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MATRIXNEWORLD
Engineering Progress

July 7, 2020

Ms. Tarmiko Graham
U.S. Army Corps of Engineers
Vicksburg District
4155 Clay Street
Vicksburg, Mississippi 39183-3435

**Re: Pelican Foster Mitigation Bank Addendum Prospectus**
**MVK-2012-00197**
**Pelican Mitigation, LLC**
**Ashley County, Arkansas**
**Matrix Project No. 19-043**

Dear Ms. Graham:

Matrix New World Engineering (Matrix), on behalf of Pelican Mitigation, LLC (Pelican), is submitting this hard-copy prospectus for the proposed Pelican Foster Mitigation Bank Addendum (PFMBA).

Should you have questions regarding this prospectus, or require additional information, please feel free to contact me at 504-578-0627 or via email at lwomack@matrixneworld.com.

Sincerely,

Lee Womack

Lee Womack
Senior Project Manager
Matrix New World Engineering

RECEIVED JUL 14 2020

# PELICAN FOSTER MITIGATION BANK
# ADDENDUM PROSPECTUS
# MVK-2012-00197
# ASHLEY COUNTY, ARKANSAS

Prepared for:

Pelican Mitigation, LLC
536 Highway 162
Benton, Louisiana 71006

Prepared by:

MATRIXNEWORLD
Engineering Progress

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Matrix Project No. 19-043

July 2020

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## 1.0 INTRODUCTION

The following prospectus summarizes the mitigation potential on approximately 56.33 acres in Sections 22, Township 17 South, Range 5 West of Ashley County, Arkansas. The purpose of the prospectus is to summarize the existing conditions of the proposed Pelican Foster Mitigation Bank Addendum (PFMBA) and assess the potential for establishing a mitigation bank to provide compensatory wetland mitigation for unavoidable impacts to wetlands associated with Department of the Army (DA) permits authorized under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act issued by the U.S. Army Corps of Engineers (USACE), Vicksburg District.

## 2.0 GOALS AND OBJECTIVES

The proposed PFMBA will encompass 56.33 acres placed in a conservation easement, including 54.87 acres of land in which restoration, enhancement, and preservation activities are proposed. The sponsor of the PFMBA is Pelican Mitigation, LLC (Pelican). The goal of Pelican will be to conduct bottomland hardwood wetland, instream, riparian buffer, upland buffer, and upland stream buffer restoration, enhancement, and preservation activities on the PFMBA (Tract or Site).

Bottomland hardwood wetland activities will consist of 3.57 acres of herbaceous wetland enhancement, 0.01 acre of shrub-scrub wetland enhancement, and 0.01 acre of preservation. Stream activities will consist of 0.03 acre (330 linear feet) of Priority 1 restoration, 0.03 acre (91 linear feet) of stream wetland complex, and 1.88 acres (2,727 linear feet) of preservation of an unnamed tributary to Overflow Creek. Riparian buffer activities will consist of 13.36 acres (2,027.83 linear feet) of stream buffer bottomland hardwood enhancement (herbaceous wetlands), 1.30 acres (197.32 linear feet) of stream buffer bottomland hardwood enhancement (shrub-scrub wetlands), and 2.66 acres (403.75 linear feet) of stream buffer bottomland hardwood preservation. Upland buffer activities will consist of 28.60 acres of enhancement. Upland stream buffer activities will consist of 3.42 acres (519.10 linear feet) of enhancement. Remaining acreage associated with the PFMBA, not proposed for rehabilitation, enhancement, and preservation activities includes 1.46 acres of roads.

Pelican, the bank sponsor, intends for the PFMBA to serve as a bottomland hardwood and stream mitigation bank offering for sale, wetland mitigation and stream credits as compensation for unavoidable impacts to wetlands associated with DA Section 404 permits. A conservation easement will be executed for the entire 56.33-acre Tract. Through a contractual agreement with individual permit recipients, Pelican will, for a fee to be paid by permittees, commit to implementing the mitigation specified in DA permits and incur the responsibility of the long-term maintenance, management, protection, and overall success of the PFMBA.

## 3.0 PROPERTY OWNERSHIP, ENCUMBRANCES, AND SITE PROTECTION

### 3.1 Ownership

The legal owner of the land encompassed in the PFMBA is Overflow Creek Farms, LLC. Pelican has entered into a contractual agreement with the legal owner of the land encompassed by the PFMBA.

### 3.2 Servitudes/Easements

No servitudes or easements have been identified on the portions of the properties proposed for rehabilitation, enhancement, or preservation.

### 3.3 Liens/Encumbrances/Restrictions

No liens, encumbrances, or restrictions have been identified on the portions of the properties proposed for rehabilitation, enhancement, or preservation.

### 3.4 Site Protection Instrument

A conservation easement will be executed for the entire 56.33-acre PFMBA. Additionally, Pelican intends to designate a third-party holder of the conservation easement for PFMBA.

## 4.0 SPONSOR AND CONTRACTOR QUALIFICATIONS

### 4.1 Pelican Mitigation, LLC

Pelican has approximately ten years' experience in the mitigation banking business, with three approved mitigation banks: two in the USACE Vicksburg District (Pelican Wardview and Pelican Foster) and one in the USACE New Orleans District (Pelican Echo). Pelican is also a partner on four approved mitigation banks: two in the USACE Vicksburg District (Bashaway Creek and Little Bodcau), and one in the USACE New Orleans District (Beacons Gully). Currently, Pelican is partnering on two mitigation banks pending in the USACE Vicksburg District (Kelly Bayou and Three Creeks) and one in the USACE New Orleans District (Bigwoods).

### 4.2 Matrix New World Engineering

Matrix New World Engineering (Matrix) has over 20 years of experience providing industrial, commercial, and private clients with multi-media (air, water, waste, and natural resources) environmental compliance expertise. Matrix has been involved with various stages of 51 mitigation banks, totaling over 40,000 acres of wetland restoration, in the Vicksburg, New Orleans, Galveston, Little Rock, and Mobile Districts of the USACE.

## 5.0 WETLAND DELINEATION

A wetland delineation was conducted on the PFMBA by Matrix in May 2017. A request for preliminary jurisdictional determination (JD) was submitted to the USACE, Vicksburg District on May 22, 2017, and subsequently a preliminary JD was rendered on October 4, 2017 (MVK-2012-197) for the PFMBA and is included as **Attachment A**.

## 6.0 CURRENT SITE CONDITIONS

The 56.33-acre Site is approximately 10.75 miles east of Harnburg, Arkansas. Approximate center coordinates of the Site are Latitude 33.213227°; Longitude -91.612782° in Section 22, Township 17 South, Range 5 West of Ashley County, Arkansas (**Figure 2**). Access to the Site is via County Road 69. The Site is bound to the east by Pelican Foster Mitigation Bank, to the south and west by pine plantation, and to the north by County Road 69 and a residential property.

Ashley County has a humid, subtropical climate characterized by relatively high rainfall, averaging 54.84 inches per year. The average daily maximum temperature is 76°F and the average daily minimum temperature is 51.5°F. The growing season for Ashley County spans from April to November, approximately 211 days (United States Department of Agriculture [USDA] Soil Conservation Service 1979).

## 7.0 EXISTING LAND USE

The 56.33-acre tract of the proposed PFMBA currently contains approximately 2.67 acres of bottomland hardwood wetlands, 1.31 acres of shrub-scrub wetlands, 16.99 acres of herbaceous wetlands, 32.02 acres of uplands, and 1.46 acres of existing roads (**Figures 3a-3d**). The tract also contains approximately 1.88 acres of intermittent stream (Unnamed Tributary to Overflow Creek). The existing and historic land use is primarily cattle grazing and hay production.

**Table 1** contains pre-restoration habitat descriptions and acreages of the jurisdictional wetlands, other waters of the U.S., and upland areas associated with the 56.33-acre tract proposed for rehabilitation, enhancement, and preservation activities within the PFMBA (**Figures 3a–3d**). A preliminary Jurisdictional Determination (MVK-2012-197) is included as **Attachment A**.

**Table 1: Pre-Restoration Habitat Acreage Summary**

| CLASS | HABITAT | ACREAGE |
|---|---|---|
| **Jurisdictional Wetlands** | | |
| | Bottomland Hardwood | 2.67 |
| | Shrub-Scrub | 1.31 |
| | Herbaceous | 16.99 |
| **Jurisdictional Other Waters of the U.S.** | | |
| | Unnamed Tributary to Overflow Creek (Intermittent) | 1.88 |
| **Non-Jurisdictional Areas** | | |
| | Herbaceous Uplands | 32.02 |
| | Existing Roads | 1.46 |
| **TOTAL** | | **56.33** |

### 7.1 Existing Plant Communities

Dominant habitat types associated with the jurisdictional wetlands on the tract consists of bottomland hardwood forested wetlands, shrub-scrub wetlands, and herbaceous wetlands. Dominant species identified in these habitats include: common persimmon (*Diospyros virginiana*), honey-locust (*Gleditsia triacanthos*), sweetgum (*Liquidambar styraciflua*), common buttonbush (*Cephalanthus occidentalis*), bog rush (*Juncus marginatus*), dotted smartweed (*Persicaria punctata*), Virginia dayflower (*Commelina virginica*), lamp rush (*Juncus effusus*), cardinal-flower (*Lobelia cardinalis*), golden crown grass (*Paspalum dilatatum*), saw-tooth blackberry (*Rubus argutus*), bushy bluestem (*Andropogon glomeratus*), broom-sedge (*A. virginicus*), and American buckwheat vine (*Brunnchia ovata*).

Dominant species identified within upland habitats include: water oak (*Quercus nigra*), cherry-bark oak (*Q. pagoda*), common persimmon, honey-locust, perennial rye grass (*Lolium perenne*), golden crown grass, saw-tooth blackberry, bushy bluestem, broom-sedge, and trumpet-creeper (*Campsis radicans*).

### 7.2 Soils

The NRCS Web Soil Survey shows that the tract may be underlain Arkabutla silt loam, 0 to 1 percent slopes, frequently flooded; Calloway silt loam, 1 to 3 percent slopes; Grenada silt loam, 1 to 3 percent slopes; Grenada silt loam, 8 to 12 percent slopes; and Rilla silt loam, 0 to 1 percent slopes (**Figure 7**), which all are listed as having hydric components.

The non-jurisdictional upland areas on the Site are predominantly underlain by Calloway silt loam, Grenada silt loam, and Rilla silt loam. The Calloway, Grenada, and Rilla series are predominantly non-hydric soil series associated with stream terraces or natural levees. However, components associated with both series, including Calhoun (5% of the Calloway soil series), Henry (5% of the Calloway and Grenada soil series), Aqualfs (5% of the Calloway and Grenada soil series), Perry (5% of the Rilla soil series), and Aquepts (3% of the Rilla soil series), are found to be hydric in backswamps and depressions within Ashley County (NRCS Web Soil Survey 2020). These habitats are indicative of the areas underlain by these series determined to be jurisdictional by the Vicksburg District.

The majority of the jurisdictional wetland areas identified on the site are mapped as underlain by Arkabutla silt loam. The Arkabutla series is a predominantly non-hydric series found on level to nearly level floodplains. However, the components associated with the series, including, Arkabutla-West (10% of series), Tichnor (5% of series), and Aquents (5% of series), are found to be hydric in Ashley County (NRCS Web Soil Survey 2020). These soils are historically associated with floodplains and bottomland hardwood habitats, though a significant portion of this series has been cleared, drained, and converted to row crops and pasture. Furthermore, the hydric rating within floodplains was indicative of the soil type and habitat identified on-site.

### 7.3 Existing Hydrology

The PFMBA is in the Bayou Bartholomew Watershed. The PFMBA is approximately 2.3 miles west of Bayou Bartholomew and is sited within a depressional area at the base of natural high ground associated with Bayou Bartholomew. Bayou Bartholomew is a majority tributary of the Ouachita River.

The primary drainage feature associated with the PFMBA is an unnamed tributary to Overflow Creek. Historically, drainage flowed through the tract, via the unnamed tributary to Old Creek (UT1), from north to south across County Road 69, which forms the northern border of the property. Currently, the unnamed tributary consists of three segments. Reach 1 is the farthest upstream segment. Reach 1 has been heavily impacted through the on-going cattle operation and pasture vegetation. No tree stratum buffer is left along this reach and a majority of the channel is filled in. Remnant portions of the channel are evident but are mostly in a swale-like state from the constant cattle shear and lack of buffer. Reach 2 is the middle segment that functions as a stream wetland complex. Reach 3 is the downstream-most reach and is geomorphically stable.

### 7.4 Geographic Service Area

The PFMBA is in the Bayou Bartholomew Watershed (United States Geological Survey (USGS) Hydrologic Cataloguing Unit 08040205), which includes portions of Ashley, Drew, Chicot, Desha, Lincoln, Cleveland, and Jefferson Counties, Arkansas and Morehouse Parish, Louisiana. Hydrologic Cataloging Units (HCU) 08040204 and 08040205 will serve as the FMB's primary service areas (**Figure 8**).

## 8.0 SITE RESTORATION PLAN

### 8.1 Restoration Objectives

Within the 56.33-acre PFMBA, the Sponsor proposes to conduct bottomland hardwood wetland, instream, riparian buffer, upland buffer, and upland stream buffer activities on the PFMBA.

Bottomland hardwood wetland activities will consist of 3.57 acres of herbaceous wetland enhancement, 0.01 acre of shrub-scrub wetland enhancement, and 0.01 acre of preservation. Upland buffer activities will consist of 28.60 acres of enhancement (**Figure 4**). Stream activities will consist of 0.03 acre (330 linear feet) of Priority 1 restoration, 0.03 acre (91 linear feet) of stream wetland complex, and 1.88 acres (2,727 linear feet) of preservation of an unnamed tributary to Overflow Creek. Riparian buffer activities will consist of 13.36 acres (2,027.83 linear feet) of stream buffer bottomland hardwood enhancement (herbaceous wetlands), 1.30 acres (197.32 linear feet) of stream buffer bottomland hardwood enhancement (shrub-scrub wetlands), and 2.66 acres (403.75 linear feet) of stream buffer bottomland hardwood preservation. Upland stream buffer activities will consist of 3.42 acres (519.10 linear feet) of enhancement. Remaining acreage associated with the PFMBA, not proposed for rehabilitation, enhancement, and preservation activities includes 1.46 acres of roads.

### 8.2 Site Preparation

Site preparation shall be implemented during the initial restoration of the PFMBA, and will include the following:

1. Disking of the herbaceous pasture within the proposed bottomland hardwood and stream buffer bottomland hardwood enhancement and upland and stream buffer upland buffer enhancement areas to alleviate compaction caused by cattle grazing.
2. Hand or mechanical land clearing of the shrub-scrub vegetation within the proposed bottomland hardwood and stream buffer bottomland hardwood enhancement areas.
3. Removal of exotics and/or invasive species by aerial or direct herbicide application.

### 8.3 Mitigation Types and Habitat Types

**Figures 3 and 4** depict the pre-and post-restoration habitats on PFMBA. **Table 2** below depicts the target wetland mitigation types and current habitat types, as well as associated acreages within the PFMBA.

**Table 2: Target Wetland Mitigation Types**

| Wetland Mitigation Type | Acreage | Existing Habitat Type |
|---|---|---|
| Bottomland Hardwood Enhancement | 3.57 | Herbaceous Wetlands |
| Bottomland Hardwood Enhancement | 0.01 | Shrub-Scrub Wetlands |
| Bottomland Hardwood Preservation | 0.01 | Bottomland Hardwood Wetlands |

**Table 3** below depicts the target upland mitigation types and current habitat types, as well as associated acreages within PFMBA.

**Table 3: Target Upland Buffer Mitigation Types**

| Wetland Mitigation Type | Acreage | Existing Habitat Type |
|---|---|---|
| Upland Buffer Enhancement | 28.60 | Herbaceous (Pasture) Uplands |

**Table 4** below depicts the target stream mitigation types, as well as associated linear footage within the PFMBA.

**Table 4: Target Stream Mitigation Types**

| Stream Reach | Existing Linear Feet | Existing Rosgen Classification | Proposed Linear Feet | Proposed Stream Mitigation Type | Proposed Flow Regime | Proposed Rosgen Classification |
|---|---|---|---|---|---|---|
| UT1 Reach 1 | - | - | 330 | Priority 1 Restoration | Intermittent | E6 |
| UT1 Reach 2 | 91 | - | 91 | Stream Wetland Complex (No In-Stream Work) | N/A | N/A |

**Table 5** below depicts the target stream buffer mitigation types and current habitat types by stream

reach, as well as associated linear footage and acreages within the PFMBA. The linear footages of the stream buffer mitigation types were calculated based on the weighted average of the acreages.

**Table 5: Target Stream Buffer Mitigation Types by Stream Reach**

| Stream Reach | Stream Buffer Mitigation Type | Existing Habitat Type | Acreage | Linear Feet |
|---|---|---|---|---|
| UT1 Reach 1 | Stream Buffer Bottomland Hardwood Enhancement | Herbaceous Wetlands | 2.12 | 321.78 |
| | Upland Stream Buffer Enhancement | Herbaceous (Pasture) Uplands | 0.56 | 85.00 |
| UT1 Reach 2 | Stream Buffer Bottomland Hardwood Enhancement | Herbaceous Wetlands | 0.59 | 89.55 |
| | Upland Stream Buffer Enhancement | Herbaceous (Pasture) Uplands | 0.04 | 6.07 |
| UT1 Reach 3 | Stream Buffer Bottomland Hardwood Enhancement | Herbaceous Wetlands | 10.65 | 1,616.50 |
| | Stream Buffer Bottomland Hardwood Enhancement | Shrub-Scrub Wetlands | 1.30 | 197.32 |
| | Stream Buffer Bottomland Hardwood Preservation | Bottomland Hardwood Wetlands | 2.66 | 403.75 |
| | Upland Stream Buffer Enhancement | Herbaceous (Pasture) Uplands | 2.82 | 428.03 |

**Table 6** below summarized the total acreage and linear footage of the stream buffer mitigation types within the PFMBA.

**Table 6: Target Stream Buffer Mitigation Types Totals**

| Stream Buffer Mitigation Type | Existing Habitat Type | Acreage | Linear Feet |
|---|---|---|---|
| Stream Buffer Bottomland Hardwood Enhancement | Herbaceous Wetlands | 13.36 | 2,027.83 |
| Stream Buffer Bottomland Hardwood Enhancement | Shrub-Scrub Wetlands | 1.30 | 197.32 |
| Stream Buffer Bottomland Hardwood Preservation | Bottomland Hardwood Wetlands | 2.66 | 403.75 |
| Upland Stream Buffer Enhancement | Herbaceous (Pasture) Uplands | 3.42 | 519.10 |

## 8.4 Vegetative Restoration

Trees to be Planted

A mixture of no greater than 80 percent hard-mast and a minimum of 20 percent soft-mast-producing species will be planted in accordance with the following species selection lists in the bottomland hardwood enhancement (**Table 7**), stream buffer bottomland hardwood enhancement (**Table 7**), and upland buffer and stream buffer enhancement (**Table 9**) areas. If seedling availability renders a discrepancy of more than five percent from the desired mixture of hard-mast to soft mast species, Vicksburg District approval to modify the plan will be obtained. Based on monitoring results at the adjacent Pelican Foster Mitigation Bank, the following soft-mast species have over-populated via natural recruitment and will not be planted on the PFBMA: sweet-gum, common persimmon, and red maple. A mixture of the following species will be planted to restore the bottomland hardwood vegetation at the PFMBA:

**Table 7: Bottomland Hardwood Enhancement Species List**

| SPECIES | SCIENTIFIC NAME | MAST | COMPOSITION |
|---|---|---|---|
| Southern Bald-cypress | *Taxodium distichum* | Soft | 7.00% |
| Red mulberry | *Morus rubra* | Soft | 6.00% |
| American elm | *Ulmus americana* | Soft | 3.00% |
| American sycamore | *Platanus occidentalis* | Soft | 4.00% |
| **TOTAL SOFT MAST** | | | **20.00%** |
| Texas red oak (Nuttall Oak) | *Quercus texana* | Hard | 13.50% |
| Willow oak | *Quercus phellos* | Hard | 13.00% |
| Water oak | *Quercus nigra* | Hard | 13.00% |
| Overcup oak | *Quercus lyrata* | Hard | 13.50% |
| Swamp chestnut oak | *Quercus michauxii* | Hard | 13.50% |
| Pecan | *Carya illinoinensis* | Hard | 13.50% |
| **TOTAL HARD MAST** | | | **80.00%** |

**Table 8: Stream Buffer Bottomland Hardwood Enhancement Species List**

| SPECIES | SCIENTIFIC NAME | MAST | COMPOSITION |
|---|---|---|---|
| Southern Bald-cypress | *Taxodium distichum* | Soft | 5.00% |
| Red mulberry | *Morus rubra* | Soft | 4.00% |
| American elm | *Ulmus americana* | Soft | 3.00% |
| American sycamore | *Platanus occidentalis* | Soft | 5.00% |
| River birch | *Betula nigra* | Soft | 3.00% |
| **TOTAL SOFT MAST** | | | **20.00%** |
| Texas red oak (Nuttall Oak) | *Quercus texana* | Hard | 13.50% |
| Willow oak | *Quercus phellos* | Hard | 13.00% |
| Water oak | *Quercus nigra* | Hard | 13.00% |
| Overcup oak | *Quercus lyrata* | Hard | 13.50% |
| Swamp chestnut oak | *Quercus michauxii* | Hard | 13.50% |
| Pecan | *Carya illinoinensis* | Hard | 13.50% |
| **TOTAL HARD MAST** | | | **80.00%** |

**Table 9: Upland Buffer and Stream Buffer Enhancement Species List**

| SPECIES | SCIENTIFIC NAME | MAST | COMPOSITION |
|---|---|---|---|
| Red mulberry | *Morus rubra* | Soft | 5.00% |
| American beech | *Fagus grandiolia* | Soft | 6.00% |
| American sycamore | *Platanus occidentalis* | Soft | 5.00% |
| Shortleaf pine | *Pinus echinata* | Soft | 4.00% |
| **TOTAL SOFT MAST** | | | **20.00%** |
| Southern red oak | *Quercus falcata* | Hard | 13.50% |
| Northern white oak | *Quercus alba* | Hard | 13.00% |
| Water oak | *Quercus nigra* | Hard | 13.00% |
| Cherry-bark oak | *Quercus pagoda* | Hard | 13.50% |
| Pecan | *Carya illinoinensis* | Hard | 13.50% |
| Bitter-nut hickory | *Carya cordiformis* | Hard | 13.50% |
| **TOTAL HARD MAST** | | | **80.00%** |

Streamside live staking within the bankfull channel of restored streams will be planted in accordance with the species list in **Table 10**. The live stakes will aid in stream bank stabilization immediately following construction, and the fast-growing species will provide for in-stream and streamside habitat for wildlife during the early stages of the PFMBA.

**Table 10: Streamside (Bankfull Channel) Live Staking**

| SPECIES | SCIENTIFIC NAME | MAST | COMPOSITION |
|---|---|---|---|
| Hazel alder | *Alnus serrulata* | Soft | 20.00% |
| Common buttonbush | *Cephalanthus occidentalis* | Soft | 20.00% |
| Eastern cottonwood | *Populus deltoides* | Soft | 20.00% |
| Black willow | *Salix nigra* | Soft | 20.00% |
| Elderberry | *Sambucus canaensis* | Hard | 20.00% |
| **TOTAL HARD MAST** | | | **100.00%** |

Planting specifications

- Wetland Enhancement

  Vegetative restoration will be accomplished by planting an appropriate species mixture of bottomland hardwoods (**Table 7**) during the standard planting season (December-March) following site preparation activities. Seedlings will be planted on approximately 3.58 acres using a 12 x 12 foot spacing for an initial stand density of at least 302 seedlings per acre.

- Stream Buffer Enhancement

  Vegetative restoration will be conducted within riparian areas all three reaches of Unnamed Tributary to Overflow Creek. A 150-foot-wide buffer (150 feet on each side of the Stream Reaches) will be planted with an appropriate species mixture of bottomland hardwoods (**Table 8**) during the standard planting season (December-March) following site preparation activities. Seedlings will be planted on approximately 14.66 acres using a 12 x 12 foot spacing for an initial stand density of at least 302 seedlings per acre.

- Upland Buffer and Upland Stream Buffer Enhancement

  Vegetative enhancement will be accomplished by planting an appropriate species mixture of hardwoods (**Table 9**) during the standard planting season (December-March) following site preparation activities. Seedlings will be planted on approximately 32.02 acres using a 12 x 12 foot spacing for an initial stand density of at least 302 seedlings per acre.

- Streamside Live Staking

  Streamside vegetative restoration will be accomplished by planting an

appropriate mixture of riparian species (**Table 10**) during the standard planting season (December-March) following site preparation activities. Live stakes will be planted on 3 x 3 spacing for a density of 3 to 4 cuttings per square yard.

### 8.5 Hydrologic Restoration

Hydrologic restoration proposed on the PFMBA involves the Priority 1 Restoration of UT1 Reach 1. As previously stated, UT1 Reach 1 has been heavily impacted through the on-going cattle operation and pasture vegetation. Remnant portions of the channel are evident but are mostly in a swale-like state from the constant cattle shear and lack of buffer. Due to these impairments, little flow is properly transported through this system, and bedform features (i.e., riffles and pools) do not exist. Restoration activity is warranted to address these impairments and reconstruct the filled channel to the appropriate functioning condition.

As detailed on the Stream Design Report (**Attachment B**), the design of the channel began with using the developed project-specific regional curve to obtain the bankfull cross-sectional areas. Then, the appropriate reference reach was used to develop the morphological parameters associated with dimension, pattern and profile. The reference reach was chosen based on the most similar boundary conditions such as flow regime and valley setting. UT1 Reach 1 is designed for an E6 Rosgen classification with an intermittent flow regime. Excavated material from the Priority 1 restoration of U1 Reach 1 is minimized by putting the channel on the original floodplain surface. The entire project will involve less than 50 cubic yards of excavation for the restoration of 330 linear feet of stream channel. This material will be used to fill in any nearby depressions created from cattle which may prevent runoff from entering the new stream channel. Any remaining material will be used for access road buildup or spread out in an upland area and stabilized with BMPs to prevent erosion.

No in-stream work is proposed to UT1 Reach 2 allowing this stream wetland complex feature to naturally flow and transition into the existing channel at UT1 Reach 3. No in-stream work is proposed to Reach 3 as this segment is geomorphically stable.

Centerlines of UT1 Reach1, 2, and 3 are depicted in **Figure 5**. Further stream design and project reach morphological characteristics discussions are also included in the Stream Design Report. Additionally, Stream Design Plans, included as **Attachment C**, detail typical riffle and pool cross-sections, plan and profile drawings, in-stream structure details, planting plans, and erosion and sediment control plans.

## 9.0 ACCOUNTING PROCEDURES, METHODS FOR DETERMINING CREDITS AND RELEASE OF CREDITS

The Sponsor proposes that approximately 26.27 acres of the PFMBA can be used as compensatory mitigation through the enhancement and preservation of bottomland hardwood wetlands, streams, and riparian corridors. Credits and debits will be assessed based on wetland acreage of rehabilitated, enhanced, and preserved bottomland hardwoods and linear footage of restored, enhanced, and preserved stream buffer. The available wetland and stream credits shall be determined by the Interagency Review Team (IRT) in accordance with the Charleston Methodology (2010).

## 10.0 FINANCIAL ASSURANCES

Financial assurances will be in the form of two sets of accounts, established at a federally insured depository that is well, or adequately, capitalized as defined in Section 38 of the Federal Deposit Insurance Act. The escrow account funds shall be placed into the proper account upon receipt of payment from permit recipients and divided as follows between the four funds: wetland construction and establishment account, wetland long-term maintenance and protection account, stream construction and establishment account, and stream long-term maintenance and protection account. Specified percentages of this assurance shall be released back to the Sponsor incrementally in accordance with the achievement of milestones specified in the initial contract.

## 11.0 LONG-TERM MANAGEMENT OF MITIGATION BANK

### 11.1 Long-Term Management

The Sponsor, its heirs, assigns or successors, shall be responsible for maintaining and protecting lands contained within the restored portions of the PFMBA, unless the bank lands are transferred to a state or federal resource agency or non-profit conservation organization or this responsibility is contractually conveyed to another person, subject to approval by the IRT. The IRT shall not unreasonably withhold authorization of transfer of long-term maintenance and protection to another person.

### 11.2 Impacts to Mitigation Bank

After restoration, wetlands within the PFMBA will be jurisdictional and will therefore be subject to all applicable requirements established under the Clean Water Act (CWA). As such, permits from USACE will be required for the deposition of dredged or fill material, including mechanized land clearing, in these areas. All requests for permits within the mitigation bank will be coordinated with the IRT; however, decisions regarding the issuance of such permits will be made by USACE in accordance with applicable permit regulations and guidance.

### 11.3 Mitigation for Impacts to Mitigation Bank

If impacts to planted portions of the PFMBA are permitted, the permittee will be required to compensate for the loss of wetland values associated with the project, past wetland impacts that are being mitigated by these wetlands, and all temporal losses associated with the re-establishment of new mitigation sites. The amount of compensation required will be based upon the acreage of wetlands actually impacted. Impacts to wetlands within the PFMBA shall be mitigated by restoration or enhancing the appropriate acreage within the PFMBA if insufficient acreage for restoration or enhancement is available. In cases where sufficient unplanted acreage is not available, the permittee will be responsible for fulfilling all or part of his compensatory mitigation requirement elsewhere, as approved by USACE.

### 11.4 Timber Management

All timber harvests and thinning operations conducted in the PFMBA shall be authorized by the IRT acting through the Corps and shall be performed in a manner that maintains and enhances the ecological integrity and wildlife habitat value of the stand.

## 12.0 ADAPTIVE MANAGEMENT

Exotic/noxious plant species (e.g., Chinese tallow-tree, cottonwood, and black willow) will be controlled as needed until crown closure has occurred. All timber harvests and thinning operations conducted in the PFMBA will be authorized by the Vicksburg District and will be performed in a manner that maintains and enhances timber stand and wildlife habitat quality.

## 13.0 SUCCESS CRITERIA

Performance standards refer to measurable physical (including hydrological), chemical and/or biological attributes that are used to determine if the compensatory mitigation is meeting the restoration objectives for the PFMBA. Compliance with the following performance standards shall demonstrate that the PFMBA is meeting the restoration objectives and is achieving the community types outlined in restoration plan. Measures to achieve the performance standards, as outlined below, shall be implemented during the initial restoration of the site (Year 1), and shall be documented in the as-built baseline submittal for the PFMBA. Following Year 1, documentation that the PFMBA is meeting performance standards, as outlined below, shall be provided in monitoring reports, with monitoring conducted as described in Section 14.0.

The following are standards which must be met to achieve credit releases at the specified year.

### 13.1 Bottomland Hardwood Wetland

*Year 0 – BLH – Initial:*

1. Approval of the Mitigation Banking Instrument and approval of restoration plan,
2. A copy of the approved and recorded conservation servitude that protects the site in perpetuity,
3. Proof of title insurance for the conservation easement,
4. Submittal of a professional land survey,
5. Receipt of necessary permits,
6. Establishment of financial assurances for the construction account and the long-term maintenance and protection account.

*Year 1 – BLH – Post Construction:*

1. Submittal of a monitoring/as-built report,
2. Completion of initial planting (verified by the IRT),
3. Establishment and marking of monitoring plots,
4. Implementation of hydrologic features,
5. Placement of redox tubes,
6. Demonstration that a wetland functional capacity increase has occurred as a result of implementation of the restoration plan (via completion of an HGM Functional Assessment by a qualified professional individual, and verified by the IRT, through the Chair),
7. Maintenance of financial assurances.

*Year 3 – BLH – Success/Performance:* [to occur after the 3rd full growing season]

1. Submittal of a monitoring report,
2. Verification of an 80% or greater survival rate (or 240 trees/acre) of planted species at the minimum required initial planting density of 302 trees/acre, hard mast species should comprise between 50 to 60% of total species planted,
3. Documentation verifying that hydrology restoration features are successful,
4. Maintenance of financial assurances,
5. Demonstration of positive growth in planted tree: lateral canopy diameter, stem diameter, and/or height. Must have at least two additional feet in height from planted species, and at least 50% growth in lateral canopy from previous monitoring event.
6. Exotic and nuisance (Chinese tallow, privet, or as defined by the US Department of Agriculture National Invasive Species Information Center) species shall not comprise more than 5% cover and noxious species (e.g., honey locust, black willow, *Baccharis spp.*, cotton wood) shall not comprise more than 15% of the total stem density.

*Year 5 – BLH – Success/Performance:* [to occur after the 5th full growing season]

1. That the bank qualifies as a jurisdictional wetland. (A delineation must be submitted at Year 5 to document site conditions and extent of jurisdictional areas.)
2. Submittal of a monitoring report,
3. Vegetative success, verified by the following:
   a. a survival rate of 80% (240 trees per acre). This number may include desirable natural recruitment,
   b. seven (7) to ten (10) target species or greater per acre, with no single species comprising more than 25% of the overall stocking,
   c. hard mast species comprising between 50 to 60% of the total species planted,
   d. demonstration of positive growth in planted tree: lateral canopy diameter, stem diameter, and/or height. Must have at least two additional feet in height from planted species, and at least 50% growth in lateral canopy from previous monitoring event.
   e. exotic and nuisance (Chinese tallow, privet, or other species as defined by the US Department of Agriculture National Invasive Species Information Center.) species shall not comprise more than 5% cover and noxious species (e.g., honey locust, black willow, cotton wood, *Baccharis spp.*) shall not comprise more than 20% of the total stem density.
4. Wetland hydrology, verified by the following:
   a. primary and secondary indicators of wetland hydrology are present,
5. Hydric soils, verified by the following:
   a. field data that document the existence of hydric soil criteria as described in the USACE Wetland Delineation Method, 1987 Manual or appropriate Regional Supplement,
   b. data from soil reduction tubes (GPS-referenced) that indicate that soils are significantly anaerobic and saturated.
6. Demonstration of a wetland functional capacity increase from baseline conditions by using the HGM Functional Assessment (to be completed by a qualified professional individual), and verified by the IRT, through the Chair,
7. Maintenance of financial assurances.

