Caney Creek
Mitigation Bank Prospectus

A single-client bank for Southwestern Energy Company

streamworks mitigation services

TABLE OF CONTENTS

INTRODUCTION **1**

1.0 Objective 2
2.0 Site Selection and Justification 2
3.0 Site Protection Instrument 2
4.0 Baseline Information 3
5.0 Determination of Credits 4
6.0 Mitigation Work Plan 4
7.0 Operation and Maintenance Plan 6
8.0 Performance Standards 6
9.0 Monitoring Requirements 6
10.0 Long-term Management 6
11.0 Adaptive Management 6
12.0 Financial Assurances 6

LIST OF TABLES

Table 1: Summary of background information of the Caney Creek Mitigation Bank 1
Table 2: Reach names, stream lengths, and associated stream credit production for the Caney Creek Mitigation Bank 2
Table 3: Mean Wetland Indicator Value for plants collected at the Caney Creek Mitigation Bank on July 30th, 2012 3
Table 4: Vegetation planting list for the Caney Creek Mitigation Bank 5

APPENDIX A: Figures

Figure 1: Vicinity Map for the Caney Creek Mitigation Bank
Figure 2: Topographic map of the Caney Creek Mitigation Bank (USGS)
Figure 3: Aerial map of the Caney Creek Mitigation Bank
Figure 4: Aerial map of the Caney Creek Mitigation Bank wetland areas
Figure 5: Wetland delineation sampling points for the Caney Creek Mitigation Bank
Figure 6: Topographic map of the wetland areas of the Caney Creek Mitigation Bank
Figure 7: Wetland area soils map of the Caney Creek Mitigation Bank
Figure 8: Soils map of the Caney Creek Mitigation Bank (NRCS 2011)
Figure 9: Photo point locations for the Caney Creek Mitigation Bank taken April 10th, 2012
Figure 10: Proposed primary and secondary service areas for the Caney Creek Mitigation Bank

APPENDIX B: Site photographs

Introduction

The proposed Caney Creek Mitigation Bank is a single client bank in the Cadron watershed developed for Southwestern Energy Company to be used as compensatory mitigation for unavoidable impacts authorized under Section 404 of the Clean Water Act. This combined wetland and stream mitigation project is located on 100-acres in Section 33, Township 7N, Range 11W of Faulkner County, Arkansas, east of Enola along HWY 310 (Figure A-1). The project will restore, enhance, or protect 3,098 linear feet (LF) of Caney Creek, 5,564 LF of tributaries, and approximately 28-acres of wetland prairie and Pin Oak/Willow Oak flat under the guidance of the *Compensatory Mitigation for Losses of Aquatic Resources, Final Rule. Regulation 40CFR Part 230* (USACE & USEPA 2008). Caney Creek is a tributary to Muddy Bayou, a primary contributing waterbody to East Fork Cadron Creek. An initial site visit by the Little Rock District Corps of Engineers (LRD) was conducted in November 2011 and additional Interagency Review Team participation will include: the U.S. Fish and Wildlife Service, Region IV (FWS); the U.S. Environmental Protection Agency, Region VI (EPA); the Arkansas Department of Environmental Quality (ADEQ); the Arkansas Game and Fish Commission (AGFC); the Arkansas Natural Heritage Commission (ANHC); and the Arkansas Natural Resources Commission (ANRC).

Table 1: Summary of background information of the Caney Creek Mitigation Bank

BACKGROUND INFORMATION	
Project Name	Caney Creek Mitigation Bank
Project Sponsor	Southwestern Energy Company
Site Location	Sections 33, Township 7N, Range 11W
County	Faulkner
8-digit HUC	Cadron 11110205
10-digit HUC	East Fork Cadron Creek 1111020502
12-digit HUC	Muddy Bayou 111102050304
Proposed primary service Area	Cadron Lake Conway-Point Remove
Proposed secondary service area	Upper White-Bayou Des Arc
Protection Mechanism	Conservation Easement filed and recorded with the Land Trust of Arkansas March 2012
Monitoring Frequency	annually
Anticipated Date of Final Monitoring	2018
Size of Mitigation Area	~100 acres/8,662 LF of streams 28-acres of wetlands and buffers
Date of Initial USACE Visit	November 2011
Mitigation Objectives	To establish a single client mitigation bank in association with the granting of Department of the Army permits through restoration and enhancement of a 8,662 LF of streams, 28-acres of wetlands, and associated riparian buffer zones.

1.0 Objective

The project objective is to develop a single client mitigation bank in the Cadron watershed in association with the granting of Department of Army permits through restoration, enhancement, and preservation of stream channels, wetlands, and associated buffers along Caney Creek. The project goal is to restore the perennial, intermittent, and ephemeral streams and to restore and create wetland habitat. The specific design objectives of the project included:

- Restoration or enhancement of channel dimension, pattern and profile;
- Water quality enhancement in the Cadron watershed through sediment reduction, nutrient removal, streambank stability, and erosion control;
- Water quantity improvement through water storage and flood control, improved ground water recharge, and improved and restored hydrologic connections;
- Enhancement of aquatic and terrestrial habitats through improved substrate and instream cover, addition of woody debris, reduction in water temperature due to shading, restoration of terrestrial habitat, increase of spatial extent of natural area, and improved aesthetics.

Table 2: Reach names, stream lengths, and associated stream credit production for the Caney Creek Mitigation Bank

Reach Name	Stream Type	Estimated Stream Length (ft)	Mitigation Activity
Caney Creek	Perennial	3,098	Enhancement
Reach A	Intermittent	1,075	Enhancement
Reach B	Perennial	955	Preservation
Reach C	Intermittent	2,915	Restoration
Totals		**8,043**	

2.0 Site Selection and Justification

The proposed Caney Creek Mitigation bank is a 100-acre site located along Caney Creek approximately two miles upstream from the confluence with Muddy Bayou (HUC 11110205) (Figure A-1). The project site was used for cattle and hay production with stream channel segments filled or degraded to facilitate agriculture. Hydrology on site has been manipulated through land clearing, channel filling, dredging, and surface mining. Impacts to the site model existing and potential effects of natural gas drilling on headwater systems and will offset future gas development impacts. Additional benefits include improved water quantity through water retention and increased ground water recharge. Restoration and reforestation of this site will reduce sediment contributions to East Fork Cadron Creek and provide connectivity to adjacent forested areas.

3.0 Site Protection Instrument

The property is owned by a private third party and the mitigation acreage was placed in a conservation easement with the Arkansas Land Trust and filed at the courthouse in Faulkner County on April 30th, 2012. The site will be monitored annually by the Arkansas Land Trust to ensure that the easement restrictions are being followed.

