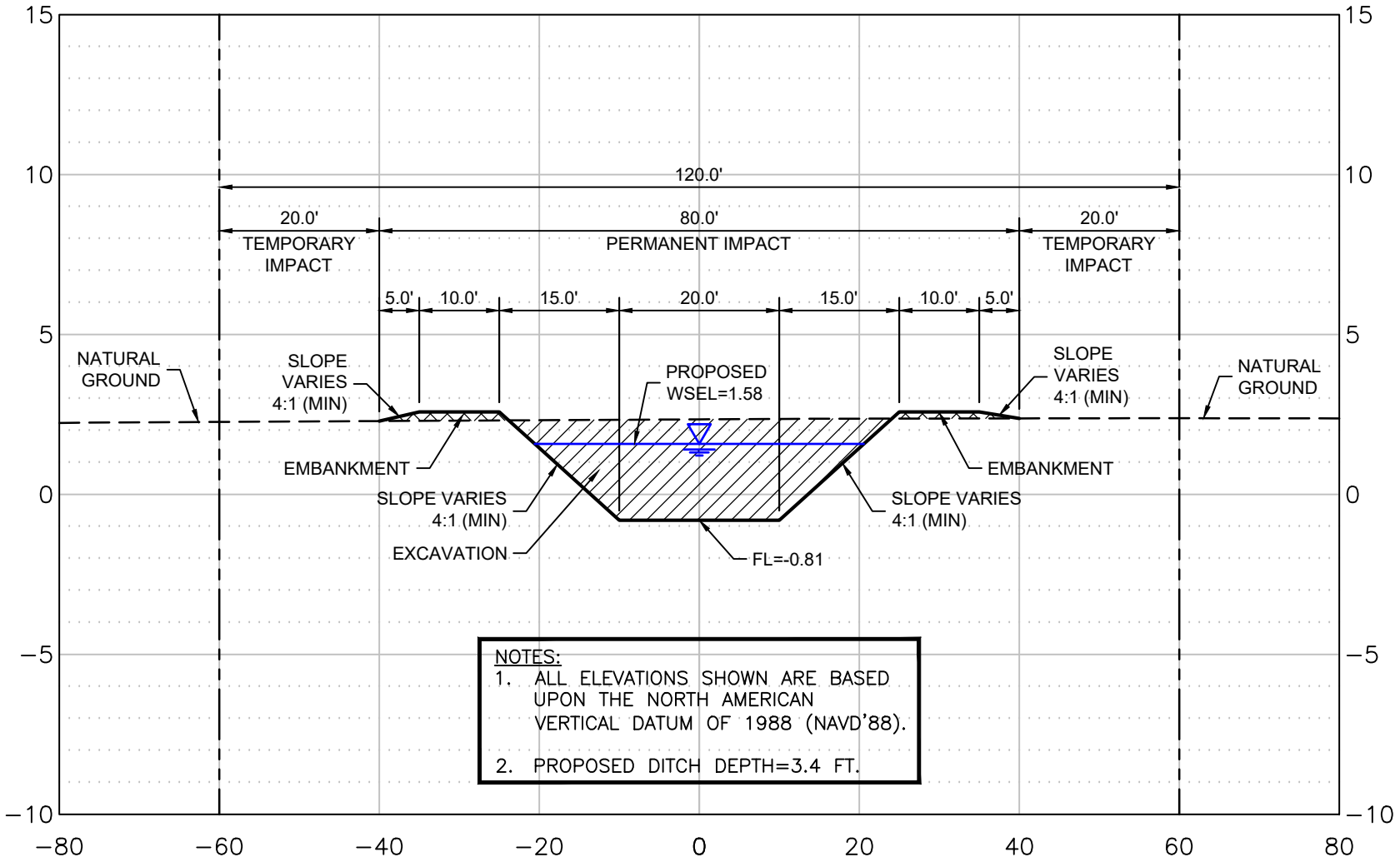

NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.4 FT.

STA. 33+00

LJA Engineering, Inc.
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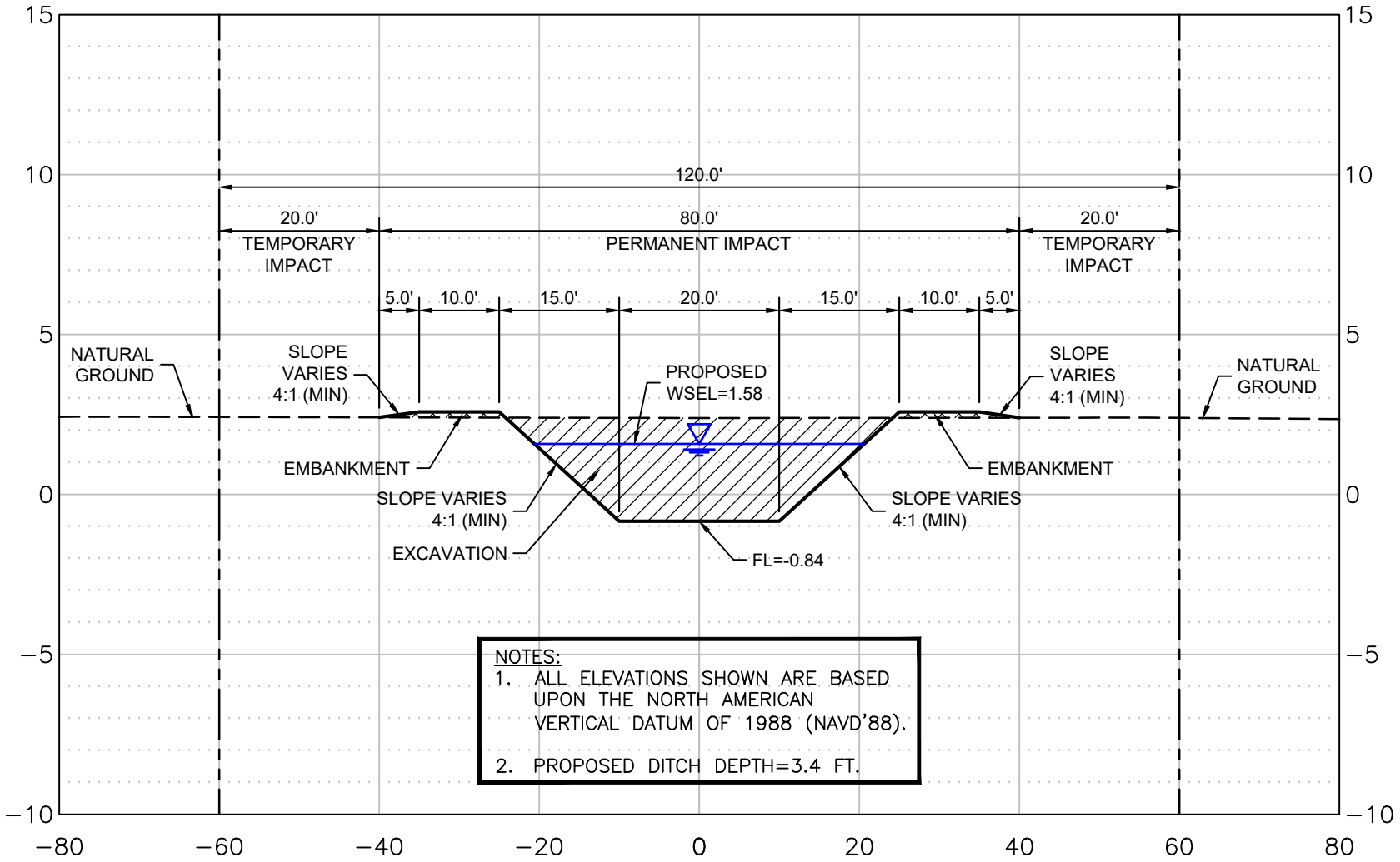
PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	32 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.4 FT.

STA. 34+00

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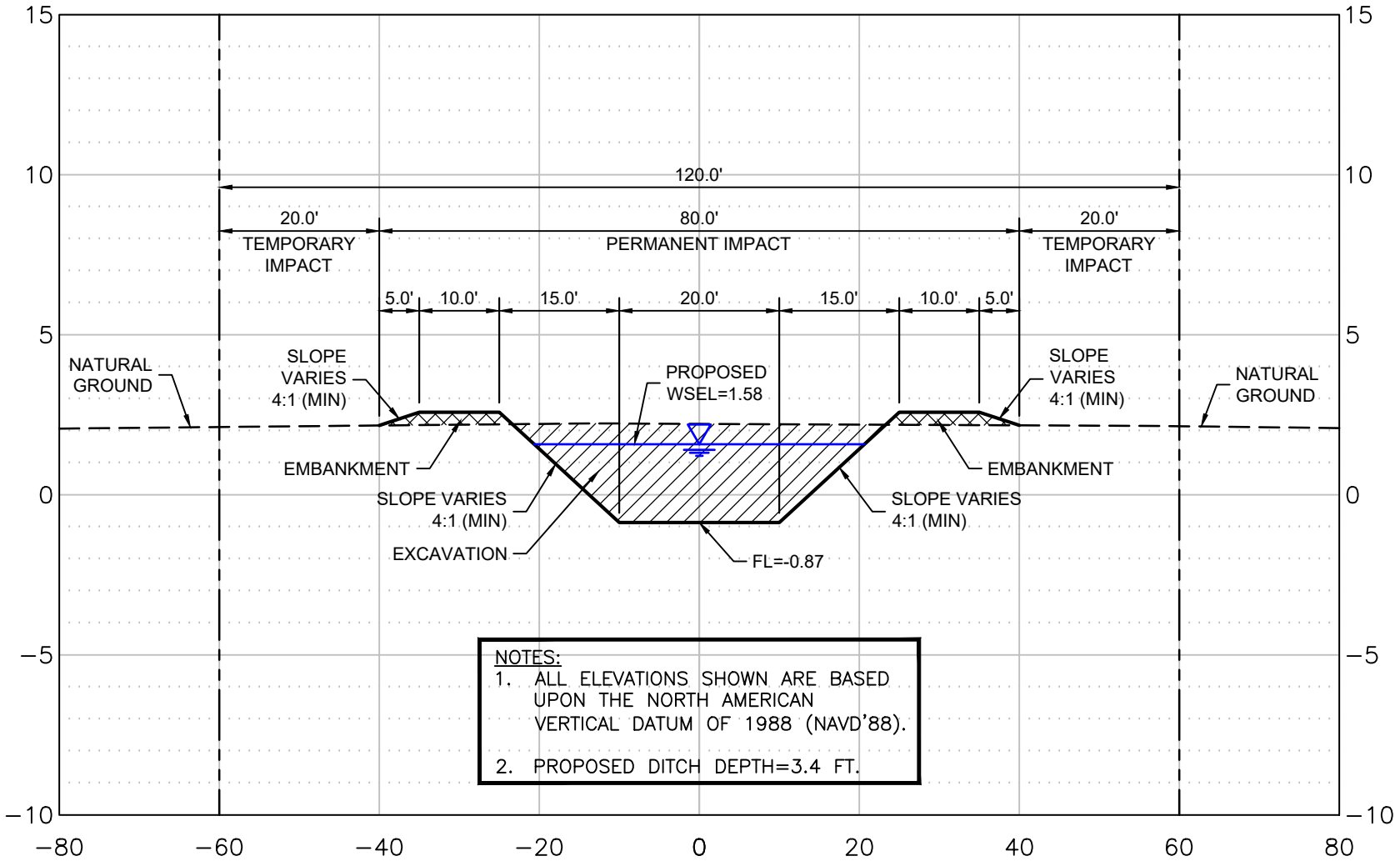
STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE GULF INTRACOASTAL WATERWAY JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	33 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.4 FT.

STA. 35+00

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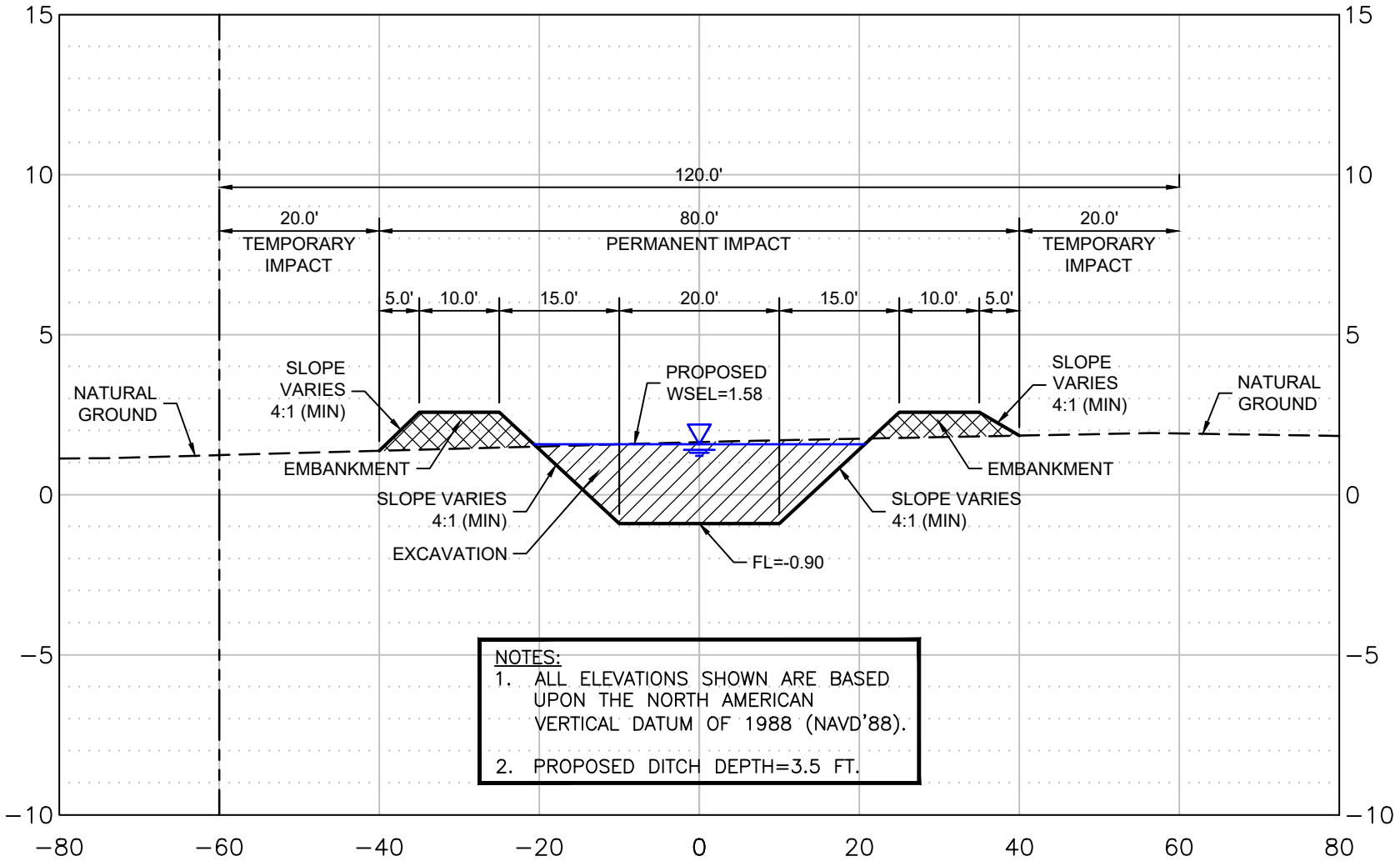
STAR LAKE
SIPHON CONTROL STRUCTURES & OUTFALL STRUCTURE AT STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	34 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.5 FT.

