THE PICTSWEET COMPANY

ROSSVILLE FARM MITIGATION BANK PROSPECTUS

FAYETTE COUNTY, TENNESSEE

PREPARED FOR:

ROGER ALLEN
U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT, REGULATORY BRANCH
167 NORTH MAIN STREET, RM B-202
MEMPHIS, TN 38103

PREPARED BY:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
FRANKLIN, TENNESSEE

CEC PROJECT 173-272

JANUARY 2019

TABLE OF CONTENTS

1 OWNER 1

2 AGENT 1

3 PROJECT LOCATION 2

4 ACCESS TO PROPERTY 3

5 PROJECT GOALS 3

6 SITE CONTRAINTS 3

7 WETLAND ASSESSMENT 9

8a WETLAND ASSESSMENT – (WETLAND-SPECIFIC INFORMATION) 9

8b CATCHMENT FORM – (STREAM-SPECIFIC INFORMATION)……...9

9 EXISTING AND PROPOSED STREAM FUNCTION-BASED RAPID ASSESSMENT DATA FORM……10

10 BIOLOGICAL DATA…….……..……..10

11 VISUAL HABITAT ASSESSMENT……..……...10

12(9) MAPS……10

13(10) SITE PHOTOS……..……..10

14(11) BASELINE CONDITIONS……..……..10

15(12) PROPOSED MITIGATION APPROACH……...12

16(13) SITE PROTECTION……..……16

17(14) LONG-TERM MANAGEMENT …….……16

18(15) HISTORIC PROPERTIES…….……...16

19(16) THREATENED AND ENDANGERED SPECIES…….…….16

APPENDICES

Appendix A – Figures 1 – 12
Appendix B – Site Photos and Cross-Section Surveys
Appendix C – Catchment Assessment Forms
Appendix D – Reach-Level Function-Based Forms
Appendix E – Geomorphic Assessment Forms
Appendix F – TRAM Wetland Assessment Forms & BEHI Forms
Appendix G – Jurisdictional Determination Letter Request

FIGURES

Figure 1 – Land Ownership Map
Figure 2 – Existing Aquatic Resources Map
Figure 3 – NRCS Soils Map
Figure 4 – NWI Map
Figure 5 – Mitigation Site Topographic Map
Figure 6 – Mitigation Site Aerial Map
Figure 7 – 1963 Historical Aerial Map
Figure 7a – Existing Features Overlay 1963 Historic Aerial Map
Figure 7b – Conceptual Mitigation Overlay 1963 Historic Aerial Map
Figure 8 – 1998 Historic Aerial Map
Figure 9 – 2008 Historic Aerial Map
Figure 10 – Service Area Map
Figure 11 – Soil Test Pit Location Map
Figure 12 – FEMA Floodplain Map
Figure 13 – TDEC 303d Streams Layer Map

1. OWNER

The Rossville Farm property is owned by The Pictsweet Company. The Sponsor for the Rossville Farm Mitigation Bank is The Pictsweet Company.

2. AGENT

Agent for the Sponsor is Jeffrey Duke, Senior Principal at Civil & Environmental Consultants, Inc. (CEC), in Franklin, TN. Mr. Duke has more than 27 years of experience in wetland and stream restoration and mitigation, and is the lead for the stream and wetland design and implementation of the bank. CEC has designed and implemented multiple stream and wetland mitigation sites across the southeast.

CEC Qualifications and Previous Experience

CEC has designed and permitted more than 50 stream and wetland permittee-responsible mitigation sites in Tennessee and throughout the southeast. CEC has also developed three stream mitigation banks and six wetland mitigation banks in Tennessee, Alabama, and Mississippi.

Stream Banks

Flint River Mitigation Bank – Gurley, Madison County, AL (Nashville District)

- Phase I prospectus, design, permitting, MBI, construction oversight, and monitoring
- ~8,800 linear feet of restoration
- Phase II Prospectus – 9,573 feet of restoration

Berg Mississippi Stream Bank – Attalla County, MS (Vicksburg District)

- Prospectus, design, permitting, MBI, construction oversight, and monitoring
- ~7,500 linear feet of restoration

Panther Creek Mitigation Bank – Madison County, MS (Vicksburg District)

- Prospectus development and future MBI, permitting, design, construction oversight, and monitoring
- ~15,800 linear feet of restoration, enhancement, and preservation

Wetland Banks

Harpeth Wetland Mitigation Bank – Rutherford County, TN (Nashville District)

- Prospectus, design, permitting, MBI, construction oversight, and monitoring
- ~235 acres of wetland restoration and enhancement

Swamp Road Wetland Mitigation Bank I – Rutherford County, TN (Nashville District)

- Prospectus, design, permitting, MBI, construction oversight, and monitoring
- ~38 acres of wetland restoration

Swamp Road Wetland Mitigation Bank II – Rutherford County, TN (Nashville District)

- Prospectus, design, permitting, MBI, construction oversight, and monitoring
- ~62 acres of wetland restoration

Beech River Wetland Mitigation Bank (TDOT) – Henderson/Decatur County, TN (Nashville District)

- Prospectus, design, permitting, MBI, construction oversight, and monitoring
- ~70 acres of restoration and enhancement

Madison County Wetland Mitigation Bank (TDOT) – Madison County, TN (Memphis District)

- Prospectus, design, permitting, MBI, construction oversight, and monitoring
- ~850 acres of wetland restoration and enhancement

Millington Wetland Mitigation Bank (TDOT) – Shelby County, TN (Memphis District)

- Prospectus, design, permitting, MBI
- ~600 acres of wetland restoration

3. PROJECT LOCATION

The Rossville Farm Mitigation Bank (referred to herein as the "Bank") site is located in southwest Tennessee, approximately 20 miles east of Memphis in the southwest corner of Fayette County in the City of Rossville. The main entrance to the site is located on North Railroad Street just off SR-197 (Rossville Highway) at coordinates N35.047949; W89.553311. The 843-acre farm is located in the HUC-12 Hurricane Creek – Wolf River (080102100302) within the HUC-8 Wolf River watershed (08010210), which are within Level III ecoregion 74 – Mississippi Valley Loess Plains.

4. ACCESS TO PROPERTY

The Bank site consists of four parcels, all of which are owned by The Pictsweet Company (Figure 1). Parcel 165 008.00 is a 71-acre forested tract comprising the northern portion of the farm. Parcel 165 009.01 is a 19.59-acre tract located along the southern portion of the farm. Parcel 165 009.00 is 751.63 acres and is the farmed portion of the site. Parcel 165 010.01 is 36.06 acres located west of Parcel 165 009.00, and is currently protected by a restrictive covenant with the Environmental Protection Agency (EPA).

5. PROJECT GOALS

The purpose of the Bank is to provide stream and wetland mitigation credits to satisfy compensatory mitigation requirements for adverse impacts to streams permitted under Section 404/401 of the Clean Water Act by the U.S. Army Corps of Engineers, in conjunction with the following federal and state agencies: the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Natural Resources and Conservation Service, Tennessee Department of Environment and Conservation, and the U.S. Army Corps of Engineers, Memphis District; all of which comprise the Interagency Review Team (IRT). The bank will provide mitigation credits by restoring, enhancing, re-establishing, and preserving streams, wetlands, and adjacent riparian areas throughout the site.

The primary goal of the Bank is to improve ecological functions and values within the watershed by restoring a healthy and self-sustaining aquatic environment that provides water quality benefits within the local watershed and downstream. Another goal of the bank is to provide a functional lift capable of restoring natural channel hydrology, hydraulic, geomorphic, physicochemical, and biological characteristics. Furthermore, the Bank will restore more than 430 acres of agricultural land back to a high quality functioning bottomland hardwood forest.

The bank will consist of the restoration, enhancement, and preservation of approximately 573.85 acres of wetlands, and the restoration, re-establishment, enhancement and preservation of approximately 32,659 linear feet of the Wolf River and its unnamed tributaries using natural channel design techniques. Of the approximate 573.85 acres of wetland, approximately 315.76 acres will be restored, approximately 65.17 acres will be enhanced, and approximately 192.92 acres will be preserved. Of the approximate 32,659 linear feet of stream, approximately 19,276 linear feet will be restored, approximately 6,500 linear feet will be re-established, approximately 5,754 linear feet will be enhanced, and approximately 1,129 linear feet will be preserved. The Bank project goals are detailed in Table 1 and Table 2 below.

6. PROJECT OBJECTIVES

Project objectives aim to improve overall ecological function and stability of the unnamed tributaries to the Wolf River and their immediate headwaters, and provide numerous ecological and water quality benefits within the Wolf River (08010210) and Hurricane Creek – Wolf River (080102100302) watersheds.

i. Streams

- Restore dynamically stable stream channels to improve bedform diversity and vertical and lateral stability.
- Restore natural, stable dimensions, patterns and profiles to stream reaches using natural channel design techniques.

- Restore natural hydrology by removing culverts and channelized reaches.
- Decrease channel velocities by increasing channel sinuosity and improving floodplain connectivity.
- Install large woody debris (LWD) structures to improve aquatic habitat and vertical and lateral stability.
- Improve water quality by reducing non-point source pollution, nutrient overloading, and in-stream sediment contribution by restoring adjacent agricultural fields to wetlands.
- Increase re-oxygenation zones to improve water quality and biological integrity.
- Establish a minimum 50-foot riparian buffer with native vegetation to provide shade, increase stream bank stability, nutrient filtration, and habitat.
- Protect streams and riparian zones with land use restrictions.

Table 1.

Stream	Goals	Objectives
STR-1 & STR-1a	Improve floodplain connectivity	Reduce the BHR and increase entrenchment ratio
	Improve bedform diversity	Increase pool depth ratio; Restore natural pool-pool spacing and riffle/glide habitats
	Improve lateral stability	Achieve dominant BEHI score of moderate or less
	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher and vegetation protection to 8 or higher
	Restore natural channel geomorphology and improve water quality	Restore natural channel dimensions, pattern, and profile
STR-2	Improve floodplain connectivity	Reduce the BHR and increase entrenchment ratio
	Improve bedform diversity	Increase pool depth ratio; Restore natural pool-pool spacing and riffle/glide habitat
	Improve lateral stability	Achieve dominant BEHI score of moderate or less
	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher and vegetation protection to 8 or higher
	Restore natural channel geomorphology and improve water quality	Restore natural channel dimensions, pattern, and profile
STR-3	Improve floodplain connectivity	Reduce the BHR and increase entrenchment ratio

	Improve bedform diversity	Increase pool depth ratio; Restore natural pool-pool spacing and riffle/glide habitat
	Improve lateral stability	Achieve dominant BEHI score of moderate or less
	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher and vegetation protection to 8 or higher
	Restore natural channel geomorphology and improve water quality	Restore natural channel dimensions, pattern, and profile
STR-4	Improve floodplain connectivity	Reduce the BHR and increase entrenchment ratio
	Improve bedform diversity	Increase pool depth ratio; Restore natural pool-pool spacing and riffle/glide habitat
	Improve lateral stability	Achieve dominant BEHI score of moderate or less
	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher and vegetation protection to 8 or higher
	Restore natural channel geomorphology and improve water quality	Restore natural channel dimensions, pattern and profile
STR-5	Improve floodplain connectivity	Reduce the BHR and increase entrenchment ratio
	Improve bedform diversity	Increase pool depth ratio; Restore natural pool-pool spacing and riffle/glide habitat
	Improve lateral stability	Achieve dominant BEHI score of moderate or less
	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher and vegetation protection to 8 or higher
	Restore natural channel geomorphology and improve water quality	Restore natural channel dimensions, pattern, and profile
STR-6	Improve floodplain connectivity	Reduce the BHR and increase entrenchment ratio
	Improve bedform diversity	Increase pool depth ratio; Restore natural pool-pool spacing and riffle/glide habitat
	Improve lateral stability	Achieve dominant BEHI score of moderate or less
	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher and vegetation protection to

		8 or higher
	Restore natural channel geomorphology and improve water quality	Restore natural channel dimensions, pattern, and profile
STR-8	Protect from future alteration	Install Conservation Easement signs around the perimeter of the site
Wolf River	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher

ii. Wetlands

- Restore and create bottomland hardwood forests incorporating microtopography and small open pools to promote reptile and amphibian refugia.
- Create microtopographic relief to provide microhabitat, amphibian breeding grounds, and higher water retention.
- Enhance existing wetlands by connecting to adjacent restored wetlands and restoring natural hydrologic regime.
- Plant native tree and shrub species to provide nesting grounds for birds.
- Plug and/or fill historic drainage ditches and remove existing diversion berms to restore natural hydrologic regime.
- Improve water quality through sedimentation, filtration, and adsorption.

Table 2.		
Approach	**Goals**	**Objectives**
Wetland Restoration	Increase habitat diversity	Restore bottomland hardwood forest
	Improve amphibian breeding grounds and reptile refugia	Create microtopographic relief and small open pools
	Increase species diversity	Survival rate of 220 stems/acre of native tree and shrub species
	Restore hydrologic regime	Plug and/or fill drainage ditches and increase overbank flooding
	Improve water quality	Increase hydrologic retention
Wetland Enhancement	Increase habitat diversity	Connect to adjacent restored wetlands
	Increase species diversity	Survival rate of 220 stems/acre of native tree and shrub species
	Restore hydrologic regime	Plug and/or fill drainage ditches and increase overbank flooding
	Improve water quality	Increase hydrologic retention
Wetland Preservation	Protect wetlands from future alteration	Install conservation easement signs along wetland boundaries

7. SITE CONSTRAINTS

As previously mentioned, parcel 165 010.01, located in the southwest corner of the property, is currently protected by a restrictive covenant with the Environmental Protection Agency (EPA). The southern boundary of the property is bordered by a railroad right of way. Additionally, the site entrance and access road exists along the southeastern border of the property. None of the afore-mentioned site constraints are considered significant or believed to diminish the ability or value of proposed activities.

8a. WETLAND ASSESSMENT – (WETLAND-SPECIFIC INFORMATION)

CEC conducted a site assessment in December of 2018 and recorded soil, vegetation, and hydrology data at various test pit locations throughout the site. Existing wetland boundaries can be found in Figure 2, and soil test pit locations are shown in Figure 11 (Appendix A). Tennessee Rapid Assessment Methodology (TRAM) assessment data sheets are located in Appendix G and summarized in Table 3.

Table 3.

Feature	TRAM Score
WTL – 1	17
WTL - 2	17
WTL - 3	18
WTL - 4	16.2
WTL - 5	59.4
WTL-6	48.2

8b. CATCHMENT FORM – (STREAM-SPECIFIC INFORMATION)

Catchment Assessment forms are located in Appendix C.

9. EXISTING AND PROPOSED STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Existing Reach-Level Stream Function-Based Rapid Assessment Field Data Forms are located in Appendix D. Hydraulic and Geomorphic Assessment Data Forms are located in Appendix E.

10. BIOLOGICAL DATA

Benthic macroinvertebrate data was not collected for quantitative analysis; however, qualitative observations for respective streams indicated that bedform diversity was lacking, with significant substrate embeddedness. As a result of channelization and siltation, few riffle-pool sequences remain to provide appropriate aquatic habitat. Additionally, all of the streams located on the property are highly unstable with actively eroding banks and heavy siltation impacts extending throughout the property.

11. VISUAL HABITAT ASSESSMENT

Visual Habitat Assessment field data sheets are located in Appendix F.

***Stream And Wetland Information –** For the remainder of the prospectus, the section numbers indicated with parentheses () refer to Wetland Prospectus Headings and those section numbers without parentheses refer to Stream Prospectus Headings.

12(9). MAPS

Respective maps are located in Appendix A.

13(10). SITE PHOTOS

Site photos are located in Appendix B.

14(11). BASELINE CONDITIONS

i. Streams

a. Proposed Service Area

The Bank will focus on the restoration, re-establishment, enhancement, and preservation of stream and wetland resources within the Hydrological Unit Code 08010210 (Wolf). The Wolf watershed will be the primary service area of the Bank. Secondary service areas include adjacent Hydrological Unit Codes 08010209 (Loosahatchie), 08010211 (Horn Lake-Nonconnah), and the lower portion of 08010100 (Lower Mississippi-Memphis) within the State of Tennessee. The primary and secondary service areas served by the Bank (Figure 9) will include all or portions of the following counties: Shelby, Fayette, Tipton, Hardeman, Lauderdale, and Haywood.

b. Catchment Assessment Form

The Bank lies within a primarily urbanized watershed that consists of a variety of land uses ranging from high density residential, commercial, and industrial to low density residential and agricultural; however, the contributing watershed for the Bank is dominated by low-density residential and agricultural land with some industrial areas and sparse forested land still remaining. Intense urbanization and agricultural practices have contributed to the degradation of streams within the watershed through increased peak runoff, channelization, siltation, nutrient overloading, and loss of productive habitat. The Wolf River has experienced increased erosion and sedimentation as a result of the afore-mentioned changes in its natural watershed conditions. The unnamed tributaries onsite have been demolished and/or channelized extensively throughout the project site in order to expedite drainage for agricultural purposes. Poor overall watershed conditions and lack of vertical and lateral stability and riparian vegetation of the site made it a strong candidate for establishing a bank. Furthermore, conducting a

thorough on-site evaluation of mitigation potential sealed the notion that the site would have a high probable rate of success and meet the proposed restoration goals and performance standards.

c. Adjacent Land Uses

Surrounding land use has been dominated by agricultural land, low-density residential communities, forested land, and some industrial areas. Immediately adjacent land use has been dominated by agricultural practices, forested land, and some industrial areas for at least the last approximately 30+ years, and has little potential for development due to much of it being located in a mapped floodplain or floodway (Figure 12). Additionally, large tracts of land bordering the northern property boundary of the site are owned and protected by the State of Tennessee (Figure 1).

ii. Wetlands

a. Proposed Service Area

The Bank will focus on the restoration, re-establishment, enhancement, and preservation of stream and wetland resources within the Hydrological Unit Code 08010210 (Wolf). The Wolf watershed will be the primary service area of the Bank. Secondary service areas include adjacent Hydrological Unit Codes 08010209 (Loosahatchie), 08010211 (Horn Lake-Nonconnah), and the lower portion of 08010100 (Lower Mississippi-Memphis) within the State of Tennessee. The primary and secondary service areas served by the Bank (Figure 9) will include all or portions of the following counties: Shelby, Fayette, Tipton, Hardeman, Lauderdale, and Haywood.

b. Project Overview

The project site lies within a primarily urbanized watershed that consists of a variety of land uses ranging from high density residential, commercial, and industrial to low density residential and agricultural; however, the contributing watershed for the Bank is dominated by low-density residential and agricultural land with some industrial areas and sparse forested land still remaining. Much of the land has been historically clear-cut and streams channelized to improve drainage. Evidence of historic drainage of the site made it a strong candidate for wetland restoration. Additionally, the United States Department of Agriculture Natural Resource Conservation Service has given a prior converted cropland designation for the majority of the site. Furthermore, a site assessment conducted by CEC identified several existing wetlands and sealed the notion that the site would have a high probable rate of success and is capable of meeting the proposed performance standards.

c. Size

The Bank, in its entirety, is approximately 885 acres in size. Wetland aspects of the project consist of approximately 316.02 acres of restoration, approximately 65.17 acres of enhancement, and approximately 198.38 acres of preservation.

d. Hydrology

Primary hydrologic sources for existing wetlands consist of elevated groundwater and precipitation. Many hydrologic impairments exist throughout the site, such as drainage ditches, levees, and diversion berms, which have effectively altered the natural hydrologic conditions of the site.

e. Current Wetland Habitat

Approximately 254.08 acres of existing palustrine forested (PFO) wetlands with some small interspersed areas of palustrine emergent wetlands (PEM) are located onsite. Existing forested wetlands onsite are dominated by species such as black willow (*Salix nigra*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), river birch (*Betula nigra*), overcup oak (*Quercus lyrata*) and bald cypress (*Taxodium distichum*). Approximately 65.17 acres of the existing wetlands were historically clear-cut and ditched in an attempt to drain and convert to agricultural land; however, these areas remained too wet to farm, and have since established secondary growth trees and shrubs.

f. Adjacent Land Uses

Surrounding land use has been dominated by agricultural land, low-density residential communities, forested land, and some industrial areas. Immediately adjacent land use has been dominated by agricultural practices, forested land, and some industrial areas for at least the last approximately 30+ years, and has little potential for development due to much of it being located in a mapped floodplain or floodway (Figure 12). Additionally, large tracts of land bordering the northern property boundary of the site are owned and protected by the State of Tennessee (Figure 1).

15(12). <u>PROPOSED MITIGATION APPROACH</u>

i. Streams

a. Mitigation Approach

Restoration of unnamed tributaries to Wolf River will consist of raising the streambed to establish floodplain connectivity, improving vertical and lateral stability, and providing in-stream habitat, which will be achieved by installing grade control, toe protection, and other structures such as log drops, log cross-vanes, root wads, j-hooks, and other bioengineering techniques. Restoration will also include re-establishing natural channel dimensions, patterns and profiles using natural channel design

techniques. Any additional stream length created by the proposed restoration will qualify for re-establishment. Buffer enhancement along Wolf River will consist of planting native hardwood tree and shrub species to improve wildlife habitat. All mitigation approaches will include establishing riparian buffers at least 50 feet wide on each side of the stream reaches. Riparian buffers established 100 feet outside the top of banks will justify a 6% credit addition per linear foot.

Table 4.				
Stream Reach	**Existing Length (ft.)**	**Proposed Mitigation**	**Proposed Length (ft.)**	**Proposed Ratio**
STR-1	9,194	Restoration	9,149	1.5:1
	0	Establishment	4,152	1:1
STR-1a	1,683	Enhancement	1,683	4:1
STR-2	597	Restoration	597	1.5:1
	0	Establishment	360	1:1
STR-3	2,317	Restoration	2,317	1.5:1
	0	Establishment	927	1:1
STR-4	1,059	Restoration	1,059	1.5:1
	0	Establishment	571	1:1
STR-5	2,865	Restoration	2,865	1.5:1
	0	Establishment	2,036	1:1
STR-6	0	Establishment	1,699	1:1
STR-8	1,129	Preservation	1,129	10:1
Wolf River	4,071	Enhancement	4,071	6:1

b. Functional Lift

Restoration of unnamed tributaries to Wolf River will re-establish natural channel dimensions, pattern and profile and allow geomorphological characteristics to naturally develop. In-stream wood structures will be introduced to provide vertical and lateral stability and provide in-stream habitat. Establishing floodplain connectivity will provide flood relief and reduce active bank erosion and in-stream siltation currently found onsite. Providing floodplain connectivity, increasing re-oxygenation zones and reducing siltation effects will increase overall water quality of the respective streams, which drain directly to Wolf River. Planting live stakes and establishing riparian buffers will provide riparian habitat as well as shade, which reduces water temperatures and also improves water quality. Replacing adjacent agricultural practices with restored wetlands will also reduce nutrient loading and eutrophication of streams. The detail design of the restoration reach will be based on reference channel morphology data and hydraulic geometry data from TDEC regional curves.

ii. Wetlands

a. Mitigation Approach

Wetlands currently present at the site are moderate quality forested and emergent wetlands that have been historically drained, clear-cut, and altered for farming and agricultural purposes. Prior converted wetlands proposed for restoration will re-establish a hydrologic regime that will reclaim the natural hydrologic, soil, and vegetative characteristics commonly found in bottomland hardwood forests. This will be achieved by filling and plugging existing drainage ditches, removing and manipulating diversion berms, and establishing microtopographic relief. Existing wetlands proposed for enhancement will restore natural hydraulic regimes and adjoin to surrounding restored wetlands. Areas proposed for creation adjoin, and therefore will compliment, adjacent wetland restoration areas. Creation areas will receive manipulations such as shallow excavations, 1-2 foot berms or plow berms and microtopographic relief in an effort to increase hydrologic retention and establish wetland hydrology, soils, and vegetation.

Table 5.

Feature	Proposed Mitigation	Proposed Credit Acreage
Field - A	Restoration	51.8
WTL-1	Enhancement	27.21
Field - B	Restoration	66.16
WTL-2	Enhancement	4.35
Field - C	Restoration	167.42
WTL-3	Enhancement	33.42
WTL-4	Enhancement	0.20
Field - D	Restoration	30.39
WTL-5	Preservation	181.25
WTL-6	Preservation	11.67

**Proposed credit acreages differ from existing wetland acreages to account for acreage used as stream buffer.*

b. Functional Lift

Establishing the Bank will restore, enhance and create a riverine bottomland hardwood forest wetland community that will provide high functioning riparian habitat along Wolf River and its unnamed tributaries. Completion of this project will improve and vary hydrologic inputs, increase biodiversity in plant communities, increase presence of amphibian and reptile refugia and breeding grounds and pools, increase floodplain productivity and functionality, improve water quality draining to Wolf River, and protect the area from future habitat alteration. Table 6 lists projected TRAM scores

approximately 5-7 years following completion of construction and planting. TRAM scores are anticipated to increase as trees continue to grow and mature.

Table 6.			
Feature	**TRAM Score**	**Size (ac)**	**Representative Projected TRAM Score**
Field - A	10	79.01	≥ 56
Field - B	10	70.51	
Field - C	10	202.17	
Field - D	10	42.06	
WTL-5	52	186.71	59.4

c. Reference Site

WTL-5 is being used as an onsite reference wetland. Planting plans will include species identified in WTL-5, as well as other species commonly found in bottomland hardwood forest communities in order to achieve greater species diversity. Performance standards will be based on meeting wetland hydrology, soil, and vegetation criteria commonly found in riparian bottomland hardwood forests.

16(13). SITE PROTECTION

Land use restrictions for the Bank will be designed to restrict conflicting activities within riparian buffers, protect the improved aquatic habitats, and restrict future activities that may compromise the functions and services of the aquatic resources. The Pictsweet Company will maintain financial responsibility of the mitigation site throughout the monitoring phase until final approval and closure of the site by the IRT. Once final approval is granted and the site is closed, an endowment fund will be available for protection and maintenance of the mitigation site, consistent with the Conservation Easement.

17(14). LONG-TERM MANAGEMENT

An endowment fund will be established by the bank sponsor through mitigation credit sales to provide revenue for the long-term stewardship of the land. A 2.5% endowment fund will be accrued, funded by mitigation credit sales to a maximum of $250,000, to cover costs associated with the long-term care of the site.

18(15). HISTORIC PROPERTIES

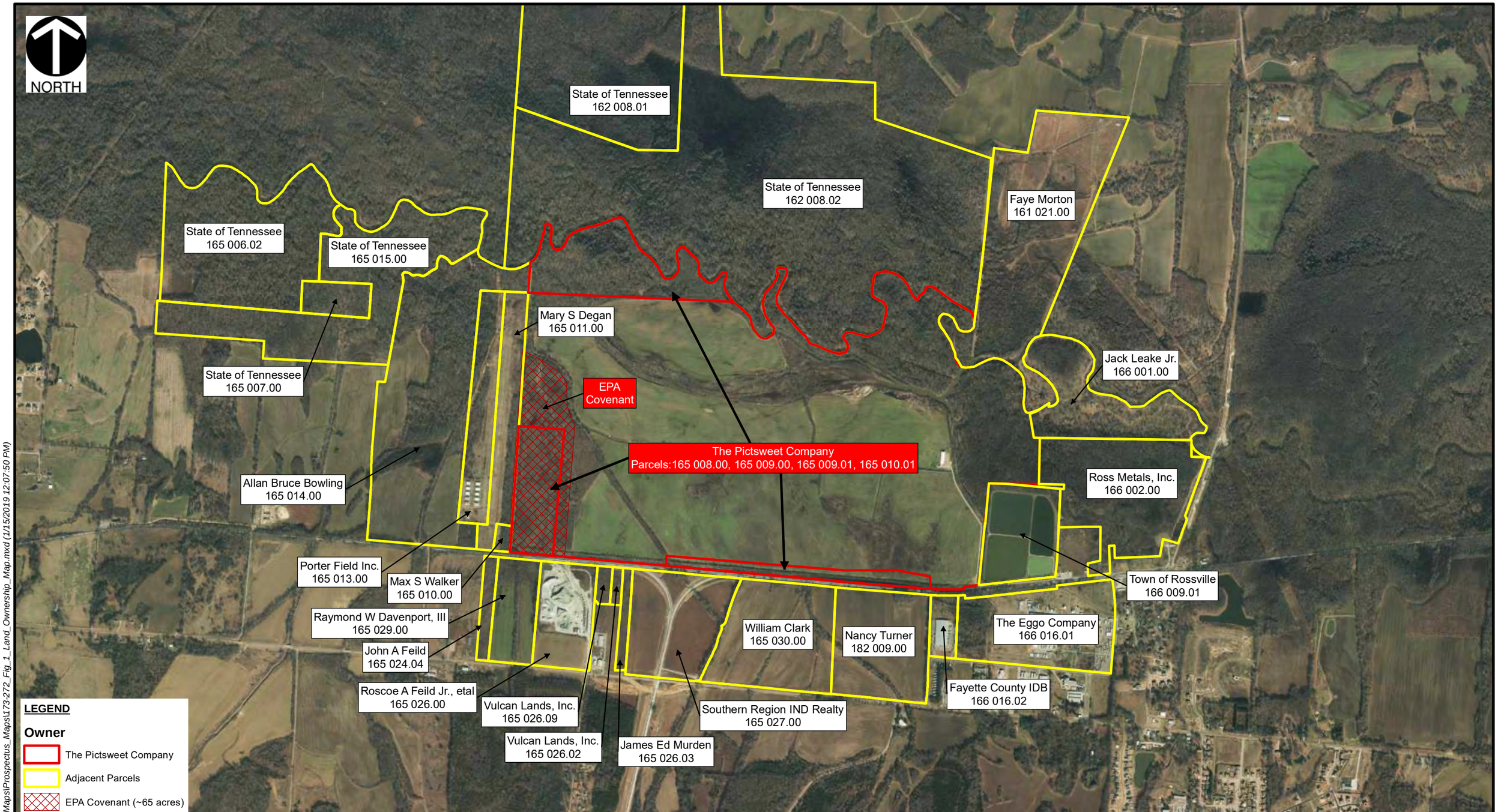
A review of the National Register of Historic Places revealed that no historically significant properties are located within the vicinity of the proposed Bank.

19(16). THREATENED AND ENDANGERED SPECIES

No potential bat habitat was identified or will be disturbed as a result of the proposed project. Threatened or endangered mussels may exist in the Wolf River; however, no in-channel work is proposed in the Wolf River, and therefore is not likely to adversely affect.

APPENDIX A

FIGURES 1-13



REFERENCE

TDOT AERIAL IMAGERY
GO TO ARCGIS ON TNMAP.TN.GOV/BASEMAPS/IMAGERY
ACCESSED 1/15/2019

0 1,500 3,000 6,000 Feet

Civil & Environmental Consultants, Inc.
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www.cecinc.com

THE PICTSWEET COMPANY
ROSSVILLE FARM
MITIGATION BANK PROSPECTUS
ROSSVILLE, FAYETTE COUNTY, TN

LAND OWNERSHIP MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY:	JTD * Hand signature on file	FIGURE NO:	1
DATE:	1/15/2019	SCALE:	1 " = 1,500 '	PROJECT NO:	173-272		

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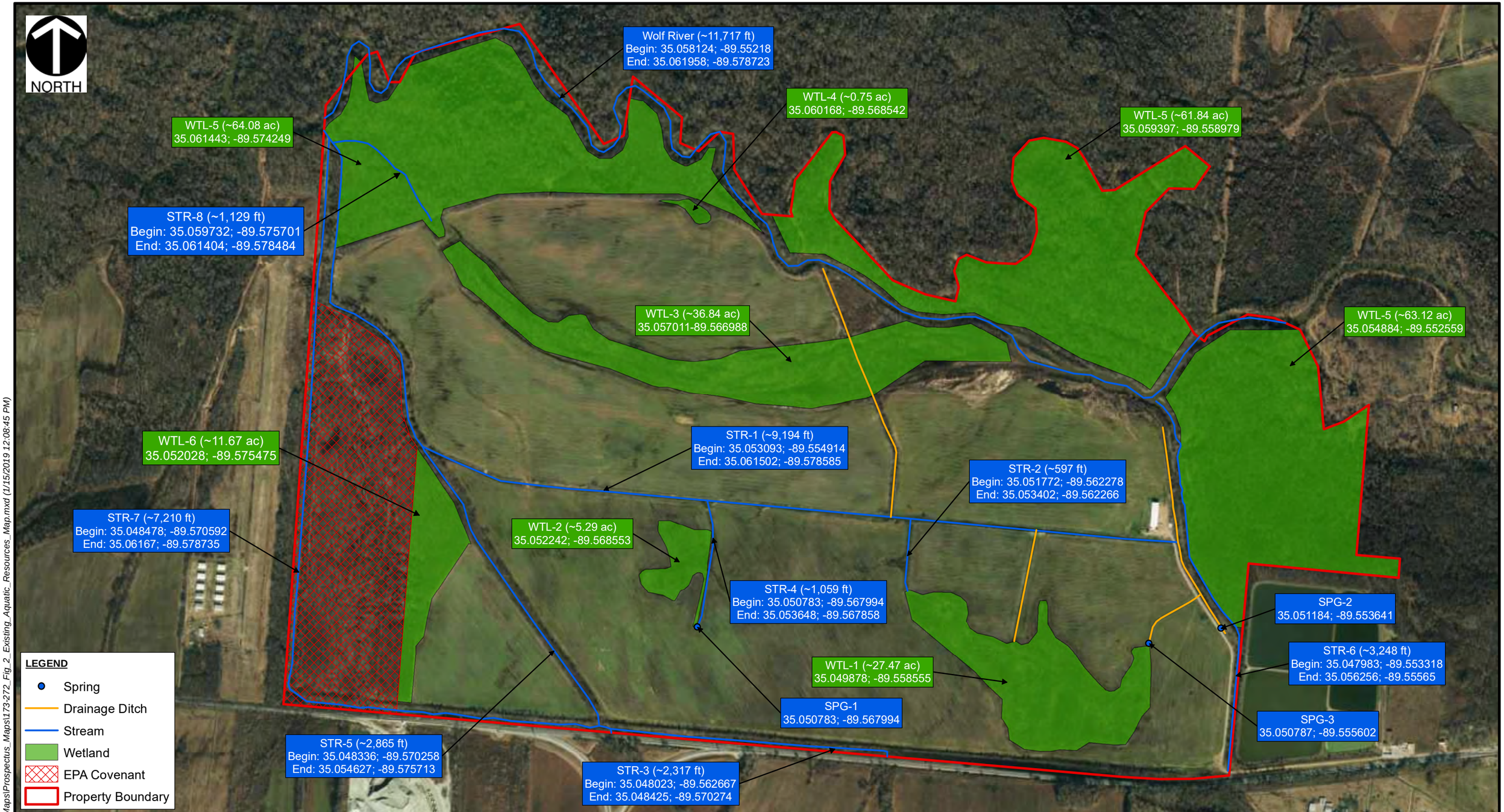

REFERENCE

TDOT AERIAL IMAGERY
GO TO ARCGIS ON TNMAP.TN.GOV/BASEMAPS/IMAGERY
ACCESSED 1/15/2019

0 750 1,500 3,000 Feet

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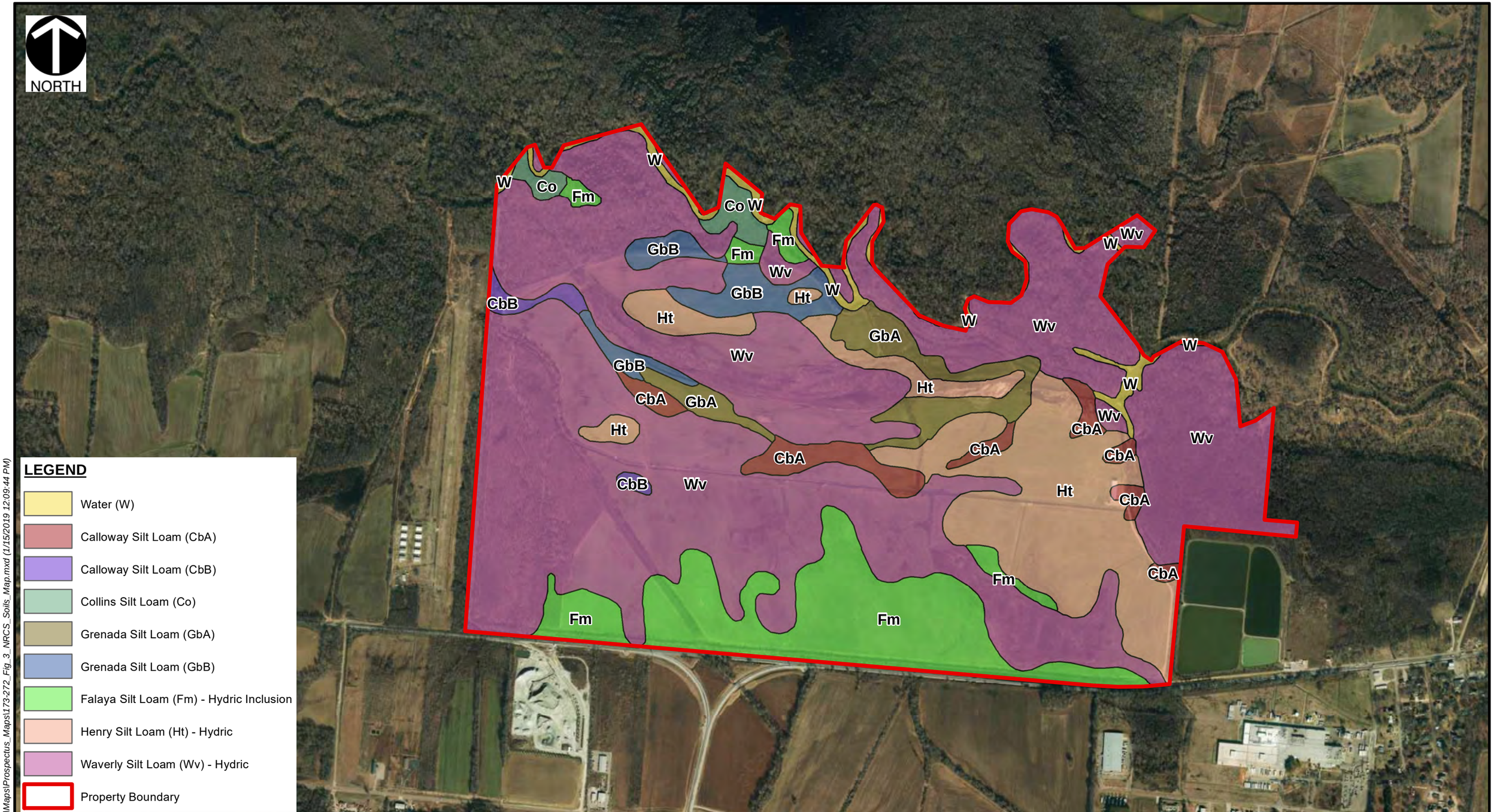
THE PICTSWEET COMPANY
ROSSVILLE FARM
JURSIDICTIONAL DETERMINATION
ROSSVILLE, FAYETTE COUNTY, TN

EXISTING AQUATIC RESOURCES MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD	* Hand signature on file	FIGURE NO:	2
DATE:	1/15/2019	SCALE:	1 " = 750 '	PROJECT NO:	173-272		

\\SVR-NASH\ P:\2017\173-272\-GIS\Maps\Prospectus_Maps\173-272_Fig_2_Existing_Aquatic_Resources_Map.mxd (1/15/2019 12:08:45 PM)



REFERENCE
TDOT AERIAL IMAGERY
GO TO ARCGIS ON TNMAP.TN.GOV/BASEMAPS/IMAGERY
ACCESSED 1/15/2019

U.S.D.A., N.R.C.S
SOIL SURVEY GEOGRAPHIC (SSURGO) DATABASE FOR
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0 1,000 2,000 4,000 Feet

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NRCS SOILS MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD	*Hand signature on file	FIGURE NO:	3
DATE:	1/15/2019	SCALE:	1 " = 1,000 '	PROJECT NO:	173-272		

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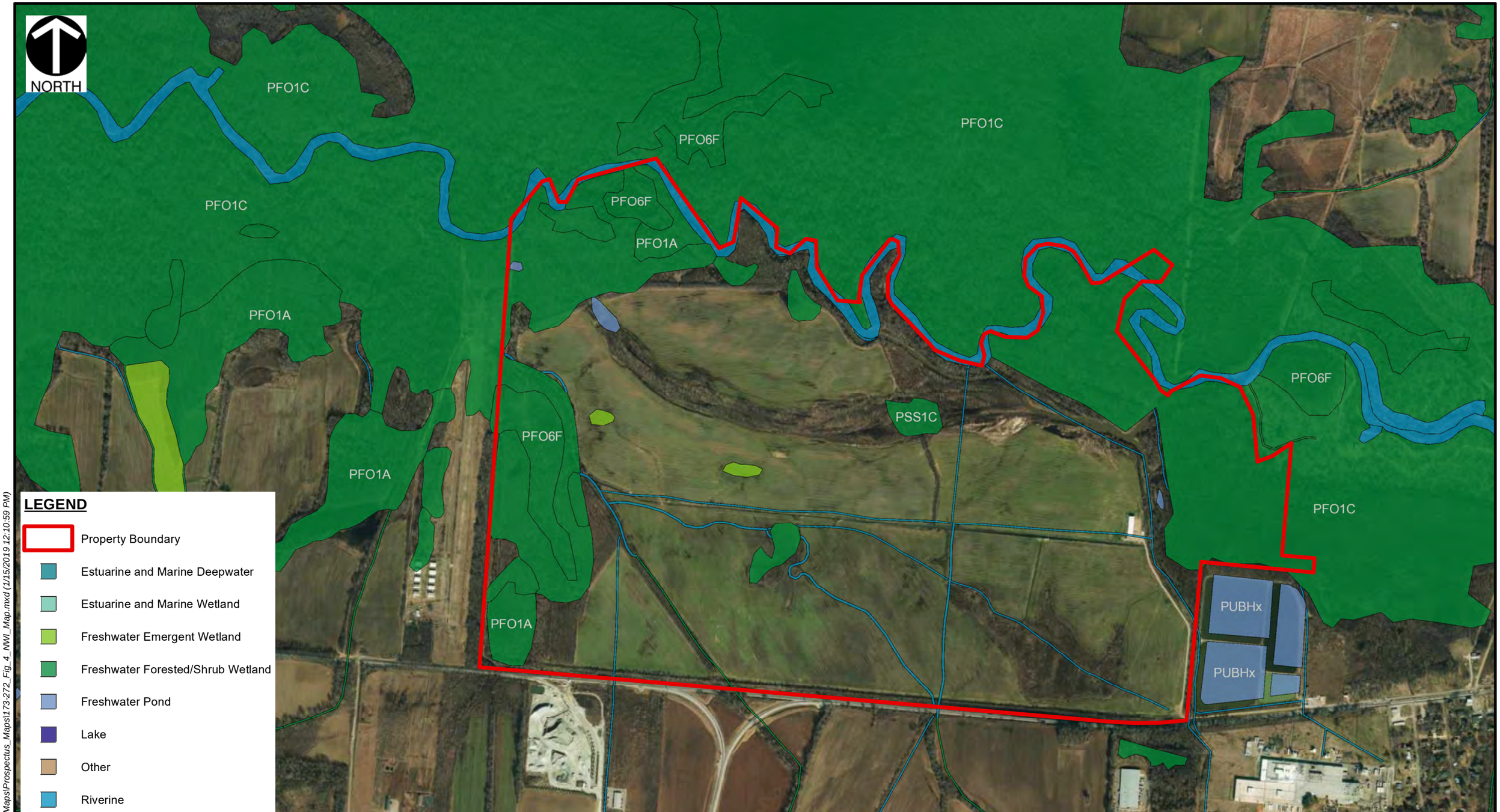