*Year 8 – BLH – Success/Performance:* [to occur after the 8th full growing season]

1. Submittal of a monitoring report,
2. Verification of a 50% or greater survival rate (or 150 trees/acre) of planted species at the minimum required initial planting density of 302 trees/acre. Hard mast species should comprise between 50 to 60% of total species,
3. Documentation verifying that hydrology restoration features are successful,

4. Maintenance of financial assurances.
5. Demonstration of positive growth in planted tree: lateral canopy diameter, stem diameter, and/or height. Must have at least two additional feet in height from planted species, and at least 50% growth in lateral canopy from previous monitoring event.
6. Exotic and nuisance (Chinese tallow, privet, or other species as defined by the US Department of Agriculture National Invasive Species Information Center) species shall not comprise more than 5% cover and noxious species (e.g., honey locust, black willow, cotton wood, *Baccharis spp.*) shall not comprise more than 15% of the total stem density.

*Year 10 – BLH – Success/Performance:* [to occur after the 10th full growing season]

1. Submittal of a monitoring report,
2. Vegetative success, verified by the following:
   a. a survival rate of 150 trees/acre or greater. This number may include desirable natural recruitment,
   b. seven (7) to ten (10) target species or greater per acre,
   c. a range of hard to soft mast ratio between 50/50 and 60/40,
   d. a minimum of three years of positive growth of planted tree species through demonstration of positive growth in planted tree: lateral canopy diameter, stem diameter, and/or height. Must have at least two additional feet in height from planted species, and at least 50% growth in lateral canopy from previous monitoring event.
   e. average height of the planted canopy is a minimum of five (5) feet or greater, excluding fast growing genera such as *Platanus* and *Populus*,
   f. the plant community must be comprised primarily of hydrophytic vegetation typical of bottomland hardwood community types where more than 50% of all dominant species are facultative (FAC), facultative-wetland (FACW) or wetland (WET), *excluding FAC- plants*, using routine delineation methods as described in the USACE Wetland Delineation Method, 1987 Manual or appropriate Regional Supplement,
   g. exotic and nuisance species (Chinese tallow tree, Chinese privet, or other species as defined by the US Department of Agriculture National Invasive Species Information Center) shall not comprise more than 5% cover, and noxious species (e.g., honey locust, black willow, cottonwood, and *Baccharis spp.*) shall not comprise more than 15% of the total stem density.
3. Demonstration of a minimum of three years of positive functional benefit using the HGM Functional Assessment (to be completed by a qualified professional individual), and verified by the IRT, through the Chair.
4. Maintenance of financial assurances. Long term management account is fully funded one year prior to bank close-out.

### 13.2 Stream Mitigation

*ALL YEARS – Stream –Exhibiting the Following Characteristics:*

1. **Dimension:** The analysis of representative riffle cross-section shall indicate that it has neither aggraded, degraded, widened, nor narrowed to the point where it has become unstable or will cause instability. The following measurements will be used to aid in making this determination each monitoring year:
   a. The Width/Depth Ratio Stability Rating (measured Width/Depth Ratio divided by the baseline Width/Depth Ratio) shall not be greater than 1.3 as appropriate to the associated stream type.
   b. The Bank Height Ratio shall be 1.0 to 1.2.
   c. Entrenchment ratio will be greater than 2.2 for C and E stream types and greater than 1.4 for B stream types.
   d. Additional measurements: cross-sectional (bankfull) area of the channel, flood prone elevation, bankfull elevation, flood prone width, entrenchment ratio, mean depth, bankfull width, and hydraulic radius to demonstrate the project meets stated restoration goals.
2. **Pattern:** The analysis of the plan-view survey or field measurements shall indicate that the stream is not migrating significantly to the point where it will cause significant bank erosion and cause instability. The following standards will be used to aid in making this determination each monitoring year:
   a. Within any given year, the sinuosity of the stream shall not increase or decrease by an amount greater than 0.2 of the approved channel design and associated stream-type or evolutionary phase.
   b. The centerline of each channel cross-section will not move by more than 20% of the width of the approved as-built channel width in any given year.
   c. The Radius of Curvature and Meander Width Ratio ($W_{blt}/W_{bkf}$) shall remain within the range of variability provided in the stream design included in the restoration plan.
   d. Pool to pool spacing shall be 5 to 7 for watersheds greater than 5 square miles and 4 to 5 for watersheds less than 5 square miles.
3. **Profile:** The analysis of the longitudinal profile shall indicate that the bed elevation has neither aggraded nor degraded to the point where it will cause instability. The following performance standards will be used to aid in making this determination each monitoring year:
   a. The analysis of the Longitudinal Profile shall not indicate significant alterations in the target locations, depths, and slopes of stream features (riffle, run, pool, and glide).

b. Bankfull Shear Stress, and Mean Depth and Slope (calculated using Critical Dimensionless Shear Stress) shall be appropriate for transporting the D50 of either the bar sample or the sub-pavement sample.
c. The slope of the longitudinal profile shall not increase or decrease by an amount greater than 0.2% of the appropriate stream type.

4. **Rosgen Stream Type:** Channel meets definition of designed type.
5. **Stream Reach Stability:** The analysis of the streambank from the top of the bank to the ordinary high water mark shall indicate a significant amount of natural protection to prevent streambank erosion that could jeopardize the stability of the streambank or the stream reach.
   a. The individual Index Values of the Bank Erodibility Hazard Index (BEHI) rating for any identified reach shall be equal to or less than the previous year's Index Value. In addition, the Total Score shall be equal to or less than the previous year's Total Score and shall have a Total Score of "Moderate" by Monitoring Year 3, and a Total Score of "Low" by Monitoring Year 4 and maintained at "Low" throughout the remainder of the monitoring period.

*Year 0 – Stream – Initial*:

1. Approval of the Mitigation Banking Instrument and approval of a restoration plan which will include but is not limited to planform, profile, and typical dimensions as well as expected credits generated,
2. A copy of the approved and recorded conservation easement that protects the site in perpetuity,
3. Establishment of permanent monitoring cross-sections,
4. Establishment of financial assurances for the construction account and the long-term maintenance and protection account.

*Year 1 – Stream – Construction:*

1. Submittal of:
   a. Stream Construction Report – with as-built drawings that show the completion of all initial physical improvements of a Reach made pursuant to the Stream Bank Restoration Plan
   b. Buffer Construction Report – with buffer woody species planting list, submittal of planting report, and proof of planting,
2. Submittal of a monitoring report with the following information:
   a. Stream morphology/stability exhibits the required conditions approved in the MBI

b. where streambank plantings were undertaken, the numbers of live stakes, planted, or volunteer woody species providing bank stabilization from the top of bank to edge of riparian buffer shall be at least 15 living stems per 1/20$^{th}$ acre sample plot,
c. exotic and nuisance species (Chinese tallow tree) shall not comprise more than 5% cover, and noxious species (e.g., honey locust, black willow, cottonwood, thistle, and *Baccharis*) shall not comprise more than 15% of the total stem density.

3. Maintenance of financial assurances.

*Year 3 – Stream – Success/Performance:*

1. Submittal of a monitoring report with the following information:
   a. Stream morphology/stability exhibits the required conditions approved in the MBI
   b. the U.S. Forest Service Stream Reach Inventory and Channel Stability Evaluation (Pfankuch, 1975) rating shall be "Good",
   c. exotic and nuisance species (Chinese tallow tree) shall not comprise more than 5% cover, and noxious species (e.g., honey locust, black willow, cottonwood, thistle, and *Baccharis*) shall not comprise more than 15% of the total stem density.
2. Maintenance of financial assurances.

*Year 5 – Stream – Success/Performance:*

1. Submittal of a monitoring report with the following information:
   a. Documentation of at least 2 overbank events.
   b. Stream morphology/stability exhibits the required conditions approved in the MBI
   c. the individual Index Values of the Bank Erodibility Hazard Index (BEHI) rating for any identified reach shall have a Total Score between the Adjective Ratings of " Very Low to Moderate",
   d. the U.S. Forest Service Stream Reach Inventory and Channel Stability Evaluation (Pfankuch, 1975) rating shall be "Good",
2. Maintenance of financial assurances.
3. Vegetative success, verified by the following:
   a. a survival rate of 80% (240 trees per acre). This number may include desirable natural recruitment,
   b. seven (7) to ten (10) target species or greater per acre, with no single species comprising more than 25% of the overall stocking,
   c. hard mast species comprising between 50 to 60% of the total species planted,

d. demonstration of positive growth in planted tree, including lateral canopy diameter, stem diameter, and/or height. Must have at least two additional feet in height from planted species, and at least 50% growth in lateral canopy from previous monitoring event,
e. exotic and nuisance (Chinese tallow, privet, or as defined by the US Department of Agriculture National Invasive Species Information Center.) species shall not comprise more than 5% cover and noxious species (e.g., honey locust, black willow, cotton wood, *Baccharis spp*) shall not comprise more than 20% of the total stem density.

*Year 8 – Stream – Success/Performance:*

1. Submittal of a monitoring report with the following information:
   a. Stream morphology/stability exhibits the required conditions approved in the MBI
   b. the individual Index Values of the Bank Erodibility Hazard Index (BEHI) rating for any identified reach shall be equal to or less than the Year 3 Total Score,
   c. the U.S. Forest Service Stream Reach Inventory and Channel Stability Evaluation (Pfankuch, 1975) rating shall be "Good",
2. Maintenance of financial assurances.
3. Vegetative success, verified by the following:
   a. a survival rate of 80% (240 trees per acre). This number may include desirable natural recruitment,
   b. seven (7) to ten (10) target species or greater per acre, with no single species comprising more than 25% of the overall stocking,
   c. hard mast species comprising between 50 to 60% of the total species planted,
   d. demonstration of positive growth in planted tree, including lateral canopy diameter, stem diameter, and/or height. Must have at least two additional feet in height from planted species, and at least 50% growth in lateral canopy from previous monitoring event,
   e. exotic and nuisance (Chinese tallow, privet, or as defined by the US Department of Agriculture National Invasive Species Information Center.) species shall not comprise more than 5% cover and noxious species (e.g., honey locust, black willow, cotton wood, *Baccharis spp*) shall not comprise more than 20% of the total stem density.

*Year 10 – Stream – Success/Performance:*

1. Submittal of a monitoring report with the following information:
   a. Stream morphology/stability exhibits the required conditions approved in the MBI
   b. the individual Index Values of the Bank Erodibility Hazard Index (BEHI) rating for any identified reach shall be equal to or less than the Year 4 Total Score.

c. the U.S. Forest Service Stream Reach Inventory and Channel Stability Evaluation (Pfankuch, 1975) rating shall be "Good",

2. Maintenance of financial assurances. Long-term management account is fully funded one year prior to bank closeout.
   a. A minimum of five documented overbank events.
   b. Vegetative success, verified by the following:
   c. a survival rate of 150 trees/acre or greater. This number may include desirable natural recruitment,
   d. seven (7) to ten (10) target species or greater per acre,
   e. a range of hard to soft mast ratio between 50/50 and 60/40,
   f. a minimum of three years of positive growth of planted tree species through demonstration of positive growth in planted tree: lateral canopy diameter, stem diameter, and/or height. Must have at least two additional feet in height from planted species, and at least 50% growth in lateral canopy from previous monitoring event.
   g. exotic and nuisance species (Chinese tallow tree, Chinese privet, or as defined by the US Department of Agriculture National Invasive Species Information Center) shall not comprise more than 5% cover, and noxious species (e.g., honey locust, black willow, cottonwood, and *Baccharis spp.*) shall not comprise more than 15% of the total stem density.

## 14.0 MAINTENANCE, MONITORING, AND REPORTING

### 14.1 Maintenance Provisions

The Sponsor agrees to perform all necessary work to maintain the Mitigation Bank consistent with the maintenance criteria established in the Mitigation Bank Restoration Plan. The Sponsor shall continue with such maintenance activities until closure of the Mitigation Bank. Upon closure of the Mitigation Bank, the Sponsor shall implement the management requirements established in the Long-Term Management Plan. Deviation from the approved Mitigation Bank Restoration Plan is subject to review and written approval by the IRT, acting through the Chair.

### 14.2 Monitoring Provisions

The Sponsor agrees to perform all necessary work to monitor the Mitigation Bank to demonstrate compliance with the performance criteria developed by the USACE, Vicksburg District, for jurisdictional areas and associated upland buffers. If the Sponsor does not provide a complete monitoring report, the District Engineer has the right to suspend further credit sales and / or terminate the mitigation bank. The following should be described in monitoring reports:

*Wetland:*

- Wetland Hydrology: The hydrology monitoring should display wetland hydrology which is defined as whether the site is inundated (flooded or ponded) or the water table is ≤12 inches below the soil surface for ≥14 consecutive days during the growing season at a minimum frequency of 5 years in 10 (≥50% probability) (ERDC TN-WRAP-05-2). Any combination of inundation or shallow water table is acceptable in meeting the 14-day minimum requirement. Short-term monitoring data may be used to address the frequency requirement if the normality of rainfall occurring prior to and during the monitoring period each year is considered. A site must be inundated or saturated typical of a reference condition for the same HGM hydrology classification. A site must meet wetland hydrology criteria as described in the USACE Wetland Delineation Method, 1987 Manual and/or appropriate Regional Supplement
- Wetland Vegetation: The bank should display a dominance of wetland vegetation, defined as a vegetation community of species where more than 50% of all dominant species are facultative (FAC), facultative-wetland (FACW) or wetland (OBL), excluding FAC- plants, using routine delineation methods as described in the USACE Wetland Delineation Method, 1987 Manual and/or appropriate Regional Supplement.
- Hydric Soils: The mitigation bank should display hydric soils, which are soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (United States NRCS Version 7.0, 2010).

*Streams:*

- Must exhibit a dimension/ pattern/ profile within 15% of designed channel and meet stream stability metrics.
- Stream buffers should display a dominance of wetland vegetation, defined as a vegetation community of species where more than 50% of all dominant species are facultative (FAC), facultative-wetland (FACW) or obligate (OBL), excluding FAC- plants, using routine delineation methods as described in the USACE Wetland Delineation Method, 1987 Manual and/or the appropriate Regional Supplement.

### 14.3 Post-Construction/Post-Planting Report

An as-built report shall be submitted to the IRT within 90 days of completion of each Phase of mitigation activities depicted in the bank Restoration Plan. The as-built report is submitted to meet the requirements of the Post Construction credit release. The report shall include:

1. The GPS referenced locations for all required monitoring plots and soil reduction tubes.

2. A plan view map of the constructed/restored wetlands, streams, and adjacent buffers with location of all permanent sampling stations, in-stream and stream bank structures, and all permanent cross-sections and profiles.
3. A description and map of vegetation monitoring plots established at the time of planting. Vegetation monitoring plots will be:
   a. Distributed throughout the mitigation bank.
   b. Cover at least 10% of the mitigation bank and represent each of the vegetative community types (e.g. cypress sloughs, bottomland hardwoods, wet pine savannah, etc.).
   c. Be at least 1/10-acre randomized circular plots established using a randomly selected, evenly distributed grid approach.
4. The establishment of a photo point at the center of each monitoring plot, with four photos taken facing outward toward each of the four cardinal directions (north, south, east and west).
5. The installation of soil reduction tubes to provide evidence of soil saturation at selected fixed vegetative monitoring plots.
   a. be displayed on a map (including GPS coordinates) and presented to the IRT for approval prior to field establishment
   b. be evenly distributed throughout the mitigation bank, to the maximum extent practicable,
   c. be installed at a rate of one five-tube cluster per for every 70 acres of restored bank area, at selected fixed vegetative monitoring plots,
   d. be painted with one coat of ferrihydrate paint and installed to a minimum depth of 20 inches below the surface leaving a minimum of ½ inch of coating above the surface,
   e. be considered as providing a positive indicator of sufficient anaerobic and saturation conditions if most of the ferrihydrate paint coating is dissolved,
6. A baseline HGM Functional analysis of the site prior to planting and restoration utilizing the appropriate HGM form.
7. Profile of in-stream structures, stream cross-sections, longitudinal stream profiles from permanent monitoring locations, and other relevant baseline information for stream success metrics.
8. Description regarding invasive species prevalence and composition.
9. Professional stamped survey of mitigation area.

### 14.4 Monitoring Reports:

Monitoring reports shall be provided to USACE no later than December 15th following the growing seasons in Years 1, 3, 5 ,8, and 10 so that any corrective measures by the Sponsor may be undertaken. USACE will distribute the report to the members of the IRT. In the event monitoring reveals that initial standards have not been met, the Sponsor shall take measures to achieve the

performance standards the following year. Monitoring, reporting and remedial action shall be conducted in accordance with the following:

1. The Sponsor shall provide a written report to USACE by October 15th to allow for the Sponsor to complete vegetative chemical control, if needed. Reports shall be submitted following the growing seasons in years 1, 3, 5, 8, and 10 documenting the results of the monitoring conducted above. The report shall include, at minimum, the following:
   a. A United States Geological Survey topographic quadrangle with the Mitigation Bank indicated.
   b. A detailed narrative that summarizes the condition of the Mitigation Bank and all maintenance activities.
   c. Appropriate site maps that show the locations of all sampling plots, permanent photographic stations, soil reduction tubes, and hydrologic monitoring devices or stations.
   d. Data and interpretation regarding the hydrology of the Mitigation Bank (e.g., hydroperiod, extent and depth of inundation, groundwater monitoring results, precipitation records, etc.). Additionally, during each monitoring event, all primary and secondary hydrology indicators will be observed and documented for each monitoring plot, as currently defined in the USACE Delineation Manual, Environmental Laboratory, 1987, Corps of Engineers' Wetlands Delineation Manual (and Supplemental Guidance), Technical Report Y-87-1, USACE of Engineers Waterways Experiment Station, Vicksburg, Mississippi.
   e. Results and interpretation of vegetation surveys, including the following: The Sponsor shall conduct surveys of living seedlings on the tract at each monitoring location. Sampling shall be done between April 15th and September 15th. Planted seedling survival shall be documented by performing monitoring at the vegetative plots indicated in the Restoration Plan. A table will be provided which documents the following for each monitoring plot: monitoring plot identification, latitude, longitude, count of planted trees per plot, height of trees, count of volunteer tree species per plot, hard mast and soft mast percent, and tree per acre value for each plot. Provide averages over entire site for tree per acre, hard mast/ soft mast ratio. A table should be provided which shows invasive species information for each plot and an estimate of invasive or exotic species over the entire site. Visual estimates of overall percent cover and of percent cover within each stratum of vegetation over the entire bank; species composition; hard mast to soft mast ratio; indices of species diversity; estimates of percent cover of exotic species within each stratum of vegetation present; composition of plant community (wetland indicator status); calculations of survival, density of all trees within the monitoring plots (including natural recruitment),diameter or DBH, and height of all planted trees; and estimates of natural

recruitment.

f. Results of surveys of wildlife usage of the site (e.g., observations of amphibians, reptiles, mammals, birds and macro invertebrates on or near the Mitigation Bank).

g. Descriptions of the condition of applicable drainage ditch plugs, low water crossings, and water control structures (including but not limited to cross vanes, j-hook vanes, etc.).

h. A discussion of likely causes of observed tree mortality within those plots or areas that did not achieve specified performance standards at Years 3, 5, and 10, or note plots in monitoring reports for Years 1 and 8 which are candidates for corrective measures.

i. A completed HGM functional assessment of each planting zone utilizing the appropriate HGM Regional Guidebook. The HGM assessment will be utilized to assess the ecological functional lift of the restoration effort. The HGM score for each monitoring event will be compared to the original baseline pre-restoration score, and to the score of the previous monitoring event to determine both overall ecological functional lift and ecological functional lift between monitoring events. The HGM Assessment shall determine a score for the Functional Capacity Indices required in the appropriate HGM regional guidebook.

j. A drawing based upon the grading plans of the site that depicts topography, sampling plots, cross-sections, longitudinal profile, and permanent photo stations. Survey data and comparison to as-built data will be included.

k. For stream mitigation banks, metrics relating to dimension, pattern and profile performance standards will be submitted and compared to as-built reports.

l. Data regarding the hydrology of the bank (e.g. hydroperiod, extent and depth of inundation, precipitation records, etc.).

m. Monitoring reports shall present yearly data in tabular and graphical format comparing as-built, target, current and previous years monitoring data, and shall include a discussion of any deviation from as-built, target, or previous year's data. For stream banks with in-stream work, metrics measured should reflect metrics in restoration plan. The Sponsor shall provide funding information on financial assurance mechanisms.

2. The Sponsor shall provide funding information on financial assurance mechanisms.

3. If survival (as determined by sampling or observing high mortality rates within any planting zone) is less than indicated performance standards, the Sponsor shall take appropriate actions, as recommended by the IRT, to address the causes of mortality and shall replace all dead trees with new seedlings of the appropriate species during the following non-growing season. Replanting, monitoring, and reporting shall occur thereafter as needed to achieve and document the minimum required survival density for five consecutive years.

4. If tree survival or any other corrective measure is required for the site to meet restoration goals (as documented in monitoring reports), the Sponsor shall develop and implement an

adaptive management plan. This adaptive management plan will be submitted to USACE for approval. Upon approval, any replanting will require the site to be monitored according to monitoring and reporting guidance above until success criteria are met.

5. The Sponsor shall continue monitoring and reporting of each planting effort, in accordance with the Restoration Plan for a minimum of ten (10) years for wetlands and stream work. Annual reports will be provided to USACE for distribution to the IRT members.

## 15.0 CORRECTIVE ACTIONS

### 15.1 Contingency Plans/Remedial Actions

In the event the Mitigation Bank fails to achieve any of the short-term or long-term success criteria, the Sponsor shall develop necessary contingency plans and implement appropriate remedial actions for the PFMBA in coordination with the IRT. In the event the Sponsor fails to implement necessary remedial actions within 45 calendar days after notification by the USACE of necessary remedial action to address any failure in meeting the criteria, the IRT (acting through the Chair) will notify the Sponsor and the appropriate authorizing agencies and recommend appropriate remedial actions. The sponsor must notify the IRT if the project cannot be constructed in accordance with the Restoration Plan.

### 15.2 Completion of Corrective Actions

At the request of the Sponsor, the IRT will perform a final compliance visit to determine whether all performance standards have been satisfied. Upon satisfaction of the performance standards, any remaining contingency funds will be released to the Sponsor, if eligible.

### 15.3 Deficits

If the IRT determines that the PFMBA is operating at a deficit of credits bank operation will immediately cease, and the authorizing agencies, in consultation with the IRT and the Sponsor, will determine what remedial actions are necessary to correct the situation. As determined by the Chair, in coordination with the IRT and the Sponsor, if conditions at the PFMBA continue to deteriorate or do not improve within a reasonable time frame from the date that the need for remediation was first identified in writing to the Sponsor by the Chair of the IRT, the Construction Account Funds will be used to undertake corrective measures in accordance with IRT specifications and correct any deficits.

### 15.4 Non-Compliance

In the event the Sponsor does not comply with the MBI or the Conservation Easement, the Sponsor will be required to immediately perform corrective actions (e.g., replanting and repair or replacement

of hydrologic improvement efforts). USACE will then convene a meeting with the Sponsor and the IRT to determine if a reassessment of the management or mitigation potential is necessary. At that time, the IRT may choose to stop use of the bank until corrective action has occurred. If remedial action is not taken within one year, the IRT will cease recognition of the PFMBA, and the Sponsor will be required to implement mitigation, as approved by USACE, to replace all mitigation which had been performed at the PFMBA, but was not successful. Alternatively, if placed in non-compliance, failure by the Sponsor to replace mitigation will result in forfeiture of the portion of the letter of credit or funds pertaining to the tract(s) for which the Sponsor has been placed in non-compliance. If the bank is not brought into compliance, then remaining credits could be suspended, as determined by the IRT. In the event, that the Sponsor is unwilling or unable to bring the bank into compliance then the bank could be terminated in accordance with MBI.

### 15.5 Adjustment of Mitigation Potential

The management or mitigation potential may be adjusted by the IRT at any time should any activity adversely affect the value or functioning of the PFMBA. Any adjustments to the management or mitigation potential will apply only to unsold credit acreage within the bank. If all credits have been sold, then other means of corrective action will be taken within the bank and will not affect those tracts that have already been debited.

### 15.6 Force Majeure

Force majeure damage, including natural disasters or any other "Act of God", will remain the responsibility of the Sponsor until the Year 5 wetland performance standards and the stream performance standards have been met. If the IRT determines that a Force Majeure event has occurred, and that event affects the long-term viability of the PFMBA, the IRT can require appropriate measures be taken by the Sponsor or Third Party to implement corrections that may be funded by a release of funds from the construction account or interest earnings from the long-term endowment.

## 16.0 CONCLUSION

In summary, the Sponsor proposes to conduct bottomland hardwood wetland, instream, riparian buffer, upland buffer, and upland stream buffer activities on the 56.33-acre PFMBA.

Bottomland hardwood wetland activities will consist of 3.57 acres of herbaceous wetland enhancement, 0.01 acre of shrub-scrub wetland enhancement, and 0.01 acre of preservation. Upland buffer activities will consist of 28.60 acres of enhancement. Stream activities will consist of 0.03 acre (330 linear feet) of Priority 1 restoration, 0.03 acre (91 linear feet) of stream wetland complex, and 1.88 acres (2,727 linear feet) of preservation of an unnamed tributary to Overflow

Creek. Riparian buffer activities will consist of 13.36 acres (2,027.83 linear feet) of stream buffer bottomland hardwood enhancement (herbaceous wetlands), 1.30 acres (197.32 linear feet) of stream buffer bottomland hardwood enhancement (shrub-scrub wetlands), and 2.66 acres (403.75 linear feet) of stream buffer bottomland hardwood preservation. Upland stream buffer activities will consist of 3.42 acres (519.10 linear feet) of enhancement. Remaining acreage associated with the PFMBA, not proposed for rehabilitation, enhancement, and preservation activities includes 1.46 acres of roads.

## 17.0 REFERENCES

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss. Technical Report Y-87-1. 207 p.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/ Accessed [6/15/2020].

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United States Department of Agriculture, Soil Conservation Service. 1914. *Soil Survey of Ashley County, Arkansas.*

United States Department of Agriculture, Soil Conservation Service. 1979. *Soil Survey of Ashley County, Arkansas.*

United States Environmental Protection Agency, Summary Table: Characteristics of the Ecoregions of Arkansas (Ecoregions 35c and 73i). Available online at https://www.epa.gov/eco-research/ecoregion-download-files-state-region-6#pane-03 Accessed [6/15/2020]

# FIGURES


## Legend

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Pelican Foster Mitigation Bank

**Source:** Base map comprised of ESRI StreetMap USA data.

# Vicinity Map

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

4 2 0 4 Miles

MATRIXNEWORLD
Engineering Progress

| | |
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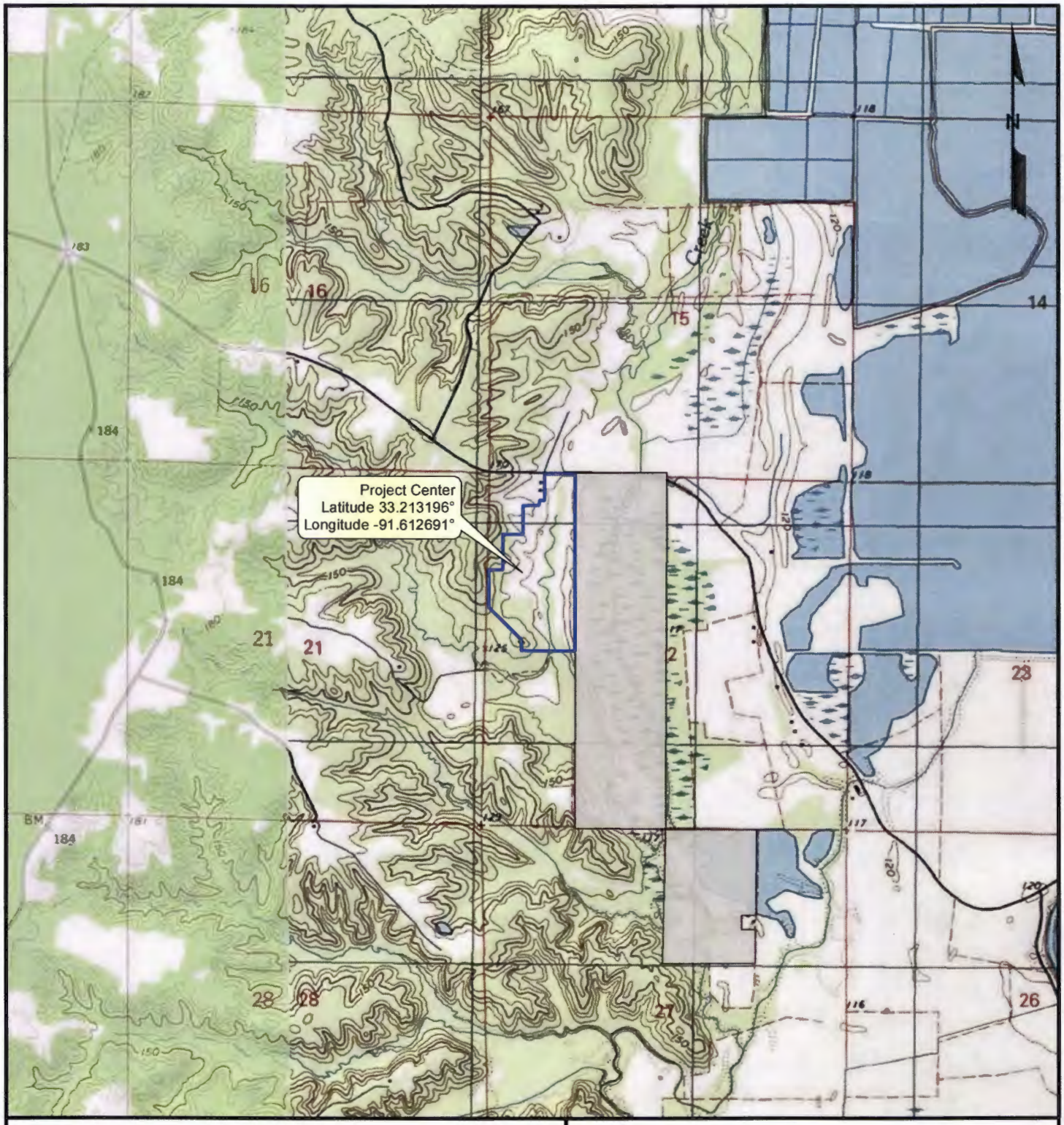
| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A011 |

1
Figure No.




## Legend

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Pelican Foster Mitigation Bank

**Source:** Base map comprised of U.S.G.S. 7.5-minute topographic map(s), "Portland, AR" dated 2002; and "Wilmot NW, AR" dated 1960.

# Site Location Map

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

2,000 1,000 0 2,000 Feet

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Engineering Progress

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| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A012 |

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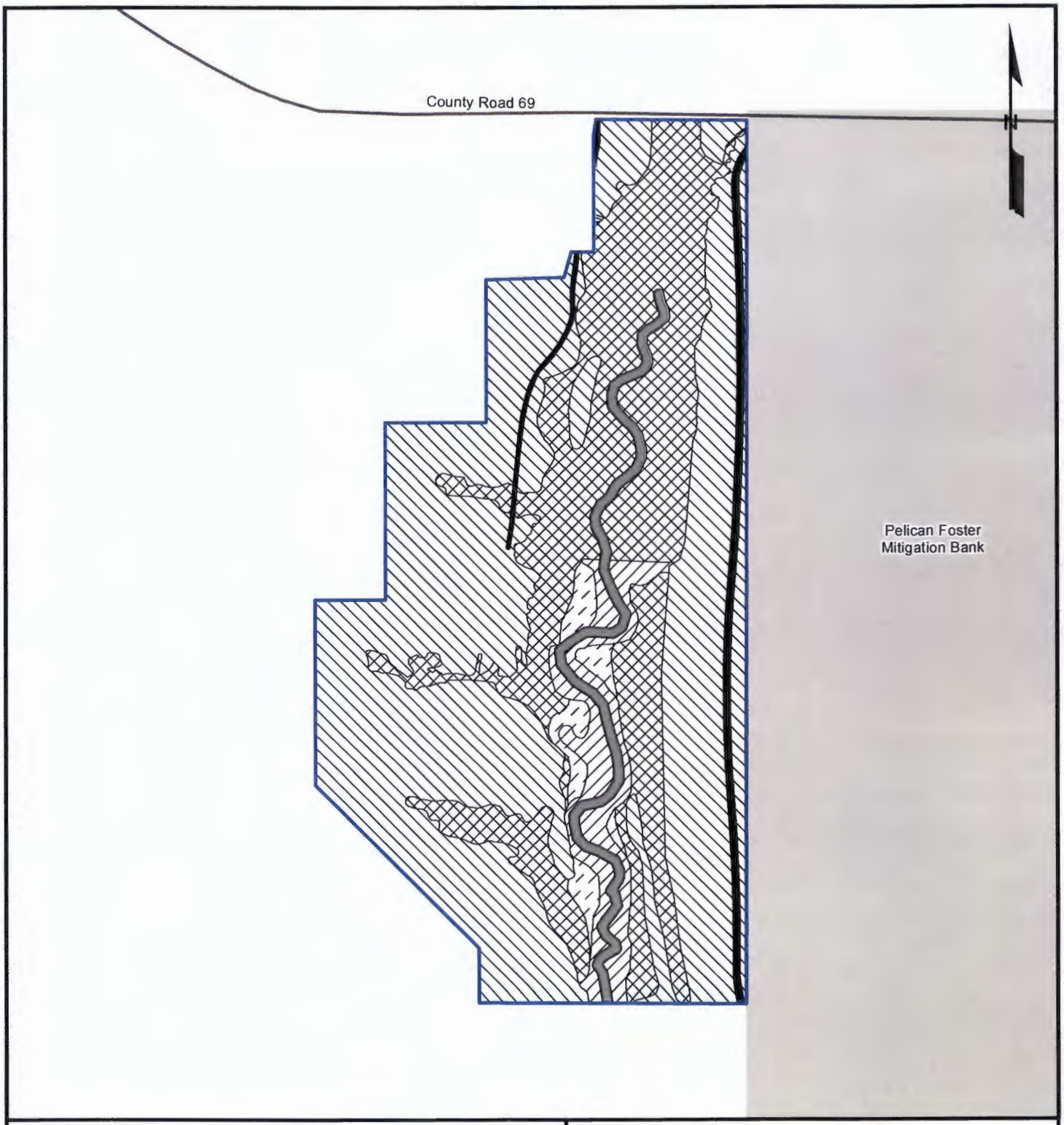
Figure No.




