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SMOKESTACK MITIGATION BANK PROSPECTUS

CITY OF LAKELAND, SHELBY COUNTY, TENNESSEE

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JULY 2019



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Executive Summary

Resource Environmental Solutions (RES), by and through its wholly owned subsidiary, HGS, LLC, (the "Bank Sponsor" or "Sponsor") is proposing to establish the Smokestack Mitigation Bank (the "Bank") located in southwest Tennessee, less than 20 miles from the City of Memphis in Shelby County. The Bank is jointly located within the City of Lakeland and Arlington Township at the convergence of the Loosahatchie River and Cypress Creek (Figure 1). There is one primary access point to the Smokestack LLC Property off Evergreen Road (35.276463, -89.718229).

The Bank will encompass approximately 360 acres. Mitigation activities at this site will occur throughout the property focused on Stream 1, which has an existing 3,848 linear feet (LF) of corridor, but which will be lengthened to more closely resemble its original alignment as part of its pattern restoration. The Bank is located within the Level III Ecoregion 74 – Mississippi Valley Loess Plains, which is typified by low-gradient, fine-grained sediment dominant streams. The Bank site will incorporate approximately 3,848 LF of existing perennial stream channels and it encompasses approximately 5,200 LF of proposed restored stream, 25.6 acres of riparian buffers and 50 acres of nontidal wetlands.

The approximately 220-acre western portion of this site (parcel ID L014100269) is located within the Hydrological Unit Code (HUC)-12 Loosahatchie River–Oliver Creek Watershed (080102090405); however, the approximately 125-acre eastern portion of the site (parcel ID A014100270) is located within the HUC-12 Clear Creek Canal Watershed. Both these HUC-12 watersheds are located within the HUC-8 Loosahatchie Watershed (08010209).

Existing Conditions

The Bank lies along the divide between the urban and suburban development of the Memphis metro area and the more rural agricultural areas within northern Shelby County and into Tipton County. The Bank is adjacent to the Loosahatchie River, which has been severely channelized and dredged throughout the project area primarily for agricultural and drainage purposes. The Bank contains three tributaries that drain directly into the Loosahatchie River, one of which flows into the river just off the Bank property. Clear Creek Canal, which flows south to north into the river bisecting the Bank property, was constructed for a combination of drainage, agriculture, and irrigation purposes.

The site is currently in intensive agricultural production, with soybeans occupying most of the site in 2018. There are 52 delineated wetlands scattered throughout the site totaling 20.648 acres, the majority of which are palustrine emergent (PEM) wetlands. In addition, thirty-three (33) streams and wet weather conveyances, for a total of 18,464 linear feet (5.894 acres), were identified within the project area. Ten (10) of these features are considered stream, the remaining features are wet weather conveyances. No open water aquatic resources were identified within the project area. The site also has a smaller amount of palustrine forested wetland (PFO) and palustrine scrub shrub (PSS), which are primarily located along riparian corridors of the Loosahatchie River and Clear Creek Canal.

The Bank contains 1019 linear feet (LF) of Loosahatchie River along its left-descending bank and it contains 4,196 LF of the Clear Creek Canal. The site contains 7,594 LF of intermittent stream, 1,558 LF of perennial stream (not counting the Loosahatchie River or Clear Creek Canal), 1144 LF of ephemeral stream, and 23 separate wet weather conveyances totaling 2,953 LF. Similar to the Loosahatchie River, the tributaries that drain the Bank property have also been extensively straightened and channelized for agricultural purposes as well as their riparian corridors being largely removed. The streams have virtually no in-stream aquatic habitat to support biological diversity.

It is anticipated that long-term trends will result in continued residential and commercial growth pushing northward from Memphis as is evident from viewing historical aerial mapping from the prior thirty years.



The Bank itself is mostly located within a Regulatory Floodway and is likely to remain in agricultural use. If this restoration project does not proceed, the agricultural operations will continue within close proximity of the stream corridors resulting in further water quality, benthic macro-invertebrate, and fish community impairment, and will contribute to the overall degradation of the watershed.

The overall goal of the Bank is to restore, to the greatest extent possible, the ecological function of the highly degraded aquatic resources within the Bank site. A primary objective of achieving this goal will be to generate stream compensation credits that fully mitigate authorized losses of streams and wetlands, which are Waters of the U.S., in a manner that best contributes to the long-term ecological health of the Loosahatchie Watershed. The Bank will accomplish this objective through the implementation of various mitigation measures, including stream re-establishment, restoration, preservation, and riparian buffer planting as well as wetland restoration and preservation. These activities are intended to produce watershed-scale improvements of ecological services that will replace the chemical, physical, and biological function of stream channels and riparian areas within the proposed service area that are lost as a result of authorized impacts.