REFERENCE
TDOT AERIAL IMAGERY
GO TO ARCGIS ON TNMAP.TN.GOV/BASEMAPS/IMAGERY
ACCESSED 1/15/2019

U.S. FISH & WILDLIFE SERVICE
NATIONAL WETLANDS INVENTORY (NWI) MAP
ACCESSED 1/15/2019

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NATIONAL WETLANDS INVENTORY (NWI) MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY:	JTD * Hand signature on file	FIGURE NO:	4
DATE:	1/15/2019	SCALE:	1 " = 1,000 '	PROJECT NO:	173-272		

\\SVR-NASH\ P:\2017\173-272\-GIS\Maps\Prospectus_Maps\173-272_Fig_4_NWI_Map.mxd (1/15/2019 12:10:59 PM)

REFERENCE

1963 HISTORIC AERIAL IMAGERY
GO TO WWW.HISTORICAERIALS.COM
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0 750 1,500 3,000 Feet

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1963 HISTORIC AERIAL MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD * Hand signature on file	FIGURE NO: 7
DATE:	1/15/2019	SCALE:	1 " = 750 '	PROJECT NO: 173-272	

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REFERENCE

1963 HISTORIC AERIAL IMAGERY
GO TO WWW.HISTORICAERIALS.COM
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EXISTING FEATURES OVERLAY
1963 HISTORIC AERIAL MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD	* Hand signature on file	FIGURE NO:	7a
DATE:	1/15/2019	SCALE:	1 " = 750 '	PROJECT NO:	173-272		

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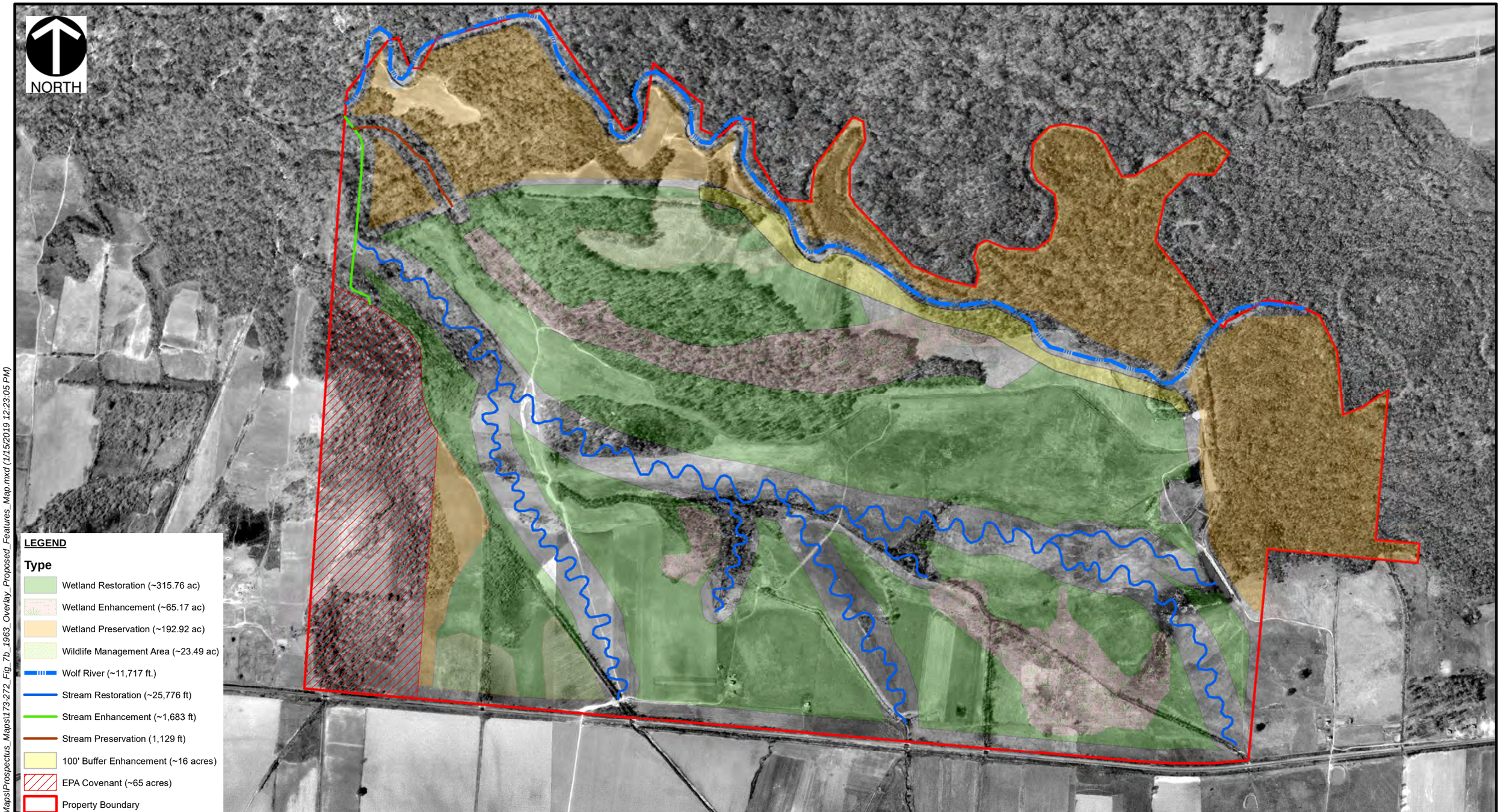

REFERENCE

1963 HISTORIC AERIAL IMAGERY
GO TO WWW.HISTORICAERIALS.COM
GEOREFERENCED AND ACCESSED 1/15/2019

0 750 1,500 3,000 Feet

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CONCEPTUAL MITIGATION OVERLAY
1963 HISTORIC AERIAL MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY:	JTD * Hand signature on file	FIGURE NO:	7b
DATE:	1/15/2019	SCALE:	1 " = 750 '	PROJECT NO:	173-272		

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REFERENCE

1998 GOOGLE IMAGERY
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1998 HISTORIC AERIAL MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD	* Hand signature on file	FIGURE NO:	8
DATE:	1/15/2019	SCALE:	1 " = 750 '	PROJECT NO:	173-272		

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REFERENCE

2008 GOOGLE IMAGERY
GEOREFERENCED AND ACCESSED 1/15/2019

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2008 HISTORIC AERIAL MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD	* Hand signature on file	FIGURE NO:	9
DATE:	1/15/2019	SCALE:	1 " = 750 '	PROJECT NO:	173-272		

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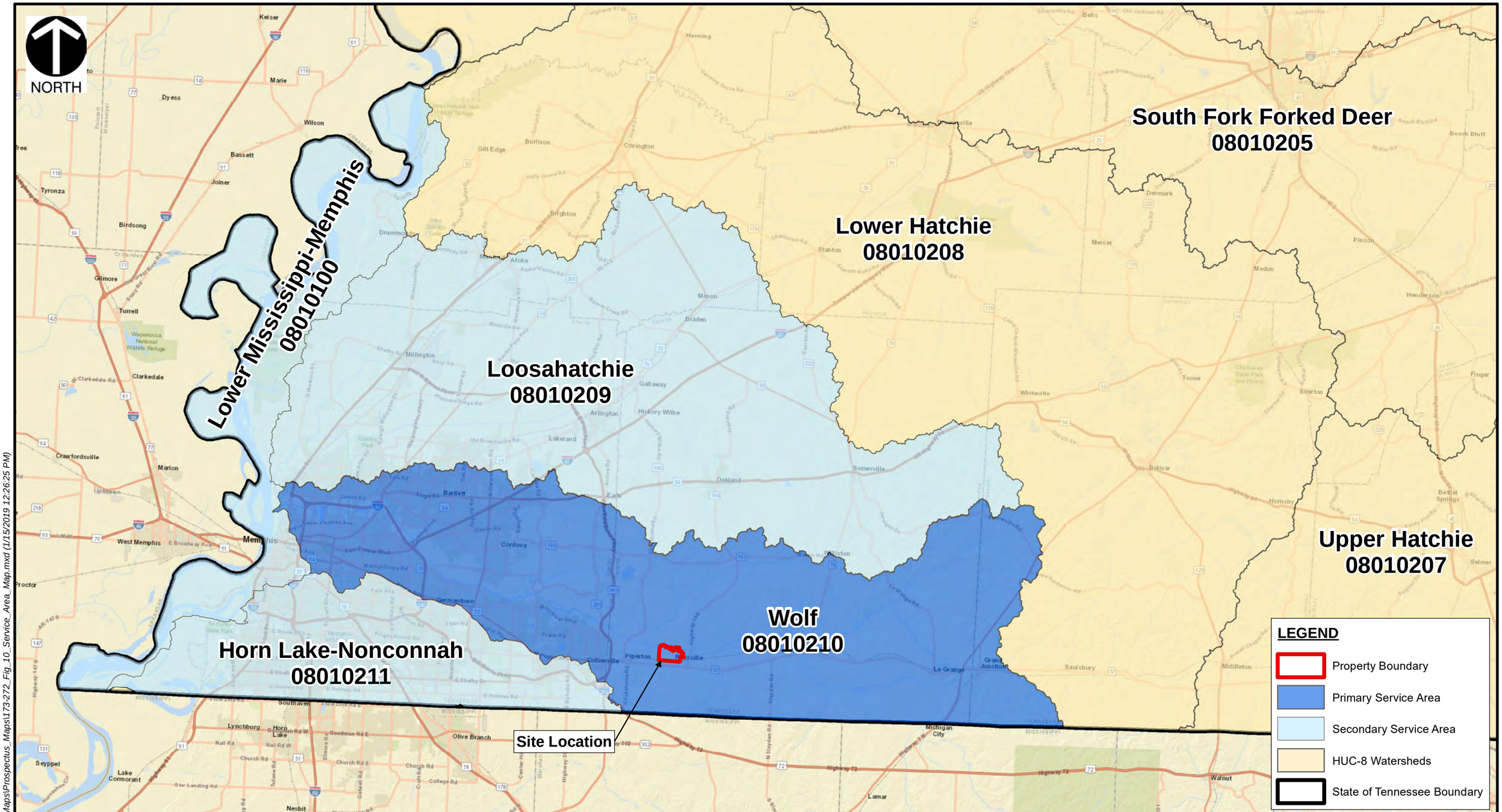

REFERENCE

WORLD STREET MAP / ARCGIS MAP SERVICE:
HTTP://GOTO.ARCGISONLINE.COM/MAPS/WORLD_STREET_MAP,
ACCESSED 1/15/2019

0 5 10 20 Miles

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SERVICE AREA MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD	* Hand signature on file	FIGURE NO:	10
DATE:	1/15/2019	SCALE:	1 " = 6 miles	PROJECT NO:	173-272		

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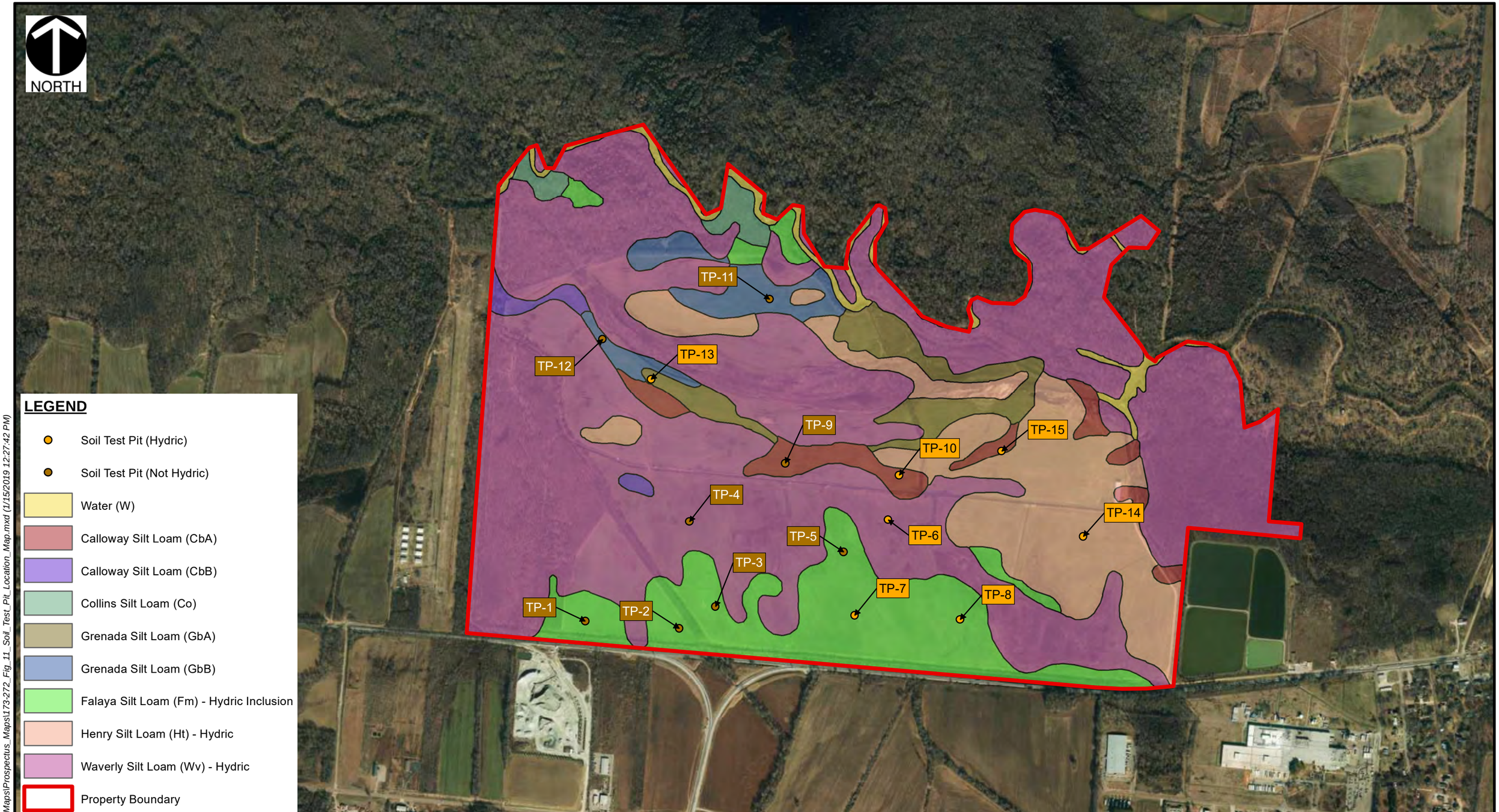

REFERENCE
TDOT AERIAL IMAGERY
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0 1,000 2,000 4,000 Feet

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SOIL TEST PIT LOCATION MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD	* Hand signature on file	FIGURE NO:	11
DATE:	1/15/2019	SCALE:	1 " = 1,000 '	PROJECT NO:	173-272		

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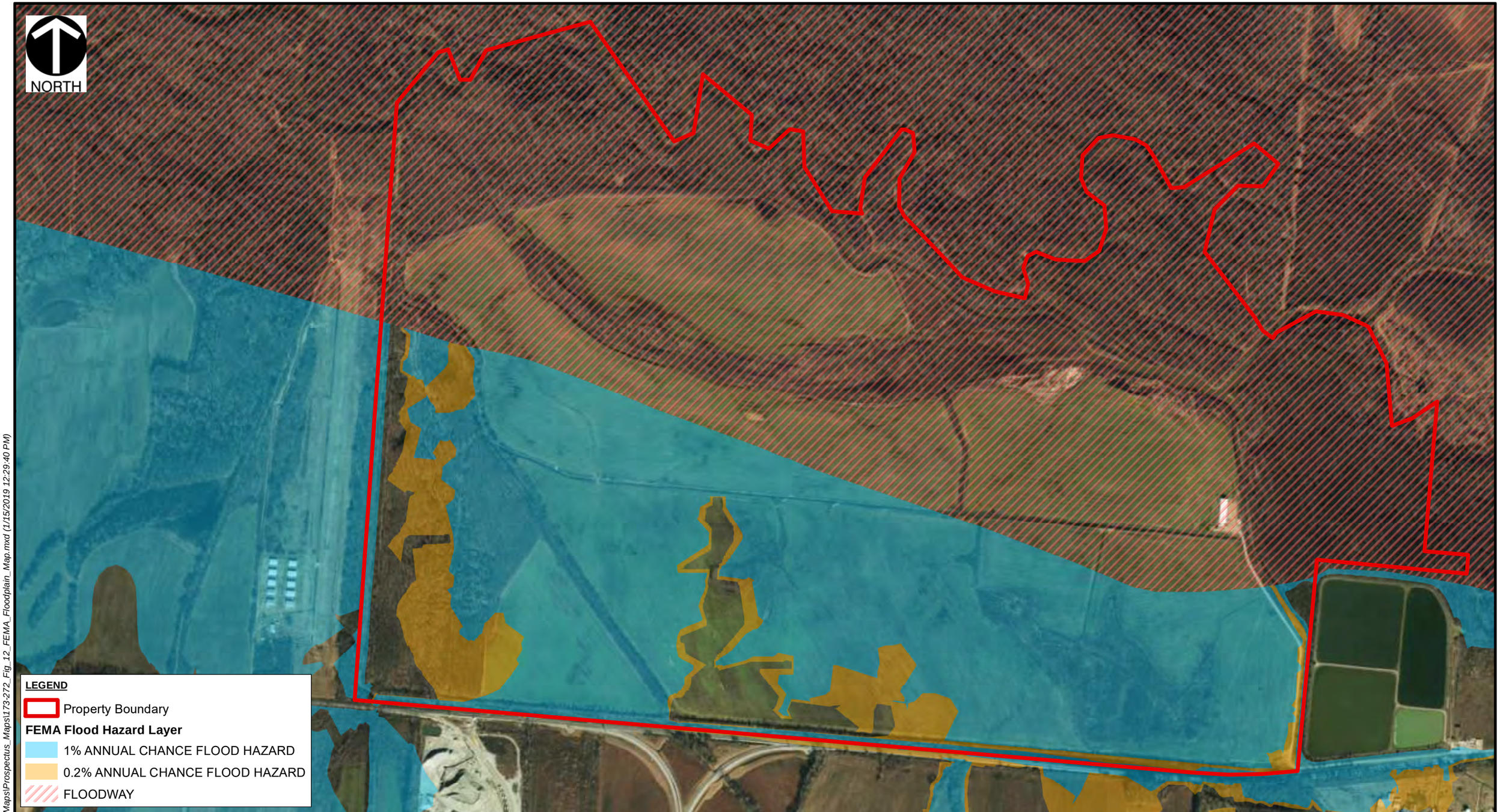

REFERENCE

TDOT AERIAL IMAGERY
GO TO ARCGIS ON TNMAP.TN.GOV/BASEMAPS/IMAGERY
ACCESSED 1/15/2019

FEMA FLOOD HAZARD LAYER
DATED: 02-24-2017
ACCESSED: 1/15/2019

0 750 1,500 3,000 Feet

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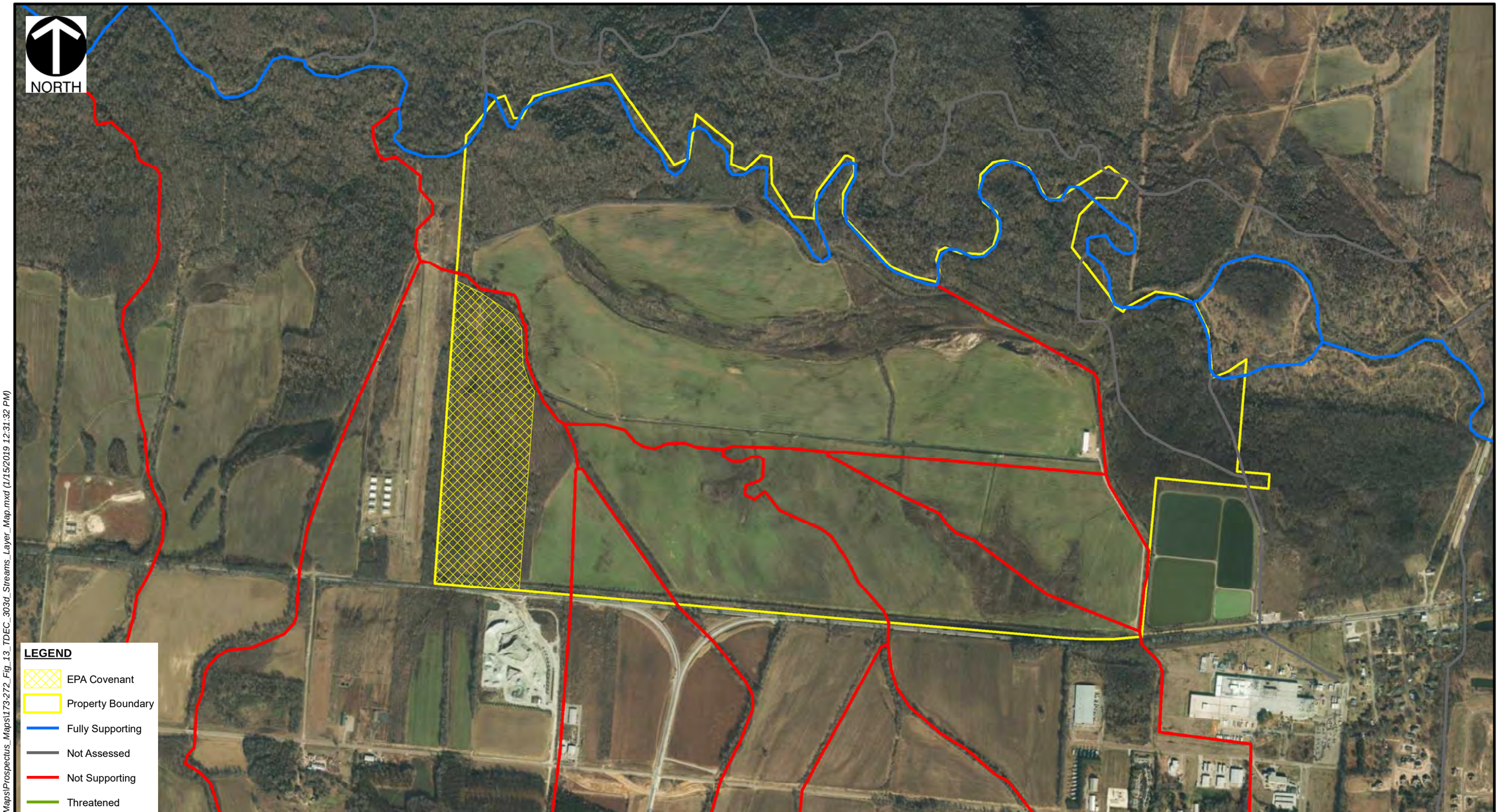
FEMA FLOODPLAIN MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY:	JTD * Hand signature on file	FIGURE NO:	12
DATE:	1/15/2019	SCALE:	1 " = 750 '	PROJECT NO:	173-272		

\\SVR-NASH P:\2017\173-272\-GIS\Maps\Prospectus_Maps\173-272_Fig_12_FEMA_Floodplain_Map.mxd (1/15/2019 12:29:40 PM)



REFERENCE

TDOT AERIAL IMAGERY
GO TO ARCGIS ON TNMAP.TN.GOV/BASEMAPS/IMAGERY
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TDEC WATER POLLUTION CONTROL LAYER
GO TO ARCGIS ON TNMAP.TN.GOV/ENVIRONMENTAL/TDEC_WATER_POLLUTION_CONTROL
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0 1,000 2,000 4,000 Feet

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TDEC 303d STREAMS LAYER MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY:	JTD * Hand signature on file	FIGURE NO:	13
DATE:	1/15/2019	SCALE:	1 " = 1,000 '	PROJECT NO:	173-272		

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APPENDIX B

PHOTOGRAPHIC SUMMARY AND CROSS-SECTIONS

Photo 1 (8356) View of STR-1 R-1 looking upstream (N35.061502; W89.578585).

Photo 2 (8357) View of STR-1 R-1 looking downstream. (N35061502; W89578585)

Photo 3 (3222) View of STR-1 R-2 looking downstream below culvert crossing (N35054016; W89573737).

Photo 4 (3207) Upstream view of STR-1 R-2 above culvert crossing. (N35053867; W89572508)

Photo 5 (3163) Downstream view of STR-2 R-1. (N35.052844; W89.562314)

Photo 6 (3164) Upstream view of STR-2 R-1. (N35.052844; W89.562314)

Photo 7 (3169) Upstream view of STR-3 R-1. (N35.048340; W89.567677)

Photo 8 (3170) Downstream view of STR-3 R-1. (N35.048340; W89.567677)

Photo 9 (3180) View of SPG-1 located at the beginning of STR-4 R-1. (N35050783; W89.567994)

Photo 10 (3184) Upstream view of STR-4 R-1. (N35.052992; W89.567677)

Photo 11 (3185) Downstream view of STR-4 R-1. (N35.052992; W89.567677)

Photo 12 (3192) Downstream view of STR-5 R-1. STR-5 has been turned into an overflow channel for STR-7. (N35.051349; W89.572998)

Photo 13 (3193) Upstream view of STR-5 R-1. (N35.051349; W89.572998)

Photo 14 (6520) General view of SPG-2. (N35.051184; W89.553641)

Photo 15 (3156) Upstream view of STR-6 R-1. (N35.051574; W89.553631)

Photo 16 (3157) Downstream view of STR-6 R-1. (N35.051574; W89.553631)

Photo 17 (3205) Downstream View of STR-7 R-1. (N35.048524; W89.571345)

Photo 18 (6553) View of SPG-3 located along drainage ditch from WTL-1. (N35.050787; W89555602)

Photo 19 (6546) General view of WTL-1 located on the southeastern portion of the property. (N35.048296; W89.558335)

Photo 20 (6545) Verification of hydric soil in WTL-1. Soil matrix: 10YR 5/1 with 10YR 4/6 redox concentrations. (N35.048296; W89.558335)

Photo 21 (6571) General view of WTL-2 facing southeast.
(N35.052065; W89.569215)

Photo 22 (6569) Verification of hydric soil in WTL-2. Soil matrix: 10YR 5/2 with 7.5YR 5/6 redox concentrations. (N35.052065; W89.569215)

Photo 23 (4713) General view of the eastern portion of WTL-3.
(N35.057165; W89564592)

Photo 24 (4710) Verification of hydric soil in WTL-3. Soil matrix: 10YR 5/2 with 7.5YR 4/4 redox concentrations. (N35.057165; W89564592)

Photo 25 (3247) General view of WTL-4. (N35.059956; W89.568399)

Photo 26 (3245) Verification of hydric soil in WTL-4. Soil matrix: 10YR 5/2 with 7.5YR 3/4 redox concentrations. (N35.059956; W89.568399)

Photo 27 (5173) General view of WTL-5 facing northeast.
(N35.053595; W89.552646)

Photo 28 (6552) View of drainage ditch coming from WTL-1.
(N35.051071; W89.555528)

Photo 29 (3161) View of drainage ditch draining WTL-1 into STR-1.
(N35.051149; W89.559228)

Photo 30 (3255) General view looking downstream at the Wolf River.
(N35.058124; W89.578723)

Photo 31 (3265) General view of STR-8 facing downstream.
(N35.059732; W89.578484)

Photo 32 (6521) View of soil profile at TP-1. Soil matrix: 10YR 5/3 with 7.5YR 4/6 redox concentrations. (N35.049196; W89.574934)

Photo 33 (6522) General view of area surrounding TP-1.
(N35.049196; W89.574934)

Photo 34 (6524) View ofsoil profile at TP-2. Soil matrix: 10YR 5/4 with 10YR 5/4 redox concentrations. (N35.049196; W89.574934)

Photo 35 (6526) View of soil profile at TP-3. Soil matrix: 10YR 5/4 with 7.5YR 5/4 redox concentrations. (N35.049776; W89.57018)

Photo 36 (6528) View of TP-4 soil profile. Soil matrix: 10YR 5/4 with 7.5YR 5/4 redox concentrations. (N35.052305; W89.571254)

Photo 37 (6529) View of soil profile at TP-5. Soil matrix: 10YR 5/3 with 7.5YR 5/6 redox concentrations. (N35.051564; W89.56556)

Photo 38 (6531) Northern view of area surrounding TP-5. (N35.051564; W89.56556)

Photo 39 (6533) View of soil profile at TP-6. Soil matrix: 10YR 5/2 with 7.5YR 5/6 redox concentrations. (N35.052586; W89.563972)

Photo 40 (6534) View of TP-7 soil profile. Soil matrix: 10YR 5/2 with 7.5YR 4/6 redox concentrations. (N35.049662; W89.565068)

Photo 41 (6535) View of soil profile at TP-8. Soil matrix: 10YR 6/2 with 7.5YR 5/6 redox concentrations. (N35.049653; W89.5612)

Photo 42 (6536) View of soil profile at TP-9. Soil matrix: 10YR 5/3 with 7.5YR 5/8 redox concentrations. (N35.054174; W89.567816)

Photo 43 (6537) View of soil profile at TP-10. Soil matrix: 10YR 6/1 with 7.5YR 5/8 redox concentrations. (N35.053935; W89.563623)

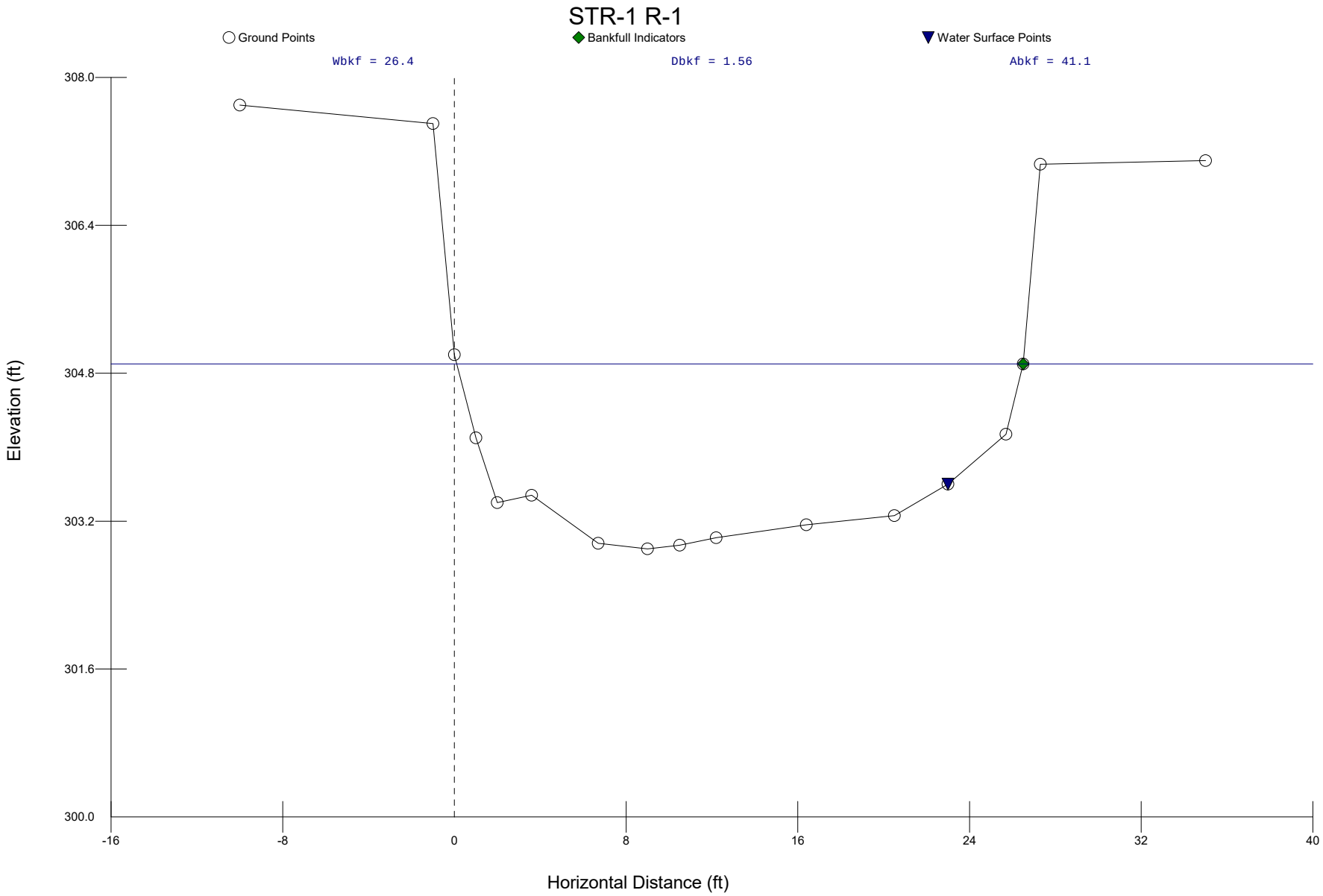
Photo 44 (6538) View of soil profile at TP-11. Soil matrix: 10YR 4/6 with no redox features. (N35.059107; W89.568608)

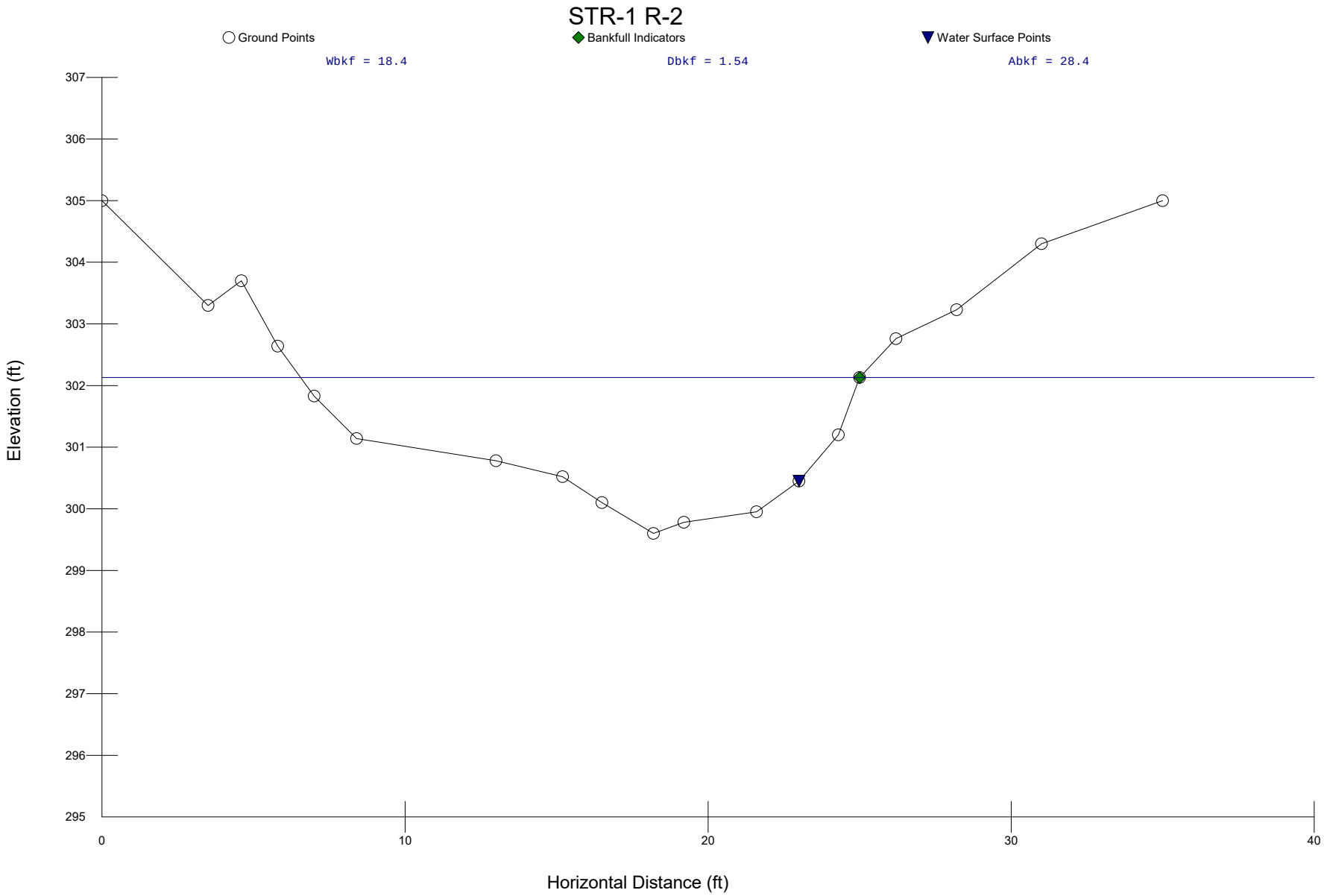
Photo 45 (6539) View of soil profile at TP-12. Soil matrix: 10YR 5/6 with no redox features. (N35.057712; W89.574677)

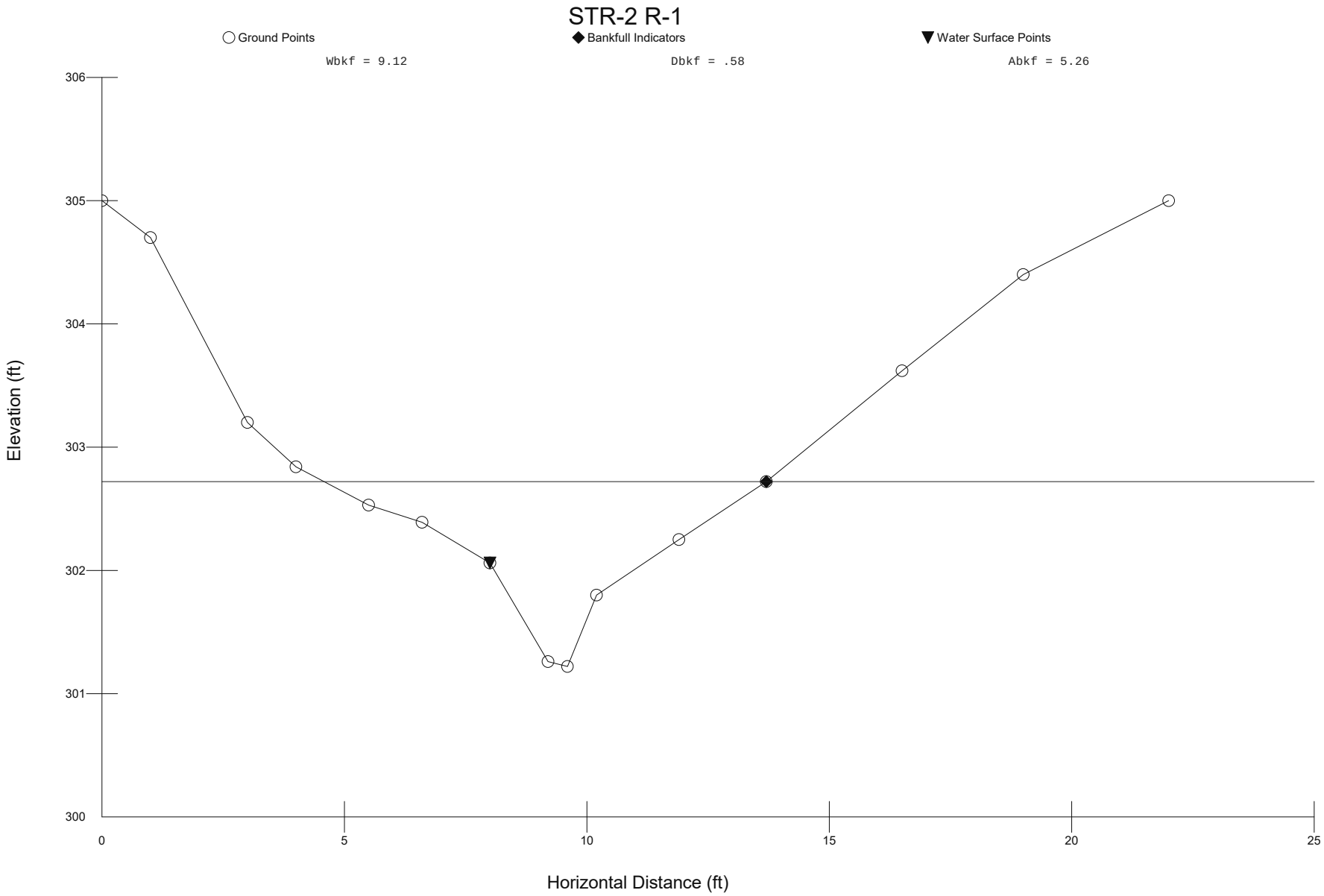
Photo 46 (6540) View of soil profile at TP-13. Soil matrix: 10YR 6/2 7.5YR 5/6 redox concentrations. (N35.056561; W89.57285)