## Legend

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Bottomland Hardwood Wetlands (2.67 acres)
- Herbaceous Wetlands (16.99 acres)
- Shrub-Scrub Wetlands (1.31 acres)
- Uplands (32.02 acres)
- Unnamed Tributary to Overflow Creek (1.88 acres)
- Existing Roads (1.46 acres)

# Pre-Restoration Site Plan

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

400 200 0 400 Feet

MATRIXNEWORLD
Engineering Progress

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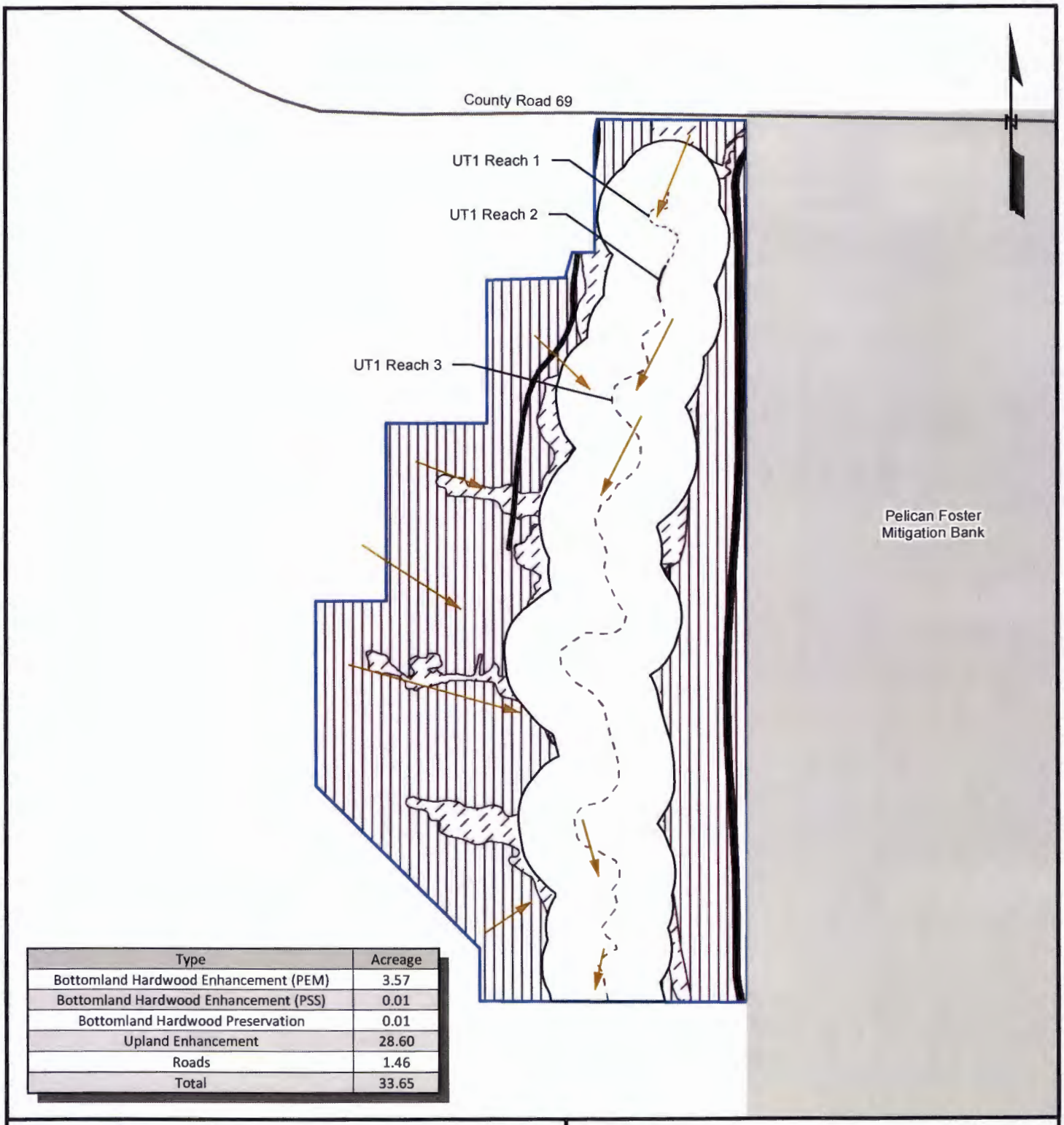
| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A013 |

3
Figure No.




| Type | Acreage |
|---|---|
| Bottomland Hardwood Enhancement (PEM) | 3.57 |
| Bottomland Hardwood Enhancement (PSS) | 0.01 |
| Bottomland Hardwood Preservation | 0.01 |
| Upland Enhancement | 28.60 |
| Roads | 1.46 |
| Total | 33.65 |

## Legend

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Existing Roads
- Bottomland Hardwood Enhancement (PEM)
- Bottomland Hardwood Enhancement (PSS)
- Bottomland Hardwood Preservation
- Upland Buffer Enhancement
- Streams and Stream Buffers (See Attached Stream Design Plans)
- Priority 1 Stream Restoration
- Stream Wetland Complex
- Stream Preservation (No In-Stream Work)
- Drainage Flow

# Post-Restoration Site Plan

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

400 200 0 400
Feet

MATRIXNEWORLD
Engineering Progress

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|---|---|
| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A014 |

4
Figure No.


**Legend**

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Pelican Foster Mitigation Bank

Source: U.S. Geological Survey (U.S.G.S). Aerial Single Frame Photo ID: AR1VUY000020202 [aerial photo]. Sioux Falls, S. Dak.: EROS Data Center, January 22, 1959.

# 1959 Aerial Photograph

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

400 200 0 400 Feet

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Engineering Progress

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|---|---|
| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A015 |

5
Figure No.


**Legend**

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Pelican Foster Mitigation Bank

**Source:** Base map comprised of 2019 aerial photography from USDA/FSA Aerial Photography Field Office, National Agriculture Imagery Program (NAIP).

# 2019 Aerial Photograph

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

400 200 0 400 Feet

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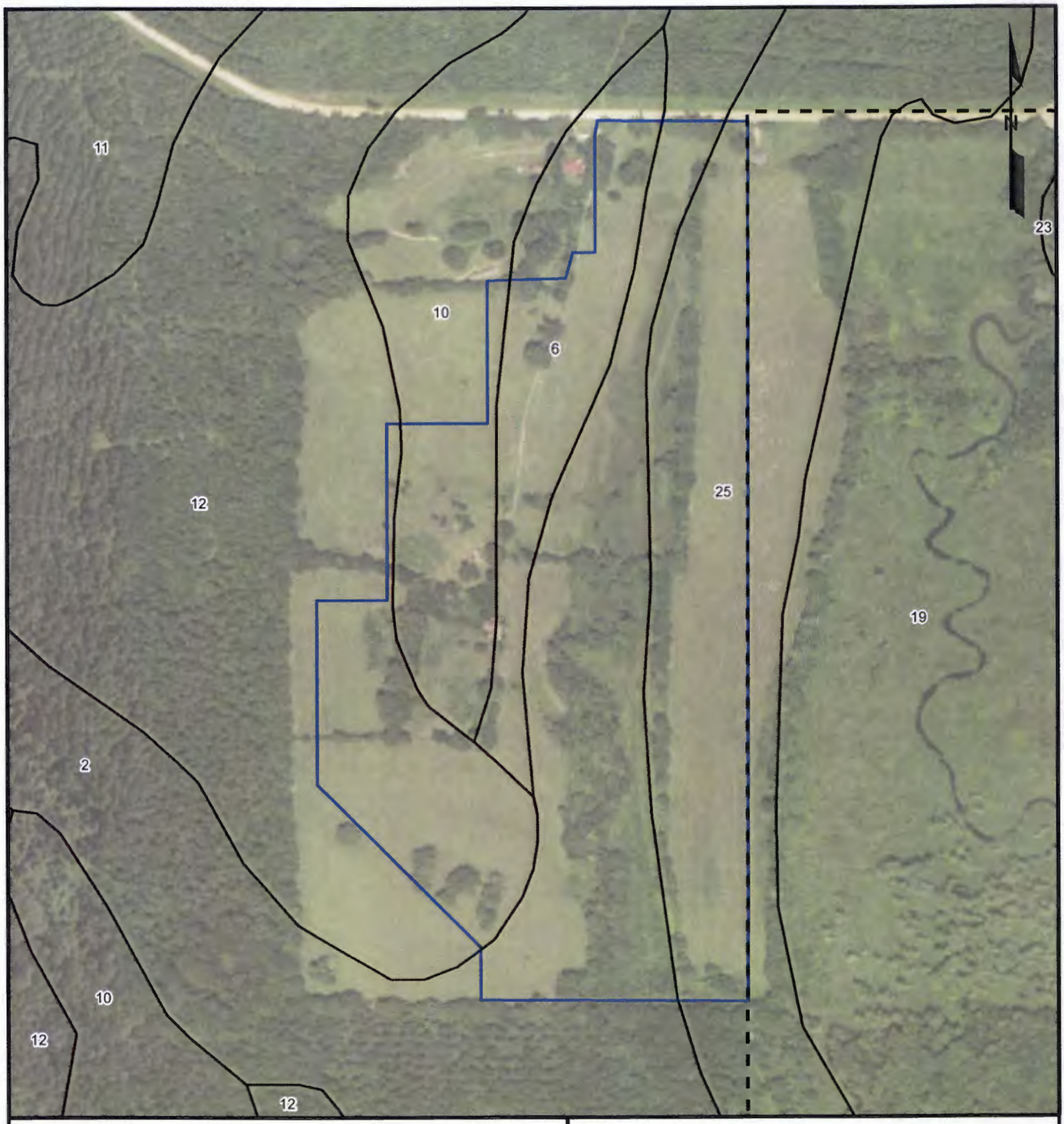
|---|---|
| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A016 |

6
Figure No.




## Legend

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Pelican Foster Mitigation Bank
- Soils:
  - 2 - Arkabutla silt loam, 0 to 1 percent slopes, frequently flooded
  - 6 - Calloway silt loam, 1 to 3 percent slopes
  - 10 - Grenada silt loam, 1 to 3 percent slopes
  - 12 - Grenada silt loam, 8 to 12 percent slopes
  - 25 - Rilla silt loam, 0 to 1 percent slopes

**Source:** Base map comprised of 2019 aerial photography from USDA/FSA Aerial Photography Field Office, National Agriculture Imagery Program (NAIP). Soils data obtained from Natural Resources Conservation Service (NRCS) Web Soil Survey.

# Soils Map

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

400 200 0 400 Feet

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Engineering Progress

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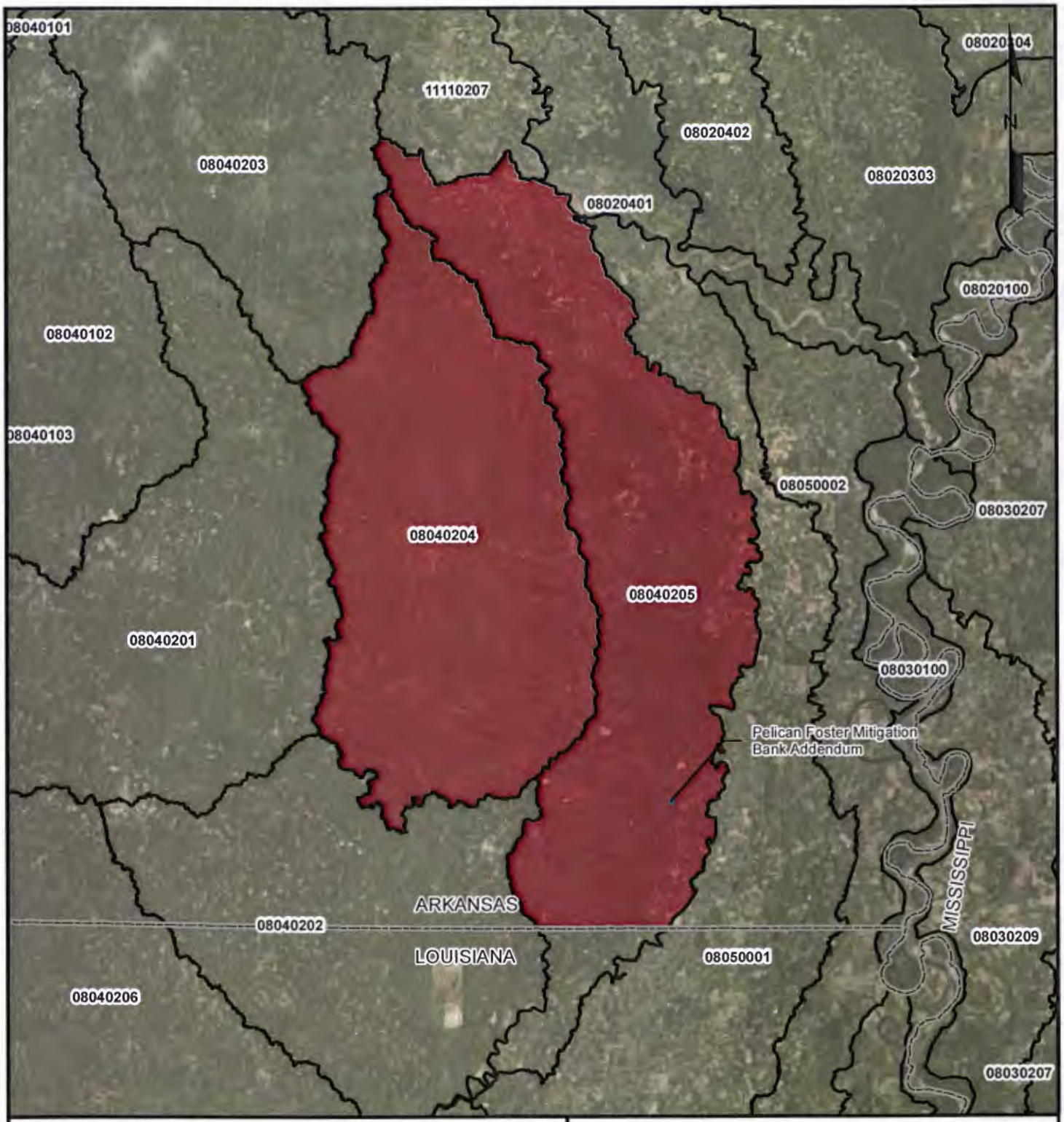
| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A017 |

7
Figure No.




## Legend

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Primary Service Area
- Hydrologic Unit Boundary

**Source:** Base map comprised of 2019 aerial photography from USDA/FSA Aerial Photography Field Office, National Agriculture Imagery Program (NAIP). Hydrologic Unit Boundaries (HUC)

# Primary Service Area

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

15 7.5 0 15 Miles

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Engineering Progress

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|---|---|
| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A018 |

8
Figure No.

## Legend

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Pelican Foster Mitigation Bank
- DEM Elevation Contours (meters)

**Source:** Base map comprised of 2019 aerial photography from USDA/FSA Aerial Photography Field Office, National Agriculture Imagery Program (NAIP). DEM Contours calculated from U.S. Geological Survey, National Elevation Database (NED).

# LIDAR Map

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

400 200 0 400 Feet

MATRIXNEWORLD
Engineering Progress

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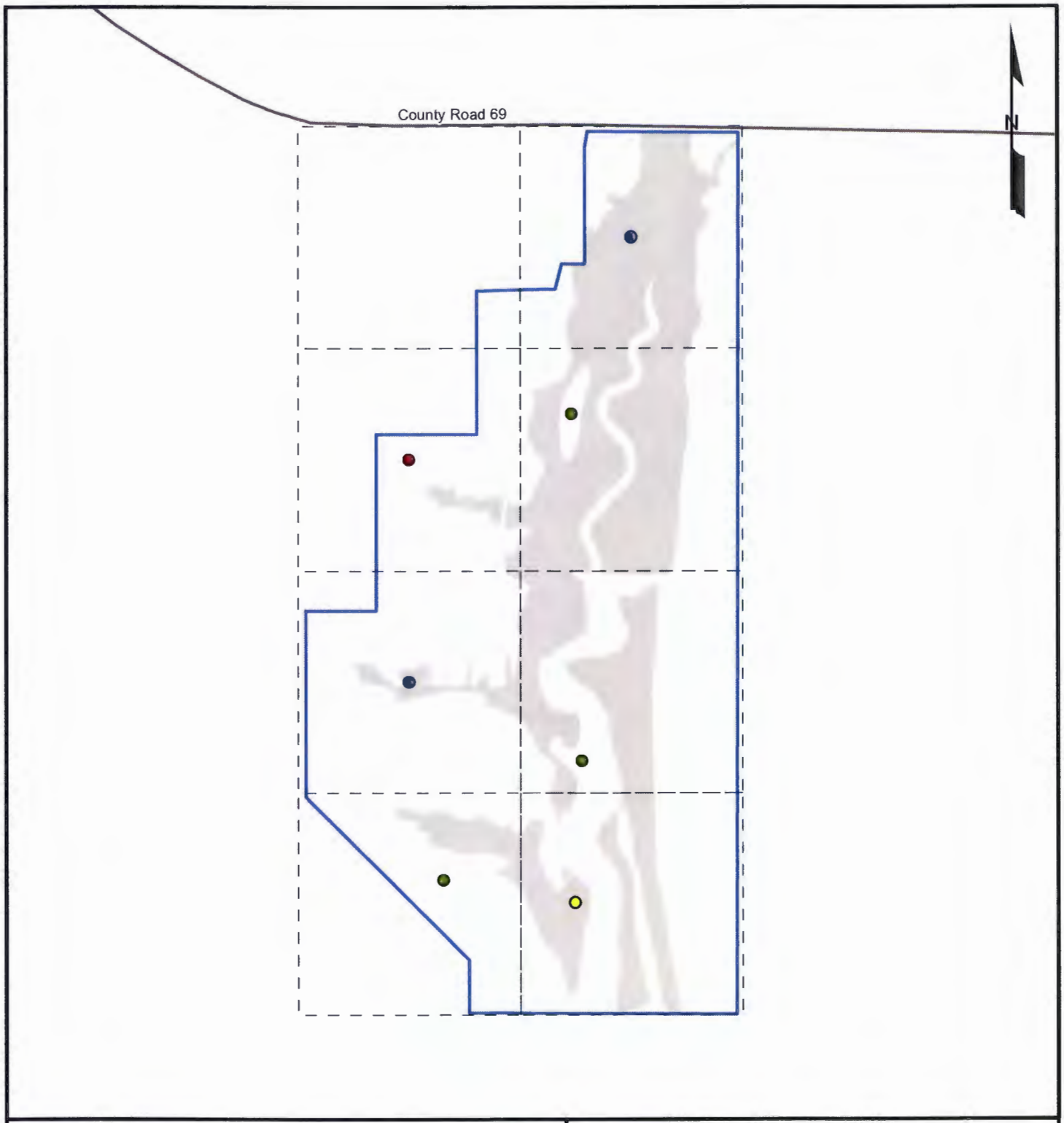
| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A019 |

9
Figure No.




## Legend

- Pelican Foster Mitigation Bank Addendum (56.33 acres)
- Wetland and Stream Buffer Enhancement
- 10 Acre Grid
- Enhancement Plots (10%)
- Adjusted Enhancement Plots to Compensate for Habitat Type
- Preservation and Upland Plots (5%)
- Adjusted Preservation and Upland Plots to Compensate for Habitat Type

# Permanent Monitoring Plots

**Mitigation Bank Addendum**
Ashley County, Arkansas

## Pelican Mitigation, LLC

Pelican Foster Mitigation Bank Addendum

400 200 0 400
Feet

MATRIXNEWORLD
Engineering Progress

| | |
|---|---|
| Drawn By | LMM |
| Approved By | CET |
| Date | 6/25/2020 |
| Drawing No. | 19-043-A020 |

**10**
Figure No.

# DEPARTMENT OF THE ARMY

VICKSBURG DISTRICT, CORPS OF ENGINEERS
4155 CLAY STREET
VICKSBURG, MISSISSIPPI 39183-3435

REPLY TO
ATTENTION OF:

October 4, 2017

Operations Division

SUBJECT: Preliminary Jurisdictional Determination - Approximately 72.16-Acre Site in Ashley County, Arkansas

Mr. Lee Womack
Matrix New World Engineering
4451 Bluebonnet Boulevard, Suite E
Baton Rouge, Louisiana 70809

Dear Mr. Womack:

I refer to the information you submitted, on behalf of Pelican Mitigation, LLC, in regards to a request for a jurisdictional determination on property located in section 22, T17S-R5W, Ashley County, Arkansas (enclosure 1).

Based upon the information provided, it appears that there are jurisdictional waters of the United States located on the property subject to regulation pursuant to Section 404 of the Clean Water Act. Any work involving the discharge of dredged or fill material (land clearing, ditching, filling, leveeing, etc.) within jurisdictional waters, including wetlands, will require a Department of the Army Section 404 permit prior to beginning work. For your information, I have enclosed a copy of our appeals form (enclosure 2) for this preliminary jurisdictional determination.

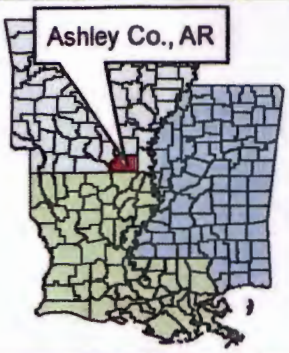
For your convenience, I am enclosing a Department of the Army permit application package with instructions (enclosure 3). Your application for any proposed work in wetlands or other waters of the United States should be submitted at least 120 days in advance of the proposed starting date. To expedite the evaluation process, please reference the identification no. MVK-2012-197 when submitting the application.

If you have any questions, please contact Mr. Arel Simpson of this office, telephone (601) 631-5996, or e-mail address: arel.d.simpson@usace.army.mil.

Sincerely,

Charles R. Allred, Jr.
Chief, Enforcement Section
Regulatory Branch

Enclosures

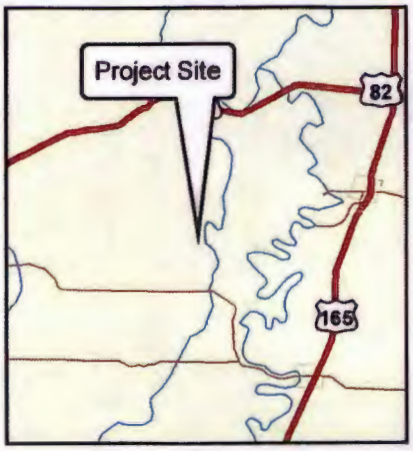

4 October 2017

# MVK-2012-197

**Jurisdictional Determination**
**Pelican-Foster Addendum**
**Pelican Mitigation, LLC**
**Ashley County, Arkansas**

**Preliminary**
**Jurisdictional Determination**

Prepared by
Arel Simpson




**US Army Corps of Engineers**

N
W E
S

## Regulatory Branch

**Enforcement Section**

0 105 210 420 Feet

**Enclosure 1**

## Legend

- Project Boundary (72.16 Acs.)
- Jurisdictional Stream (2,745 L.F.)
- Jurisdictional Wetlands (21.09 Acs.)

## NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

| Applicant: Pelican Mitigation, LLC | File Number: MVK-2012-197 | Date: 10-4-2017 |
|---|---|---|
| Attached is: | | See Section below |
| | INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission) | A |
| | PROFFERED PERMIT (Standard Permit or Letter of permission) | B |
| | PERMIT DENIAL | C |
| | APPROVED JURISDICTIONAL DETERMINATION | D |
| X | PRELIMINARY JURISDICTIONAL DETERMINATION | E |

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/appeals.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

ENCLOSURE 2

## SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

## POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

| | |
|---|---|
| If you have questions regarding this decision and/or the appeal process you may contact:<br>Arel Simpson<br>U. S. Army Corps of Engineers<br>Regulatory Branch<br>4155 Clay Street<br>Vicksburg, MS 39180<br>Telephone No.: 601-631-5996 | If you only have questions regarding the appeal process you may also contact:<br>Administrative Appeals Review Officer<br>Mississippi Valley Division<br>U.S. Army Corps of Engineers<br>1400 Walnut Street<br>Vicksburg, MS 39181-0080<br>601-634-5820 |

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

| | | |
|---|---|---|
| _____<br>Signature of appellant or agent. | Date: | Telephone number: |

MATRIXNEWORLD

Engineering Progress

# ATTACHMENT B

# STREAM DESIGN REPORT

WILBANKS ENGINEERING
& ENVIRONMENTAL SOLUTIONS, LLC

MAY 29, 2020

# PELICAN FOSTER MITIGATION BANK ADDENDUM SITE

*Ashley County, Arkansas*

## STREAM DESIGN REPORT

*MVK-2012-197*

### INTRODUCTION

This report was prepared for Pelican Mitigation, LLC for the purposes of presenting stream data and information used in the design of project stream within the Pelican Foster Mitigation Bank (PFMB) addendum site. This report was prepared by Zachary Wilbanks with Wilbanks Engineering & Environmental Solutions, LLC. The restoration of the stream channel within the PFMB used a Natural Channel Design (NCD) approach. This first involved developing a project-specific regional curve to properly size the channel. Once the channel size (i.e., bankfull channel cross-sectional area) was determined, the various specific dimension, pattern and profile characteristics of the channel was designed from the dimensionless ratios of a geomorphically stable reference reach within the local watershed.

This document provides information in regard to the project-specific regional curve, as well as presents the reference reach dimensionless ratios that were used for design. These design tools were developed for the PFMB addendum project, MVK-2012-197, which is a stream and wetland mitigation bank project in Ashley County, Alabama within the Bayou Bartholomew watershed (HUC 08040205). The site is located on the delineation boundary between the Arkansas/Ouachita River Backswamps Level IV Ecoregion (73i) and the Pleistocene Fluvial Terraces Level IV Ecoregion (35c).

### REGIONAL CURVES

Field work was conducted in November of 2019 collecting data from stable streams throughout the region to develop empirical relationship between drainage area and stable stream geometry. Emphasis was placed on finding stream channels that are under similar conditions to that of the FPMB project stream with the same geologic and climatic characteristics. The PFMB project stream is a low-slope (i.e., less than 0.1%) channel with high sinuosity. Silts and clay dominate the substrate consistency in the system exhibiting very low-energy conditions from the essentially flat floodplain slope and low flow depths that are present in the stable portion of the channel on the site. Therefore, downcutting from vertical degradation is limited at the site. The existing channel extends into a pasture that is currently being used to support a cattle operation. This has caused

the upstream-most reach to become filled from cattle impacts and aggradated conditions which allowed pasture grasses to grow into the channel forming unnatural swale-like conditions.

A regional curve is a valuable resource for project stream design and was developed to gain information in understanding the relationship between channel geometry and drainage area. Emphasis was placed on finding regional curve stream sites that were located within the watershed of the Bayou Bartholomew and within the Arkansas/ Ouachita River Backswamps Level IV Ecoregion (73i) and/or the Pleistocene Fluvial Terraces Level IV Ecoregion (35c) so that hydrologic and geologic conditions are similar and are consistent with the watershed approach. Considering the project stream has a very low slope condition with silt/clay dominated substrate, further emphasis was placed on finding streams with these conditions as well. A total of nine stable stream channels with various drainage areas were found and used for this purpose. All of the regional curve stream locations are within five miles of the site with one of these sites being the project's reference reach that was only one mile from the site. Data was collected from these sites in order to develop the regional curves which is a project-specific relationship between drainage area (i.e., watershed size) and bankfull channel cross-sectional area, width, depth and discharge.

A majority of the sites had 1% or less slopes and were in unconfined valleys similar to site conditions. All streams had width to depth ratios less than 12 and were some variation of an "E" Rosgen Stream Type (RST) stream. Gravel substrate was purposefully limited with the study but was found within two of the stream reaches (i.e., RC-02 and RC-6). The other seven stream reaches had silt/clay or sandy silt substrate similar to project reach conditions. An illustration of these stream sites used in developing the regional curve is provided in Exhibit B and the location of each site is shown on Figure 1 within Exhibit A. Table 1, below, presents a summary of the data that was collected from these sites and used to develop the regional curve. Table 2 indicates the Rosgen Stream Types and geographic coordinates of each site as well.

**Table 1: Regional Curve Data Summary**

| Reach ID | Drainage Area | Drainage Area | Bankfull XSEC Area | Bankfull Width | Bankfull Mean Depth | Bankfull Slope | Bankfull Discharge | Bankfull Velocity |
|---|---|---|---|---|---|---|---|---|
| | *acres* | *sqmi* | *sf* | *ft* | *ft* | *%* | *cfs* | *fps* |
| RC-01 | 134 | 0.209 | 9.9 | 8.0 | 1.24 | 1.20 | 44.3 | 4.5 |
| RC-02 | 269 | 0.421 | 12.7 | 8.6 | 1.48 | 0.70 | 48.3 | 3.8 |
| RC-03 | 6,697 | 10.464 | 76.2 | 27.3 | 2.79 | 0.30 | 312.0 | 4.1 |
| RC-04 | 46 | 0.072 | 3.4 | 6.0 | 0.57 | 2.20 | 13.3 | 3.9 |
| RC-05 | 155 | 0.242 | 7.1 | 5.6 | 1.26 | 0.64 | 22.1 | 3.1 |
| RC-06 | 42 | 0.066 | 3.5 | 4.2 | 0.83 | 1.90 | 14.6 | 4.1 |
| RC-07 | 241 | 0.376 | 9.9 | 8.5 | 1.17 | 1.00 | 39.7 | 4.0 |
| RC-08 | 84 | 0.132 | 4.0 | 5.8 | 0.69 | 2.30 | 17.2 | 4.4 |
| RC-09 | 499 | 0.780 | 23.9 | 11.5 | 2.08 | 0.65 | 108.9 | 4.6 |

**Table 2: Regional Curve Stream Types and Location**

| Reach ID | W/D Ratio | Entrench. Ratio | Stream Type | Latitude, Longitude | Location Description |
|---|---|---|---|---|---|
| | *n/a* | *n/a* | *n/a* | *decimal degrees* | |
| RC-01 | 6.5 | >7 | E6 | 33.173367, -91.624787 | UT to Overflow Creek |
| RC-02 | 5.8 | >7 | E4/6 | 33.173889, -91.658004 | UT to Beech Creek |
| RC-03 | 9.8 | >5 | E6 | 33.173894, -91.654050 | Headwaters of Beech Creek |
| RC-04 | 10.4 | >6 | E6b | 33.210937, -91.630225 | UT to Overflow Creek |
| RC-05 | 4.5 | >7 | E6 | 33.221366, -91.629873 | UT to Overflow Creek |
| RC-06 | 5.1 | >7 | E4/6 | 33.253566, -91.616101 | UT to Overflow Creek |
| RC-07 | 7.3 | >7 | E6 | 33.261384, -91.633543 | UT to Overflow Creek |
| RC-08 | 8.4 | >5 | E6 | 33.269063, -91.632342 | UT to Overflow Creek |
| RC-09 | 5.5 | >7 | E6 | 33.284969, -91.617985 | UT to Overflow Creek |

This data was used to prepare a log-log graphical relationship which yielded strong results with good $R^2$ statistical values. These curves provide a relationship between drainage area (square miles) and bankfull cross-section area, width, depth, and discharge. These regional curve graphs are attached to this report in Exhibit C. The equations of each curve and corresponding $R^2$ value are as shown in Table 3:

**Table 3: Regional Curve Equations**

| Curve | Units | Equation | $R^2$ Value |
|---|---|---|---|
| Area | square feet | $A_{bkf} = 19.98x^{0.643}$ | 0.954 |
| Width | feet | $W_{bkf} = 11.90x^{0.343}$ | 0.937 |
| Depth | feet | $D_{bkf} = 1.68x^{0.300}$ | 0.823 |
| Discharge | cubic feet per second | $Q_{bkf} = 80.99x^{0.649}$ | 0.943 |

The 'x' in each equation represents the drainage area in square miles. These equations (or regional curves) represent an empirical relationship between the size of stable stream channels up to the bankfull stage and drainage area. In this case, stable refers to streams that appear to properly transport the water and sediment delivered from the watershed while maintaining dimension, pattern and profile within a natural range of variability without exhibiting degradation or aggradation. These curves are unique to the climate, geology, soils, and vegetation of this region.

These curves provide a design tool that will generate the most appropriately sized channels on the PFMB project site. A graph of the cross-sections used in the regional curve is included in Exhibit D. All that is needed before using the regional curve for design is the project stream drainage area. Using the regional curve will prevent the oversizing of channels that can lead to poor floodplain connectivity, aggradation from improper channel widths/depths or degradation from an excessive amount of shear stress and power in the channel.

## REFERENCE REACHES

One reference reach was identified for the PFMB addendum project located about one mile to the northwest along an unnamed tributary that flows into the project stream downstream of the project boundary. The PFMB addendum site has one impaired reach with proposed restoration. The project involves one stream system in which the upstream-most reach (i.e., Reach 1) is impaired, the middle reach functions as a stream wetland complex (i.e., Reach 2) and the downstream-most reach (i.e., Reach 3) is geomorphically stable. Therefore, only one reference reach is appropriate for the design of the restoration channel reach.

The dimension, pattern and profile of this reference reach channel is in fully functioning condition with good floodplain connectivity, bedform diversity, lateral stability and riparian buffers. Data collection consisted of surveying riffle and pool cross-sections, a representative longitudinal profile and alignment survey to develop dimensionless ratios useful in designing the project streams with similar ecological functionality. The reference reach is identified as RC-05. This channel is an intermittent E6 channel that is low-slope (i.e., 0.64% average bankfull slope), has functioning planform (i.e., sinuosity value of 1.23) and has a homogeneous silt/clay bed substrate. The reference reach survey data is presented in Exhibit E.

The reference reach was also assessed using "A Function-Based Framework" developed by Stream Mechanics, Inc. to assign a value of "Functioning", "Functioning-at-risk", and "Not Functioning" based on the morphological characteristics that were collected from each reference reach. The performance standards used to assign a score can be found at https://stream-mechanics.com/. Each reference reach received a score of "Functioning" for the parameters presented in Table 4 below.