STA. 36+00

LJA Engineering, Inc.
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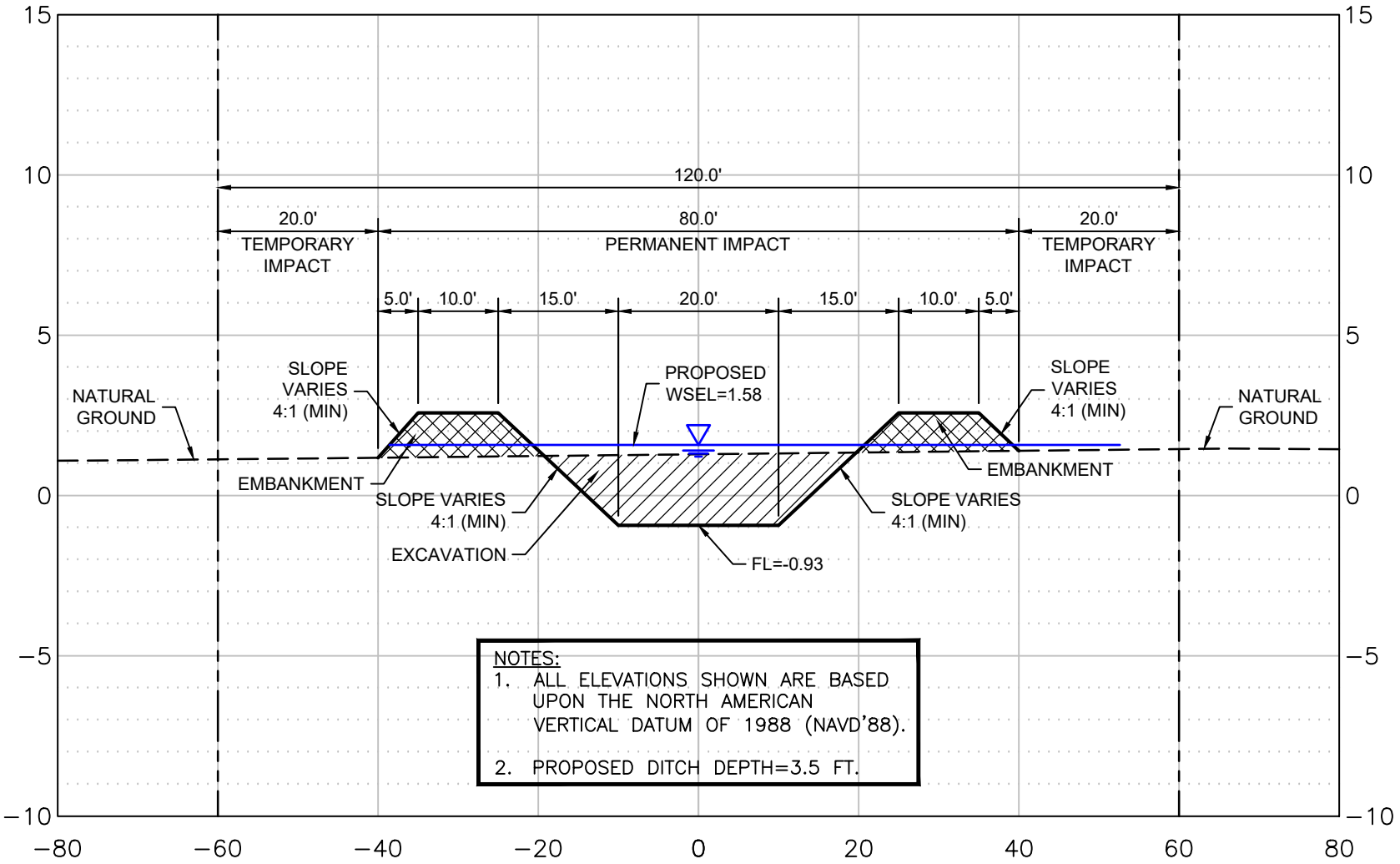
Fax 409.833.0317
FRN - F-1386

PLOT DATE: 11/22/2023

STAR LAKE
SIPHON CONTROL STRUCTURES &
OUTFALL STRUCTURE AT
STAR LAKE
GULF INTRACOASTAL WATERWAY
JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

Action	Name	Date
Design	VTD	10/23
Drawn	BDS	10/23
Approved	VTD	11/23
Last Revised	–	
Scale	HOR: 1"=20, VERT 1"=5'	
Sheet	35 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.5 FT.

STA. 37+00

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STAR LAKE
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DITCH CROSS SECTION

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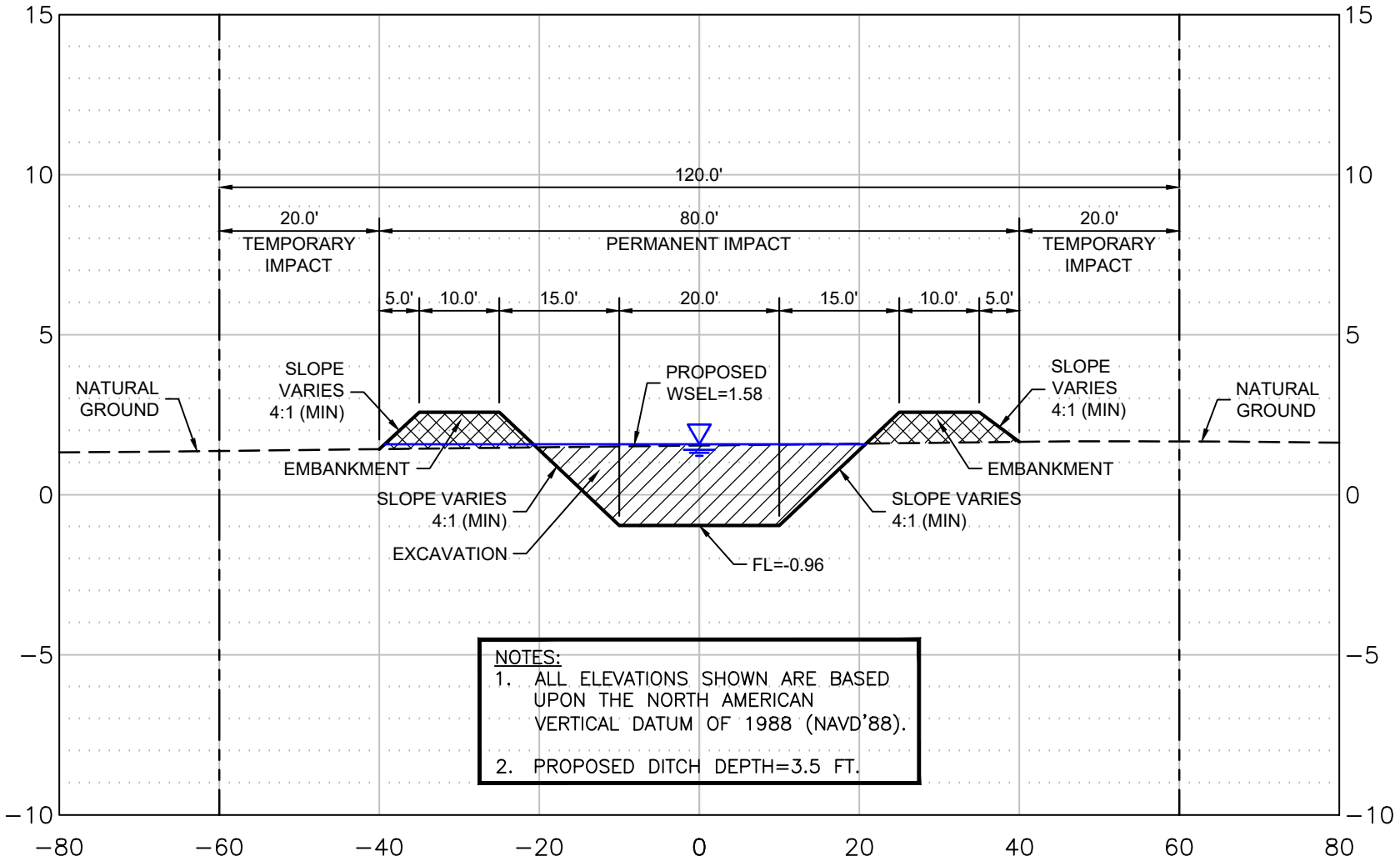
Sheet	36 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.5 FT.

STA. 38+00

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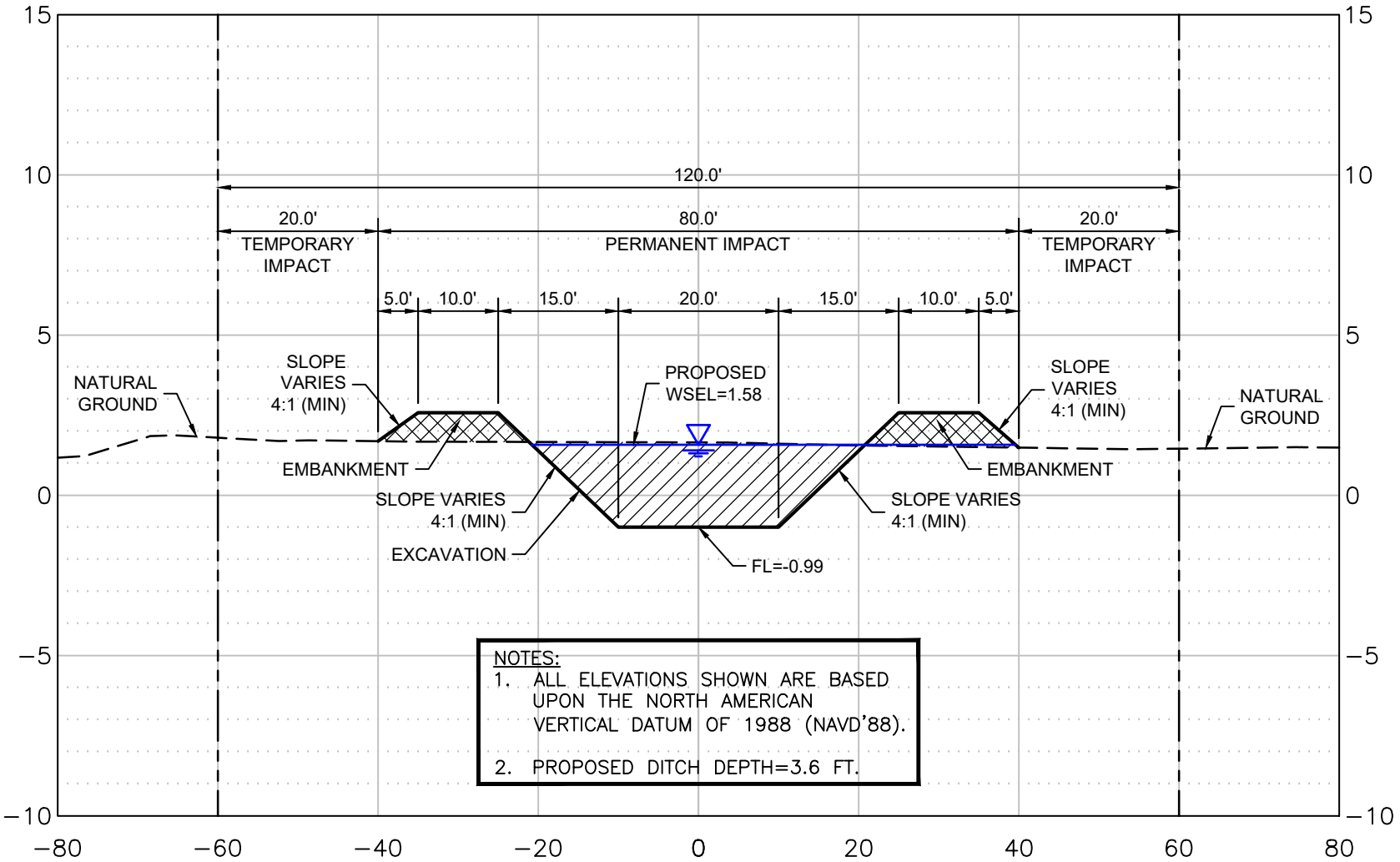
Sheet	37 of 38	

O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG



NOTES:
1. ALL ELEVATIONS SHOWN ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).
2. PROPOSED DITCH DEPTH=3.6 FT.