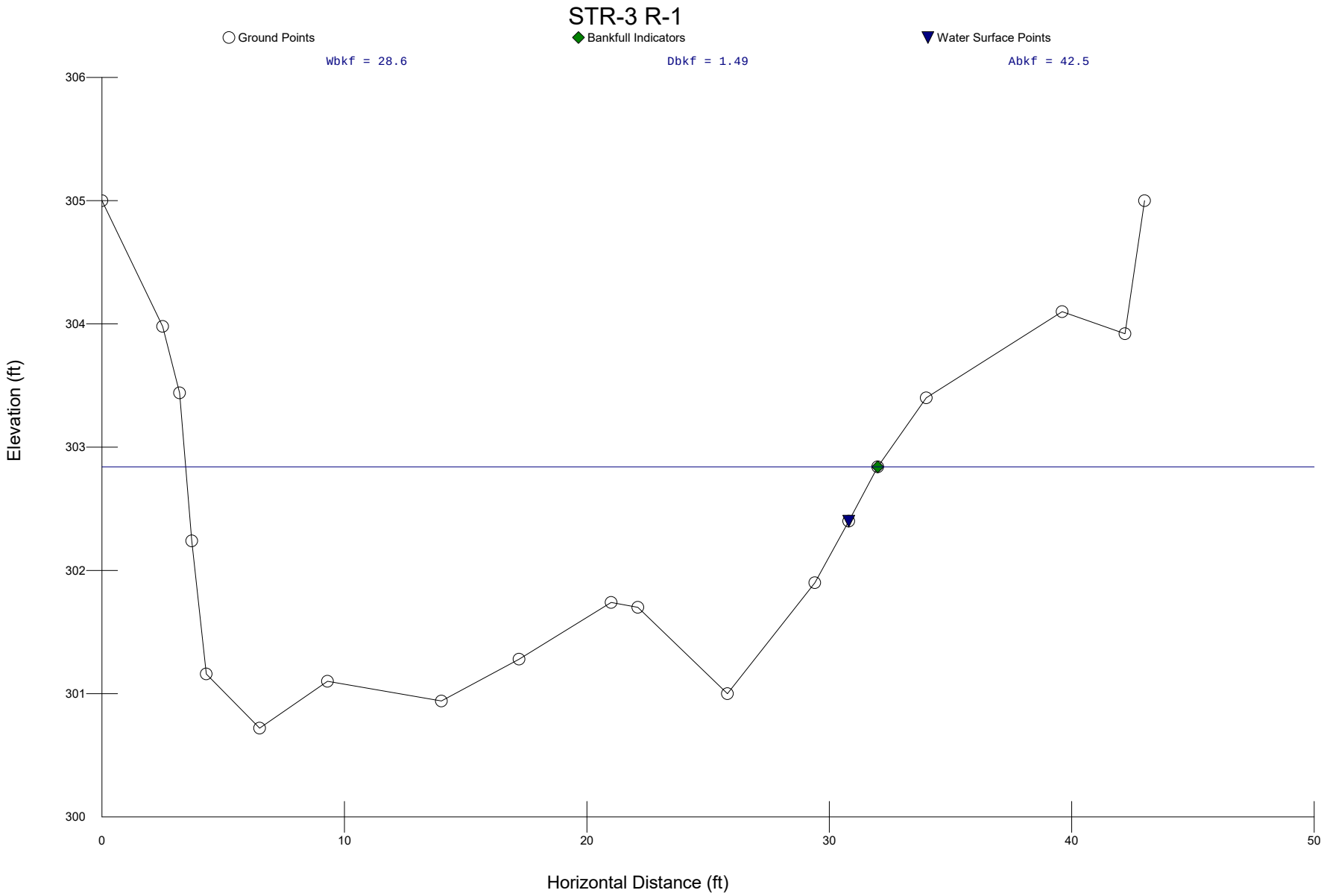
Photo 47 (6541) View of soil profile at TP-14. Soil matrix: 10YR 6/2 7.5YR 5/6 redox concentrations. (N35.052291; W89.556786)

Photo 48 (6542) View of soil profile at TP-15. Soil matrix: 10YR 6/2 7.5YR 5/8 redox concentrations. (N35.054779; W89.559901)


STR-1 R-1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 26.4
Dbkf = 1.56
Abkf = 41.1
308.0
306.4
304.8
303.2
301.6
300.0
Elevation (ft)
-16
-8
0
8
16
24
32
40
Horizontal Distance (ft)


STR-1 R-2
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 18.4
Dbkf = 1.54
Abkf = 28.4
Elevation (ft)
307
306
305
304
303
302
301
300
299
298
297
296
295
0
10
20
30
40
Horizontal Distance (ft)


STR-2 R-1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 9.12
Dbkf = .58
Abkf = 5.26
306
305
304
303
302
301
300
Elevation (ft)
0
5
10
15
20
25
Horizontal Distance (ft)


STR-3 R-1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 28.6
Dbkf = 1.49
Abkf = 42.5
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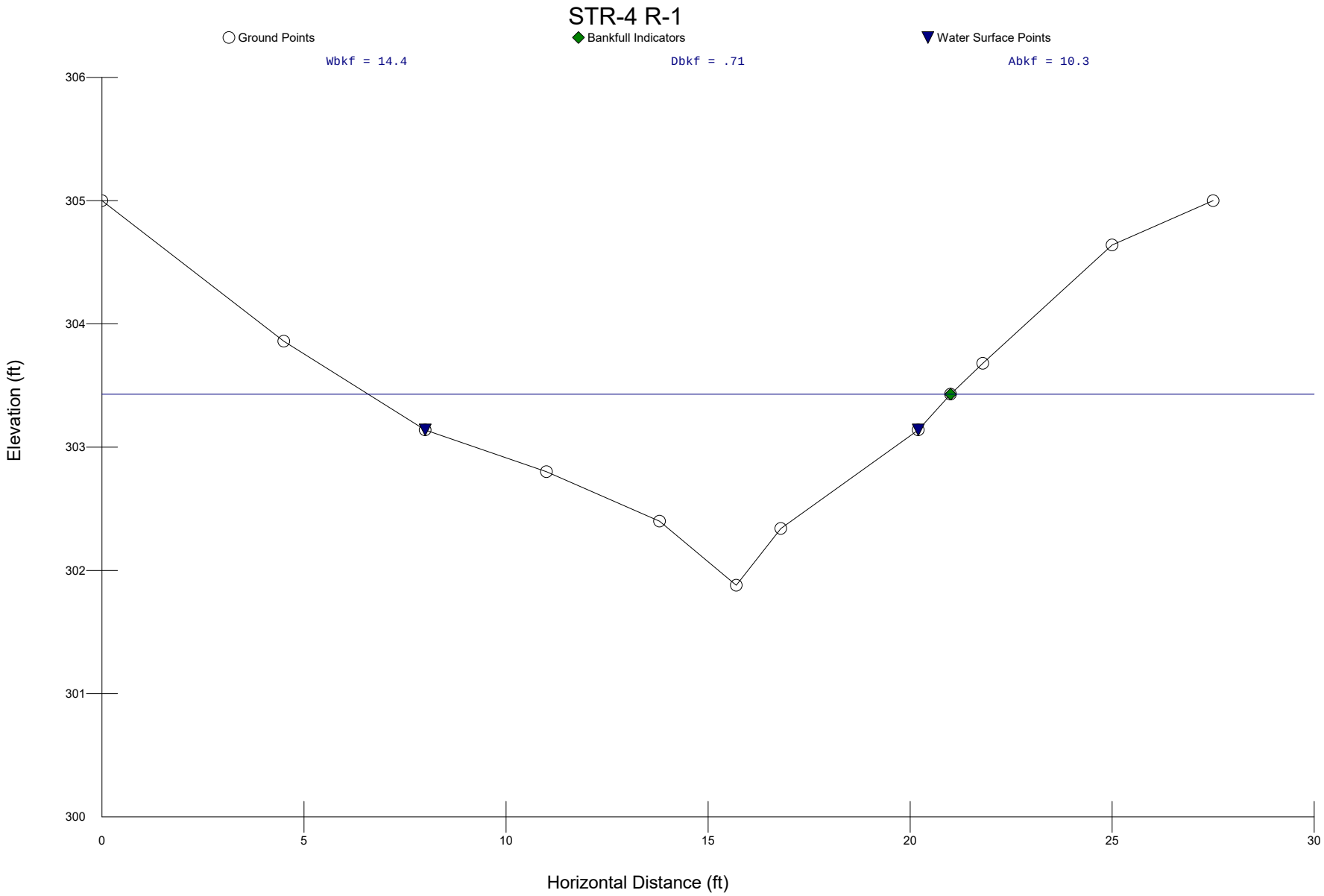
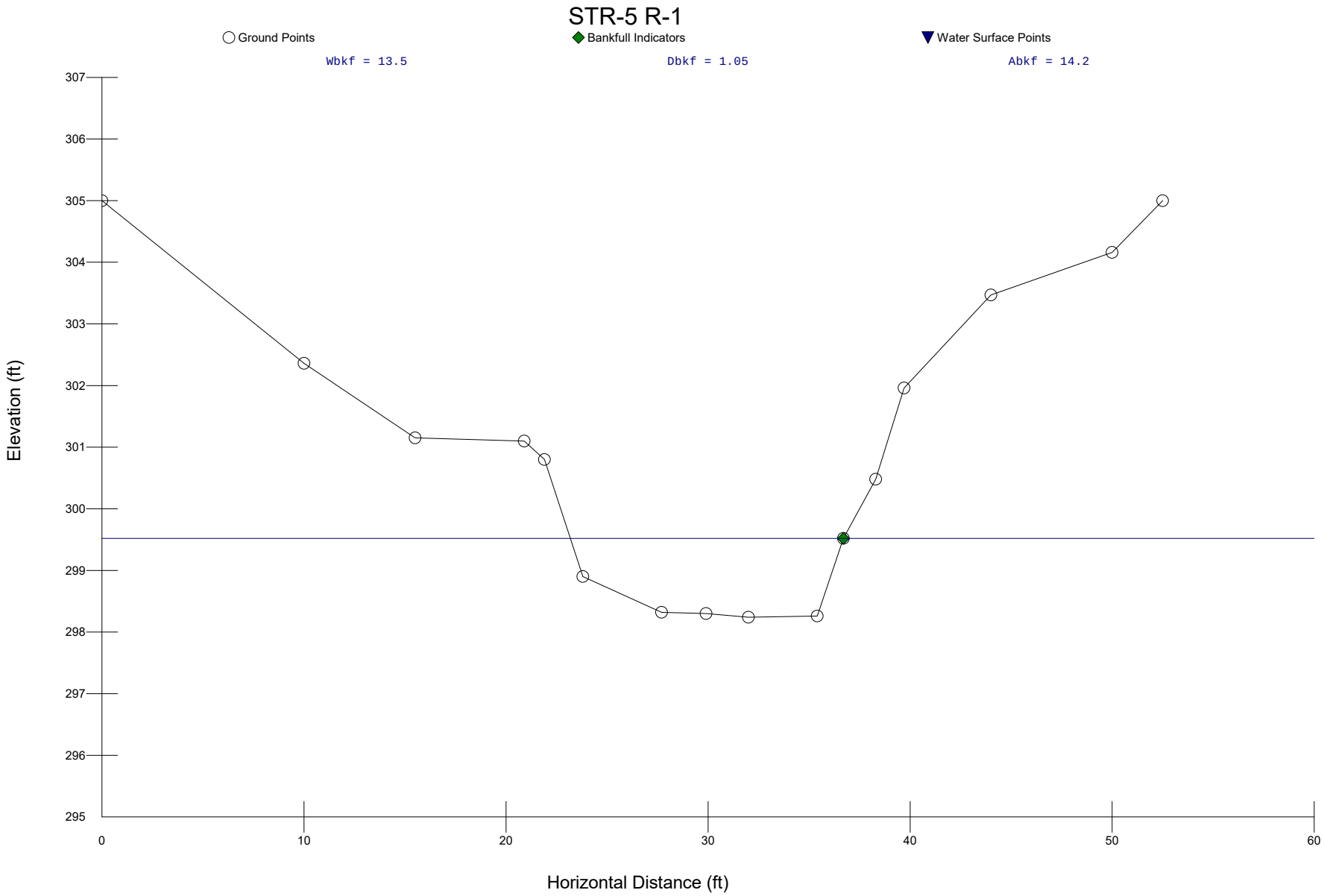
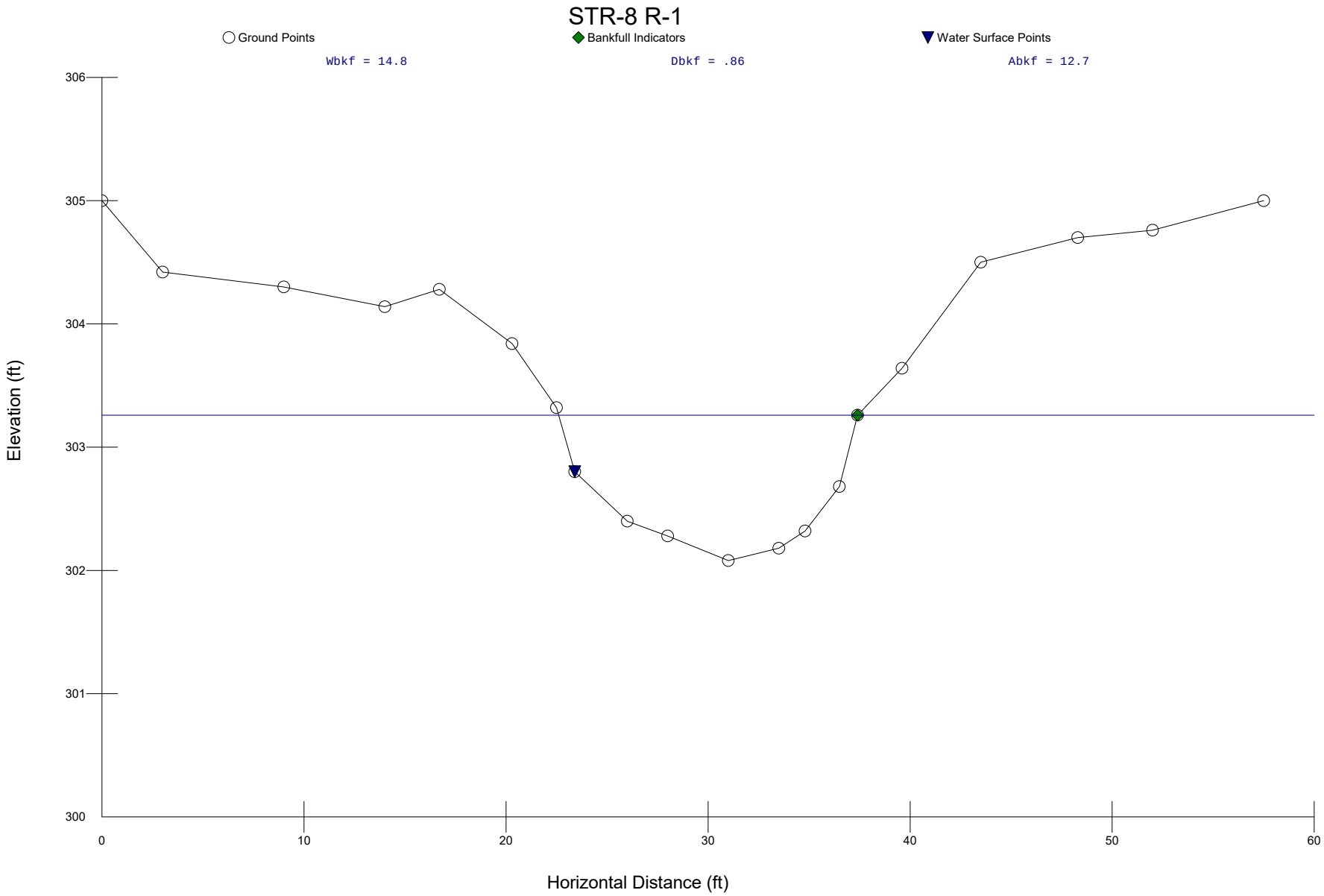
305
304
303
302
301
300
Elevation (ft)
0
10
20
30
40
50
Horizontal Distance (ft)


STR-4 R-1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 14.4
Dbkf = .71
Abkf = 10.3
306
305
304
303
302
301
300
Elevation (ft)
0
5
10
15
20
25
30
Horizontal Distance (ft)


STR-5 R-1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 13.5
Dbkf = 1.05
Abkf = 14.2
Elevation (ft)
307
306
305
304
303
302
301
300
299
298
297
296
295
0
10
20
30
40
50
60
Horizontal Distance (ft)


STR-8 R-1
Ground Points
Bankfull Indicators
Water Surface Points
Wbkf = 14.8
Dbkf = .86
Abkf = 12.7
306
305
304
303
302
301
300
Elevation (ft)
0
10
20
30
40
50
60
Horizontal Distance (ft)

APPENDIX C

CATCHMENT ASSESSMENT FORM

Catchment Assessment Form

Rater(s): C.Duke, C. Liggett, C.Hertwig, M. Skelton

Date: 12-07-1

Purpose: This form is used to determine the project's restoration potential.

Overall Watershed Conditon	**Fair**

CATCHMENT ASSESSMENT

	Categories	Description of Catchment Condition			Rating (P/F/G)
		Poor	Fair	Good	
1	Concentrated Flow (Hydrology)	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	No potential for concentrated flow/impairments from adjacent land use	P
2	Impervious cover (Hydrology)	Greater than 15%	Between 7% and 15%	Less than 7%	G
3	Land Use Change (Hydrology)	Rapidly urbanizing/urban	Single family homes/suburban	Rural communities/slow growth or primarily forested	G
4	Distance to Roads (Hydrology)	Roads located in or adjacent to project reach and/or major roads proposed in 10 year DOT plans	No roads in or adjacent to project reach. No more than one major road proposed in 10 year DOT plans.	No roads in or adjacent to project reach. No proposed roads in 10 year DOT plans.	G
5	Watershed Hydrology (e.g., flow regime, basin characteristics) (Hydrology)	Flashy flow regime as a result of land use, rainfall patterns, geology, and soils.	Moderate flashy flow regime as a result of land use, rainfall patterns, geology, and soils.	Not Flashy flow regime as a result of land use, rainfall patterns, geology, and soils.	P
6	Percent Forested (Watershed) (Hydrology)	<= 20%	>20% and <70%	>=70%	P
7	Riparian Vegetation (Geomorphology)	<50% of contributing stream length has > 25 ft corridor width	50-80% of contributing stream length has > 25 ft corridor width	>80% of contributing stream length has > 25 ft corridor width	P
8	Sediment Supply (Geomorphology)	High sediment supply from upstream bank erosion and surface runoff	Moderate sediment supply from upstream bank erosion and surface runoff	Low sediment supply. Upstream bank erosion and surface runoff is minimal	P
9	Located on or downstream of a 303(d) listed stream TMDL list (Physicochemical)	On, upstream, or downstream of 303(d) and no TMDL/WS Mgmt plan to address deficiencies	On, upstream, or downstream of 303(d) and TMDL/WS Mgmt plan addressing deficiencies	Not on 303(d) list	P
10	Agricultural Land Use (Physicochemical)	Livestock access to stream and/or intensive cropland immediately upstream of project reach.	Livestock access to stream and/or intensive cropland upstream of project reach. A sufficient reach of stream is between Ag. land use and project reach.	There is little to no agricultural land uses or the livestock or cropland is far enough away from project reach to cause no impact to water quality or biology.	P
11	NPDES Permits	Many NPDES permits within watershed or some within one mile of project reach	A few NPDES permits within watershed and none within one mile of project reach	No NPDES permits within watershed and none within one mile of project reach	G
12	Watershed impoundments (Biology)	Impoundment(s) located within 1 mile upstream or downstream of project area and/or has a negative effect on project area and fish passage	No impoundment within 1 mile upstream or downstream of project area OR impoundment does not adversely affect project area but a blockage could exist outside of 1 mile and impact and fish passage	No impoundment upstream or downstream of project area OR impoundment provides beneficial effect on project area and allows for fish passage	G
13	Organism Recruitment (Biology)	Channel immediately upstream or downstream of project reach is concrete, piped, or hardened.	Channel immediately upstream or downstream of project reach has native bed and bank material, but is impaired.	Channel immediately upstream or downstream of project reach has native bed and bank material.	G
14	Percent of Catchment being Enhanced or Restored	Less than 40% of the total catchment area is within the project reach.	40 to 60% of the total catchment area is within the project reach.	Greater than 60% of the total catchment area is within the project reach.	F
15	Other				

APPENDIX D

REACH-LEVEL FUNCTION-BASED ASSESSMENT FORMS

EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed:	Hurricane Creek-Wolf River (0801021000302)	Rater(s):	C.Duke; C. Liggett
Stream:	STR-1	Date:	01/14/2019
Reach Length:	~11,038 ft	Latitude:	N35.053093
Photo(s):		Longitude:	W89.554914
Reach ID:	R-1		

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 1 Hydrology				
Runoff	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place
	Existing Condition			✔
	Proposed Condition	✔		
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition			✔
	Proposed Condition	✔		
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.50	>1.50
	Existing Condition		✔	
	Proposed Condition	✔		
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition			✔
	Proposed Condition	✔		
	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4	1.3 - 1.2	<1.2
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	No concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	Runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	Concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition		✔	
	Proposed Condition	✔		
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 5-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 3 Geomorphology				
Riparian Vegetation	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	8. Riparian Vegetation Zone (EPA, RBP Habitat Assessment)	Good vegetation community diversity and density; human activities do not impact zone(optimal score 9-10)	Human activities impacted zone minimally (sub-optimal, score 6-8); width of riparian zone 20-40 feet (6-12 meters); human activities have impacted zone a great deal (marginal, score 3-5)	Little or no riparian vegetation due to human activities (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	9. Vegetative Protection	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. (optimal score 9-10)	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. (sub-optimal score 6-8); 50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. (marginal, score 3-5)	Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	10.Riparian Zone Invasive Species	Invasive species not present or sparse	Invasive species well represented and alter the community	Majority of vegetation is invasive
	Left Bank Existing	✔		
	Left Bank Proposed	✔		
	Right Bank Existing	✔		
	Right Bank Proposed	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 3 Geomorphology				
Lateral Stability	11. Dominant BEHI/NBS Rating	L/VL, L/L, L/M, L/H, L/VH, M/VL	M/L, M/M, M/H, L/Ex, H/L, M/VH, M/Ex, H/L, H/M, VH/VL, Ex/VL	H/H, H/Ex, VH/H, Ex/M, Ex/H, Ex/VH, VH/VH, Ex/Ex
	Existing Condition (Right bank)		✔	
	Proposed Condition (Right Bank)	✔		
	Existing Condition (Left bank)		✔	
	Proposed Condition (Left Bank)	✔		
	12. Dominant Bank Erosion	Dominate bank erosion rate is low 10%	Dominate bank erosion rate is moderate 10-25%	Dominate bank erosion rate is high >25%
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Bedform Diversity	13. Shelter for Fish and Macroinvertebrates (EPA 1999)	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, rubble, gravel, cobble and large rocks, or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	20-70% mix of stable habitat; suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale)	Less than 20% mix of stable habitat; lack of habitat availability less than desirables obvious; substrate unstable or lacking
	Existing Condition			✔
	Proposed Condition		✔	
	14. Large Woody Debris Index (LWDI)	LWDI of project reach equals LWDI of reference reach	LWDI of project reach does not equal reference reach, but is trending towards reference	LWDI of project reach does not equal LWDI of reference reach and is not trending towards reference
	Exisiting Condition			✔
	Proposed Condition	✔		
	Streams in Alluvial Valleys (C, E)			
	15. Percent Riffle <3% slope	>60 - <70	70 - 80 or 40 - 60	> 80 or < 40
	Existing Condition			✔
	Proposed Condition	✔		
	16a. Pool-to-Pool Spacing Ratio (Watersheds < 10 mi^2)	>4.0 - <5.0	3.0 - 4.0 or 5.0 - 7.0	< 3.0 or >7.0
	Existing Condition			✔
	Proposed Condition	✔		
	16b. Pool-to-Pool Spacing Ratio (Watersheds > 10 mi^2)	>5.0 - <7.0	3.5 - 5.0 or 7.0 - 8.0	<3.5 or >8.0
	Existing Condition			
	Proposed Condition			
	17a. Pool Max Depth Ratio/Depth Variability (Gravel Bed Streams)	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	17b. Pool Max Depth Ratio/Depth Variability (Sand Bed Streams)	>1.2	1.1 - 1.2	<1.1
	Existing Condition	✔		
	Proposed Condition	✔		
	Moderate Gradient Streams in Colluvial Valleys			
	18. Pool-to-Pool Spacing Ratio (3-5% Slope)	0.5- 4.0	4.0 - 6.0	>6.0
	Existing Condition			
	Proposed Condition			
	19. Pool Max Depth Ratio/Depth Variability	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	20a. Percent Riffle 3% - 10% slope	>50 - <60	50 - 40 or 60 - 70	> 70 or < 40
	Existing Condition			
	Proposed Condition			
	20b. Percent Riffle >10% slope	>75 - 80	70 - 75	< 70
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 4 Physicochemical				
Water Quality and Nutrients (Do not complete if stream is ephemeral)	21. Water Appearance and Nutrient Enrichment (USDA 1999)	Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks. Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present	Frequent cloudiness especially after storm events; objects visible to depth 0.5 to 3.0 ft; may have slight green color; no oil sheen on water surface. Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrate	Very turbid or muddy appearance most of the time; objects visible at depth< 0.5 ft; slow moving water maybe bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface; or strong odor of chemicals, oil, sewage, or other pollutants. Pea-green, gray, or brown water along entire reach; dense stands of macrophytes clogging stream; severe algal blooms creating thick algal mats in stream
	Existing Condition			✔
	Proposed Condition	✔		
	22. Detritus (Petersen, 1992)	Mainly consisting of leaves and wood without sediment covering it	Leaves and wood scarce; fine organic debris without sediment	Fine organic sediment - black in color and foul odor (anaerobic) or detritus absent
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 5 Biology				
Biology (Do not complete if stream is ephemeral)	23. Macroinvertebrate Index Semi Quantitative Single Habitat (SQSH) Macroinvertebrate Sample (as defined in 2011 TN State QSSOP for macroinvertebrate surveys)	SQSH Score: >34 (Ecoregion 73A; >24)	SQSH Score: 30-34 (Ecoregion 73A; 20-24)	SQSH Score: <30 (Ecoregion 73A; <20)
	Existing Condition			
	Proposed Condition			
	24. Macroinvertebrate Tolerance from NCBI Metric Score (as defined in the 2011 TN State QSSOP for macroinvertebrate surveys)	Abundant intolerant species 6	Limited intolerant species 4	Only tolerant species <4
	Existing Condition			
	Proposed Condition			
	25. Fish Presence	Abundant	Rare	Not present
	Existing Condition			✔
	Proposed Condition		✔	
	Provide description of cause (s) and stability trend and if F can not be potentially achieved, provide reason			

EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed:	Hurricane Creek-Wolf River (0801021000302)	Rater(s):	C.Duke; C. Liggett
Stream:	STR-1	Date:	01/14/2019
Reach Length:	2,307 ft.	Latitude:	N35.053093
Photo(s):		Longitude:	W89.554914
Reach ID:	R-2		

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 1 Hydrology				
Runoff	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place
	Existing Condition			✔
	Proposed Condition	✔		
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition			✔
	Proposed Condition	✔		
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.50	>1.50
	Existing Condition			✔
	Proposed Condition	✔		
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition			✔
	Proposed Condition	✔		
	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4	1.3 - 1.2	<1.2
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	No concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	Runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	Concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition		✔	
	Proposed Condition	✔		
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 5-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-2

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 3 Geomorphology				
Riparian Vegetation	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	8. Riparian Vegetation Zone (EPA, RBP Habitat Assessment)	Good vegetation community diversity and density; human activities do not impact zone(optimal score 9-10)	Human activities impacted zone minimally (sub-optimal, score 6-8); width of riparian zone 20-40 feet (6-12 meters); human activities have impacted zone a great deal (marginal, score 3-5)	Little or no riparian vegetation due to human activities (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	9. Vegetative Protection	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. (optimal score 9-10)	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. (sub-optimal score 6-8); 50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. (marginal, score 3-5)	Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	10.Riparian Zone Invasive Species	Invasive species not present or sparse	Invasive species well represented and alter the community	Majority of vegetation is invasive
	Left Bank Existing	✔		
	Left Bank Proposed	✔		
	Right Bank Existing	✔		
	Right Bank Proposed	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 3 Geomorphology				
Lateral Stability	11. Dominant BEHI/NBS Rating	L/VL, L/L, L/M, L/H, L/VH, M/VL	M/L, M/M, M/H, L/Ex, H/L, M/VH, M/Ex, H/L, H/M, VH/VL, Ex/VL	H/H, H/Ex, VH/H, Ex/M, Ex/H, Ex/VH, VH/VH, Ex/Ex
	Existing Condition (Right bank)		✔	
	Proposed Condition (Right Bank)	✔		
	Existing Condition (Left bank)		✔	
	Proposed Condition (Left Bank)	✔		
	12. Dominant Bank Erosion	Dominate bank erosion rate is low 10%	Dominate bank erosion rate is moderate 10-25%	Dominate bank erosion rate is high >25%
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-2

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Bedform Diversity	13. Shelter for Fish and Macroinvertebrates (EPA 1999)	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, rubble, gravel, cobble and large rocks, or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	20-70% mix of stable habitat; suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale)	Less than 20% mix of stable habitat; lack of habitat availability less than desirables obvious; substrate unstable or lacking
	Existing Condition			✔
	Proposed Condition		✔	
	14. Large Woody Debris Index (LWDI)	LWDI of project reach equals LWDI of reference reach	LWDI of project reach does not equal reference reach, but is trending towards reference	LWDI of project reach does not equal LWDI of reference reach and is not trending towards reference
	Exisiting Condition			✔
	Proposed Condition	✔		
	Streams in Alluvial Valleys (C, E)			
	15. Percent Riffle <3% slope	>60 - <70	70 - 80 or 40 - 60	> 80 or < 40
	Existing Condition			✔
	Proposed Condition	✔		
	16a. Pool-to-Pool Spacing Ratio (Watersheds < 10 mi^2)	>4.0 - <5.0	3.0 - 4.0 or 5.0 - 7.0	< 3.0 or >7.0
	Existing Condition		✔	
	Proposed Condition	✔		
	16b. Pool-to-Pool Spacing Ratio (Watersheds > 10 mi^2)	>5.0 - <7.0	3.5 - 5.0 or 7.0 - 8.0	<3.5 or >8.0
	Existing Condition			
	Proposed Condition			
	17a. Pool Max Depth Ratio/Depth Variability (Gravel Bed Streams)	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	17b. Pool Max Depth Ratio/Depth Variability (Sand Bed Streams)	>1.2	1.1 - 1.2	<1.1
	Existing Condition			✔
	Proposed Condition	✔		
	Moderate Gradient Streams in Colluvial Valleys			
	18. Pool-to-Pool Spacing Ratio (3-5% Slope)	0.5- 4.0	4.0 - 6.0	>6.0
	Existing Condition			
	Proposed Condition			
	19. Pool Max Depth Ratio/Depth Variability	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	20a. Percent Riffle 3% - 10% slope	>50 - <60	50 - 40 or 60 - 70	> 70 or < 40
	Existing Condition			
	Proposed Condition			
	20b. Percent Riffle >10% slope	>75 - 80	70 - 75	< 70
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-2

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 4 Physicochemical				
Water Quality and Nutrients (Do not complete if stream is ephemeral)	21. Water Appearance and Nutrient Enrichment (USDA 1999)	Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks. Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present	Frequent cloudiness especially after storm events; objects visible to depth 0.5 to 3.0 ft; may have slight green color; no oil sheen on water surface. Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrate	Very turbid or muddy appearance most of the time; objects visible at depth< 0.5 ft; slow moving water maybe bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface; or strong odor of chemicals, oil, sewage, or other pollutants. Pea-green, gray, or brown water along entire reach; dense stands of macrophytes clogging stream; severe algal blooms creating thick algal mats in stream
	Existing Condition			✔
	Proposed Condition	✔		
	22. Detritus (Petersen, 1992)	Mainly consisting of leaves and wood without sediment covering it	Leaves and wood scarce; fine organic debris without sediment	Fine organic sediment - black in color and foul odor (anaerobic) or detritus absent
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 5 Biology				
Biology (Do not complete if stream is ephemeral)	23. Macroinvertebrate Index Semi Quantitative Single Habitat (SQSH) Macroinvertebrate Sample (as defined in 2011 TN State QSSOP for macroinvertebrate surveys)	SQSH Score: >34 (Ecoregion 73A; >24)	SQSH Score: 30-34 (Ecoregion 73A; 20-24)	SQSH Score: <30 (Ecoregion 73A; <20)
	Existing Condition			
	Proposed Condition			
	24. Macroinvertebrate Tolerance from NCBI Metric Score (as defined in the 2011 TN State QSSOP for macroinvertebrate surveys)	Abundant intolerant species 6	Limited intolerant species 4	Only tolerant species <4
	Existing Condition			
	Proposed Condition			
	25. Fish Presence	Abundant	Rare	Not present
	Existing Condition			✔
	Proposed Condition		✔	
	Provide description of cause (s) and stability trend and if F can not be potentially achieved, provide reason			

EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed:	Hurricane Creek-Wolf River (0801021000302)	Rater(s):	C.Duke; C. Liggett
Stream:	STR-2	Date:	01/14/2019
Reach Length:	~597ft	Latitude:	N35.051772
Photo(s):		Longitude:	W89.562266
Reach ID:	R-1		

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 1 Hydrology				
Runoff	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place
	Existing Condition			✔
	Proposed Condition	✔		
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition			✔
	Proposed Condition	✔		
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.50	>1.50
	Existing Condition			✔
	Proposed Condition	✔		
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition			✔
	Proposed Condition	✔		
	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4	1.3 - 1.2	<1.2
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	No concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	Runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	Concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition		✔	
	Proposed Condition	✔		
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 5-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition		✔	
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 3 Geomorphology				
Riparian Vegetation	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	8. Riparian Vegetation Zone (EPA, RBP Habitat Assessment)	Good vegetation community diversity and density; human activities do not impact zone(optimal score 9-10)	Human activities impacted zone minimally (sub-optimal, score 6-8); width of riparian zone 20-40 feet (6-12 meters); human activities have impacted zone a great deal (marginal, score 3-5)	Little or no riparian vegetation due to human activities (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	9. Vegetative Protection	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. (optimal score 9-10)	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. (sub-optimal score 6-8); 50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. (marginal, score 3-5)	Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	10.Riparian Zone Invasive Species	Invasive species not present or sparse	Invasive species well represented and alter the community	Majority of vegetation is invasive
	Left Bank Existing	✔		
	Left Bank Proposed	✔		
	Right Bank Existing	✔		
	Right Bank Proposed	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 3 Geomorphology				
Lateral Stability	11. Dominant BEHI/NBS Rating	L/VL, L/L, L/M, L/H, L/VH, M/VL	M/L, M/M, M/H, L/Ex, H/L, M/VH, M/Ex, H/L, H/M, VH/VL, Ex/VL	H/H, H/Ex, VH/H, Ex/M, Ex/H, Ex/VH, VH/VH, Ex/Ex
	Existing Condition (Right bank)		✔	
	Proposed Condition (Right Bank)	✔		
	Existing Condition (Left bank)		✔	
	Proposed Condition (Left Bank)	✔		
	12. Dominant Bank Erosion	Dominate bank erosion rate is low 10%	Dominate bank erosion rate is moderate 10-25%	Dominate bank erosion rate is high >25%
	Existing Condition		✔	
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Bedform Diversity	13. Shelter for Fish and Macroinvertebrates (EPA 1999)	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, rubble, gravel, cobble and large rocks, or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	20-70% mix of stable habitat; suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale)	Less than 20% mix of stable habitat; lack of habitat availability less than desirables obvious; substrate unstable or lacking
	Existing Condition			✔
	Proposed Condition		✔	
	14. Large Woody Debris Index (LWDI)	LWDI of project reach equals LWDI of reference reach	LWDI of project reach does not equal reference reach, but is trending towards reference	LWDI of project reach does not equal LWDI of reference reach and is not trending towards reference
	Exisiting Condition			✔
	Proposed Condition	✔		
	Streams in Alluvial Valleys (C, E)			
	15. Percent Riffle <3% slope	>60 - <70	70 - 80 or 40 - 60	> 80 or < 40
	Existing Condition			✔
	Proposed Condition	✔		
	16a. Pool-to-Pool Spacing Ratio (Watersheds < 10 mi^2)	>4.0 - <5.0	3.0 - 4.0 or 5.0 - 7.0	< 3.0 or >7.0
	Existing Condition			✔
	Proposed Condition	✔		
	16b. Pool-to-Pool Spacing Ratio (Watersheds > 10 mi^2)	>5.0 - <7.0	3.5 - 5.0 or 7.0 - 8.0	<3.5 or >8.0
	Existing Condition			
	Proposed Condition			
	17a. Pool Max Depth Ratio/Depth Variability (Gravel Bed Streams)	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	17b. Pool Max Depth Ratio/Depth Variability (Sand Bed Streams)	>1.2	1.1 - 1.2	<1.1
	Existing Condition	✔		
	Proposed Condition	✔		
	Moderate Gradient Streams in Colluvial Valleys			
	18. Pool-to-Pool Spacing Ratio (3-5% Slope)	0.5- 4.0	4.0 - 6.0	>6.0
	Existing Condition			
	Proposed Condition			
	19. Pool Max Depth Ratio/Depth Variability	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	20a. Percent Riffle 3% - 10% slope	>50 - <60	50 - 40 or 60 - 70	> 70 or < 40
	Existing Condition			
	Proposed Condition			
	20b. Percent Riffle >10% slope	>75 - 80	70 - 75	< 70
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 4 Physicochemical				
Water Quality and Nutrients (Do not complete if stream is ephemeral)	21. Water Appearance and Nutrient Enrichment (USDA 1999)	Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks. Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present	Frequent cloudiness especially after storm events; objects visible to depth 0.5 to 3.0 ft; may have slight green color; no oil sheen on water surface. Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrate	Very turbid or muddy appearance most of the time; objects visible at depth< 0.5 ft; slow moving water maybe bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface; or strong odor of chemicals, oil, sewage, or other pollutants. Pea-green, gray, or brown water along entire reach; dense stands of macrophytes clogging stream; severe algal blooms creating thick algal mats in stream
	Existing Condition			✔
	Proposed Condition	✔		
	22. Detritus (Petersen, 1992)	Mainly consisting of leaves and wood without sediment covering it	Leaves and wood scarce; fine organic debris without sediment	Fine organic sediment - black in color and foul odor (anaerobic) or detritus absent
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 5 Biology				
Biology (Do not complete if stream is ephemeral)	23. Macroinvertebrate Index Semi Quantitative Single Habitat (SQSH) Macroinvertebrate Sample (as defined in 2011 TN State QSSOP for macroinvertebrate surveys)	SQSH Score: >34 (Ecoregion 73A; >24)	SQSH Score: 30-34 (Ecoregion 73A; 20-24)	SQSH Score: <30 (Ecoregion 73A; <20)
	Existing Condition			
	Proposed Condition			
	24. Macroinvertebrate Tolerance from NCBI Metric Score (as defined in the 2011 TN State QSSOP for macroinvertebrate surveys)	Abundant intolerant species 6	Limited intolerant species 4	Only tolerant species <4
	Existing Condition			
	Proposed Condition			
	25. Fish Presence	Abundant	Rare	Not present
	Existing Condition			✔
	Proposed Condition		✔	
	Provide description of cause (s) and stability trend and if F can not be potentially achieved, provide reason			

EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed:	Hurricane Creek-Wolf River (0801021000302)	Rater(s):	C.Duke; C. Liggett
Stream:	STR-3	Date:	12/21/2018
Reach Length:	~2,317	Latitude:	N35.048023
Photo(s):		Longitude:	W89.562667
Reach ID:	R-1		