4.0 Baseline Information

The Caney Creek site is located within the Arkansas River Valley Ecoregion (37); subsection 37c – Arkansas Valley Hills (AWAP 2004). Within this ecoregion, there are two major ecosystems at the Caney Creek site described in baseline vegetation monitoring report: Ozark-Ouachita Riparian and Interior Highlands Unglaciated Forest. The valley slope within the project area is relatively flat, with elevations ranging from 318 ft along Caney Creek to 345 ft within the uplands. Enola, Arkansas, receives an average of 48.3 inches of rainfall per year.

Wetland delineation sampling was conducted in June 2012. Soil sampling revealed the presence of wetland indicators including, but not limited to, oxidized rhizospheres, reduced iron lenses, and saturation visible on aerial photos (Figure A-5). Soils are mapped into three primary units, all are considered partially hydric. The majority of the site, 70-acres, is Leadville silt loam, one to three percent slopes. These are moderately well-drained soils with a parent material of loamy colluvium derived from shale and siltstone. The secondary soils, 25-acres, are Ouachita silt loam, occasionally flooded. These soils are a loamy alluvium located in the floodplain of Caney Creek and Reach C. The third unit is Taft silt loam, zero to two percent slopes located along four acres of the left descending bank of Caney Creek (Figures A-6 & A-7).

A baseline plant community monitoring survey was established along two 100-meter transects within the mitigation area. Wetland components of this ecosystem are represented by various panic grasses (*Dichanthelium/Panicum* spp.), sedges, a spikerush (*Eleocharis sp.*), buttonbush (*Cephalanthus occidentalis*) and smartweed (*Polygonum pennsylvanicum*). Oak flatwood components are represented by several native, warm-season grasses including *Tridens strictus* and *Eragrostis spectabilis*, as well as slender mountain mint, greenbrier (*Simlax* spp.) and blue sedge (*Carex glaucodea*). Preliminary site evaluations were conducted in June 2012. Results from the vegetative sampling yielded a mean indicator value of 2.43 (a value of 3.0 or less serves as a good indicator of the presence of a wetland).

Table 3: Mean Wetland Indicator Value for plants collected at the Caney Creek Mitigation Bank on July 30th, 2012

SCIENTIFIC NAME	COMMON NAME	REGON 2 INDICATOR STATUS	INDICATOR VALUE
LUDWIGIA GLANDULOSA	Seed box	Obligate	1
POLYGONUM PUNCTATUM	Dotted Smartweed	Fac Wetland	2
ERYNGIUM YUCCIFOLIUM	Rattlesnake Master	Fac	3
TRIDENS STRICTUS	Long Spike Tridens	Fac Wetland	2
CYPERUS ERYTHRORHIZOS	Red root Flat Sedge	Obligated	1
HELIANTHUS MOLLIS	Prairie Sunflower	Upland	5
SENECIO TOMENTOSUS	Woolly Groundsel	Fac Upland	4
JUNCUS MARGINATUS	Grass leaf Rush	Fac Wetland	2
PANICUM RIGIDULUM	Red Top Panic Grass	Fac Wetland	2
ELYMUS VIRGINICUS	Virginia Wild Rye	Fac	3
HYDROLEA OVATA	False Fiddle Leaf	Obligate	1
PANICUM DICHOTOMIFLORUM	Velvet Panic Grass	Fac Wetland	2
PANICUM ANCEPS	Beaked Panic Grass	Fac	3
PYNANTHEMUM TENUIFOLIUM	Slender Mountain Mint	Fac	3
			Mean Indicator Value = 2.43

In addition to the baseline vegetation monitoring effort, a baseline avian point count was conducted between May 27th and June 6th 2012. The five most abundant species at Caney Creek tended to be those that prefer open and/or brushy habitats: American crow (*Corvus brachyrhynchos*), Dickcissel (*Spiza Americana*), Indigo Bunting (*Passerina cyanea*), Northern Cardinal (*Cardinalis cardinalis*), and Barn swallow (*Hirundo rustica*). Three species showed signs of breeding on this site: Brown-headed cowbirds (*Molothrus ater*), Red-tailed hawk (*Buteo jamaicensis*) and Dickcissels. The greatest species diversity and bird abundance was observed north of the riparian area on the western portion of the site. The fallow field areas in this portion of the property lacked dense stands of exotic grasses and forbs (e.g., *Sericea lespedeza*) as compared to the eastern portion of the property. Higher avian observations in the western portion would suggest that these habitats may fulfill important requirements for these species and should be expanded. A benthic macroinvertebrate study is slated for 2013. These baseline studies help determine restoration activities and goals, as well as, illustrate ecological lift after restoration efforts are implemented.

5.0 Determination of Credits

The method of credit determination will be a combination of stream channel restoration, enhancement, preservation and riparian buffer creation. The Little Rock Stream Method (USACE 2011) will be used to determine the amount of stream credits with wetland credit determination following the Charleston Method (USACE 2002). Stream segments that overlay with wetland areas or buffers will not be stacked for mitigation credits.

6.0 Mitigation Work Plan

Preliminary site surveys found Reach A as an intermittent channel which enters Caney creek at station 1+150. Reach B is a perennial channel running along the western boundary of the mitigation area. Reach C bisects the project area and is the primary focus for restoration activities. The entire project area will be re-vegetated in native trees, shrubs, grasses, and forbs after a prescribed burn is conducted.

- **Caney Creek**
  Caney Creek is a third order stream running east to west along the southern boundary of the property. The channel is incised to bedrock and overwidened with areas of severe to moderate bank erosion. Bank stabilizations efforts will be implemented where needed and feasible.

- **Intermittent Channels**
  Reach A is a first order stream which enters Caney Creek at station 1+168. Similar to Caney Creek, the channel is incised with eroding banks located throughout. Enhancement activities will include bank stabilization and grade control where necessary. Reach B is located along the western edge of the mitigation area and enters Caney Creek downstream of the mitigation site. This reach will be preserved and the left descending bank will be re-vegetated to ensure a minimum 100ft buffer. The majority of restoration activities will take place along Reach C. Reach C drains approximately 0.25 mi^2 and is approximately 3,600 LF. The upper portion of the reach was filled years ago in order to increase hay production and cattle grazing. The lower portion was altered by extensive surface soil removal and ditching. Activities will include

installation of structures and bioengineering materials where needed to stabilize the channel and to restore aquatic habitat.

Wetlands

The wetland activities will be a combination of restoration, buffer enhancement, and creation on 28-acres of the site (Figure 4). There are two separate wetland restoration areas totaling approximately 9.09 acres. The three-acre shale pit will be converted into a shallow wetland in conjunction with the restoration of Reach C. Soils will be replaced and planted with appropriate vegetation grown within the Streamworks Mitigation Services, LLC greenhouse operation. The 1.37-acre Pin oak (*Quercus palustris*) flat located along the western boundary is only slightly impaired and will be used for preservation.