STA. 39+00

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JEFFERSON COUNTY, TEXAS
DITCH CROSS SECTION

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O:\PROJECTS LJA B000 - BXXX\B1275 - DUCKS UNLIMITED\B1275-1001 MCFADDIN NATIONAL WILDLIFE REFUGE STAR LAKE GIWW SIPHON\CADD\ACOE EXHIBITS\DU DITCH XSECS.DWG

APPENDIX B

Other Applicable Statutes, Executive Orders, & Regulations

APPENDIX B
OTHER APPLICABLE STATUTES, EXECUTIVE ORDERS & REGULATIONS

STATUTES, EXECUTIVE ORDERS, AND REGULATIONS	
Cultural Resources American Indian Religious Freedom Act, as amended, 42 U.S.C. 1996 – 1996a; 43 CFR Part 7 Antiquities Act of 1906, 16 U.S.C. 431-433; 43 CFR Part 3 Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa – 470mm; 18 CFR Part 1312; 32 CFR Part 229; 36 CFR Part 296; 43 CFR Part 7 National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470-470x-6; 36 CFR Parts 60, 63, 78, 79, 800, 801, and 810 Paleontological Resources Protection Act, 16 U.S.C. 470aaa – 470aaa-11 Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001-3013; 43 CFR Part 10 Executive Order 11593 – Protection and Enhancement of the Cultural Environment, 36 Fed. Reg. 8921 (1971) Executive Order 13007 – Indian Sacred Sites, 61 Fed. Reg. 26771 (1996)	Compliance with the National Historic Preservation Act of 1966, as amended, requires identification of all NRHP-listed or NRHP-eligible properties in the project's Area of Potential Effect (APE) and development of mitigation measures for those resources adversely affected in coordination with the Texas State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation. The State Historic Preservation Officer (SHPO) of the Texas Historical Commission is responsible for overseeing Section 106 consistency within the State of Texas. DESCO completed a file search of known archaeological and historic resources within the project area. This assessment was based on a search of the site files at the Texas Archaeology Research Laboratory (TARL). USFWS consulted with the SHPO with regard to potential impacts to cultural resources. The SHPO concurred that the project would have no effect to cultural resources on May 16, 2024.
Fish & Wildlife Endangered Species Act of 1973, as amended, 16 U.S.C. 1531-1544; 36 CFR Part 13; 50 CFR Parts 10, 17, 23, 81, 217, 222, 225, 402, and 450 Fish and Wildlife Act of 1956, 16 U.S.C. 742 a-m Migratory Bird Treaty Act, as amended, 16 U.S.C. 703-712; 50 CFR Parts 10, 12, 20, and 21 Executive Order 13186 – Responsibilities of Federal Agencies	Interagency consultation procedures under Section 7 of the Endangered Species Act were satisfied on March 25, 2025 on listed species under the jurisdiction of the USFWS. The Fish and Wildlife Coordination Act directs Federal agencies to consult with USFWS, NMFS, and State agencies before authorizing alterations to water bodies, for any purpose, including navigation, and by any public or private agency under Federal permit or license. USFWS, NMFS, and TPWD are being provided copies of this Draft EA for review and comment. There should be no adverse impacts to migratory birds, as the project would be constructed within a small footprint, away from any rookeries, and avoiding T&E habitat. Should birds be displaced by noise or presence of crews during operations, there is a multitude of adjacent suitable habitat for them to move into.

to Protect Migratory Birds, 66 Fed. Reg. 3853 (2001)	
Natural Resources Clean Air Act, as amended, 42 U.S.C. 7401-7671q; 40 CFR Parts 23, 50, 51, 52, 58, 60, 61, 82, and 93; 48 CFR Part 23 Executive Order 13112 – Invasive Species, 64 Fed. Reg. 6183 (1999)	The Clean Air Act (CAA) contains provisions under the General Conformity Rule to ensure that actions taken by Federal agencies in air quality nonattainment and maintenance areas do not interfere with a state's plans to meet national standards for air quality. Under the General Conformity Rule (the Rule), Federal agencies must work with State, Tribal and local governments in a nonattainment or maintenance areas to ensure that Federal actions conform to the air quality plans established in the applicable state or tribal implementation plan. The regulations codifying the Rule under 40 CFR Part 93, Subpart B, specify that no Federal agency shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan. Construction emissions would be minimal and would not adversely affect air quality. Construction equipment would be washed prior to entry into the area to prevent the spread of invasive species.
Water Resources Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et seq.; 15 CFR Parts 923, 930, 933 Federal Water Pollution Control Act of 1972 (commonly referred to as Clean Water Act), 33 U.S.C. 1251 et seq.; 33 CFR Parts 320-330; 40 CFR Parts 110, 112, 116, 117, 230-232, 323, and 328 Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.; 33 CFR Parts 114, 115, 116, 321, 322, and 333 Executive Order 11988 – Floodplain Management, 42 Fed. Reg. 26951 (1977) Executive Order 11990 – Protection of Wetlands, 42 Fed. Reg. 26961 (1977)	Submerged tracts of land owned by the State of Texas and administered by the Texas General Land Office (GLO) are not present adjacent to the project area. Texas Coastal Management Program (CMP) Consistency statements were submitted to the USACE as part of permit application. The USFWS will obtain any necessary permissions from the GLO to construct the siphon project. The proposed action has been analyzed for compliance with Executive Order (EO) 11990, Protection of Wetlands and 11988, Floodplain Management. The project would help to protect wetlands that offer flood protection to interior areas and, therefore, any impacts to floodplains as a result of the proposed action would be beneficial. State water quality certification through Section 401 of the Clean Water Act will be obtained from the Texas Commission on Environmental Quality through the USACE permit process. The Clean Water Act (Section 404) and Rivers and Harbors Act (Section 10) afford protection of non-tidal and tidal waters of the United States. The USFWS applied for a USACE Permit for construction of the Star Lake GIWW Siphon Project (SWG-2024-00766) from the USACE Galveston District. The applicant will comply with the terms and conditions of the USACE permit.

APPENDIX C
NMFS Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
McFaddin National Wildlife Refuge
5638 Clam Lake Rd./P.O. Box 358
Sabine Pass, TX 77655
Phone: (409) 971-2909 Fax: (409) 971-2104

April 8, 2024

Charrish Stevens
Fishery Biologist, Habitat Conservation Division
NOAA National Marine Fisheries Service (NMFS)
4700 Ave U
Galveston, TX 77551

RE: Essential Fish Habitat Consultation Request
McFaddin National Wildlife Refuge– Star Lake GIWW Siphon Project

Dear Ms. Stevens,

The US Fish and Wildlife Service proposes to construct a siphon system on McFaddin National Wildlife Refuge (NWR), connecting Big Reservoir, north of the Gulf Intracoastal Waterway (GIWW). The Star Lake GIWW Siphon Project is located within Jefferson County, TX, adjacent to the Gulf Intracoastal Waterway (GIWW), approximately 16.1 miles northeast of High Island, Texas, and approximately 1 mile east of Spindletop Gully on the GIWW.

The purpose of this project will be to redirect water to improve reservoir management on the north side of the GIWW to meet migrating waterfowl needs, as well as significantly improve marsh conditions on the south side of the GIWW in the refuge that have deteriorated through time as a result of saltwater intrusion exacerbated by dissection of the landscape with the creation of the GIWW. This project will result in significant flows of freshwater being reintroduced into the Salt Bayou system at its upper end and working its way through the watershed, mimicking historic flows and restoring historic salinity gradients.

Ducks Unlimited (DU) will construct the project for USFWS. This project is funded through Additional Supplemental Appropriations for Disaster Relief Act, 2019 (PL 116-20). DESCO Environmental Consultants, LP (DESCO) has been contracted by Ducks Unlimited (DU) and is authorized by DU and USFWS to obtain regulatory clearances for the project.

DESCO conducted a review of Essential Fish Habitat (EFH) in the project area on behalf of USFWS. Based on review of the NOAA Inland Fisheries Essential Fish Habitat Mapper available at https://efhtools.github.io/InlandEFH/Mapper.html, areas mapped as Inland Essential Fish Habitat (EFH) for brown, pink, and white shrimp; red drum; Spanish mackerel; red grouper, goliath grouper, gray grouper, yellowmouth grouper; cobia; and lane snapper, with varying life stages for each species, are present within the Star Lake GIWW Siphon project.

It is our understanding that consultation with NMFS under the Magnuson-Stevens Act with regard to EFH is required because our project area contains EFH and has a federal nexus. We are providing the following information to initiate consultation under the Magnuson-Stevens Act with regard to Essential Fish Habitat:

1. Project Description (below)
2. Essential Fish Habitat Determination (below)
3. 8.5 x 11 drawings showing the project's location and design (**Attachment A**)

Project Description

The siphon will consist of four high density polyethylene pipes with a diameter of 36" directionally bored and placed underneath the GIWW well below the mudline. The total boring and pipe length is expected to be approximately 850 linear feet. Inflow and outflow structures will be constructed to facilitate the flow of freshwater on the north and south sides of the GIWW. To properly distribute water into the southern portions of Salt Bayou and to Star Lake, a 2,600-foot linear ditch will be excavated within the Star Lake Unit of McFaddin NWR. This distribution ditch connects directly with the downstream outfall siphon structure and travels south and southwest toward Star Lake. The ditch will have a width of 50 to 80 inches and depth of 4.8 to 3.5 inches, becoming wider and shallower as the ditch flows south. The proposed ditch will have a minimum of 4:1 and 3:1 varying side slope.

Water levels on the northern portion of the GIWW are 12 to 18 inches above that of the southern portion, creating sufficient head pressure to move water through the siphon structure. The flow capacities for each placed pipe were calculated to be 30 cubic feet per second (cfs) with a freshwater head of +0.5 feet, and 100 cfs with a freshwater head of +3.0 feet.

The upstream siphon structure will consist of a ditch lined with an articulated concrete mat with filter fabric that feeds into the siphon openings. This ditch will be 35.8 feet wide and 86.47 feet long with a 3:1 side slope. Sheet pile will outline 86.47 feet of the southern edge of the structure, with gaps formed around the four siphon openings which are reinforced with 6-inch x 6-inch posts, cement stab, and backfilled to match the structure elevation.

The downstream siphon structure will consist of 65 feet of sheet pile outlining the northern edge of the structure, with gaps formed around the four siphon openings which are reinforced with 6-inch x 6-inch posts, cement stab, and backfilled to match the structure elevation. There will be a 10-foot-wide x 75-foot-long articulated concrete mat with filter fabric slab directly downstream of the siphon discharge points to prevent scouring. Tied into this slab will be the start of the water distribution ditch.

Temporary staging areas will be required for material and equipment storage. The north laydown area will allow the contractor to fuse the HDPE pipes together before directionally drilling them under the GIWW. To construct the outfall ditch, temporary timber mats will be placed abutting the western portion of the project area footprint to allow easy movement of construction equipment and to avoid the nearby pipeline.

Allowing freshwater to flow once again with this project will improve reservoir management on the north side of the GIWW to meet migrating waterfowl needs. Additionally, significant improvements in marsh conditions are expected on the south side of the GIWW which is experiencing advanced degradation due to saltwater intrusion exacerbated by the dissection of the landscape with the creation of the GIWW. This project will result in significant flows of freshwater being reintroduced into the

Salt Bayou system at its upper end and this water will flow its way through the watershed, mimicking historic flows and restore historic salinity gradients.

Construction drawings are included in **Attachment A.**

Essential Fish Habitat Determination

Direct Impacts

Project construction would have short-term, adverse effects as well as long-term beneficial effects on EFH and fisheries that are managed by NMFS in the project area. Larger, mobile species would likely avoid the area for the duration of project construction, avoiding injury or mortality. However, less mobile benthic species may be injured or killed as a result of excavation of the linear ditch within the Star Lake Unit of MNWR. Permanent impacts to EFH would include the conversion of approximately 3.889 acres of estuarine wetlands into open water that would flow north to south into Star Lake. The project would also temporarily impact an additional 2.862 acres of EFH during construction. The direct impacts through habitat conversion would, in the long term, be beneficial to the Star Lake and the Salt Bayou watersheds by restoring the flow of freshwater into these regions that have been separated from the northern marshes above the GIWW for decades. In turn, those species that rely on a regulated salinity from freshwater inputs would be able to thrive in optimal conditions.

Indirect Impacts

Once the proposed Star Lake Siphon project is completed, beneficial indirect effects on water quality and habitat are anticipated as a result of increased freshwater flows into Star Lake and the Salt Bayou watershed. This will allow the created and enhanced habitat to stabilize and provide vegetated marsh habitat that will increase quality foraging habitat and nursery grounds for the aquatic species that use those habitats.

Cumulative Impacts

This project is only one of several projects that will cumulatively protect, restore, and improve habitat for aquatic and terrestrial species within Texas Chenier Plain National Wildlife Refuge Complex (Refuge Complex). Other projects implemented and/or planned by USFWS include restoring or repairing various levees and water control structures within the Refuge Complex; constructing breakwaters in the GIWW to protect the shorelines of Anahuac, McFaddin, and Moody NWRs; and beneficially using dredged material to restore and enhance eroded and degraded interior marsh habitat.

Conclusion

Construction of the Star Lake Siphon Project will temporarily impact EFH used by managed fish species. The proposed project would produce short-term, localized impacts on EFH for all fisheries that are managed by NMFS in the project area, including three species of shrimp, red drum, Spanish mackerel, three species of grouper, two species of snapper, and cobia. Long-term impacts include the conversion of approximately 3.889 acres of estuarine wetlands into open water and enhancement of 60,000 acres of marsh, waterways, and EFH within the Salt Bayou watershed.

USFWS believes that the long-term benefits of the project on EFH and managed species will far exceed the short-term, adverse effects, as the project would create, improve, and/or help to preserve thousands of acres of estuarine wetland habitat suitable for all life stages of fish and shellfish.

Based on the discussion above, we have determined the project would not have any substantial adverse effects on federally managed fishery species, or EFH. Conversely, the project is expected to improve EFH over the longer term for all species in the assessment.

We request concurrence with the above determination. If you have any questions or would like additional information, please feel free to contact me at (409) 971-2909 or via email at douglas_head@fws.gov. Additionally, if you could copy Tanya Matcek of DESCO in on all correspondence at tmatcek@descoenv.com it would be greatly appreciated.

Sincerely,

DOUGLAS HEAD Digitally signed by DOUGLAS HEAD
Date: 2024.04.09 15:24:43 -05'00'

Douglas Head
McFaddin National Wildlife Refuge Manager

Attachment A: Construction Drawings

From:	charrish stevens - NOAA Federal
To:	Head, Douglas; _NMFS ser HCDconsultations
Cc:	Rusty Swafford - NOAA Federal; Tanya Matcek; ernie_crenwelge@fws.gov; Cooper, Tim
Subject:	Re: Consultation Request - McFaddin NWR, Star Lake Siphon Project
Date:	Monday, April 22, 2024 4:23:41 PM

Hello Doug,

The National Marine Fishery Service (NMFS) Habitat Conservation District has received your email dated April 8, 2024, requesting Essential Fish Habitat (EFH) Coordination on the following proposed project located along the Gulf Intracoastal Waterway (GIWW) shoreline at the McFaddin National Wildlife Refuge in Jefferson County, TexasTX.