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 1 Hydrology				
Runoff	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place
	Existing Condition			✔
	Proposed Condition	✔		
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition			✔
	Proposed Condition	✔		
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.50	>1.50
	Existing Condition			✔
	Proposed Condition	✔		
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition			✔
	Proposed Condition	✔		
	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4	1.3 - 1.2	<1.2
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	No concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	Runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	Concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition		✔	
	Proposed Condition	✔		
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 5-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition		✔	
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 3 Geomorphology				
Riparian Vegetation	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	8. Riparian Vegetation Zone (EPA, RBP Habitat Assessment)	Good vegetation community diversity and density; human activities do not impact zone(optimal score 9-10)	Human activities impacted zone minimally (sub-optimal, score 6-8); width of riparian zone 20-40 feet (6-12 meters); human activities have impacted zone a great deal (marginal, score 3-5)	Little or no riparian vegetation due to human activities (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	9. Vegetative Protection	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. (optimal score 9-10)	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. (sub-optimal score 6-8); 50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. (marginal, score 3-5)	Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	10.Riparian Zone Invasive Species	Invasive species not present or sparse	Invasive species well represented and alter the community	Majority of vegetation is invasive
	Left Bank Existing	✔		
	Left Bank Proposed	✔		
	Right Bank Existing	✔		
	Right Bank Proposed	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 3 Geomorphology				
Lateral Stability	11. Dominant BEHI/NBS Rating	L/VL, L/L, L/M, L/H, L/VH, M/VL	M/L, M/M, M/H, L/Ex, H/L, M/VH, M/Ex, H/L, H/M, VH/VL, Ex/VL	H/H, H/Ex, VH/H, Ex/M, Ex/H, Ex/VH, VH/VH, Ex/Ex
	Existing Condition (Right bank)		✔	
	Proposed Condition (Right Bank)	✔		
	Existing Condition (Left bank)		✔	
	Proposed Condition (Left Bank)	✔		
	12. Dominant Bank Erosion	Dominate bank erosion rate is low 10%	Dominate bank erosion rate is moderate 10-25%	Dominate bank erosion rate is high >25%
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Bedform Diversity	13. Shelter for Fish and Macroinvertebrates (EPA 1999)	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, rubble, gravel, cobble and large rocks, or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	20-70% mix of stable habitat; suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale)	Less than 20% mix of stable habitat; lack of habitat availability less than desirables obvious; substrate unstable or lacking
	Existing Condition			✔
	Proposed Condition		✔	
	14. Large Woody Debris Index (LWDI)	LWDI of project reach equals LWDI of reference reach	LWDI of project reach does not equal reference reach, but is trending towards reference	LWDI of project reach does not equal LWDI of reference reach and is not trending towards reference
	Exisiting Condition			✔
	Proposed Condition	✔		
	Streams in Alluvial Valleys (C, E)			
	15. Percent Riffle <3% slope	>60 - <70	70 - 80 or 40 - 60	> 80 or < 40
	Existing Condition			✔
	Proposed Condition	✔		
	16a. Pool-to-Pool Spacing Ratio (Watersheds < 10 mi^2)	>4.0 - <5.0	3.0 - 4.0 or 5.0 - 7.0	< 3.0 or >7.0
	Existing Condition			✔
	Proposed Condition	✔		
	16b. Pool-to-Pool Spacing Ratio (Watersheds > 10 mi^2)	>5.0 - <7.0	3.5 - 5.0 or 7.0 - 8.0	<3.5 or >8.0
	Existing Condition			
	Proposed Condition			
	17a. Pool Max Depth Ratio/Depth Variability (Gravel Bed Streams)	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	17b. Pool Max Depth Ratio/Depth Variability (Sand Bed Streams)	>1.2	1.1 - 1.2	<1.1
	Existing Condition	✔		
	Proposed Condition	✔		
	Moderate Gradient Streams in Colluvial Valleys			
	18. Pool-to-Pool Spacing Ratio (3-5% Slope)	0.5- 4.0	4.0 - 6.0	>6.0
	Existing Condition			
	Proposed Condition			
	19. Pool Max Depth Ratio/Depth Variability	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	20a. Percent Riffle 3% - 10% slope	>50 - <60	50 - 40 or 60 - 70	> 70 or < 40
	Existing Condition			
	Proposed Condition			
	20b. Percent Riffle >10% slope	>75 - 80	70 - 75	< 70
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 4 Physicochemical				
Water Quality and Nutrients (Do not complete if stream is ephemeral)	21. Water Appearance and Nutrient Enrichment (USDA 1999)	Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks. Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present	Frequent cloudiness especially after storm events; objects visible to depth 0.5 to 3.0 ft; may have slight green color; no oil sheen on water surface. Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrate	Very turbid or muddy appearance most of the time; objects visible at depth< 0.5 ft; slow moving water maybe bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface; or strong odor of chemicals, oil, sewage, or other pollutants. Pea-green, gray, or brown water along entire reach; dense stands of macrophytes clogging stream; severe algal blooms creating thick algal mats in stream
	Existing Condition			✔
	Proposed Condition	✔		
	22. Detritus (Petersen, 1992)	Mainly consisting of leaves and wood without sediment covering it	Leaves and wood scarce; fine organic debris without sediment	Fine organic sediment - black in color and foul odor (anaerobic) or detritus absent
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 5 Biology				
Biology (Do not complete if stream is ephemeral)	23. Macroinvertebrate Index Semi Quantitative Single Habitat (SQSH) Macroinvertebrate Sample (as defined in 2011 TN State QSSOP for macroinvertebrate surveys)	SQSH Score: >34 (Ecoregion 73A; >24)	SQSH Score: 30-34 (Ecoregion 73A; 20-24)	SQSH Score: <30 (Ecoregion 73A; <20)
	Existing Condition			
	Proposed Condition			
	24. Macroinvertebrate Tolerance from NCBI Metric Score (as defined in the 2011 TN State QSSOP for macroinvertebrate surveys)	Abundant intolerant species 6	Limited intolerant species 4	Only tolerant species <4
	Existing Condition			
	Proposed Condition			
	25. Fish Presence	Abundant	Rare	Not present
	Existing Condition			
	Proposed Condition			
	Provide description of cause (s) and stability trend and if F can not be potentially achieved, provide reason			

EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed:	Hurricane Creek-Wolf River (0801021000302)	Rater(s):	C.Duke; C. Liggett
Stream:	STR-4	Date:	12/21/2018
Reach Length:	~1,059	Latitude:	N35.053093
Photo(s):		Longitude:	W89.554914
Reach ID:	R-1		

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 1 Hydrology				
Runoff	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place
	Existing Condition			✔
	Proposed Condition	✔		
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition			✔
	Proposed Condition	✔		
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.50	>1.50
	Existing Condition			✔
	Proposed Condition	✔		
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition			✔
	Proposed Condition	✔		
	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4	1.3 - 1.2	<1.2
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	No concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	Runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	Concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition		✔	
	Proposed Condition	✔		
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 5-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 3 Geomorphology				
Riparian Vegetation	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	8. Riparian Vegetation Zone (EPA, RBP Habitat Assessment)	Good vegetation community diversity and density; human activities do not impact zone(optimal score 9-10)	Human activities impacted zone minimally (sub-optimal, score 6-8); width of riparian zone 20-40 feet (6-12 meters); human activities have impacted zone a great deal (marginal, score 3-5)	Little or no riparian vegetation due to human activities (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	9. Vegetative Protection	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. (optimal score 9-10)	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. (sub-optimal score 6-8); 50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. (marginal, score 3-5)	Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	10.Riparian Zone Invasive Species	Invasive species not present or sparse	Invasive species well represented and alter the community	Majority of vegetation is invasive
	Left Bank Existing	✔		
	Left Bank Proposed	✔		
	Right Bank Existing	✔		
	Right Bank Proposed	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 3 Geomorphology				
Lateral Stability	11. Dominant BEHI/NBS Rating	L/VL, L/L, L/M, L/H, L/VH, M/VL	M/L, M/M, M/H, L/Ex, H/L, M/VH, M/Ex, H/L, H/M, VH/VL, Ex/VL	H/H, H/Ex, VH/H, Ex/M, Ex/H, Ex/VH, VH/VH, Ex/Ex
	Existing Condition (Right bank)		✔	
	Proposed Condition (Right Bank)	✔		
	Existing Condition (Left bank)		✔	
	Proposed Condition (Left Bank)	✔		
	12. Dominant Bank Erosion	Dominate bank erosion rate is low 10%	Dominate bank erosion rate is moderate 10-25%	Dominate bank erosion rate is high >25%
	Existing Condition		✔	
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Bedform Diversity	13. Shelter for Fish and Macroinvertebrates (EPA 1999)	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, rubble, gravel, cobble and large rocks, or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	20-70% mix of stable habitat; suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale)	Less than 20% mix of stable habitat; lack of habitat availability less than desirables obvious; substrate unstable or lacking
	Existing Condition			✔
	Proposed Condition		✔	
	14. Large Woody Debris Index (LWDI)	LWDI of project reach equals LWDI of reference reach	LWDI of project reach does not equal reference reach, but is trending towards reference	LWDI of project reach does not equal LWDI of reference reach and is not trending towards reference
	Exisiting Condition			✔
	Proposed Condition	✔		
	Streams in Alluvial Valleys (C, E)			
	15. Percent Riffle <3% slope	>60 - <70	70 - 80 or 40 - 60	> 80 or < 40
	Existing Condition			✔
	Proposed Condition	✔		
	16a. Pool-to-Pool Spacing Ratio (Watersheds < 10 mi^2)	>4.0 - <5.0	3.0 - 4.0 or 5.0 - 7.0	< 3.0 or >7.0
	Existing Condition			✔
	Proposed Condition	✔		
	16b. Pool-to-Pool Spacing Ratio (Watersheds > 10 mi^2)	>5.0 - <7.0	3.5 - 5.0 or 7.0 - 8.0	<3.5 or >8.0
	Existing Condition			
	Proposed Condition			
	17a. Pool Max Depth Ratio/Depth Variability (Gravel Bed Streams)	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	17b. Pool Max Depth Ratio/Depth Variability (Sand Bed Streams)	>1.2	1.1 - 1.2	<1.1
	Existing Condition	✔		
	Proposed Condition	✔		
	Moderate Gradient Streams in Colluvial Valleys			
	18. Pool-to-Pool Spacing Ratio (3-5% Slope)	0.5- 4.0	4.0 - 6.0	>6.0
	Existing Condition			
	Proposed Condition			
	19. Pool Max Depth Ratio/Depth Variability	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	20a. Percent Riffle 3% - 10% slope	>50 - <60	50 - 40 or 60 - 70	> 70 or < 40
	Existing Condition			
	Proposed Condition			
	20b. Percent Riffle >10% slope	>75 - 80	70 - 75	< 70
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 4 Physicochemical				
Water Quality and Nutrients (Do not complete if stream is ephemeral)	21. Water Appearance and Nutrient Enrichment (USDA 1999)	Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks. Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present	Frequent cloudiness especially after storm events; objects visible to depth 0.5 to 3.0 ft; may have slight green color; no oil sheen on water surface. Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrate	Very turbid or muddy appearance most of the time; objects visible at depth< 0.5 ft; slow moving water maybe bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface; or strong odor of chemicals, oil, sewage, or other pollutants. Pea-green, gray, or brown water along entire reach; dense stands of macrophytes clogging stream; severe algal blooms creating thick algal mats in stream
	Existing Condition			✔
	Proposed Condition	✔		
	22. Detritus (Petersen, 1992)	Mainly consisting of leaves and wood without sediment covering it	Leaves and wood scarce; fine organic debris without sediment	Fine organic sediment - black in color and foul odor (anaerobic) or detritus absent
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 5 Biology				
Biology (Do not complete if stream is ephemeral)	23. Macroinvertebrate Index Semi Quantitative Single Habitat (SQSH) Macroinvertebrate Sample (as defined in 2011 TN State QSSOP for macroinvertebrate surveys)	SQSH Score: >34 (Ecoregion 73A; >24)	SQSH Score: 30-34 (Ecoregion 73A; 20-24)	SQSH Score: <30 (Ecoregion 73A; <20)
	Existing Condition			
	Proposed Condition			
	24. Macroinvertebrate Tolerance from NCBI Metric Score (as defined in the 2011 TN State QSSOP for macroinvertebrate surveys)	Abundant intolerant species 6	Limited intolerant species 4	Only tolerant species <4
	Existing Condition			
	Proposed Condition			
	25. Fish Presence	Abundant	Rare	Not present
	Existing Condition			✔
	Proposed Condition		✔	
	Provide description of cause (s) and stability trend and if F can not be potentially achieved, provide reason			

EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed:	Hurricane Creek-Wolf River (0801021000302)	Rater(s):	C.Duke; C. Liggett
Stream:	STR-5	Date:	12/21/2018
Reach Length:	~2,865	Latitude:	N35.048336
Photo(s):		Longitude:	W89.570358
Reach ID:	R-1		

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 1 Hydrology				
Runoff	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place
	Existing Condition			✔
	Proposed Condition	✔		
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition			✔
	Proposed Condition	✔		
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.50	>1.50
	Existing Condition			✔
	Proposed Condition	✔		
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition			✔
	Proposed Condition	✔		
	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4	1.3 - 1.2	<1.2
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	No concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	Runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	Concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition		✔	
	Proposed Condition	✔		
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 5-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition		✔	
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 3 Geomorphology				
Riparian Vegetation	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	8. Riparian Vegetation Zone (EPA, RBP Habitat Assessment)	Good vegetation community diversity and density; human activities do not impact zone(optimal score 9-10)	Human activities impacted zone minimally (sub-optimal, score 6-8); width of riparian zone 20-40 feet (6-12 meters); human activities have impacted zone a great deal (marginal, score 3-5)	Little or no riparian vegetation due to human activities (poor score 0-2)
	Left Bank Existing		✔	
	Left Bank Proposed	✔		
	Right Bank Existing		✔	
	Right Bank Proposed	✔		
	9. Vegetative Protection	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. (optimal score 9-10)	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. (sub-optimal score 6-8); 50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. (marginal, score 3-5)	Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. (poor score 0-2)
	Left Bank Existing			✔
	Left Bank Proposed	✔		
	Right Bank Existing			✔
	Right Bank Proposed	✔		
	10.Riparian Zone Invasive Species	Invasive species not present or sparse	Invasive species well represented and alter the community	Majority of vegetation is invasive
	Left Bank Existing	✔		
	Left Bank Proposed	✔		
	Right Bank Existing	✔		
	Right Bank Proposed	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 3 Geomorphology				
Lateral Stability	11. Dominant BEHI/NBS Rating	L/VL, L/L, L/M, L/H, L/VH, M/VL	M/L, M/M, M/H, L/Ex, H/L, M/VH, M/Ex, H/L, H/M, VH/VL, Ex/VL	H/H, H/Ex, VH/H, Ex/M, Ex/H, Ex/VH, VH/VH, Ex/Ex
	Existing Condition (Right bank)		✔	
	Proposed Condition (Right Bank)	✔		
	Existing Condition (Left bank)		✔	
	Proposed Condition (Left Bank)	✔		
	12. Dominant Bank Erosion	Dominate bank erosion rate is low 10%	Dominate bank erosion rate is moderate 10-25%	Dominate bank erosion rate is high >25%
	Existing Condition			✔
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Bedform Diversity	13. Shelter for Fish and Macroinvertebrates (EPA 1999)	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, rubble, gravel, cobble and large rocks, or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	20-70% mix of stable habitat; suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale)	Less than 20% mix of stable habitat; lack of habitat availability less than desirables obvious; substrate unstable or lacking
	Existing Condition			✔
	Proposed Condition		✔	
	14. Large Woody Debris Index (LWDI)	LWDI of project reach equals LWDI of reference reach	LWDI of project reach does not equal reference reach, but is trending towards reference	LWDI of project reach does not equal LWDI of reference reach and is not trending towards reference
	Exisiting Condition			✔
	Proposed Condition	✔		
	Streams in Alluvial Valleys (C, E)			
	15. Percent Riffle <3% slope	>60 - <70	70 - 80 or 40 - 60	> 80 or < 40
	Existing Condition			✔
	Proposed Condition		✔	
	16a. Pool-to-Pool Spacing Ratio (Watersheds < 10 mi^2)	>4.0 - <5.0	3.0 - 4.0 or 5.0 - 7.0	< 3.0 or >7.0
	Existing Condition			✔
	Proposed Condition		✔	
	16b. Pool-to-Pool Spacing Ratio (Watersheds > 10 mi^2)	>5.0 - <7.0	3.5 - 5.0 or 7.0 - 8.0	<3.5 or >8.0
	Existing Condition			
	Proposed Condition			
	17a. Pool Max Depth Ratio/Depth Variability (Gravel Bed Streams)	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	17b. Pool Max Depth Ratio/Depth Variability (Sand Bed Streams)	>1.2	1.1 - 1.2	<1.1
	Existing Condition			✔
	Proposed Condition	✔		
	Moderate Gradient Streams in Colluvial Valleys			
	18. Pool-to-Pool Spacing Ratio (3-5% Slope)	0.5- 4.0	4.0 - 6.0	>6.0
	Existing Condition			
	Proposed Condition			
	19. Pool Max Depth Ratio/Depth Variability	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	20a. Percent Riffle 3% - 10% slope	>50 - <60	50 - 40 or 60 - 70	> 70 or < 40
	Existing Condition			
	Proposed Condition			
	20b. Percent Riffle >10% slope	>75 - 80	70 - 75	< 70
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 4 Physicochemical				
Water Quality and Nutrients (Do not complete if stream is ephemeral)	21. Water Appearance and Nutrient Enrichment (USDA 1999)	Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks. Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present	Frequent cloudiness especially after storm events; objects visible to depth 0.5 to 3.0 ft; may have slight green color; no oil sheen on water surface. Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrate	Very turbid or muddy appearance most of the time; objects visible at depth< 0.5 ft; slow moving water maybe bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface; or strong odor of chemicals, oil, sewage, or other pollutants. Pea-green, gray, or brown water along entire reach; dense stands of macrophytes clogging stream; severe algal blooms creating thick algal mats in stream
	Existing Condition			✔
	Proposed Condition	✔		
	22. Detritus (Petersen, 1992)	Mainly consisting of leaves and wood without sediment covering it	Leaves and wood scarce; fine organic debris without sediment	Fine organic sediment - black in color and foul odor (anaerobic) or detritus absent
	Existing Condition		✔	
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 5 Biology				
Biology (Do not complete if stream is ephemeral)	23. Macroinvertebrate Index Semi Quantitative Single Habitat (SQSH) Macroinvertebrate Sample (as defined in 2011 TN State QSSOP for macroinvertebrate surveys)	SQSH Score: >34 (Ecoregion 73A; >24)	SQSH Score: 30-34 (Ecoregion 73A; 20-24)	SQSH Score: <30 (Ecoregion 73A; <20)
	Existing Condition			
	Proposed Condition			
	24. Macroinvertebrate Tolerance from NCBI Metric Score (as defined in the 2011 TN State QSSOP for macroinvertebrate surveys)	Abundant intolerant species 6	Limited intolerant species 4	Only tolerant species <4
	Existing Condition			
	Proposed Condition			
	25. Fish Presence	Abundant	Rare	Not present
	Existing Condition			
	Proposed Condition			
	Provide description of cause (s) and stability trend and if F can not be potentially achieved, provide reason			

EXISTING and PROPOSED REACH LEVEL STREAM FUNCTION-BASED RAPID ASSESSMENT FIELD DATA FORM

Watershed:	Hurricane Creek-Wolf River (0801021000302)	Rater(s):	C.Duke; C. Liggett
Stream:	STR-8	Date:	12/21/2018
Reach Length:	~3,248	Latitude:	N35.047983
Photo(s):		Longitude:	W89.553318
Reach ID:	R-1		

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 1 Hydrology				
Runoff	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potential for concentrated flow/impairments to reach restoration site, however, measures are in place to protect resources	Potential for concentrated flow/impairments to reach restoration site and no treatments are in place
	Existing Condition			✔
	Proposed Condition	✔		
	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
	Existing Condition		✔	
	Proposed Condition	✔		
	If existing runoff is FAR or NF, provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 2 Hydraulics				
Floodplain Connectivity (Vertical Stability)	3. Bank Height Ratio (BHR)	1.0-1.2	1.21 - 1.50	>1.50
	Existing Condition		✔	
	Proposed Condition	✔		
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2	2.2 - 2.0	<2.0
	Existing Condition	✔		
	Proposed Condition	✔		
	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4	1.3 - 1.2	<1.2
	Existing Condition			
	Proposed Condition			
	5. Floodplain Drainage	No concentrated flow; runoff is primarily sheet flow; hillslopes < 10%; hillslopes >200 ft from stream; ponding or wetland areas and litter or debris jams are well represented	Runoff is equally sheet and concentrated flow (minor gully and rill erosion occurring); hillslopes 10 - 40%; hillslopes 50 - 200 ft from stream; ponding or wetland areas and litter or debris jams are minimally represented	Concentrated flows present (extensive gully and rill erosion); hillslopes >40%; hillslopes <50 ft from stream; ponding or wetland areas and litter or debris jams are not well represented or absent
	Existing Condition		✔	
	Proposed Condition	✔		
	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Instability: 5-50% of bottom affected by localized vertical stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down-cutting; head cuts present
	Existing Condition		✔	
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Stream Function Pyramid Level 3 Geomorphology				
Riparian Vegetation	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing		✔	
	Left Bank Proposed	✔		
	Right Bank Existing	✔		
	Right Bank Proposed	✔		
	8. Riparian Vegetation Zone (EPA, RBP Habitat Assessment)	Good vegetation community diversity and density; human activities do not impact zone(optimal score 9-10)	Human activities impacted zone minimally (sub-optimal, score 6-8); width of riparian zone 20-40 feet (6-12 meters); human activities have impacted zone a great deal (marginal, score 3-5)	Little or no riparian vegetation due to human activities (poor score 0-2)
	Left Bank Existing		✔	
	Left Bank Proposed	✔		
	Right Bank Existing		✔	
	Right Bank Proposed	✔		
	9. Vegetative Protection	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. (optimal score 9-10)	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. (sub-optimal score 6-8); 50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. (marginal, score 3-5)	Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. (poor score 0-2)
	Left Bank Existing		✔	
	Left Bank Proposed		✔	
	Right Bank Existing		✔	
	Right Bank Proposed		✔	
	10.Riparian Zone Invasive Species	Invasive species not present or sparse	Invasive species well represented and alter the community	Majority of vegetation is invasive
	Left Bank Existing	✔		
	Left Bank Proposed	✔		
	Right Bank Existing	✔		
	Right Bank Proposed	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 3 Geomorphology				
Lateral Stability	11. Dominant BEHI/NBS Rating	L/VL, L/L, L/M, L/H, L/VH, M/VL	M/L, M/M, M/H, L/Ex, H/L, M/VH, M/Ex, H/L, H/M, VH/VL, Ex/VL	H/H, H/Ex, VH/H, Ex/M, Ex/H, Ex/VH, VH/VH, Ex/Ex
	Existing Condition (Right bank)		✔	
	Proposed Condition (Right Bank)		✔	
	Existing Condition (Left bank)		✔	
	Proposed Condition (Left Bank)		✔	
	12. Dominant Bank Erosion	Dominate bank erosion rate is low 10%	Dominate bank erosion rate is moderate 10-25%	Dominate bank erosion rate is high >25%
	Existing Condition		✔	
	Proposed Condition		✔	
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category		
		Functioning	Functioning-at-Risk	Not Functioning
Bedform Diversity	13. Shelter for Fish and Macroinvertebrates (EPA 1999)	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, rubble, gravel, cobble and large rocks, or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	20-70% mix of stable habitat; suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale)	Less than 20% mix of stable habitat; lack of habitat availability less than desirables obvious; substrate unstable or lacking
	Existing Condition		✔	
	Proposed Condition		✔	
	14. Large Woody Debris Index (LWDI)	LWDI of project reach equals LWDI of reference reach	LWDI of project reach does not equal reference reach, but is trending towards reference	LWDI of project reach does not equal LWDI of reference reach and is not trending towards reference
	Exisiting Condition		✔	
	Proposed Condition		✔	
	Streams in Alluvial Valleys (C, E)			
	15. Percent Riffle <3% slope	>60 - <70	70 - 80 or 40 - 60	> 80 or < 40
	Existing Condition		✔	
	Proposed Condition		✔	
	16a. Pool-to-Pool Spacing Ratio (Watersheds < 10 mi^2)	>4.0 - <5.0	3.0 - 4.0 or 5.0 - 7.0	< 3.0 or >7.0
	Existing Condition		✔	
	Proposed Condition		✔	
	16b. Pool-to-Pool Spacing Ratio (Watersheds > 10 mi^2)	>5.0 - <7.0	3.5 - 5.0 or 7.0 - 8.0	<3.5 or >8.0
	Existing Condition			
	Proposed Condition			
	17a. Pool Max Depth Ratio/Depth Variability (Gravel Bed Streams)	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	17b. Pool Max Depth Ratio/Depth Variability (Sand Bed Streams)	>1.2	1.1 - 1.2	<1.1
	Existing Condition		✔	
	Proposed Condition		✔	
	Moderate Gradient Streams in Colluvial Valleys			
	18. Pool-to-Pool Spacing Ratio (3-5% Slope)	0.5- 4.0	4.0 - 6.0	>6.0
	Existing Condition			
	Proposed Condition			
	19. Pool Max Depth Ratio/Depth Variability	>1.5	1.2 - 1.5	<1.2
	Existing Condition			
	Proposed Condition			
	20a. Percent Riffle 3% - 10% slope	>50 - <60	50 - 40 or 60 - 70	> 70 or < 40
	Existing Condition			
	Proposed Condition			
	20b. Percent Riffle >10% slope	>75 - 80	70 - 75	< 70
	Existing Condition			
	Proposed Condition			
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Reach ID:	R-1

Function-based Rapid Reach Level Stream Assessment

Assessment Parameter	Measurement Method	Category: Functioning	Category: Functioning-at-Risk	Category: Not Functioning
Stream Function Pyramid Level 4 Physicochemical				
Water Quality and Nutrients (Do not complete if stream is ephemeral)	21. Water Appearance and Nutrient Enrichment (USDA 1999)	Very clear, or clear but tea-colored; objects visible at depth 3 to 6 ft (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks. Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present	Frequent cloudiness especially after storm events; objects visible to depth 0.5 to 3.0 ft; may have slight green color; no oil sheen on water surface. Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrate	Very turbid or muddy appearance most of the time; objects visible at depth< 0.5 ft; slow moving water maybe bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface; or strong odor of chemicals, oil, sewage, or other pollutants. Pea-green, gray, or brown water along entire reach; dense stands of macrophytes clogging stream; severe algal blooms creating thick algal mats in stream
	Existing Condition			✔
	Proposed Condition	✔		
	22. Detritus (Petersen, 1992)	Mainly consisting of leaves and wood without sediment covering it	Leaves and wood scarce; fine organic debris without sediment	Fine organic sediment - black in color and foul odor (anaerobic) or detritus absent
	Existing Condition		✔	
	Proposed Condition	✔		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
Stream Function Pyramid Level 5 Biology				
Biology (Do not complete if stream is ephemeral)	23. Macroinvertebrate Index Semi Quantitative Single Habitat (SQSH) Macroinvertebrate Sample (as defined in 2011 TN State QSSOP for macroinvertebrate surveys)	SQSH Score: >34 (Ecoregion 73A; >24)	SQSH Score: 30-34 (Ecoregion 73A; 20-24)	SQSH Score: <30 (Ecoregion 73A; <20)
	Existing Condition			
	Proposed Condition			
	24. Macroinvertebrate Tolerance from NCBI Metric Score (as defined in the 2011 TN State QSSOP for macroinvertebrate surveys)	Abundant intolerant species 6	Limited intolerant species 4	Only tolerant species <4
	Existing Condition			
	Proposed Condition			
	25. Fish Presence	Abundant	Rare	Not present
	Existing Condition			✔
	Proposed Condition			✔
	Provide description of cause (s) and stability trend and if F can not be potentially achieved, provide reason			

APPENDIX E

GEOMORPHIC ASSESSMENT FORMS

Stream Name: STR-1 R-1

Date: 1/14/2019

Hydraulic and Geomorphic Assessment Data Form

Form created by Stream Mechanics and modified by Corps on 5/17/2016

I. Bankfull Verification

A.	Regional Curve	65/74	
B.	Drainage Area	0.06	sq. miles
C.	Difference between bankfull stage and water surface	1.30	feet
D.	Bankfull Width (Measured)	26.39	feet
E.	Bankfull Area (Measured)	41.11	sq. feet
F.	Bankfull Mean Depth (Area/Width)	1.56	feet
G.	Bankfull Width (Regional Curve)	6.15	feet
H.	Bankfull Area (Regional Curve)	3.03	sq. feet
I.	Bankfull Mean Depth (Regional Curve)	0.49	feet

Area Calculations

II. Stream Classification

A.	Bankfull W/D, calculate as $\frac{Bankfull\ Width}{Bankfull\ Mean\ Depth}$	16.92	ft/ft.
B.	Bankfull Max Riffle Depth (Dmax)	2.0	feet
C.	Floodprone Area Width	28.0	feet
D.	Entrenchment Ratio, calculate as $\frac{Floodprone\ Area\ Width}{Bankfull\ Width}$	1.06	ft/ft.
E.	Slope Estimate	.01	ft/ft.
F.	Channel Material Estimate	60% silt, 40% sand	
G.	Rosgen Stream Type	F	

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R_1	R_2	R_3	R_4
Low Bank Height (LBH)	3			
Dmax	2.0			
Bank Height Ratio (LBH/Dmax)	1.5			
Riffle Length	84 ft			

B. Weighted Bank Height Ration, calculate as $\frac{\Sigma(Bank\ Height\ Ratio_i \text{ x Riffle Length}_i)}{\Sigma Riffle\ Length}$ 1.5 ft/ft.

C. Entrenchment Ratio from Riffle 1.06 ft/ft.

IV. Bedform Diversity

A. Pool Data

	P_1	P_2	P_3	P_4	P_5
Station	144				
Pool to Pool Spacing	84				
Pool Spacing Ratio, $\frac{Pool\ Spacing}{Bankfull\ Width}$	3.18				
Pool Depth (max depth at bankfull)	3.36				
Pool Depth Ratio, $\frac{Pool\ Depth}{Bankfull\ Mean\ Depth}$	2.15				

B. Average Pool Spacing Ratio 3.18 ft/ft.

C. Average Pool Depth Ratio 2.15 ft/ft.

V. Large Woody Debris[7]

A. Number of Pieces per 100m 0

B. Large Woody Debris Index 0

[7] Davis, Jeffrey C., G. Wayne Minshall, Christopher T. Robinson, Peter Landres. Monitoring Wilderness Stream Ecosystems. USDA Forest Service General Technical Report RMRS-GTR-70 (January 2001). http://www.fs.fed.us/rm/pubs/rmrs_gtr070.pdf

VI. Lateral Stability

A. Bank Data

BEHI/NBS[8] Score	Bank Length
Moderte/Low	400

B. Total Eroding Bank Length 163 ft.

C. Total Bank Length 200 ft.

D. Dominant BEHI/NBS Score Moderate/Low

E. Percent of Bank Erosion, calculate as

$$\frac{Total \quad » Æ \; Æ^{-} \quad Æ}{\quad ´ \quad » \quad Æ^{-} \quad Æ}$$

82% %

VI. Riparian Vegetation

A. Riparian Vegetation Data

	Left	Right
Riparian/Buffer Width	0	0
RBP Score	0	0

VII. Channel Evolution

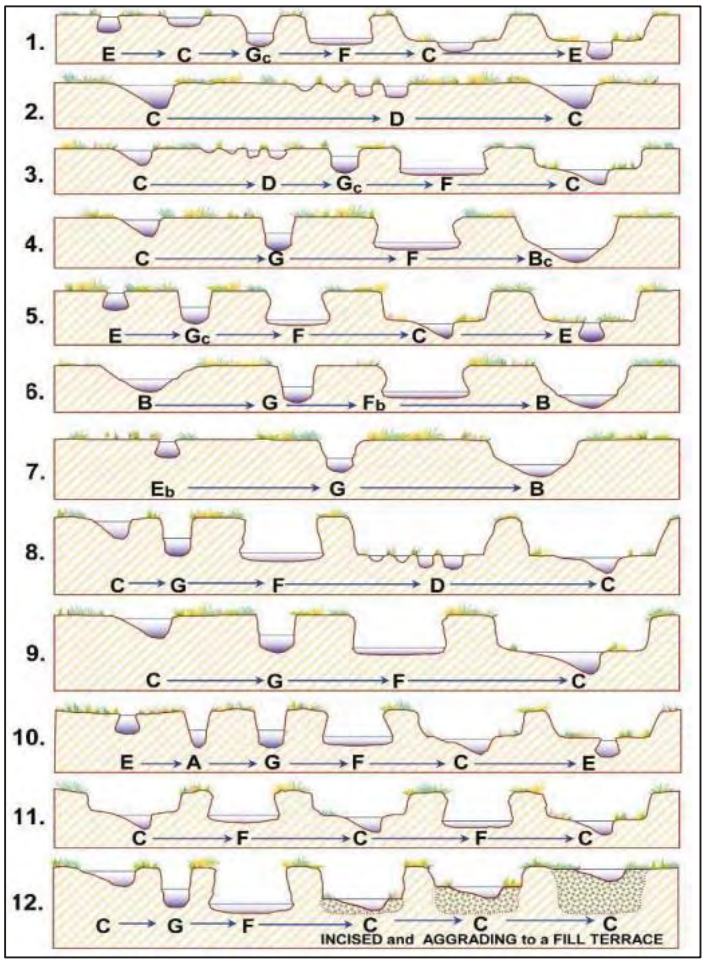
A. Rosgen Channel Type Succession 5

B. Simon Channel Evolution Model (Stage) 2

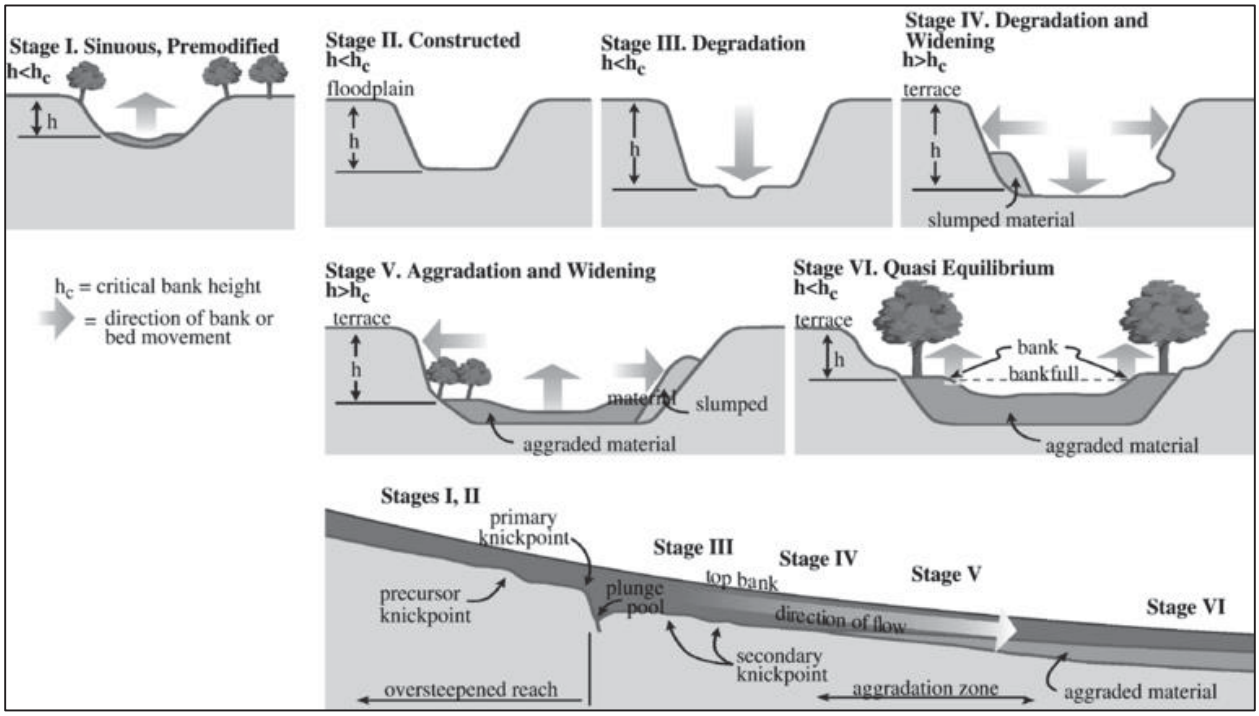
C. Provide a brief narrative describing the channel evolution trend.

[8] Rosgen, D. 2014. River Stability Field Guide (Second Edition). Wildland Hydrology, Fort Collins, CO.

Rosgen Channel Type Succession Scenarios



Simon Channel Evolution Model



Stream Name: STR-1 R-2

Date: 1/14/2019

Hydraulic and Geomorphic Assessment Data Form

Form created by Stream Mechanics and modified by Corps on 5/17/2016

I. Bankfull Verification

A.	Regional Curve	65/74	
B.	Drainage Area	0.37	sq. miles
C.	Difference between bankfull stage and water surface	1.68	feet
D.	Bankfull Width (Measured)	18.44	feet
E.	Bankfull Area (Measured)	28.45	sq. feet
F.	Bankfull Mean Depth (Area/Width)	1.54	feet
G.	Bankfull Width (Regional Curve)	11.46	feet
H.	Bankfull Area (Regional Curve)	10.76	sq. feet
I.	Bankfull Mean Depth (Regional Curve)	0.94	feet

Area Calculations

II. Stream Classification

A.	Bankfull W/D, calculate as $\frac{Bankfull\ Width}{Bankfull\ Mean\ Depth}$	11.97	ft/ft.
B.	Bankfull Max Riffle Depth (Dmax)	2.53	feet
C.	Floodprone Area Width	32.36	feet
D.	Entrenchment Ratio, calculate as $\frac{Floodprone\ Area\ Width}{Bankfull\ Width}$	1.75	ft/ft.
E.	Slope Estimate	0.01	ft/ft.
F.	Channel Material Estimate	60% silt, 40% sand	
G.	Rosgen Stream Type	B	

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R_1	R_2	R_3	R_4
Low Bank Height (LBH)	3.97	4.11	3.79	3.64
Dmax	1.80	1.62	1.94	1.47
Bank Height Ratio (LBH/Dmax)	2.21	2.54	1.95	2.48
Riffle Length	13	27	136	12

B. Weighted Bank Height Ration, calculate as $\frac{\Sigma(Bank\ Height\ Ratio_i \text{ x Riffle Length}_i)}{\Sigma Riffle\ Length}$ 2.09 ft/ft.

C. Entrenchment Ratio from Riffle 1.84 ft/ft.

IV. Bedform Diversity

A. Pool Data

	P_1	P_2	P_3	P_4	P_5
Station	22	78	158	232	270
Pool to Pool Spacing	22	56	80	74	38
Pool Spacing Ratio, $\frac{Pool\ Spacing}{Bankfull\ Width}$	1.27	2.67	5	4.77	2.38
Pool Depth (max depth at bankfull)	1.43	1.31	1.21	1.07	1.40
Pool Depth Ratio, $\frac{Pool\ Depth}{Bankfull\ Mean\ Depth}$	0.93	0.85	0.79	0.69	0.91

B. Average Pool Spacing Ratio 3.22 ft/ft.

C. Average Pool Depth Ratio 0.83 ft/ft.

V. Large Woody Debris[7]

A. Number of Pieces per 100m 0

B. Large Woody Debris Index 0

[7] Davis, Jeffrey C., G. Wayne Minshall, Christopher T. Robinson, Peter Landres. Monitoring Wilderness Stream Ecosystems. USDA Forest Service General Technical Report RMRS-GTR-70 (January 2001). http://www.fs.fed.us/rm/pubs/rmrs_gtr070.pdf

STR-1 R-2

1/14/2019

VI. Lateral Stability

A. Bank Data

BEHI/NBS[8] Score	Bank Length
Very High/Low	275

B. Total Eroding Bank Length 275 ft.

C. Total Bank Length 275 ft.

D. Dominant BEHI/NBS Score Extreme/Low

E. Percent of Bank Erosion, calculate as

$$\frac{Total \quad » Æ \; Æ^{-} \quad Æ}{\quad ´ \quad » \quad Æ^{-} \quad Æ}$$

100 %

VI. Riparian Vegetation

A. Riparian Vegetation Data

	Left	Right
Riparian/Buffer Width	0	0
RBP Score	0	0

VII. Channel Evolution

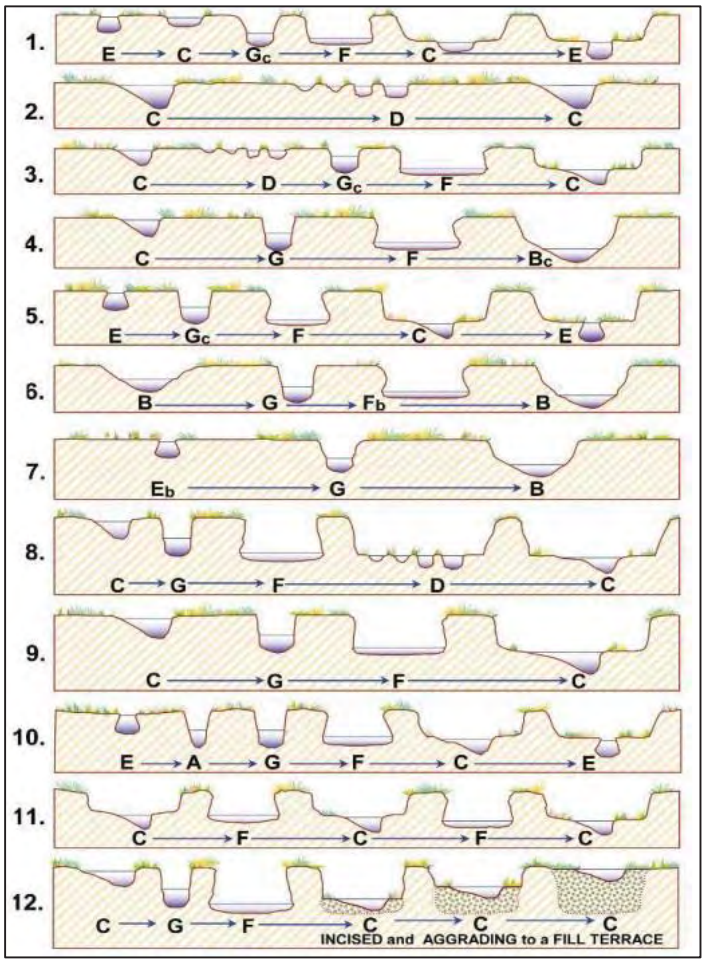
A. Rosgen Channel Type Succession 5

B. Simon Channel Evolution Model (Stage) 2

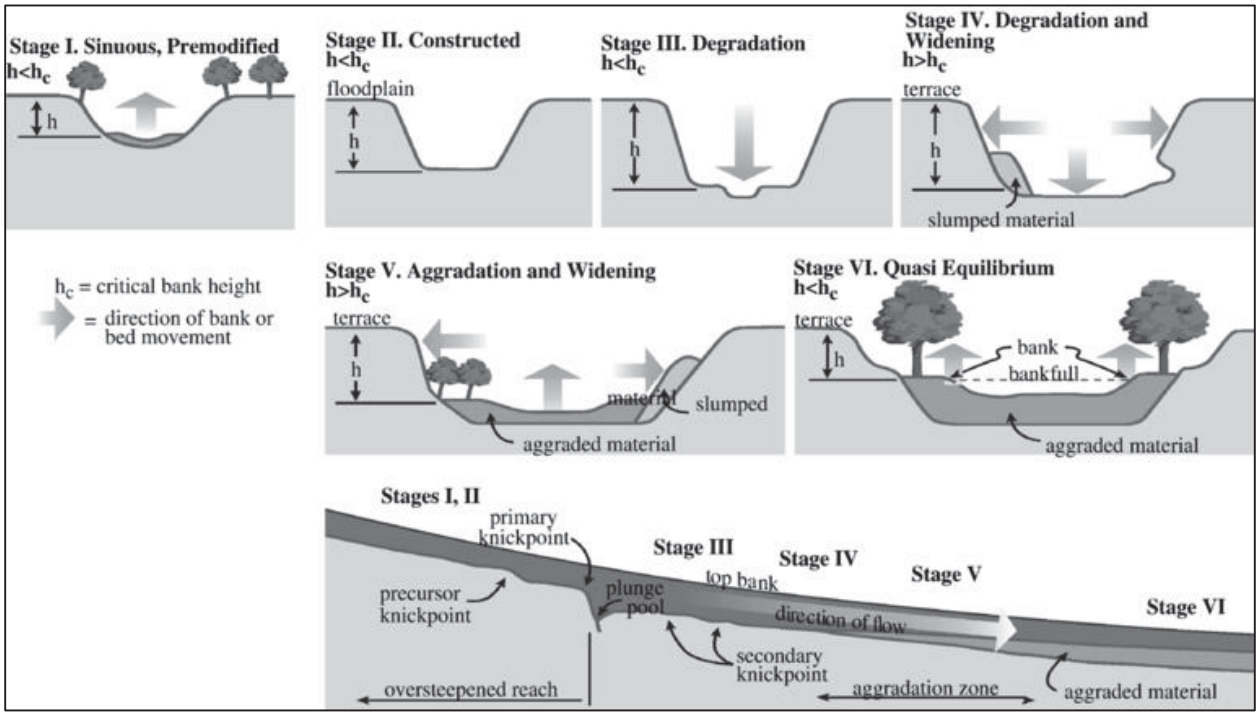
C. Provide a brief narrative describing the channel evolution trend.