**Table 4: Performance Standards**

| Category | Parameter | Performance Standard |
|---|---|---|
| Floodplain Connectivity | Bank Height Ratio | 1.0 to 1.2 |
| | Entrenchment Ratio (C and E Stream Types) | > 2.2 |
| | Entrenchment Ratio (B Stream Types) | > 1.4 |
| Bedform Diversity | Pool Max Depth Ratio (Sand Bed Streams) | > 1.2 |
| | Pool Max Depth Ratio (Gravel Bed Streams) | > 1.5 |
| | Pool-to-pool spacing Ratio (Watersheds < 10 $mi^2$) | 4.0 – 5.0 |
| Lateral Stability | Meander Width Ratio (C and E Stream Types) | ≥ 3.5 |
| | Meander Width Ratio (B Stream Types) | N/A |
| | BEHI/NBS | L/L, L/H, M/L |

A more exhaustive list of morphological characteristics for the reference reach is included in Exhibit F within this report. This is the data that will be used to determine the dimension, pattern and profile of project streams.

## STREAM DESIGN

The PFMB addendum project involves in-stream work to one stream reach. Unnamed Tributary 1 (UT1) Reach 1 is proposed to receive Priority 1 restoration for 330 linear feet ending at the existing stream wetland complex where Reach 2 begins. This stream wetland complex flows from 91 linear feet then transitions into a single-thread stream channel where Reach 3 begins and flows for 2,744 linear feet where the stream leaves the site. Priority 1 restoration is establishment of the channel at the historical floodplain elevation. No in-stream work is proposed to Reach 2 allowing this stream wetland complex feature to naturally flow and transition into the existing channel at Reach 3. No in-stream work is proposed to Reach 3 where this segment is geomorphically stable. This document focuses on the mitigation design of the impaired Reach 1 of UT1.

Restoration is proposed to the aforementioned stream reach due to the presence of existing impairments and/or functional deficiencies to the dimension, pattern and profile as justified through the baseline conditions. UT1 Reach 1 has been heavily impacted through the on-going cattle operation and pasture vegetation. No tree stratum buffer was left along this reach and a majority of the channel is filled in. Remnant portions of the channel were identified in the field, but were mostly in an swale-like state from the constant cattle shear and lack of buffer. Due to these impairments, little flow is properly transported through this system, and bedform features (i.e., riffles and pools) do not exist. Restoration activity is warranted to address these impairments and reconstruct the filled channel to the appropriate functioning condition.

The design of the channel began with using the developed project-specific regional curve to obtain the bankfull cross-sectional areas. Then, the reference reach was used to develop the morphological parameters associated with dimension, pattern and profile. A complete list of morphological characteristics for each project stream reach can be found in Exhibit G within this report. The following table, Table 5, presents the reference reach that was applied to each stream.

**Table 5: Stream Design Information**

| Project Stream | In-Stream Treatment | Proposed Length (ft) | Flow Regime | Project Stream Drainage Area (sqmi) | Reference Reach Used in Design | Design Cross-Sectional Area (sf) |
|---|---|---|---|---|---|---|
| UT1 Reach 1 | Priority 1 Restoration | 330 | Intermittent | 0.037 | RC-05 | 2.4 |

## SHEAR STRESS AND VELOCITY

The restoration channel reach is very low sloped (i.e., 0.03%). This reach is a first order channel which is the headwater or beginning of this unnamed tributary that flows into Overflow Creek approximately 4,000 linear feet downstream of the project boundary. Sediment supply is very low with UT1 being sediment supply streams to Overflow Creek. The sediments transported within these channels is basically from the site landscape and sediment-laden runoff. Large sediment loads are not delivered from upstream.

The sediment load is very low and lacks any particles larger than small sand grain. The substrate of the site stream is mostly silt and clay dominated. It does not take much energy to flush silts and clay from stream channels. The Shields relationship of shear stress versus particle entrainment illustrates that it takes about 0.01 lb/sf to entrain sand grains and much less to entrain silt/clay particles. Even with exceptionally low slopes on this site, the shear stress is still high enough to suspend silt and clay deposits in the water column as they move downstream. Table 6, below, illustrates the velocities and shear stresses in the restored stream channels.

**Table 6: Shear Stress and Velocity**

| Project Stream | Bankfull Discharge, cfs (Manning Eq.) | Bankfull Area, sf | Bankfull Velocity, fps | Bankfull Slope | Bankfull Mean Depth, ft | Bankfull Shear Stress, lb/sf |
|---|---|---|---|---|---|---|
| UT1 Reach 1 | 2.5 | 2.4 | 1.0 | 0.0003 | 0.60 | 0.01 |
| RC-05 | 17.1 | 6.7 | 2.6 | 0.0061 | 1.05 | 0.40 |

The site stream will exhibit a bankfull shear stress of 0.01 lb/sf due to the exceptionally low slope of the site's floodplain/valley. The design ensured that all portions of the restored channel would have shear stress values under 0.40 lb/sf for this project. Although enough shear stress will be present to flush the largest particle, emphasis was placed on designing the streams with a low width to depth ratio (i.e., 6.6) to provide a narrower, deeper channel that will be able to maintain channel depth and not aggrade. This will enable the stream to have more sediment transport capacity while also allowing the channels to laterally migrate at a healthy, stable rate on the alluvial floodplain as needed to reach the ideal slope and sinuosity. These streams should function well during baseflow and will flush out collected silts and clays during larger events.

A standard sediment transport analysis is not necessary for this project considering this stream is a sediment supply stream and mainly receive deposited silts and clays from runoff. The stream at this site is homogenous in nature and consist of silt/clay bottoms in which a pebble count is not appropriate. Sediment competency calculations typically involve collecting particle sizes from both the riffle pavement and the riffle sub-pavement or from the pool point bar. Keeping velocities low (i.e., 1.0 fps), and shear stresses low (i.e., 0.01 lb/sf) will ensure that the restored channels will not downcut/degrade.

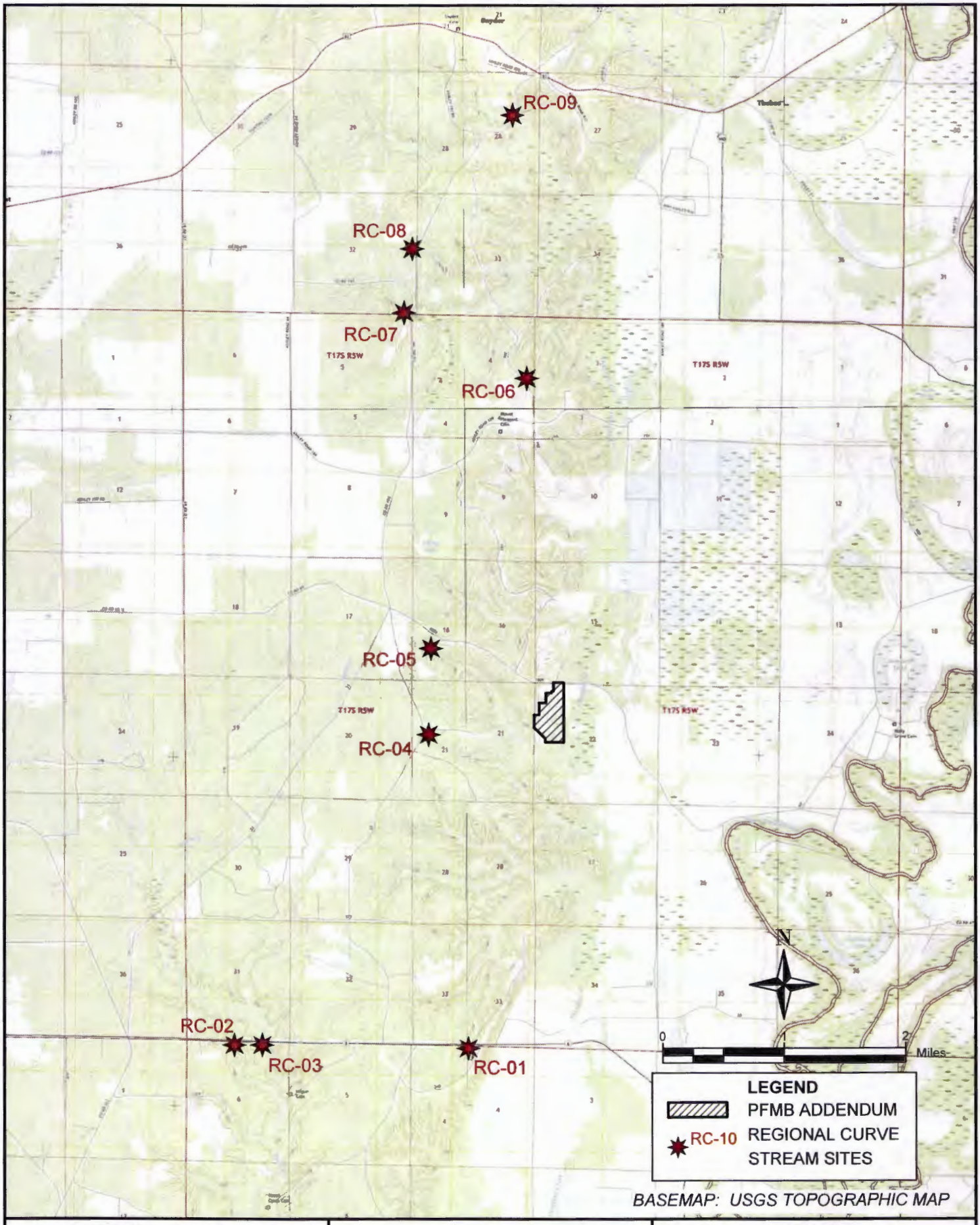
## ADDITIONAL INFORMATION

Excavated material from the Priority 1 restoration of U1 Reach 1 is minimized by putting the channel on the original floodplain surface. The entire project will involve less than 50 cubic yards of material which is very little for restoration of 330 linear feet of stream channel. This material will be used to fill in any nearby depressions created from cattle which may prevent runoff from entering the new stream channel. Any remaining material will be used for access road buildup or spread out in an upland area and stabilized with BMPs to prevent erosion.

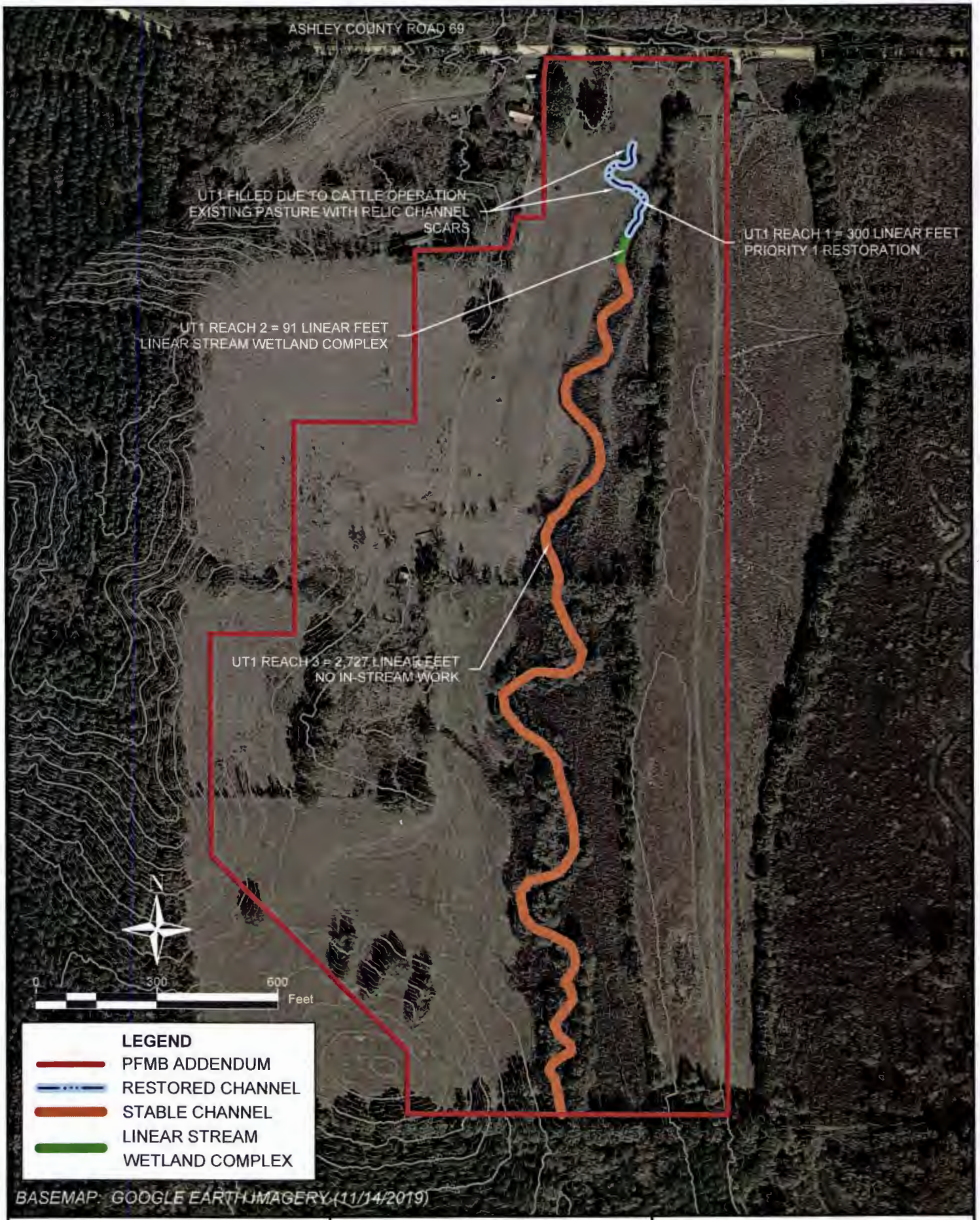
Banks will be stabilized through the use of strategically placed stream structures. An emphasis will be placed on woody structures to provide large woody debris to the channel. Woody structures selected for this project include log sills/rollers and toe wood (with brush). This will improve the physicochemical and biological components of the stream as well by providing organic matter to the stream and better habitat. Furthermore, woody debris is a natural component to streams in the watershed. Log rollers and toe wood (with brush) are excellent for smaller streams considering the wood is at the bottom of the stream bed which keeps the wood from deteriorating. Please see the 75% - 100% Stream Design Plans in the MBI for the design drawings that are supported by this document.

## EXHIBITS

EXHIBIT A: FIGURES
EXHIBIT B: SITE PHOTOGRAPHS
EXHIBIT C: REGIONAL CURVE GRAPHS
EXHIBIT D: REGIONAL CURVE SITE CROSS-SECTIONS
EXHIBIT E: REFERENCE REACH CROSS-SECTIONS AND LONGITUDINAL PROFILES
EXHIBIT F: REFERENCE REACH MORPHOLOGICAL CHARACTERISTICS
EXHIBIT G: PROJECT REACH MORPHOLOGICAL CHARACTERISTICS




| | | |
|---|---|---|
| PROJECT NO.: MVK-2012-197 | REGIONAL CURVE STREAM SITE LOCATION MAP | FIGURE 1 |
| SCALE: 1" = 1 MILE | | DATE: 07/02/2020 |




| | | |
|---|---|---|
| PROJECT NO.: MVK-2012-197 | **IN-STREAM WORK SITE MAP** | FIGURE 2 |
| SCALE: 1" = 300' | PELICAN MITIGATION, LLC<br>*PELICAN FOSTER MITIGATION BANK ADDENDUM SITE* | DATE: 07/02/2020 |

**Photo #1: RC-01 facing downstream showing a stable E6 stream with leaf litter during the dry month of November.**

**Photo #2: RC-02 facing upstream showing a stable E4/6 stream with good floodplain connectivity.**

**Photo #3: RC-03 facing downstream showing a larger perennial stream channel with stable channel geometry.**

**Photo #4: RC-04 facing upstream on a small headwater stream channel which stable channel form.**

**Photo #5: RC-05 facing downstream on the project's reference reach with little flow, mostly in pool features.**

**Photo #6: RC-06 facing upstream showing a stable E6 stream with leaf litter during the dry month of November.**

**Photo #7: RC-07 facing downstream showing a stable E6 channel with good floodplain connectivity.**

**Photo #8: RC-08 facing upstream showing a small headwater E6 channel with little bedform diversity but stable channel form.**

**Photo #9: RC-09 facing upstream showing a large stream that has downcut slightly but had bankfull indicators that were useful in developing the RC.**

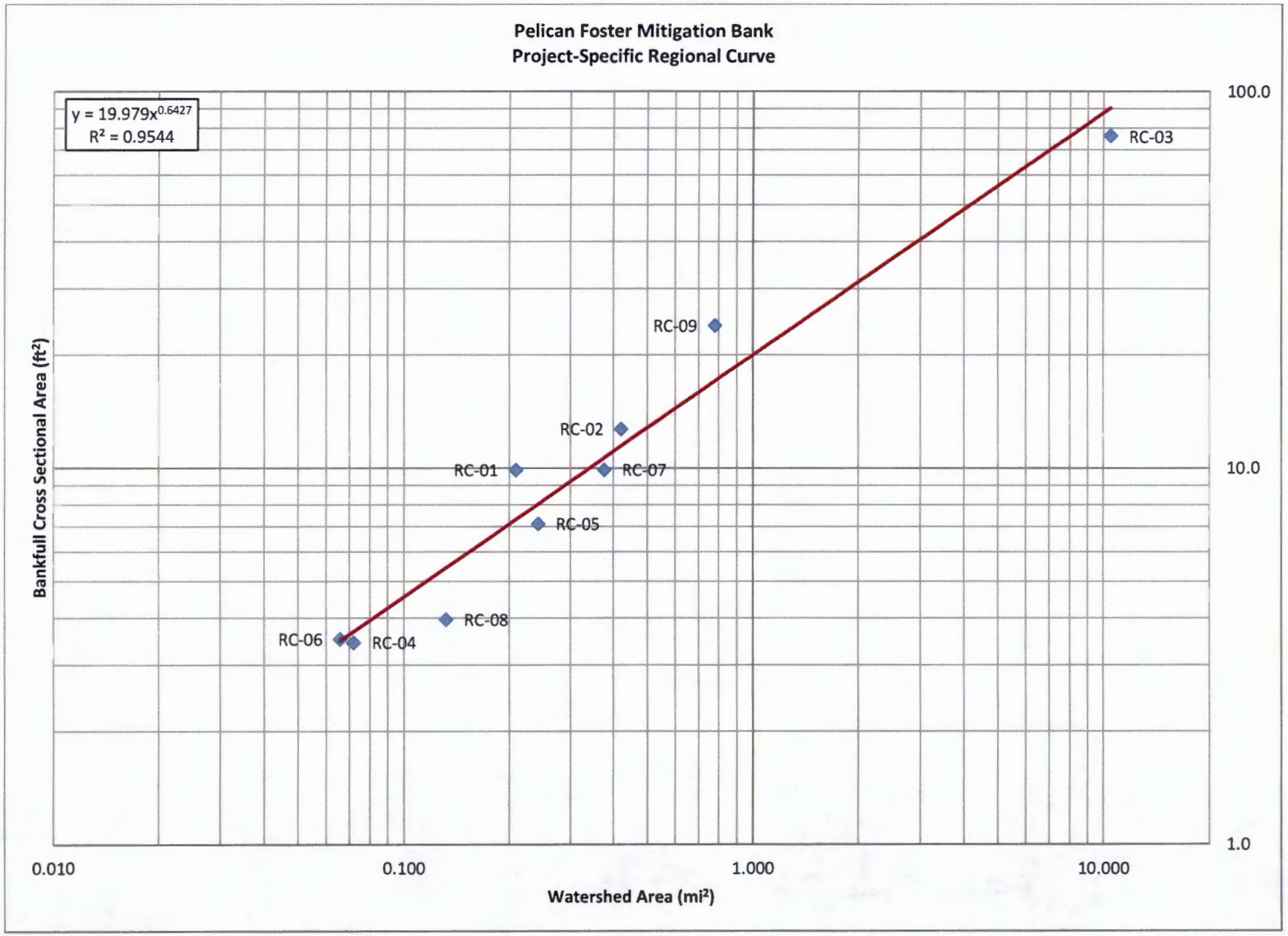
**Photo #10: UT1 Reach 1 area in the pasture where the stream channel has been impaired by cattle operation and a lack of buffer.**

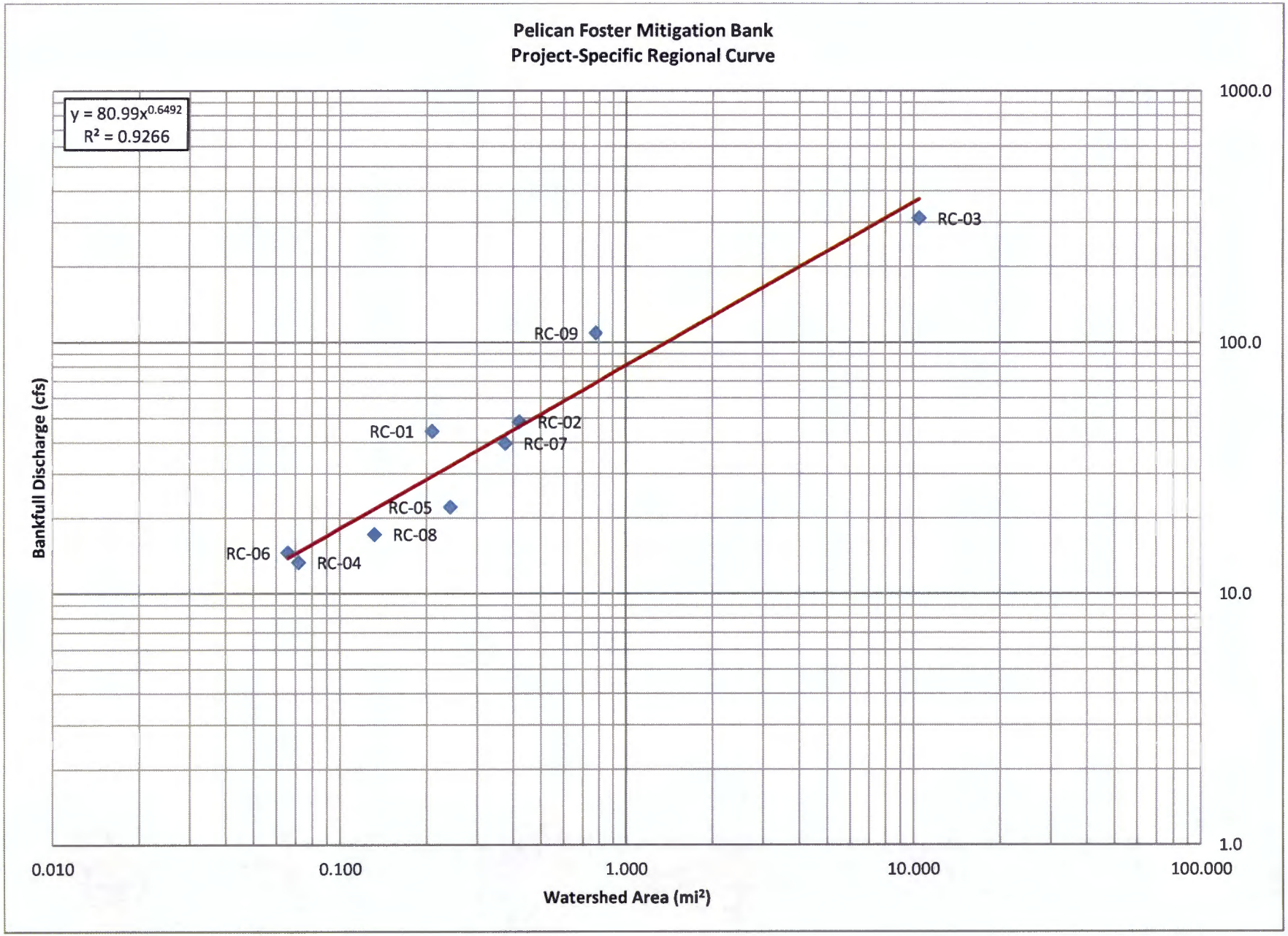
**Photo #11: UT1 Reach 2 where a grassy stream wetland complex exists and is linear in nature.**

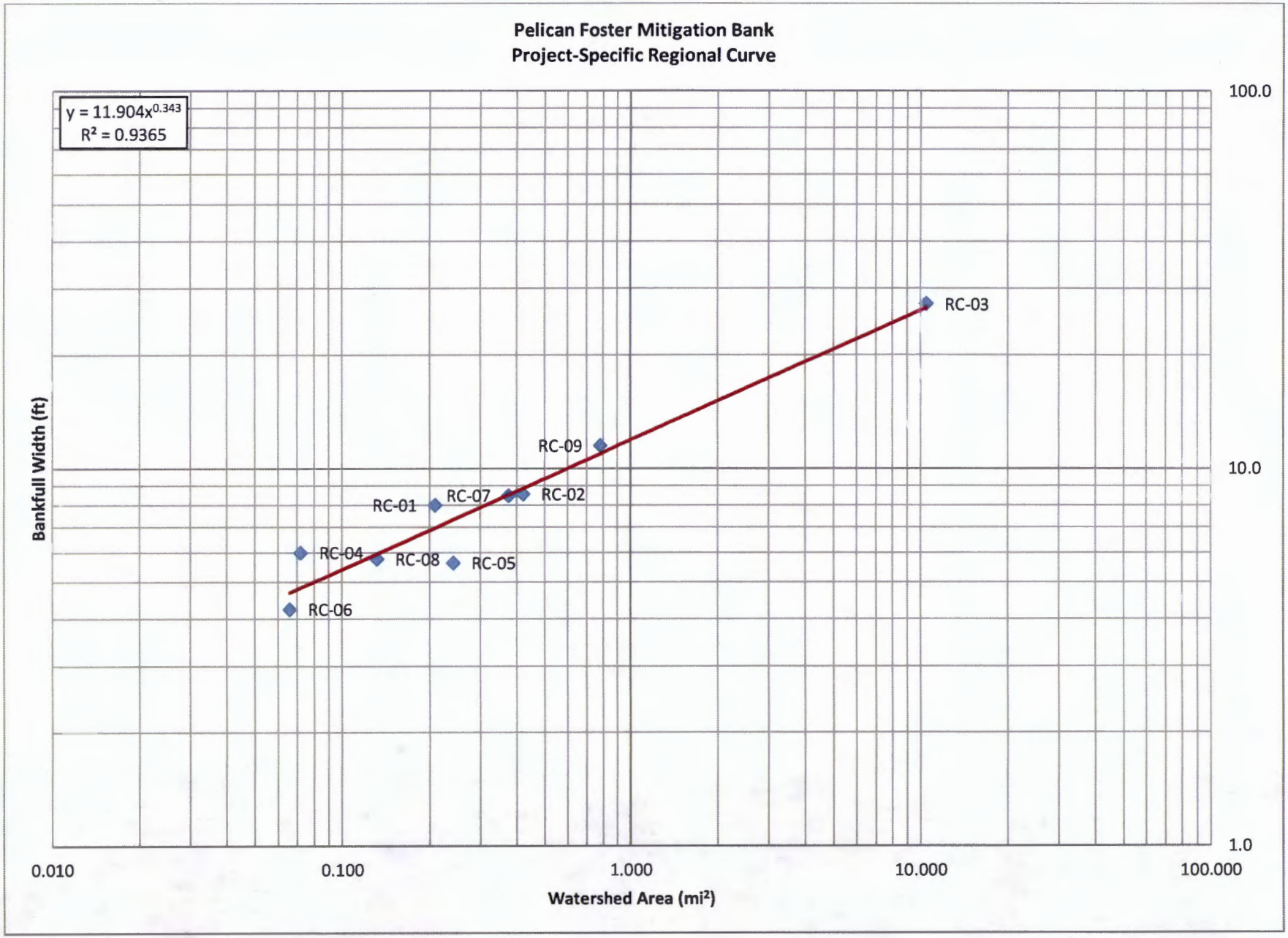
**Photo #12: UT1 Reach 3 beginning where stream wetland complex ends and transitions into a single-thread channel.**

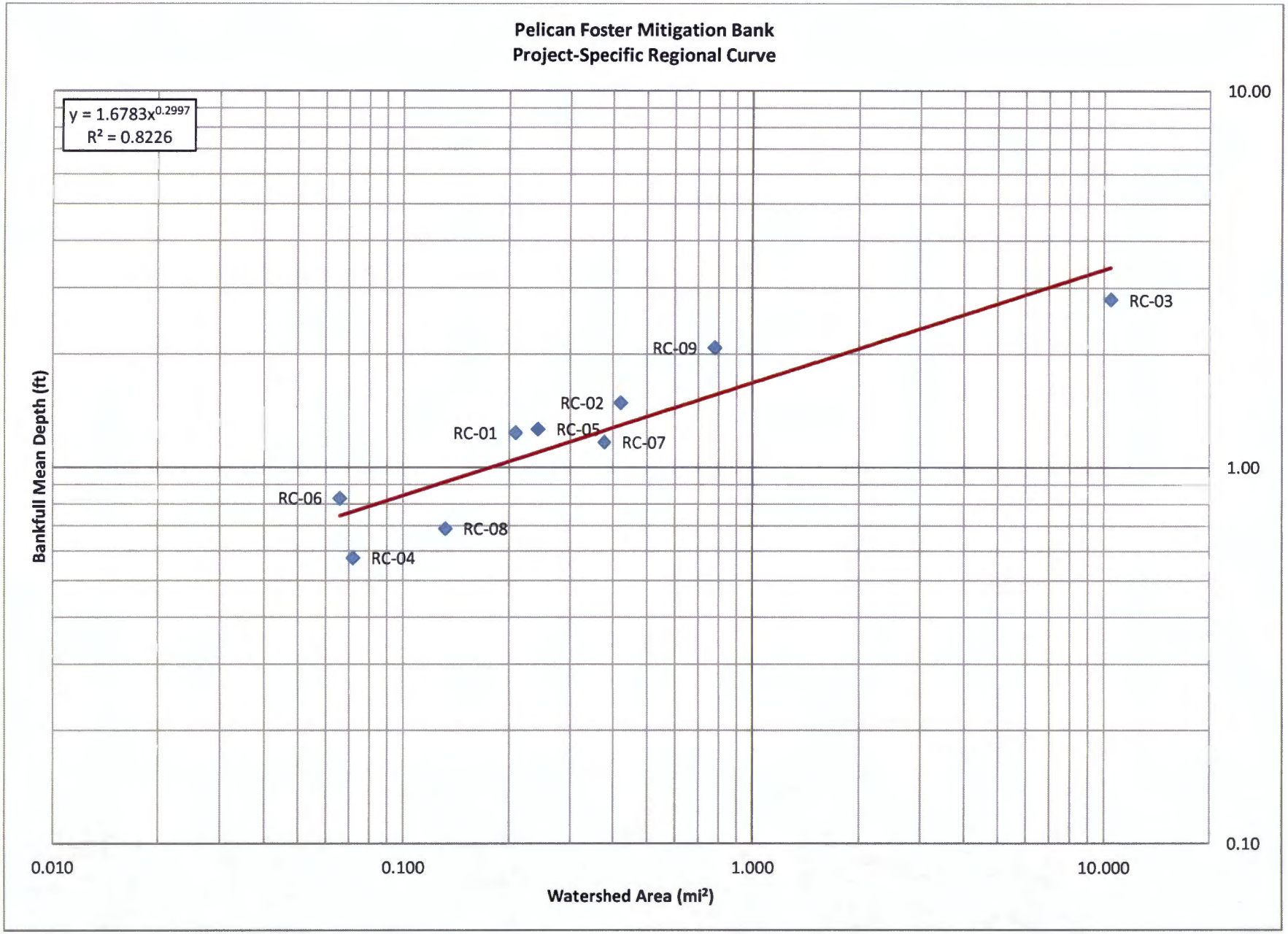
**Photo #13: UT1 Reach 2 where the channel has an existing buffer and has maintained its channel.**

**Photo #14: UT1 downstream of the project boundary showing a stable stream channel flowing towards Overflow Creek.**

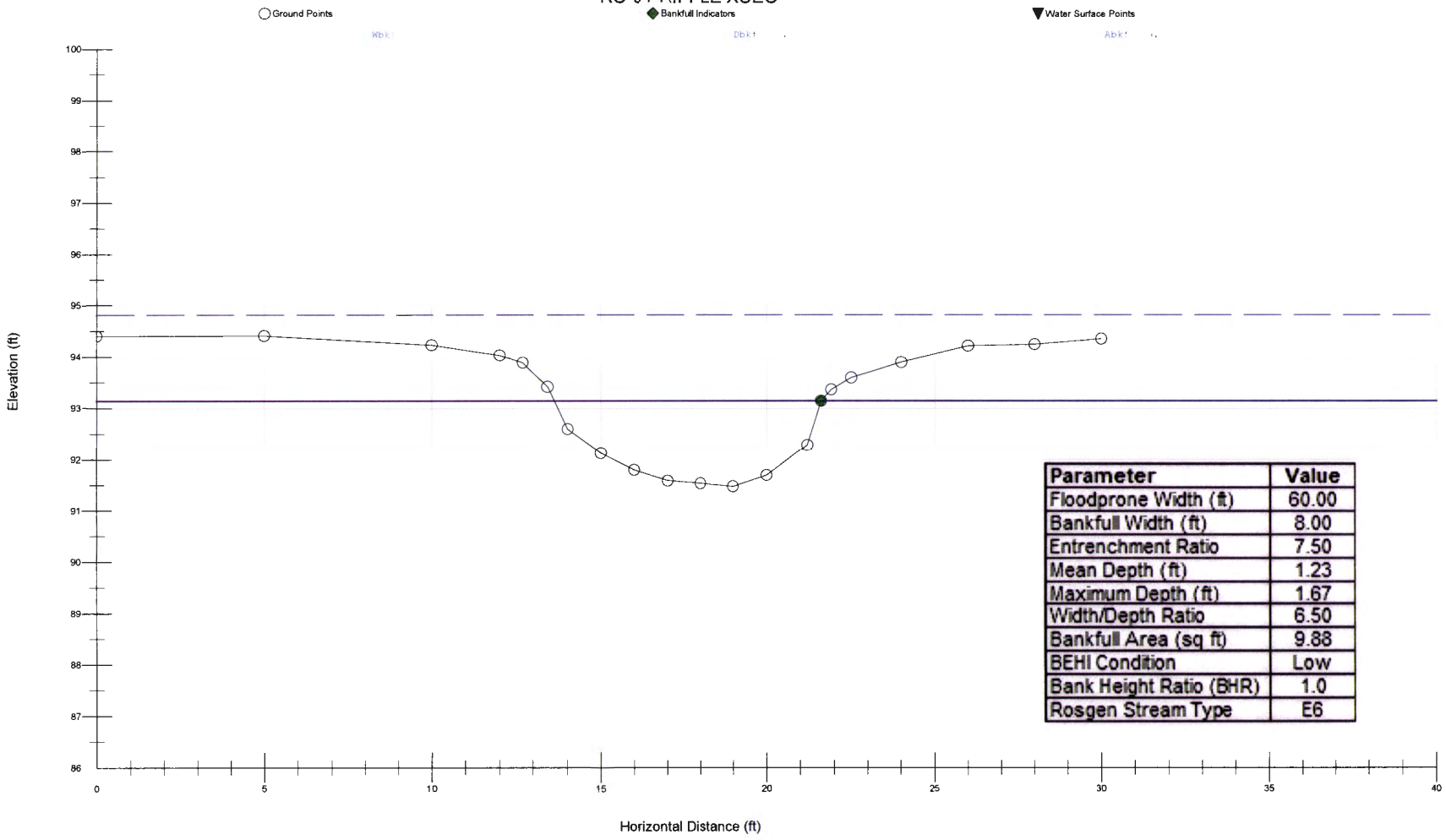

Pelican Foster Mitigation Bank
Project-Specific Regional Curve
y = 19.979x^0.6427
R² = 0.9544
RC-03
RC-09
RC-02
RC-01
RC-07
RC-05
RC-08
RC-06
RC-04
100.0
10.0
1.0
0.010
0.100
1.000
10.000
Bankfull Cross Sectional Area (ft²)
Watershed Area (mi²)