- Star Lake GIWW Siphon Project

The NMFS has reviewed the proposed project, project plans, and EFH assessment under the provisions of theMagnuson-Stevens Fishery Conservation and Management Act. We concur the project will have minimal adverse effects to EFH or managed species and would provide an overall net benefit to the EFH in the area by restoring freshwater inflow to Star Lake and its associated wetland habitats . Therefore, we have no objections to the issuance of this permit. This concludes the EFH consultation with NMFS and no further information is required.

We appreciate your coordination with our office on this project. If you have any additional questions or require additional information, please feel free to contact me via email.

Thank you for your coordination,

Charrish Stevens
Fishery Biologist
Habitat Conservation Division
NOAA National Marine Fisheries Service
4700 Ave U, Galveston, TX 77551

Currently Teleworking contact at
Mobile Number: 713-715-9613

Office Ph: (409) 766-3699
Fax: (409) 766-3575
Email: charrish.stevens@noaa.gov

On Mon, Apr 15, 2024 at 12:29 PM Head, Douglas <douglas_head@fws.gov> wrote:

> Hello Charrish
>
> Please see attached National Marine Fisheries Service Essential Fish Habitat (NMFS EFH) Consultation Request and construction drawings referenced as Attachment A for the Star Lake Siphon Project located on McFaddin National Wildlife Refuge. Please let me know if you have any other questions.

Thanks for your time.

Douglas Head
Refuge Manager
McFaddin National Wildlife Refuge
U.S. Fish and Wildlife Service
(409) 971-2909

APPENDIX D

USFWS Intra-Service Section 7
Biological Evaluation Form

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Doug Head
McFaddin National Wildlife Refuge
Telephone Number: (409) 971-2909
Date: February 19, 2025

I. **Region**: Region 2

II. **Service activity**: McFaddin National Wildlife Refuge (MNWR) – Star Lake GIWW Siphon Project

III. **Pertinent species and habitat:**

A. **Listed species and/or their critical habitat within the action area:**

DESCO obtained a Species List for the Star Lake GIWW Siphon Project Area from the USFWS ECOS-IPaC system on December 9, 2024 to determine threatened and endangered species with potential for occurrence within the project area (Project Code: 2025-0029230). Based on this information, the following federally listed threatened and endangered species have potential for occurrence:

Piping plover (*Charadrius melodus*) - T
Red knot (*Calidris canutus rufa*) – T
Eastern black rail (*Laterallus jamaicencis jamaicensis*) - T
Whooping crane (*Grus americana)* - E
Green sea turtle (*Chelonia mydas)* - T
Hawksbill sea turtle (*Eretmochelys imbricata*) - E
Kemp's ridley sea turtle (*Lepidochelys kempii*) - E
Leatherback sea turtle (*Dermochelys coriacea*) - E
Loggerhead sea turtle (*Caretta caretta*) - T
West Indian manatee (*Trichechus manatus*) - T

B. **Proposed species and/or proposed critical habitat within the action area**:

Tricolored Bat (*Perimyotis subflavus*) - PE

C. **Candidate species within the action area**:

Monarch butterfly (*Danaus plexippus*) - C

IV. **Geographic area or station name and action**:
Station: Texas Chenier Plain NWR Complex, McFaddin NWR, Jefferson County, Texas.

Action: The proposed Star Lake GIWW Siphon Project will restore the historic freshwater flow/recharge between the north and south portions of the 60,000-acre Salt Bayou watershed that has been interrupted by the GIWW. The siphon will consist of four high density polyethylene pipes with a diameter of 36" directionally bored and placed underneath the GIWW well below the mudline. The total boring and pipe length is expected to be approximately 850 linear feet. Inflow and outflow structures will be constructed to facilitate the flow of freshwater on the north and south sides of the GIWW. This project will allow freshwater to flow once again and will improve reservoir management on the north side of the GIWW to meet migrating waterfowl needs. Additionally, significant improvements in marsh conditions are expected on the south side of the GIWW which is experiencing advanced degradation due to saltwater intrusion exacerbated by the dissection of the landscape with the creation of the GIWW. This project will result in significant flows of freshwater being reintroduced into the Salt Bayou system at its upper end and this water will flow its way through the watershed, mimicking historic flows and restore historic salinity gradients.

V. Location (attach map): See maps in **Attachment A.**

A. Ecoregion Number and Name: Southeastern Mixed Forest Province (231)

B. County and State: Jefferson County, Texas

C. Section, township, and range (or latitude and longitude):

North End:	29° 41' 32.563" N
	94° 10' 4.914" W
South End:	29° 40' 51.646" N
	94° 10' 7.248" W

D. Distance (miles) and direction to nearest town:

McFaddin National Wildlife Refuge (MNWR) is part of the Texas Chenier Plain NWR Complex. The Refuge entrance is approximately 25 miles south-southwest of the Beaumont-Port Arthur metro area. MNWR begins approximately 12 miles west-southwest of the town of Sabine Pass, with its southern boundary following the coastal beach boundary along the Gulf of Mexico, southwest to the town of High Island, where the majority of the northern boundary of the Refuge follows along the Gulf Intracoastal Waterway (GIWW). A smaller portion of the Refuge resides northeast of the GIWW in the vicinity of Willow Slough Marsh.

E. Species/habitat occurrence:

Sea turtles and manatees would be transient and confined to the coastal waters of the Refuge. There is no suitable sea turtle nesting habitat within the project area, and no sea turtles or manatees have ever been documented in interior MNWR. Chances of these species occurring in the project area are discountable due to the extremely shallow water

levels, tidal mud flats, and vegetated freshwater marshes an individual would have to navigate to reach the project sites.

Piping Plovers and Red Knots have been seen using the beach areas on the Texas Chenier Plain NWR Complex. Piping Plovers have also been observed utilizing mud flat areas along the GIWW, however these species would not utilize the uplands, wetlands, or open water habitat within the project area.

The Eastern Black Rail occurs within the Texas Chenier Plain NWR Complex year-round and could be present in persistent emergent wetland areas. There is currently no suitable Eastern Black Rail habitat within the project area due to recent fire and maintenance mowing activities.

The monarch butterfly, a candidate species, could be present in the project area during construction; however, suitable habitat within the project footprint is extremely limited.

Tricolored bats require forested areas or cave/manmade structures for roosting and hibernation. No such suitable habitat is present within the project's APE. Transient migrating or feeding bats could occur within the Refuge at certain times of the year.

There is no designated critical habitat or proposed critical habitat for any protected species located within the MNWR boundary nor within the action area considered herein.

VI. Description of proposed action:

The Star Lake GIWW Siphon Project on McFaddin NWR will restore freshwater flows from the north side of the GIWW to the south side of the GIWW in the 60,000-acre Salt Bayou watershed in southern Jefferson County. Natural freshwater flow in this system was cut off when the GIWW was constructed. Under this project, a set of inverted siphons will be installed under the GIWW from Big Reservoir on the north side of the GIWW. The siphon system will consist of four 36" diameter high density polyethylene pipes, approximately 850 linear feet in length, to be bored under the GIWW at a safe depth, well below the mud line of the GIWW. Inflow and outflow require the construction of an added water conveyance ditch within the refuge on the south side of the GIWW. This ditch will be approximately 2,600-feet-long and will connect the siphon outlet to the Star Lake Unit of McFaddin NWR. From this Unit water will be diverted east into the project area via an existing water control structure on 5-mile cut and on into Clam Lake which feeds into the rest of the Salt Bayou system or can be diverted west across the Star Lake Unit near the western end of the watershed.

Inverted gravity flow siphons will work by taking advantage of water level differences between the north and south side of the GIWW. Water levels on the north side are 12-18 inches above water levels south of the GIWW. This will create a sufficient amount of head pressure to carry water and operate the siphons sufficiently.

The flow capacities for each siphon system are calculated to be 30 cfs with a freshwater head of +0.5' and 100 cfs with a freshwater head of +3.0'.

Temporary staging areas alongside the project will be required for material and equipment storage. The north side laydown area will allow the contractor to fuse the HDPE pipes together before directionally drilling them under the GIWW. To construct the outfall ditch, temporary timber mats will be placed alongside the western portion of the project area footprint to allow easy movement of construction equipment and to avoid a nearby pipeline.

The redirection of water with this project will improve reservoir management on the north side of the GIWW to meet migrating waterfowl needs, as well as significantly improve marsh conditions on the south side of the GIWW in the refuge that have deteriorated through time as a result of saltwater intrusion exacerbated by dissection of the landscape with the creation of the GIWW. This project will result in significant flows of freshwater being reintroduced into the Salt Bayou system at its upper end and working its way through the watershed, mimicking historic flows and restoring historic salinity gradients.

The project is expected to take approximately 12 months to construct.

VII. Determination of effects:

Explanation of effects of the action on species and critical habitats

A. Piping Plover

The Piping Plover, a federally listed threatened species, occurs along the Texas Gulf Coast in large wintering populations. Piping Plovers are normally only observed in small numbers wintering on the beaches and mudflats of the Texas Chenier Plain NWR Complex between October and March.

There is no suitable habitat or designated critical habitat for this species within the project's area of potential effect (APE).

Historically, McFaddin National Wildlife Refuge conducted some short duration population surveys consisting of two survey types, an annual full beach survey and a monthly survey that was done on select preferred habitat areas. The annual survey route was conducted during the middle of the Piping Plover wintering season on the Texas Gulf Coast (November), at low tide, and ran the entire length of the beach in the proposed area. For a project need on the beach bordering 3 miles of McFaddin National Wildlife Refuge, bi-monthly surveys were conducted on two main areas, one on the east end of the route and one on the west end of the route. These surveys were conducted from July-April from 2014 to 2016. Results from Dec 2014-April 2016 show an average of nine Piping Plovers on the McFaddin beach per survey. The McFaddin beach birds are approximately 7 miles from this project area.

No survey work has been conducted on McFaddin since 2016.

The project area is located approximately 2.8 miles from the Gulf beaches at its nearest point and 150 feet from the Gulf Intracoastal Waterway at its closest point. The nearest designated Critical Habitat is approximately 20 miles to the southeast in Louisiana at Sabine Pass.

We have analyzed the effects of the proposed action on the threatened Piping Plover and believe the project will have **no effect** on the species due to the lack of suitable habitat in the project area.

B. Red Knot

The Red Knot, listed as threatened under the Endangered Species Act, has the potential to occur within the Texas Chenier Plain NWR Complex during the migration and winter months. While sightings have been recorded within the Complex, information on these sightings is limited entirely to coastal beach areas. While there are records of Red Knot usage on mudflats in fresher water systems, occurrence within the project area is highly unlikely due to the lack of suitable habitat in the project's APE.

The Star Lake GIWW Siphon Project is located approximately 2.8 miles from the Gulf beaches at its closest point.

We have analyzed the effects of the proposed action on the threatened Red Knot and believe the project would have **no effect** on the species due to the lack of suitable habitat in the project area.

C. Sea Turtles

Three species of sea turtles, the Kemp's Ridley, leatherback, and hawksbill are federally listed as endangered, and two species, the loggerhead and green sea turtles, are federally listed as threatened. All five species occur in the nearshore Gulf of Mexico waters and the Kemp's ridley and green sea turtles can be found in East Bay adjacent to Anahuac NWR. The likelihood of presence is greater in the summer months than in the winter months. There is no suitable sea turtle nesting habitat within the Star Lake GIWW Siphon project area, so there is **no effect** under the consolation role of USFWS consultation.

Similarly, there would be **no effect** to any of the listed sea turtles under NMFS purview, as operations would not be conducted in waters deep enough to support sea turtle usage. Pipes would be directionally drilled under the GIWW and chances of sea turtles occurring in portions of the project area within the MNWR are discountable due to the extremely shallow water levels, tidal mud flats, and vegetated freshwater marshes an individual would have to navigate to reach the APE.

D. West Indian Manatee

The threatened West Indian manatee is most commonly found in shallow, slow-moving waters of rivers, estuaries, saltwater bays, canals, and coastal areas where it prefers freshwater and brackish habitats. West Indian manatees have never been documented in any waters within MNWR. Chances of these species occurring in the project area are discountable due to the extremely shallow water levels, tidal mud flats, and vegetated freshwater marshes an individual would have to navigate to reach the project sites.

There seem to be a few rare, documented occurrences or reports of manatees on the Upper Texas Coast. We reviewed a comprehensive work on distribution of manatees, namely *Manatee Occurrence in Northern Gulf of Mexico, West of Florida* (D. Fertl et al, 2005), which found 53 sightings, 8 carcasses, and documented 5 captures in Texas over a 151-year period (1853-2005). Most occurrences in Texas were south of the Matagorda Bay area. Schmidly and Bradley (2016) reported a manatee carcass found off of Bolivar with no specific location. It is possible this is the same badly decomposed manatee carcass that was found in 2016 on McFaddin Beach near Perkins Levee. This is an area that has offshore currents coming in directly from the Gulf, and it is likely that this manatee died elsewhere in the Gulf and was washed ashore at this location. One additional manatee carcass was documented in Cow Bayou just north of Sabine Lake, but no date was provided.

The Galveston Bay system has certainly had a few more manatee sightings and relocations since Fertl et. al.'s comprehensive work was published in 2005. Other manatees of noteworthy acclaim occurred in the area. A manatee was captured and referred to as Sweet Pea or Selina. It was found in Buffalo Bayou during December 1995. She was in a sewer plant outfall surrounded in photos by water hyacinth. She needed to be rescued as water temperatures would not have supported her. In 2012, there were manatee sightings from South Padre Island to Galveston Bay, which were thought to be a single manatee given the name Molly. Molly likely found that conditions on the upper coast were not supportive enough for survival and kept moving. She was a short-term visitor and disappeared without needing rescue. In 2014, a manatee was seen near Corpus Christi, and more sightings came from Corpus Christi on July 11th and 17th of 2019. Both the 2014 and 2019 sightings in Corpus Christi could have been Molly moving north again or possibly another manatee. In late November of 2014, an animal was reported in need of rescue at the Baytown CPL power outlet on Trinity Bay (possibly the same as a manatee documented in Westlake, LA). The warm water discharge was attracting the animal who appeared reluctant to leave this artificial hot water discharge outflow. This animal was emaciated and captured by SeaWorld staff. It was identified as a known manatee from the Tampa Bay area of Florida and was returned to that area as soon as adequate fat reserves could be restored to allow for its release. For the Galveston Bay area, we have only two additions to the list, both rescues from the relatively sea grass rich portions of this bay system.