Riparian Buffer

The entire site will be revegetated with native hardwood and herbaceous species with a density of 302 stems/acre. A minimum 100-ft buffer will be maintained where property boundaries allow. During the dormant season, Black willow (*Juglans nigra*), Alder (*Alnus serrulata*) and Sycamore (*Platanus occidentalis*) stakes will be placed along the streambanks of the intermittent and perennial channels. Seedlings will be planted in winter 2013-2014. The floodplain zone will consist of the appropriate floodplain species, while the upland buffers will consist of an oak-hickory mix with a representative understory if available (Table 4).

Table 4: Vegetation planting list for the Caney Creek Mitigation Bank

Common Name	Scientific Name
Pin Oak	*Quercus palustris*
Nutall Oak	*Quercus phellos*
Willow Oak	*Quercus nuttallii*
Black Walnut	*Juglans nigra*
River Birch	*Betula nigra*
Black Willow	*Salix nigra*
Northern Red Oak	*Quercus rubra*
White Oak	*Quercus alba*
Flowering Dogwood	*Cornus florida*
Box Elder	*Acer negundo*
Wild Plum	*Prunus mexicana*
Spicebush	*Lindera benzoin*
Persimmon	*Diospyros virginiana*
Black Gum	*Nyssa sylvatica*
Alder	*Alnus serrulata*
Elderberry	*Sambucus canadensis*
Sycamore	*Platanus occidentalis*
Hackberry	*Celtis occidentalis*

7.0 Operation and Maintenance Plan

The project will be developed and implemented by Streamworks Mitigation Services, LLC with oversight from Southwestern Energy Company. This is the sixth mitigation project Southwestern Energy Company has developed with Streamworks for a total of 750 acres under conservation easement with restoration and protection of over nine miles of streams. The site will be maintained and monitored annually by Streamworks with reports submitted to the LRD for review.

8.0 Performance Standards

The overall performance standard and success criteria for the stream and wetland compensation is demonstrable ecological lift within the project site. This lift will be measured through biological surveys and reinforced through geomorphic monitoring, vegetative monitoring, and qualitative stability indices. The performance standards will follow guidelines from the Compensatory Mitigation Standard Operating Procedure (USACE 2006) and approved by the IRT and LRD.

9.0 Monitoring Requirements

Monitoring will be conducted by Streamworks Mitigation Services, LLC, for five years or until the LRD determines the project is complete. Permanent cross-sections and longitudinal feature parameters will be established following the guidelines set forth in the Little Rock Stream Method (USACE 2002). This data will be collected and analyzed annually to determine if success criteria are being met.

10.0 Long-term Management

An escrow account will be established by Streamworks Mitigation Services, LLC to adequately service long-term management goals. These long-term management activities will be conducted by Streamworks. At a later time, and with approval from the LRD, Streamworks may designate a long-term steward or an entity to act as steward.

11.0 Adaptive Management

Upon a determination by USACE that performance standards have not been met or the compensatory mitigation project is not on track to meet those standards, the monitoring period may be extended. USACE may also revise monitoring requirements when remediation and/or adaptive management are required. In the event that the success criteria have not been met, remedial action will be taken within 90 days.

12.0 Financial Assurances

Financial assurances will be provided by Southwestern Energy Company in the form of an escrow agreement with Streamworks Mitigation Services, LLC.

References

AWAP (2004) *Ecoregions of Arkansas* , Arkansas Wildlife Action Plan

USEPA and USACE (2008) Compensatory Mitigation for Losses of Aquatic Resources, Final Rule. Regulation 40CFR Part 230

USACE (2002) Compensatory Mitigation Standard Operating Procedure, Department of Army, Regulatory Branch, Charleston District.

USACE (2005) Compensatory Mitigation Standard Operating Procedure, Department of Army, Regulatory Branch, LRD.

USACE (2011) Little Rock District Stream Method. Department of the Army, Little Rock District.

USEPA (1972) Clean Water Act, CWA. 33 U.S.C. §1251 et seq. Regulation 40 C.F.R. pts. 104-149. Charleston Regulatory Division - Standard Operating Procedure Issued September 19, 2002 Compensatory Mitigation