[8] Rosgen, D. 2014. River Stability Field Guide (Second Edition). Wildland Hydrology, Fort Collins, CO.

Rosgen Channel Type Succession Scenarios



Simon Channel Evolution Model



Stream Name: STR-2 R-1

Date: 1/02/2019

Hydraulic and Geomorphic Assessment Data Form

Form created by Stream Mechanics and modified by Corps on 5/17/2016

I. Bankfull Verification

A.	Regional Curve	65/74	
B.	Drainage Area	0.06	sq. miles
C.	Difference between bankfull stage and water surface	0.66	feet
D.	Bankfull Width (Measured)	9.12	feet
E.	Bankfull Area (Measured)	5.26	sq. feet
F.	Bankfull Mean Depth (Area/Width)	0.58	feet
G.	Bankfull Width (Regional Curve)	6.15	feet
H.	Bankfull Area (Regional Curve)	3.03	sq. feet
I.	Bankfull Mean Depth (Regional Curve)	0.49	feet

Area Calculations

II. Stream Classification

A.	Bankfull W/D, calculate as $\frac{Bankfull\ Width}{Bankfull\ Mean\ Depth}$	15.72	ft/ft.
B.	Bankfull Max Riffle Depth (Dmax)	1.5	feet
C.	Floodprone Area Width	16.78	feet
D.	Entrenchment Ratio, calculate as $\frac{Floodprone\ Area\ Width}{Bankfull\ Width}$	1.84	ft/ft.
E.	Slope Estimate	0.01	ft/ft.
F.	Channel Material Estimate	80% silt, 20% sand	
G.	Rosgen Stream Type	B	

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R_1	R_2	R_3	R_4
Low Bank Height (LBH)	3.78			
Dmax	1.5			
Bank Height Ratio (LBH/Dmax)	2.52			
Riffle Length	82 ft			

B. Weighted Bank Height Ration, calculate as $\frac{\Sigma(Bank\ Height\ Ratio_i \text{ x Riffle Length}_i)}{\Sigma Riffle\ Length}$ 2.52 ft/ft.

C. Entrenchment Ratio from Riffle 1.84 ft/ft.

IV. Bedform Diversity

A. Pool Data

	P_1	P_2	P_3	P_4	P_5
Station	148				
Pool to Pool Spacing	66				
Pool Spacing Ratio, $\frac{Pool\ Spacing}{Bankfull\ Width}$	7.23				
Pool Depth (max depth at bankfull)	1.5				
Pool Depth Ratio, $\frac{Pool\ Depth}{Bankfull\ Mean\ Depth}$	2.59				

B. Average Pool Spacing Ratio 7.23 ft/ft.

C. Average Pool Depth Ratio 2.59 ft/ft.

V. Large Woody Debris[7]

A. Number of Pieces per 100m 0

B. Large Woody Debris Index 0

[7] Davis, Jeffrey C., G. Wayne Minshall, Christopher T. Robinson, Peter Landres. Monitoring Wilderness Stream Ecosystems. USDA Forest Service General Technical Report RMRS-GTR-70 (January 2001). http://www.fs.fed.us/rm/pubs/rmrs_gtr070.pdf

VI. Lateral Stability

A. Bank Data

BEHI/NBS[8] Score	Bank Length
Moderate/Low	200

B. Total Eroding Bank Length 40 ft.

C. Total Bank Length 200 ft.

D. Dominant BEHI/NBS Score Moderate/Low

E. Percent of Bank Erosion, calculate as

$$\frac{Total \quad » Æ \; Æ^{-} \quad Æ}{\quad ´ \quad » \quad Æ^{-} \quad Æ}$$

20 %

VI. Riparian Vegetation

A. Riparian Vegetation Data

	Left	Right
Riparian/Buffer Width	0	0
RBP Score	0	0

VII. Channel Evolution

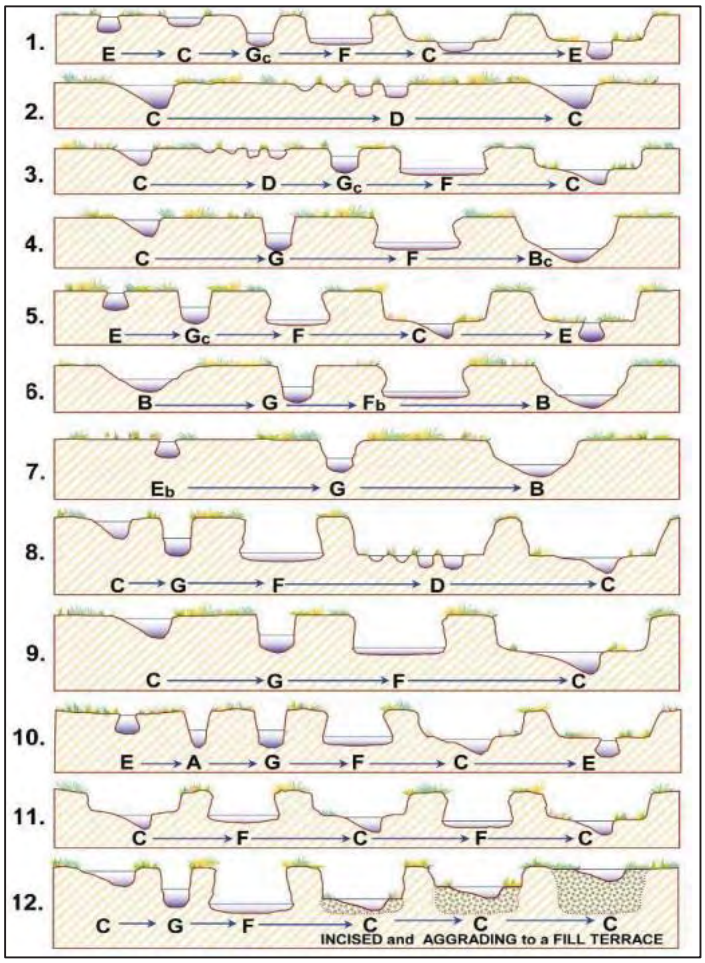
A. Rosgen Channel Type Succession 5

B. Simon Channel Evolution Model (Stage) 2

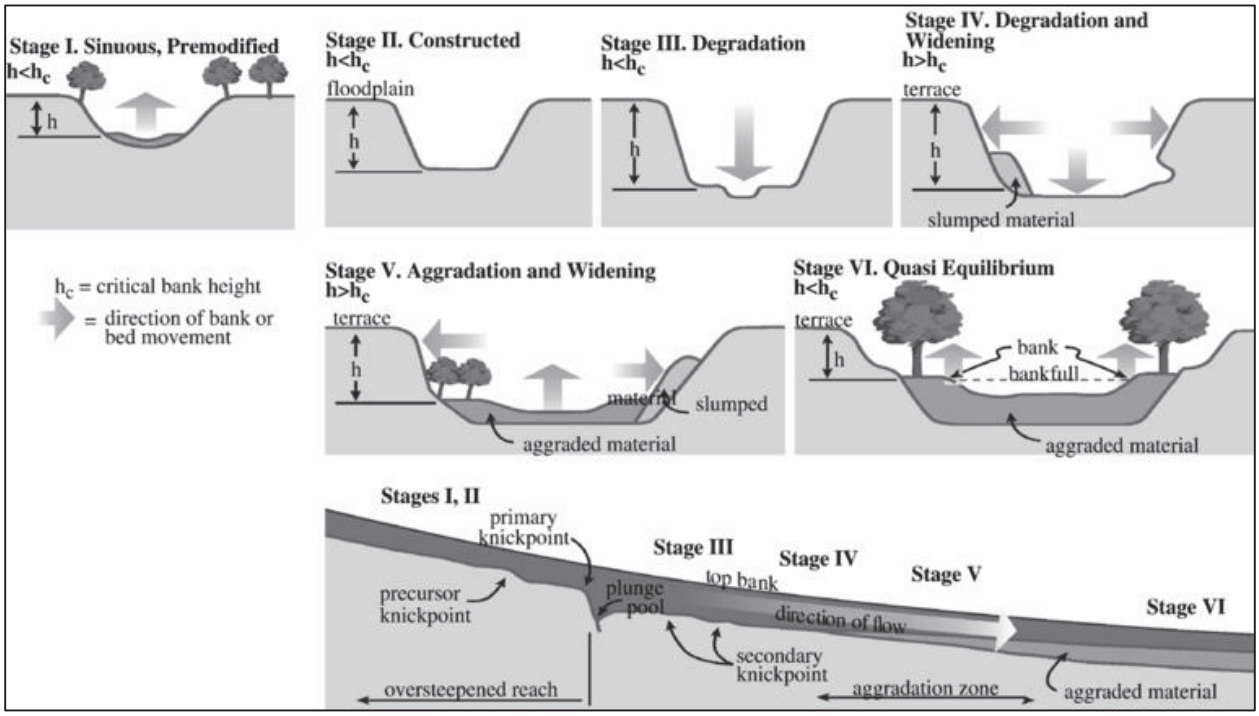
C. Provide a brief narrative describing the channel evolution trend.

[8] Rosgen, D. 2014. River Stability Field Guide (Second Edition). Wildland Hydrology, Fort Collins, CO.

Rosgen Channel Type Succession Scenarios



Simon Channel Evolution Model



Stream Name: STR-3 R-1

Date: 1/02/2019

Hydraulic and Geomorphic Assessment Data Form

Form created by Stream Mechanics and modified by Corps on 5/17/2016

I. Bankfull Verification

A.	Regional Curve	65/74	
B.	Drainage Area	1.4	sq. miles
C.	Difference between bankfull stage and water surface	0.44	feet
D.	Bankfull Width (Measured)	28.55	feet
E.	Bankfull Area (Measured)	42.47	sq. feet
F.	Bankfull Mean Depth (Area/Width)	1.49	feet
G.	Bankfull Width (Regional Curve)	18.06	feet
H.	Bankfull Area (Regional Curve)	27.17	sq. feet
I.	Bankfull Mean Depth (Regional Curve)	1.51	feet

Area Calculations

II. Stream Classification

A.	Bankfull W/D, calculate as $\frac{Bankfull\ Width}{Bankfull\ Mean\ Depth}$	19.16	ft/ft.
B.	Bankfull Max Riffle Depth (Dmax)	2.12	feet
C.	Floodprone Area Width	42.87	feet
D.	Entrenchment Ratio, calculate as $\frac{Floodprone\ Area\ Width}{Bankfull\ Width}$	1.5	ft/ft.
E.	Slope Estimate	0.01	ft/ft.
F.	Channel Material Estimate	80% silt, 20% sand	
G.	Rosgen Stream Type	B	

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R_1	R_2	R_3	R_4
Low Bank Height (LBH)	4.06			
Dmax	2.12			
Bank Height Ratio (LBH/Dmax)	1.92			
Riffle Length	NA			

B. Weighted Bank Height Ration, calculate as $\frac{\Sigma(Bank\ Height\ Ratio_i \text{ x Riffle Length}_i)}{\Sigma Riffle\ Length}$ NA ft/ft.

C. Entrenchment Ratio from Riffle 1.5 ft/ft.

IV. Bedform Diversity

A. Pool Data

	P_1	P_2	P_3	P_4	P_5
Station	122				
Pool to Pool Spacing	NA				
Pool Spacing Ratio, $\frac{Pool\ Spacing}{Bankfull\ Width}$					
Pool Depth (max depth at bankfull)	2.56				
Pool Depth Ratio, $\frac{Pool\ Depth}{Bankfull\ Mean\ Depth}$	1.72				

B. Average Pool Spacing Ratio NA ft/ft.

C. Average Pool Depth Ratio 1.72 ft/ft.

V. Large Woody Debris[7]

A. Number of Pieces per 100m 17

B. Large Woody Debris Index NA

[7] Davis, Jeffrey C., G. Wayne Minshall, Christopher T. Robinson, Peter Landres. Monitoring Wilderness Stream Ecosystems. USDA Forest Service General Technical Report RMRS-GTR-70 (January 2001). http://www.fs.fed.us/rm/pubs/rmrs_gtr070.pdf

STR-3 R-1

1/02/2019

VI. Lateral Stability

A. Bank Data

BEHI/NBS[8] Score	Bank Length
Moderate/Moderate	300

B. Total Eroding Bank Length 300 ft.

C. Total Bank Length 300 ft.

D. Dominant BEHI/NBS Score Moderate/Moderate

E. Percent of Bank Erosion, calculate as

$$\frac{Total \quad » Æ \; Æ^{-} \quad Æ}{\quad ´ \quad » \quad Æ^{-} \quad Æ}$$

100 %

VI. Riparian Vegetation

A. Riparian Vegetation Data

	Left	Right
Riparian/Buffer Width	10	15-20
RBP Score	1	1

VII. Channel Evolution

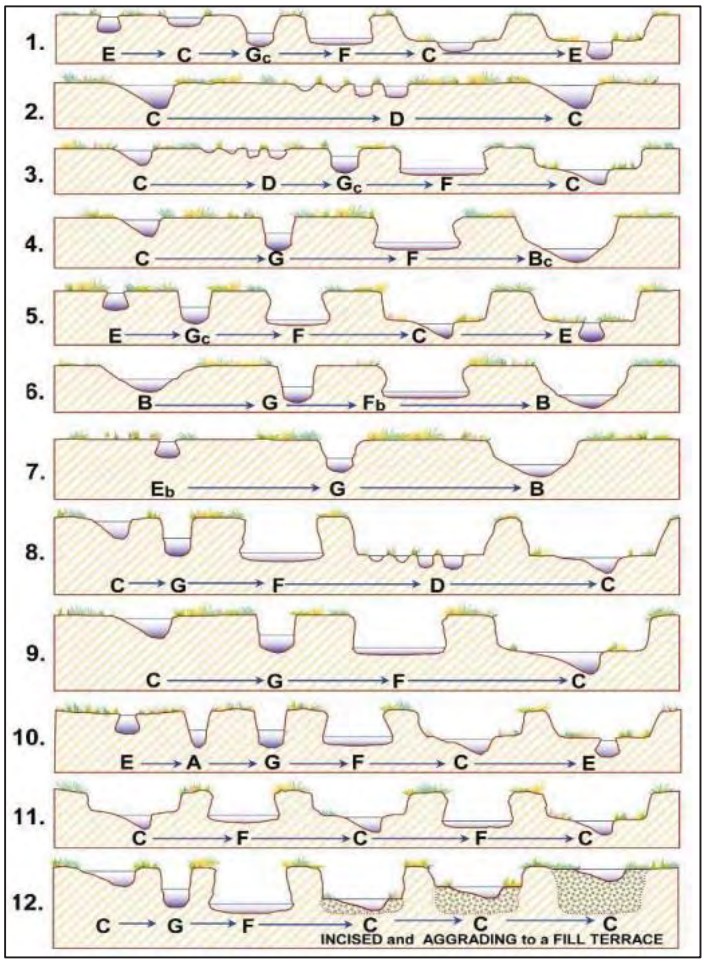
A. Rosgen Channel Type Succession 5

B. Simon Channel Evolution Model (Stage) 2

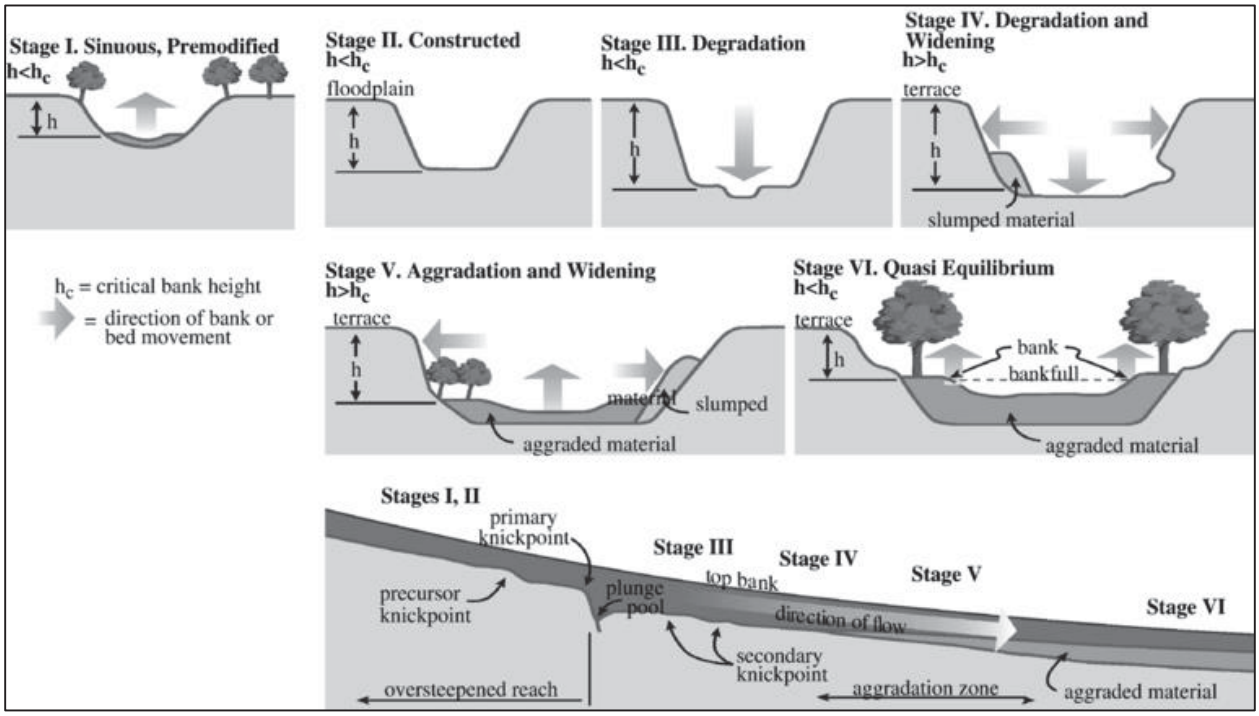
C. Provide a brief narrative describing the channel evolution trend.

[8] Rosgen, D. 2014. River Stability Field Guide (Second Edition). Wildland Hydrology, Fort Collins, CO.

Rosgen Channel Type Succession Scenarios



Simon Channel Evolution Model



Stream Name: STR-4 R-1

Date: 1/14/2019

Hydraulic and Geomorphic Assessment Data Form

Form created by Stream Mechanics and modified by Corps on 5/17/2016

I. Bankfull Verification

A.	Regional Curve	65/74	
B.	Drainage Area	0.06	sq. miles
C.	Difference between bankfull stage and water surface	0.29	feet
D.	Bankfull Width (Measured)	14.41	feet
E.	Bankfull Area (Measured)	10.27	sq. feet
F.	Bankfull Mean Depth (Area/Width)	.71	feet
G.	Bankfull Width (Regional Curve)	6.15	feet
H.	Bankfull Area (Regional Curve)	3.03	sq. feet
I.	Bankfull Mean Depth (Regional Curve)	0.49	feet

Area Calculations

II. Stream Classification

A.	Bankfull W/D, calculate as $\frac{Bankfull\ Width}{Bankfull\ Mean\ Depth}$	20.3	ft/ft.
B.	Bankfull Max Riffle Depth (Dmax)	1.55	feet
C.	Floodprone Area Width	27.28	feet
D.	Entrenchment Ratio, calculate as $\frac{Floodprone\ Area\ Width}{Bankfull\ Width}$	1.89	ft/ft.
E.	Slope Estimate	0.01	ft/ft.
F.	Channel Material Estimate	80% silt, 20% sand	
G.	Rosgen Stream Type	B	

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R_1	R_2	R_3	R_4
Low Bank Height (LBH)	3.12			
Dmax	1.55			
Bank Height Ratio (LBH/Dmax)	2.01			
Riffle Length	NA			

B. Weighted Bank Height Ration, calculate as $\frac{\Sigma(Bank\ Height\ Ratio_i \text{ x Riffle Length}_i)}{\Sigma Riffle\ Length}$ NA ft/ft.

C. Entrenchment Ratio from Riffle 1.89 ft/ft.

IV. Bedform Diversity

A. Pool Data

	P_1	P_2	P_3	P_4	P_5
Station	129				
Pool to Pool Spacing	NA				
Pool Spacing Ratio, $\frac{Pool\ Spacing}{Bankfull\ Width}$					
Pool Depth (max depth at bankfull)	1.45				
Pool Depth Ratio, $\frac{Pool\ Depth}{Bankfull\ Mean\ Depth}$	2.04				

B. Average Pool Spacing Ratio NA ft/ft.

C. Average Pool Depth Ratio 2.04 ft/ft.

V. Large Woody Debris[7]

A. Number of Pieces per 100m 0

B. Large Woody Debris Index 0

[7] Davis, Jeffrey C., G. Wayne Minshall, Christopher T. Robinson, Peter Landres. Monitoring Wilderness Stream Ecosystems. USDA Forest Service General Technical Report RMRS-GTR-70 (January 2001). http://www.fs.fed.us/rm/pubs/rmrs_gtr070.pdf

VI. Lateral Stability

A. Bank Data

BEHI/NBS[8] Score	Bank Length
Moderate/Low	146

B. Total Eroding Bank Length 30 ft.

C. Total Bank Length 146 ft.

D. Dominant BEHI/NBS Score Moderate/Low

E. Percent of Bank Erosion, calculate as

$$\frac{Total \quad » Æ \; Æ^{-} \quad Æ}{\quad ´ \quad » \quad Æ^{-} \quad Æ}$$

20 %

VI. Riparian Vegetation

A. Riparian Vegetation Data

	Left	Right
Riparian/Buffer Width	0	0
RBP Score	0	0

VII. Channel Evolution

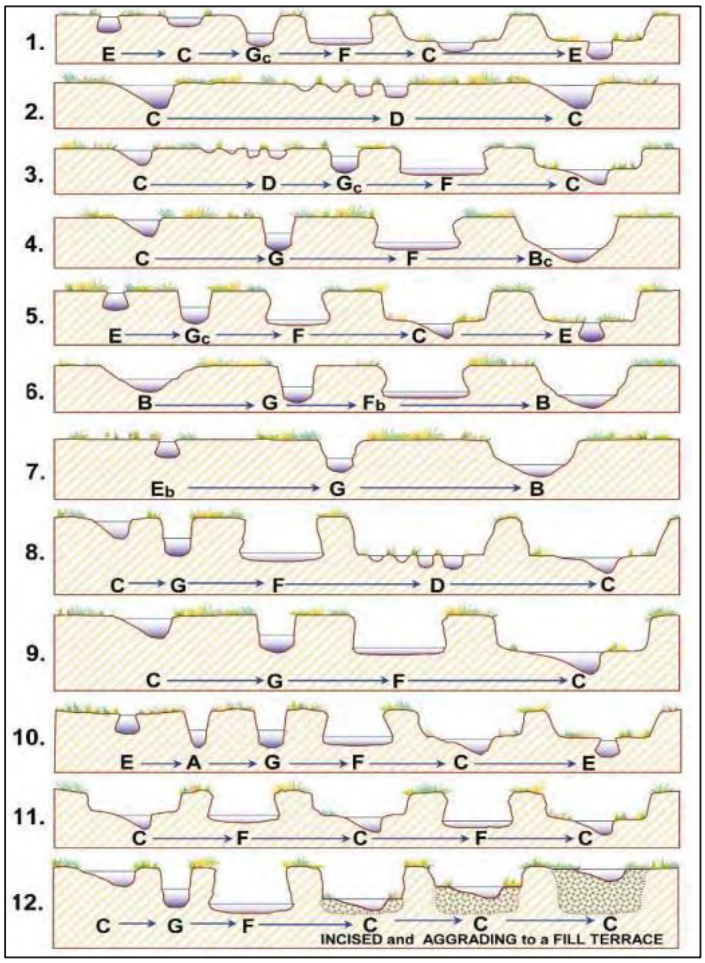
A. Rosgen Channel Type Succession 7

B. Simon Channel Evolution Model (Stage) 2

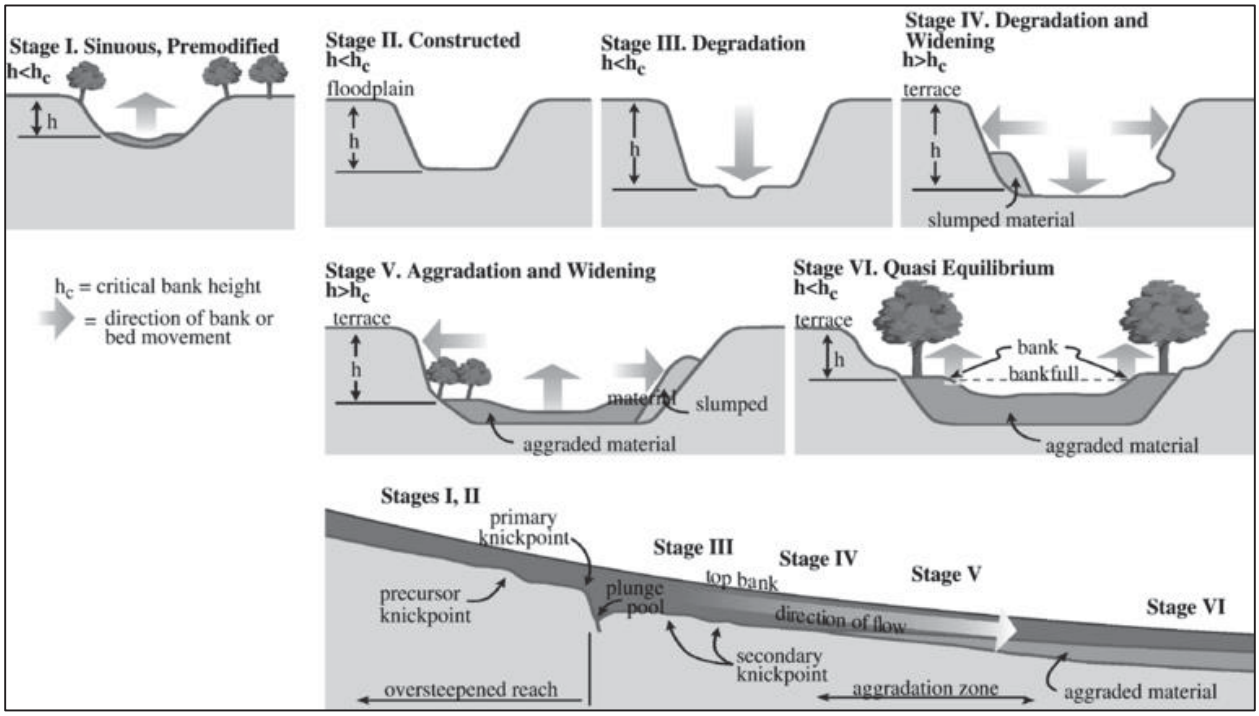
C. Provide a brief narrative describing the channel evolution trend.

[8] Rosgen, D. 2014. River Stability Field Guide (Second Edition). Wildland Hydrology, Fort Collins, CO.

Rosgen Channel Type Succession Scenarios



Simon Channel Evolution Model



Stream Name: STR-5 R-1

Date: 1/02/2019

Hydraulic and Geomorphic Assessment Data Form

Form created by Stream Mechanics and modified by Corps on 5/17/2016

I. Bankfull Verification

A.	Regional Curve	65/74	
B.	Drainage Area	1.49	sq. miles
C.	Difference between bankfull stage and water surface	1.28	feet
D.	Bankfull Width (Measured)	13.52	feet
E.	Bankfull Area (Measured)	14.17	sq. feet
F.	Bankfull Mean Depth (Area/Width)	1.05	feet
G.	Bankfull Width (Regional Curve)	18.45	feet
H.	Bankfull Area (Regional Curve)	28.38	sq. feet
I.	Bankfull Mean Depth (Regional Curve)	1.54	feet

Area Calculations

II. Stream Classification

A.	Bankfull W/D, calculate as $\frac{Bankfull\ Width}{Bankfull\ Mean\ Depth}$	12.88	ft/ft.
B.	Bankfull Max Riffle Depth (Dmax)	1.28	feet
C.	Floodprone Area Width	16.7	feet
D.	Entrenchment Ratio, calculate as $\frac{Floodprone\ Area\ Width}{Bankfull\ Width}$	1.24	ft/ft.
E.	Slope Estimate		ft/ft.
F.	Channel Material Estimate	10% silt, 90% sand	
G.	Rosgen Stream Type	F	

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R_1	R_2	R_3	R_4
Low Bank Height (LBH)	2.56	3.90	3.90	
Dmax	1.28	1.44	2.0	
Bank Height Ratio (LBH/Dmax)	2	2.7	1.95	
Riffle Length	48	92	60	

B. Weighted Bank Height Ration, calculate as $\frac{\Sigma(Bank\ Height\ Ratio_i \text{ x Riffle Length}_i)}{\Sigma Riffle\ Length}$ 2.31 ft/ft.

C. Entrenchment Ratio from Riffle 1.24 ft/ft.

IV. Bedform Diversity

A. Pool Data

	P_1	P_2	P_3	P_4	P_5
Station	155	345	500		
Pool to Pool Spacing	107	190	155		
Pool Spacing Ratio, $\frac{Pool\ Spacing}{Bankfull\ Width}$	7.91	14.05	11.46		
Pool Depth (max depth at bankfull)	0.92	1.1	0.6		
Pool Depth Ratio, $\frac{Pool\ Depth}{Bankfull\ Mean\ Depth}$	.88	1.05	.57		

B. Average Pool Spacing Ratio 11.14 ft/ft.

C. Average Pool Depth Ratio .83 ft/ft.

V. Large Woody Debris[7]

A. Number of Pieces per 100m 5

B. Large Woody Debris Index NA

[7] Davis, Jeffrey C., G. Wayne Minshall, Christopher T. Robinson, Peter Landres. Monitoring Wilderness Stream Ecosystems. USDA Forest Service General Technical Report RMRS-GTR-70 (January 2001). http://www.fs.fed.us/rm/pubs/rmrs_gtr070.pdf

VI. Lateral Stability

A. Bank Data

BEHI/NBS[8] Score	Bank Length
Moderate/Low	200

B. Total Eroding Bank Length 600 ft.

C. Total Bank Length 1000 ft.

D. Dominant BEHI/NBS Score Moderate/Low

E. Percent of Bank Erosion, calculate as

$$\frac{Total \quad » Æ \; Æ^{-} \quad Æ}{\quad ´ \quad » \quad Æ^{-} \quad Æ}$$

60 %

VI. Riparian Vegetation

A. Riparian Vegetation Data

	Left	Right
Riparian/Buffer Width	20	20
RBP Score	3	3

VII. Channel Evolution

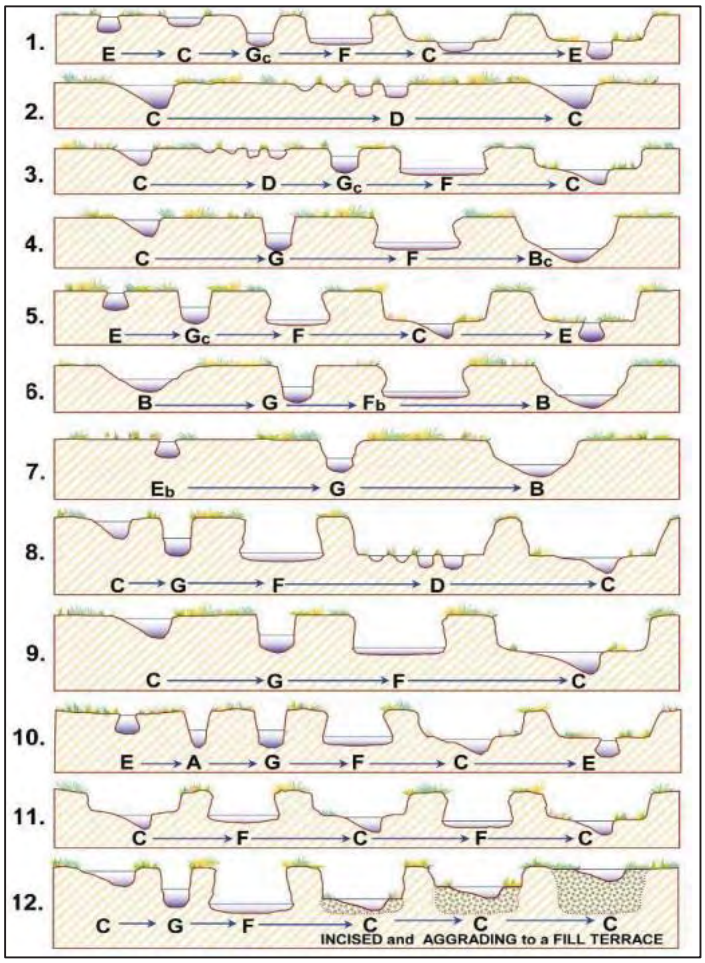
A. Rosgen Channel Type Succession 11

B. Simon Channel Evolution Model (Stage) 2

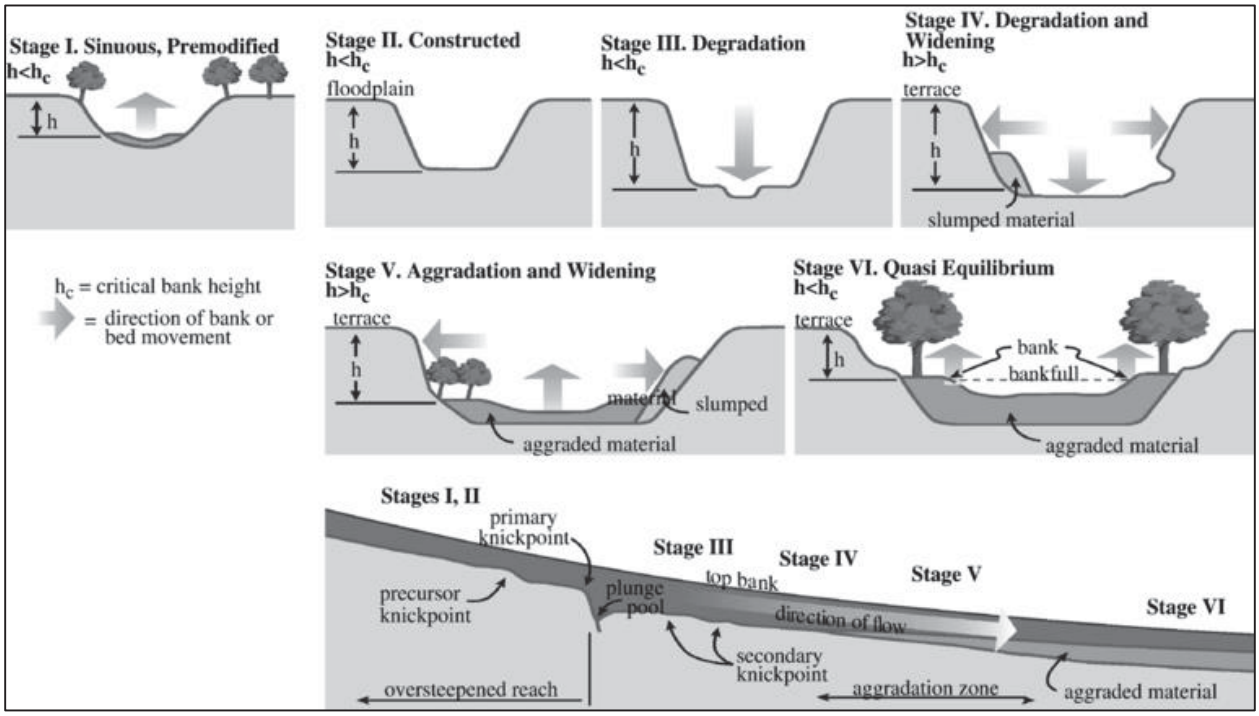
C. Provide a brief narrative describing the channel evolution trend.

[8] Rosgen, D. 2014. River Stability Field Guide (Second Edition). Wildland Hydrology, Fort Collins, CO.

Rosgen Channel Type Succession Scenarios



Simon Channel Evolution Model



Stream Name: STR-8 R-1

Date: 1/02/2019

Hydraulic and Geomorphic Assessment Data Form

Form created by Stream Mechanics and modified by Corps on 5/17/2016

I. Bankfull Verification

A.	Regional Curve	65/74	
B.	Drainage Area	0.15	sq. miles
C.	Difference between bankfull stage and water surface	0.46	feet
D.	Bankfull Width (Measured)	14.8	feet
E.	Bankfull Area (Measured)	12.67	sq. feet
F.	Bankfull Mean Depth (Area/Width)	0.86	feet
G.	Bankfull Width (Regional Curve)	8.41	feet
H.	Bankfull Area (Regional Curve)	5.74	sq. feet
I.	Bankfull Mean Depth (Regional Curve)	0.68	feet

Area Calculations

II. Stream Classification

A.	Bankfull W/D, calculate as $\frac{Bankfull\ Width}{Bankfull\ Mean\ Depth}$	17.21	ft/ft.
B.	Bankfull Max Riffle Depth (Dmax)	1.18	feet
C.	Floodprone Area Width	40.33	feet
D.	Entrenchment Ratio, calculate as $\frac{Floodprone\ Area\ Width}{Bankfull\ Width}$	2.73	ft/ft.
E.	Slope Estimate	0.01	ft/ft.
F.	Channel Material Estimate	90% silt, 10% sand	
G.	Rosgen Stream Type	C	

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R_1	R_2	R_3	R_4
Low Bank Height (LBH)	1.76			
Dmax	1.18			
Bank Height Ratio (LBH/Dmax)	1.49			
Riffle Length	NA			

B. Weighted Bank Height Ration, calculate as $\frac{\Sigma(Bank\ Height\ Ratio_i \text{ x Riffle Length}_i)}{\Sigma Riffle\ Length}$ 1.49 ft/ft.