Rare reports exist for manatees in Louisiana (LA), as well. In 1929, a skull was added to the National Museum collection (#257406) from Calcasieu Lake and was reported,

up to 1941, as the only record of this animal in this state at that time. There were other records in the state in 1976 and 1979 (Powell and Rathburn, 1984), but they were mostly confined to the eastern portion of LA. However, a manatee was videoed in November of 2014 near Westlake, LA on the Calcasieu River. Scarring on that animal's back was not consistent with the animal recovered from Trinity Bay in November of 2014 (T. Cooper, pers. comm.); therefore, we think this was a different animal.

Florida manatees (*Trichechus manatus latirostris*) have been documented exploring other areas all the way to Massachusetts, and it is likely that the Antillean manatee (*Trichechus manatus manatus*) may move up the coast in exploratory trips. These wandering trips are referenced in numerous places in literature reviewed, but exploration comes at considerable risk to the individuals. They run a risk of being killed by cold water exposure, or they may simply find inadequate food resources and return to suitable year-round habitats.

Manatees feed on aquatic vegetation and need to consume between 5% and 10% of their body weight to maintain condition. That equates to 100 to 200 pounds of sea grasses or other vegetation daily. Seas grasses do occur in East Bay, but not in abundance since the mid-1950s. The TPWD Seagrass Conservation Plan states, "Although 1956 is our earliest reference point, it is interesting to note that seagrasses were generally more abundant in the Galveston Bay system (even East Bay and upper Galveston Bay) during the early part of the century based on anecdotal information." The only notation of East Bay in this entire report is to provide context that it no longer supports much in the way of seagrass. The proposed project will not directly impact any sea grass beds. Seagrasses may still be found in other areas of the Galveston Bay System, including places like Christmas Bay and the Trinity River delta. Manatees moving through the upper Texas Coast will not find adequate food resources from sea grasses to remain in the East Bay area at this time. Therefore, any manatee in the vicinity of the project area should be considered transient and likely continuing its search for more favorable areas than East Bay, even during warm summer exploratory trips. The Chenier Plain Refuges have no sightings or reports since their establishment in this area, with the exception of the 2016 carcass that likely floated in from some other location. The animal was found in an advanced state of decomposition with >95% of its epidermis sloughed off. Manatee food resources are not present in the action area except in trace amounts, and any vagrant manatee that passes through this area would continue moving to find required sea grasses or aquatic vegetation.

In conclusion, in 172 years of record keeping between these various references, there has been no reported sighting of a manatee in East Bay or the upper reaches of the GIWW between East Bay and the Sabine Ship Channel. The odds that we will encounter a manatee passing through the area during construction of this project are so remote as to be discountable.

We have analyzed the effects of the proposed action on the threatened West Indian manatee and believe that the project will have **no effect** to the species due to lack of suitable habitat in interior marshlands.

E. Eastern Black Rail

The Eastern Black Rail has been listed as threatened under the Endangered Species Act and is thought to occur within the Texas Chenier Plain NWR Complex year-round. Eastern Black Rails along the Gulf Coast are known to inhabit freshwater and brackish/saltwater persistent emergent marsh habitats. There is currently no defined critical habitat for this species.

There were 8.42 acres of suitable habitat mapped by USFWS within the project area during formal consultation efforts, however the project area was recently burned during a 2024 wildfire and is currently being mowed by MNWR every 4-5 months to preclude black rail habitat development in the project area. The USFWS conducted formal consultation with the Clear Lake Ecological Services Office with regard to potential effects of Refuge projects within the Texas Chenier Plain NWR Complex on the Eastern Black Rail. During consultation efforts, habitat that is burned or mowed was deemed unsuitable for Eastern Black Rail for a year post-burn; therefore, Eastern Black Rails would not be present in the project area during construction. Mowing will continue until the project is complete.

Currently, there are no records of Eastern Black Rails documented within or near the project area. There is some potential for equipment noise issues creating secondary effects to any Eastern Black Rails present in suitable habitat in the adjacent marsh, but the effects of noise are all speculative and not supported in publications for this species or similar cryptic marsh birds. Black rails have been found near roadways, pumping stations, and other noisy equipment, indicating that they do not abandon areas subjected to industrial noise.

We have analyzed the effects of the proposed action on the Eastern Black Rail and believe the project **may affect, but not likely to adversely effect** on this species due to lack of suitable habitat within the APE. Once the Star Lake GIWW Siphon Project is complete and historic freshwater flow and recharge is restored, there will be 60,000 acres within the Salt Bayou watershed that would be preserved and/or enhanced, offering higher quality potentially suitable Eastern Black Rail habitat within MNWR. Interior marsh areas protected from further open water conversion would provide crucial habitat for many species of native flora and fauna within the refuge, including Eastern Black Rail.

The following conservation measures would also be implemented for protection of Eastern Black Rail:

Explanation of actions to be implemented to avoid adverse effects:

1. Borrow materials necessary for construction will not be taken from Eastern Black Rail habitat and efforts will be made to ensure borrow materials are free of potential invasive species.
2. When equipment is needed, the project area will be marked prior to construction

with flagging to assure that no work affects Eastern Black Rail habitat that may be adjacent to the APE.

3. Operators would avoid multiple passes over the same area to the extent practicable to limit damage to existing vegetation.
4. A coordination meeting will be conducted prior to all work adjacent to Eastern Black Rail habitat to assure that employees or contractors work within the established footprint of the project.
5. Marking the project boundary will be conducted in cases where there is a risk of damage to areas outside the APE.
6. Efforts will be made to mitigate noise and vibration in areas adjacent to Eastern Black Rail habitat, especially during the breeding season. These efforts include planning and performing work outside of peak breeding call times (i.e., dawn and dusk) for Eastern Black Rail.
7. Construction crews would be educated on the identification and potential presence of the Eastern Black Rail in the vicinity of the project area and instructed to halt operations if an Eastern Black Rail is observed and consult with USFWS staff on any necessary protective actions prior to proceeding.

F. Whooping Crane

The Whooping Crane is designated as endangered under the Endangered Species Act. The species utilizes a variety of habitats to breed, overwinter, migrate, and forage. These habitats include coastal marshes and estuaries, inland marshes, open ponds, shallow bays, salt marshes, sand or tidal flats, rivers, and pastures and agricultural fields.

There are four geographically distinct populations, with the only natural and self-supported population being the Aransas Wood Buffalo Population that migrates between Aransas National Wildlife Refuge on the Texas Coastal Bend to Wood Buffalo National Park in Alberta, Canada. Three experimental populations were established between 1993-2011, a Central Florida non-migratory population, an Eastern migratory population, and a White Lake, Louisiana non-migratory flock. The current populations of Whooping Cranes in existence today come from the all-time low population of 15 individual Whooping Cranes that were overwintering at Aransas National Wildlife Refuge in 1941.

The nearest critical habitat for the species is located approximately 180 miles southwest of the project site in the vicinity of Aransas National Wildlife Refuge. Whooping Cranes have been seen and documented within the upper Texas coast region in recent years. Observations on iNaturalist show the nearest reported sighting to the project area as approximately 10-miles away. Additional clustered sightings have occurred further west between the towns of Anahuac and Winnie from 2017-2023.

Whooping Cranes that were in Jefferson and Chambers County are utilizing rice fields further inland. All Whooping Cranes ever recorded in this area were animals that were tracked to the experimental population releases managed and monitored from the

Louisiana Department of Wildlife and Fisheries program and at no time were birds from the Aransas flock found in this area. They were easily identified with radio transmitters or colored bands and were closely monitored. However, there have been no Whooping Cranes in the action area since the last female was removed on March 14, 2023, by the Louisiana Department of Wildlife and Fisheries as moved back into a release location in that state. There have been no Whooping Cranes reported in the area since that last female crane was captured and relocated. While there is a possibility for Whooping Cranes to occur as with another pair coming over near the project area, the likelihood of occurrence in the project's area of effect is so low that it is discountable. The detailed tracking of this entire group would notify us and we would reconsult in the case that conditions changed.

We have analyzed the effects of the proposed action on the endangered Whooping Crane and believe the project will have **no effect** on this species due to the lack of suitable habitat in the project area.

G. Monarch Butterfly

The monarch butterfly, a candidate species for listing under the Endangered Species Act, has the potential for occurrence in the project area. Whether monarchs are present in a given area within their range depends on the time of year, as they are one of the few migratory insects, traveling great distances between summer breeding habitat and winter habitat where they spend several months inactive. Most adult monarchs only live for a few weeks, searching for food in the form of flower nectar, for mates, and for milkweed plants (their only caterpillar host plant) on which to lay their eggs.

While adult monarchs are mobile and would likely move out of harm's way during construction, their host plants and/or eggs have the potential to be impacted if present during construction. There is an abundance of potentially suitable habitat for monarch butterflies adjacent to the project area that will remain undisturbed during and be preserved after project construction.

We have analyzed the effects of the proposed action on the monarch butterfly and believe the proposed action would not jeopardize the continued existence of the species, thus resulting in **no effect** to the monarch butterfly. This determination is due to the minimal, nature of project impacts to potentially suitable habitat in interior wetlands.

H. Tricolored Bat

The tricolored bat is a proposed species for listing under the Endangered Species Act. Named for their unique tricolored fur that fades from dark to light and to dark again, adult tricolored bats are often yellowish to near orange. These bats are insectivorous and are one of the smallest bats in eastern North America. Tricolored bats can be found in the southern extents of four Canadian Provinces, 39 States in the Central and Eastern U.S., as well as Mexico, Guatemala, Honduras, Belize, and Nicaragua. During the spring, summer, and fall months tricolored bats can be found in forested habitats and

affect species/adversely modify critical habitat (species:_____) ___ **Concurrence**

B. Proposed species/proposed critical habitat:

Determination	**Response Requested**
No effect on proposed species/no adverse modification of proposed critical habitat species: Tricolored bat	_x_ **Concurrence**
Is likely to jeopardize proposed species/ Adversely modify proposed critical habitat (species:_____)	___ **Concurrence**

C. Candidate species:

Determination	**Response Requested**
No effect species: Monarch Butterfly	_x_ **Concurrence**
Is likely to jeopardize candidate species. (Species:)	___ **Concurrence**

TIMOTHY COOPER Digitally signed by TIMOTHY COOPER Date: 2025.03.14 12:51:58 -05'00'

Signature **Date**

(Tim Cooper, Texas Chenier Plain NWR Complex)

IX. Reviewing ESO Evaluation:

A. Concurrence X **Nonconcurrence** _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed): Per Regional consultation guidance, this consultation is not requesting concurrence. The determinations of these findings are reviewed by Clearlake E.S per consultation guidance.

3-25-2025

Signature **Date**

predominantly roost amidst the leaves of live or recently dead deciduous hardwoods. In the winter months tricolored bats hibernate in caves and mines, however, in the southern U.S. where caves are sparse, they utilize culverts, tree cavities, abandoned water wells, and other man-made structures. Additionally, where winters are less harsh tricolored bats may break hibernation to feed on warm nights. It is common for many tricolored bats to return year after year to the same hibernation site.

The tricolored bat's greatest threat is white-nose syndrome, which is estimated to have caused a 90% decline in affected tricolored bat colonies throughout its range. Tricolored bat populations require a matrix of interconnected habitats that support spring migration, summer maternity colony formation, fall swarming, and winter hibernation. They prefer forested areas, tree corridors, and forest aggregation. No trees or possible roost areas will be impacted by the proposed project work. The current Species Status Assessment's range map (Version 1.1, pg.17) clearly shows that this species' range would not include Jefferson, Chambers Counties or the eastern part of Galveston Counties in Texas; as well as some portion of coastal SW LA. This map's distribution appears to reflect that this area's lacks suitable habitat and was developed and reviewed by experienced team focused on this species needs.

We have analyzed the effects of the proposed action on the tricolored bat and believe the proposed action would have **no effect** on the tricolored bat due to lack of suitable habitat within the project area.

VIII. Effect determination and response requested:

A. Listed species/designated critical habitat:

Determination		**Response Requested**
No effect/no adverse modification species:	Piping Plover	_x_ **Concurrence**
	Red Knot	
	Whooping Crane	
	Green sea turtle	
	Hawksbill sea turtle	
	Kemp's Ridley sea turtle	
	Leatherback sea turtle	
	Loggerhead sea turtle	
	West Indian Manatee	
May affect, but is not likely to adversely affect species/adversely modify critical habitat species:	Eastern Black Rail	_x_ **Concurrence**
May affect, and is likely to adversely		

X. Literature Cited

Fertl, D., A. Schiro, G. Regan, C. Beck, N. Adimey, L. Price-May, A. Amos, G. Worthy and R. Crossland. 2005. Manatee Occurrence in the Northern Gulf of Mexico, West of Florida:Gulf and Caribbean Research 17 (1): 69-94.

Powell, J.A. and Rathburn, G.B. 1984. Distribution and Abundance of Manatees Along the Northern Coast of the Gulf of Mexico. Northeast Gulf Science, 7, (1).

Pulich, W.M., Jr., K. Dunton, T. Calnan, and J. Lester. 1999. Seagrass Conservation Plan for Texas. Texas Parks and Wildlife. Resource Protection Division Publication. 1-84.

Schmidly, D.J. and Bradley, R.D. 2016. The Mammals of Texas, Seventh Edition. University of Texas Press.