APPENDIX A
Figures

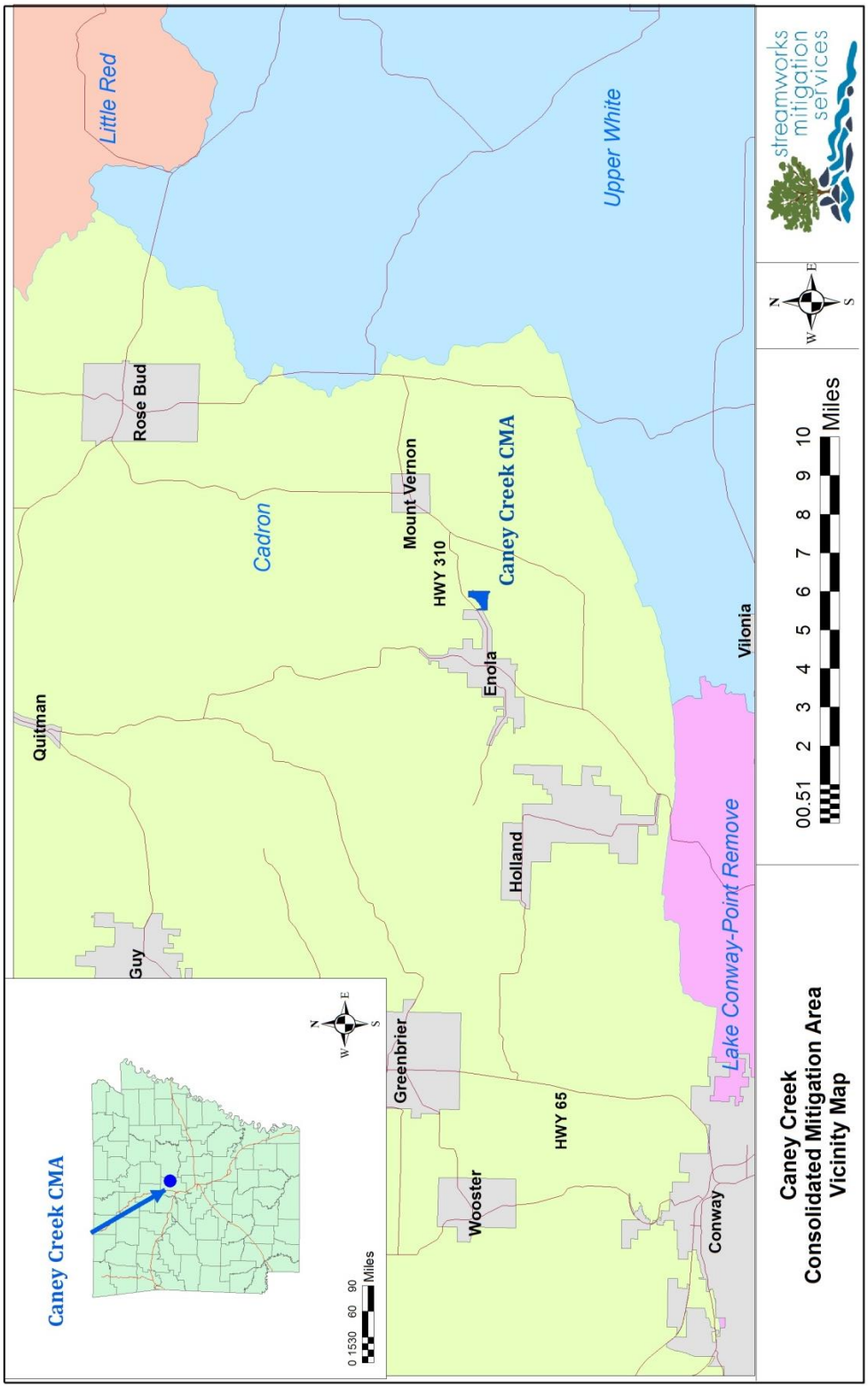

Figure 1: Vicinity Map for the Caney Creek Mitigation Bank

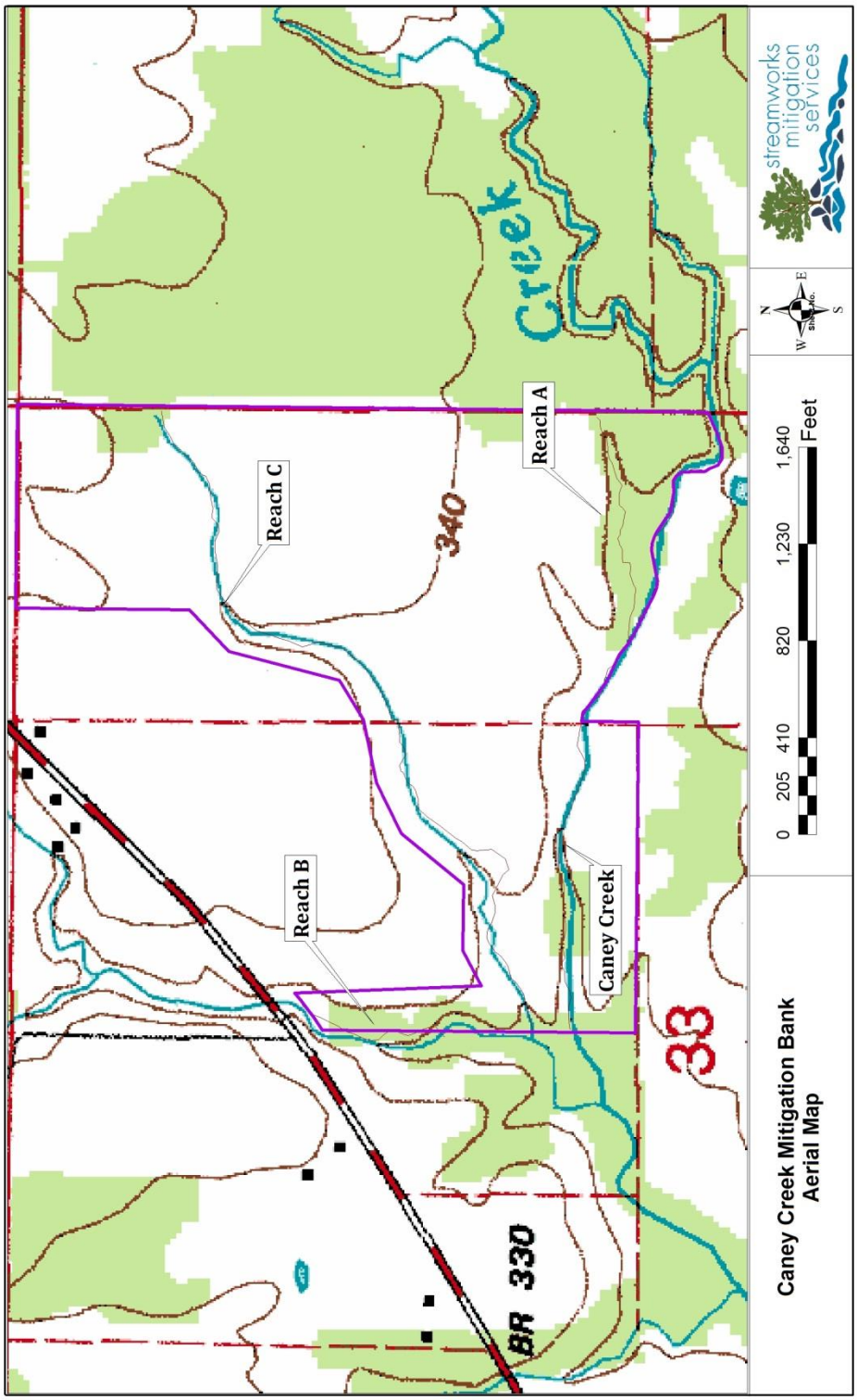

Figure 2: Topographic map of the Caney Creek Mitigation Bank (USGS)