Proximity to Other Protected Lands

Most of the parks and other protected lands are in closer proximity to the City of Memphis. No protected lands are adjacent to the Bank site. However, Blue Lagoon Park, an approximately 240-acre park and protected area, lies along the south bank of the Loosahatchie River, approximately 3.5 miles west of the subject property. The Tennessee Board of Regents also owns approximately 336 acres of land along the south bank of the Loosahatchie River in this area. Both the Blue Lagoon Park and the Tennessee Board of Regents properties are located within the same HUC 12 Loosahatchie River–Oliver Creek Watershed. The largest area of protected lands within Shelby County is the Meeman-Shelby Forest State Park at over 13,467 acres, which is located along the Mississippi River and approximately 15 miles west of the Bank mitigation site.



1.0 Bank Sponsor

The Bank Sponsor for the proposed Smokestack Mitigation Bank (referred to herein as the "Bank") is Resource Environmental Solutions (RES), who is the nation's largest and most experienced ecological offset provider. Operating in 14 different states and 26 different Corps Districts across the Country, RES has successfully restored, enhanced and preserved over 294 miles of streams and 45,500 acres of wetlands, including the development and operation of some 350 mitigation sites, more than 50 of which have been successfully closed out. RES's project efforts to date further include more than 58,000 acres of custom, turnkey mitigation solutions, rehabilitation, and preservation of over 9,100 acres of endangered species habitats, 2,843 permits executed, and planting of over 14 million trees across all operating regions with a survival rate of 78.5%.

RES has developed design-build stream and wetland mitigation banks and permittee responsible mitigation sites throughout the U.S. that they have successfully monitored to site closeout. Select projects in the Southeastern U.S. relevant to the scope of this contractinclude:

Baileyton Stream Mitigation Bank – Greene County, TN (Nolichucky Watershed) Pending

Walnut Shade Stream Mitigation Bank – Macon County, TN (Barren River Watershed) Pending

Mud Creek Stream Mitigation Bank – Morgan County, TN (Emory River Watershed) 20,607 Proposed Stream Credits Pending

Lodi Stream Mitigation Bank – McMinn County, TN (Hiwassee River Watershed) 11,049 Proposed Stream Credits Pending

Forrest Creek Stream Mitigation Bank - Hillsborough, NC (Neuse 01 Watershed) 8,601 Stream Credits Mitigation Banking Instrument (MBI) Approval Date: 2007 (Wilmington District)

Cedar Grove Stream Mitigation Bank Hillsborough, NC (Neuse 01 Watershed) 6,862 Stream Credits MBI Approval Date: 2014 (Wilmington District)

Selma Mill Stream Mitigation Bank - Selma, NC (Neuse 01 Watershed) 7,305 Stream Credits MBI Approval Date: 2016 (Wilmington District)

Randolph 1 (Cheat River Watershed) 108 acres of wetland creation 20,248 linear feet of stream restoration MBI Approval Date: 2008 (Pittsburgh District)

Foster Run (Middle Ohio North Watershed) Wetland credits 2.93



Stream credits 15,489 MBI Approval Date: 2008 (Huntington District)

Blackjack Wetland Mitigation Bank (Rappahannock Watershed)

57 acres of wetland creation MBI Approval Date: 2001 (Norfolk District)

Northern Virginia Regional Environmental Bank (Potomac Watershed) 87 acres of wetlands restoration on 3 bank sites MBI Approval Date: 2004 (Norfolk District)

Caeli Farm 4 PRM Stream and Wetland Projects (Potomac Watershed) 3,400 linear feet of stream restoration, 23 acres of riparian buffer establishment, 8 acres of floodplain wetland restoration MBI Approval Date: 2006 (Norfolk District)

Potomac Regional Environmental Bank at Caeli Farm (Potomac Watershed) 6,800 linear feet of stream restoration MBI Approval Date: 2007 (Norfolk District)

The Prince William Environmental Bank (Potomac Watershed) 12,000 linear feet of stream restoration and 20,000 stream credits sold MBI Approval Date: 2007 (Norfolk District)

Trapp Branch 3 PRM Stream and Wetland Projects (Potomac Watershed) 2,500 linear feet of stream restoration, 11 acres of riparian buffer, 4 acres of wetland restoration MBI Approval Date: 2007 (Norfolk District)

Cannon Regional Environmental Bank (Rappahannock Watershed) 13,000 stream credits from stream restoration, riparian buffer re-establishment and preservation MBI Approval Date: 2010 (Norfolk District)

Hulls Springs Farm Mitigation Bank (Potomac Watershed) 49 wetland credits and 6,000 stream credits from restoration, enhancement, and preservation MBI Approval Date: 2013 (Norfolk District)

Piedmont Farms Stream Mitigation Bank (James River Watershed) 19,000 stream credits from stream restoration, enhancement, and preservation MBI Approval Date: 2013 (Norfolk District)

Robinson Fork Mitigation Bank – Phase I (Robinson Fork Watershed) 54.42 acres of restoration; 48.88 wetland credits 91 acres of upland enhancement; 68,350 trees planted – 146,407 linear feet of stream restored and protected; 77,792 stream credits MBI Approval Date: 2015 (Pittsburgh District)



2.0 Agent

The Agent for the Sponsor is Julie Bingham, M.S., CERP at EnviroScience, Inc. in Stow, Ohio. Ms. Bingham is the Restoration Practice Area Manager at EnviroScience where she uses her 20 years of handson stream and wetland restoration and mitigation experience to manage a multidisciplinary team of staff, develop and oversee work over the Midwest, South, and East Coast Operations. Her background in biology, morphological assessment, restoration design, and implementation makes her an outstanding leader. Ms. Bingham additionally has an extensive level of training in ecological design, having completed all the Rosgen Applied Fluvial Morphology training classes (Level 1 through 4), and as an Ohio EPA certified Level 3 Qualified Data Collector for fish sampling and Qualitative Habitat Evaluation Index (QHEI) analyses.