Pelican Foster Mitigation Bank
Project-Specific Regional Curve
y = 80.99x^0.6492
R² = 0.9266
RC-03
RC-09
RC-01
RC-02
RC-07
RC-05
RC-08
RC-06
RC-04
Bankfull Discharge (cfs)
1000.0
100.0
10.0
1.0
0.010
0.100
1.000
10.000
100.000
Watershed Area (mi²)


Pelican Foster Mitigation Bank
Project-Specific Regional Curve
y = 11.904x^0.343
R² = 0.9365
RC-03
RC-09
RC-01
RC-07
RC-02
RC-04
RC-08
RC-05
RC-06
Bankfull Width (ft)
100.0
10.0
1.0
0.010
0.100
1.000
10.000
100.000
Watershed Area (mi²)

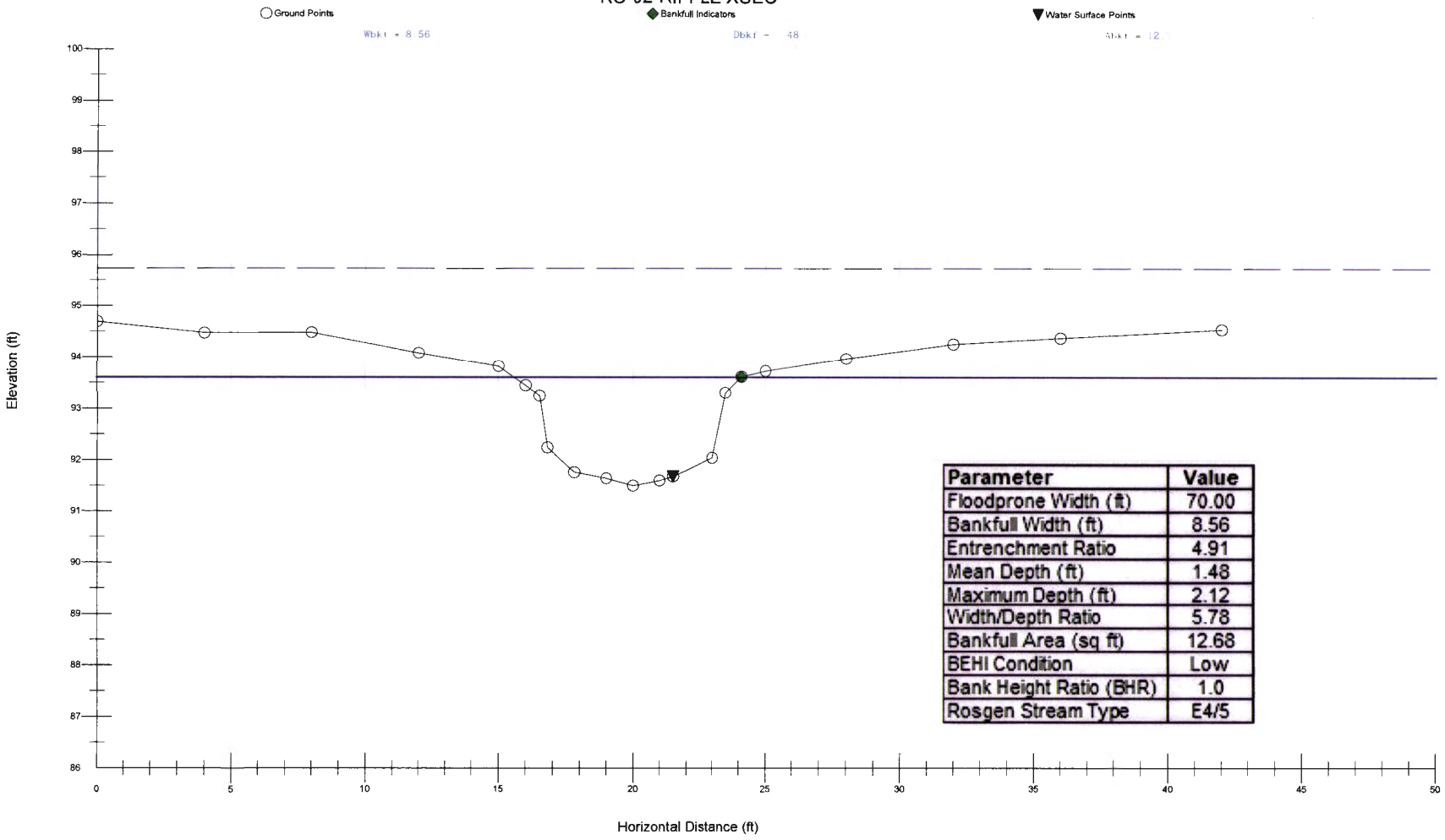

Pelican Foster Mitigation Bank
Project-Specific Regional Curve
y = 1.6783x^0.2997
R² = 0.8226
RC-03
RC-09
RC-02
RC-01
RC-05
RC-07
RC-06
RC-08
RC-04
10.00
1.00
0.10
0.010
0.100
1.000
10.000
Bankfull Mean Depth (ft)
Watershed Area (mi²)

# RC-01 RIFFLE XSEC



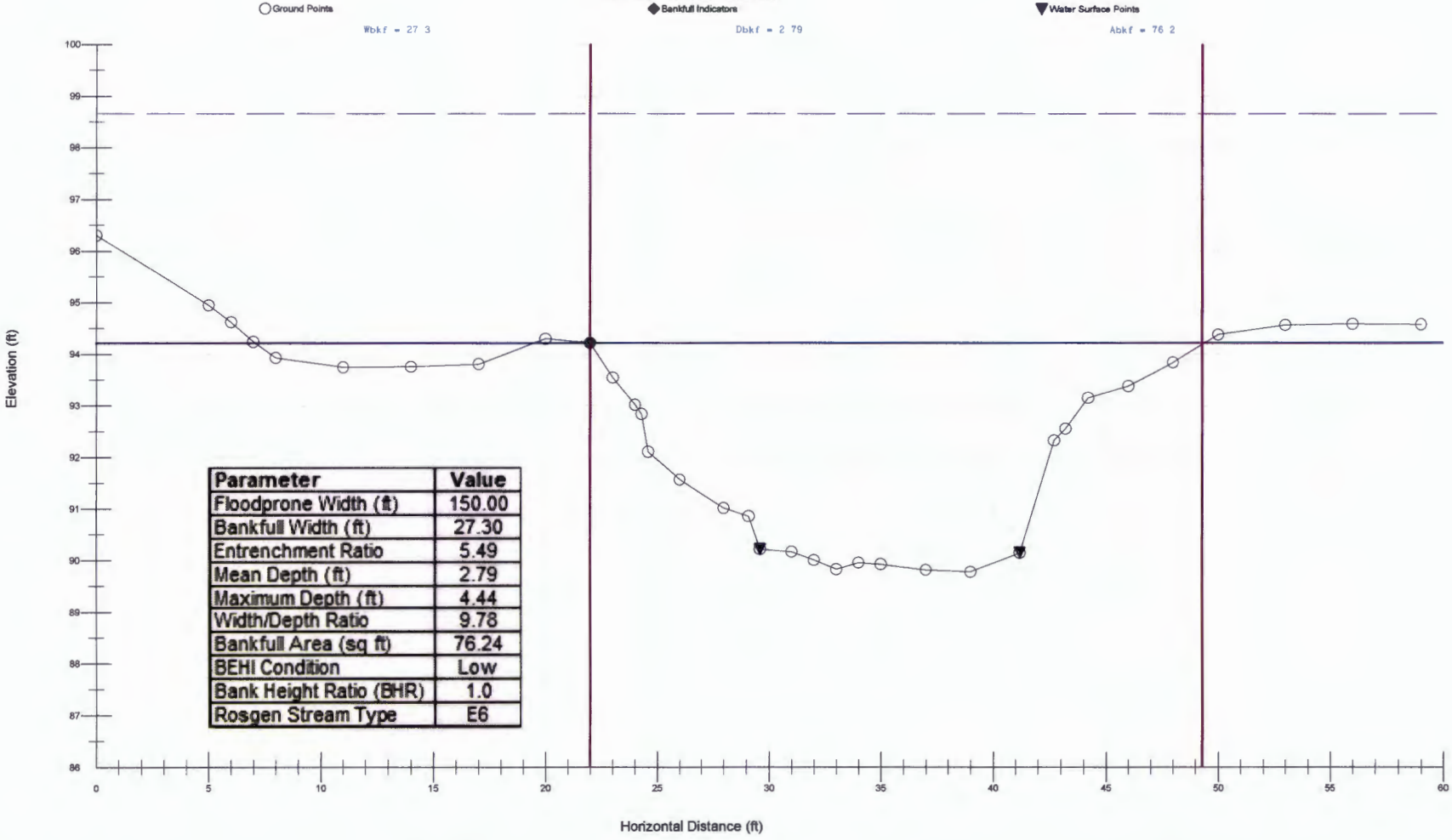

| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 60.00 |
| Bankfull Width (ft) | 8.00 |
| Entrenchment Ratio | 7.50 |
| Mean Depth (ft) | 1.23 |
| Maximum Depth (ft) | 1.67 |
| Width/Depth Ratio | 6.50 |
| Bankfull Area (sq ft) | 9.88 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E6 |

# RC-02 RIFFLE XSEC



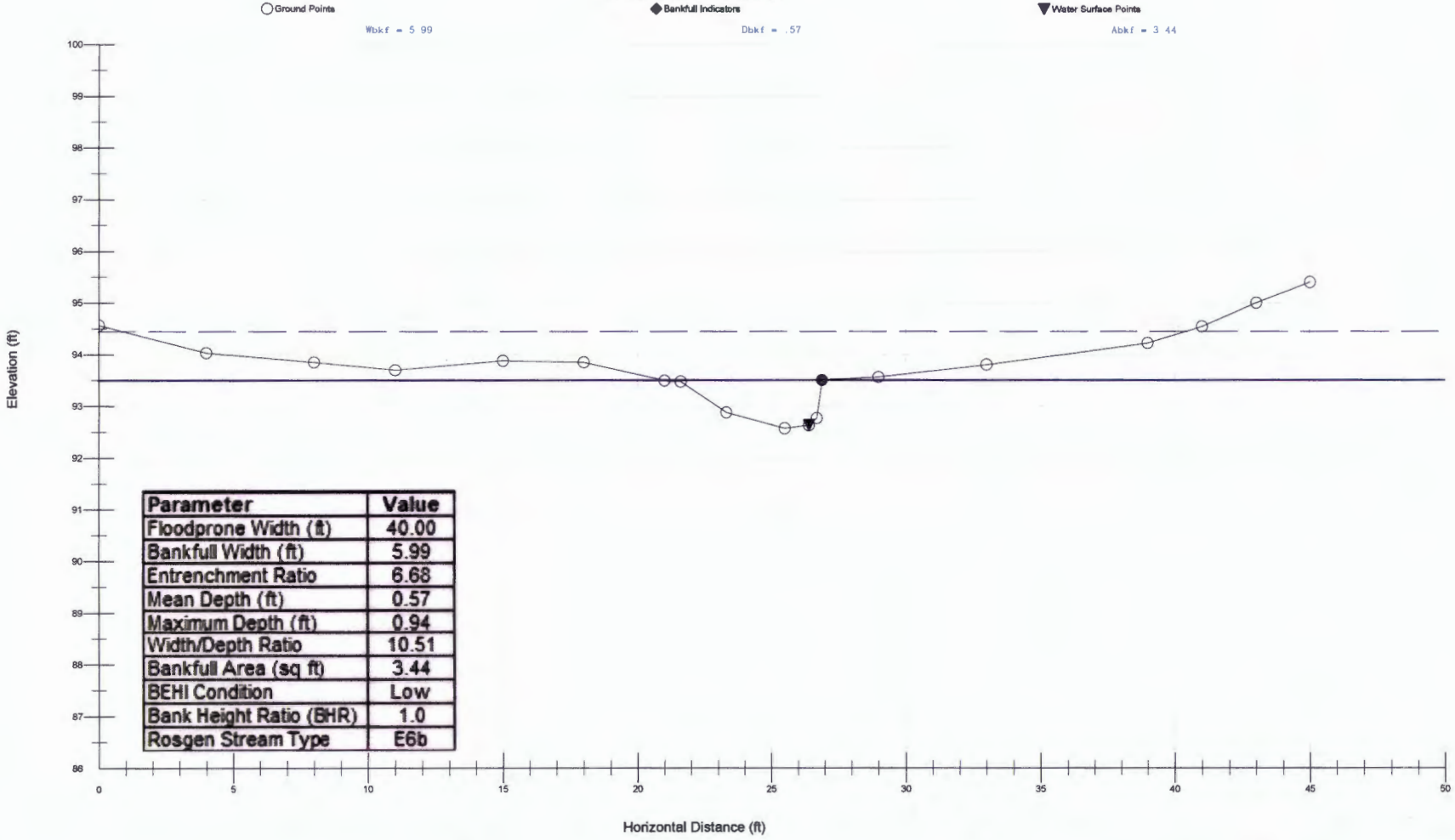

| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 70.00 |
| Bankfull Width (ft) | 8.56 |
| Entrenchment Ratio | 4.91 |
| Mean Depth (ft) | 1.48 |
| Maximum Depth (ft) | 2.12 |
| Width/Depth Ratio | 5.78 |
| Bankfull Area (sq ft) | 12.68 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E4/5 |

## RC-03 RIFFLE XSEC



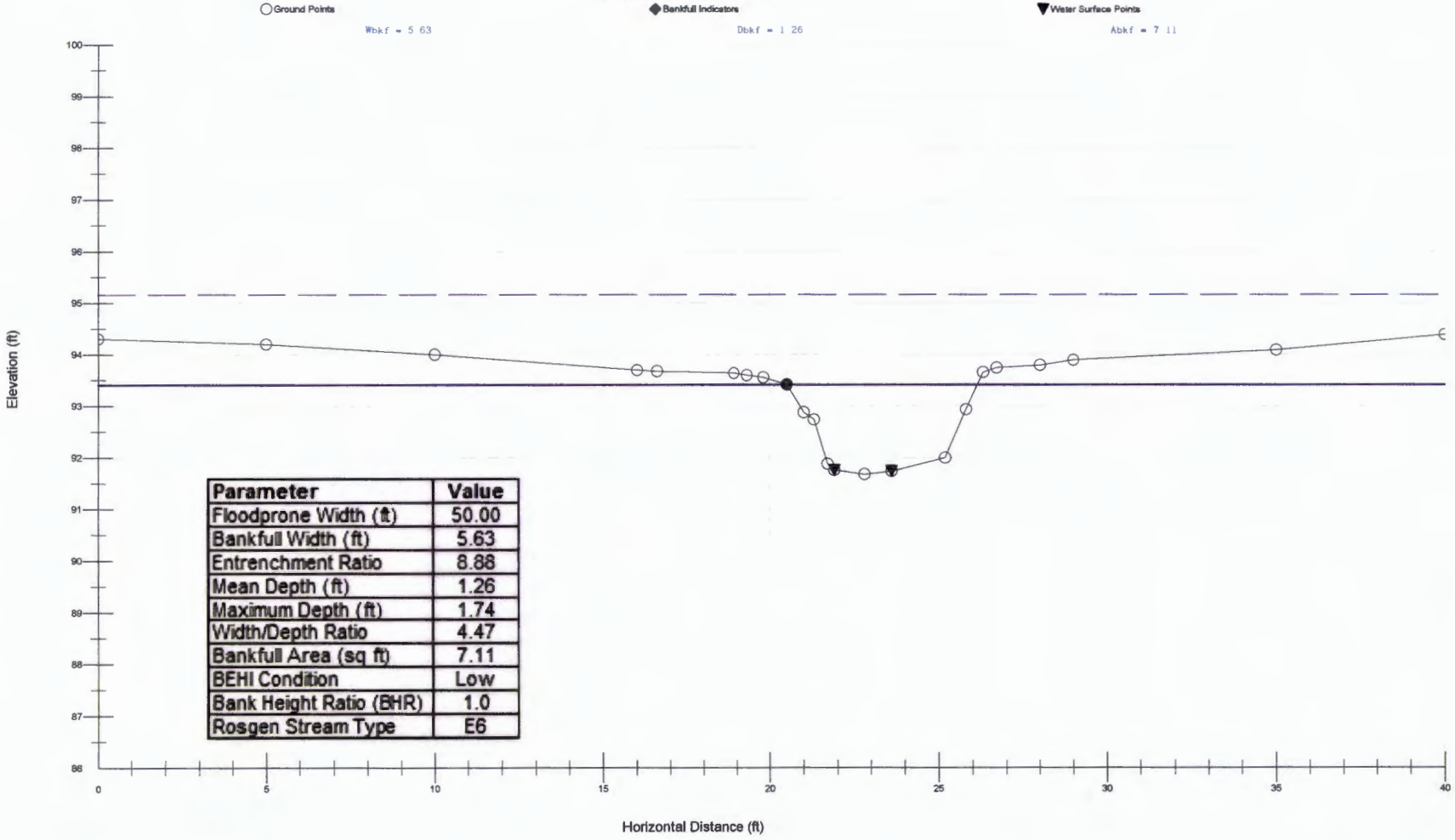

| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 150.00 |
| Bankfull Width (ft) | 27.30 |
| Entrenchment Ratio | 5.49 |
| Mean Depth (ft) | 2.79 |
| Maximum Depth (ft) | 4.44 |
| Width/Depth Ratio | 9.78 |
| Bankfull Area (sq ft) | 76.24 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E6 |

# RC-04 RIFFLE XSEC



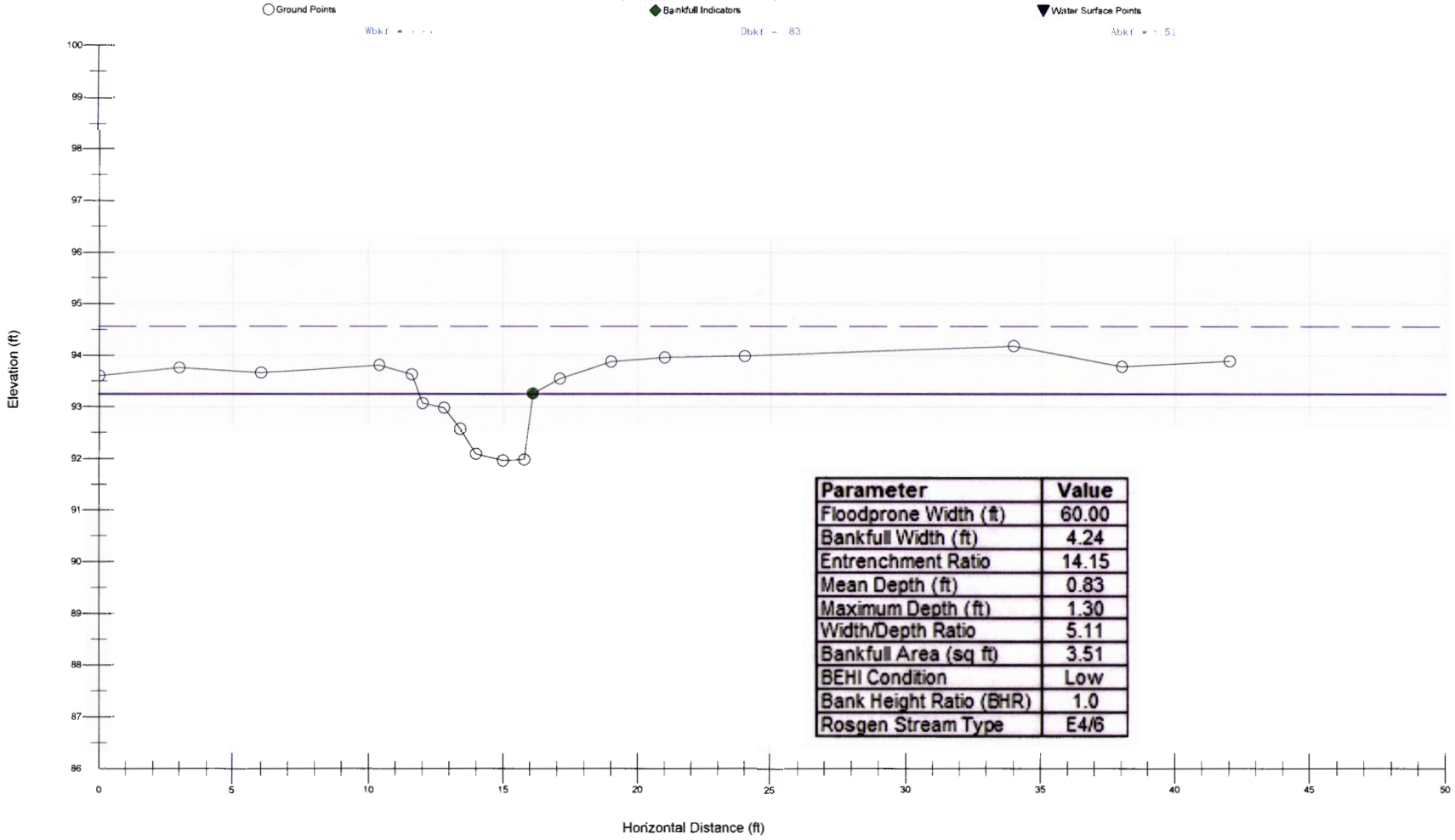

| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 40.00 |
| Bankfull Width (ft) | 5.99 |
| Entrenchment Ratio | 6.68 |
| Mean Depth (ft) | 0.57 |
| Maximum Depth (ft) | 0.94 |
| Width/Depth Ratio | 10.51 |
| Bankfull Area (sq ft) | 3.44 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E6b |

## RC-05 RIFFLE XSEC



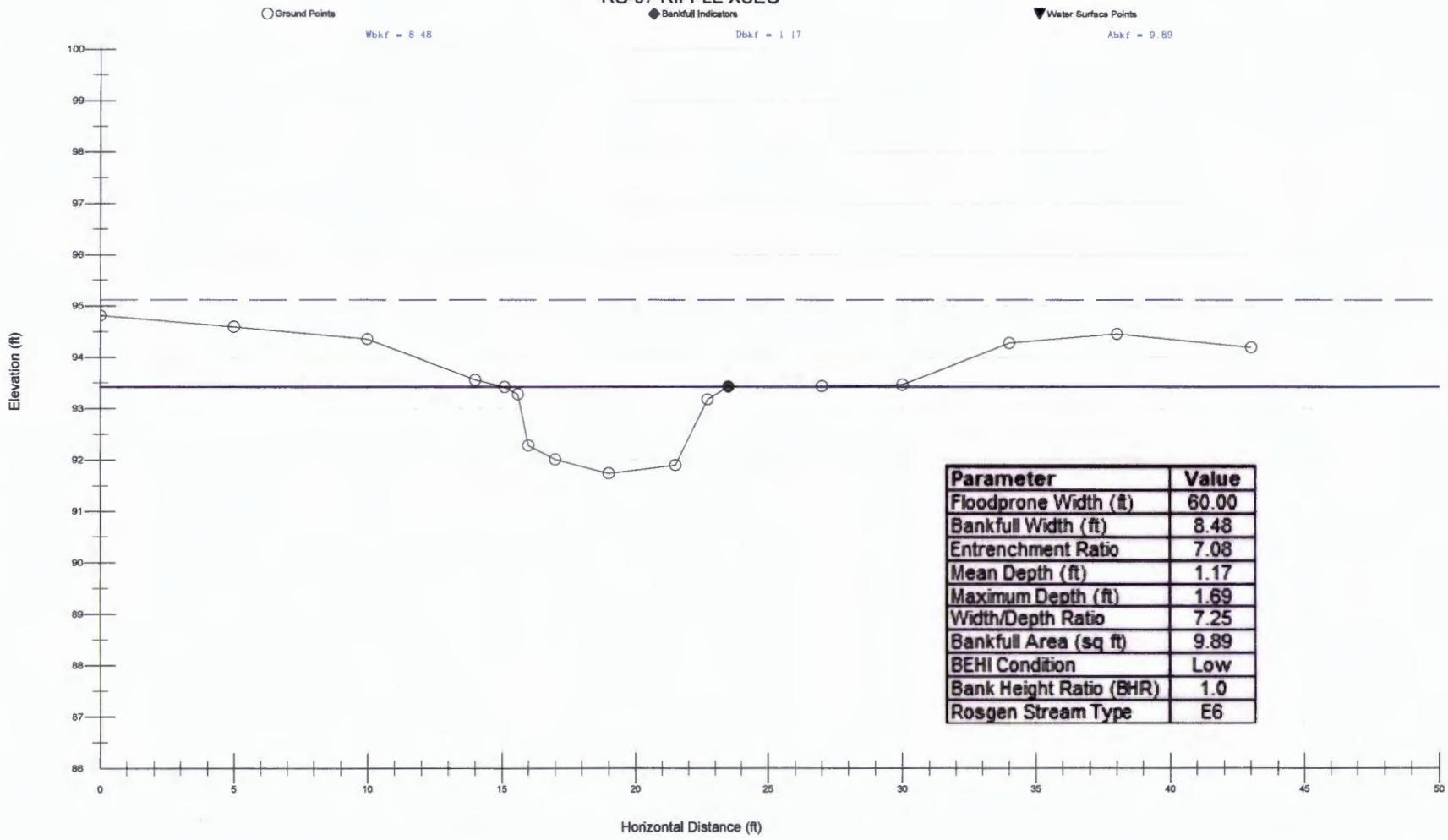

| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 50.00 |
| Bankfull Width (ft) | 5.63 |
| Entrenchment Ratio | 8.88 |
| Mean Depth (ft) | 1.26 |
| Maximum Depth (ft) | 1.74 |
| Width/Depth Ratio | 4.47 |
| Bankfull Area (sq ft) | 7.11 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E6 |

## RC-06 RIFFLE XSEC



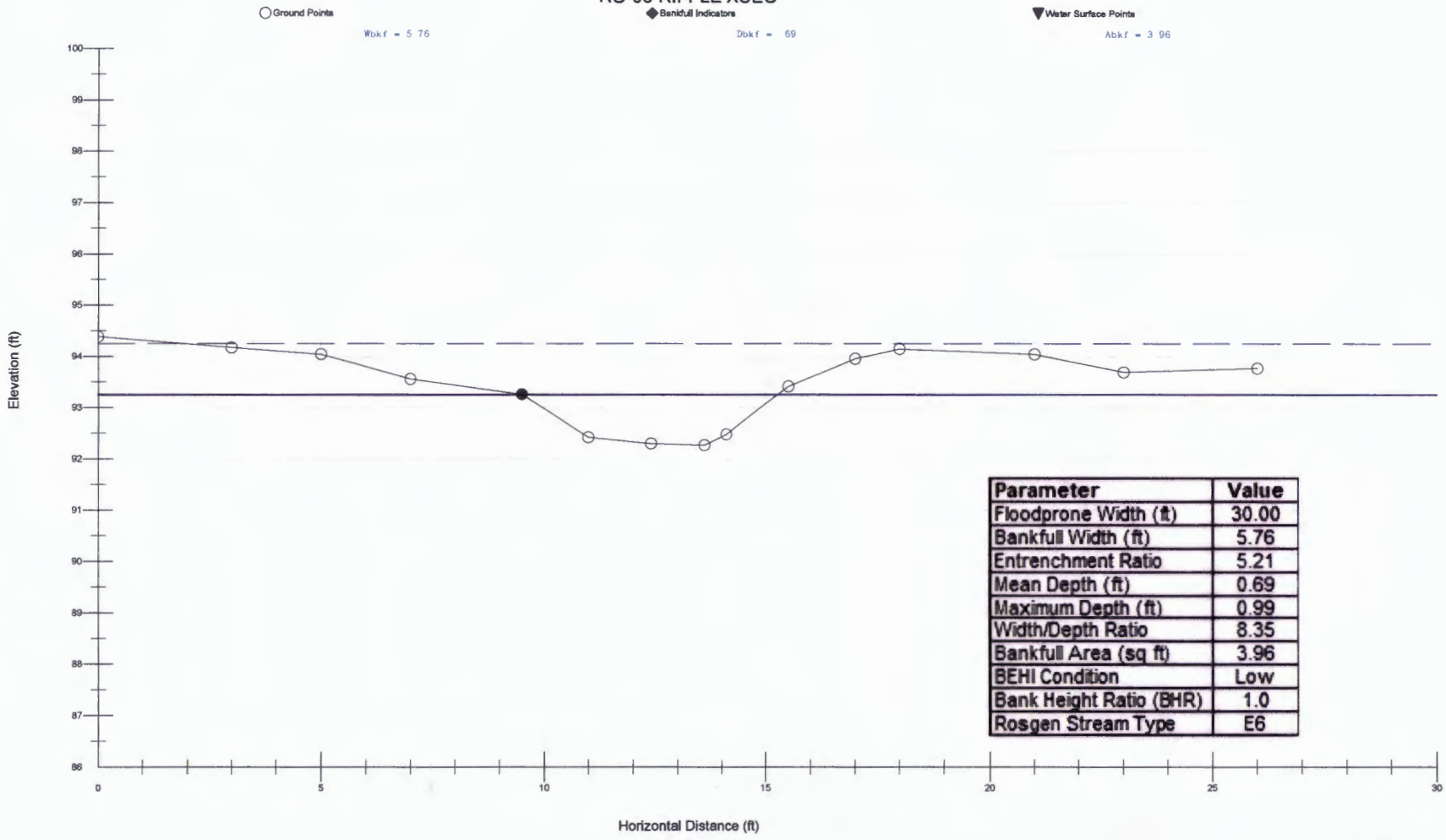

| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 60.00 |
| Bankfull Width (ft) | 4.24 |
| Entrenchment Ratio | 14.15 |
| Mean Depth (ft) | 0.83 |
| Maximum Depth (ft) | 1.30 |
| Width/Depth Ratio | 5.11 |
| Bankfull Area (sq ft) | 3.51 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E4/6 |

# RC-07 RIFFLE XSEC



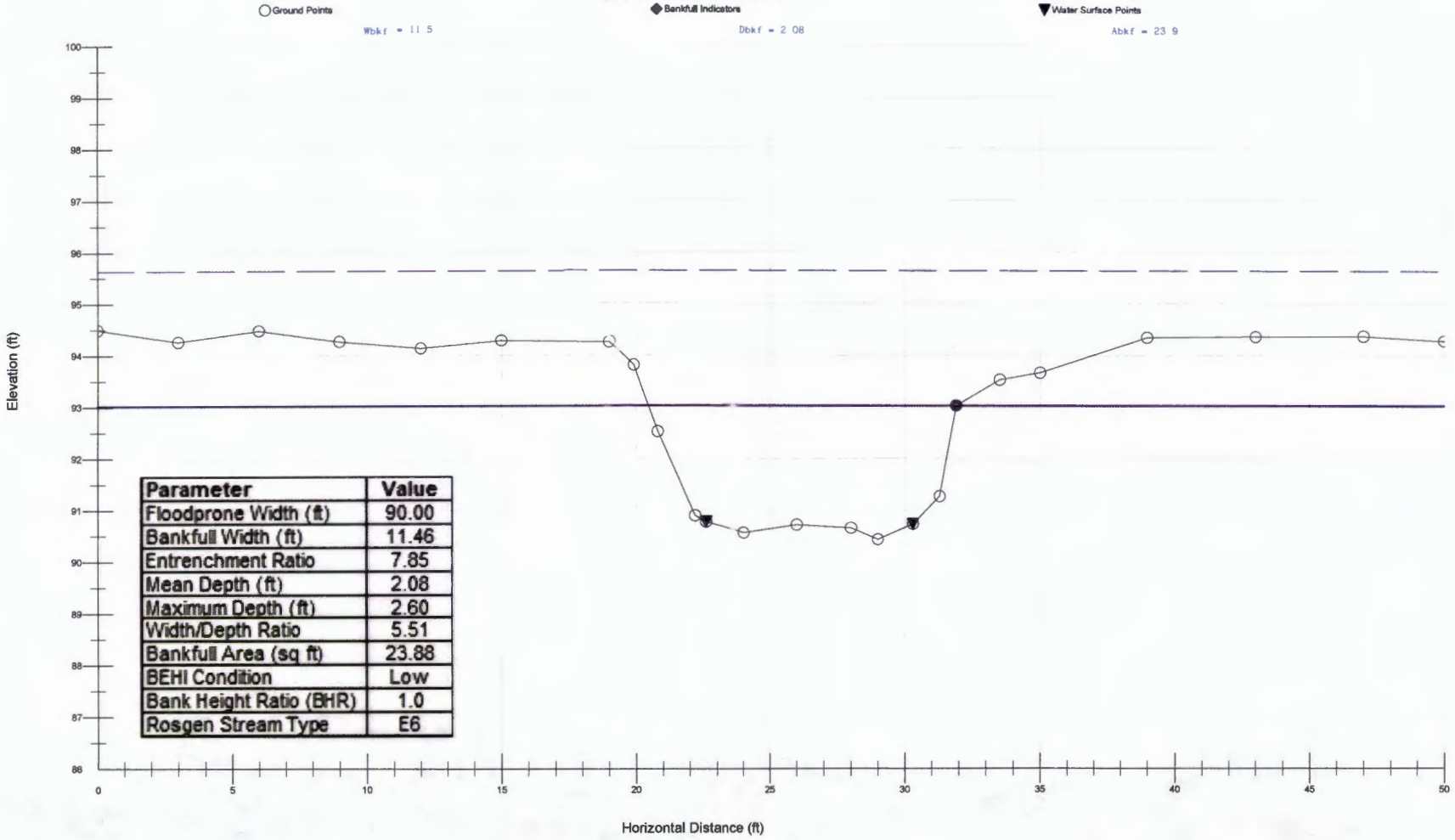

| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 60.00 |
| Bankfull Width (ft) | 8.48 |
| Entrenchment Ratio | 7.08 |
| Mean Depth (ft) | 1.17 |
| Maximum Depth (ft) | 1.69 |
| Width/Depth Ratio | 7.25 |
| Bankfull Area (sq ft) | 9.89 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E6 |