ATTACHMENT A
Location Maps

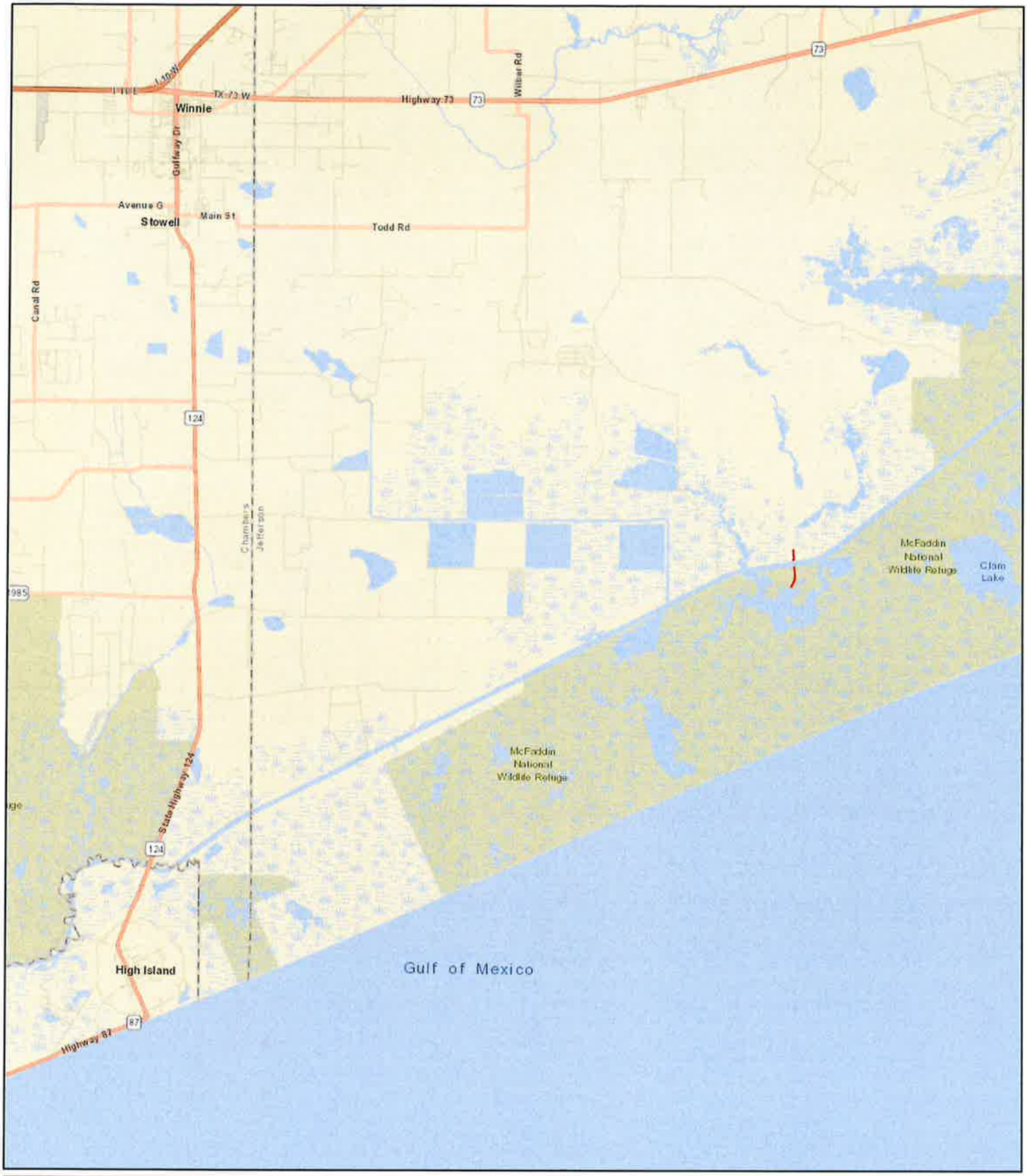

Figure 1: Vicinity Map
Star Lake GIWW Siphon Project
Ducks Unlimited - McFaddin National Wildlife Refuge

Jefferson County, Texas

Legend

Project Area

Map Base: ESRI World Streetmap
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: January 22, 2024

N
1:164,880

DESCO

0 0.5 1 2
Miles

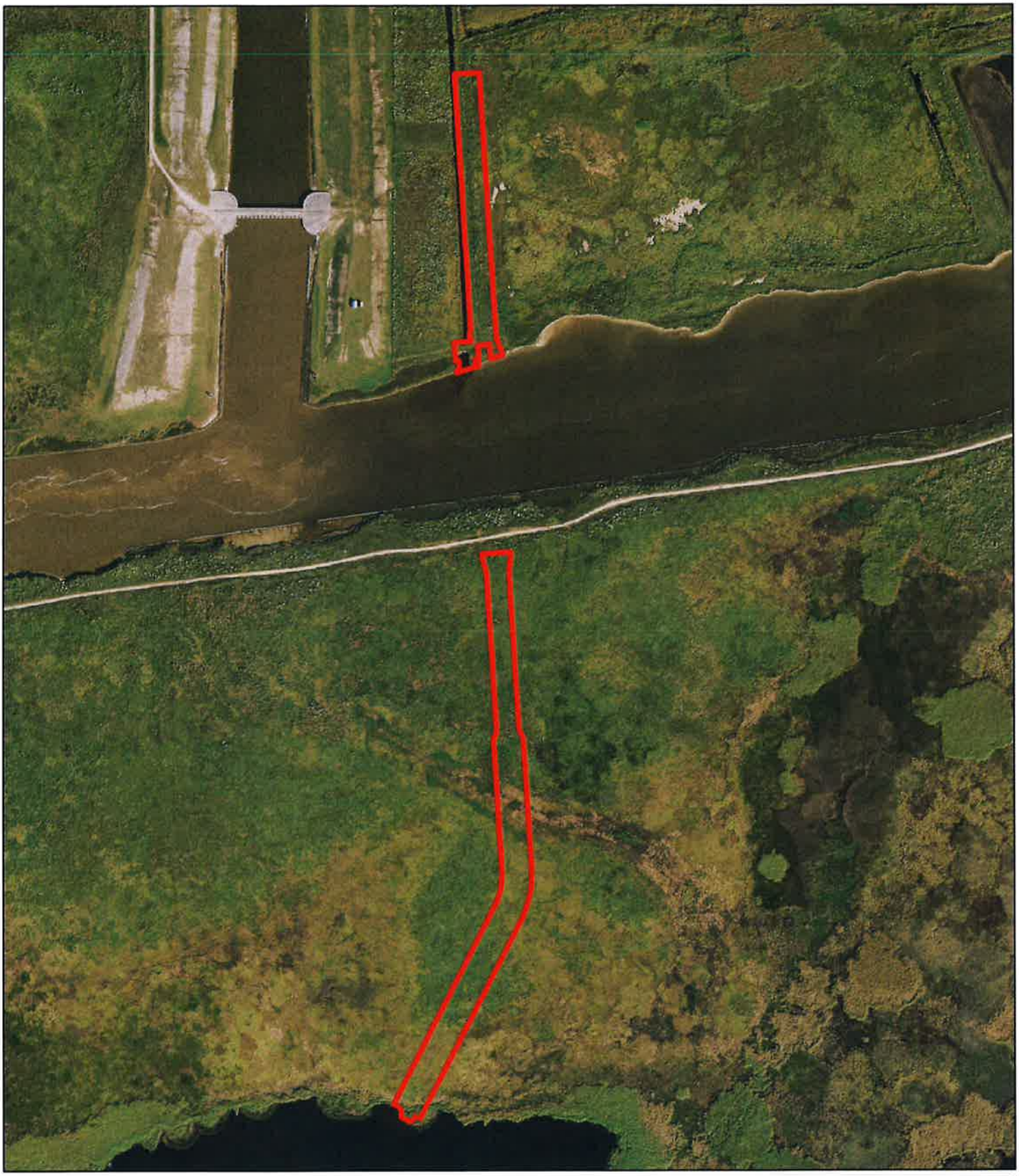

Figure 2: Project Location
Star Lake GIWW Siphon Project
Ducks Unlimited - McFaddin National Wildlife Refuge

Jefferson County, Texas

Legend

Project Area

Map Base: 2020 NAIP Aerial Imagery from TNRIS
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: January 22, 2024

N

1:6,000

IDESCO

0 125 250 500 Feet

APPENDIX E
Section 106 Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Post Office Box 1306
Albuquerque, New Mexico 87103

In Reply Refer To:
FWS/R2/VS-CR

RE: Star Lake GIWW Siphon Project, U.S. Fish and Wildlife Service, McFaddin NWR

Mr. Mark S. Wolfe
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

Dear Mr. Wolfe:

The US Fish and Wildlife Service (USFWS) is proposing to construct the Star Lake Siphon on the Gulf Intercoastal Waterway (GIWW) within McFaddin National Wildlife Refuge in Jefferson County, Texas. The project will entail construction of a siphon structure on the north side of the GIWW, boring and installation of 850 feet of pipes under the GIWW, and construction of a 2,600 foot water conveyance ditch to Star Lake. The purpose of this undertaking is to help restore freshwater flows from the north side of the GIWW to the south side in order to enhance wildlife habitat in this marsh area that was cut off from freshwater by construction of the GIWW.

The USFWS and Ducks Unlimited (our partner in this action) contracted DESCO Environmental Consultants to conduct archaeological inventory and assessment of the project area to determine its potential impacts to historic properties. Large portions of the project area are currently marsh land with standing water (south of the GIWW) or areas of previous construction disturbance (north of the GIWW). Proposed staging areas and high probability areas (shorelines) were investigated in greater depth. The details of the inventory efforts are attached in DESCO's report.

No cultural resources were identified during field inventory. Based on the results of the DESCO inventory and review, the USFWS has determined that the project will result in ***no adverse effect to historic properties*** for the actions proposed for this undertaking. Please contact George MacDonell, USFWS Regional Historic Preservation Officer at george_macdonell@fws.gov or 505-248-7396 if you have any questions or concerns.

Sincerely,

George MacDonell
Regional Archaeologist / RHPO
US Fish and Wildlife Service, Region 2

Enclosure: DESCO Short Report on the Cultural Resources Survey of the McFaddin NWR Star lake GIWW Siphon Project in Jefferson County, Texas

April 16, 2024

Mr. George MacDonell
Archaeologist / Regional Historic Preservation Officer
Region 2 (Southwest - AZ, NM, TX, OK)
U.S. Fish and Wildlife Service
500 Gold Ave SW
Albuquerque, NM 87102

Dear Mr. MacDonell,

Below you will find a copy of the draft short report detailing the cultural resources survey for the Star Lake GIWW Siphon Project on McFaddin NWR in Jefferson County, Texas. This report presents the findings of a cultural resources investigation completed by DESCO Environmental Consultants, LP (DESCO) in March of 2024.

DESCO strives to preserve the historic resources of all landscapes and is honored to contribute to the cultural resource management of the Northeast Coastal Region of Texas.

Should you require any additional information or have any questions, please feel free to contact Ashley A. Chapman at (281) 252-9799 or via email at achapman@descoenv.com.

Best,

Ashley A. Chapman II

Ashley A. Chapman II, M.A., R.P.A
Principal Investigator
DESCO Environmental Consultants
26902 Nichols Sawmill Rd.
Magnolia, TX 7735

SHORT REPORT ON THE CULTURAL RESOURCES SURVEY OF THE MCFADDIN NWR STAR LAKE GIWW SIPHON PROJECT IN JEFFERSON COUNTY, TEXAS

Permit No. ARPA-MCF-2024-001

Prepared For:
U.S. Fish and Wildlife Service
Texas Chenier Plain National Wildlife Refuge Complex
4017 FM 563
Anahuac, TX 77514

Prepared on Behalf of:
Ducks Unlimited
915 Richmond Parkway
Richmond, TX 77469

Prepared By:
DESCO Environmental Consultants, LP
26902 Nichols Sawmill Road
Magnolia, TX 77355

April 16, 2024

MANAGEMENT SUMMARY

The U.S. Fish and Wildlife Service (USFWS) proposes to construct the Star Lake GIWW Siphon Project on McFaddin NWR to restore freshwater flows from the north side of the GIWW to the south side of the GIWW in the 60,000-acre Salt Bayou watershed in southern Jefferson County, Texas. Natural freshwater flow in this system was cut off when the GIWW was constructed. Under this project, a set of inverted siphons will be installed under the GIWW from Big Reservoir on the north side of the GIWW. The siphon system will consist of four 36" diameter high density polyethylene pipes, approximately 850 linear feet in length, to be bored under the GIWW at a safe depth, well below the mud line of the GIWW. Inflow and outflow require the construction of an added water conveyance ditch within the refuge on the south side of the GIWW. This ditch will be approximately 2,600-feet-long and will connect the siphon outlet to the Star Lake Unit of McFaddin NWR. From this Unit, water will be diverted east into the project area via an existing water control structure on 5-mile cut and on into Clam Lake which feeds into the rest of the Salt Bayou system or can be diverted west across the Star Lake Unit near the western end of the watershed.

DESCO Environmental Consultants, LP (DESCO) conducted a pedestrian survey of the project's area of potential effect (APE), consisting of 8.78 total acres (3.55 hectares), in March of 2024 to identify any cultural resources that could potentially be impacted by the project and determine if those resources would be eligible for inclusion in the National Register of Historic Places or listing as State Antiquities Landmarks. The survey consisted of visual inspection and probing, where appropriate, and was carried out by Ashley Chapman, DESCO Archaeological Principal Investigator. No previously undocumented cultural resources were encountered within the APE during DESCO's survey. Additionally, the survey did not encounter any previously recorded sites [all digital documentation/shapefiles generated as a result of survey will be curated per U.S. Fish and Wildlife Service Region 2 (Southwest - AZ, NM, TX, OK) guidelines]. Therefore, DESCO believes the proposed work would not adversely affect archaeological sites or historic properties and recommends that the work be allowed to proceed as planned.

TABLE OF CONTENTS

1.0 INTRODUCTION

The U.S. Fish and Wildlife Service (USFWS) proposes to construct the Star Lake GIWW Siphon Project on McFaddin NWR to restore freshwater flows from the north side of the GIWW to the south side of the GIWW in the 60,000-acre Salt Bayou watershed in southern Jefferson County, Texas. Natural freshwater flow in this system was cut off when the GIWW was constructed. Under this project, a set of inverted siphons will be installed under the GIWW from Big Reservoir on the north side of the GIWW. The siphon system will consist of four 36" diameter high density polyethylene pipes, approximately 850 linear feet in length, to be bored under the GIWW at a safe depth, well below the mud line of the GIWW. Inflow and outflow require the construction of an added water conveyance ditch within the refuge on the south side of the GIWW. This ditch will be approximately 2,600-feet-long and will connect the siphon outlet to the Star Lake Unit of McFaddin NWR. From this Unit, water will be diverted east into the project area via an existing water control structure on 5-mile cut and on into Clam Lake which feeds into the rest of the Salt Bayou system or can be diverted west across the Star Lake Unit near the western end of the watershed.