C. Entrenchment Ratio from Riffle 2.73 ft/ft.

IV. Bedform Diversity

A. Pool Data

	P_1	P_2	P_3	P_4	P_5
Station	NA				
Pool to Pool Spacing	NA				
Pool Spacing Ratio, $\frac{Pool\ Spacing}{Bankfull\ Width}$	NA				
Pool Depth (max depth at bankfull)	NA				
Pool Depth Ratio, $\frac{Pool\ Depth}{Bankfull\ Mean\ Depth}$	NA				

B. Average Pool Spacing Ratio NA ft/ft.

C. Average Pool Depth Ratio NA ft/ft.

V. Large Woody Debris[7]

A. Number of Pieces per 100m 15

B. Large Woody Debris Index NA

[7] Davis, Jeffrey C., G. Wayne Minshall, Christopher T. Robinson, Peter Landres. Monitoring Wilderness Stream Ecosystems. USDA Forest Service General Technical Report RMRS-GTR-70 (January 2001). http://www.fs.fed.us/rm/pubs/rmrs_gtr070.pdf

VI. Lateral Stability

A. Bank Data

BEHI/NBS[8] Score	Bank Length
Moderate/Low	200

B. Total Eroding Bank Length 100 ft.

C. Total Bank Length 500 ft.

D. Dominant BEHI/NBS Score Moderate/Low

E. Percent of Bank Erosion, calculate as

$$\frac{Total \quad » Æ \; Æ^{-} \quad Æ}{\quad ´ \quad » \quad Æ^{-} \quad Æ}$$

20 %

VI. Riparian Vegetation

A. Riparian Vegetation Data

	Left	Right
Riparian/Buffer Width	20	50-75
RBP Score	2	8

VII. Channel Evolution

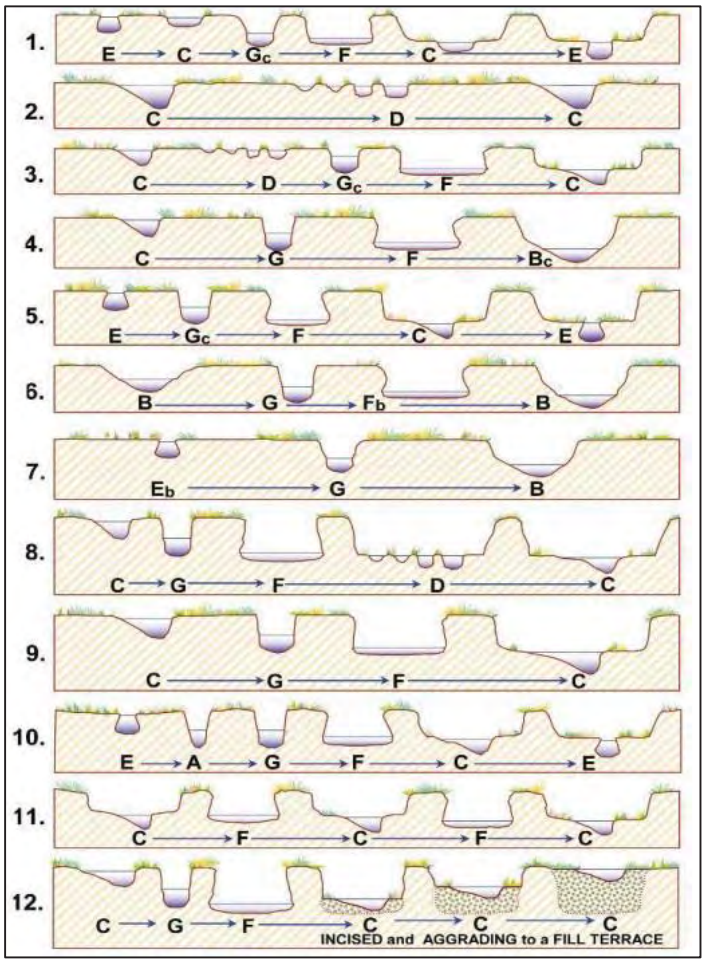
A. Rosgen Channel Type Succession 1

B. Simon Channel Evolution Model (Stage) 3

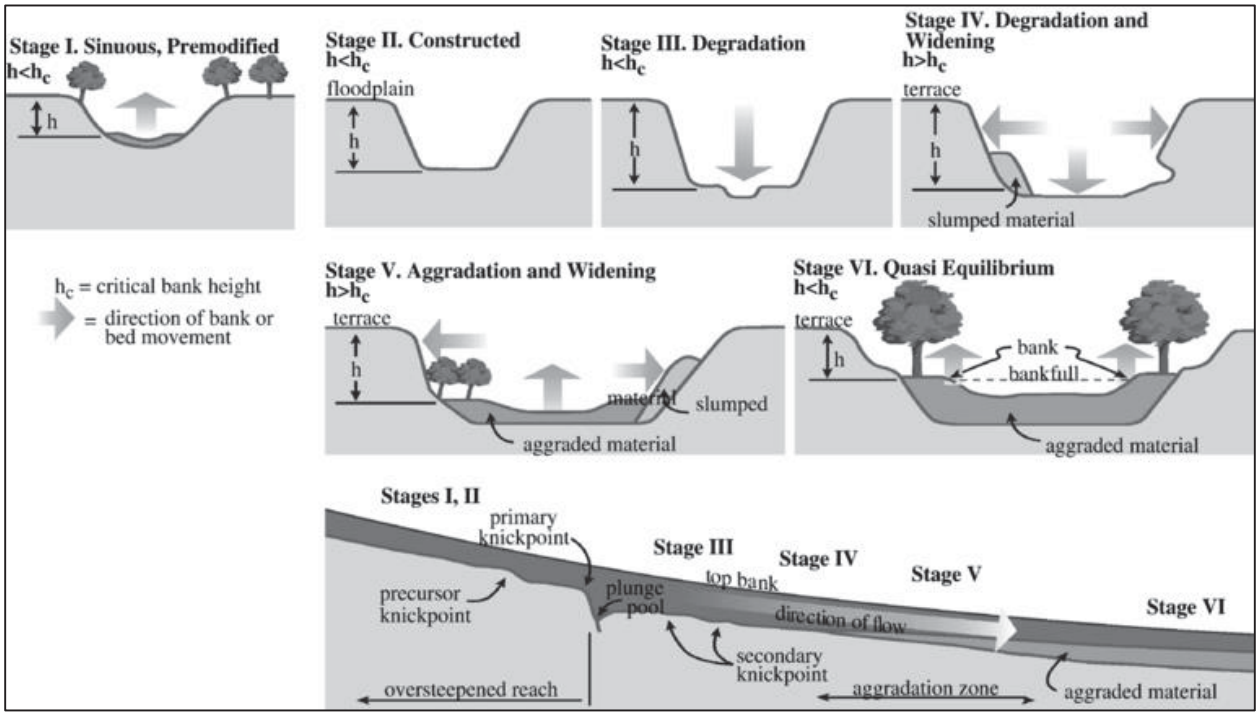
C. Provide a brief narrative describing the channel evolution trend.

[8] Rosgen, D. 2014. River Stability Field Guide (Second Edition). Wildland Hydrology, Fort Collins, CO.

Rosgen Channel Type Succession Scenarios



Simon Channel Evolution Model



APPENDIX F

TRAM WETLAND ASSESSMENT FORMS & BEHI FORMS

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location WTL-1

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH
   __ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)
   __ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot
   __ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	__ River birch	__ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	X Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	X Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	__ Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.66

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 _____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 0.33
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 _____
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.57

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.16
	Function: Biogeochemical Processes	0.24
	Function: Retain Particulates	0.11
	Function: Plant Community	0.16
	Function: Wildlife Community	0.18
	Quantitative Score (Average of FCIs x 100)	17
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	17

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location WTL-2

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH
   __ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)
   __ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot
   __ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	__ River birch	__ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	X Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	X Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	__ Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.66

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 _____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 0.33
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 _____
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.57

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.16
	Function: Biogeochemical Processes	0.24
	Function: Retain Particulates	0.11
	Function: Plant Community	0.16
	Function: Wildlife Community	0.18
	Quantitative Score (Average of FCIs x 100)	17
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	17

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location WTL-3

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH
   __ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)
   __ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot
   __ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	X River birch	__ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	X Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	X Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	__ Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.66

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 0.495
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 _____
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.70

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered
__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.16
	Function: Biogeochemical Processes	0.24
	Function: Retain Particulates	0.11
	Function: Plant Community	0.19
	Function: Wildlife Community	0.20
	Quantitative Score (Average of FCIs x 100)	18
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	18

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location WTL-4

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)

__ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	X River birch	__ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	__ Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	__ Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	__ Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.66

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 _____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 0.17
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.41

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.16
	Function: Biogeochemical Processes	0.24
	Function: Retain Particulates	0.11
	Function: Plant Community	0.14
	Function: Wildlife Community	0.16
	Quantitative Score (Average of FCIs x 100)	16.2
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	16.2

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location WTL-5

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   - levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   - widely spaced ditches/drainage tiles present over entire site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   - moderately spaced ditches/drainage tiles present over entire site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)

__ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	River birch	__ European/Chinese privet
__ Willow oak	X Overcup oak	__ Slippery elm	X Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	__ Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	X Bald cypress	__ Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	__ Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.89

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 0.67
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 _____
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.82

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.86
	Function: Biogeochemical Processes	0.63
	Function: Retain Particulates	0.55
	Function: Plant Community	0.46
	Function: Wildlife Community	0.47
	Quantitative Score (Average of FCIs x 100)	54.4
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	59.4

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location WTL-6

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   - levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   - widely spaced ditches/drainage tiles present over entire site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   - moderately spaced ditches/drainage tiles present over entire site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)

__ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	__ River birch	__ European/Chinese privet
__ Willow oak	X Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	__ Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	X Sweetgum	__ _____	__ Purple loosestrife
X Nuttall oak	__ Am. hornbeam	X Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	__ Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.83

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 0.83
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 _____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 _____
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.91

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.61
	Function: Biogeochemical Processes	0.52
	Function: Retain Particulates	0.44
	Function: Plant Community	0.41
	Function: Wildlife Community	0.43
	Quantitative Score (Average of FCIs x 100)	48.2
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	48.2

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location Field-A

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)

__ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	__ River birch	__ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	__ Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	__ Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	1 Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.66

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 _____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 0.165
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.41

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

100

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.05
	Function: Biogeochemical Processes	0.09
	Function: Retain Particulates	0.11
	Function: Plant Community	0.11
	Function: Wildlife Community	0.14
	Quantitative Score (Average of FCIs x 100)	10
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	10

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location Field-B

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)

__ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	__ River birch	__ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	__ Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	__ Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	1 Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.66

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 _____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 0.165
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.41

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

100

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.05
	Function: Biogeochemical Processes	0.09
	Function: Retain Particulates	0.11
	Function: Plant Community	0.11
	Function: Wildlife Community	0.14
	Quantitative Score (Average of FCIs x 100)	10
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	10

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location Field-C

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)

__ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	__ River birch	__ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	__ Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	__ Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	1 Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.66

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 _____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 0.165
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.41

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

100

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.05
	Function: Biogeochemical Processes	0.09
	Function: Retain Particulates	0.11
	Function: Plant Community	0.11
	Function: Wildlife Community	0.14
	Quantitative Score (Average of FCIs x 100)	10
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	10

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location Field-D

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)

__ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	__ River birch	__ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	__ Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	__ Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	__ _____	__ _____
__ Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	1 Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.66

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 _____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 0.165
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.41

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

100

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.05
	Function: Biogeochemical Processes	0.09
	Function: Retain Particulates	0.11
	Function: Plant Community	0.11
	Function: Wildlife Community	0.14
	Quantitative Score (Average of FCIs x 100)	10
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	10

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/06/2018 Project Name Rossville Farm

Field Personnel C.Duke, C. Liggett Wetland Name/Location Projected Score After 5-7 Years

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions
   - no channelization; channel is naturally meandering
   - no channel downcutting
   - no lateral cutting and no bank failure
   - flood frequency < 2 years
   - local knowledge
   - gauge data
2. Overbank flooding slightly impacted (SI = 0.75)
   - levee(s) etc. present but most overbank flooding occurs
   - channelization
   - slight channel downcutting
   - slight lateral cutting and bank failure
   - flooding frequency < 2 years
   - local knowledge
   - gauge data
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - moderate channel downcutting
   - moderate lateral cutting and bank failure
   - local knowledge
   - gauge data
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs
   - channelization
   - significant channel downcutting
   - significant lateral cutting and bank failure
   - local knowledge
   - gauge data
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding
   - channelization
   - severe channel downcutting
   - severe lateral cutting and bank failure
   - natural flood regime no longer occurs
   - local knowledge
   - gauge data

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
   - no land leveling
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment
   - widely spaced ditches/drainage tiles present over entire site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment
   - moderately spaced ditches/drainage tiles present over entire site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of portion of site
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding
   - land leveling of entire site

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH

__ > 16 in. (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)

__ < 4 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot

__ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 3 – 7 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

__ ≥70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added as a Group 2 species. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum.*

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	__ American elm	__ River birch	__ European/Chinese privet
X Willow oak	X Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	X Red maple	__ Sugarberry	__ Giant reed
X Swamp chestnut oak	__ Water tupelo	X Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	__ Sweetgum	__ _____	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	X Green ash	__ _____	__ _____
X Swamp white oak	__ _____	__ Number native shrub spp.		
__ _____	__ _____	__ Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = 0.85

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 0.85
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 _____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 _____
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above. This is the SI for V7 0.92

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

__ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state.

__ > 7,000 (SI = 1.0) >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) __In Eastern or Central Tennessee (SI=1.0)

TRAM Summary Worksheet

Exceptional Status Wetlands		**Check if applicable**
	1. **ONRW**	
	2. **ETW**	
	3. **Further Review Requested:** Attach Wetland Background and Exceptional Status Wetlands Worksheet	
	COMMENTS/NOTES:	
Quantitative Rating scores	Function: Hydrologic Regime	0.87
	Function: Biogeochemical Processes	0.59
	Function: Retain Particulates	0.51
	Function: Plant Community	0.40
	Function: Wildlife Community	0.43
	Quantitative Score (Average of FCIs x 100)	56
	Value Added (Significant Size) Total	0
Total of Quantitative and Value Added Scores	**TOTAL SCORE**	56

Appendix 2

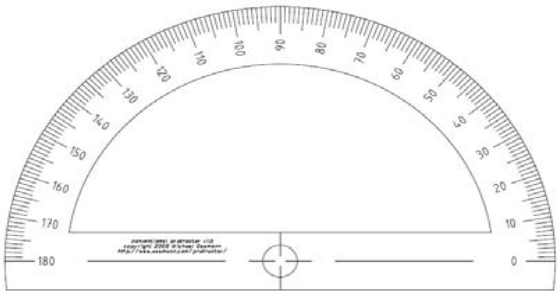
BEHI Field Form - Complete

Location description: STR-1 R-1 Analysis by: C.Hertwig, C. Liggett, C.Duke, M. Skelton Date: 12/05/18

Latitude: Longitude:

BEHI category	A		B		C		D		E	
	Bank height	**BH score**	Root depth	**RDH score**	Root density	**RD score**	Surface protection	**SP score**	Bank angle	**BA score**
Very low	1.0 – 1.1	**1**	90 - 100	**1**	80 - 100	**1**	80 - 100	**1**	0 - 20	**1**
Low	1.1 – 1.2	**3**	50 - 89	**3**	55 - 79	**3**	55 - 79	**3**	21 - 60	**3**
Moderate	1.3 – 1.5	**5**	30 - 49	**5**	30 - 54	**5**	30 - 54	**5**	61 - 80	**5**
High	1.6 – 2.0	**7**	15 - 29	**7**	15 - 29	**7**	15 - 29	**7**	81 - 90	**7**
Very high	2.1 – 2.8	**8.5**	5 - 14	**8.5**	5 - 14	**8.5**	10 - 14	**8.5**	91 - 119	**8.5**
Extreme	> 2.8	**10**	< 5	**10**	< 5	**10**	< 14	**10**	> 119	**10**

Material adjustment (F)		**Stratification adjustment (G)**		**Total Score** (Sum **A-G**)
Bedrock - automatically	Very low	No layer	No adjustment	26
Boulder - automatically	Low	Single layer	(+) 5	
Cobble	(-) 10	Multiple layers	(+) 10	
Gravel or mostly gravel	(+) 5			
Sand or mostly sands	(+) 10			
Silt/loam	No adjustment			
Clay	(-) 20			



BEHI Category: Moderate

Very low	Low	Moderate	High	Very high	Extreme
≤ 9.5	10 - 19.5	20 - 29.5	30 - 39.5	40 - 45	> 45

Comments:

Appendix 2

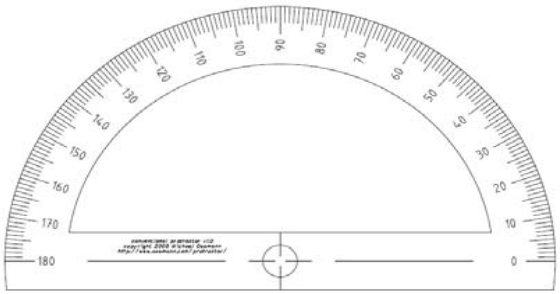
BEHI Field Form - Complete

Location description: STR-1 R-2 Analysis by: C.Hertwig, C. Liggett, C.Duke, M. Skelton Date: 12/05/18

Latitude: Longitude:

BEHI category	A		B		C		D		E	
	Bank height	**BH score**	Root depth	**RDH score**	Root density	**RD score**	Surface protection	**SP score**	Bank angle	**BA score**
Very low	1.0 – 1.1	**1**	90 - 100	**1**	80 - 100	**1**	80 - 100	**1**	0 - 20	**1**
Low	1.1 – 1.2	**3**	50 - 89	**3**	55 - 79	**3**	55 - 79	**3**	21 - 60	**3**
Moderate	1.3 – 1.5	**5**	30 - 49	**5**	30 - 54	**5**	30 - 54	**5**	61 - 80	**5**
High	1.6 – 2.0	**7**	15 - 29	**7**	15 - 29	**7**	15 - 29	**7**	81 - 90	**7**
Very high	2.1 – 2.8	**8.5**	5 - 14	**8.5**	5 - 14	**8.5**	10 - 14	**8.5**	91 - 119	**8.5**
Extreme	> 2.8	**10**	< 5	**10**	< 5	**10**	< 14	**10**	> 119	**10**

Material adjustment (F)		**Stratification adjustment (G)**		**Total Score** (Sum **A-G**)
Bedrock - automatically	Very low	No layer	No adjustment	44
Boulder - automatically	Low	Single layer	(+) 5	
Cobble	(-) 10	Multiple layers	(+) 10	
Gravel or mostly gravel	(+) 5			
Sand or mostly sands	(+) 10			
Silt/loam	No adjustment			
Clay	(-) 20			



BEHI Category: Very High

Very low	Low	Moderate	High	Very high	Extreme
≤ 9.5	10 - 19.5	20 - 29.5	30 - 39.5	40 - 45	> 45

Comments:

Appendix 2

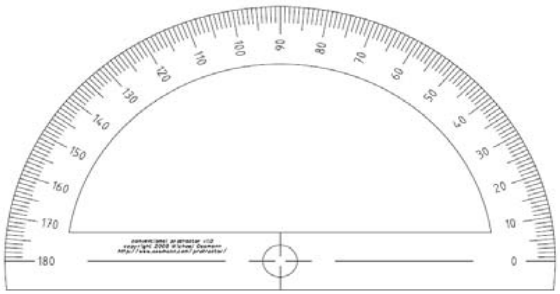
BEHI Field Form - Complete

Location description: STR-2 R-1 Analysis by: C.Hertwig, C. Liggett, C.Duke, M. Skelton Date: 12/05/18

Latitude: Longitude:

BEHI category	A		B		C		D		E	
	Bank height	**BH score**	Root depth	**RDH score**	Root density	**RD score**	Surface protection	**SP score**	Bank angle	**BA score**
Very low	1.0 – 1.1	**1**	90 - 100	**1**	80 - 100	**1**	80 - 100	**1**	0 - 20	**1**
Low	1.1 – 1.2	**3**	50 - 89	**3**	55 - 79	**3**	55 - 79	**3**	21 - 60	**3**
Moderate	1.3 – 1.5	**5**	30 - 49	**5**	30 - 54	**5**	30 - 54	**5**	61 - 80	**5**
High	1.6 – 2.0	**7**	15 - 29	**7**	15 - 29	**7**	15 - 29	**7**	81 - 90	**7**
Very high	2.1 – 2.8	**8.5**	5 - 14	**8.5**	5 - 14	**8.5**	10 - 14	**8.5**	91 - 119	**8.5**
Extreme	> 2.8	**10**	< 5	**10**	< 5	**10**	< 14	**10**	> 119	**10**

Material adjustment (F)		**Stratification adjustment (G)**		**Total Score** (Sum **A-G**)
Bedrock - automatically	Very low	No layer	No adjustment	20.5
Boulder - automatically	Low	Single layer	(+) 5	
Cobble	(-) 10	Multiple layers	(+) 10	
Gravel or mostly gravel	(+) 5			
Sand or mostly sands	(+) 10			
Silt/loam	No adjustment			
Clay	(-) 20			



BEHI Category: Moderate

Very low	Low		Moderate	High	Very high	Extreme
≤ 9.5	10 - 19.5		20 - 29.5	30 - 39.5	40 - 45	> 45

Comments:

Appendix 2

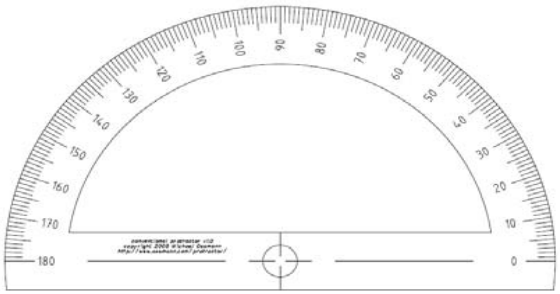
BEHI Field Form - Complete

Location description: STR-3 R-1 Analysis by: C.Hertwig, C. Liggett, C.Duke, M. Skelton Date: 12/05/18

Latitude: Longitude:

BEHI category	A		B		C		D		E	
	Bank height	**BH score**	Root depth	**RDH score**	Root density	**RD score**	Surface protection	**SP score**	Bank angle	**BA score**
Very low	1.0 – 1.1	**1**	90 - 100	**1**	80 - 100	**1**	80 - 100	**1**	0 - 20	**1**
Low	1.1 – 1.2	**3**	50 - 89	**3**	55 - 79	**3**	55 - 79	**3**	21 - 60	**3**
Moderate	1.3 – 1.5	**5**	30 - 49	**5**	30 - 54	**5**	30 - 54	**5**	61 - 80	**5**
High	1.6 – 2.0	**7**	15 - 29	**7**	15 - 29	**7**	15 - 29	**7**	81 - 90	**7**
Very high	2.1 – 2.8	**8.5**	5 - 14	**8.5**	5 - 14	**8.5**	10 - 14	**8.5**	91 - 119	**8.5**
Extreme	> 2.8	**10**	< 5	**10**	< 5	**10**	< 14	**10**	> 119	**10**

Material adjustment (F)		**Stratification adjustment (G)**		**Total Score** (Sum **A-G**)
Bedrock - automatically	Very low	No layer	No adjustment	27
Boulder - automatically	Low	Single layer	(+) 5	
Cobble	(-) 10	Multiple layers	(+) 10	
Gravel or mostly gravel	(+) 5			
Sand or mostly sands	(+) 10			
Silt/loam	No adjustment			
Clay	(-) 20			



BEHI Category: Moderate

Very low	Low		Moderate	High	Very high	Extreme
≤ 9.5	10 - 19.5		20 - 29.5	30 - 39.5	40 - 45	> 45

Comments:

Appendix 2

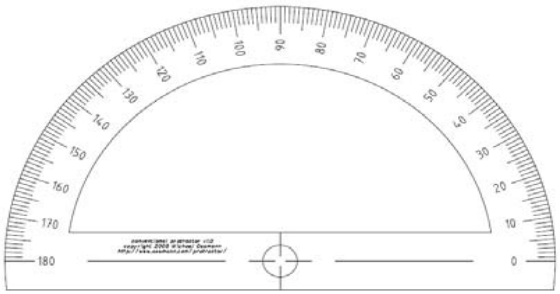
BEHI Field Form - Complete

Location description: STR-4 R-1 Analysis by: C.Hertwig, C. Liggett, C.Duke, M. Skelton Date: 12/05/18

Latitude: Longitude:

BEHI category	A		B		C		D		E	
	Bank height	**BH score**	Root depth	**RDH score**	Root density	**RD score**	Surface protection	**SP score**	Bank angle	**BA score**
Very low	1.0 – 1.1	**1**	90 - 100	**1**	80 - 100	**1**	80 - 100	**1**	0 - 20	**1**
Low	1.1 – 1.2	**3**	50 - 89	**3**	55 - 79	**3**	55 - 79	**3**	21 - 60	**3**
Moderate	1.3 – 1.5	**5**	30 - 49	**5**	30 - 54	**5**	30 - 54	**5**	61 - 80	**5**
High	1.6 – 2.0	**7**	15 - 29	**7**	15 - 29	**7**	15 - 29	**7**	81 - 90	**7**
Very high	2.1 – 2.8	**8.5**	5 - 14	**8.5**	5 - 14	**8.5**	10 - 14	**8.5**	91 - 119	**8.5**
Extreme	> 2.8	**10**	< 5	**10**	< 5	**10**	< 14	**10**	> 119	**10**

Material adjustment (F)		**Stratification adjustment (G)**		**Total Score** (Sum **A-G**)
Bedrock - automatically	Very low	No layer	No adjustment	21
Boulder - automatically	Low	Single layer	(+) 5	
Cobble	(-) 10	Multiple layers	(+) 10	
Gravel or mostly gravel	(+) 5			
Sand or mostly sands	(+) 10			
Silt/loam	No adjustment			
Clay	(-) 20			



BEHI Category: Low

Very low	Low	Moderate	High	Very high	Extreme
≤ 9.5	10 - 19.5	20 - 29.5	30 - 39.5	40 - 45	> 45

Comments:

Appendix 2

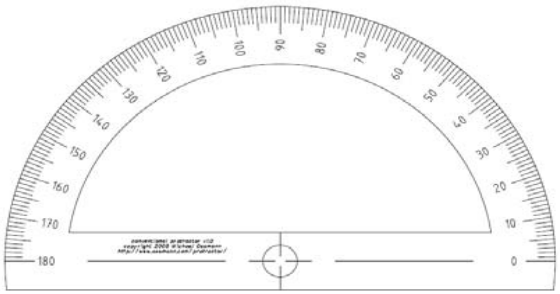
BEHI Field Form - Complete

Location description: STR-5 R-1 Analysis by: C.Hertwig, C. Liggett, C.Duke, M. Skelton Date: 12/05/18

Latitude: Longitude:

BEHI category	A		B		C		D		E	
	Bank height	**BH score**	Root depth	**RDH score**	Root density	**RD score**	Surface protection	**SP score**	Bank angle	**BA score**
Very low	1.0 – 1.1	**1**	90 - 100	**1**	80 - 100	**1**	80 - 100	**1**	0 - 20	**1**
Low	1.1 – 1.2	**3**	50 - 89	**3**	55 - 79	**3**	55 - 79	**3**	21 - 60	**3**
Moderate	1.3 – 1.5	**5**	30 - 49	**5**	30 - 54	**5**	30 - 54	**5**	61 - 80	**5**
High	1.6 – 2.0	**7**	15 - 29	**7**	15 - 29	**7**	15 - 29	**7**	81 - 90	**7**
Very high	2.1 – 2.8	**8.5**	5 - 14	**8.5**	5 - 14	**8.5**	10 - 14	**8.5**	91 - 119	**8.5**
Extreme	> 2.8	**10**	< 5	**10**	< 5	**10**	< 14	**10**	> 119	**10**

Material adjustment (F)		**Stratification adjustment (G)**		**Total Score** (Sum **A-G**)
Bedrock - automatically	Very low	No layer	No adjustment	24.5
Boulder - automatically	Low	Single layer	(+) 5	
Cobble	(-) 10	Multiple layers	(+) 10	
Gravel or mostly gravel	(+) 5			
Sand or mostly sands	(+) 10			
Silt/loam	No adjustment			
Clay	(-) 20			



BEHI Category: Moderate

Very low	Low	Moderate	High	Very high	Extreme
≤ 9.5	10 - 19.5	20 - 29.5	30 - 39.5	40 - 45	> 45

Comments:

Appendix 2

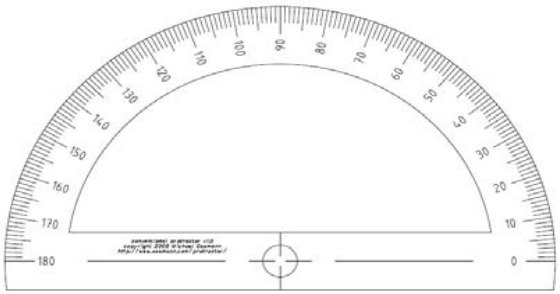
BEHI Field Form - Complete

Location description: STR-8 R-1 Analysis by: C.Hertwig, C. Liggett, C.Duke, M. Skelton Date: 12/05/18

Latitude: Longitude:

BEHI category	A		B		C		D		E	
	Bank height	**BH score**	Root depth	**RDH score**	Root density	**RD score**	Surface protection	**SP score**	Bank angle	**BA score**
Very low	1.0 – 1.1	**1**	90 - 100	**1**	80 - 100	**1**	80 - 100	**1**	0 - 20	**1**
Low	1.1 – 1.2	**3**	50 - 89	**3**	55 - 79	**3**	55 - 79	**3**	21 - 60	**3**
Moderate	1.3 – 1.5	**5**	30 - 49	**5**	30 - 54	**5**	30 - 54	**5**	61 - 80	**5**
High	1.6 – 2.0	**7**	15 - 29	**7**	15 - 29	**7**	15 - 29	**7**	81 - 90	**7**
Very high	2.1 – 2.8	**8.5**	5 - 14	**8.5**	5 - 14	**8.5**	10 - 14	**8.5**	91 - 119	**8.5**
Extreme	> 2.8	**10**	< 5	**10**	< 5	**10**	< 14	**10**	> 119	**10**

Material adjustment (F)		**Stratification adjustment (G)**		**Total Score** (Sum **A-G**)
Bedrock - automatically	Very low	No layer	No adjustment	25
Boulder - automatically	Low	Single layer	(+) 5	
Cobble	(-) 10	Multiple layers	(+) 10	
Gravel or mostly gravel	(+) 5			
Sand or mostly sands	(+) 10			
Silt/loam	No adjustment			
Clay	(-) 20			



BEHI Category: Moderate

Very low	Low	Moderate	High	Very high	Extreme
≤ 9.5	10 - 19.5	20 - 29.5	30 - 39.5	40 - 45	> 45

Comments:

APPENDIX G

JURISDICTIONAL DETERMINATION LETTER REQUEST

January 15, 2019

Ms. Joellyn Brazile
Water Resources Manager
Division of Water Resources
Memphis Environmental Field Office
8383 Wolf Lake Drive
Bartlett, TN 38133

Dear Ms. Brazile:

Subject: Jurisdictional Determination
Rossville Farm, The Pictsweet Company– Mitigation Site
Rossville, Fayette County, TN
CEC Project 173-272

Civil & Environmental Consultants, Inc. (CEC) was contracted by The Pictsweet Company to perform a jurisdictional determination at a +/-855 acre parcel located approximately 0.6 miles west of Rossville town center in Fayette County, Tennessee. The site coordinates are N35.04808; W89.55349. The area of interest is depicted on the Rossville, TN USGS 7.5 Minute Topographic Map (Figure 1). The property is located in the Hurricane Creek-Wolf River (HUC12–080102100302) and Wolf River (HUC8–08010210) watersheds.

The site is being evaluated to determine the jurisdictional status of hydrologic features located on the property proposed for a stream and wetland mitigation bank. CEC biologists Casey Hertwig, Matthew Skelton, Caleb Duke and Cole Liggett performed the site visit on December 4 - 7, 2018. The study area is primarily agricultural with some forested land still remaining (Figure 2). This report documents CEC's findings on the day the field survey was performed.

Prior to the site visit, CEC performed desktop reviews of the U.S. Fish and Wildlife Service National Wetland Inventory (NWI), the National Resources Conservation Service Web Soil Survey, and the Tennessee Department of Environment and Conservation GIS (TDEC-GIS) websites and databases. The NWI Map (Figure 4) depicts 8 wetlands and 11 streams within the study area. The USGS Topographic Map (Figure 1) shows 9 "blue line" features and 2 wetlands within the study area. The NRCS Soil Map (Figure 3) indicates there are approximately 656 acres of hydric soil and approximately 112 acres of hydric inclusion soil located within the study area.

Hydrologic determinations at the proposed site included both a literature review and an on-site evaluation in accordance with the Tennessee Division of Water Resources' "Hydrologic Determination Field Data Sheet" (attached). Evaluation of wetlands at the site included both a literature review and an on-site evaluation in accordance with the criteria established in the

Regional Supplement to the Corps of Engineers Wetland Delineation Manual: *Atlantic and Gulf Coastal Plain Region*, Version 2.0. Wetland forms were completed for areas exhibiting the characteristics of wetland hydrology, hydrophytic plant community, and hydric soils. A photographic summary and associated Photo Location Map (Figure 5) depicting conditions observed during the site visit is attached.

A review of the Community Collaborative Rain, Hail & Snow Network (CoCoRaHS) data for Somerville was obtained to determine if rain had fallen in the general area within seven days of the site visit. According to the website, total precipitation in the area from November 27, 2018 to December 7, 2018 was 1.00-inch (Table 1).

Table 1. Rainfall Data – CoCoRaHS

Date	11/27 Tues	11/28 Wed	11/29 Thurs	11/30 Fri	12/1 Sat	12/2 Sun	12/3 Mon	12/4 Tues	12/5 Wed	12/6 Thurs	12/7 Fri
Somerville	0.00	0.00	0.00	0.02	0.71	0.14	0.00	0.00	0.00	0.00	0.13

Figure 2 shows an aerial map of the features identified and delineated by CEC during the field survey on December 4 - 7, 2018. Figure 5 depicts the location of photographs taken within the study area.

Several wetland drainage ditches located on the property were created in an effort to expedite drainage for agricultural purposes (Figure 2). These are not considered jurisdictional features, as they are all manmade and provide no ecological resource values.

STR-1 is a perennial stream that begins at coordinates N35.053093; W89.55218 and drains from east to west across the property for approximately 9,194 linear feet before exiting the property at coordinates N35.061502; W89.578585. STR-1 has been channelized the majority of its length within the property. STR-1 substrate is comprised of mostly sand and silt, and has an average water depth of 2-3 feet. STR-1 receives hydrologic inputs from SPG-2, SPG-3, and multiple wetland drainage ditches. STR-1 has a natural groundwater table connection, meeting HD primary indicator #7, and a habitat assessment score of 40.

STR-2 is a perennial stream that begins at the WTL-1 boundary at coordinates N35.051772; W89.562278 and drains north for approximately 597 linear feet before ending at the STR-1 confluence at coordinates N35.053402; W89.562266. STR-2 substrate is comprised of mostly sand and silt. STR-2 has been channelized its entire length and partially impacted by beaver dams in its upper reach near WTL-1. STR-2 has a natural groundwater table connection, meeting HD primary indicator #7, and a habitat assessment score of 42.

STR-3 is a perennial stream that begins at coordinates N35.048023; W89.562667 and drains from east to west for approximately 2,317 linear feet before ending at the STR-7 confluence at coordinates N35.048425; W89.570274. STR-3 substrate is comprised of mostly sand and silt. STR-3 has been channelized its entire length within the study area. STR-3 has a natural

groundwater table connection, meeting HD primary indicator #7, and a habitat assessment score of 50.

STR-4 is a perennial stream that begins at SPG-1 at coordinates N35.050783; W89.567994 and drains from south to north for approximately 1,059 linear feet before ending at the STR-1 confluence at coordinates N35.053648; W89.567858. STR-4 has been channelized its entire length within the study area. STR-4 substrate is characterized by mostly silt and some sand. STR-4 has a natural groundwater table connection, meeting HD primary indicator #7, and a habitat assessment score of 50.

STR-5 is an intermittent stream that begins at coordinates N35.048336; W89.570258 and drains from southeast to northwest for approximately 2,865 linear feet before ending at the STR-1 confluence at coordinates N35.054627; W89.575713. STR-5 was historically a perennial stream; however, historical alterations have diverted the majority of base-flow into STR-7. STR-5 has been channelized its entire length within the study area. STR-5 had an HD score of 24.5 and a habitat assessment score of 43.

STR-6 is a perennial stream that enters the property at coordinates N35.047983; W89.553318 and drains from south to north for approximately 3,248 linear feet before ending at the Wolf River confluence at coordinates N35.056256; W89.55565. STR-6 has been historically channelized and floodplain removed along its left descending bank due to the construction of a levee. STR-6 has a natural groundwater table connection, meeting HD primary indicator #7, and a habitat assessment score of 67.

STR-7 is a perennial stream that begins at coordinates N35.048478; W89.570592 and drains around the southern and western property boundaries for 7,210 linear feet before ending at the STR-1 confluence at coordinates N35.06167; W89.578735. STR-7 has been historically channelized to divert flow from STR-5 around the property for agricultural purposes. STR-7 has a natural groundwater table connection, meeting HD primary indicator #7, and a habitat assessment score of 49.

STR-8 is a perennial stream that begins at coordinates N35.059732; W89.575701 and drains from south to north for approximately 1,129 linear feet before ending at STR-5 confluence at coordinates N35.061404; W89.578484. STR-8 has been slightly impacted by sediment from runoff of adjacent agricultural fields. STR-8 has a natural groundwater table connection, meeting HD primary indicator #7, and a habitat assessment score of 82.

WTL-1 is an emergent and forested wetland located in the southeastern portion of the property. WTL-1 is approximately 27.47 acres in size, and is located at coordinates N35.04944; W89.55849. Wetland hydrology indicators observed in WTL-1 include saturation, high water table, surface water, presence of reduce iron, and oxidized rhizospheres on living roots. Dominant hydrophytic vegetation documented in WTL-1 included black willow (*Salix nigra*), sweetgum (*Liquidambar styraciflua*), frank sedge (*Carex frankii*), cattails (*Typha angustifolia*), smartweed (*Polygonum hydropiperoides*), and woolgrass (*Scirpus cyperinus*). According to the

Munsell™ soil color chart, soils observed in WTL-1 had a soil matrix of 10YR 5/1 with 10YR 4/6 redox concentrations in the pore linings and matrix, meeting the criteria for hydric soil indicator F3 for depleted matrix.

WTL-2 is a forested and emergent wetland located near the center of the study area. WTL-2 is approximately 5.29 acres in size, and is located at coordinates N35.05221; W89.56831. Wetland hydrology indicators observed in WTL-2 include saturation, high water table, surface water, water stained leaves, presence of reduce iron, and oxidized rhizospheres along living roots. Dominant hydrophytic vegetation documented in WTL-2 included black willow (*Salix nigra*), sweetgum (*Liquidambar styraciflua*), frank sedge (*Carex frankii*,) giant goldenrod (*Solidago gigantea*), and soft rush (*Juncus effusus*). According to the Munsell™ soil color chart, soils observed in WTL-2 had a soil matrix of 10YR 5/2 with 7.5YR 5/6 redox concentrations in the pore linings and matrix, meeting the criteria for hydric soil indicator F3 for depleted matrix.

WTL-3 is a forested wetland located in the northern portion of the property. WTL-3 is approximately 36.84 acres in size, and is located at coordinates N35.05694; W89.56468. Wetland hydrology indicators observed in WTL-3 include saturation, drift deposits, water stained leaves, high water table, surface water, presence of reduce iron, and oxidized rhizospheres along living roots. Dominant hydrophytic vegetation documented in WTL-3 included black willow (*Salix nigra*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), frank sedge (*Carex frankii*,), Indian woodoats (*Chasmanthium latifolium*) and smartweed (*Polygonum hydropiperoides*). According to the Munsell™ soil color chart, soils observed in WTL-3 had a soil matrix of 10YR 5/2 with 7.5YR 4/4 redox concentrations in the pore linings and matrix, meeting the criteria for hydric soil indicator F3 for depleted matrix.

WTL-4 is an isolated depression located on the southern border of the Wolf River levy. WTL-4 is a forested wetland approximately 0.75 acres in size, and is located at coordinates N35.060168; W89.568542. Wetland hydrology indicators observed in WTL-4 include surface water, high water table, saturation, water stained leaves, oxidized rhizospheres along living roots and presence of reduced iron. Dominant hydrophytic vegetation documented in WTL-4 include river birch (*Betula nigra*), common buttonbush (*Cephalanthus occidentalis*) and frank sedge (*Carex frankii*). According to the Munsell™ soil color chart, soils observed in WTL-4 had a soil matrix of 10YR 6/2 with 7.5YR 3/4 redox concentrations in the pore linings and matrix, meeting the criteria for hydric soil indicator F3 for depleted matrix.

WTL-5 is a forested wetland located along the Wolf River and the northern boundary of the site. WTL-5 is approximately 189.79 acres in size, and is located at coordinates N35.059397; W89.558979. Wetland hydrology indicators observed in WTL-5 include saturation, drift deposits, water stained leaves, high water table, surface water, presence of reduce iron, and oxidized rhizospheres along living roots. Dominant hydrophytic vegetation documented in WTL-5 included bald cypress *(Taxodium distichum)*, overcup oak *(Quercus lyrata)*, box elder *(Acer negundo)*, and frank sedge *(Carex frankii).* According to the Munsell™ soil color chart, soils observed in WTL-5 had a soil matrix of 10YR 6/2 with 7.5YR 5/6 redox concentrations

in the pore linings and matrix, meeting the criteria for hydric soil indicator F3 for depleted matrix.

WTL-6 is a forested wetland located adjacent to the EPA covenant at the southwest corner of the property. WTL-6 is approximately 11.67 acres in size and located at coordinates N35.02028; W89.575475. Wetland hydrology indicators observed in WTL-6 include saturation, drift deposits, water stained leaves, high water table, surface water, presence of reduce iron, and oxidized rhizospheres along living roots. Dominant hydrophytic vegetation documented in WTL-6 included green ash (Fraxinus pennsylvanica), overcup oak (Quercus lyrata), American sweetgum (*Liquidambar styraciflua*), nuttall oak (*Quercus texana*) and frank sedge (Carex frankii). According to the MunsellTM soil color chart, soils observed in WTL-6 had a soil matrix of 10YR 6/2 with 7.5YR 3/4 redox concentrations in the pore linings and matrix, meeting the criteria for hydric soil indicator F3 for depleted matrix.

In summary, a total of approximately 27,619 linear feet of stream and approximately 271.81 acres of wetland are located on the Rossville Farm Property.