EnviroScience, Inc. Qualifications and Previous Experience

EnviroScience is a fully licensed engineering and design firm within the State of Tennessee. Since the early 2000s, EnviroScience has completed over 60 design-build ecological restoration projects, including a variety of full-delivery stream and wetland mitigation projects, and an equal number of design-only projects encompassing all manner of restoration approaches, sizes, and complexities. Every single one of our restoration projects have met or exceeded or are on schedule to meet and/or exceed, their pre-construction ecological performance criteria goals and have been released from regulatory oversight on or ahead of schedule.

3.0 Project Location

The Bank is in southwest Tennessee, less than 20 miles from the City of Memphis in Shelby County. The Bank is jointly located within the City of Lakeland and Arlington Township at the convergence of the Loosahatchie River and the Clear Creek Canal (Figure 1).

The approximately 220-acre western portion of this site (parcel ID L014100269) is located within the Hydrological Unit Code (HUC)-12 Loosahatchie River–Oliver Creek Watershed (080102090405); however, the approximately 125-acre eastern portion of the site (parcel ID A014100270) is located within the HUC-12 Clear Creek Canal Watershed. Both these HUC-12 watersheds are located within the HUC-8 Loosahatchie Watershed (08010209).

4.0 Access to Property

There is one primary access point to the Smokestack LLC Property off Evergreen Road (35.276463, - 89.718229). The Bank site consists of tax parcels L0141 0029 and Parcel ID A0141 00270 (Figure 2), both of which are wholly owned by Pea Point LLC. RES, by and through a wholly owned subsidiary (HGS, LLC), has entered into an agreement with the landowner to purchase the property in fee simple title. This agreement provides RES and its agents all access and use rights necessary to develop, operate, and maintain the proposed Bank in accordance with applicable regulatory standards. The land ownership map (Figure 3) is presented in Appendix A.

5.0 Project Goals

A primary goal of the Bank is to create a self-sustaining, natural aquatic system that achieves the intended level of aquatic ecosystem functionality with minimal human intervention, including long-term



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

The aquatic resources on Bank property have been highly modified and degraded due to past agricultural and drainage purposes. There are three primary waterways on the property, not including the Loosahatchie River and the Clear Creek Canal. Stream 1 is an intermittent stream a total of 3,848 linear feet (LF) in length and for delineation purposes has been broken into two sections, S-1a and S-1b, due to a hydrologic disruption resulting from a culvert crossing installed to provide tractor and vehicular access to the eastern fields. Stream 1 has been ditched and dredged so that it flows exactly south to north into the Loosahatchie River, and it has very little riparian corridor. As evident on the historical aerial maps (Appendix B), Stream 1 was once a highly sinuous, low-gradient stream that likely provided hydrology to an expansive wetland system. An approximately 20-foot section of the stream is culverted for crossing purposes. Due to ditching and dredging activities, proper stream morphology and virtually any semblance of in-stream habitat is lacking. The stream has little to no access to its floodplain and is currently functioning essentially as an over-wide ditch. Water quality is poor, and the water has a highly turbid appearance, likely contributing to Loosahatchie River nutrient and sediment loading issues.

The Clear Creek Canal (Stream Reach 2), which accepts flow from the Cypress Creek Drainage Canal upstream, flows for 4,196 LF on the Bank property. It is heavily entrenched and mostly disconnected from its floodplain; however, it is evident that during large storm events the stream will breach its bank on river left in a couple isolated places. This perennial stream has better morphology, with moderately developed riffle/pool sequencing and in-stream aquatic habitat, including the presence of wood structure, than the other on-site waterbodies. Because in-water work is not proposed for Clear Creek Canal, only abbreviated assessment activities were performed on it.

Other than Clear Creek Canal and portions of the left descending bank of the Loosahatchie River, Stream Reach 3 is the only other perennial waterbody located on the property. It flows from east to west for 1,558 LF within the Bank boundaries. The stream is located within a forested riparian corridor that averages approximately 50 feet in width. The stream has moderate gradient, access to its floodplain, and a more natural morphologic profile, indicating relatively little direct hydromodification over the years. There is an in-stream water crossing constructed of rock material, which acts as a form of grade control for the stream and slightly impounds water upstream. The downstream portions of Stream Reach 3 are exhibiting instability, including the formation of a headcut that is incising upstream, near the confluence with Clear Creek Canal.