Inverted gravity flow siphons will work by taking advantage of water level differences between the north and south side of the GIWW. Water levels on the north side are 12-18 inches above water levels south of the GIWW. This will create a sufficient amount of head pressure to carry water and operate the siphons sufficiently. The flow capacities for each siphon system are calculated to be 30 cubic feet per second (cfs) with a freshwater head of +0.5 feet and 100 cfs with a freshwater head of +3.0 feet.

Temporary staging areas alongside the project will be required for material and equipment storage. The north side laydown area will allow the contractor to fuse the HDPE pipes together before directionally drilling them under the GIWW. To construct the outfall ditch, temporary timber mats will be placed alongside the western portion of the project area footprint to allow easy movement of construction equipment and to avoid a nearby pipeline.

The redirection of water with this project will improve reservoir management on the north side of the GIWW to meet migrating waterfowl needs, as well as significantly improve marsh conditions on the south side of the GIWW in the refuge that have deteriorated through time as a result of saltwater intrusion exacerbated by dissection of the landscape with the creation of the GIWW. This project will result in significant flows of freshwater being reintroduced into the Salt Bayou system at its upper end and working its way through the watershed, mimicking historic flows and restoring historic salinity gradients.

The project is expected to take approximately 12 months to construct. Project timing will be dependent on regulatory permit timeframes associated with obtaining all necessary authorizations, as well as contractor availability.

The USFWS contracted with Ducks Unlimited (DU) for project design and construction, and DU contracted with DESCO Environmental Consultants, LP (DESCO) to obtain regulatory clearances for the project.

DESCO conducted a cultural resources desktop review of the area of potential effect (APE) and a one-mile buffer of the APE. DESCO also conducted a cultural resources survey of the APE in March of 2024, consisting of visual inspection with supplemental probing, where appropriate. The project was carried out by Ashley Chapman, DESCO Archaeological Principal Investigator (PI), in accordance with the *Council of Texas Archeologists Standards and Guidelines Committee – Intensive Terrestrial Survey Guidelines* (CTA, 2020) and USFWS permit No. ARPA-MCF-2024-001.

The purpose of DESCO's investigations was to identify any cultural resources that would potentially be impacted by the proposed project and determine if those resources would be eligible for inclusion in the National Register of Historic Places (NRHP) or listing as State Antiquities Landmarks (SALs).

This report documents the results of DESCO's desktop review and field survey and was produced in accordance with the *Secretary of the Interiors Standards and Guidelines for Archaeology and Historic Preservation* (DOI, 1983), *Council of Texas Archeologists Guidelines for Cultural Resources Management Reports* (Short Report Format) (CTA, 2023), and the THC Rules of Practice and Procedure (Texas Administrative Code, Title 13, Chapter 26).

2.0 DEFINITION OF THE APE AND NATURAL SETTING

The APE is defined as the limits of proposed ground disturbing activities (length, width, and depth-wise) associated with all proposed project features and enhancements in the project area as described above and depicted in **Appendix A.** DESCO's investigations were confined to the APE and staging area.

McFaddin National Wildlife Refuge is located in the Gulf Coastal Plain of Texas in Jefferson County (**Appendix B, Figure 1**). The project area lies within the Western Gulf Coastal Plain of the Texas and Louisiana Coastal Plain of the Great Plains Ecoregion .

The U.S. Department of Agriculture Natural Resources Conservation Service (USDA-NRCS) has defined the soil mapping units in the majority of the APE (51%) as frequently flooded tidal soils consisting of a combination of Harris clay, 0 to 1 percent slopes (HarA), and Neel clay, tidal (NeA). The remainder of the APE is comprised of 41% Franeau clay (0 to 1 percent slopes, occasionally flooded; FraA) and 8% water (W). These soils are depicted in **Appendix B, Figure 2.**

3.0 ARCHIVAL RESEARCH AND METHODOLOGY

DESCO reviewed records maintained by the Texas Archeological Research Laboratory (TARL) and the online Texas Historic Sites Atlas within a 1-mile radius of the project area (**Appendix B, Figure 3)**. Site file research resulted in the finding of no known cultural resources sites, and three previous archaeological projects [THC# 8500014545/13461 (abstract # 8100011889), and 8400002059 (abstract # not provided)]. No sites were discovered in the project's APE or nearby during these previous undertakings.

Shell middens are the primary cultural resource identified through previous project-specific surveys in McFaddin NWR. Typically, shell middens are often hardly noticeable except for those located along eroded shorelines because they are buried under dense vegetation and are typically not identified until a field survey is initiated.

Data concerning previously recorded sites in the project vicinity (THC 2024) and examination of USGS Topo Maps and aerial imagery (1939, 1953, 1966, 2020), suggest that much of the project areas exhibits low probability for containing historic and prehistoric resources. However, there is moderate potential for presence of sites in the south terminus area of the APE at the north rim of Star Lake based upon the distribution of known sites in the area and the presence of comparable environmental settings in the APE (i.e., areas bordering natural waterways and/or lakes). **Appendix B, Figures 4-7** contain historic aerial imagery from the afore-mentioned time periods showing the past historic landscapes of the APE.

DESCO conducted the Phase I field survey to document cultural resources within the entirety of the APE. Field methods followed the *Council of Texas Archeologists Standards and Guidelines Committee – Intensive Terrestrial Survey Guidelines* (CTA, 2023). The field methodology for the archaeological survey aimed to provide the most effective coverage for the discovery of cultural resources within the project's APE. DESCO's PI performed visual reconnaissance, utilizing pedestrian survey, supplemented with probe testing in higher probability areas such as the northern rim of Star Lake to help identify subsurface cultural resources. Additional probe tests were placed along the shoreline/lake margins looking for evidence of shell middens.

DESCO's PI utilized a handheld global positioning system (GPS) unit and detailed maps to record investigated probe and photo reference points within the APE. Following survey, all GPS positions were downloaded and plotted on 7.5-minute U.S. Geological Survey topographic and aerial maps.

DESCO's PI inspected the entire breadth of the APE as conditions warranted (i.e. areas outside of natural features such as creeks or low areas containing standing water) through surface observations and probing. All digital documentation/shapefiles generated as a result of survey will be curated per U.S. Fish and Wildlife Service Region 2 (Southwest - AZ, NM, TX, OK) guidelines.

4.0 RESULTS

DESCO PI, Ashley Chapman, inspected the entire reach of the Star Lake GIWW Siphon Project APE, consisting of 8.78 total acres (3.55 hectares), within the McFaddin National Wildlife Refuge (**Appendix B Figure 8 and Appendix C, Figure 1, Photos 1-25**). Due to the nature of much of the project and natural environment, (inundated areas, disturbed areas of spoil redeposition or contained existing road or levee structures) limited subsurface inspections were completed by the utilization of probe tests (n=11) in the APE. In addition to the probe tests, shoreline areas were visually inspected for exposed shell middens and evidence of cultural deposits, historic and prehistoric. The extreme southern end and terminus of the APE at the northern edge of Star Lake was investigated by additional probing (n=6) to determine if any subsurface deposits were present. These investigations found no evidence of cultural resources.

5.0 SUMMARY AND RECOMMENDATIONS

The U.S. Fish and Wildlife Service (USFWS) proposes to construct the Star Lake GIWW Siphon Project on McFaddin NWR to restore freshwater flows from the north side of the GIWW to the south side of the GIWW in the 60,000-acre Salt Bayou watershed in southern Jefferson County, Texas.

DESCO conducted a pedestrian survey of the APE in March of 2024 to identify any cultural resources that could potentially be impacted by the project and determine if those resources would be eligible for inclusion in the National Register of Historic Places or listing as State Antiquities Landmarks. The survey consisted of visual inspection and limited auger testing and probing, where appropriate, due to the nature of much of the APE and natural environment, (inundated areas, disturbed areas of spoil redeposition or contained existing road or levee structures). Shoreline areas were visually inspected for exposed shell middens and evidence of cultural deposits, historic and prehistoric. As a result of DESCO's survey, no cultural resources were encountered within the APE. Therefore, DESCO believes the proposed work would not adversely affect archaeological sites or historic properties and recommends that the work be allowed to proceed as planned.

6.0 REFERENCES

Council of Texas Archeologists (CTA) (2023)
Guidelines for Cultural Resource Management Reports. Accessed on February, 2024 from https://www.thc.texas.gov/public/upload/CTAguidelines.pdf.

Council of Texas Archeologists (CTA) (2020)
Standards and Guidelines Committee Intensive Terrestrial Survey Guidelines. Accessed on February, 2024 from https://counciloftexasarcheologists.org/resources/Documents/CTA%20Intensive%20Survey%20Standards.pdf.

Texas Historical Commission (THC)
Texas Archeological Sites Atlas (Atlas). Located at: http://atlas.thc.state.tx.us/, Accessed on February 17, 2024.

USDA-NRCS
USDA Web Soil Survey Online. 2024. Located at: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm. Accessed on February 17, 2024.

APPENDIX B
Figures

Figure 1: Project Location
Ducks Unlimitted
McFaddin National Wildlife Refuge
Star Lake GIWW Siphon Project

Jefferson County, Texas

Map Base: ESRI Street Map (2024)
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: April 2024

N

1:595,451

DESCO

0 2.25 4.5 9 13.5 18 Miles

0 3.75 7.5 15 22.5 30 Kilometers

Legend

Project Location

Figure 2: Soils of the APE
Ducks Unlimitted
McFaddin National Wildlife Refuge
Star Lake GIWW Siphon Project

Jefferson County, Texas

Map Base: ESRI Aerial Imagery (2022)
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: April 2024

Legend

APE

Soil Unit

FraA - occasionally flooded
HarA - frequently flooded, tidal
NeA - occasionally flooded, tidal (Disturbed/Spoil)
W - Water

N

1:6,056

DESCO

0 0.0225 0.045 0.09 0.135 0.18 Miles

0 0.0375 0.075 0.15 0.225 0.3 Kilometers

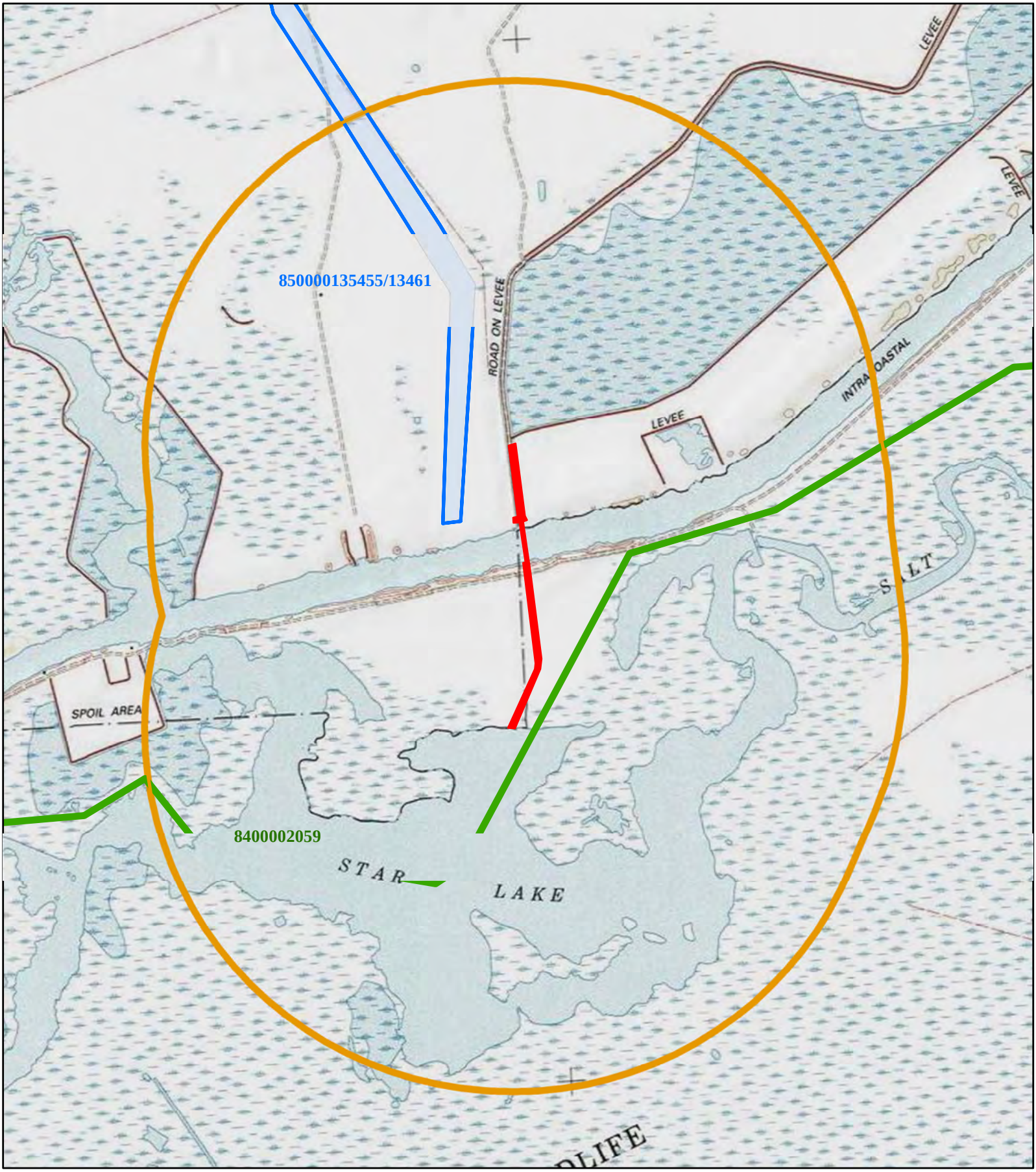

Figure 3: Archaeological Review
Ducks Unlimitted
McFaddin National Wildlife Refuge
Star Lake GIWW Siphon Project

Jefferson County, Texas

Map Base: ESRI USA Topo Maps (2024)
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: April 2024

Legend

- APE
- 1-Mile Study Buffer
- Archaeological Project (linear)
- Archaeological Project (area)

N

1:21,691

DESCO

0 0.075 0.15 0.3 0.45 0.6 Miles

0 0.125 0.25 0.5 0.75 1 Kilometers

Legend

Oleum Exploration NG Pipeline

Project Area - 8.685 acres

Figure 4: 1939 USDA Imagery
Star Lake GIWW Siphon Project
Ducks Unlimited - McFaddin National Wildlife Refuge
Jefferson County, Texas