We request concurrence of our findings at your earliest convenience. If you have any questions or need any additional information, please contact Caleb Duke at 615-333-7797 or by e-mail at cduke@cecinc.com

Sincerely,

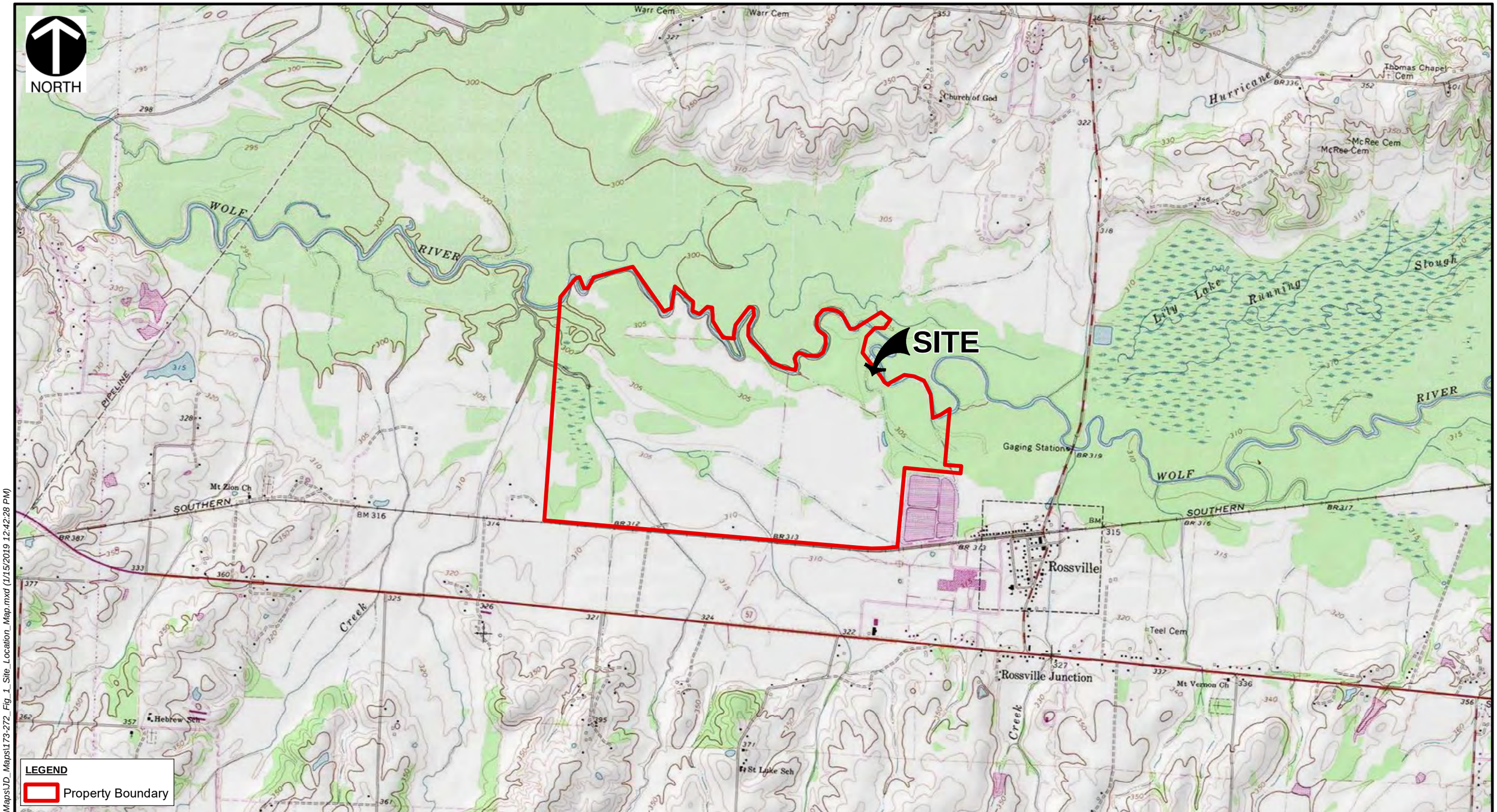
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Caleb Duke
Project Scientist

Matthew Skelton, QHP
Project Manager

Attachments: Figures 1 – 5
Field Data Sheets
Photo Summary

cc: US Army Corps of Engineers, Memphis District – Regulatory Branch
Mike Lee – TDEC
Caitlin Elam – TDEC



REFERENCE

USGS TOPOGRAPHIC MAP/ ARCGIS MAP SERVICE:
HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS,
ACCESSED 1/15/2019

0 2,050 4,100 8,200 Feet

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ROSSVILLE FARM
JURSIDICTIONAL DETERMINATION
ROSSVILLE, FAYETTE COUNTY, TN

SITE LOCATION MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD	* Hand signature on file	FIGURE NO:	1
DATE:	1/15/2019	SCALE:	1 " = 2,000 '	PROJECT NO:	173-272		

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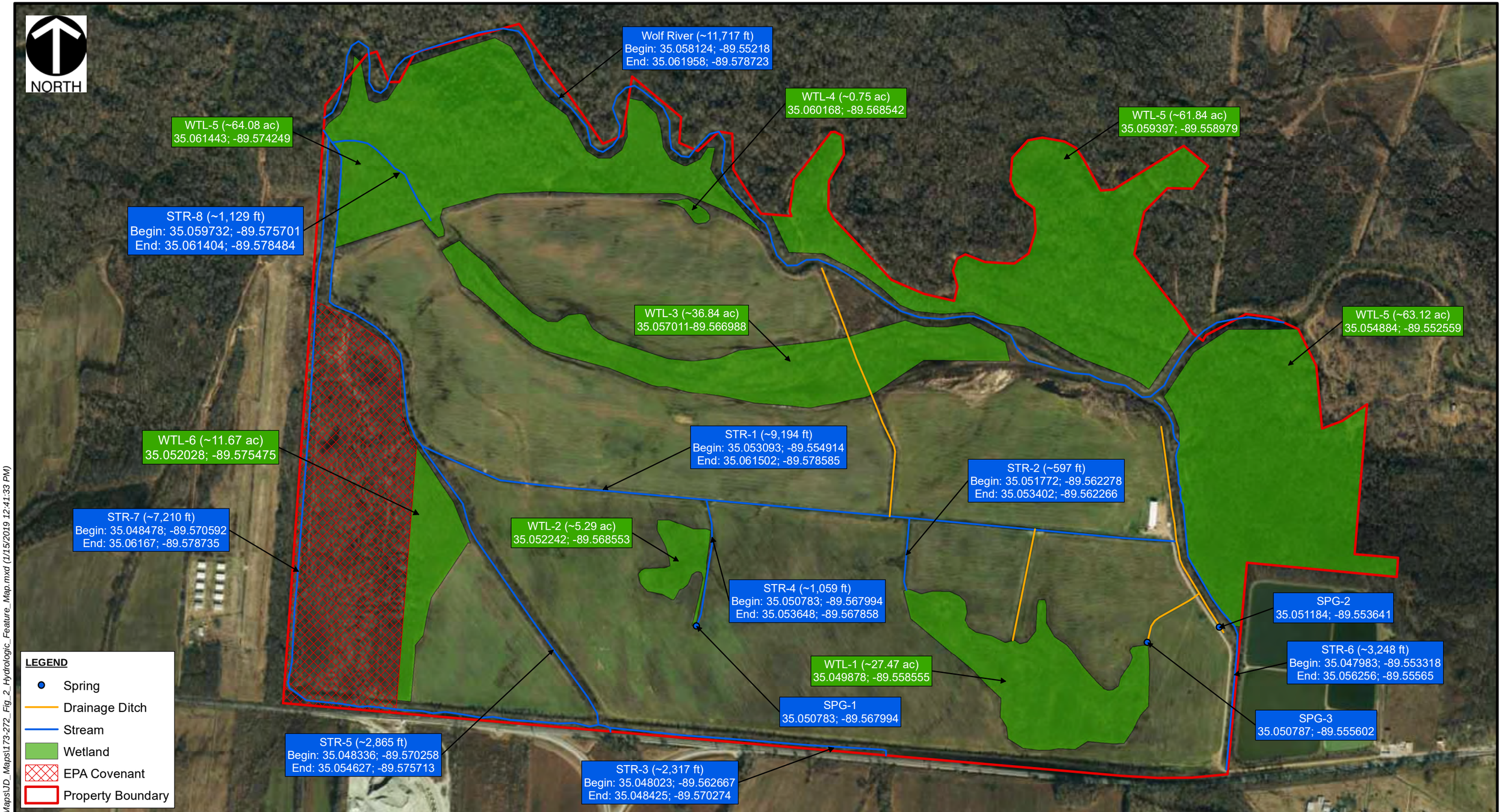

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HYDROLOGIC FEATURE MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY:	JTD *Hand signature on file	FIGURE NO:	2
DATE:	1/15/2019	SCALE:	1 " = 750 '	PROJECT NO:	173-272		

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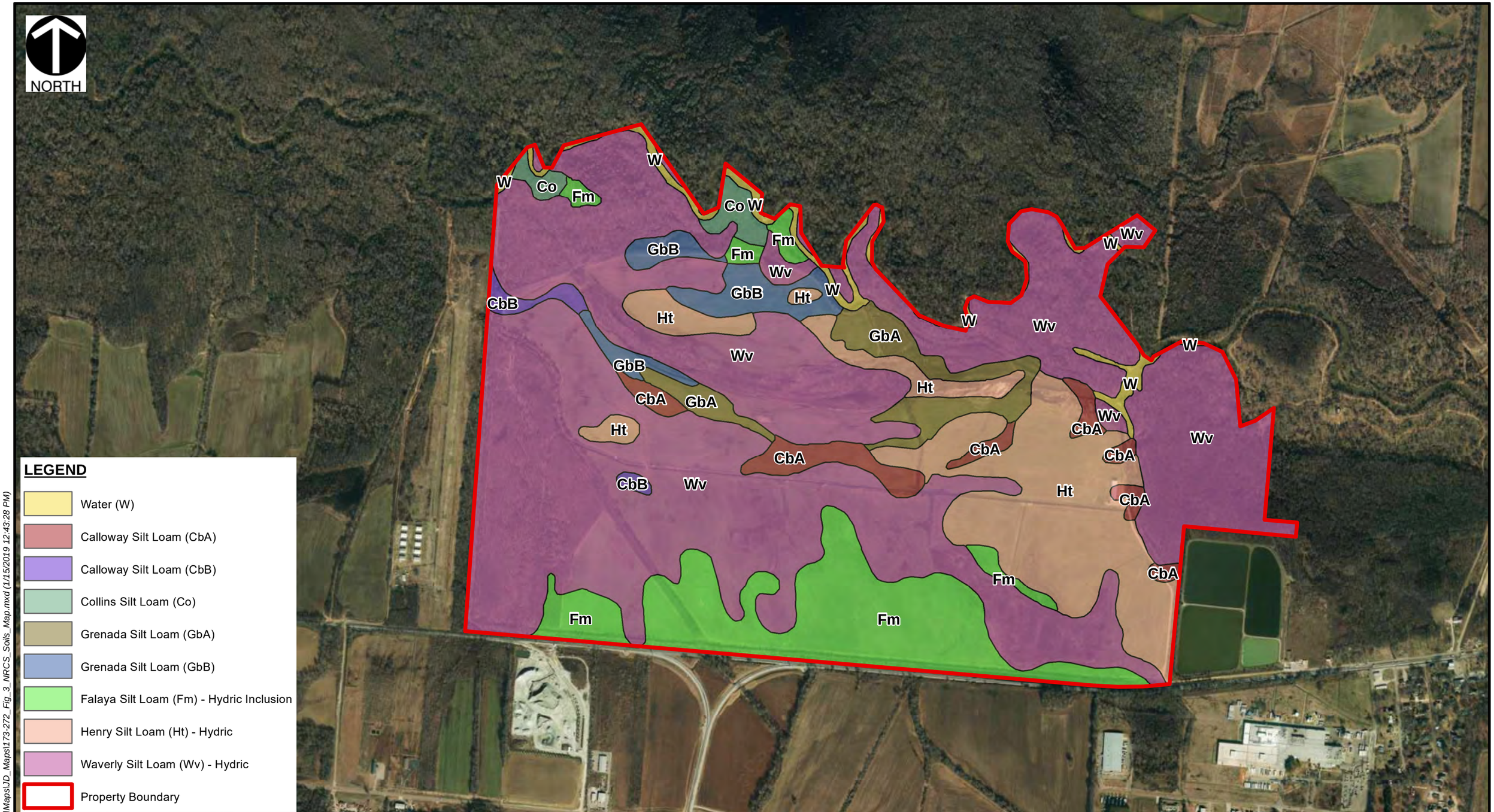

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ACCESSED 1/15/2019

U.S.D.A., N.R.C.S
SOIL SURVEY GEOGRAPHIC (SSURGO) DATABASE FOR
FAYETTE COUNTY, TN

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NRCS SOILS MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY:	JTD * Hand signature on file	FIGURE NO:	3
DATE:	1/15/2019	SCALE:	1 " = 1,000 '	PROJECT NO:	173-272		

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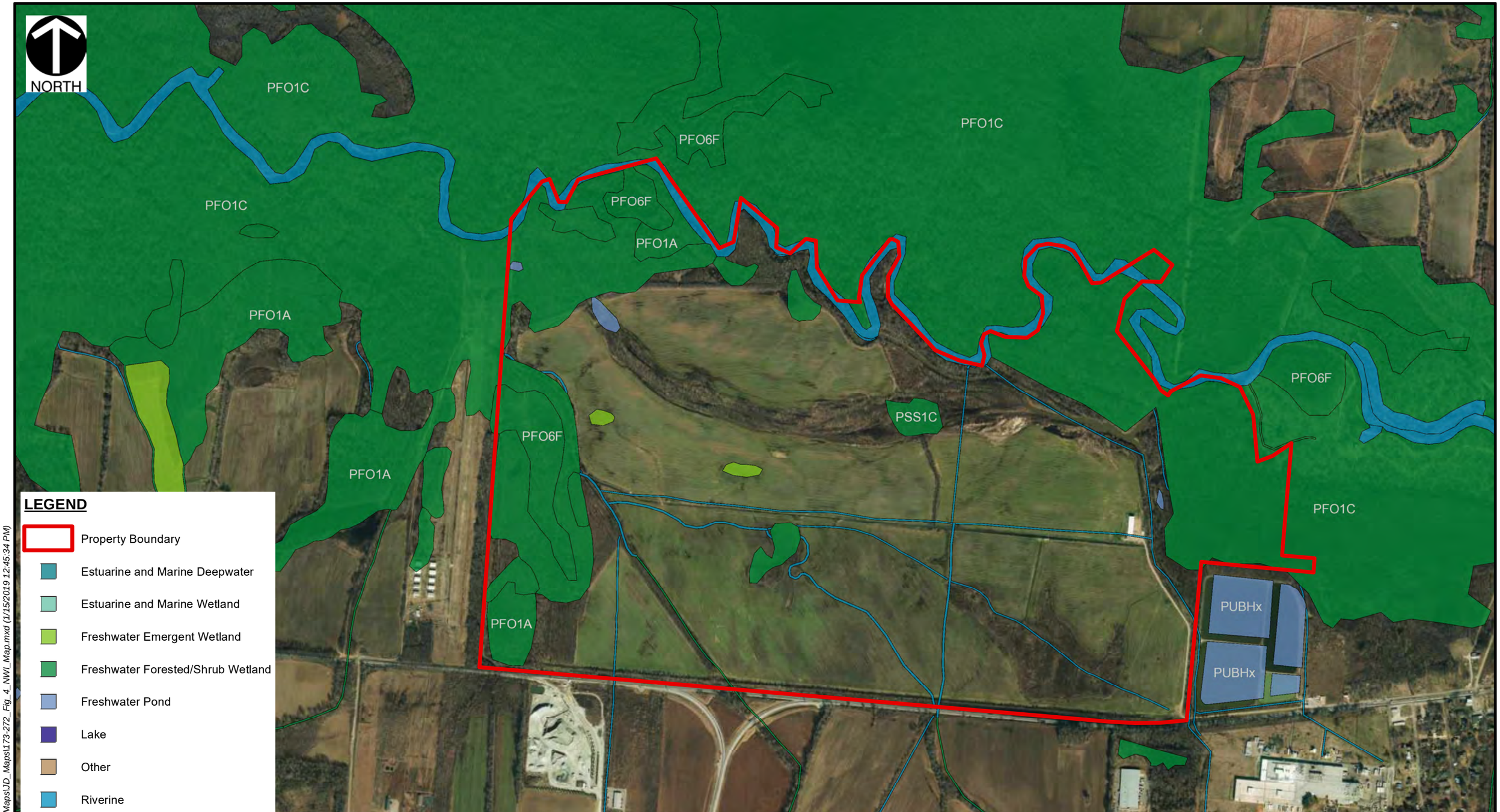

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U.S. FISH & WILDLIFE SERVICE
NATIONAL WETLANDS INVENTORY (NWI) MAP
ACCESSED 1/15/2019

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NATIONAL WETLANDS INVENTORY (NWI) MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY:	JTD * Hand signature on file	FIGURE NO:	4
DATE:	1/15/2019	SCALE:	1 " = 1,000 '	PROJECT NO:	173-272		

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REFERENCE

TDOT AERIAL IMAGERY
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ACCESSED 1/15/2019

0 750 1,500 3,000 Feet

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PHOTO LOCATION MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY:	JTD * Hand signature on file	FIGURE NO:	5
DATE:	1/15/2019	SCALE:	1 " = 750 '	PROJECT NO:	173-272		

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Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Fayette	Named Waterbody: N/A	Date/Time: 12/5/2018
Assessors/Affiliation: C.Duke, C. Liggett; CEC Inc.		Project ID: STR-1
Site Name/Description: Rossville Farm Mitigation		
Site Location: Rossville, TN		
USGS quad: Rossville	HUC (12 digit): Hurricane Creek-Wolf River (080102100302)	Lat/Long: N35.05314, W89.55635
Previous Rainfall (7-days) : 0.00" (24hr) / 0.87" (7-days)		
Precipitation this Season vs. Normal : very wet wet [average] dry drought unknown Source of recent & seasonal precip data : https://www.cocorahs.org/ViewData/ListDailyPrecipReports.aspx		
Watershed Size : ~0.45sqmi	Photos: Yes	Number :
Soil Type(s) / Geology : Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration		
Surrounding Land Use : Agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : [Severe] Moderate Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✔	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✔	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✔	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✔	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✔	Stream
6. Presence of fish (except *Gambusia*)	✔	Stream
7. Presence of naturally occurring ground water table connection		[Stream]
8. Flowing water in channel and 7 days since last precipitation in local watershed	✔	Stream
9. Evidence watercourse has been used as a supply of drinking water	✔	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Perennial Stream

Secondary Indicator Score (if applicable) = 0

Justification / Notes :

Secondary Field Indicator Evaluation Project ID: STR-1

A. Geomorphology (Subtotal =) 0		Absent	Weak	Moderate	Strong
1. Continuous bed and bank	N/A	0	1	2	3
2. Sinuous channel	N/A	0	1	2	3
3. In-channel structure: riffle-pool sequences	N/A	0	1	2	3
4. Sorting of soil textures or other substrate	N/A	0	1	2	3
5. Active/relic floodplain	N/A	0	1	2	3
6. Depositional bars or benches	N/A	0	1	2	3
7. Braided channel	N/A	0	1	2	3
8. Recent alluvial deposits	N/A	0	0.5	1	1.5
9. Natural levees	N/A	0	1	2	3
10. Headcuts	N/A	0	1	2	3
11. Grade controls	N/A	0	0.5	1	1.5
12. Natural valley or drainageway	N/A	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map		N/A			

B. Hydrology (Subtotal =) 0		Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	N/A	0	1	2	3
15. Water in channel and >48 hours since sig. rain	N/A	0	1	2	3
16. Leaf litter in channel (January – September)	N/A	1.5	1	0.5	0
17. Sediment on plants or on debris	N/A	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	N/A	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel		N/A			

C. Biology (Subtotal =) 0		Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	N/A	3	2	1	0
21. Rooted plants in channel [1]	N/A	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	N/A	0	0.5	1	1.5
23. Bivalves/mussels	N/A	0	1	2	3
24. Amphibians	N/A	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	N/A	0	1	2	3
26. Filamentous algae; periphyton	N/A	0	1	2	3
27. Iron oxidizing bacteria/fungus	N/A	0	0.5	1	1.5
28.Wetland plants in channel [2]	N/A	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 0

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (FRONT)

(Refer to Protocol E for detailed descriptions and rank information)

PROJECT: Rossville Farm Mitigation			
STA: N/A		**HABITAT ASSESSED BY:** C.Duke, C.Liggett	
STREAM NAME: STR-1		**DATE:** 12/5/18	**TIME:**
MAP LABEL: STR-1		**ECOREGION:** 74b, Loess Plains	
HUC: Hurricane Creek-Wolf River (080102100302)		**QC: Consensus / Duplicate**	

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate / Available Cover	Over 50% of reach has natural, stable habitat for colonization by macroinvertebrates and/or fish. Three or more productive habitats are present.	Natural stable habitat covers 30-50% of stream reach or less than three habitats are present.	Natural stable habitat 10-30% of stream reach. Availability less than desirable, substrate frequently disturbed or removed. Habitat diversity is reduced.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
2. Channel Substrate Characterization	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; or substrate is fissured bedrock, some root mats and submerged vegetation present.	All mud, clay, soft sand or fissured bedrock bottom, little or no root mat, no submerged vegetation present.	Hard-pan clay, conglomerate or predominantly flat bedrock; no root mat or submerged vegetation.

SCORE 9	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools are large-deep very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
4. Sediment Deposition	Sediment deposition affects less than 20% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected. Slight deposition in pools.	Moderate deposition of fine material on old and new bars, 50-80% of bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition of pools.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
5. Channel Flow Status If water backed up by obstructions (beaver dam, log jams, bedrock during low flow) move assessment reach above or below affected area or consider postponing sampling until accurate assessment of stream can be achieved.	Water reaches base of both lower banks throughout reach. Streambed is covered. Minimal productive habitat is exposed.	Water covers > 75% of streambed and/or < 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or stable habitat is mostly exposed.	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.

SCORE 18	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (BACK)

MAP LABEL: STR-1	**DATE:** 12/5/18	**ASSESSOR INITIALS:** C.Duke, C.Liggett

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization, dredging rock removal or 4-wheel activity (past or present) absent or minimal; natural meander pattern. NO artificial structures in reach. Upstream or downstream structures do not affect reach.	Channelization, dredging or 4-wheel activity up to 40%. Channel has stabilized. If larger reach, channelization is historic and stable. Artificial structures in or out of reach do not affect natural flow patterns.	Channelization, dredging or 4-wheel activity 40-80% (or less that has not stabilized.) Artificial structures in or out of reach may have slight affect.	Over 80% of reach channelized, dredged or affected by 4-wheelers. In-stream habitat greatly altered or removed. Artificial structures have greatly affected flow pattern.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
7. Channel Sinuosity (Entire meander sequence not limited to sampling reach)	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
8. Bank Stability (score each bank) Determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. If approaching 30% score marginal if banks steep.	Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.	Unstable; many eroded area; raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.

SCORE (LDB) 1	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 1	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
9. Bank Vegetative Protection (score each bank) include vegetation from top of bank to base of bank. Determine left or right side by facing downstream.	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (< 30%).	50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).	Less than 50% of the banks covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. Non-native vegetation may dominate (> 50%).

SCORE (LDB) 1	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 1	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
10. Riparian Vegetative Zone Width (score each bank.) Zone begins at top of bank.	Average width of riparian zone > 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.	Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are small or are minimally disturbed.	Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.	Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small or are minimally disturbed.

SCORE (LDB) 0	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 0	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

TOTAL SCORE 40

Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

If score is below guidelines, result of (circle) Natural Conditions Human Disturbance

Comments:

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Fayette	Named Waterbody: N/A	Date/Time: 12/5/2018
Assessors/Affiliation: C.Duke, C. Liggett; CEC Inc.		Project ID: STR-2
Site Name/Description: Rossville Farm Mitigation		
Site Location: Rossville, TN		
USGS quad: Rossville	HUC (12 digit): Hurricane Creek-Wolf River (080102100302)	Lat/Long: N35.05247, W89.56228
Previous Rainfall (7-days) : 0.00" (24hr) / 0.87" (7-days)		
Precipitation this Season vs. Normal : very wet wet **average** dry drought unknown Source of recent & seasonal precip data : https://www.cocorahs.org/ViewData/ListDailyPrecipReports.aspx		
Watershed Size : ~0.18sqmi	Photos: Yes	Number :
Soil Type(s) / Geology : Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration		
Surrounding Land Use : Agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : **Severe** Moderate Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✔	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✔	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✔	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✔	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✔	Stream
6. Presence of fish (except *Gambusia*)	✔	Stream
7. Presence of naturally occurring ground water table connection		**Stream**
8. Flowing water in channel and 7 days since last precipitation in local watershed	✔	Stream
9. Evidence watercourse has been used as a supply of drinking water	✔	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Perennial Stream

Secondary Indicator Score (if applicable) = 0

Justification / Notes :

Secondary Field Indicator Evaluation Project ID: STR-2

A. Geomorphology (Subtotal =) 0		Absent	Weak	Moderate	Strong
1. Continuous bed and bank	N/A	0	1	2	3
2. Sinuous channel	N/A	0	1	2	3
3. In-channel structure: riffle-pool sequences	N/A	0	1	2	3
4. Sorting of soil textures or other substrate	N/A	0	1	2	3
5. Active/relic floodplain	N/A	0	1	2	3
6. Depositional bars or benches	N/A	0	1	2	3
7. Braided channel	N/A	0	1	2	3
8. Recent alluvial deposits	N/A	0	0.5	1	1.5
9. Natural levees	N/A	0	1	2	3
10. Headcuts	N/A	0	1	2	3
11. Grade controls	N/A	0	0.5	1	1.5
12. Natural valley or drainageway	N/A	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map		N/A			

B. Hydrology (Subtotal =) 0		Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	N/A	0	1	2	3
15. Water in channel and >48 hours since sig. rain	N/A	0	1	2	3
16. Leaf litter in channel (January – September)	N/A	1.5	1	0.5	0
17. Sediment on plants or on debris	N/A	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	N/A	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel		N/A			

C. Biology (Subtotal =) 0		Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	N/A	3	2	1	0
21. Rooted plants in channel [1]	N/A	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	N/A	0	0.5	1	1.5
23. Bivalves/mussels	N/A	0	1	2	3
24. Amphibians	N/A	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	N/A	0	1	2	3
26. Filamentous algae; periphyton	N/A	0	1	2	3
27. Iron oxidizing bacteria/fungus	N/A	0	0.5	1	1.5
28.Wetland plants in channel [2]	N/A	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 0

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (FRONT)

(Refer to Protocol E for detailed descriptions and rank information)

PROJECT: Rossville Farm Mitigation			
STA: N/A		**HABITAT ASSESSED BY:** C.Duke, C.Liggett	
STREAM NAME: STR-2		**DATE:** 12/5/18	**TIME:**
MAP LABEL: STR-2		**ECOREGION:** 74b, Loess Plains	
HUC: Hurricane Creek-Wolf River (080102100302)		**QC: Consensus / Duplicate**	

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate / Available Cover	Over 50% of reach has natural, stable habitat for colonization by macroinvertebrates and/or fish. Three or more productive habitats are present.	Natural stable habitat covers 30-50% of stream reach or less than three habitats are present.	Natural stable habitat 10-30% of stream reach. Availability less than desirable, substrate frequently disturbed or removed. Habitat diversity is reduced.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
2. Channel Substrate Characterization	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; or substrate is fissured bedrock, some root mats and submerged vegetation present.	All mud, clay, soft sand or fissured bedrock bottom, little or no root mat, no submerged vegetation present.	Hard-pan clay, conglomerate or predominantly flat bedrock; no root mat or submerged vegetation.

SCORE 9	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools are large-deep very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
4. Sediment Deposition	Sediment deposition affects less than 20% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected. Slight deposition in pools.	Moderate deposition of fine material on old and new bars, 50-80% of bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition of pools.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
5. Channel Flow Status If water backed up by obstructions (beaver dam, log jams, bedrock during low flow) move assessment reach above or below affected area or consider postponing sampling until accurate assessment of stream can be achieved.	Water reaches base of both lower banks throughout reach. Streambed is covered. Minimal productive habitat is exposed.	Water covers > 75% of streambed and/or < 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or stable habitat is mostly exposed.	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.

SCORE 18	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (BACK)

MAP LABEL: STR-2	**DATE:** 12/5/18	**ASSESSOR INITIALS:** C.Duke, C.Liggett

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization, dredging rock removal or 4-wheel activity (past or present) absent or minimal; natural meander pattern. NO artificial structures in reach. Upstream or downstream structures do not affect reach.	Channelization, dredging or 4-wheel activity up to 40%. Channel has stabilized. If larger reach, channelization is historic and stable. Artificial structures in or out of reach do not affect natural flow patterns.	Channelization, dredging or 4-wheel activity 40-80% (or less that has not stabilized.) Artificial structures in or out of reach may have slight affect.	Over 80% of reach channelized, dredged or affected by 4-wheelers. In-stream habitat greatly altered or removed. Artificial structures have greatly affected flow pattern.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
7. Channel Sinuosity (Entire meander sequence not limited to sampling reach)	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
8. Bank Stability (score each bank) Determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. If approaching 30% score marginal if banks steep.	Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.	Unstable; many eroded area; raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.

SCORE (LDB) 1	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 1	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
9. Bank Vegetative Protection (score each bank) include vegetation from top of bank to base of bank. Determine left or right side by facing downstream.	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (< 30%).	50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).	Less than 50% of the banks covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. Non-native vegetation may dominate (> 50%).

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 2	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
10. Riparian Vegetative Zone Width (score each bank.) Zone begins at top of bank.	Average width of riparian zone > 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.	Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are small or are minimally disturbed.	Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.	Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small or are minimally disturbed.

SCORE (LDB) 0	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 0	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

TOTAL SCORE 42

Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

If score is below guidelines, result of (circle) Natural Conditions Human Disturbance

Comments:

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Fayette	Named Waterbody: N/A	Date/Time: 12/5/2018
Assessors/Affiliation: C.Duke, C. Liggett; CEC Inc.		Project ID: STR-3
Site Name/Description: Rossville Farm Mitigation		
Site Location: Rossville, TN		
USGS quad: Rossville	HUC (12 digit): Hurricane Creek-Wolf River (080102100302)	Lat/Long: N35.04831, W89.56600
Previous Rainfall (7-days) : 0.00" (24hr) / 0.87" (7-days)		
Precipitation this Season vs. Normal : very wet wet [average] dry drought unknown Source of recent & seasonal precip data : https://www.cocorahs.org/ViewData/ListDailyPrecipReports.aspx		
Watershed Size : ~1.84sqmi	Photos: Yes	Number :
Soil Type(s) / Geology : Falaya silt loam		
Surrounding Land Use : Agricultural/Forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe [Moderate] Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✔	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✔	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✔	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✔	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✔	Stream
6. Presence of fish (except *Gambusia*)	✔	Stream
7. Presence of naturally occurring ground water table connection		[Stream]
8. Flowing water in channel and 7 days since last precipitation in local watershed	✔	Stream
9. Evidence watercourse has been used as a supply of drinking water	✔	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Perennial Stream

Secondary Indicator Score (if applicable) = 0

Justification / Notes :

Secondary Field Indicator Evaluation Project ID: STR-3

A. Geomorphology (Subtotal =) 0		Absent	Weak	Moderate	Strong
1. Continuous bed and bank	N/A	0	1	2	3
2. Sinuous channel	N/A	0	1	2	3
3. In-channel structure: riffle-pool sequences	N/A	0	1	2	3
4. Sorting of soil textures or other substrate	N/A	0	1	2	3
5. Active/relic floodplain	N/A	0	1	2	3
6. Depositional bars or benches	N/A	0	1	2	3
7. Braided channel	N/A	0	1	2	3
8. Recent alluvial deposits	N/A	0	0.5	1	1.5
9. Natural levees	N/A	0	1	2	3
10. Headcuts	N/A	0	1	2	3
11. Grade controls	N/A	0	0.5	1	1.5
12. Natural valley or drainageway	N/A	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map		N/A			

B. Hydrology (Subtotal =) 0		Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	N/A	0	1	2	3
15. Water in channel and >48 hours since sig. rain	N/A	0	1	2	3
16. Leaf litter in channel (January – September)	N/A	1.5	1	0.5	0
17. Sediment on plants or on debris	N/A	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	N/A	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel		N/A			

C. Biology (Subtotal =) 0		Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	N/A	3	2	1	0
21. Rooted plants in channel [1]	N/A	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	N/A	0	0.5	1	1.5
23. Bivalves/mussels	N/A	0	1	2	3
24. Amphibians	N/A	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	N/A	0	1	2	3
26. Filamentous algae; periphyton	N/A	0	1	2	3
27. Iron oxidizing bacteria/fungus	N/A	0	0.5	1	1.5
28.Wetland plants in channel [2]	N/A	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 0

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (FRONT)

(Refer to Protocol E for detailed descriptions and rank information)

PROJECT: Rossville Farm Mitigation			
STA: N/A		**HABITAT ASSESSED BY:** C.Duke, C.Liggett	
STREAM NAME: STR-3		**DATE:** 12/5/18	**TIME:**
MAP LABEL: STR-3		**ECOREGION:** 74b, Loess Plains	
HUC: Hurricane Creek-Wolf River (080102100302)		**QC: Consensus / Duplicate**	

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate / Available Cover	Over 50% of reach has natural, stable habitat for colonization by macroinvertebrates and/or fish. Three or more productive habitats are present.	Natural stable habitat covers 30-50% of stream reach or less than three habitats are present.	Natural stable habitat 10-30% of stream reach. Availability less than desirable, substrate frequently disturbed or removed. Habitat diversity is reduced.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 2	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
2. Channel Substrate Characterization	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; or substrate is fissured bedrock, some root mats and submerged vegetation present.	All mud, clay, soft sand or fissured bedrock bottom, little or no root mat, no submerged vegetation present.	Hard-pan clay, conglomerate or predominantly flat bedrock; no root mat or submerged vegetation.

SCORE 9	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools are large-deep very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
4. Sediment Deposition	Sediment deposition affects less than 20% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected. Slight deposition in pools.	Moderate deposition of fine material on old and new bars, 50-80% of bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition of pools.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
5. Channel Flow Status If water backed up by obstructions (beaver dam, log jams, bedrock during low flow) move assessment reach above or below affected area or consider postponing sampling until accurate assessment of stream can be achieved.	Water reaches base of both lower banks throughout reach. Streambed is covered. Minimal productive habitat is exposed.	Water covers > 75% of streambed and/or < 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or stable habitat is mostly exposed.	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.

SCORE 18	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (BACK)

MAP LABEL: STR-3	**DATE:** 12/5/18	**ASSESSOR INITIALS:** C.Duke, C.Liggett

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization, dredging rock removal or 4-wheel activity (past or present) absent or minimal; natural meander pattern. NO artificial structures in reach. Upstream or downstream structures do not affect reach.	Channelization, dredging or 4-wheel activity up to 40%. Channel has stabilized. If larger reach, channelization is historic and stable. Artificial structures in or out of reach do not affect natural flow patterns.	Channelization, dredging or 4-wheel activity 40-80% (or less that has not stabilized.) Artificial structures in or out of reach may have slight affect.	Over 80% of reach channelized, dredged or affected by 4-wheelers. In-stream habitat greatly altered or removed. Artificial structures have greatly affected flow pattern.

SCORE 5	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
7. Channel Sinuosity (Entire meander sequence not limited to sampling reach)	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.

SCORE 2	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
8. Bank Stability (score each bank) Determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. If approaching 30% score marginal if banks steep.	Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.	Unstable; many eroded area; raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 2	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
9. Bank Vegetative Protection (score each bank) include vegetation from top of bank to base of bank. Determine left or right side by facing downstream.	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (< 30%).	50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).	Less than 50% of the banks covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. Non-native vegetation may dominate (> 50%).

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 2	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
10. Riparian Vegetative Zone Width (score each bank.) Zone begins at top of bank.	Average width of riparian zone > 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.	Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are small or are minimally disturbed.	Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.	Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small or are minimally disturbed.

SCORE (LDB) 1	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 1	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

TOTAL SCORE 50

Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

If score is below guidelines, result of (circle) Natural Conditions Human Disturbance

Comments:

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Fayette	Named Waterbody: N/A	Date/Time: 12/5/2018
Assessors/Affiliation: C.Duke, C. Liggett; CEC Inc.		Project ID: STR-4
Site Name/Description: Rossville Farm Mitigation		
Site Location: Rossville, TN		
USGS quad: Rossville	HUC (12 digit): Hurricane Creek-Wolf River (080102100302)	Lat/Long: N35.05247, W89.56767
Previous Rainfall (7-days) : 0.00" (24hr) / 0.87" (7-days)		
Precipitation this Season vs. Normal : very wet wet [average] dry drought unknown Source of recent & seasonal precip data : https://www.cocorahs.org/ViewData/ListDailyPrecipReports.aspx		
Watershed Size : ~0.10sqmi	Photos: Yes	Number :
Soil Type(s) / Geology : Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration		
Surrounding Land Use : Agricultural/Forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : [Severe] Moderate Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✔	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✔	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✔	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✔	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✔	Stream
6. Presence of fish (except *Gambusia*)	✔	Stream
7. Presence of naturally occurring ground water table connection		[Stream]
8. Flowing water in channel and 7 days since last precipitation in local watershed	✔	Stream
9. Evidence watercourse has been used as a supply of drinking water	✔	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Perennial Stream

Secondary Indicator Score (if applicable) = 0

Justification / Notes :

Secondary Field Indicator Evaluation Project ID: STR-4

A. Geomorphology (Subtotal =) 0		Absent	Weak	Moderate	Strong
1. Continuous bed and bank	N/A	0	1	2	3
2. Sinuous channel	N/A	0	1	2	3
3. In-channel structure: riffle-pool sequences	N/A	0	1	2	3
4. Sorting of soil textures or other substrate	N/A	0	1	2	3
5. Active/relic floodplain	N/A	0	1	2	3
6. Depositional bars or benches	N/A	0	1	2	3
7. Braided channel	N/A	0	1	2	3
8. Recent alluvial deposits	N/A	0	0.5	1	1.5
9. Natural levees	N/A	0	1	2	3
10. Headcuts	N/A	0	1	2	3
11. Grade controls	N/A	0	0.5	1	1.5
12. Natural valley or drainageway	N/A	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map		N/A			

B. Hydrology (Subtotal =) 0		Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	N/A	0	1	2	3
15. Water in channel and >48 hours since sig. rain	N/A	0	1	2	3
16. Leaf litter in channel (January – September)	N/A	1.5	1	0.5	0
17. Sediment on plants or on debris	N/A	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	N/A	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel		N/A			

C. Biology (Subtotal =) 0		Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	N/A	3	2	1	0
21. Rooted plants in channel [1]	N/A	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	N/A	0	0.5	1	1.5
23. Bivalves/mussels	N/A	0	1	2	3
24. Amphibians	N/A	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	N/A	0	1	2	3
26. Filamentous algae; periphyton	N/A	0	1	2	3
27. Iron oxidizing bacteria/fungus	N/A	0	0.5	1	1.5
28.Wetland plants in channel [2]	N/A	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 0

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (FRONT)

(Refer to Protocol E for detailed descriptions and rank information)

PROJECT: Rossville Farm Mitigation			
STA: N/A		**HABITAT ASSESSED BY:** C.Duke, C.Liggett	
STREAM NAME: STR-4		**DATE:** 12/5/18	**TIME:**
MAP LABEL: STR-4		**ECOREGION:** 74b, Loess Plains	
HUC: Hurricane Creek-Wolf River (080102100302)		**QC: Consensus / Duplicate**	

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate / Available Cover	Over 50% of reach has natural, stable habitat for colonization by macroinvertebrates and/or fish. Three or more productive habitats are present.	Natural stable habitat covers 30-50% of stream reach or less than three habitats are present.	Natural stable habitat 10-30% of stream reach. Availability less than desirable, substrate frequently disturbed or removed. Habitat diversity is reduced.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
2. Channel Substrate Characterization	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; or substrate is fissured bedrock, some root mats and submerged vegetation present.	All mud, clay, soft sand or fissured bedrock bottom, little or no root mat, no submerged vegetation present.	Hard-pan clay, conglomerate or predominantly flat bedrock; no root mat or submerged vegetation.

SCORE 10	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools are large-deep very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
4. Sediment Deposition	Sediment deposition affects less than 20% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected. Slight deposition in pools.	Moderate deposition of fine material on old and new bars, 50-80% of bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition of pools.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
5. Channel Flow Status If water backed up by obstructions (beaver dam, log jams, bedrock during low flow) move assessment reach above or below affected area or consider postponing sampling until accurate assessment of stream can be achieved.	Water reaches base of both lower banks throughout reach. Streambed is covered. Minimal productive habitat is exposed.	Water covers > 75% of streambed and/or < 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or stable habitat is mostly exposed.	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.

SCORE 18	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (BACK)

MAP LABEL: STR-4	**DATE:** 12/5/18	**ASSESSOR INITIALS:** C.Duke, C.Liggett

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization, dredging rock removal or 4-wheel activity (past or present) absent or minimal; natural meander pattern. NO artificial structures in reach. Upstream or downstream structures do not affect reach.	Channelization, dredging or 4-wheel activity up to 40%. Channel has stabilized. If larger reach, channelization is historic and stable. Artificial structures in or out of reach do not affect natural flow patterns.	Channelization, dredging or 4-wheel activity 40-80% (or less that has not stabilized.) Artificial structures in or out of reach may have slight affect.	Over 80% of reach channelized, dredged or affected by 4-wheelers. In-stream habitat greatly altered or removed. Artificial structures have greatly affected flow pattern.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
7. Channel Sinuosity (Entire meander sequence not limited to sampling reach)	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
8. Bank Stability (score each bank) Determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. If approaching 30% score marginal if banks steep.	Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.	Unstable; many eroded area; raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 2	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
9. Bank Vegetative Protection (score each bank) include vegetation from top of bank to base of bank. Determine left or right side by facing downstream.	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (< 30%).	50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).	Less than 50% of the banks covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. Non-native vegetation may dominate (> 50%).

SCORE (LDB) 1	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 1	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
10. Riparian Vegetative Zone Width (score each bank.) Zone begins at top of bank.	Average width of riparian zone > 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.	Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are small or are minimally disturbed.	Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.	Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small or are minimally disturbed.

SCORE (LDB) 0	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 0	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

TOTAL SCORE 43

Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

If score is below guidelines, result of (circle) Natural Conditions Human Disturbance

Comments:

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Fayette	Named Waterbody: N/A	Date/Time: 12/5/2018
Assessors/Affiliation: C.Duke, C. Liggett; CEC Inc.		Project ID: STR-5
Site Name/Description: Rossville Farm Mitigation		
Site Location: Rossville, TN		
USGS quad: Rossville	HUC (12 digit): Hurricane Creek-Wolf River (080102100302)	Lat/Long: N35.05109, W89.57270
Previous Rainfall (7-days) : 0.00" (24hr) / 0.87" (7-days)		
Precipitation this Season vs. Normal : very wet wet **average** dry drought unknown Source of recent & seasonal precip data : https://www.cocorahs.org/ViewData/ListDailyPrecipReports.aspx		
Watershed Size : ~4.20sqmi	Photos: Yes	Number :
Soil Type(s) / Geology : Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration		
Surrounding Land Use : Agricultural/Forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe **Moderate** Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✔	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✔	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✔	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✔	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✔	Stream
6. Presence of fish (except *Gambusia*)	✔	Stream
7. Presence of naturally occurring ground water table connection	✔	Stream
8. Flowing water in channel and 7 days since last precipitation in local watershed	✔	Stream
9. Evidence watercourse has been used as a supply of drinking water	✔	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Intermittent Stream

Secondary Indicator Score (if applicable) = 24.5

Justification / Notes : Overflow Channel from STR-7, flows only when STR-7 has high flow.