Another important hydrologic feature of the site is the abundance of wet weather conveyances, 26 in all, located throughout the Bank site, which flow only in response to a localized precipitation event. The wet weather conveyances are located in both forested areas and agricultural fields; however, they have their greatest adverse impact upon water quality within the agricultural fields. As is evident by the photographs in Appendix D, the wet weather conveyances within the agricultural fields laterally and vertically erode due to the lack of confining vegetation. As such, they contribute large amounts of sediment, and likely



nutrients as well, into the intermittent and perennial streams at the Bank and the Loosahatchie River. Restoration of this impairment source will be a priority for the project.

The historic stream hydromodifications also greatly impaired wetland function at the site. As indicated by the wetland delineation, site soils, and the historic topographic maps, most of the site west of the Clear Creek Canal was likely wetland habitat prior to the straightening and ditching of Stream 1. Stream 1 meander scrolls are evident throughout these agricultural fields. Note that a jurisdictional determination site visit has been completed and the formal jurisdictional determination is pending; however, the classification of on-site resources is pending review and confirmation by TDEC.

In total, the goal of the Bank will be to provide a high level of ecological and aquatic functional lift through the restoration, re-establishment, and preservation of stream resulting in the development of an estimated 2,037 functional feet (SQT) credits and wetlands totaling an estimated 50 credits.

The Bank project goals for streams and wetlands are summarized in Table 1.



6.0 Project Objectives

The project objectives will be to return a more natural hydrologic regime to the Bank site by restoring the stream geomorphology, sediment transport capabilities, floodplain connectivity, large woody debris, biology and water chemistry of Stream Reach 1; restoring and enhancing wetlands throughout the site, but particularly within the western agricultural fields; and protecting, expanding, and enhancing the Clear Creek Canal and Stream Reach 3 riparian corridor. Combined, this will improve the ecological function of the Bank's aquatic resources and it will improve water quality entering the Loosahatchie River from the site.

The stream and wetland objectives are to:

- Restore dynamically stable stream channels to improve bedform diversity and lateral stability.
- Restore natural, stream geomorpholgy to stream reaches using natural channel design techniques.
- Restore natural hydrology to the site by removing culverts and reattaching streams back to their relic floodplains.
- Decrease channel shear and velocities by increasing channel sinuosity and improving floodplain connectivity.
- Utilize woody debris and rock, as appropriate, to improve aquatic habitat and lateral stability.
- Improve water quality by reducing farm-related non-point source pollution and in-stream sediment contribution, primarily through the cessation of intensive agricultural activities, the stabilization of highly eroding wet weather conveyances within the agricultural fields and the revegetation of the agricultural fields.
- 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.
- Where possible, establish and enhance the riparian buffer up to 200 feet in width to improve nutrient filtration, to stabilize wet weather conveyances along the primary stream channels, increase habitat connectivity, and to improve stream shading to minimize the effects of thermal modification.
- Plant trees and shrubs in wetland enhancement areas for habitat improvement.
- Protect streams and riparian zones and wetlands with land use restrictions.
- Establish streams with adjacent floodplain wetlands to provide additional water quality benefits with the understanding that it could generate additional mitigation credits.

Stream	Goals	Objectives
Stream 1	Restore natural channel pattern, geomorphology, and improve water quality Improve floodplain connectivity	Restore natural channel geomorphology (dimension, pattern, profile) and establish natural hydrology and the development of floodplain wetlands Reduce the BHR and increase the entrenchment ratio where practical
	Improve bedform diversity	Increase pool depth ratio; Restore natural pool- pool spacing and riffle habitat, as practical in this low

Table 1. Stream and Wetland Restoration Goals and Objectives



		gradient system		
	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		
Clear Creek Canal (STR 2)	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher and vegetation protection to 8 or higher. 200' of buffer enhancement on right descending bank (RDB) and 50' of buffer on LDB		
	Permanent conservation protection			
STR 3	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher and vegetation protection to 8 or higher. 200' of buffer on RDB and 100' on LDB		
	Permanent conservation protection			
Loosahatchie River	Improve riparian vegetation buffer width and protection	Increase RBP buffer width scores to 9 or higher and vegetation protection to 8 or higher. 200' of buffer on LDB		
Wetland Re-Establishment	Restore hydrology, restore wetland vegetation, maintain wetland conditions	Cease agricultural activity, reconnect floodplain to restored stream channel, plant wetland vegetation, invasive species management		
Wetland Enhancement	Improve wetland plant diversity, maintain wetland conditions	Plant native herbaceous and tree species, reconnect floodplain to restored stream channel, invasive species management		

7.0 Site Constraints

An overhead transmission line corridor crosses the bank property from east to west and exists at the Bank approximately 150 feet in width and bisects Stream 1 and Clear Creek Canal. This area will be deducted from the restoration and credit yield calculations. Even though it could benefit from restoration activities, the Clear Creek Canal/Cypress Creek Drainage Canal is too entrenched for cost effective restoration. Additionally, since it is an important drainage canal within the region that is a mapped Regulatory Floodway, its degree of potential restoration activity is limited. The Bank property is being purchased in fee simple title, and thus there are no other limitations upon the restoration and long-term protection activities that can occur at the site.