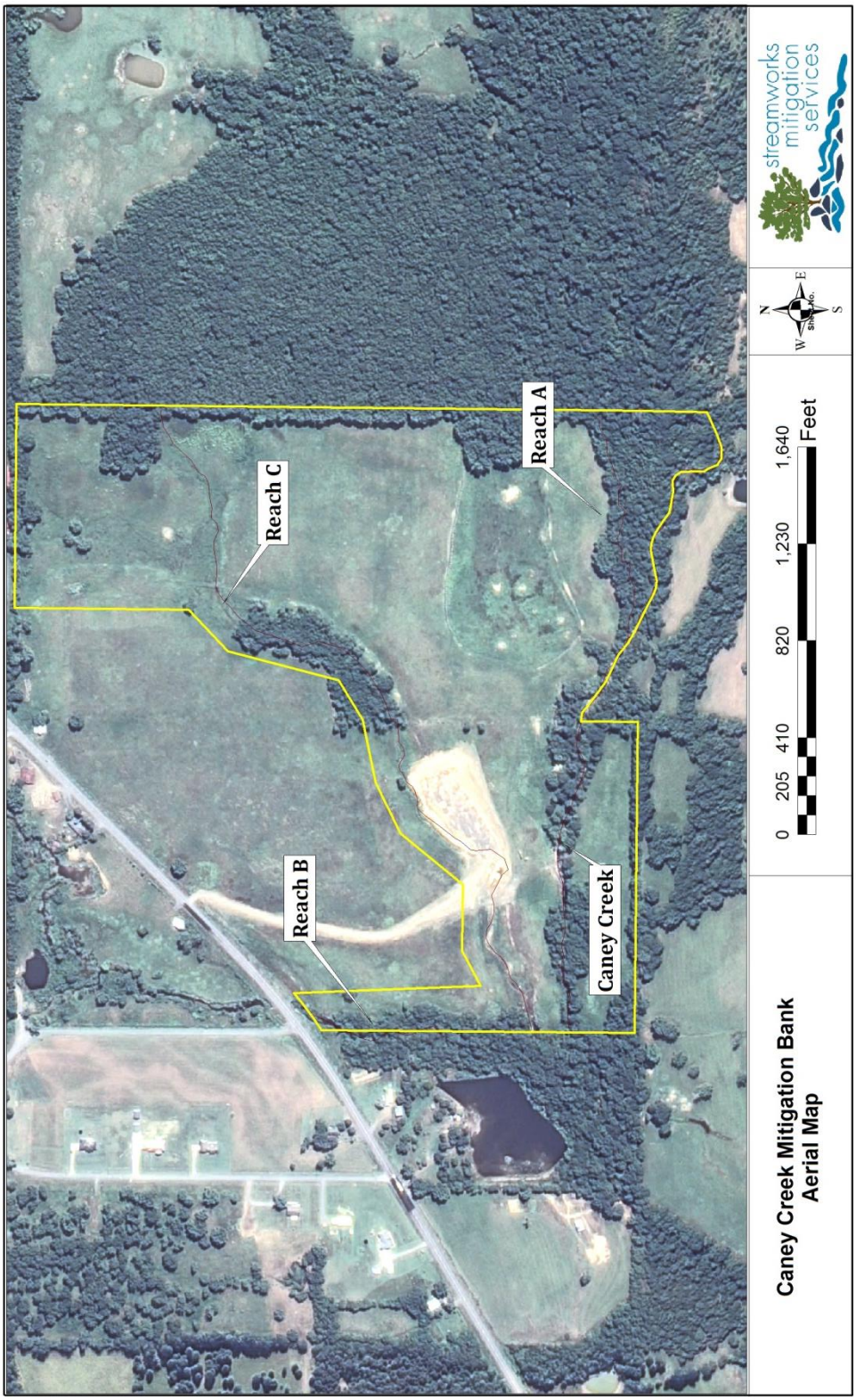

Figure 3: Aerial map of the Caney Creek Mitigation Bank

Figure 4: Aerial map of the Caney Creek Mitigation Bank wetland areas

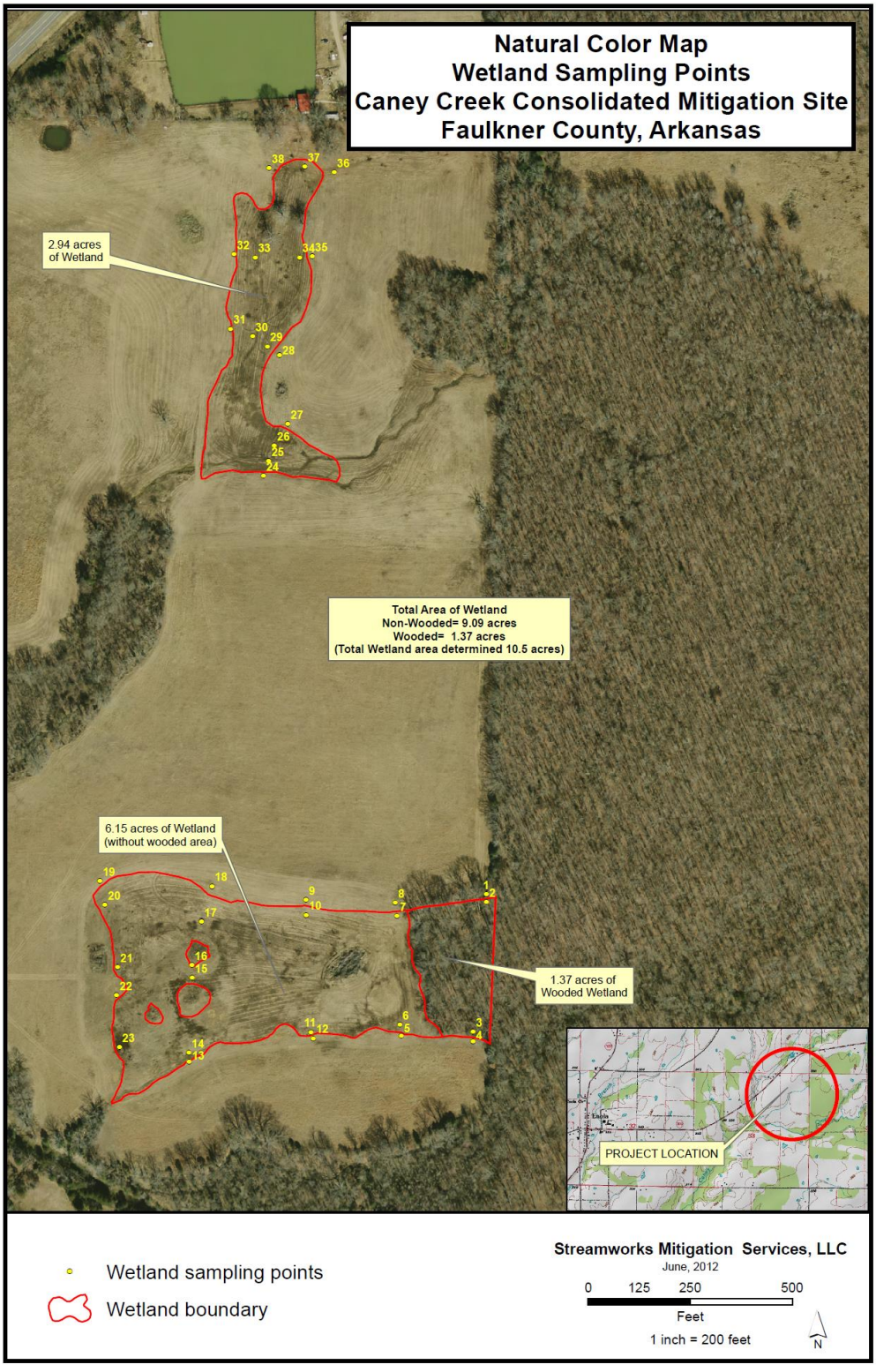

Figure 5: Wetland delineation sampling points for the Caney Creek Mitigation Bank