## RC-08 RIFFLE XSEC



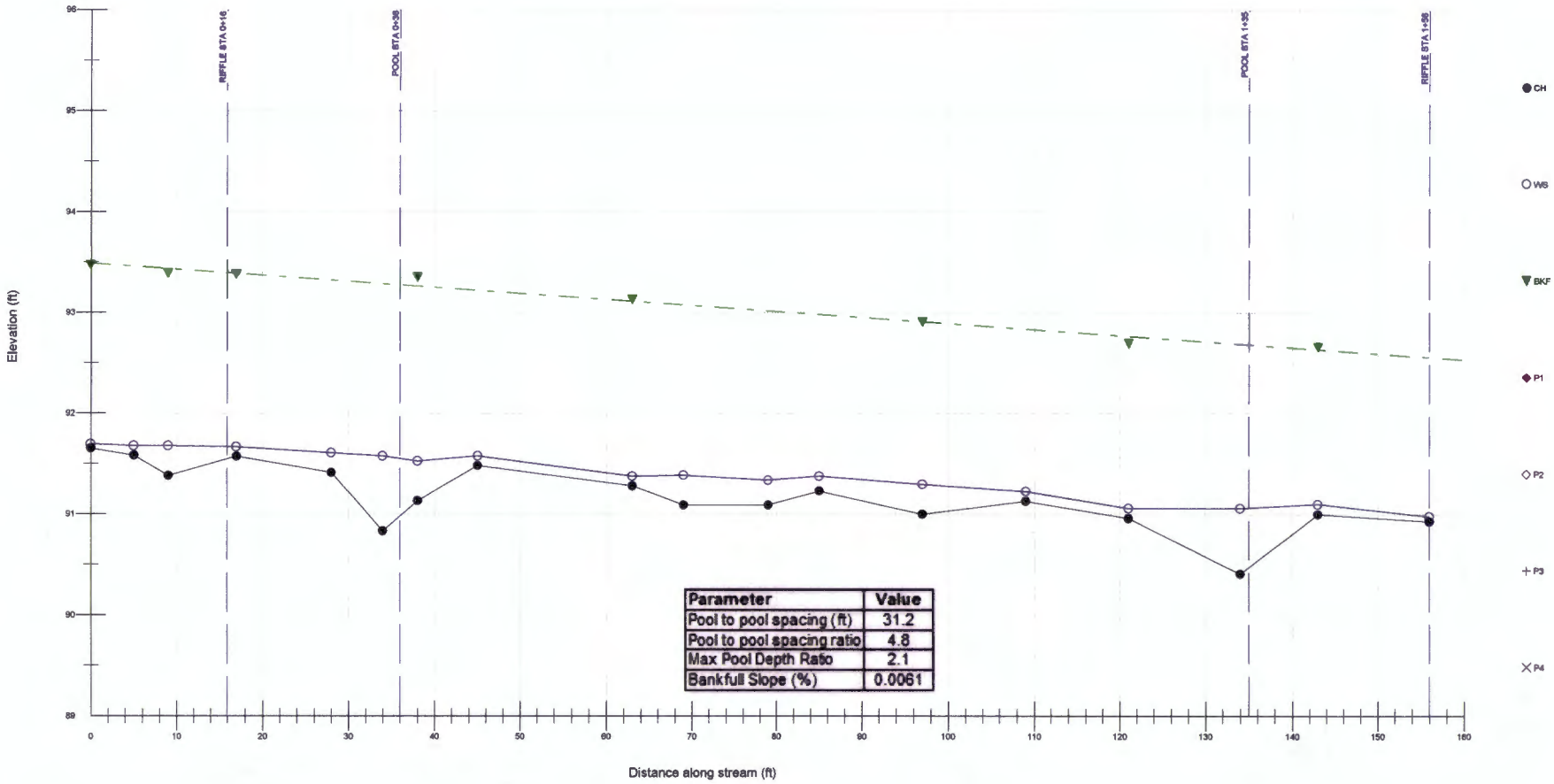

| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 30.00 |
| Bankfull Width (ft) | 5.76 |
| Entrenchment Ratio | 5.21 |
| Mean Depth (ft) | 0.69 |
| Maximum Depth (ft) | 0.99 |
| Width/Depth Ratio | 8.35 |
| Bankfull Area (sq ft) | 3.96 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E6 |

## RC-09 RIFFLE XSEC

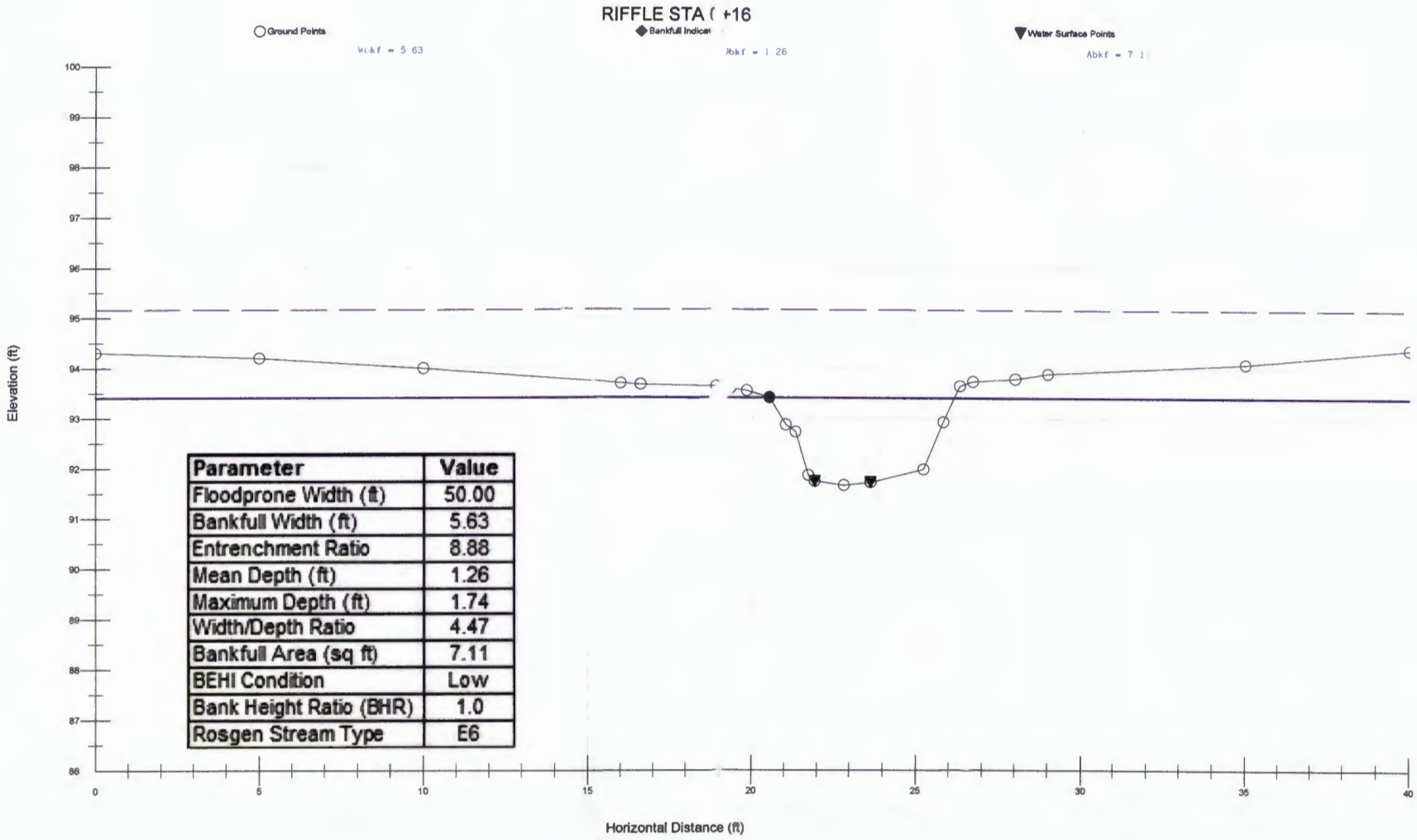



| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 90.00 |
| Bankfull Width (ft) | 11.46 |
| Entrenchment Ratio | 7.85 |
| Mean Depth (ft) | 2.08 |
| Maximum Depth (ft) | 2.60 |
| Width/Depth Ratio | 5.51 |
| Bankfull Area (sq ft) | 23.88 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E6 |

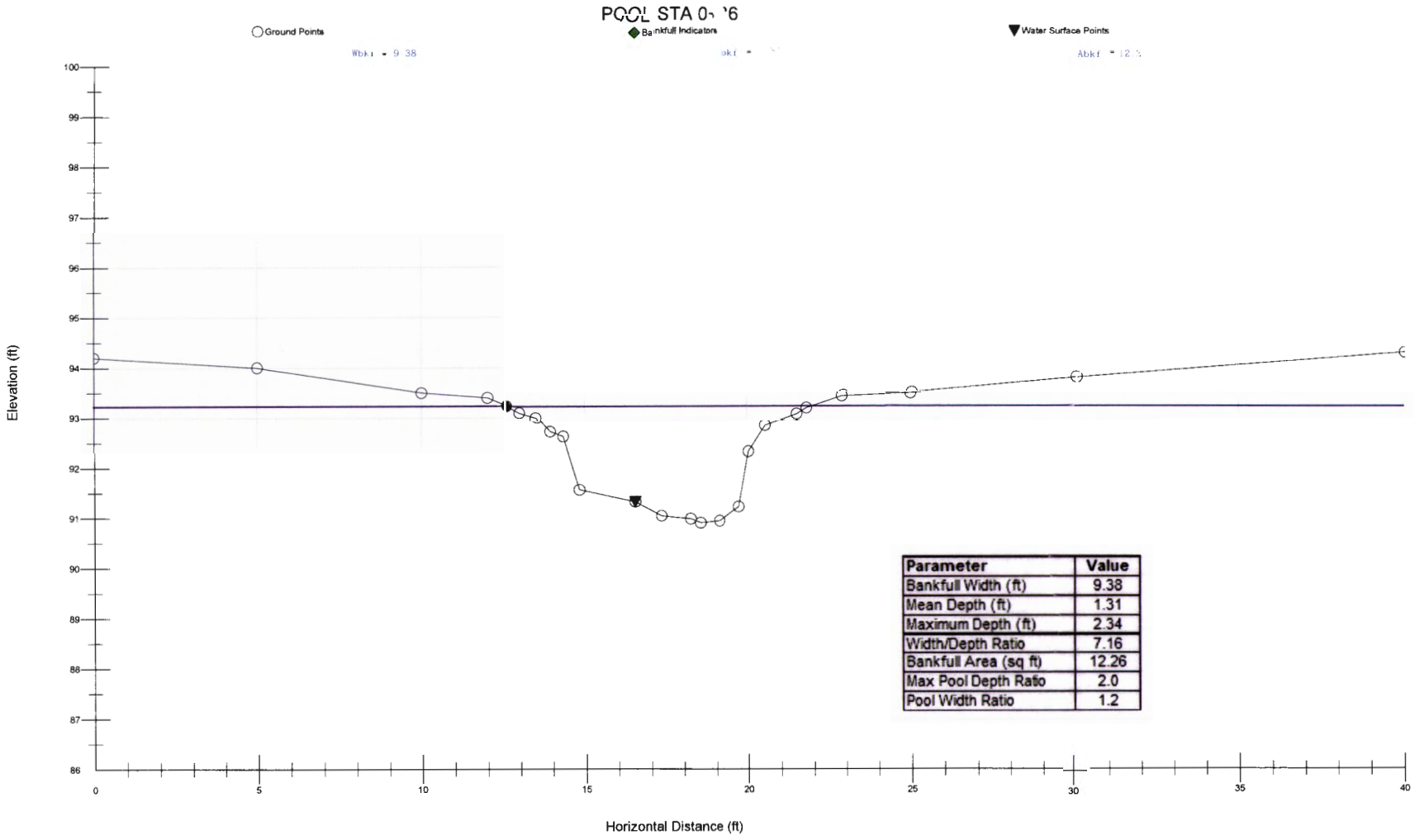
RC-05 LONG PRO




| Parameter | Value |
|---|---|
| Pool to pool spacing (ft) | 31.2 |
| Pool to pool spacing ratio | 4.8 |
| Max Pool Depth Ratio | 2.1 |
| Bankfull Slope (%) | 0.0061 |

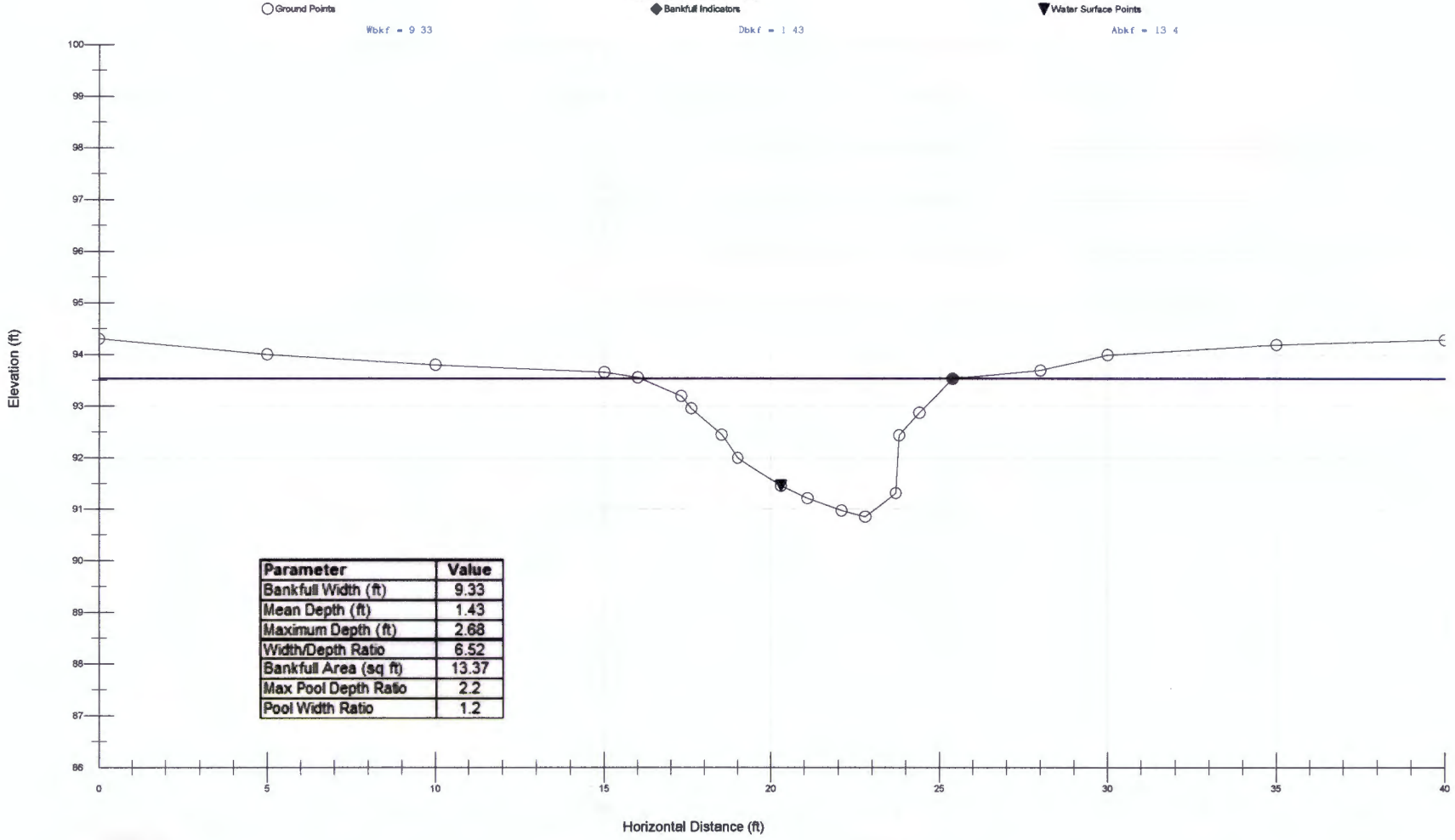



| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 50.00 |
| Bankfull Width (ft) | 5.63 |
| Entrenchment Ratio | 8.88 |
| Mean Depth (ft) | 1.26 |
| Maximum Depth (ft) | 1.74 |
| Width/Depth Ratio | 4.47 |
| Bankfull Area (sq ft) | 7.11 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E6 |

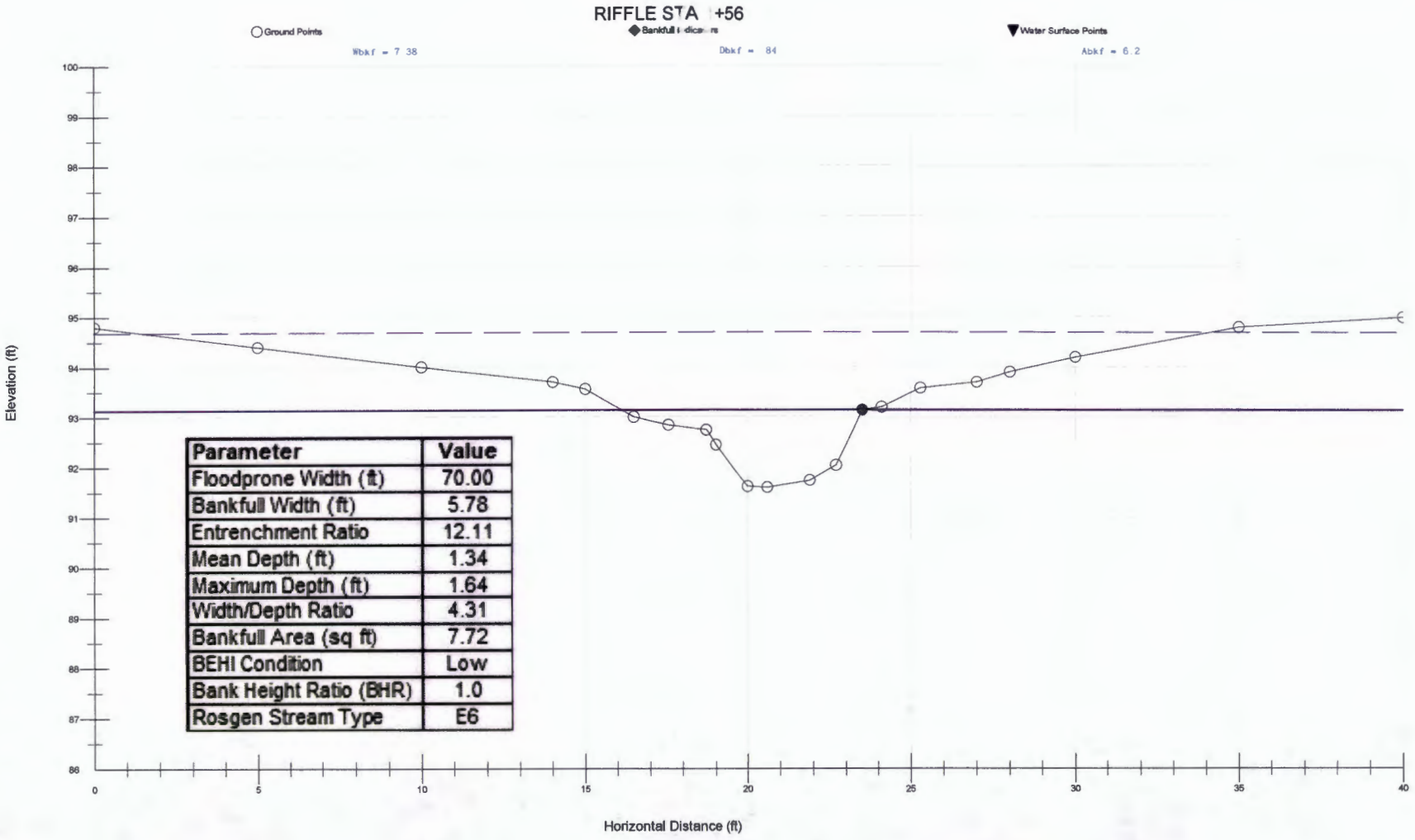



| Parameter | Value |
|---|---|
| Bankfull Width (ft) | 9.38 |
| Mean Depth (ft) | 1.31 |
| Maximum Depth (ft) | 2.34 |
| Width/Depth Ratio | 7.16 |
| Bankfull Area (sq ft) | 12.26 |
| Max Pool Depth Ratio | 2.0 |
| Pool Width Ratio | 1.2 |

# POOL STA 1+35




| Parameter | Value |
|---|---|
| Bankfull Width (ft) | 9.33 |
| Mean Depth (ft) | 1.43 |
| Maximum Depth (ft) | 2.68 |
| Width/Depth Ratio | 6.52 |
| Bankfull Area (sq ft) | 13.37 |
| Max Pool Depth Ratio | 2.2 |
| Pool Width Ratio | 1.2 |




| Parameter | Value |
|---|---|
| Floodprone Width (ft) | 70.00 |
| Bankfull Width (ft) | 5.78 |
| Entrenchment Ratio | 12.11 |
| Mean Depth (ft) | 1.34 |
| Maximum Depth (ft) | 1.64 |
| Width/Depth Ratio | 4.31 |
| Bankfull Area (sq ft) | 7.72 |
| BEHI Condition | Low |
| Bank Height Ratio (BHR) | 1.0 |
| Rosgen Stream Type | E6 |

## REFERENCE REACH MORPHOLOGICAL CHARACTERISTICS SUMMARY

| Parameter | Reference Stream | | |
|---|---|---|---|
| | Avg | Min | Max |
| Stream name | RC-05 | | |
| Stream type | Intermittent | | |
| Drainage area, DA (sq mi) | 0.242 | | |
| Mean riffle depth, dbkf (ft) | 1.05 | 0.84 | 1.26 |
| Riffle width, Wbkf (ft) | 6.5 | 5.6 | 7.4 |
| Width-to-depth ratio, [Wbkf/dbkf] | 6.6 | 4.5 | 8.8 |
| Riffle cross-sectional area, Abkf (sq ft) | 6.7 | 6.2 | 7.1 |
| Max riffle depth, dmbkf (ft) | 1.64 | 1.54 | 1.74 |
| Max riffle depth ratio, [dmbkf/dbkf] | 1.6 | 1.5 | 1.7 |
| Mean pool depth, dbkfp (ft) | 1.36 | 1.33 | 1.38 |
| Mean pool depth ratio, [dbkfp/dbkf] | 1.3 | 1.3 | 1.3 |
| Pool width, Wbkfp (ft) | 7.6 | 7.6 | 7.7 |
| Pool width ratio, [Wbkfp/Wbkf] | 1.2 | 1.2 | 1.2 |
| Pool cross-sectional area, Abkfp (sq ft) | 10.4 | 10.2 | 10.5 |
| Pool area ratio, [Abkfp/Abkf] | 1.6 | 1.5 | 1.6 |
| Max pool depth, dmbkfp (ft) | 2.22 | 2.10 | 2.34 |
| Max pool depth ratio, [dmbkfp/dbkf] | 2.1 | 2.0 | 2.2 |
| Low bank height, LBH (ft) | 1.6 | 1.5 | 1.7 |
| Low bank height ratio, [LBH/dmbkf] | 1.0 | 1.0 | 1.0 |
| Width flood-prone area, Wfpa (ft) | 40 | 32 | 50 |
| Entrenchment ratio, ER (Wfpa/Wbkf] | 6.1 | 4.9 | 7.7 |
| Bankfull discharge, Qbkf (cfs) | 17.1 | | |
| Meander length, Lm (ft) | 60 | 55 | 65 |
| Meander length ratio [Lm/Wbkf] | 9.2 | 8.4 | 10.0 |
| Radius of curvature, Rc (ft) | 16 | 14 | 20 |
| Radius of curvature ratio [Rc/Wbkf] | 2.5 | 2.2 | 3.1 |
| Belt width, Wblt (ft) | 35 | 30 | 40 |
| Meander width ratio [Wblt/Wbkf] | 5.4 | 4.6 | 6.1 |
| Pool length, Lp (ft) | 12.5 | 10.7 | 13.4 |
| Pool length ratio [Lp/Wbkf] | 1.9 | 1.6 | 2.1 |
| Pool-to-pool spacing, p-p (ft) | 31.2 | 23.9 | 39.5 |
| Pool-to-pool spacing ratio, [p-p/Wbkf] | 4.8 | 3.7 | 6.1 |
| Stream length, SL (ft) | 160 | | |
| Valley length, VL (ft) | 130 | | |
| Valley slope, VS (ft/ft) | 0.0075 | | |
| Average water surface slope, S (ft/ft) | 0.0061 | | |
| Sinuosity, k = SL/VL (ft/ft) | 1.23 | | |
| Riffle slope, Srif (ft/ft) | 0.0095 | 0.0090 | 0.0100 |
| Riffle slope ratio, [Srif/S] | 1.5590 | 1.4769 | 1.6410 |
| Run slope, Srun (ft/ft) | 0.0045 | 0.0030 | 0.0050 |
| Run slope ratio, [Srun/S] | 0.7385 | 0.4923 | 0.8205 |
| Pool slope, Sp (ft/ft) | 0.0010 | 0.0008 | 0.0012 |
| Pool slope ratio, [Sp/S] | 0.1641 | 0.1313 | 0.1969 |
| Glide slope, Sg (ft/ft) | 0.0030 | 0.0028 | 0.0032 |
| Glide slope ratio, [Sg/S] | 0.4923 | 0.4595 | 0.5251 |
| Riffle length, Lrif (ft) | 13.9 | 11.1 | 18.4 |
| Riffle length ratio, [Lrif/Wbkf] | 2.5 | 2.0 | 3.3 |

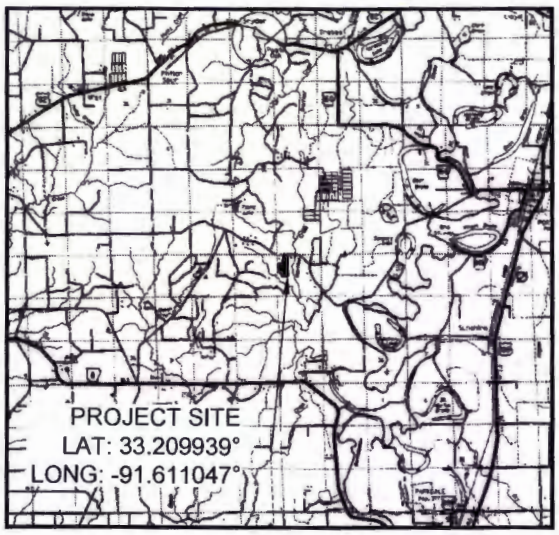
| Parameter | Existing Stream | | | Design Stream | | | Reference Stream | | |
|---|---|---|---|---|---|---|---|---|---|
| | Avg | Min | Max | Avg | Min | Max | Avg | Min | Max |
| Stream name | UT1 R1 | | | UT1 R1 | | | RC-05 | | |
| Stream type | Intermittent/Perennial | | | Intermittent/Perennial | | | Intermittent | | |
| Drainage area, DA (sq mi) | 0.037 | | | 0.037 | | | 0.24 | | |
| Mean riffle depth, dbkf (ft) | Existing channel filled in from agricultural land use | | | 0.6 | 0.7 | 0.5 | 1.05 | 0.84 | 1.26 |
| Riffle width, Wbkf (ft) | | | | 4.0 | 3.3 | 4.6 | 6.5 | 5.6 | 7.38 |
| Width-to-depth ratio, [Wbkf/dbkf] | | | | 6.6 | 4.5 | 8.8 | 6.63 | 4.5 | 8.79 |
| Riffle cross-sectional area, Abkf (sq ft) | | | | 2.4 | | | 6.7 | 6.2 | 7.1 |
| Max riffle depth, dmbkf (ft) | | | | 0.9 | 0.9 | 1.0 | 1.64 | 1.54 | 1.74 |
| Max riffle depth ratio, [dmbkf/dbkf] | | | | 1.6 | 1.5 | 1.7 | 1.6 | 1.5 | 1.7 |
| Mean pool depth, dbkfp (ft) | | | | 0.8 | 0.8 | 0.8 | 1.4 | 1.3 | 1.4 |
| Mean pool depth ratio, [dbkfp/dbkf] | | | | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Pool width, Wbkfp (ft) | | | | 4.7 | 4.6 | 4.7 | 7.6 | 7.6 | 7.7 |
| Pool width ratio, [Wbkfp/Wbkf] | | | | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Pool cross-sectional area, Abkfp (sq ft) | | | | 3.7 | 3.7 | 3.8 | 10.4 | 10.2 | 10.5 |
| Pool area ratio, [Abkfp/Abkf] | | | | 1.6 | 1.5 | 1.6 | 1.6 | 1.5 | 1.6 |
| Max pool depth, dmbkfp (ft) | | | | 1.3 | 1.2 | 1.3 | 2.22 | 2.10 | 2.34 |
| Max pool depth ratio, [dmbkfp/dbkf] | | | | 2.1 | 2.0 | 2.2 | 2.1 | 2.0 | 2.2 |
| Low bank height, LBH (ft) | | | | 0.9 | 0.9 | 1.0 | 1.6 | 1.5 | 1.7 |
| Low bank height ratio, [LBH/dmbkf] | | | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Width flood-prone area, Wfpa (ft) | | | | 24.5 | 19.6 | 30.6 | 40 | 32 | 50 |
| Entrenchment ratio, ER (Wfpa/Wbkf] | | | | 6.1 | 4.9 | 7.7 | 6.1 | 4.9 | 7.7 |
| Bankfull discharge, Qbkf (cfs) | | | | 2.5 | | | 17.1 | | |
| Meander length, Lm (ft) | | | | 36.8 | 33.7 | 39.8 | 60 | 55 | 65 |
| Meander length ratio [Lm/Wbkf] | | | | 9.2 | 8.4 | 10.0 | 9.2 | 8.4 | 10.0 |
| Radius of curvature, Rc (ft) | | | | 9.8 | 8.6 | 12.3 | 16 | 14 | 20 |
| Radius of curvature ratio [Rc/Wbkf] | | | | 2.5 | 2.2 | 3.1 | 2.5 | 2.2 | 3.1 |
| Belt width, Wblt (ft) | | | | 21.4 | 18.4 | 24.5 | 35 | 30 | 40 |
| Meander width ratio [Wblt/Wbkf] | | | | 5.4 | 4.6 | 6.1 | 5.4 | 4.6 | 6.1 |
| Pool length, Lp (ft) | | | | 7.7 | 6.6 | 8.2 | 12.5 | 10.7 | 13.4 |
| Pool length ratio [Lp/Wbkf] | | | | 1.9 | 1.6 | 2.1 | 1.9 | 1.6 | 2.1 |
| Pool-to-pool spacing, p-p (ft) | | | | 19.1 | 14.7 | 24.2 | 31.2 | 23.9 | 39.5 |
| Pool-to-pool spacing ratio, [p-p/Wbkf] | | | | 4.8 | 3.7 | 6.1 | 4.8 | 3.7 | 6.1 |
| Stream length, SL (ft) | | | | 330 | | | 160 | | |
| Valley length, VL (ft) | | | | 240 | | | 130 | | |
| Valley slope, VS (ft/ft) | | | | 0.00042 | | | 0.0075 | | |
| Average water surface slope, S (ft/ft) | | | | 0.0003 | | | 0.0061 | | |
| Sinuosity, k = SL/VL (ft/ft) | | | | 1.38 | | | 1.23 | | |
| Riffle slope, Srif (ft/ft) | | | | 0.0005 | 0.0005 | 0.0005 | 0.0095 | 0.0090 | 0.0100 |
| Riffle slope ratio, [Srif/S] | | | | 1.5590 | 1.4769 | 1.6410 | 1.5590 | 1.4769 | 1.6410 |
| Run slope, Srun (ft/ft) | | | | 0.0002 | 0.0002 | 0.0003 | 0.0045 | 0.0030 | 0.0050 |
| Run slope ratio, [Srun/S] | | | | 0.7385 | 0.4923 | 0.8205 | 0.7385 | 0.4923 | 0.8205 |
| Pool slope, Sp (ft/ft) | | | | 0.0001 | 0.0000 | 0.0001 | 0.0010 | 0.0008 | 0.0012 |
| Pool slope ratio, [Sp/S] | | | | 0.1641 | 0.1313 | 0.1969 | 0.1641 | 0.1313 | 0.1969 |
| Glide slope, Sg (ft/ft) | | | | 0.0002 | 0.0001 | 0.0002 | 0.0030 | 0.0028 | 0.0032 |
| Glide slope ratio, [Sg/S] | | | | 0.4923 | 0.4595 | 0.5251 | 0.4923 | 0.4595 | 0.5251 |
| Riffle length, Lrif (ft) | | | | 9.8 | 7.9 | 13.0 | 13.9 | 11.1 | 18.4 |
| Riffle length ratio, [Lrif/Wbkf] | | | | 2.46 | 1.97 | 3.27 | 2.5 | 2.0 | 3.3 |

MATRIXNEWORLD
Engineering Progress

# ATTACHMENT C

# STREAM DESIGN PLANS

VICINITY MAP




SCALE 1" = 2 MILES

| STREAM WORK LENGTHS | | |
|---|---|---|
| OW REGIME | IN-STREAM ACTIVITY | LENGTH (FT) |
| ERMITTENT | RESTORATION | 330 |
| IN-STREAM WORK | | 330 |

1. 05/28/2020: DRAFT PLANS - 75% COMPLETE

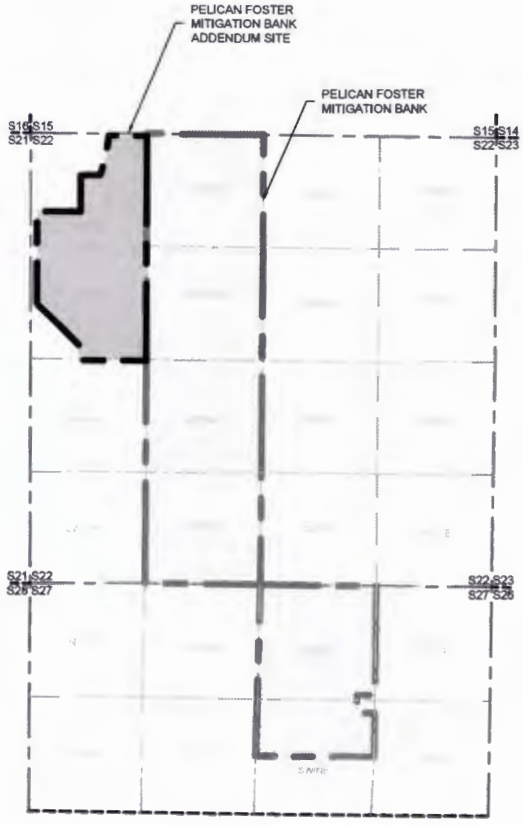
3.