A review of the Tennessee Historic Commission Viewer (TN-SHPO Survey Map) indicated there are no listed or potentially eligible historic properties that would limit the proposed restoration approach for the site. A review of the USFWS Information for Planning and Consultation (IPaC) report indicated no critical habitat for threatened or endangered species are likely to be affected by the proposed restoration approach at the site.

8.0 Biological Data

Per the TDEC online data viewer, none of the streams proposed for restoration have been assessed regarding the achievement of their water quality standards. However, based upon recently conducted field assessment activities and as shown on the datasheets included in Appendix E, it is apparent that none of the streams to be restored on the subject property are supporting their water quality standards due to the historic hydromodifications and ongoing agricultural activities. Qualitative observations indicate that because of



intensive agricultural activity, habitat alteration, and sedimentation, few riffle-pool sequences and available stable substrate exist within Streams 1 and 2 in order to provide the appropriate aquatic habitat necessary for significant macroinvertebrate presence.

The subject tributaries do flow into the Loosahatchie River, which is not supporting its water quality standards per the TDEC online data viewer due to habitat alteration/hydromodification, sedimentation/siltation, and nutrient and fecal coliform pollution. As such, the potential to maximize the functional lift of the streams and benefit the Loosahatchie River water quality is great.

9.0 Baseline Conditions

9.1 Proposed Service Area

The Bank is located within the HUC-8 Loosahatchie River Watershed (08010209), which is within the Level III Ecoregion – Mississippi Valley Loess Plains (74). As such, the primary service area for the Bank will be the Loosahatchie River Watershed (08010209). The secondary service area is comprised of the surrounding HUC-8 watersheds that lie within the same Level III Ecoregion – Mississippi Valley Loess Plains (74) as the subject site. The secondary service area consists of the Wolf River in Tennessee (08010210) and Lower Hatchie River (08010208). The service areas served by the Smokestack Mitigation Bank (Figure 7) will include all or portions of the following counties: Fayette, Hardeman, Haywood, Shelby, and Tipton.

The proposed service area is located within the same EPA Level III Ecoregion 74 except for a small portion along the eastern boundary of the Horn Lake-Nonconnah Watershed. The Mississippi Valley Loess Plains stretches from near the Ohio River in western Kentucky to Louisiana and is distinguished by thick loess (a loosely compacted yellowish-gray deposit of windblown sediment). The region consists primarily of irregular plains, gently rolling hills, and bluffs near the Mississippi River. The western portion of the ecoregion contains soils that are deep, steep, silty, and erosive (reflected in the geology of the Bank site). Dominant natural vegetation in the west of the ecoregion and on the bluffs consists of mixed and southern mesophytic forests. The proposed service area would provide ecologically and environmentally compatible aquatic resources as the Bank site.

9.2 Watershed Assessment

The watershed for the Bank is primarily agricultural with a patchwork of interspersed forest areas (Figure 8). Residential and commercial expansion, farming, livestock, and deforestation have contributed to the degradation of streams within the watershed through habitat alteration, impoundment, siltation, nonpoint source pollution, and loss of productive habitat. It is anticipated that long-term trends will result in continued residential and commercial growth pushing northward from Memphis as is evident from viewing historical aerial mapping from the prior thirty years.

Similar to the Loosahatchie River, the tributaries that drain the Bank property have also been severely channelized and dredged throughout the project area primarily for drainage and agricultural purposes, and much of the riparian corridor has been impacted or removed. The streams have virtually no in-stream aquatic habitat to support biological diversity. Poor overall watershed conditions and lack of riparian vegetation on the site make it a strong candidate for establishing the stream mitigation bank. Furthermore, after conducting a thorough on-site assessment, the lack of floodplain connectivity and in-stream habitat reaffirmed the site's high restoration potential and ability to provide functional lift capable of achieving the proposed performance standards, goals, and objectives. If this restoration project does not proceed, the agricultural operations will continue within close proximity of the stream corridors, resulting in further water quality, benthic macro-invertebrate and fish community impairment. These impacts will further contribute to the overall degradation of the watershed.



The proposed Bank site does have Federal Emergency Management Agency (FEMA) flood data available for the property. The parcel is located on Map Number 47157C0215G: Panel 215 of 635, revised February 6, 2013 (Figure 6). The entirety of the Bank is located within a FEMA Zone AE Floodway Area, which must be kept free of encroachments so that 1% annual chance flood can be carried without substantial increase in flood heights. RES will work with the Shelby County Flood Insurance Program manager to address any FEMA flood related issues.

9.3 Adjacent Land Uses

The Bank is less than 20 miles northeast of the City of Memphis in Shelby County. The Bank is jointly located within the City of Lakeland and Arlington Township at the convergence of the Loosahatchie River and Clear Creek Canal. Adjacent land uses are primarily agriculture with isolated patches of forest throughout, as well as encroaching residential and commercial development. If the Bank is not built, agricultural operations combined with development would continue in the immediate vicinity of the stream reaches, which would continue the impairment of water quality and benthic macro-invertebrate communities, promote head cutting, and further the overall degradation of the watershed. Development on adjacent properties will likely cause alterations to the hydrologic regime within the sub-watershed, which strengthens the needs for a more natural, connected, and adaptive riparian system.