Secondary Field Indicator Evaluation Project ID: STR-5

A. Geomorphology (Subtotal =) 14.5		Absent	Weak	Moderate	Strong
1. Continuous bed and bank	3	0	1	2	3
2. Sinuous channel	0	0	1	2	3
3. In-channel structure: riffle-pool sequences	2.5	0	1	2	3
4. Sorting of soil textures or other substrate	1.5	0	1	2	3
5. Active/relic floodplain	0	0	1	2	3
6. Depositional bars or benches	2	0	1	2	3
7. Braided channel	0	0	1	2	3
8. Recent alluvial deposits	1	0	0.5	1	1.5
9. Natural levees	0	0	1	2	3
10. Headcuts	0	0	1	2	3
11. Grade controls	1	0	0.5	1	1.5
12. Natural valley or drainageway	0.5	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map		Yes = 3			

B. Hydrology (Subtotal =) 4		Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0	0	1	2	3
15. Water in channel and >48 hours since sig. rain	2	0	1	2	3
16. Leaf litter in channel (January – September)	N/A	1.5	1	0.5	0
17. Sediment on plants or on debris	1	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	1	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel		No = 0			

C. Biology (Subtotal =) 6		Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	3	2	1	0
21. Rooted plants in channel [1]	3	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0	0.5	1	1.5
23. Bivalves/mussels	0	0	1	2	3
24. Amphibians	0	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	N/A	0	1	2	3
26. Filamentous algae; periphyton	0	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0	0.5	1	1.5
28.Wetland plants in channel [2]	0	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 24.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (FRONT)

(Refer to Protocol E for detailed descriptions and rank information)

PROJECT: Rossville Farm Mitigation			
STA: N/A		**HABITAT ASSESSED BY:** C.Duke, C.Liggett	
STREAM NAME: STR-5		**DATE:** 12/5/18	**TIME:**
MAP LABEL: STR-5		**ECOREGION:** 74b, Loess Plains	
HUC: Hurricane Creek-Wolf River (080102100302)		**QC: Consensus / Duplicate**	

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate / Available Cover	Over 50% of reach has natural, stable habitat for colonization by macroinvertebrates and/or fish. Three or more productive habitats are present.	Natural stable habitat covers 30-50% of stream reach or less than three habitats are present.	Natural stable habitat 10-30% of stream reach. Availability less than desirable, substrate frequently disturbed or removed. Habitat diversity is reduced.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 6	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
2. Channel Substrate Characterization	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; or substrate is fissured bedrock, some root mats and submerged vegetation present.	All mud, clay, soft sand or fissured bedrock bottom, little or no root mat, no submerged vegetation present.	Hard-pan clay, conglomerate or predominantly flat bedrock; no root mat or submerged vegetation.

SCORE 6	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools are large-deep very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.

SCORE 8	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
4. Sediment Deposition	Sediment deposition affects less than 20% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected. Slight deposition in pools.	Moderate deposition of fine material on old and new bars, 50-80% of bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition of pools.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.

SCORE 6	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
5. Channel Flow Status If water backed up by obstructions (beaver dam, log jams, bedrock during low flow) move assessment reach above or below affected area or consider postponing sampling until accurate assessment of stream can be achieved.	Water reaches base of both lower banks throughout reach. Streambed is covered. Minimal productive habitat is exposed.	Water covers > 75% of streambed and/or < 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or stable habitat is mostly exposed.	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.

SCORE 5	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (BACK)

MAP LABEL: STR-5	**DATE:** 12/5/18	**ASSESSOR INITIALS:** C.Duke, C.Liggett

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization, dredging rock removal or 4-wheel activity (past or present) absent or minimal; natural meander pattern. NO artificial structures in reach. Upstream or downstream structures do not affect reach.	Channelization, dredging or 4-wheel activity up to 40%. Channel has stabilized. If larger reach, channelization is historic and stable. Artificial structures in or out of reach do not affect natural flow patterns.	Channelization, dredging or 4-wheel activity 40-80% (or less that has not stabilized.) Artificial structures in or out of reach may have slight affect.	Over 80% of reach channelized, dredged or affected by 4-wheelers. In-stream habitat greatly altered or removed. Artificial structures have greatly affected flow pattern.

SCORE 5	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
7. Channel Sinuosity (Entire meander sequence not limited to sampling reach)	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
8. Bank Stability (score each bank) Determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. If approaching 30% score marginal if banks steep.	Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.	Unstable; many eroded area; raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 2	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
9. Bank Vegetative Protection (score each bank) include vegetation from top of bank to base of bank. Determine left or right side by facing downstream.	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (< 30%).	50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).	Less than 50% of the banks covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. Non-native vegetation may dominate (> 50%).

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 2	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
10. Riparian Vegetative Zone Width (score each bank.) Zone begins at top of bank.	Average width of riparian zone > 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.	Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are small or are minimally disturbed.	Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.	Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small or are minimally disturbed.

SCORE (LDB) 3	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 3	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

TOTAL SCORE 51 | Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

If score is below guidelines, result of (circle) Natural Conditions Human Disturbance

Comments:

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Fayette	Named Waterbody: N/A	Date/Time: 12/5/2018
Assessors/Affiliation: C.Duke, C. Liggett; CEC Inc.		Project ID: STR-6
Site Name/Description: Rossville Farm Mitigation		
Site Location: Rossville, TN		
USGS quad: Rossville	HUC (12 digit): Hurricane Creek-Wolf River (080102100302)	Lat/Long: N35.047983, W89.553318
Previous Rainfall (7-days) : 0.00" (24hr) / 0.87" (7-days)		
Precipitation this Season vs. Normal : very wet wet [average] dry drought unknown Source of recent & seasonal precip data : https://www.cocorahs.org/ViewData/ListDailyPrecipReports.aspx		
Watershed Size : ~0.52sqmi	Photos: Yes	Number :
Soil Type(s) / Geology : Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration		
Surrounding Land Use : Agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe [Moderate] Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✔	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✔	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✔	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✔	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✔	Stream
6. Presence of fish (except *Gambusia*)	✔	Stream
7. Presence of naturally occurring ground water table connection		[Stream]
8. Flowing water in channel and 7 days since last precipitation in local watershed	✔	Stream
9. Evidence watercourse has been used as a supply of drinking water	✔	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Perennial Stream

Secondary Indicator Score (if applicable) = 0

Justification / Notes :

Secondary Field Indicator Evaluation Project ID: STR-6

A. Geomorphology (Subtotal =) 0		Absent	Weak	Moderate	Strong
1. Continuous bed and bank	N/A	0	1	2	3
2. Sinuous channel	N/A	0	1	2	3
3. In-channel structure: riffle-pool sequences	N/A	0	1	2	3
4. Sorting of soil textures or other substrate	N/A	0	1	2	3
5. Active/relic floodplain	N/A	0	1	2	3
6. Depositional bars or benches	N/A	0	1	2	3
7. Braided channel	N/A	0	1	2	3
8. Recent alluvial deposits	N/A	0	0.5	1	1.5
9. Natural levees	N/A	0	1	2	3
10. Headcuts	N/A	0	1	2	3
11. Grade controls	N/A	0	0.5	1	1.5
12. Natural valley or drainageway	N/A	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map		N/A			

B. Hydrology (Subtotal =) 0		Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	N/A	0	1	2	3
15. Water in channel and >48 hours since sig. rain	N/A	0	1	2	3
16. Leaf litter in channel (January – September)	N/A	1.5	1	0.5	0
17. Sediment on plants or on debris	N/A	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	N/A	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel		N/A			

C. Biology (Subtotal =) 0		Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	N/A	3	2	1	0
21. Rooted plants in channel [1]	N/A	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	N/A	0	0.5	1	1.5
23. Bivalves/mussels	N/A	0	1	2	3
24. Amphibians	N/A	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	N/A	0	1	2	3
26. Filamentous algae; periphyton	N/A	0	1	2	3
27. Iron oxidizing bacteria/fungus	N/A	0	0.5	1	1.5
28.Wetland plants in channel [2]	N/A	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 0

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (FRONT)

(Refer to Protocol E for detailed descriptions and rank information)

PROJECT: Rossville Farm Mitigation			
STA: N/A		**HABITAT ASSESSED BY:** C.Duke, C.Liggett	
STREAM NAME: STR-6		**DATE:** 12/5/18	**TIME:**
MAP LABEL: STR-6		**ECOREGION:** 74b, Loess Plains	
HUC: Hurricane Creek-Wolf River (080102100302)		**QC: Consensus / Duplicate**	

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate / Available Cover	Over 50% of reach has natural, stable habitat for colonization by macroinvertebrates and/or fish. Three or more productive habitats are present.	Natural stable habitat covers 30-50% of stream reach or less than three habitats are present.	Natural stable habitat 10-30% of stream reach. Availability less than desirable, substrate frequently disturbed or removed. Habitat diversity is reduced.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 8	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
2. Channel Substrate Characterization	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; or substrate is fissured bedrock, some root mats and submerged vegetation present.	All mud, clay, soft sand or fissured bedrock bottom, little or no root mat, no submerged vegetation present.	Hard-pan clay, conglomerate or predominantly flat bedrock; no root mat or submerged vegetation.

SCORE 8	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools are large-deep very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.

SCORE 5	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
4. Sediment Deposition	Sediment deposition affects less than 20% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected. Slight deposition in pools.	Moderate deposition of fine material on old and new bars, 50-80% of bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition of pools.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.

SCORE 2	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
5. Channel Flow Status If water backed up by obstructions (beaver dam, log jams, bedrock during low flow) move assessment reach above or below affected area or consider postponing sampling until accurate assessment of stream can be achieved.	Water reaches base of both lower banks throughout reach. Streambed is covered. Minimal productive habitat is exposed.	Water covers > 75% of streambed and/or < 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or stable habitat is mostly exposed.	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.

SCORE 18	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (BACK)

MAP LABEL: STR-6 | **DATE:** 12/5/18 | **ASSESSOR INITIALS:** C.Duke, C.Liggett

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization, dredging rock removal or 4-wheel activity (past or present) absent or minimal; natural meander pattern. NO artificial structures in reach. Upstream or downstream structures do not affect reach.	Channelization, dredging or 4-wheel activity up to 40%. Channel has stabilized. If larger reach, channelization is historic and stable. Artificial structures in or out of reach do not affect natural flow patterns.	Channelization, dredging or 4-wheel activity 40-80% (or less that has not stabilized.) Artificial structures in or out of reach may have slight affect.	Over 80% of reach channelized, dredged or affected by 4-wheelers. In-stream habitat greatly altered or removed. Artificial structures have greatly affected flow pattern.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
7. Channel Sinuosity (Entire meander sequence not limited to sampling reach)	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
8. Bank Stability (score each bank) Determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. If approaching 30% score marginal if banks steep.	Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.	Unstable; many eroded area; raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.

SCORE (LDB) 3	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 3	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
9. Bank Vegetative Protection (score each bank) include vegetation from top of bank to base of bank. Determine left or right side by facing downstream.	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (< 30%).	50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).	Less than 50% of the banks covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. Non-native vegetation may dominate (> 50%).

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 2	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
10. Riparian Vegetative Zone Width (score each bank.) Zone begins at top of bank.	Average width of riparian zone > 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.	Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are small or are minimally disturbed.	Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.	Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small or are minimally disturbed.

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 8	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

TOTAL SCORE 67 | Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

If score is below guidelines, result of (circle) Natural Conditions Human Disturbance

Comments:

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Fayette	Named Waterbody: N/A	Date/Time: 12/5/2018
Assessors/Affiliation: C.Duke, C. Liggett; CEC Inc.		Project ID: STR-7
Site Name/Description: Rossville Farm Mitigation		
Site Location: Rossville, TN		
USGS quad: Rossville	HUC (12 digit): Hurricane Creek-Wolf River (080102100302)	Lat/Long: N35.048478, W89.570592
Previous Rainfall (7-days) : 0.00" (24hr) / 0.87" (7-days)		
Precipitation this Season vs. Normal : very wet wet [average] dry drought unknown Source of recent & seasonal precip data : https://www.cocorahs.org/ViewData/ListDailyPrecipReports.aspx		
Watershed Size : ~4.20sqmi	Photos: Yes	Number :
Soil Type(s) / Geology : Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration		
Surrounding Land Use : Agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe [Moderate] Slight Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✔	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✔	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✔	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✔	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✔	Stream
6. Presence of fish (except *Gambusia*)	✔	Stream
7. Presence of naturally occurring ground water table connection		[Stream]
8. Flowing water in channel and 7 days since last precipitation in local watershed	✔	Stream
9. Evidence watercourse has been used as a supply of drinking water	✔	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Perennial Stream

Secondary Indicator Score (if applicable) = 0

Justification / Notes :

Secondary Field Indicator Evaluation Project ID: STR-7

A. Geomorphology (Subtotal =) 0		Absent	Weak	Moderate	Strong
1. Continuous bed and bank	N/A	0	1	2	3
2. Sinuous channel	N/A	0	1	2	3
3. In-channel structure: riffle-pool sequences	N/A	0	1	2	3
4. Sorting of soil textures or other substrate	N/A	0	1	2	3
5. Active/relic floodplain	N/A	0	1	2	3
6. Depositional bars or benches	N/A	0	1	2	3
7. Braided channel	N/A	0	1	2	3
8. Recent alluvial deposits	N/A	0	0.5	1	1.5
9. Natural levees	N/A	0	1	2	3
10. Headcuts	N/A	0	1	2	3
11. Grade controls	N/A	0	0.5	1	1.5
12. Natural valley or drainageway	N/A	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map		N/A			

B. Hydrology (Subtotal =) 0		Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	N/A	0	1	2	3
15. Water in channel and >48 hours since sig. rain	N/A	0	1	2	3
16. Leaf litter in channel (January – September)	N/A	1.5	1	0.5	0
17. Sediment on plants or on debris	N/A	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	N/A	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel		N/A			

C. Biology (Subtotal =) 0		Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	N/A	3	2	1	0
21. Rooted plants in channel [1]	N/A	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	N/A	0	0.5	1	1.5
23. Bivalves/mussels	N/A	0	1	2	3
24. Amphibians	N/A	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	N/A	0	1	2	3
26. Filamentous algae; periphyton	N/A	0	1	2	3
27. Iron oxidizing bacteria/fungus	N/A	0	0.5	1	1.5
28.Wetland plants in channel [2]	N/A	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 0

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (FRONT)

(Refer to Protocol E for detailed descriptions and rank information)

PROJECT: Rossville Farm Mitigation			
STA: N/A		**HABITAT ASSESSED BY:** C.Duke, C.Liggett	
STREAM NAME: STR-7		**DATE:** 12/5/18	**TIME:**
MAP LABEL: STR-7		**ECOREGION:** 74b, Loess Plains	
HUC: Hurricane Creek-Wolf River (080102100302)		**QC: Consensus / Duplicate**	

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate / Available Cover	Over 50% of reach has natural, stable habitat for colonization by macroinvertebrates and/or fish. Three or more productive habitats are present.	Natural stable habitat covers 30-50% of stream reach or less than three habitats are present.	Natural stable habitat 10-30% of stream reach. Availability less than desirable, substrate frequently disturbed or removed. Habitat diversity is reduced.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 5	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
2. Channel Substrate Characterization	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; or substrate is fissured bedrock, some root mats and submerged vegetation present.	All mud, clay, soft sand or fissured bedrock bottom, little or no root mat, no submerged vegetation present.	Hard-pan clay, conglomerate or predominantly flat bedrock; no root mat or submerged vegetation.

SCORE 9	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools are large-deep very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
4. Sediment Deposition	Sediment deposition affects less than 20% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected. Slight deposition in pools.	Moderate deposition of fine material on old and new bars, 50-80% of bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition of pools.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.

SCORE 3	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
5. Channel Flow Status If water backed up by obstructions (beaver dam, log jams, bedrock during low flow) move assessment reach above or below affected area or consider postponing sampling until accurate assessment of stream can be achieved.	Water reaches base of both lower banks throughout reach. Streambed is covered. Minimal productive habitat is exposed.	Water covers > 75% of streambed and/or < 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or stable habitat is mostly exposed.	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.

SCORE 18	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (BACK)

MAP LABEL: STR-7	**DATE:** 12/5/18	**ASSESSOR INITIALS:** C.Duke, C.Liggett

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization, dredging rock removal or 4-wheel activity (past or present) absent or minimal; natural meander pattern. NO artificial structures in reach. Upstream or downstream structures do not affect reach.	Channelization, dredging or 4-wheel activity up to 40%. Channel has stabilized. If larger reach, channelization is historic and stable. Artificial structures in or out of reach do not affect natural flow patterns.	Channelization, dredging or 4-wheel activity 40-80% (or less that has not stabilized.) Artificial structures in or out of reach may have slight affect.	Over 80% of reach channelized, dredged or affected by 4-wheelers. In-stream habitat greatly altered or removed. Artificial structures have greatly affected flow pattern.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
7. Channel Sinuosity (Entire meander sequence not limited to sampling reach)	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.

SCORE 2	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
8. Bank Stability (score each bank) Determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. If approaching 30% score marginal if banks steep.	Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.	Unstable; many eroded area; raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 2	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
9. Bank Vegetative Protection (score each bank) include vegetation from top of bank to base of bank. Determine left or right side by facing downstream.	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (< 30%).	50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).	Less than 50% of the banks covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. Non-native vegetation may dominate (> 50%).

SCORE (LDB) 2	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 2	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
10. Riparian Vegetative Zone Width (score each bank.) Zone begins at top of bank.	Average width of riparian zone > 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.	Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are small or are minimally disturbed.	Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.	Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small or are minimally disturbed.

SCORE (LDB) 1	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 1	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

TOTAL SCORE 49

Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

If score is below guidelines, result of (circle) Natural Conditions Human Disturbance

Comments:

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Fayette	Named Waterbody: N/A	Date/Time: 12/5/2018
Assessors/Affiliation: C.Duke, C. Liggett; CEC Inc.		Project ID: STR-8
Site Name/Description: Rossville Farm Mitigation		
Site Location: Rossville, TN		
USGS quad: Rossville	HUC (12 digit): Hurricane Creek-Wolf River (080102100302)	Lat/Long: N35.059732; W89.575701
Previous Rainfall (7-days) : 0.00" (24hr) / 0.87" (7-days)		
Precipitation this Season vs. Normal : very wet wet [average] dry drought unknown Source of recent & seasonal precip data : https://www.cocorahs.org/ViewData/ListDailyPrecipReports.aspx		
Watershed Size : ~4.20sqmi	Photos: Yes	Number :
Soil Type(s) / Geology : Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration		
Surrounding Land Use : Forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe Moderate [Slight] Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✔	WWC
2. Defined bed and bank absent, dominated by upland vegetation / grass	✔	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✔	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✔	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✔	Stream
6. Presence of fish (except *Gambusia*)	✔	Stream
7. Presence of naturally occurring ground water table connection		[Stream]
8. Flowing water in channel and 7 days since last precipitation in local watershed	✔	Stream
9. Evidence watercourse has been used as a supply of drinking water	✔	Stream

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Perennial Stream

Secondary Indicator Score (if applicable) = 0

Justification / Notes :

Secondary Field Indicator Evaluation Project ID: STR-8

A. Geomorphology (Subtotal =) 0		Absent	Weak	Moderate	Strong
1. Continuous bed and bank	N/A	0	1	2	3
2. Sinuous channel	N/A	0	1	2	3
3. In-channel structure: riffle-pool sequences	N/A	0	1	2	3
4. Sorting of soil textures or other substrate	N/A	0	1	2	3
5. Active/relic floodplain	N/A	0	1	2	3
6. Depositional bars or benches	N/A	0	1	2	3
7. Braided channel	N/A	0	1	2	3
8. Recent alluvial deposits	N/A	0	0.5	1	1.5
9. Natural levees	N/A	0	1	2	3
10. Headcuts	N/A	0	1	2	3
11. Grade controls	N/A	0	0.5	1	1.5
12. Natural valley or drainageway	N/A	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map		N/A			

B. Hydrology (Subtotal =) 0		Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	N/A	0	1	2	3
15. Water in channel and >48 hours since sig. rain	N/A	0	1	2	3
16. Leaf litter in channel (January – September)	N/A	1.5	1	0.5	0
17. Sediment on plants or on debris	N/A	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	N/A	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel		N/A			

C. Biology (Subtotal =) 0		Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	N/A	3	2	1	0
21. Rooted plants in channel [1]	N/A	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	N/A	0	0.5	1	1.5
23. Bivalves/mussels	N/A	0	1	2	3
24. Amphibians	N/A	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	N/A	0	1	2	3
26. Filamentous algae; periphyton	N/A	0	1	2	3
27. Iron oxidizing bacteria/fungus	N/A	0	0.5	1	1.5
28.Wetland plants in channel [2]	N/A	0	0.5	1	2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 0

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (FRONT)

(Refer to Protocol E for detailed descriptions and rank information)

PROJECT: Rossville Farm Mitigation			
STA: N/A		**HABITAT ASSESSED BY:** C.Duke, C.Liggett	
STREAM NAME: STR-8		**DATE:** 12/5/18	**TIME:**
MAP LABEL: STR-8		**ECOREGION:** 74b, Loess Plains	
HUC: Hurricane Creek-Wolf River (080102100302)		**QC: Consensus / Duplicate**	

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate / Available Cover	Over 50% of reach has natural, stable habitat for colonization by macroinvertebrates and/or fish. Three or more productive habitats are present.	Natural stable habitat covers 30-50% of stream reach or less than three habitats are present.	Natural stable habitat 10-30% of stream reach. Availability less than desirable, substrate frequently disturbed or removed. Habitat diversity is reduced.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 2	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
2. Channel Substrate Characterization	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; or substrate is fissured bedrock, some root mats and submerged vegetation present.	All mud, clay, soft sand or fissured bedrock bottom, little or no root mat, no submerged vegetation present.	Hard-pan clay, conglomerate or predominantly flat bedrock; no root mat or submerged vegetation.

SCORE 10	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools are large-deep very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
4. Sediment Deposition	Sediment deposition affects less than 20% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected. Slight deposition in pools.	Moderate deposition of fine material on old and new bars, 50-80% of bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition of pools.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.

SCORE 1	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
5. Channel Flow Status If water backed up by obstructions (beaver dam, log jams, bedrock during low flow) move assessment reach above or below affected area or consider postponing sampling until accurate assessment of stream can be achieved.	Water reaches base of both lower banks throughout reach. Streambed is covered. Minimal productive habitat is exposed.	Water covers > 75% of streambed and/or < 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or stable habitat is mostly exposed.	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.

SCORE 18	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAM (BACK)

MAP LABEL: STR-8 | **DATE:** 12/5/18 | **ASSESSOR INITIALS:** C.Duke, C.Liggett

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization, dredging rock removal or 4-wheel activity (past or present) absent or minimal; natural meander pattern. NO artificial structures in reach. Upstream or downstream structures do not affect reach.	Channelization, dredging or 4-wheel activity up to 40%. Channel has stabilized. If larger reach, channelization is historic and stable. Artificial structures in or out of reach do not affect natural flow patterns.	Channelization, dredging or 4-wheel activity 40-80% (or less that has not stabilized.) Artificial structures in or out of reach may have slight affect.	Over 80% of reach channelized, dredged or affected by 4-wheelers. In-stream habitat greatly altered or removed. Artificial structures have greatly affected flow pattern.

SCORE 15	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
7. Channel Sinuosity (Entire meander sequence not limited to sampling reach)	The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.

SCORE 5	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
8. Bank Stability (score each bank) Determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. If approaching 30% score marginal if banks steep.	Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.	Unstable; many eroded area; raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.

SCORE (LDB) 5	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 5	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
9. Bank Vegetative Protection (score each bank) include vegetation from top of bank to base of bank. Determine left or right side by facing downstream.	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.	70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (< 30%).	50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).	Less than 50% of the banks covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. Non-native vegetation may dominate (> 50%).

SCORE (LDB) 1	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 1	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
10. Riparian Vegetative Zone Width (score each bank.) Zone begins at top of bank.	Average width of riparian zone > 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.	Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are small or are minimally disturbed.	Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.	Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small or are minimally disturbed.

SCORE (LDB) 9	LEFT	10	9	8	7	6	5	4	3	2	1	0
SCORE (RDB) 9	RIGHT	10	9	8	7	6	5	4	3	2	1	0

Comments:

TOTAL SCORE 82 | Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

If score is below guidelines, result of (circle) Natural Conditions Human Disturbance

Comments:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Rossville Farm Mitigation Bank City/County: Fayette Sampling Date: 12/6/2018

Applicant/Owner: Pictsweet State: TN Sampling Point: WTL-1

Investigator(s): C.Duke, C. Liggett Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): 0-2

Subregion (LRR or MLRA): LRR-P Lat: 35.04944 Long: -89.55849 Datum: _____

Soil Map Unit Name: Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): .5"
Water Table Present?	Yes X	No _____	Depth (inches): 4"
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0"

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Drainage ditch on far east boundary about 5' wide and 1-1.5' deep

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WTL-1

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Liquidambar styraciflua*	20	Y	FAC
2. *Salix nigra*	15	Y	OBL
3. *Populus deltoides*	5	N	FAC
4.			
5.			
6.			
7.			
8.			
	40 = Total Cover		
50% of total cover: 20	20% of total cover: 8		

Sapling/Shrub Stratum (Plot size: _____)			
1. *Liquidambar styraciflua*	5	Y	FAC
2. *Salix nigra*	5	Y	OBL
3. *Acer rubrum*	2.5	Y	FAC
4.			
5.			
6.			
7.			
8.			
	12.5 = Total Cover		
50% of total cover: 6.25	20% of total cover: 2.5		

Herb Stratum (Plot size: _____)			
1. *Carex frankii*	20	Y	OBL
2. *Typha angustifolia*	20	Y	OBL
3. *Polygonum hydropiperoides*	15	Y	OBL
4. *Scirpus cyperinus*	15	Y	OBL
5. *Juncus effusus*	10	N	OBL
6. *Rumex crispus*	5	N	FAC
7. *Carex scoparia*	5	N	FACW
8. *Solidago gigantea*	2.5	N	FACW
9.			
10.			
11.			
12.			
	92.5 = Total Cover		
50% of total cover: 46.5	20% of total cover: 18.5		

Woody Vine Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	0 (A)	0 (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [ ] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR5/1	97	10YR4/6	3	R	PL	Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Rossville Farm Mitigation Bank City/County: Fayette Sampling Date: 12/6/2018

Applicant/Owner: Pictsweet State: TN Sampling Point: WTL-2

Investigator(s): C.Duke, C. Liggett Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): 0-2

Subregion (LRR or MLRA): LRR-P Lat: 35.05221 Long: -89.56831 Datum: WGS-84

Soil Map Unit Name: Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): 0
Water Table Present?	Yes X	No _____	Depth (inches): 2-4"
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0"

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WTL-2

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Liquidambar styraciflua*	20	Y	FAC
2. *Salix nigra*	15	Y	OBL
3. *Acer rubrum*	10	N	FAC
4. *Taxodium distichum*	5	N	OBL
5. *Quercus texana*	2	N	FACW
6.			
7.			
8.			
	52 = Total Cover		
50% of total cover: 26	20% of total cover: 10.4		

Sapling/Shrub Stratum (Plot size: _____)			
1. *Acer rubrum*	2	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	2 = Total Cover		
50% of total cover: 1	20% of total cover: 0.4		

Herb Stratum (Plot size: _____)			
1. *Solidago gigantea*	20	Y	FACW
2. *Juncus effusus*	15	Y	OBL
3. *Carex frankii*	15	Y	OBL
4. *Microstegium vimineum*	10	N	FAC
5. *Carex spp.*	10	N	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70 = Total Cover		
50% of total cover: 35	20% of total cover: 14		

Woody Vine Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	0 (A)	0 (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [ ] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** x **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR5/2	70	7.5YR5/6	30	R	PL/M	Silt Loam	
8-16+	10YR6/2	70	7.5YR 4/4	30	R	PL/M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Rossville Farm Mitigation City/County: Fayette Sampling Date: 12/6/2018

Applicant/Owner: Pictsweet State: TN Sampling Point: WTL-3

Investigator(s): C.Duke, C. Liggett Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): 0-2

Subregion (LRR or MLRA): LRR-P Lat: 35.05694 Long: -89.56468 Datum: _____

Soil Map Unit Name: Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☑ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 3-4"
Water Table Present?	Yes X	No _____	Depth (inches): 2"
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0"

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WTL-3

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	15	Y	OBL
2. *Acer rubrum*	15	Y	FAC
3. *Taxodium distichum*	10	N	OBL
4. *Betula nigra*	15	Y	FACW
5. *Fagus grandifolia*	2	N	FACU
6.			
7.			
8.			
	57	= Total Cover	
50% of total cover: 28.5	20% of total cover: 11.4		

Sapling/Shrub Stratum (Plot size: _____)			
1. *Salix Nigra*	15	Y	OBL
2. *Betula nigra*	5	Y	FACW
3. *Fagus grandifolia*	1	N	FACU
4.			
5.			
6.			
7.			
8.			
	16	= Total Cover	
50% of total cover: 8	20% of total cover: 3.2		

Herb Stratum (Plot size: _____)			
1. *Polygonum hydropiperoides*	25	Y	OBL
2. *Carex frankii*	15	Y	OBL
3. *Chasmanthium latifolium*	15	Y	FAC
4. *Leersia oryzoides*	10	N	OBL
5. *Panicum capillare*	5	N	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70	= Total Cover	
50% of total cover: 35	20% of total cover: 14		

Woody Vine Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____	= Total Cover	
50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	_____	x 1 = _____
FACW species	_____	x 2 = _____
FAC species	_____	x 3 = _____
FACU species	_____	x 4 = _____
UPL species	_____	x 5 = _____
Column Totals:	0 (A)	0 (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [ ] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** x **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR5/2	80	7.5YR4/4	20	R	PL/M	Silt Loam	
3-6	10YR5/2	60	7.5YR4/4	40	R	PL/M	Sandy Silt	
6-9	10YR6/1	90	7.5YR4/4	10	R	M	Silt Loam	
9-16	10YR5/3	90	7.5YR4/4	10	R	M	Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Rossville Farm Mitigation City/County: Fayette Sampling Date: 12/6/2018

Applicant/Owner: Pictsweet State: TN Sampling Point: WTL-4

Investigator(s): C.Duke, C. Liggett Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR-P Lat: 35.060168 Long: -89.568542 Datum: _____

Soil Map Unit Name: Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 2-4"
Water Table Present?	Yes X	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WTL-4

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Betula nigra*	30	Y	FACW
2. *Fraxinus pennsylvanica*	15	N	FACW
3. *Salix nigra*	10	N	OBL
4.			
5.			
6.			
7.			
8.			
	55 = Total Cover		
50% of total cover: 27.5	20% of total cover: 11		

Sapling/Shrub Stratum (Plot size: _____)			
1. *Betula nigra*	10	Y	FACW
2. *Cephalanthus occidentalis*	10	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size: _____)			
1. *Carex frankii*	20	Y	OBL
2. *Microstegium vimineum*	5	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25 = Total Cover		
50% of total cover: 12.5	20% of total cover: 5		

Woody Vine Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	0 (A)	0 (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [ ] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16+	10YR6/2	60	7.5YR3/4	40	RM	M	Sandy Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Rossville Farm Mitigation Bank City/County: Fayette Sampling Date: 12/6/2018

Applicant/Owner: Pictsweet State: TN Sampling Point: WTL-5

Investigator(s): C.Duke, C. Liggett Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR-P Lat: 35.054884 Long: -89.552559 Datum: _____

Soil Map Unit Name: Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☑ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 4-8"
Water Table Present?	Yes X	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WTL-5

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Taxodium distichum*	95	Y	OBL
2. *Quercus lyrata*	5	N	OBL
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		

Sapling/Shrub Stratum (Plot size: _____)			
1. *Taxodium distichum*	5	Y	OBL
2. *Acer negundo*	5	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Herb Stratum (Plot size: _____)			
1. *Carex frankii*	20	Y	OBL
2. *Polygonum hydropiperoides*	5	N	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25 = Total Cover		
50% of total cover: 12.5	20% of total cover: 5		

Woody Vine Stratum (Plot size: _____)			
1. *Smilax rotundifolia*	15	Y	FAC
2.			
3.			
4.			
5.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	0 (A)	0 (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [ ] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** x **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16+	10YR6/2	70	7.5YR5/6	30	RM/C	M/PL	Sandy Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☑ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Rossville Farm Mitigation City/County: Fayette Sampling Date: 12/6/2018

Applicant/Owner: Pictsweet State: TN Sampling Point: WTL-6

Investigator(s): C.Duke, C. Liggett Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR-P Lat: 35.02028 Long: -89.575475 Datum: _____

Soil Map Unit Name: Waverly silt loam, 0 to 2 percent slopes, frequently flooded, long duration NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☑ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 4-8"
Water Table Present?	Yes X	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WTL-6

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus texana*	20	Y	FACW
2. *Quercus lyrata*	20	Y	OBL
3. *Liquidambar styraciflua*	10	Y	FAC
4. *Fraxinus pennsylvanica*	10	Y	FACW
5.			
6.			
7.			
8.			
	60 = Total Cover		
50% of total cover: 30	20% of total cover: 12		

Sapling/Shrub Stratum (Plot size: _____)			
1. *Liquidambar styraciflua*	5	Y	FAC
2. *Fraxinus pennsylvanica*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Herb Stratum (Plot size: _____)			
1. *Carex frankii*	20	Y	OBL
2. *Polygonum hydropiperoides*	5	N	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25 = Total Cover		
50% of total cover: 12.5	20% of total cover: 5		

Woody Vine Stratum (Plot size: _____)			
1. *Smilax rotundifolia*	15	Y	FAC
2.			
3.			
4.			
5.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	0 (A)	0 (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- [x] 1 - Rapid Test for Hydrophytic Vegetation
- [x] 2 - Dominance Test is >50%
- [ ] 3 - Prevalence Index is ≤3.0[1]
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16+	10YR6/2	70	7.5YR3/4	30	RM/C	M/PL	Sandy Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

Photo 1 (3222). View of STR-1 looking downstream. (N35054016; W89573737).

Photo 2 (3207) Upstream view of STR-1. (N35053867;W89572508)

Photo 3 (3163) Downstream view of STR-2. (N35.052844; W89.562314)

Photo 4 (3164) Upstream view of STR-2. (N35.052844; W89.562314)

Photo 5 (3169) Upstream view of STR-3. Note field crew taking pool depth measurements. (N35.048340; W89.567677)

Photo 6 (3170) Downstream view of STR-3. (N35.048340; W89.567677)

Photo 7 (3180) View of SPG-1 located at the head of STR-4. (N35050783; W89.567994)

Photo 8 (3184) Upstream view of STR-4. (N35.052992; W89.567677)

Photo 9 (3185) Downstream view of STR-4. (N35.052992; W89.567677)

Photo 10 (3192) Downstream view of STR-5. (N35.051349; W89.572998)

Photo 11 (3193) Upstream view of STR-5. (N35.051349; W89.572998)

Photo 12 (6520) View of SPG-2. (N35.051184; W89.553641)

Photo 13 (3156) Upstream view of STR-6. (N35.051574; W89.553631)

Photo 14 (3157) Downstream view of STR-6. (N35.051574; W89.553631)

Photo 15 (6553) View of SPG-3 located along the fringe of WTL-1 along the drainage ditch (N35.050787; W89555602).

Photo 16 (6546) General view of WTL-1 located on the southeastern portion of the property. (N35.048296; W89.558335)

Photo 17 (6545) Verification of hydric soil in WTL-1. Soil matrix: 10YR 5/1 with 10YR 4/6 redox concentrations. (N35.048296; W89.558335)

Photo 18 (6571) General view of WTL-2 facing southeast. (N35.052065; W89.569215)

Photo 19 (6569) Verification of hydric soil in WTL-2. Soil matrix: 10YR 5/2 with 7.5YR 5/6 redox concentrations. (N35.052065; W89.569215)

Photo 20 (4713) General view of the eastern portion of WTL-3. (N35.057165; W89564592)

Photo 21 (4710) Verification of hydric soil in WTL-3. Soil matrix: 10YR 5/2 with 7.5YR 4/4 redox concentrations. (N35.057165; W89564592)

Photo 22 (3259) General View of WTL-4. (N35.059956; W89.568399)

Photo 23 (3245) Verification of hydric soil in WTL-4. Soil matrix: 10YR 6/2 with 7.5YR 3/4 redox concentrations. (N35.059956; W89.568399)

Photo 24 (5173) General view of WTL-5 facing northeast.
(N35.054884; W89.552559)

Photo 25 (3265) View of STR-8/WTL-5 looking northwest. (N35.059732; W89.575701)

NOTE: DRAFT CONCEPTUAL LAYOUT. STREAM LENGTHS AND BUFFER WIDTH AREAS MAY CHANGE DURING DESIGN.

NORTH

WTL-5 (~56.27 ac)
Wolf River ~11,717 ft.
WMA-3 (~12.10 ac)
STR-8 ~1,129 ft.
WTL-4 (~0.20 ac)
WTL-3 (~33.42 ac)
STR-1a ~1,683 ft.
WTL-5 (~61.86 ac)
WTL-5 (~63.12 ac)
STR-1 R-2 ~2,307 ft.
FIELD-C (~166.54 ac)
STR-5 ~4,901 ft.
STR-6 ~1,699 ft.
WTL-6 (~11.67 ac)
FIELD-D (~30.39 ac)
STR-1 R-1 ~11,038 ft.
WMA-1 (~6.46 ac)
FIELD-A (~51.8 ac)
WMA-2 (~4.92 ac)
WTL-2 (~4.35 ac)
STR-3 ~3,244 ft.
STR-2 ~957 ft.
STR-4 ~1,630 ft.
WTL-1 (~27.21 ac)
FIELD-B (~66.16 ac)

LEGEND

Type

- Wetland Restoration (~315.76 ac)
- Wetland Enhancement (~65.17 ac)
- Wetland Preservation (~192.92 ac)
- Wildlife Management Area (~23.49 ac)
- Wolf River (~11,717 ft.)
- Stream Restoration (~25,776 ft)
- Stream Enhancement (~1,683 ft)
- Stream Preservation (~1,129 ft)
- 100' Buffer Enhancement (~16 acres)
- Average 100' Buffer Restoration (~138.80 ac)
- EPA Covenant (~65 acres)
- Property Boundary

REFERENCE

USGS TOPOGRAPHIC MAP/ ARCGIS MAP SERVICE:
HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS,
ACCESSED 1/22/2019

0 0.25 0.5 1 Miles

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THE PICTSWEET COMPANY
ROSSVILLE FARM
MITIGATION BANK PROSPECTUS
ROSSVILLE, FAYETTE COUNTY, TN

CONCEPTUAL MITIGATION TOPOGRAPHIC MAP

DRAWN BY:	BCL	CHECKED BY:	CDH	APPROVED BY: JTD	* Hand signature on file	FIGURE NO:	5
DATE:	1/22/2019	SCALE:	1 " = 2,000 '	PROJECT NO:	173-272		

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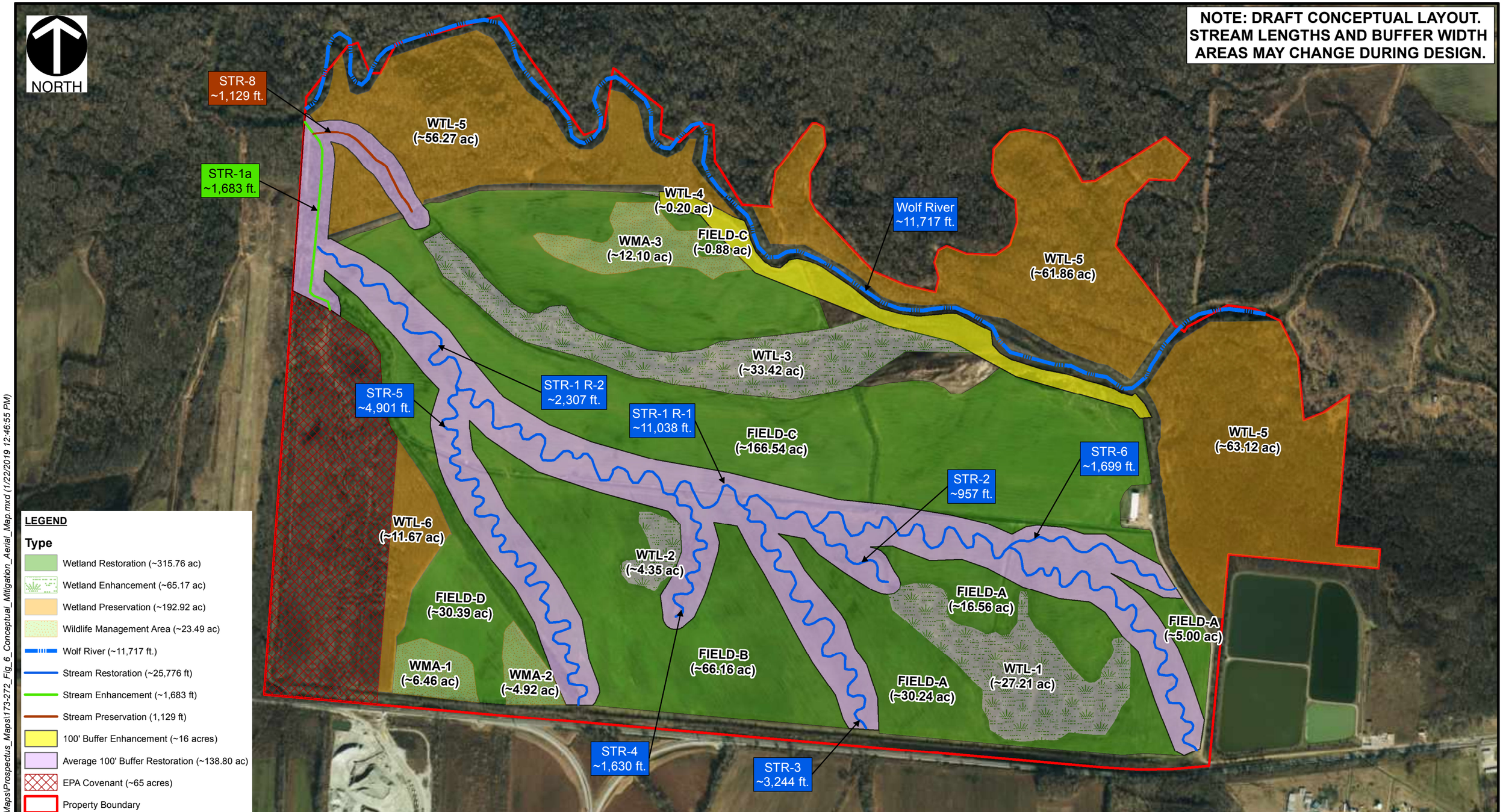

REFERENCE

TDOT AERIAL IMAGERY
GO TO ARCGIS ON TNMAP.TN.GOV/BASEMAPS/IMAGERY
ACCESSED 1/22/2019

0 750 1,500 3,000 Feet

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ROSSVILLE, FAYETTE COUNTY, TN

CONCEPTUAL MITIGATION AERIAL MAP

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DATE:	1/22/2019	SCALE:	1 " = 750 '	PROJECT NO:	173-272		

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