**PROJECT CONTACT INFO:**
BANK SPONSOR POINT OF CONTACT:
MATRIX NEW WORLD ENGINEERING
PROJECT MANAGER - LEE WOMACK

DESIGNER POINT OF CONTACT:
WILBANKS ENGINEERING &
ENVIRONMENTAL SOLUTIONS, LLC
PROJECT ENGINEER - ZACHARY WILBANKS

.3 AC)
IR (1-FT)

M
DS




## AWINGS

LE SHEET
RIAL SITE PLAN
PICAL CROSS-SECTIONS
AN & PROFILE
RUCTURE DETAILS
ANTING PLAN & DETAILS
OSION AND SEDIMENT
NTROL PLAN

MVK-2012-197
PELICAN MITIGATION, LLC
PELICAN FOSTER MITIGATION BANK
DRAWN BY: ZBW | DATE: 05/28/2020

PRELIMINARY PLANS NOT FOR CONSTRUCTION

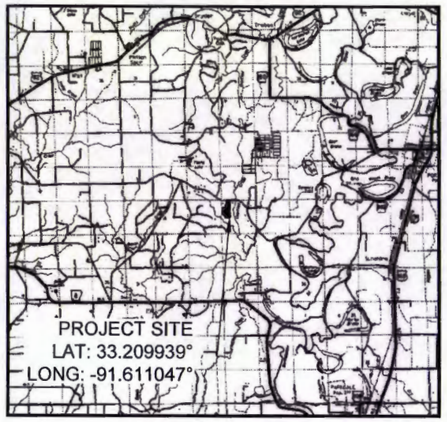
# TITLE SHEET

WILBANKS ENGINEERING & ENVIRONMENTAL SOLUTIONS, LLC
4117 SKYLINE DR., WARRIOR, AL 35180 (205) 412-3373

C.000

# PELICAN FOSTER MITIGATION BANK
# ADDENDUM SITE
## STREAM DESIGN PLANS
### MVK-2012-197

VICINITY MAP



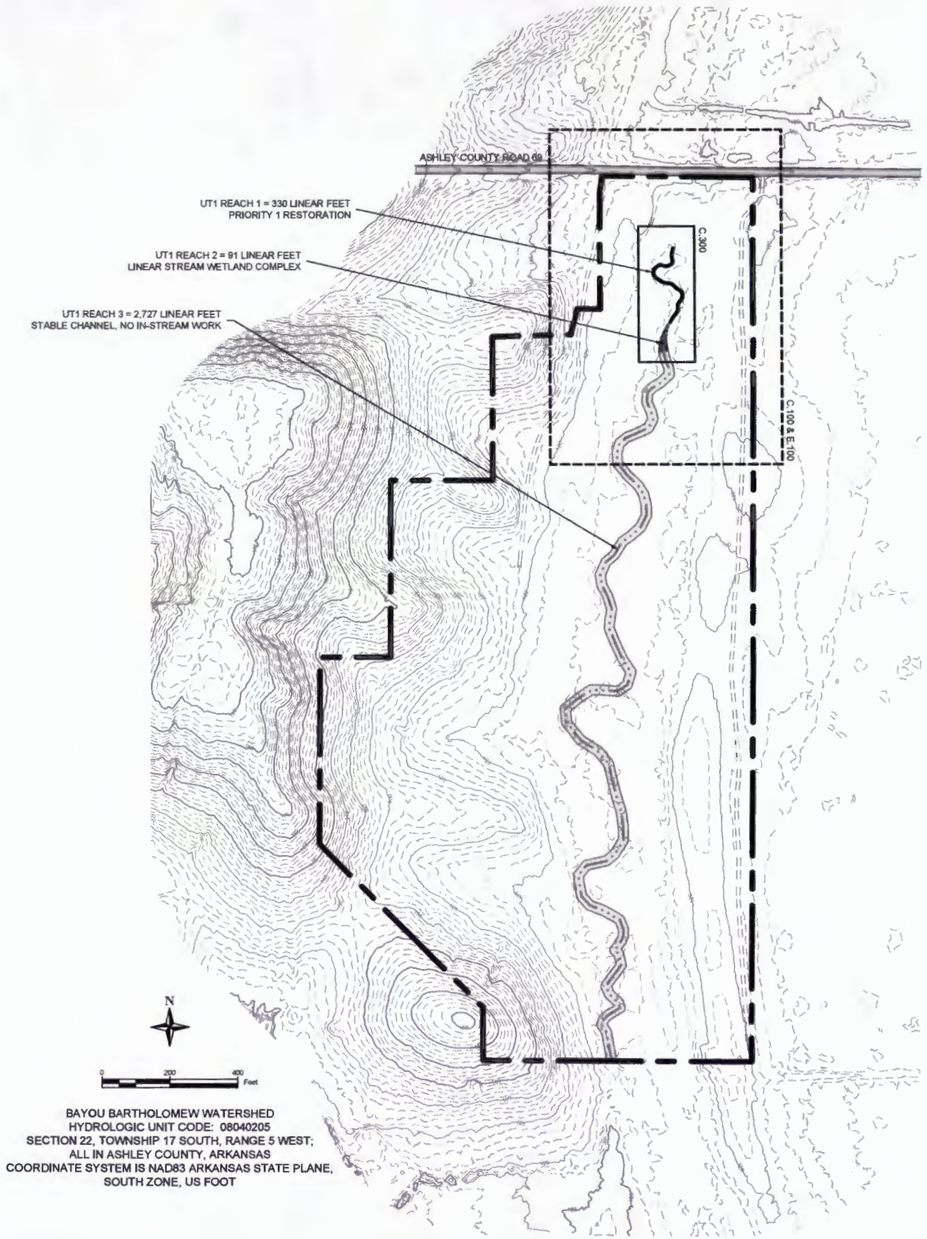

SCALE 1" = 2 MILES

1. 05/28/2020: DRAFT PLANS - 75% COMPLETE

3.

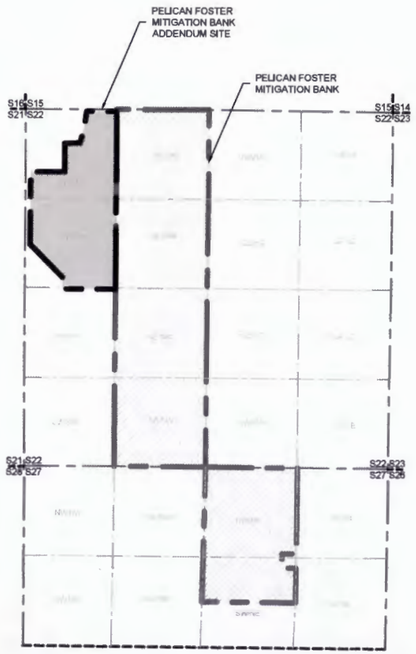
**PROJECT CONTACT INFO:**
BANK SPONSOR POINT OF CONTACT:
MATRIX NEW WORLD ENGINEERING
PROJECT MANAGER - LEE WOMACK

DESIGNER POINT OF CONTACT:
WILBANKS ENGINEERING &
ENVIRONMENTAL SOLUTIONS, LLC
PROJECT ENGINEER - ZACHARY WILBANKS




| PROJECT IN-STREAM WORK LENGTHS | | | |
|---|---|---|---|
| FEATURE NAME | FLOW REGIME | IN-STREAM ACTIVITY | LENGTH (FT) |
| UT1 REACH 1 | INTERMITTENT | RESTORATION | 330 |
| TOTAL PROJECT IN-STREAM WORK | | | 330 |

**LEGEND**
- PROJECT AREA (56.3 AC)
- 140 EXISTING CONTOUR (1-FT)
- EXISTING STREAM
- PROPOSED STREAM
- SITE ACCESS ROADS




BAYOU BARTHOLOMEW WATERSHED
HYDROLOGIC UNIT CODE: 08040205
SECTION 22, TOWNSHIP 17 SOUTH, RANGE 5 WEST;
ALL IN ASHLEY COUNTY, ARKANSAS
COORDINATE SYSTEM IS NAD83 ARKANSAS STATE PLANE,
SOUTH ZONE, US FOOT

## INDEX OF DRAWINGS



MVK-2012-197
PELICAN MITIGATION, LLC
PELICAN FOSTER MITIGATION BANK
DRAWN BY: ZBW | DATE: 05/28/2020

PRELIMINARY PLANS NOT FOR CONSTRUCTION

TITLE SHEET

WILBANKS ENGINEERING
& ENVIRONMENTAL SOLUTIONS, LLC
4117 SKYLINE DR., WARRIOR, AL 35180 (205) 412-3373

C.000

NOTES:
1. DISTURBANCES SHALL TAKE PLACE ONLY AS NECESSARY TO CONSTRUCT NEW CHANNEL.
2. PLEASE SEE THE EROSION AND SEDIMENT CONTROL PLAN FOR DETAILS ON CONSTRUCTION SEQUENCING.
3. ALL IN-STREAM WORK INVOLVES PRIORITY 1 RESTORATION WITH THE CONSTRUCTION OF THE NEW CHANNEL ON THE ORIGINAL FLOODPLAIN SURFACE.
4. NO GEOTECHNICAL STUDY HAS BEEN CONDUCTED AT THE SITE TO DETERMINE THE SHRINKAGE OR SWELLING FACTORS OF THE SOILS. ALL CUT AND FILL QUANTITIES REFLECT A 1.0 FACTOR.

GOOGLE EARTH IMAGERY - 11/14/2019

UT1 REACH 1 = 300 LINEAR FEET
PRIORITY 1 RESTORATION

UT1 FILLED DUE TO CATTLE
OPERATIVE EXITING PASTURE
WITH REED CHANNEL SCARS

UT1 REACH 2 = 91 LINEAR FEET
LINEAR STREAM WETLAND COMPLEX
NO CONSTRUCTION WORK ALLOWING
FEATURE TO FLOW NATURALLY INTO
EXISTING STREAM CHANNEL

UT1 REACH 3 = 2,727 LINEAR FEET
NO IN-STREAM WORK

GATED ACCESS

ASHLEY COUNTY ROAD 61

SITE ACCESS ROADWAY

## LEGEND

- PROJECT AREA (56.3 AC)
- 140 EXISTING CONTOUR (1-FT)
- EXISTING STREAM
- PROPOSED STREAM
- SITE ACCESS ROADS
- PROPOSED CONTOUR
- LIMITS OF CHANNEL CUT

**STREAM EARTHWORK QUANTITIES**

| FEATURE NAME | AREA (AC) | CUT (CY) | FILL (CY) | NET CUT (CY) |
|---|---|---|---|---|
| UT1 REACH 1 | 0.06 | 50 | 0 | 50 |
| SUMMARY | 0.06 | 50 | 0 | 50 |

**PROJECT IN-STREAM WORK LENGTHS**

| FEATURE NAME | FLOW REGIME | IN-STREAM ACTIVITY | LENGTH (FT) |
|---|---|---|---|
| UT1 REACH 1 | INTERMITTENT | RESTORATION | 330 |
| TOTAL PROJECT IN-STREAM WORK | | | 330 |

MVK-2012-197

PELICAN MITIGATION, LLC

PELICAN FOSTER MITIGATION BANK

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PRELIMINARY PLANS NOT FOR CONSTRUCTION

# AERIAL SITE PLAN

WILBANKS ENGINEERING & ENVIRONMENTAL SOLUTIONS, LLC
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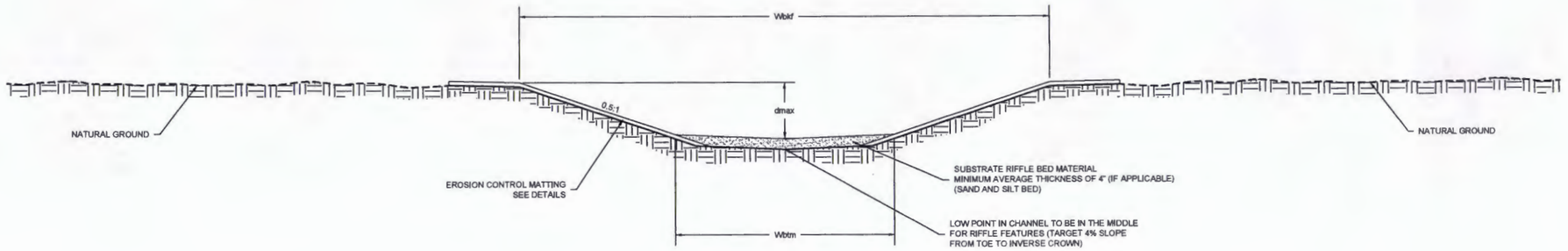
C.100

# TYPICAL RIFFLE CROSS-SECTION

*NOT TO SCALE*




# TYPICAL POOL CROSS-SECTION

*NOT TO SCALE*

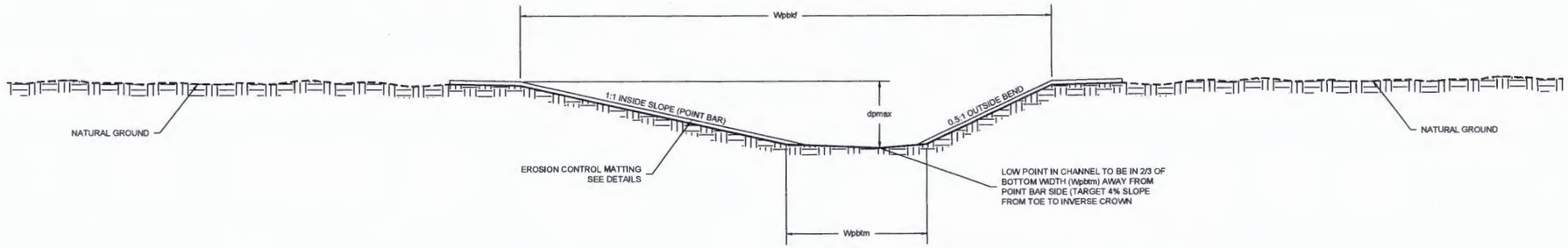



**TABLE 1: CROSS-SECTION PARAMETERS**

| REACH | STATION START | STATION END | RIFFLE PARAMETERS (FEET) | | | POOL PARAMETERS (FEET) | | |
|---|---|---|---|---|---|---|---|---|
| | | | Wbkf (ft) | Wbtm | dmax | Wpbkf | Wpbtm | dpmax |
| UT1 REACH 1 | 0+00 | 3+30 | 4.0 | 3.1 | 0.9 | 4.7 | 3.1 | 3.0 |

CROSS-SECTION NOTES:

1. STREAM CHANNEL IS A ROSGEN "E6" CHANNELS WITH VERY LOW WIDTH/DEPTH RATIOS AND ARE LOW FLOW SYSTEMS. CHANNEL SIDE SLOPES ARE STEEPER FOR THIS PROJECT AS SHOWN WITH SIDE SLOPES OF 0.5:1 TO ENSURE DEPTHS ARE OBTAINED. INSIDE BENDS OF POOL AREAS SHOULD TARGET A 1:1 SLOPE.
2. CONSTRUCTION OF EACH REACH SHALL COMMENCE AT THE UPSTREAM END OF EACH CHANNEL AND PROCEED DOWNSTREAM UNLESS NOTED IN THE PLANS OR APPROVED BY THE ENGINEER.
3. CHANNEL SHALL BE STABILIZED IN ACCORDANCE TO THE EROSION AND SEDIMENT CONTROL MEASURED NOTED THROUGHOUT THIS PLAN.
4. CONSTRUCTION TOLERANCES ARE AS FOLLOWS:
   - WIDTH: 0.4 FEET
   - DEPTH: 0.1 FEET
   - ELEVATIONS: 0.1 FEET
   - STRUCTURES: 0.1 FEET

**TABLE 2: STREAM MORPHOLOGICAL PARAMETERS**

| Stream name | UT1 REACH 1 |
|---|---|
| Stream Flow type | Intermittent |
| Rosgen Stream type | E6 |
| Drainage area, DA (sq mi) | 0.037 |
| Mean riffle depth, dbkf (ft) | 0.8 |
| Riffle width, Wbkf (ft) | 4.0 |
| Width-to-depth ratio, [Wbkf/dbkf] | 6.6 |
| Riffle cross-sectional area, Abkf (sq ft) | 2.4 |
| Mean pool depth, dbkfp (ft) | 0.8 |
| Mean pool depth ratio, [dbkfp/dbkf] | 1.3 |
| Pool cross-sectional area, Abkfp (sq ft) | 3.7 |
| Pool area ratio, [Abkfp/Abkf] | 1.6 |
| Entrenchment ratio, ER (Wfpa/Wbkf] | 6.1 |
| Meander length, Lm (ft) | 36.8 |
| Meander length ratio [Lm/Wbkf] | 9.2 |
| Radius of curvature, Rc (ft) | 9.6 |
| Radius of curvature ratio [Rc/Wbkf] | 2.5 |
| Belt width, Wblt (ft) | 21.4 |
| Meander width ratio [Wblt/Wbkf] | 5.4 |
| Pool length, Lp (ft) | 7.7 |
| Pool length ratio [Lp/Wbkf] | 1.9 |
| Pool-to-pool spacing, p-p (ft) | 19.1 |
| Pool-to-pool spacing ratio, [p-p/Wbkf] | 4.8 |
| Valley slope, VS (ft/ft) | 0.0004 |
| Average water surface slope, S (ft/ft) | 0.0003 |
| Sinuosity, k = SL/VL (ft/ft) | 1.38 |
| Riffle length, Lrif (ft) | 9.6 |
| Riffle length ratio, [Lrif/Wbkf] | 2.5 |

MVK-2012-197

PELICAN MITIGATION, LLC

PELICAN FOSTER MITIGATION BANK

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PRELIMINARY PLANS NOT FOR CONSTRUCTION

TYPICAL CROSS-SECTIONS


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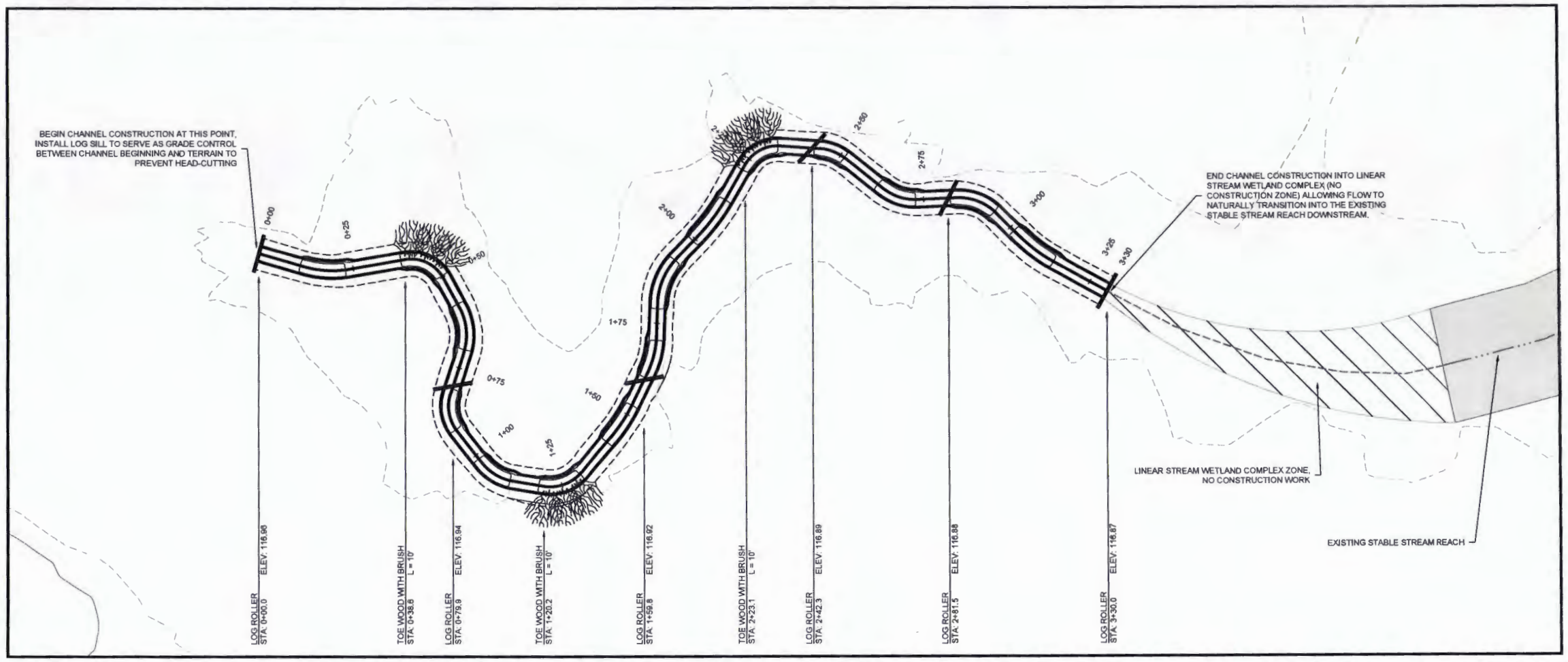
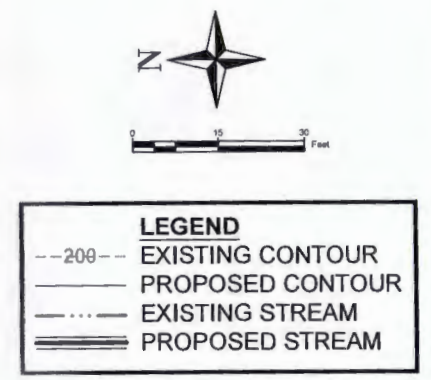
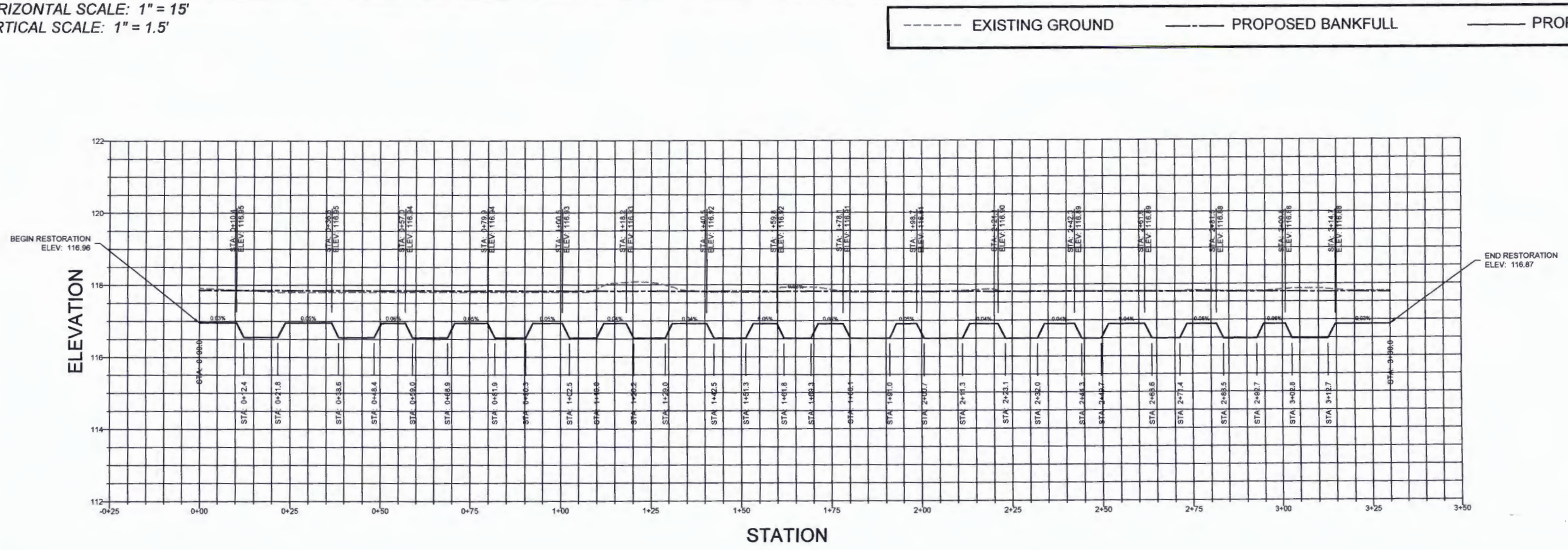



*HORIZONTAL SCALE: 1" = 15'*
*VERTICAL SCALE: 1" = 1.5'*




MVK-2012-197

PELICAN MITIGATION, LLC

PELICAN FOSTER MITIGATION BANK

DRAWN BY: ZBW | DATE: 05/28/2020

PRELIMINARY PLANS NOT FOR CONSTRUCTION

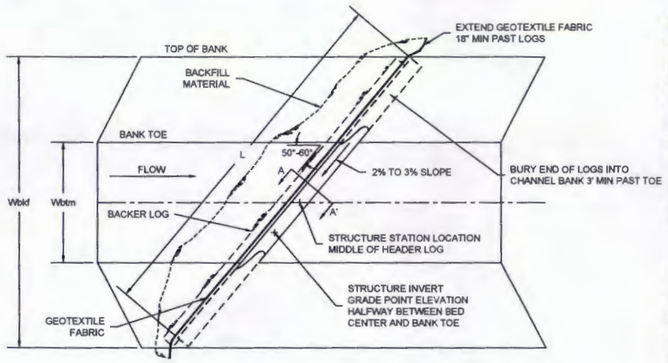
**PLAN & PROFILE**

UT1 REACH 1: STA 0+00 - 3+30

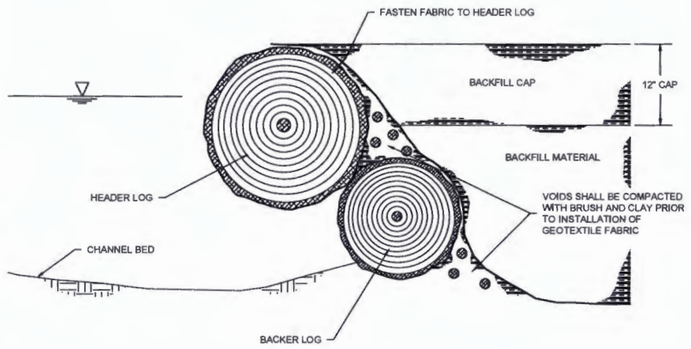

WILBANKS ENGINEERING & ENVIRONMENTAL SOLUTIONS, LLC

4117 SKYLINE DR., WARRIOR, AL 35180 (205) 412-3373


C.300




## LOG ROLLER
## PLAN VIEW
NOT TO SCALE



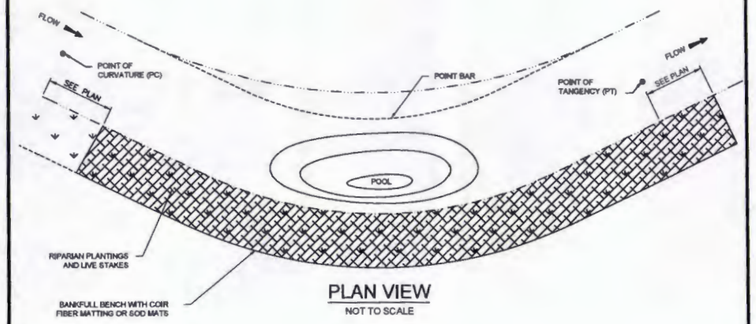

## SECTION A-A'
NOT TO SCALE

NOTES:
1. STRUCTURE BACKFILL MATERIAL AND CAP SHALL CONSISTS OF CLAYEY MATERIAL COMPACTED TO 95% OF THE STANDARD PROCTOR IN-SITU DENSITY.
2. ALL VOIDS AND GAPS BETWEEN LOGS SHALL BE PACKED WITH BRUSH AND CLAY PRIOR TO INSTALLATION OF GEOTEXTILE FABRIC.
3. SEE TABLE 3 FOR LOG LENGTHS & DIAMETERS.
4. LOG DIAMETERS SHALL NOT EXCEED 6" MORE THAN MINIMAL VALUES.
5. STRUCTURE DEMARCATED AT STATION 0+00 AND 3+30 ARE GRADE CONTROL SILLS. BACKER LOG IS NOT REQUIRED AT THESE LOCATIONS.

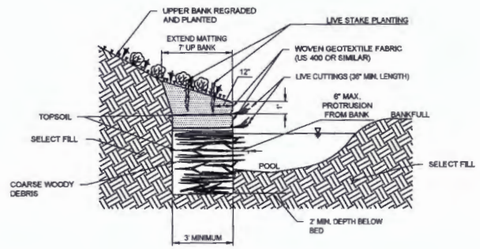
**TABLE 3: LOG ROLLER DIMENSIONS**

| REACH | STATION START | STATION END | LOG LENGTH (FEET) | LOG MIN DIAMETER (INCHES) |
|---|---|---|---|---|
| UT1 REACH 1 | 0+00 | 3+30 | 9.0 | 6.0 |

# LOG ROLLER



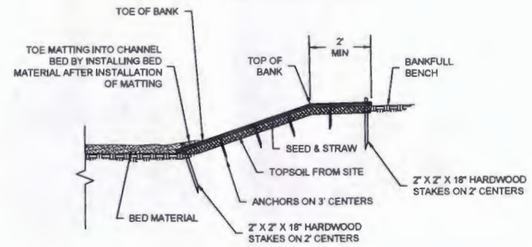

## PLAN VIEW
NOT TO SCALE




## SECTION VIEW
NOT TO SCALE

NOTES:
1. USE A MIXTURE OF TREE TOPS, BRANCHES, LOGS AND ROOTWADS FOR COURSE WOODY DEBRIS WITH AT LEAST 30% FROM FRESHLY CUT LIVE MATERIAL.
2. PLACE 6" LIFT OF TOPSOIL ON TOP OF WOODY DEBRIS, THEN PLACE WOVEN GEOTEXTILE FABRIC BEFORE FINAL PLACEMENT OF TOPSOIL TO GRADE.
3. STRUCTURE SHALL EXTEND FROM BANK LENGTH SHOWN ON THE PLANS.
4. WOODY DEBRIS SHALL NOT EXTEND INTO THE CHANNEL MORE THAN 6".
5. ALL MATERIALS ARE TO BE APPROVED BY ENGINEER OR ENGINEER'S ONSITE CONSTRUCTION OBSERVER.