10.0 Proposed Mitigation Approach

10.1 Mitigation Approach

Restoration of unnamed tributary, Stream 1 (STR-1) to the Loosahatchie River will consist of reestablishing natural channel dimensions, morphology, and profiles that will promote a more natural meandering channel with proper riffle-pool complexes. Natural channel stream restoration techniques will be used to establish a new stream channel, which will approximate the relic channel abandoned between the 1950's and 1960's, and the culverted stream crossing will be daylighted. The proposed restoration approach will reconnect the new channel to its floodplain, and it will restore proper sediment transport to this low-gradient stream system. A riparian zone with native plant and tree species will be planted, which will provide shade to cool the stream, nutrient attenuation and filtration, and wildlife connectivity and habitat.

At this time, the proposed stream mitigation approaches will be credited using the Stream Quantification Tool, which is reflected in Table 2 below. Additional stream lengths will be determined during final design in the MBI and later approved by the IRT following the As-Built survey. Sections of stream reaches that have an easement break will not receive mitigation credit, although improvements will be made in these areas to ensure the overall success of the project site. All project areas will be protected with a permanent conservation easement.

Stream Reach	Existing Length (ft)	Proposed Mitigation	Proposed Length (ft)	Total Functional Lift Credits
STR-1	3,280	Stream Restoration/Wetland Complex	5,230	1771.10
Clear Creek Canal (STR-2)	4,177	Enhancement (Buffer Zone – 200')	4,177	143.04
STR-3	1,558	Enhancement I (Buffer Zone – 200')	1,558	122.38
TOTAL				2036.52

Table 2. Proposed Mitigation

Wetland ID	Existing Acreage	Proposed Mitigation	Proposed Acreage	Proposed Ratio	Total Credits
EW	7.48	Rehabilitation	7.48	2:1	3.7
PW	0	Restoration	50	1:1	50
TOTAL					53.7

10.2 Functional Lift

10.2.1 Streams

The goal of the Bank is to provide maximum ecological and aquatic functional lift while minimizing temporal and land disturbing impacts. The proposed mitigation approach will restore ditched stream and return its pattern to a natural alignment approximating its historic, relic alignment. It will also reconnect the stream to a more functional floodplain, restore natural velocities, improve sediment transport, and reduce



erosion and sediment input from wet weather conveyances, particularly within the agricultural fields. Wood and rock will be introduced, as appropriate, for lateral stability and in-stream habitat purposes. Increasing re-oxygenation zones, reducing sedimentation effects, and providing shade with native vegetation will improve the overall water quality of the stream reaches.

Stream Reach 1 is not functioning as a result of stormwater runoff, poor bank height ratio, lack of diversity of riparian vegetation, lack of bedform diversity, water quality and nutrients, and low biological diversity. Each of these functional impairments is a direct result from prior hydromodification and agricultural activities, and they will be greatly improved through restoration of stream geomorphology, and riparian corridor (buffer zone) restoration. Although the biological function was not directly assessed, observations in the field indicate that only pollution tolerant species are present, and that fish presence is absent.

Additional riparian buffer zones will be provided with appropriate credit generation. The additional riparian buffer areas are noted in Figure 5 and extend a minimum of 50 feet and a maximum of 200 feet in the case of Clear Creek Canal and Stream Reach 3, and the west bank of the Loosahatchie River that fall within the parcel boundaries. The added buffer width will provide additional water quality benefits in the immediate watershed and will serve to filter sediment and nutrients before reaching the restored/enhanced streams.

10.2.2 Wetlands

Throughout the site, 20.648 acres of wetlands currently exist. The majority of these wetlands are very lowquality emergent wetlands that exist within or along the periphery of active agricultural fields (17.86 acres), forested wetlands (2.19 acres), and to an even lesser degree shrub swamp wetlands (0.12 acres), exist within forested portions of riparian corridors. In conjunction with this project, this 20.648 acres of existing wetlands will be greatly enhanced through revegetation with native hydrophytic plant species, restoration of natural wetland hydrology, and management of invasive vegetation.

Additionally, 50 acres of wetland habitat will be re-established within the agricultural fields west of the Clear Creek Canal. This will be accomplished by restoring a natural hydrology to the western portion of the Bank site and restoration of Stream 1. Proposed Wetland (PW), while historically disturbed as a result of filling for agriculture and disconnection from STR-1 and the Loosahatchie River, has the potential to support a variety of wildlife species, attenuate flooding, provide contaminant filtering and support groundwater recharge.

Existing Wetland (EW), or a combination of all existing wetland between STR-1 and Clear Creek Canal consists of 7.48 acres, which currently meet the USACE definition of a wetland of the United States. The Bank Sponsor is currently requesting credits for the proposed rehabilitation of EW based on the restoration activities associated with PW. Furthermore, restoration activities associated with PW1 would further enhance wetland hydrology and hydrophytic vegetation within EW, would improve overall wetland function, and increase wetland connectivity.