Map Base: 1939 USDA Aerial Imagery
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: January 26, 2024

N
1:7,800

DESCO

0 250 500 1,000 Feet

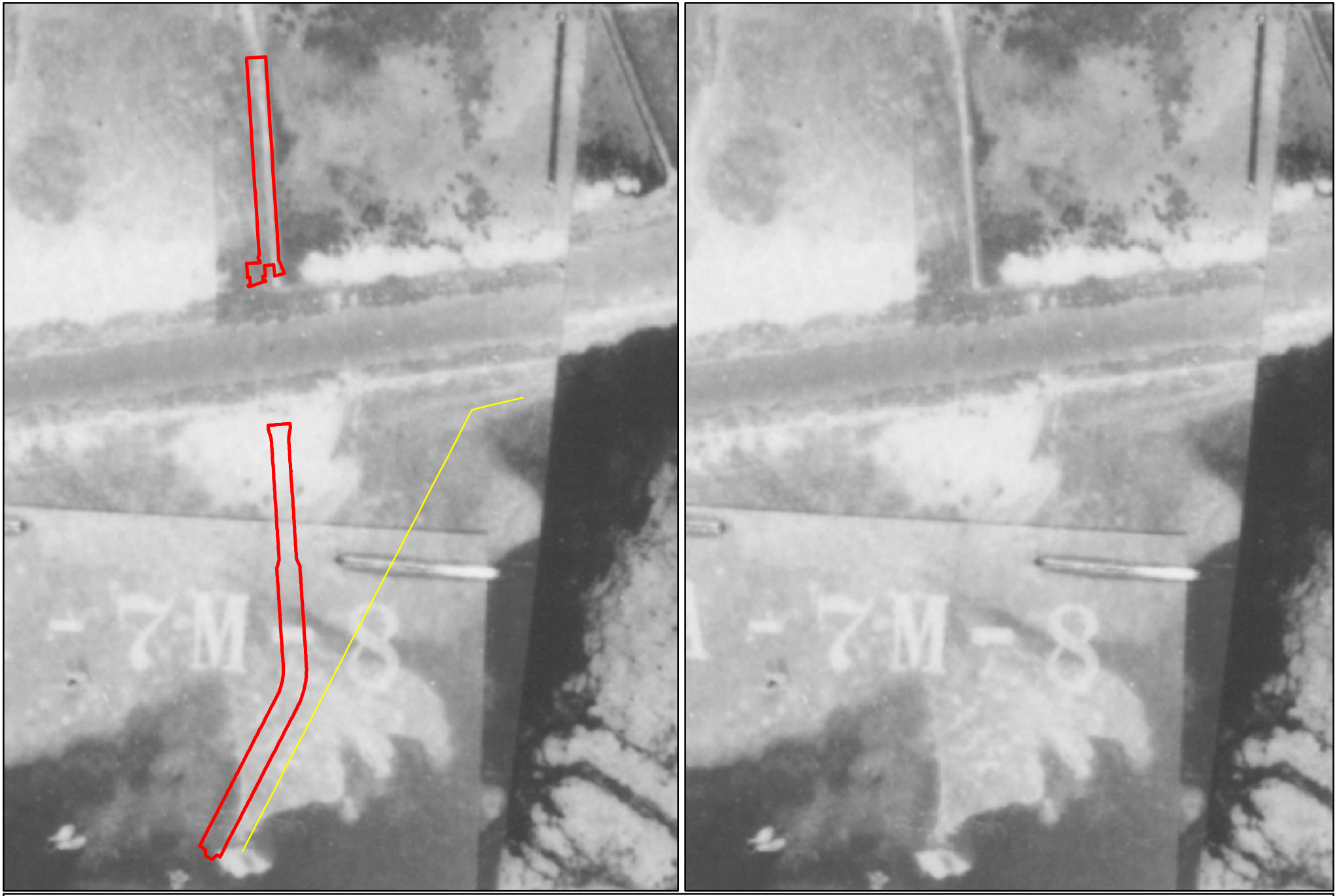

Figure 5: 1953 USDA Imagery
Star Lake GIWW Siphon Project
Ducks Unlimited - McFaddin National Wildlife Refuge
Jefferson County, Texas

Legend

- Oleum Exploration NG Pipeline
- Project Area - 8.685 acres

Map Base: 1953 USDA Aerial Imagery
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: January 26, 2024

N
1:7,800

DESCO

0 250 500 1,000 Feet

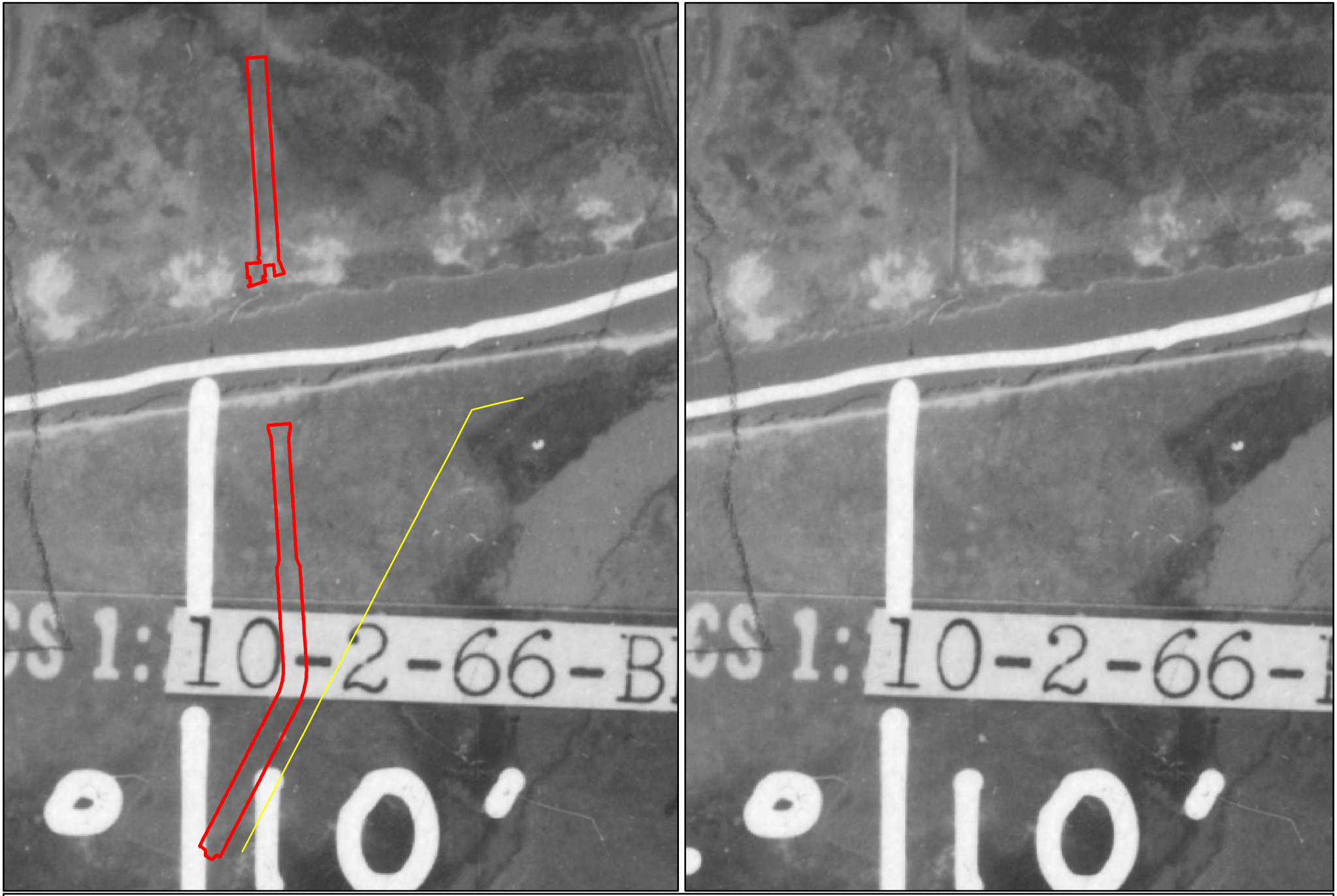

Figure 6: 1966 USDA Imagery
Star Lake GIWW Siphon Project
Ducks Unlimited - McFaddin National Wildlife Refuge
Jefferson County, Texas

Legend

- Oleum Exploration NG Pipeline
- Project Area - 8.685 acres

Map Base: 1966 USDA Aerial Imagery
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: January 26, 2024

N
1:7,800

DESCO

0 250 500 1,000 Feet

Figure 7: 2020 USDA Imagery
Star Lake GIWW Siphon Project
Ducks Unlimited - McFaddin National Wildlife Refuge
Jefferson County, Texas

Legend

- Oleum Exploration NG Pipeline
- Project Area - 8.685 acres

Map Base: 2020 NAIP Aerial Imagery
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: January 26, 2024

N
1:7,800

DESCO

0 250 500 1,000 Feet

Figure 8: Results of Survey within APE
Ducks Unlimitted
McFaddin National Wildlife Refuge Star
Lake GIWW Siphon Project

Legend

- Probe Test
- APE
- Highly Impacted/Modified Areas

Jefferson County, Texas

Map Base: ESRI Aerial Imagery (2022)
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date: April 2024

N

1:5,901

DESCO

0	0.0225	0.045	0.09	0.135	0.18	Miles
0	0.0375	0.075	0.15	0.225	0.3	Kilometers

APPENDIX C
Site Photos

Survey Photo Reference Points
Ducks Unlimitted
McFaddin National Wildlife Refuge
Star Lake GIWW Siphon Project

Jefferson County, Texas

Map Base: ESRI Aerial Imagery (2022)
Map Datum: NAD 1983 UTM Zone 15N, meters
Map Date:April 2024

N

1:5,883

DESCO

Legend
Photo_Ref_pts
APE

0	0.0225	0.045	0.09	0.135	0.18 Miles
0	0.0375	0.075	0.15	0.225	0.3 Kilometers

View of APE from Reference Pt. 1 Looking North

View of APE from Reference Pt. 2 Looking North

View of APE from Reference Pt. 2 Looking East

View of APE from Reference Pt. 2 Looking Westh

View of APE from Reference Pt. 3 Looking North

View of APE from Reference Pt. 3 Looking East

View of APE from Reference Pt. 3 Looking South

View of APE from Reference Pt. 3 Looking West

View of APE from Reference Pt. 4 Looking North

View of APE from Reference Pt. 4 Looking East

View of APE from Reference Pt. 4 Looking South

View of APE from Reference Pt. 4 Looking West

View of APE from Reference Pt. 5 Looking East

View of APE from Reference Pt. 5 Looking South

View of APE from Reference Pt. 5 Looking West

View of APE from Reference Pt. 6 Looking North

View of APE from Reference Pt. 6 Looking East

View of APE from Reference Pt. 6 Looking South

View of APE from Reference Pt. 6 Looking West

View of APE from Reference Pt. 7 Looking North

View of APE from Reference Pt. 7 Looking East

View of APE from Reference Pt. 7 Looking West

View of APE from Reference Pt. 8 Looking East

View of APE from Reference Pt. 8 Looking South

View of APE from Reference Pt. 8 Looking West

From: Ashley A. Chapman
To: Tanya Matcek
Subject: FW: [EXTERNAL] Star Lake Siphon
Date: Thursday, May 16, 2024 3:47:41 PM

FYI... good news... Have a great evening!

Ashley A. Chapman II, MA, RPA
Principal Investigator - Archaeology
DESCO Environmental Consultants
Mobile: 843-870-9049 ● Office: 281.252.9799
26902 Nichols Sawmill Rd. Magnolia, TX 77355
www.descoenv.com ● achapman@descoenv.com

From: Macdonell, George H <george_macdonell@fws.gov>
Sent: Thursday, May 16, 2024 3:31 PM
To: Ashley A. Chapman <achapman@descoenv.com>
Cc: Cooper, Tim <tim_cooper@fws.gov>; Head, Douglas <douglas_head@fws.gov>
Subject: Fw: [EXTERNAL] Star Lake Siphon

Below please find the SHPO concurrence for the Star Lake Siphon project at McFaddin NWR.
Thanks!
George

George MacDonell
Archaeologist / Regional Historic Preservation Officer
Region 2 (Southwest - AZ, NM, TX, OK)
U.S. Fish and Wildlife Service
500 Gold Ave SW
Albuquerque, NM 87102
(505)248-7396 (w)
(505)312-3683 (c)

From: noreply@thc.state.tx.us <noreply@thc.state.tx.us>
Sent: Thursday, May 16, 2024 7:02 AM
To: Macdonell, George H <george_macdonell@fws.gov>; reviews@thc.state.tx.us <reviews@thc.state.tx.us>
Subject: [EXTERNAL] Star Lake Siphon

Re: Project Review under Section 106 of the National Historic Preservation Act
THC Tracking #202409483
Date: 05/16/2024
Star Lake Siphon
5632 Clam Lake Rd
Sabine Pass,TX 77655

Description: Construction of a siphon and boring under the GIWW to a conveyance ditch on the southside to provide freshwater to Star Lake for habitat improvement.

Dear George MacDonell:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act.

The review staff, led by Caitlin Brashear and Tracy Lovingood, has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-5853 to consult on further actions that may be necessary to protect historic properties.

Archeology Comments

- No historic properties affected. However, if cultural materials are encountered during construction or disturbance activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.

- THC/SHPO concurs with information provided.
- This draft report is acceptable. To facilitate review and make project information and final reports available through the Texas Archeological Sites Atlas, we appreciate submission of tagged pdf copies of the final report including one restricted version with all site location information (if applicable), and one public version with all site location information redacted; an online abstract form submitted via the abstract tab on eTRAC; and survey area shapefiles submitted via the shapefile tab on eTRAC. For questions on how to submit these please visit our video training series at: https://www.youtube.com/playlist?list=PLONbbv2pt4cog5t6mCqZVaEAx3d0MkgQC Please note that these steps are required for projects conducted under a Texas Antiquities Permit.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review staff. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: caitlin.brashear@thc.texas.gov, tracy.lovingood@thc.texas.gov.

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

for Bradford Patterson
Chief Deputy State Historic Preservation Officer

Please do not respond to this email.