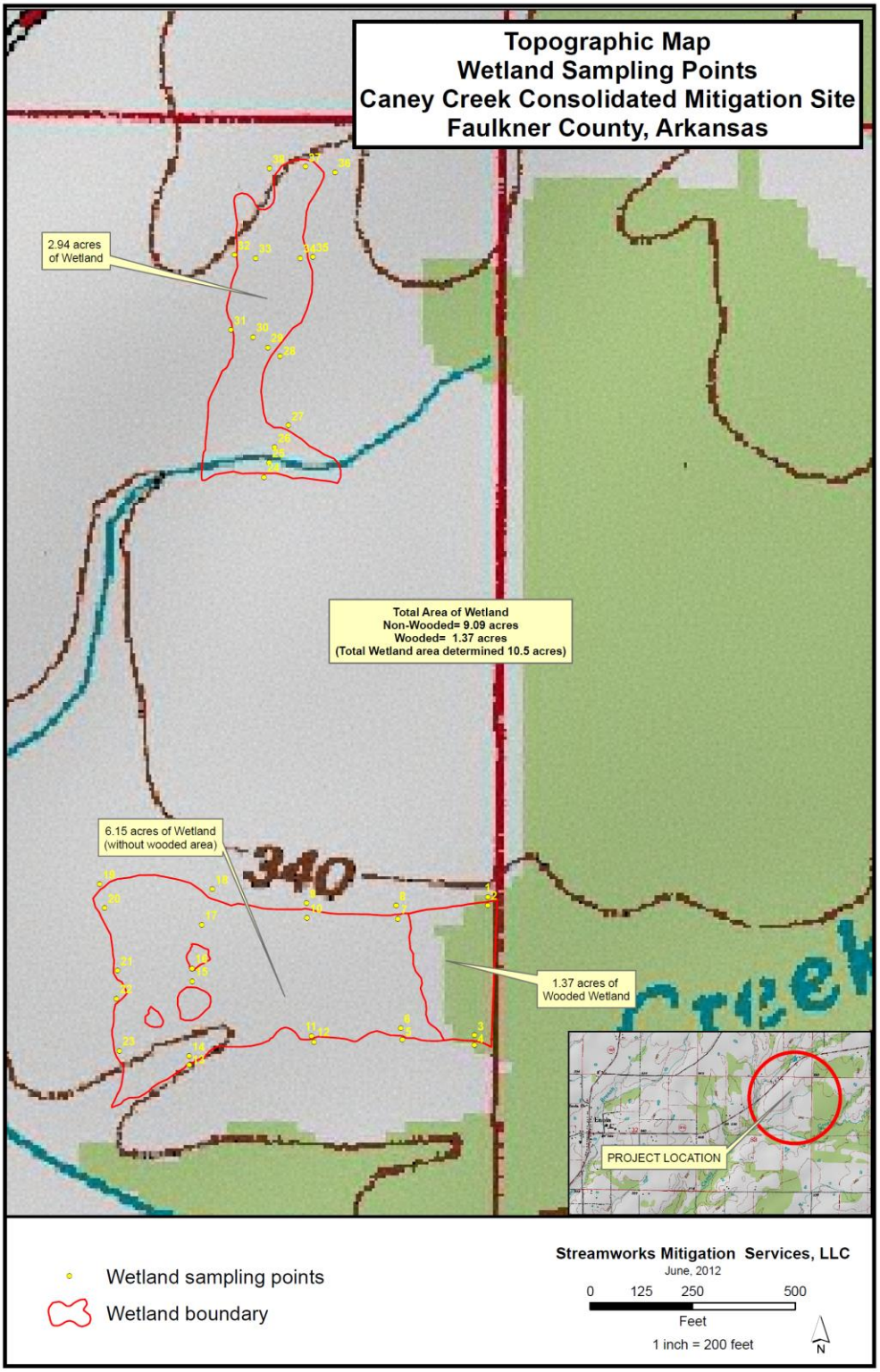

Figure 6: Topographic map of the wetland areas of the Caney Creek Mitigation Bank