All restored wetlands at the Bank will be permanently protected by the conservation easement. The wetland areas will be vegetated or enhanced with native obligate and facultative wetland herbaceous and tree species at a density of 400 stems/acre with a minimum success criterion of 75%.

11.0 Site Protection

Upon MBI approval, and prior to the initial release of credits, the restored streams, wetlands, and their respective buffers will be perpetually protected by the recordation of a Conservation Easement prepared in accordance with the Memphis District template. Land use activities within riparian and wetland buffers will have restrictions, by protecting the improved aquatic habitats, and restricting future activities that may adversely affect the functions and services of the aquatic resources. The land use restrictions implemented



will encompass all stream reaches and wetland areas, although existing power line and access easements will remain in place. RES 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 become available for protection and maintenance of the mitigation site, consistent with the terms and conditions of the Conservation Easement and a long-term steward will be assigned.

12.0 Adaptive Management and Invasive Species

The MBI will include a detailed adaptive management plan addressing how management issues on the site will be resolved. If the site or a specific component of the site fails to achieve the defined success criteria, RES will develop necessary adaptive management plans and/or implement appropriate remedial actions for the site in coordination with the IRT. Remedial action required will be designed to achieve the success criteria and will include identification of the causes of failure, remedial design approach, work schedule, and monitoring criteria that will consider physical and climatic conditions.

The presence of invasive exotic plants within the Bank site can prevent native vegetation from becoming established and has the potential to affect and prolong closeout. While invasive exotic plant treatment is necessary, it is equally necessary to be mindful of realistic outcomes and overall aquatic function. There are currently five invasive species found on-site, including three species could be a direct threat to establishment of native riparian plants: Kudzu (*Kudzu spp.*), Japanese honeysuckle (*Lonicera japonica*), and Privet (*Ligustrum spp.*). RES will perform invasive exotic vegetation treatment where necessary to achieve the success criteria. This may include herbicide applications and/or mechanical control. RES will conduct invasive species treatments at construction (baseline) and Year 2. Additional treatments will be dependent on monitoring results and regulatory agency guidance. These treatments will be timed in accordance with specific invasive exotic plant phenology for the most effective control.

Considering such factors as the influence of established invasive exotics on adjacent land, it is not feasible to expect complete eradication of the targeted invasive species. However, RES does expect to achieve significant reduction of any targeted invasive exotic species present through this control plan. The goal of the treatment program is control of invasive exotic species such that the target natural communities are present and on a positive colonization trajectory at project closeout.

13.0 Long-Term Management

An endowment fund will be established in an interest-bearing account by the Bank Sponsor through mitigation credit sales to provide funding for the long-term stewardship of the land. A two percent endowment fund will be set aside, funded by mitigation credit sales over the lifetime of the Bank to cover costs associated with the long-term care of the site.

14.0 Historic Properties

A review of the Tennessee Historical Commission Web Service Database (accessed 09 April 2019) indicated zero historical structures on the project area, and no historic impacts are proposed at the Smokestack Mitigation Site.



15.0 Threatened and Endangered Species

A USFWS Information for Planning and Consultation (IPaC) report indicates that there are two federally listed species that could potentially be encountered in the general vicinity of the project. The potential species are the Indiana bat (*Myotis sodalis*; Endangered) and the northern long-eared bat (*Myotis septentrionalis*; Threatened). A Federal Species of Concern, the bald eagle (*Haliaeetus leucocephalus*), and three birds of conservation concern, the prothonotary warbler (*Protonotaria citrea*), the red-headed woodpecker (*Melanerpes erythrocephalus*), and the wood thrush (*Hylocichla mustelina*), were noted within IPaC. Their protection will also be accounted for during site restoration activities. According to the IPaC report, no critical habitat is present within the project site. The USFWS IPaC report (dated 14 April 2019) is in Appendix C.



Appendix A Figures

- Project Location Map (Figure 1)
- Tax Parcel Map (Figure 2)
- Land Ownership Map (Figure 3)
- Wetland Map (Figure 4)
- Restoration Concept Map (Figure 5)
- FEMA Flood Map (Figure 6)
- Watershed Service Areas (Figure 7)
- Land use/Land cover Map (Figure 8)

Appendix B

Historical Maps

Appendix C Supporting Documents

- Wetland Delineation Report
- Jurisdictional Determination Letter
- IPaC Report (Natural Resources)

Appendix D

Site Photos







Basemap courtesy of Esri.



Basemap courtesy of Esri.





















Basemap courtesy of Esri.



Basemap courtesy of Esri.














EX CHANNEL STA 1+71 260 260 - PROPOSED STR- I EXISTING GROUND (TYP.) - EXISTING STR-1 250^L 10050 0













EX CHANNEL STA 25+00















Smokestack Mitigation Bank

500

250

Feet

Shelby County, Tennessee

Drawn by: AB Checked by: BW 1 inch = 500 feet





Watershed.mxd

Basemap courtesy of Esri.



Date: 5/14/2019

Basemap courtesy of Esri. Land Cover data courtesy of TNGIS.