# TOE WOOD WITH BRUSH




## SECTION VIEW
NOT TO SCALE

# TYPICAL BANK PROTECTION

**TABLE 4: STRUCTURE SUMMARY**

| REACH | LOG ROLLERS | TOE WOOD WITH BRUSH |
|---|---|---|
| UT1 REACH 1 | 10 | 7 |
| SUMMARY | 29 | 18 |

MVK-2012-197

PELICAN MITIGATION, LLC

PELICAN FOSTER MITIGATION BANK

DRAWN BY: ZBW | DATE: 05/28/2020

PRELIMINARY PLANS NOT FOR CONSTRUCTION

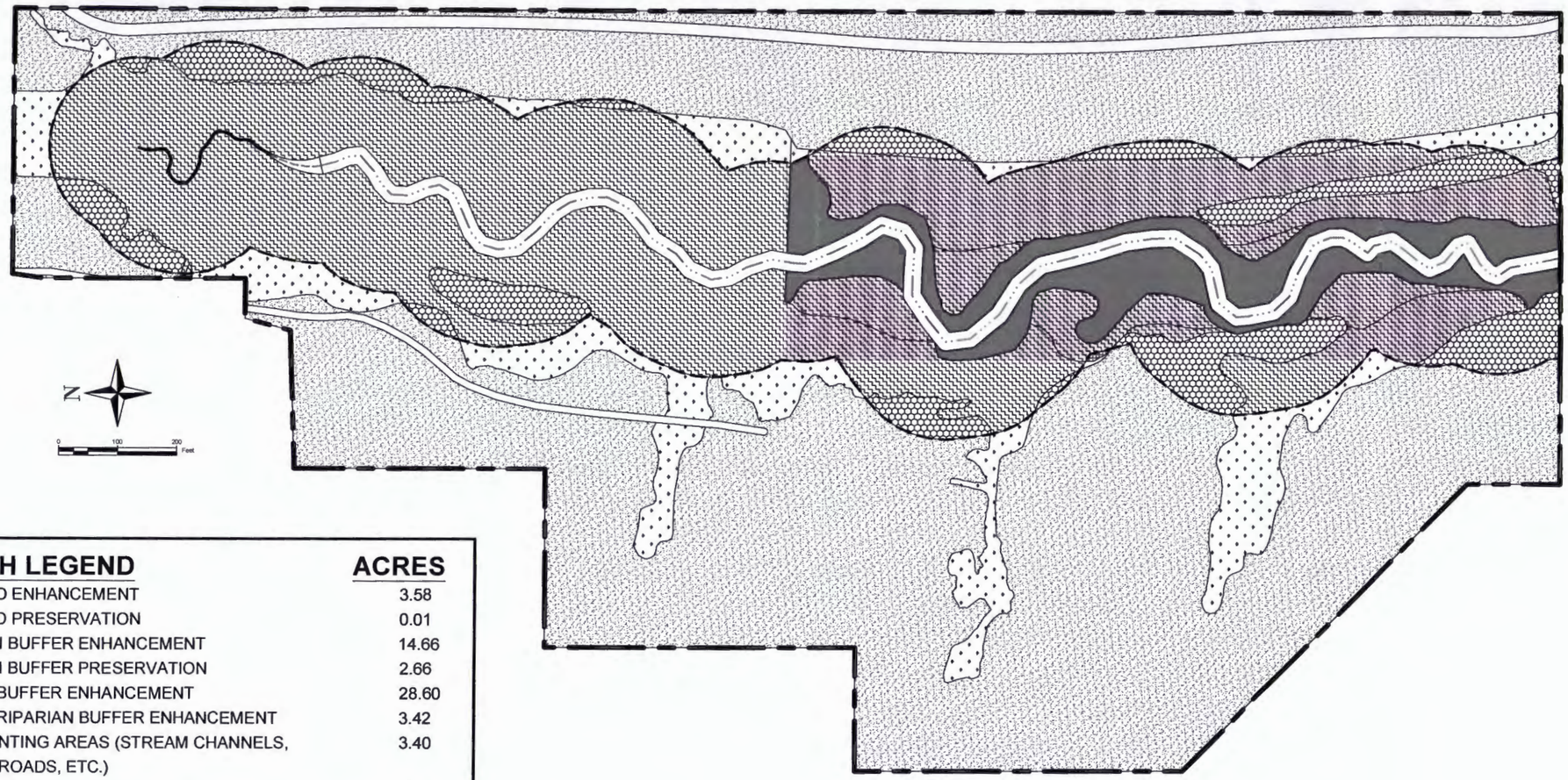
# STRUCTURE DETAILS

WILBANKS ENGINEERING & ENVIRONMENTAL SOLUTIONS, LLC
4117 SKYLINE DR., WARRIOR, AL 35180 (205) 412-3373

C.400

## LEGEND

- PROJECT AREA (56.3 AC)
- EXISTING STREAM
- PROPOSED STREAM
- STREAM WETLAND COMPLEX



N

0 100 200 Feet

| HATCH LEGEND | ACRES |
|---|---|
| WETLAND ENHANCEMENT | 3.58 |
| WETLAND PRESERVATION | 0.01 |
| RIPARIAN BUFFER ENHANCEMENT | 14.66 |
| RIPARIAN BUFFER PRESERVATION | 2.66 |
| UPLAND BUFFER ENHANCEMENT | 28.60 |
| UPLAND RIPARIAN BUFFER ENHANCEMENT | 3.42 |
| NON-PLANTING AREAS (STREAM CHANNELS, ACCESS ROADS, ETC.) | 3.40 |
| **TOTAL SITE** | **56.3** |

NOTES:
WETLAND, RIPARIAN BUFFER, AND UPLAND PLANTING AREAS TO BE PLANTED WITH LIST OF TREE SPECIES ON TABLE 5 ON SHEET C.501

**TOTAL WETLAND BOTTOMLAND HARDWOOD (BLH) ENHANCEMENT AREAS = 3.58**
**TOTAL RIPARIAN BUFFER BLH ENHANCEMENT AREAS = 14.66**
**TOTAL UPLAND BUFFER AND UPLAND RIPARIAN BUFFER ENHANCEMENT AREAS = 32.02**
**TOTAL PLANTING ACRES = 50.26**

MVK-2012-197

PELICAN MITIGATION, LLC

PELICAN FOSTER MITIGATION BANK

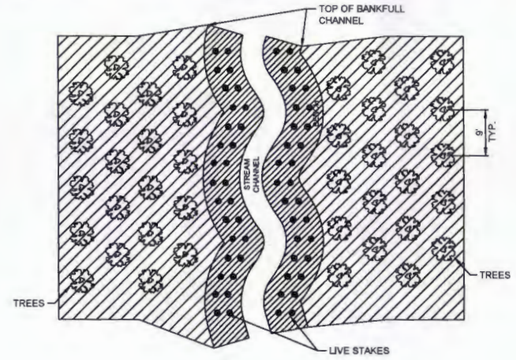
DRAWN BY: ZBW | DATE: 05/28/2020

PRELIMINARY PLANS NOT FOR CONSTRUCTION

# PLANTING PLAN

WILBANKS ENGINEERING & ENVIRONMENTAL SOLUTIONS, LLC
4117 SKYLINE DR., WARRIOR, AL 35180 (205) 412-3373

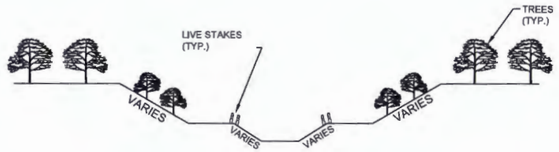
C.500




LEGEND:

LIVE STAKING

BARE ROOT PLANTING




PLANTING NOTES:

TEMPORARY AND PERMANENT SEED

1. ALL DISTURBED AREAS WILL BE STABILIZED USING MULCH AND TEMPORARY SEED TO PROVIDE ADEQUATE GROUND COVER AND CONDITION THE SOIL.
2. MULCH MUST BE ADDED TO ACHIEVE 75% COVERAGE (ROUGHLY 2 TONS/ACRE FOR WHEAT STRAW)
3. A FERTILITY SOIL TEST SHALL BE USED TO DETERMINE FERTILIZER AMOUNT OR, IF NO SOIL TEST IS AVAILABLE, A STANDARD MIXTURE SHALL BE APPLIED OF 1.5 TONS OF LIME PER ACRE AND 400 LBS OF 5-15-10 FERTILIZER PER ACRE.

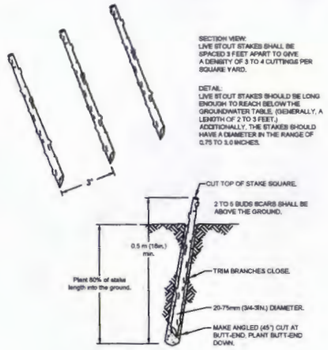
BARE ROOT PLANTINGS

1. PLANT BARE ROOT SHRUBS AND TREES IN ACRES AS INDICATED ON THE PLANS.
2. PROVIDE 9' SPACING BETWEEN PLANTS.
3. LOOSEN COMPACTED SOIL AND PLANT IN HOLES FORMED WITH A MATTOCK, DIBBLE BAR OR EQUAL.
4. PROVIDE PLANTING HOLD SUFFICIENT IN SIZE AND DEPTH TO PREVENT CROWDING OF ROOTS.
5. ROOTS SHALL BE KEPT MOIST DURING TRANSPORTATION, DISTRIBUTION, AND INSTALLATION.
6. PLANTS SHALL BE HEELED-IN INTO MOIST SOIL IF NOT PROMPTLY PLANTED AFTER DELIVERY TO THE PROJECT SITE.

LIVE STAKES:

1. STAKES CAN BE CUT AND INSTALLED ON THE SAME DAY OR SOAKED ANYWHERE FROM 1 TO 7 DAYS.
2. STAKES THAT ARE SPLIT SHALL NOT BE INSTALLED.
3. STAKES SHALL BE INSTALLED ORTHOGONAL TO THE BANK AND WITH BUDS POINTING UPWARDS.
4. STAKES SHALL BE ¾ TO 2 INCHES IN DIAMETER AND 2 TO 3 FEET IN LENGTH.
5. AFTER INSTALLATION, THE TOP PORTION OF STAKES SHALL BE PRUNED WITH A SQUARE CUT LEAVING NO LESS THAN 3 INCHES AND NO MORE THAN 6 INCHES ABOVE THE GROUND.

## GENERAL PLANTING INFORMATION




NOTES:

1. HARVEST AND PLANT STAKES DURING THE DORMANT SEASON.
2. USE HEALTHY, STRAIGHT AND LIVE WOOD AT LEAST 1 YEAR OLD.
3. MAKE CLEAN CUTS AND DO NOT DAMAGE STAKES OR SPLIT ENDS DURING INSTALLATION; USE AN IRON BAR FOR PILOT HOLE IN FIRM SOILS.
4. STAKES CAN BE CUT AND INSTALLED ON THE SAME DAY OR SOAKED.
5. IF SOAKED, SOAK CUTTINGS FOR AT LEAST 24 HOURS PRIOR TO INSTALLATION. SOAK FOR 5-7 DAYS FOR BEST RESULTS.
6. TAMP THE SOIL AROUND THE STAKE.

LIVE STAKES

NOT TO SCALE

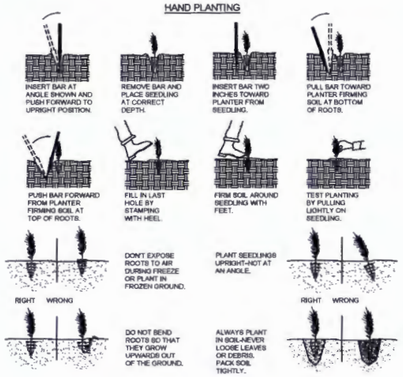
CARE OF SEEDLINGS UNTIL PLANTED

SEEDLINGS SHOULD BE PLANTED IMMEDIATELY. IF IT IS NECESSARY TO STORE MOSS-PACKED SEEDLINGS FOR MORE THAN 2 WEEKS, ONE PINT OF WATER PER PKG. SHOULD BE ADDED. IF CLAY-TREATED, DO NOT ADD WATER TO PKG. PACKAGES MUST BE SEPERATED TO PROVIDE VENTILATION TO PREVENT "HEATING". SEPARATE PACKAGES WITH WOOD STRIPS AND STORE OUT OF THE WIND IN A SHADED, COOL (NOT FREEZING) LOCATION.

CARE OF SEEDLINGS DURING PLANTING

WHEN PLANTING, ROOTS MUST BE KEPT MOIST UNTIL TREES ARE IN THE GROUND. DO NOT CARRY SEEDLINGS IN YOUR HAND EXPOSED TO THE AIR AND SUN. KEEP MOSS-PACKED SEEDLINGS IN A CONTAINER PACKED WITH WET MOSS OR FILLED WITH THICK MUDDY WATER. COVER CLAY-TREATED SEEDLINGS WITH WET BURLAP ONLY.

HAND PLANTING




BARE ROOT

NOT TO SCALE

## LIVE STAKE AND BARE ROOT SEEDLING INFORMATION

**TABLE 5: PLANTING SPECIES AND QUANTITIES**

| SCIENTIFIC NAME | COMMON NAME | PLANTING MATERIAL SIZE | COMPOSITION (%) |
|---|---|---|---|
| **STREAMSIDE** | | | |
| *Alnus serrulata* | Hazel alder | Live Stake | 3/sy |
| *Cephalanthus occidentalis* | Buttonbush | Live Stake | 3/sy |
| *Populus deltoides* | Eastern cottonwood | Live Stake | 3/sy |
| *Salix nigra* | Black willow | Live Stake | 3/sy |
| *Sambucus canaensis* | Elderberry | Live Stake | 3/sy |
| **WETLAND (BOTTOMLAND HARDWOOD) ENHANCEMENT AREAS** | | | |
| *Morus rubra* | Red mulberry | Bare Root | 6.0 |
| *Plantanus occidentalis* | American sycamore | Bare Root | 4.0 |
| *Taxodium distichum* | Bald cypress | Bare Root | 7.0 |
| *Ulmus americana* | American elm | Bare Root | 3.0 |
| | | **TOTAL SOFT MAST** | **20.0** |
| *Carya illinoinensis* | Sweet pecan | Bare Root | 13.5 |
| *Quercus lyrata* | Overcup oak | Bare Root | 13.5 |
| *Quercus michauxii* | Swamp chestnut oak | Bare Root | 13.5 |
| *Quercus nigra* | Water oak | Bare Root | 13.0 |
| *Quercus phellos* | Willow oak | Bare Root | 13.0 |
| *Quercus texana* | Nuttall oak | Bare Root | 13.5 |
| | | **TOTAL HARD MAST** | **80.0** |
| **RIPARIAN BUFFER (BOTTOMLAND HARDWOOD) ENHANCEMENT AREAS** | | | |
| *Betula nigra* | River birch | Bare Root | 3.0 |
| *Morus rubra* | Red mulberry | Bare Root | 4.0 |
| *Plantanus occidentalis* | American sycamore | Bare Root | 5.0 |
| *Taxodium distichum* | Bald cypress | Bare Root | 5.0 |
| *Ulmus americana* | American elm | Bare Root | 3.0 |
| | | **TOTAL SOFT MAST** | **20.0** |
| *Carya illinoinensis* | Sweet pecan | Bare Root | 13.5 |
| *Quercus lyrata* | Overcup oak | Bare Root | 13.5 |
| *Quercus michauxii* | Swamp chestnut oak | Bare Root | 13.5 |
| *Quercus nigra* | Water oak | Bare Root | 13.0 |
| *Quercus phellos* | Willow oak | Bare Root | 13.0 |
| *Quercus texana* | Nuttall oak | Bare Root | 13.5 |
| **TOTAL HARD MAST** | | | **80.0** |
| **UPLAND BUFFER AND UPLAND RIPARIAN BUFFER ENHANCEMENT** | | | |
| *Fagus grandiolia* | American beech | Bare Root | 6.0 |
| *Morus rubra* | Red mulberry | Bare Root | 5.0 |
| *Plantanus occidentalis* | American sycamore | Bare Root | 5.0 |
| *Pinus echinata* | Shortleaf pine | Bare Root | 4.0 |
| | | **TOTAL SOFT MAST** | **20.0** |
| *Carya cordiformis* | Bitternut hickory | Bare Root | 13.5 |
| *Carya illinoinensis* | Sweet pecan | Bare Root | 13.5 |
| *Quercus alba* | Northern white oak | Bare Root | 13.0 |
| *Quercus falcata* | Souther red oak | Bare Root | 13.5 |
| *Quercus nigra* | Water oak | Bare Root | 13.0 |
| *Quercus pagoda* | Cherry bark oak | Bare Root | 13.5 |
| | | **TOTAL HARD MAST** | **80.0** |

NOTES:

1. WETLAND ENHANCEMENT: VEGETATIVE ENHANCEMENT TO BE ACCOMPLISHED BY PLANTING AN APPROPRIATE SPECIES MIXTURE OF BOTTOMLAND HARDWOODS (TABLE 5) DURING THE STANDARD PLANTING SEASON (DECEMBER THRU MARCH), FOLLOWING THE REMOVAL OF UNDESIRED VEGETATION FROM THE ENHANCEMENT AREAS. SEEDLINGS WILL BE PLANTED USING A 9 X 9 FOOT SPACING FOR AN INITIAL STAND DENSITY OF AT LEAST 540 SEEDLINGS PER ACRE.
2. STREAM BUFFER ENHANCEMENT: VEGETATIVE ENHANCEMENT WILL BE CONDUCTED WITHIN RIPARIAN AREAS OF THE EXISTING AND PROPOSED STREAM CORRIDORS WHERE IN-STREAM RESTORATION ACTIVITIES ARE CONDUCTED. A 150-FOOT-WIDE BUFFER (150 FEET EACH SIDE OF THE STREAM) WILL BE PLANTED WITH AN APPROPRIATE SPECIES MIXTURE OF BOTTOMLAND HARDWOODS (TABLE 5) DURING THE STANDARD PLANTING SEASON (DECEMBER THRU MARCH), FOLLOWING THE REMOVAL OF UNDESIRED VEGETATION FROM THE ENHANCEMENT RIPARIAN AREAS. SEEDLINGS WILL BE PLANTED USING A 9 X 9 FOOT SPACING FOR AN INITIAL STAND DENSITY OF AT LEAST 540 SEEDLINGS PER ACRE.
3. UPLAND BUFFER AND UPLAND STREAM BUFFER ENHANCEMENT: VEGETATIVE ENHANCEMENT WILL BE ACCOMPLISHED BY PLANTING AN APPROPRIATE SPECIES MIXTURE OF HARDWOODS (TABLE 5) DURING THE STANDARD PLANTING SEASON (DECEMBER THRU MARCH). SEEDLINGS WILL BE PLANTED USING A 9 X 9 FOOT SPACING FOR AN INITIAL STAND DENSITY OF AT LEAST 540 SEEDLINGS PER ACRE.
4. THE TOTAL WETLAND ENHANCEMENT AREA IS 3.58 ACRES INVOLVING THE PLANTING OF 1,934 SEEDLINGS.
5. THE TOTAL RIPARIAN BUFFER ENHANCEMENT AREA IS 14.66 ACRES INVOLVING THE PLANTING OF 7,917 SEEDLINGS.
6. THE TOTAL UPLAND BUFFER AND UPLAND STREAM BUFFER ENHANCEMENT AREA IS 32.02 ACRES INVOLVING THE PLANTING OF 17,291 SEEDLINGS.

**TABLE 6: GRASS SPECIES SELECTION**

| SCIENTIFIC NAME | COMMON NAME | SEEDING RATE PER ACES, PLS | SEEDING DATE RANGES |
|---|---|---|---|
| **PERMANENT SEEDING** | | | |
| *Cynodon dactylon* | Bermudagrass | 10 | APR 1 - JUL 1 |
| *Schedonorus arundinaceus* | Tall Fescue | 40-50 | SEP 1 - NOV 1 |
| *Chamaecrista fasciculata* | Partridge Pea | 10-15 | MAR 15 - JUL 15 |
| *Panicum virgatum* | Switchgrass | 4 | APR 1 - JUN 15 |
| **TEMPORARY SEEDING** | | | |
| *Urochloa ramosa* | Millet | 40 | APR 1 - AUG 1 |
| *Secale cereal* | Rye | 3 BU | SEP 1 - NOV 15 |
| *Lolium perenne* | Ryegrass | 30 | AUG 1 - SEP 15 |
| *Sorghum bicolor* | Sorghum-Sudan Hydrids | 40 | MAY 1 - AUG 1 |
| *Triticum aesthivum* | Wheat | 3 BU | SEP 1 - NOV 1 |
| *Trifolium incarnatum* | Crimson Clover | 10 | SEP 1 - NOV 1 |

MVK-2012-197

PELICAN MITIGATION, LLC

PELICAN FOSTER MITIGATION BANK

DRAWN BY: ZBW | DATE: 05/28/2020

PRELIMINARY PLANS NOT FOR CONSTRUCTION

# PLANTING DETAILS


WILBANKS ENGINEERING & ENVIRONMENTAL SOLUTIONS, LLC

4117 SKYLINE DR., WARRIOR, AL 35180 (205) 412-3373


C.501


## SEDIMENT & EROSION CONTROL LEGEND

**SITE PREPARATION**

- TEMPORARY STAGING AREA
- TEMPORARY HAUL ROUTE
- LIMITS OF DISTURBANCE

**SURFACE STABILIZATION**

- MULCHING — MU
- PERMANENT SEEDING — PS
- PRESERVATION OF VEGETATION — PV
- TEMPORARY SEED — TS
- TREE PLANTING — TP

**SEDIMENT CONTROL**

- SEDIMENT BARRIER, SILT FENCE
- ROCK FILTER DAM — RD

**STREAM PROTECTION**

- CHANNEL STABILIZATION — CS
- STREAM BANK STABILIZATION — SP

# EROSION & SEDIMENT CONTROL PLAN
## SITE PLAN

PRELIMINARY PLANS NOT FOR CONSTRUCTION

MVK-2012-197

PELICAN MITIGATION, LLC

PELICAN FOSTER MITIGATION BANK

DRAWN BY: ZBW | DATE: 05/28/2020

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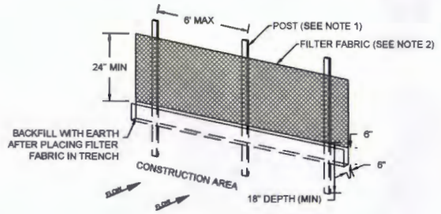
E.100

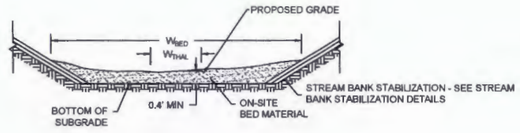



NOTES

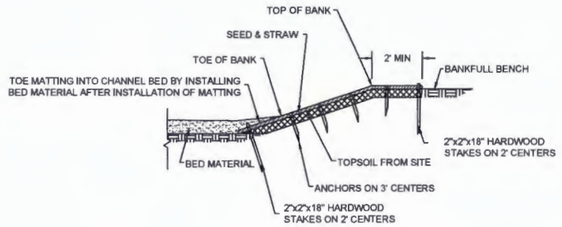
1. POSTS SHALL BE EITHER 3-IN THICK SOFT WOOD, 1.5-IN THICK OAK, OR 1.33 LB/LF STEEL WITH A MINIMUM LENGTH OF 4-FT. STEEL POSTS SHALL HAVE PROJECTIONS TO FACILITATE FASTENING FABRIC. SEE TABLE SB-1 FOR WOOD POST FASTENER INFORMATION.
2. FILTER FABRIC SHALL MEET THE FOLLOWING:
   A) MINIMUM WITH OF 36 INCHES
   B) CONFORM TO AASHTO M288
3. SILT FENCES TO BE INSTALLED IN LOCATIONS AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN AND AS DIRECTED BY THE ENGINEER PRIOR TO BEGINNING OF CONSTRUCTION.
4. SILT FENCES TO BE MAINTAINED AND CLEANED AS NECESSARY TO MAINTAIN IN FUNCTIONAL CONDITION. SILT FENCES SHALL BE INSPECTED AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL EVENT.
5. SILT FENCES TO BE REMOVED AND THE AREA TO BE RESTORED TO ITS NATURAL CONDITION WHEN PERMANENT EROSION AND SEDIMENT CONTROL PROCEDURES ARE EFFECTIVE.

(SB) SEDIMENT BARRIER - TYPE B
NOT TO SCALE

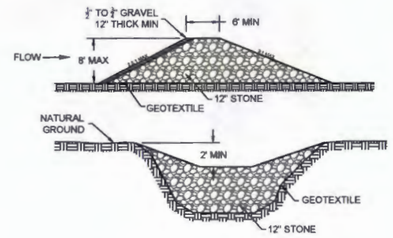
| TABLE SB-1: WOOD POST FASTENERS FOR SILT FENCE | | | | |
|---|---|---|---|---|
| | GUAGE | CROWN | LEGS | STAPLES/POST |
| WIRE STABLES | 17 MIN. | 3/4" WIDE | 1/2" LONG | 5 MIN. |
| | GUAGE | LENGTH | BUTTON HEAD | NAIL/POST |
| NAILS | 14 MIN. | 1" | 3/4" LONG | 4 MIN. |




(CS) CHANNEL STABILIZATION
NOT TO SCALE




(SP) STREAM BANK STABILIZATION
NOT TO SCALE




(RD) ROCK FILTER DAM
NOT TO SCALE

## GENERAL NOTES:

DISTURBED ACREAGE: LESS THAN 0.5 ACRES
RIVER BASIN: BAYOU BARTHOLOMEW WATERSHED; HUC: 08040205
MAINTENANCE CONTACT: LEE WOMACK (PROJECT MANAGER)

1. THE SITE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING AND MAINTAINING SUITABLE EROSION AND SEDIMENT CONTROL DEVICES ON SITE DURING CONSTRUCTION AS REQUIRED TO PREVENT SILT FROM LEAVING THE SITE. SILT WILL NOT BE ALLOWED BEYOND LIMITS OF DISTURBANCE.
2. EROSION CONTROL MEASURES SHALL BE MAINTAINED AT ALL TIMES. IF FULL IMPLEMENTATION OF APPROVED PLANS DOES NOT PROVIDE SUFFICIENT EROSION AND SEDIMENT CONTROL, ADDITIONAL CONTROL MEASURES SHALL BE IMPLEMENTED. CONTRACTOR IS RESPONSIBLE FOR DAILY INSPECTIONS, REPAIRING OR REPLACING EROSION CONTROL DEVICES WHICH BECOME INEFFECTIVE.
3. THE CONTRACTOR WILL BE RESPONSIBLE FOR OBTAINING AN NPDES PERMIT THROUGH THE ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ) AND A COPY WILL BE PROVIDED TO THE OWNER.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF A SWPPP PLAN AS REQUIRED BY LDEQ.
5. THE CONTRACTOR IS RESPONSIBLE FOR ALL INSPECTIONS AND REPORTING REQUIRED BY NPDES PERMIT AND ADEQ.
6. ALL EROSION CONTROL MEASURES SHALL MEET THE GUIDELINES SET FORTH IN THE STATE, COUNTY, AND LOCAL EROSION AND SEDIMENT CONTROL GUIDELINES AS A MINIMUM STANDARD, OR AS REQUIRED BY THE ADEQ.
7. THE CONTRACTOR IS RESPONSIBLE FOR THE CLEANUP AND REMOVAL OF ANY BUILDUP OF SEDIMENT WHICH ESCAPES THE SITE.
8. THE CONTRACTOR IS RESPONSIBLE FOR CLEANING SILT AND DEBRIS OUT OF ALL STORM DRAINAGE STRUCTURES UPON THE COMPLETION OF CONSTRUCTION.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH ANY FINES LEVIED AGAINST THE SITE OR VIOLATIONS OF EROSION CONTROL REGULATIONS.
10. THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER HANDLING AND STORAGE OF HAZARDOUS MATERIALS SUCH AS: PAINTS, FUELS, FERTILIZERS, POISONS, ETC. DURING CONSTRUCTION, APPROPRIATE SPILL PREVENTION SHOULD BE IMPLEMENTED TO REDUCE THE POSSIBILITY OF CONTAMINATING STORM WATER RUNOFF.
11. THE CONTRACTOR SHALL PROVIDE TEMPORARY GROUND COVER FOR ALL AREAS WITH EXPOSED SOIL WHICH WILL NOT BE DISTURBED BY GRADING OPERATIONS FOR A PERIOD OF FOURTEEN (14) DAYS OR MORE, OR AS REQUIRED BY NPDES PERMIT OR LDEQ.
12. THE CONTRACTOR SHALL INSPECT ALL EROSION AND SEDIMENT CONTROL DEVICES AFTER EACH RAINFALL AND PERFORM NECESSARY REPAIRS AND MAINTENANCE.
13. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL TEMPORARY EROSION CONTROL MEASURES AFTER CONSTRUCTION IS COMPLETE AND ALL DISTURBED AREAS HAVE BEEN STABILIZED.
14. NO PETROLEUM PRODUCTS ARE TO BE STORED ONSITE WHILE UNATTENDED BY CONTRACTORS REPRESENTATIVES.
15. EROSION CONTROL BLANKET SHALL BE INSTALLED ON ALL DISTURBED CHANNEL BANKS.
16. FUELING STATION AND TEMPORARY RESTROOMS WILL BE LOCATED AT THE STAGING AREA ALONG WITH NPDES PERMIT BOX AND RAIN GAUGE.
17. ALL DISTURBED AREAS WILL BE STABILIZED USING MULCH AND TEMPORARY SEED TO PROVIDE ADEQUATE GROUND COVER AND CONDITION THE SOIL.
18. MULCH MUST BE ADDED TO ACHIEVE 75% COVERAGE (ROUGHLY 2 TONS/ACRE FOR WHEAT STRAW).
19. TEMPORARY SEEDING WILL INCLUDE A MIX OF MILLET, RYE, RYEGRASS, SORGHUM-SUDAN HYBRIDS, WHEAT, AND CRIMSON CLOVER. SEE SHEET C.501 FOR PLANTING RATES.
20. PERMANENT SEEDING WILL INCLUDE A HERBACEOUS, NATIVE MIX OF BERMUDA GRASS, TALL FESCUE, PARTRIDGE PEA AND SWITCHGRASS. SEE SHEETS C.501 FOR PLANTING RATES.
21. A FERTILITY SOIL TEST SHALL BE USED TO DETERMINE FERTILIZER AMOUNTS OR, IF NO SOIL TEST IS AVAILABLE, A STANDARD MIXTURE SHALL BE APPLIED OF 1.5 TONS OF LIME PER ACRE AND 400 LBS OF 5-15-10 FERTILIZER PER ACRE.
22. SEE SHEETS C.500 AND C.501 FOR PLANTING DETAILS.

## CONSTRUCTION NOTES:

THE CONTRACTOR SHALL FOLLOW THE SEQUENCE OF CONSTRUCTION IN ACCORDANCE WITH THE PLANS AND AS DIRECTED BY THE ENGINEER.

THE CONTRACTOR SHALL CONDUCT STREAM WORK, INCLUDING INSTALLATION OF IN-STREAM STRUCTURES, GRADING, STABILIZATION MEASURES, AND SEEDING AND MULCHING, IN AN EFFICIENT MANNER THAT MINIMIZES DISTURBANCES.

1. THE CONTRACTOR SHALL IDENTIFY THE PROJECT BOUNDARY, LIMITS OF DISTURBANCE, SENSITIVE AREAS AND STAGING AREAS WITH THE PROJECT MANAGER OR ENGINEER.
2. THE CONTRACTOR SHALL MOBILIZE EQUIPMENT, MATERIALS, PREPARE STAGING AREAS, AND STOCKPILE AREAS AS SHOWN ON THE PLANS.
3. CONSTRUCTION TRAFFIC SHALL BE LIMITED TO 'LIMITS OF DISTURBANCE' AS INDICATED ON THE PLANS AND AS DIRECTED BY THE ENGINEER.
4. THE TEMPORARY STAGING AREAS SHOULD BE USED FOR EQUIPMENT STAGING, STORAGE, MAINTENANCE AND CLEAN-UP. CONTRACTOR PARKING, TEMPORARY RESTROOMS, AND ALL ONSITE FUELING SHOULD TAKE PLACE WITHIN THESE AREAS AS WELL. MINIMIZE DISTURBANCES WITHIN THESE AREAS. A TEMPORARY GRAVEL LAYER 2-4" IN THICKNESS OR TIMBER MATS ARE ACCEPTABLE DURING WET CONDITIONS, BUT NOT REQUIRED.
5. THE CONTRACTOR SHALL INSTALL ALL TEMPORARY ROCK FILTER DAMS, SILT FENCE, AND MULCHING AROUND ALL CONSTRUCTION AREAS INCLUDING STAGING AND STOCKPILE AREAS AS INDICATED ON THE CONSTRUCTION PLANS AND AS DIRECTED BY THE ENGINEER.
6. THE CONTRACTOR SHALL BEGIN CLEARING, FLOODPLAIN EXCAVATION, AND GRADING WORK TO DESIGN GRADES AT THE UPSTREAM END OF EACH CHANNEL AS INDICATED ON THE CONSTRUCTION PLANS. THE CONTRACTOR SHALL NOT DISTURB ANY MORE FLOODPLAIN AREA LARGER AND STREAM REACH LONGER THAN CAN BE STABILIZED IN ONE DAY.
7. ONCE A SECTION OF STREAM AND FLOODPLAIN HAVE BEEN EXCAVATED TO DESIGN GRADES, IN-STREAM STRUCTURES, MATTING, AND TRANSPLANTS SHALL BE INSTALLED IN THAT SECTION. EXISTING BED MATERIAL SHALL BE HARVESTED FROM EXISTING CHANNEL AND PLACED INTO CONSTRUCTED CHANNEL ONLY AFTER MATTING HAS BEEN INSTALLED ON CHANNEL BANKS.
8. ONCE A STREAM WORK PHASE IS COMPLETE, THE CONTRACTOR WILL APPLY TEMPORARY SEEDING, PERMANENT SEEDING, AND MULCH TO ALL AREAS DISTURBED DURING CONSTRUCTION. TEMPORARY AND PERMANENT SEEDING MIXTURES WILL BE APPLIED AS SHOWN ON THE PLANTING PLAN (SHEETS C.500 AND C.501). ALL SEEDING AND MULCHING SHALL BE COMPLETED BEFORE LEAVING THE PROJECT SITE ALONG WITH REMOVAL OF ANY TEMPORARY STREAM CROSSINGS AND TEMPORARY ROCK FILTER DAMS.
9. THE CONTRACTOR OR OTHER QUALIFIED PERSONNEL SHALL PLANT ALL WOODY VEGETATION AND INSTALL LIVE STAKING ACCORDING TO THE PLANTING DETAILS AND SPECIFICATIONS. ALL PERMANENT SEEDING AND PLANTINGS SHALL BE PERFORMED DURING THE APPROPRIATE TIME OF YEAR.
10. THE CONTRACTOR SHALL ENSURE THAT THE SITE IS FREE OF TRASH AND LEFTOVER MATERIALS PRIOR TO DEMOBILIZATION OF EQUIPMENT FROM THE SITE.

## SEQUENCING NOTES:

PHASE 1: ESTABLISH TEMPORARY HAUL ROUTES AND STAGING AREA(S). INSTALL ROCK FILTER DAM DOWNSTREAM OF THE CHANNEL TO BE RESTORED AND INSTALL SILT FENCING AROUND STAGING AREAS.

PHASE 2: CONSTRUCT UT1 REACH 1 BEGINNING AT THE UPSTREAM END AND ENDING WHERE IT WILL TIE INTO THE DOWNSTREAM STABLE SEGMENT OF THE UT1 CHANNEL (REACH 2).

PHASE 3: ONCE ALL PORTIONS OF THE STREAM HAVE BEEN CONSTRUCTED, ENSURE THAT THE DIMENSION, PATTERN AND PROFILE OF THE NEWLY CONSTRUCTED CHANNEL MEET THE DESIGN PARAMETERS BY CONDUCTING AS-BUILT SURVEY. ENSURE THAT ALL STREAM BANKS ARE STABILIZED WITH MATTING AND ALL STRUCTURES HAVE BEEN INSTALLED CORRECTLY. ONCE SEEDING AND PLANTINGS ALONG THE BANKS HAVE OCCURRED, REMOVE THE CHECK DAM AT THE DOWNSTREAM END OF THE CHANNEL.

PHASE 4: STABILIZE GRADING EXTENTS WITH TEMPORARY/PERMANENT SEED AND MULCH FOLLOWING COMPLETION OF FINAL GRADING AND CONTOURING. IMPLEMENT THE PLANTING PLAN THROUGHOUT THE SITE. REMOVE TEMPORARY BMPS AS NEEDED.

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PELICAN MITIGATION, LLC
PELICAN FOSTER MITIGATION BANK
DRAWN BY: ZBW | DATE: 05/28/2020

PRELIMINARY PLANS NOT FOR CONSTRUCTION

# EROSION & SEDIMENT CONTROL PLAN
SITE PLAN

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