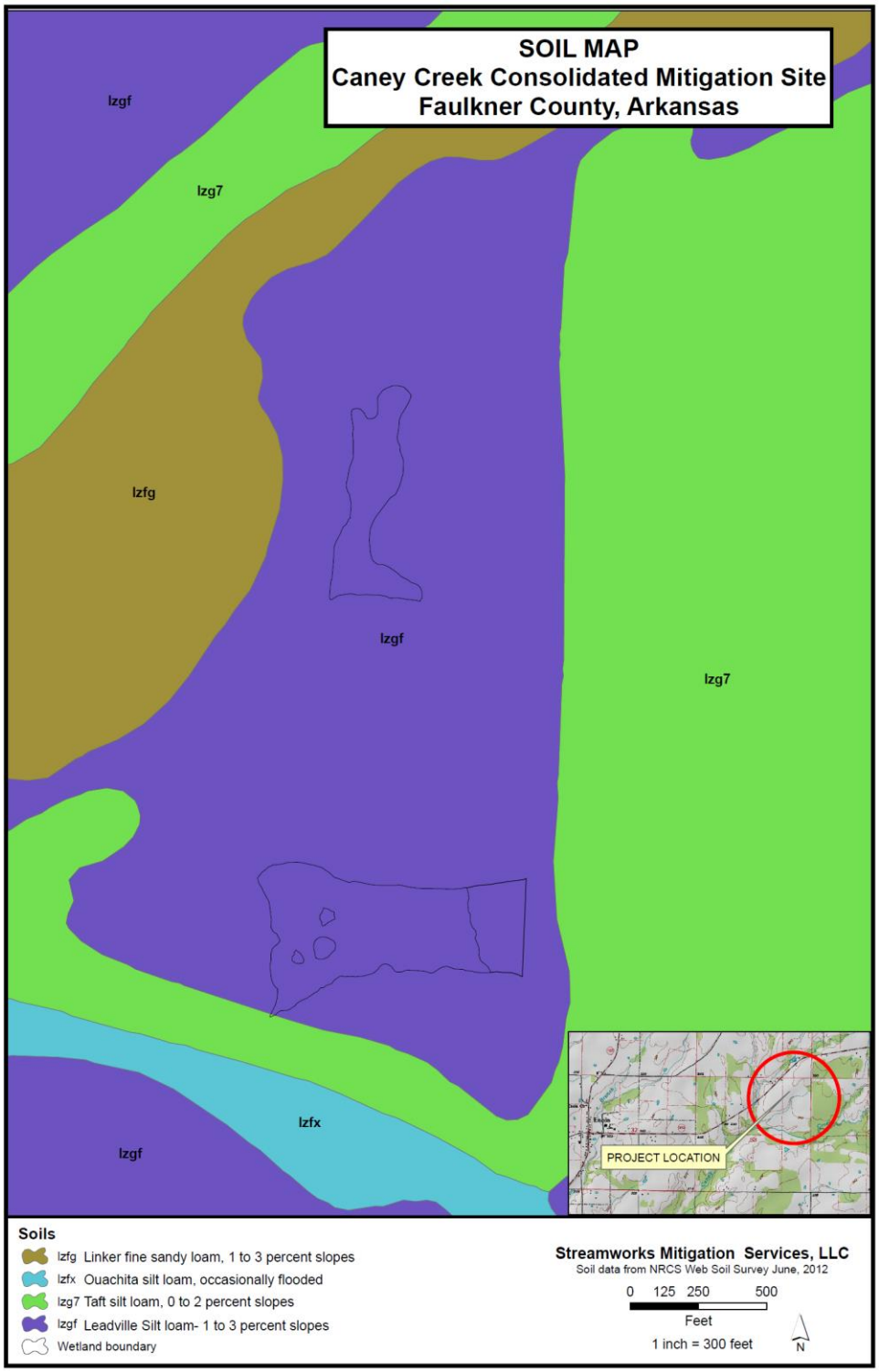

Figure 7: Wetland area soils map of the Caney Creek Mitigation Bank

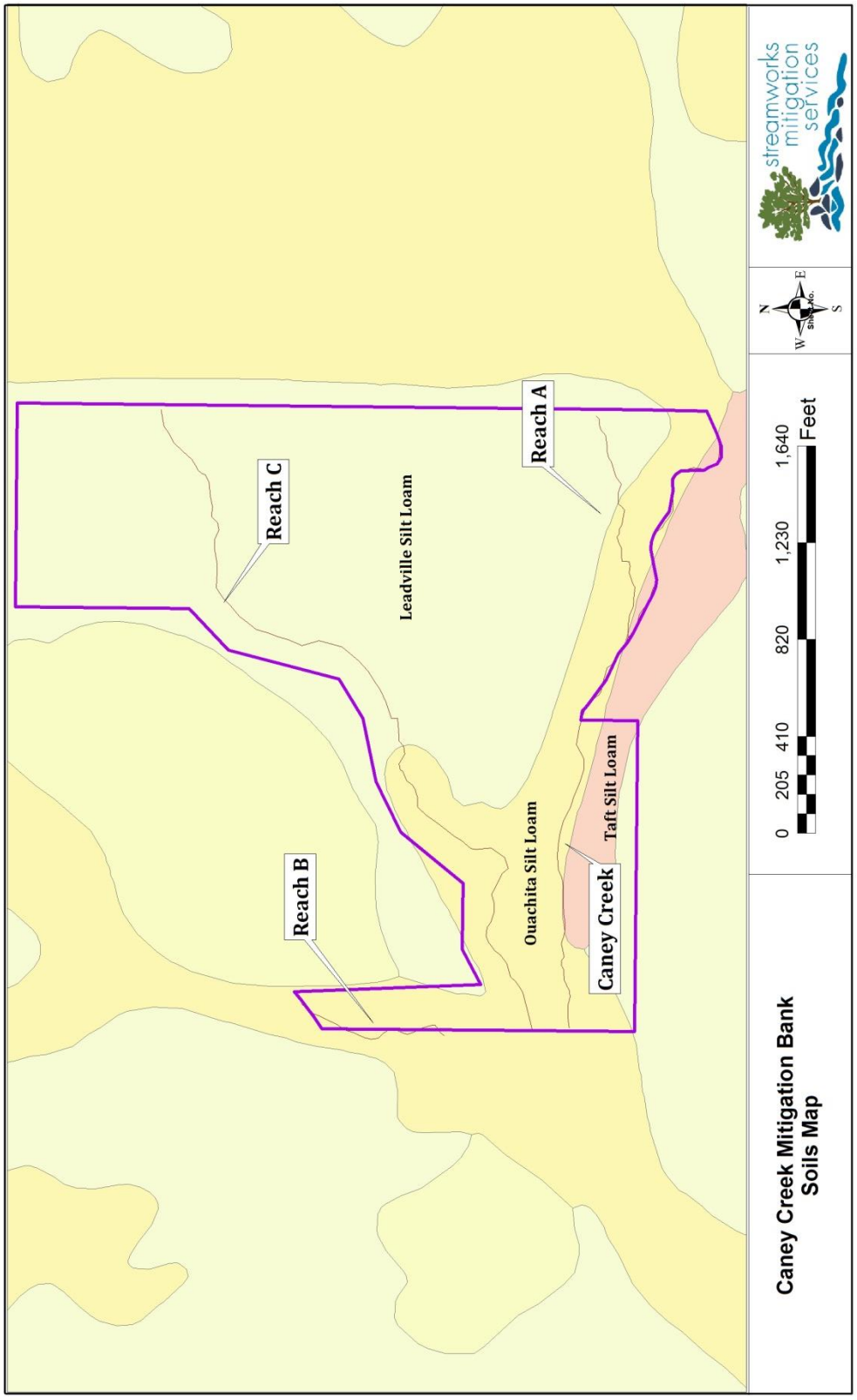

Figure 8: Soils map of the Caney Creek Mitigation Bank (NRCS 2011)

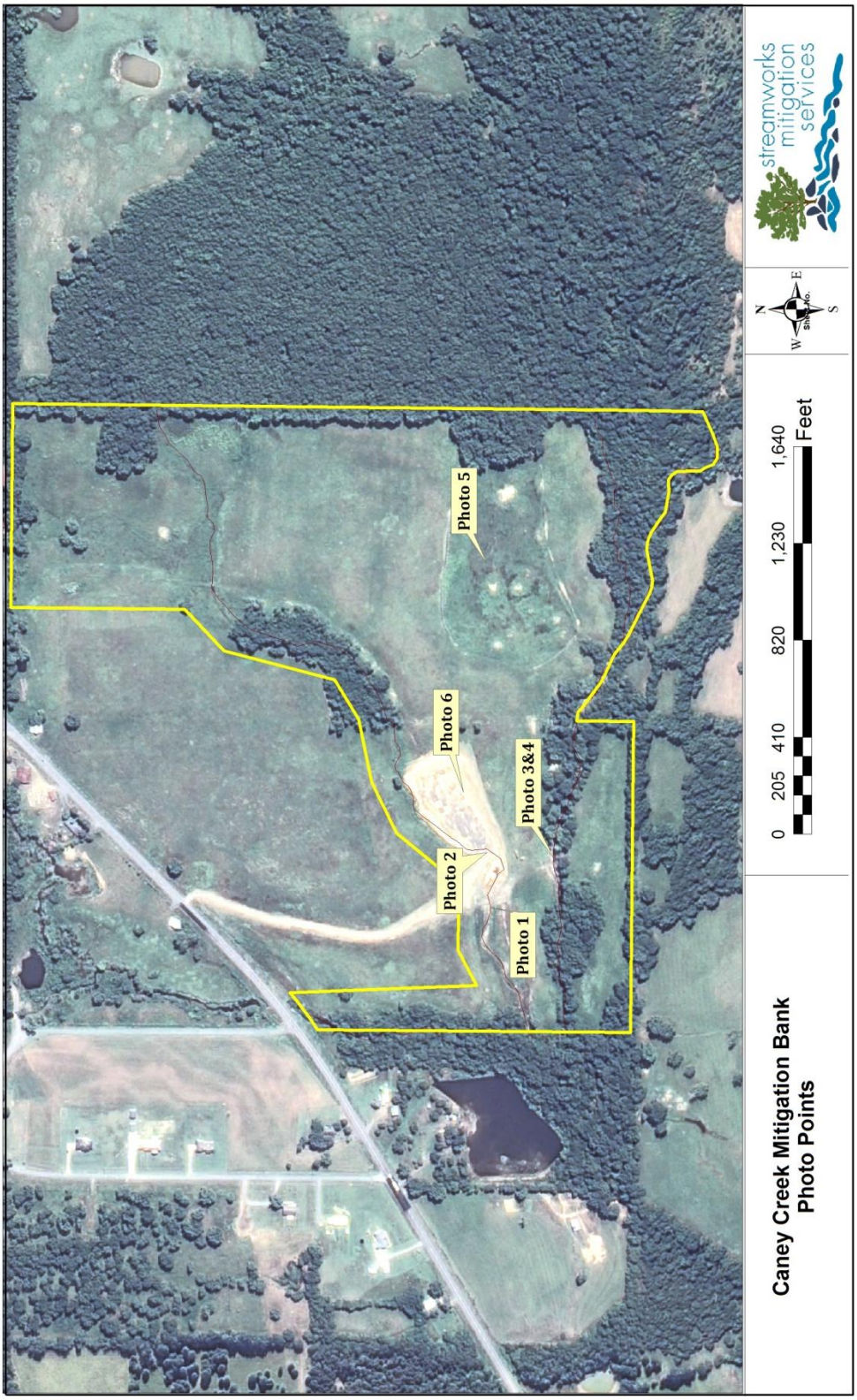

Figure 9: Photo point locations for the Caney Creek Mitigation Bank taken April 10th, 2012

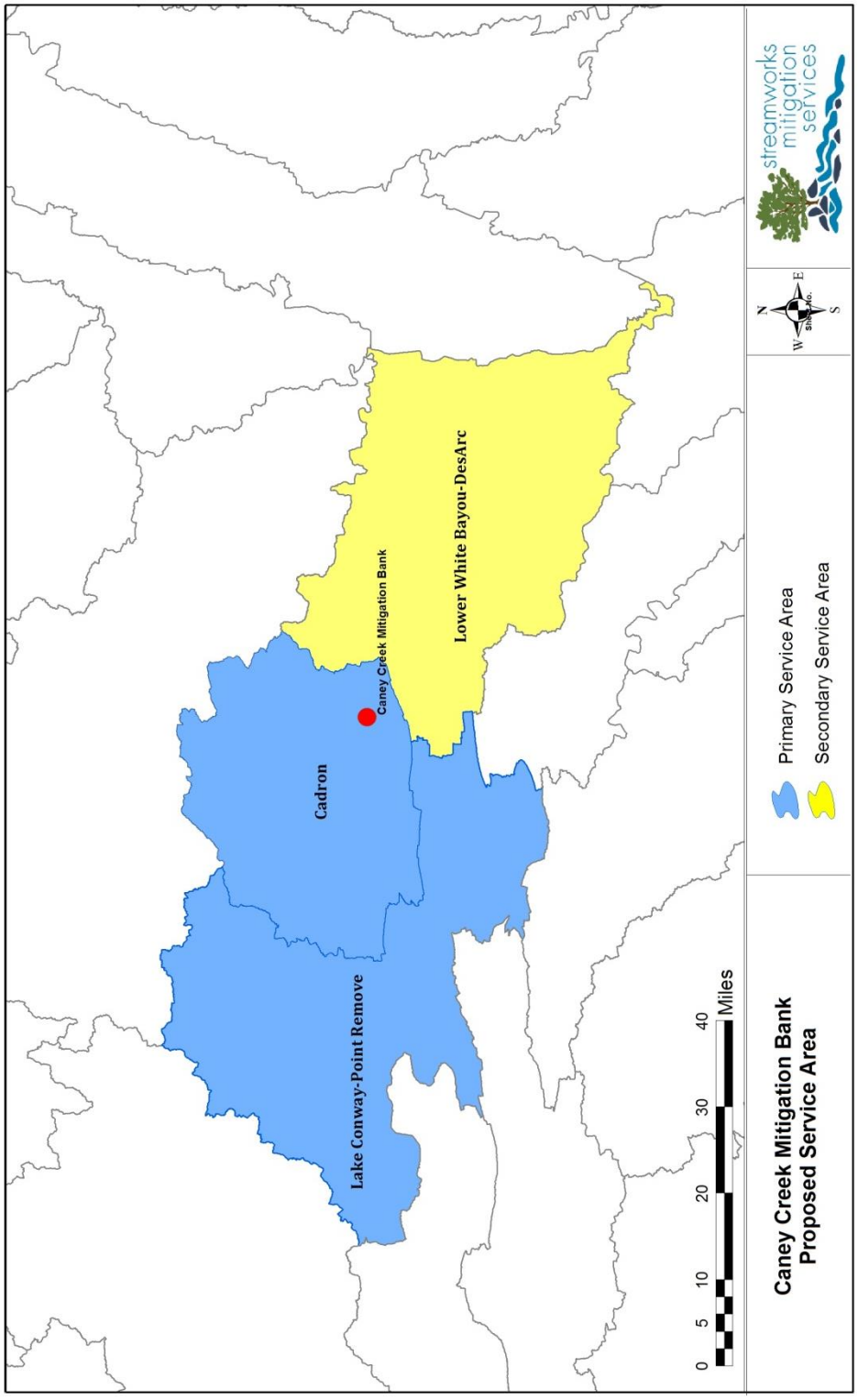

Figure 10: Proposed primary and secondary service areas for the Caney Creek Mitigation Bank

APPENDIX B
Site Photographs

Photo 1: Reach C downstream of shale pit and crossing

Photo 2: Reach C upstream facing shale pit

Photo 3: Caney Creek former road crossing

Photo 4: Caney Creek facing downstream from crossing

Photo 5: Shale pit adjacent to Reach C

Photo 6: Wetland soil sampling showing iron oxidation lenses