Appendix A. Catchment Assessment Form

Rater(s): Niehaus, Brown

Date: 7/09/18

Bolton: Stream 1 Reach 2

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

Overall Watershed Conditon POOr

high		CATCH			
	Categories		Description of Catchment Condition		Rating
	Guegones	Poor Fair		Good	(P/F/G)
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	Poor
2	Impervious cover (Hydrology)	Greater than 15%	Between 7% and 15%	Less than 7%	Fair
3	Land Use Change (Hydrology)	Rapidly urbanizing/urban	Single family homes/suburban	Rural communities/slow growth or primarily forested	Fair
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.	Good
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.	Fair
6	Percent Forested (Watershed) (Hydrology)	<= 20%	>20% and <70%	>=70%	Poo
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	Poo
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	Poo
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	Poor
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.	Poor
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	
13	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	Good
14	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.	Fair
15	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.	Pool
16	Other				

Catchment Assessment Form 1 of 1

Appendix B. Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form Page 1 of 4

EXISTING a	and PROPOSED RI	EACH LEVEL STRE	AM FUN FORM	CTION-BASED RAPID ASSES	SMENT FIELD DAT
Watershed: Stream: Reach Length: Photo(s):	Loosahatchie Unnamed Tributary 300 ft. 6-12		Rater(s): Date: Latitude: Longitude:	Niehaus 7/9/18 35.2852 -89.7169	
Reach ID:	BOLTONS1R2		- 3		
		Function-based Rapid	d Reach Le	evel Stream Assessment	
Assessment	Measurement			Category	
Parameter	Method	Functioning		Functioning-at-Risk	Not Functioning
		Stream F	unction Py	rramid Level 1 Hydrology	
	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some poter restoration	ntial for concentrated flow/impairments to reach 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				Х
ljour	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flas geolo	hy flow regime as a result of rainfall patterns, ıgy, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
ਸ਼ੁ	Existing 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				
	3. Pank Height Patie	Stream F	unction Py	ramid Level 2 Hydraulics	
	(BHR)	1.0-1.2		1.21 - 1.50	>1.50
	Existing Condition Proposed Condition				X
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2		2.2 - 2.0	<2.0
	Existing Condition				X
itability)	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4		1.3 - 1.2	<1.2
cal S	Existing Condition				
Connectivity (Verti	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 ec and rill erosi - 200 ft from d	ually sheet and concentrated flow (minor gully on occurring); hillslopes 10 - 40%; hillslopes 50 n stream; ponding or wetland areas and litter or ebris 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
olain	Existing Condition	Х			
Flood	6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Ir vertica	nstability: 5-50% of bottom affected by localized I stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down- cutting; head cuts present
	Existing Condition			X	
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason				

Appendix B. Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form Page 2 of 4

Reach ID:	BOLTONS1R2			
		Function-based Rapid	Reach Level Stream Assessment	
A	Discourses		Category	
Parameter	Method	Functioning	Functioning-at-Risk	Not Functioning
		Stream Function Py	rramid Level 3 Geomorphology	
	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing		Х	
	Left Bank Proposed	V		
	Right Bank Proposed	X		
	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		Х	
	Left Bank Proposed		V	
	Right Bank Existing Right Bank Proposed		Χ	
rian Vegetation	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)
Ripa	Left Bank Existing	300/0 0 10/		X
Ľ.	Left Bank Proposed			V
	Right Bank Existing Right Bank Proposed			X
	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	Х		
	Left Bank Proposed	N.		
	Right Bank Existing	X		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason	Stream Fund	tion Pyramid Level 3 Geomorphology	
	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		X	
	(Right bank)		Χ	
	(Right Bank)			
~	Existing Condition (Left bank)		Х	
Stabilit	Proposed Condition (Left Bank)			
ateral	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			X
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason	High bank height to ba	nkfull height ratio, low root density, low surface pro	otection

Appendix B. Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form Page 3 of 4

		Function-based Rapid	Reach Level Stream Assessment	
Assessment	Measurement		Category	
Parameter	Method	Functioning	Functioning-at-Risk	Not Functioning
	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			Х
	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	Very very very very very very		
	Proposed Condition	0	traama in Alluvial Vallava (C. E)	
	15. Percent Riffle <3%	5		
	slope	>60 - <70	70 - 80 or 40 - 60	> 80 or < 40
	Existing Condition	N MAN MAN MAN MAN MAN MAN MAN		X
	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			X
rsity	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
Dive	Existing Condition Proposed Condition			
edform	17a. Pool Max Depth Ratio/Depth Variability (Gravel Bed Streams)	>1.5	1.2 - 1.5	<1.2
ă	Existing Condition			
	Proposed Condition 17b. Pool Max Depth Ratio/Depth Variability (Sand Bed Streams)	>1.2	1.1 - 1.2	<1.1
	Existing Condition	Х		
	Proposed Condition	~~~~~		
		Moderate	e Gradient Streams in Colluvial Valleys	
	18. Pool-to-Pool Spacing Ratio (3-5% Slope)	0.5- 4.0	4.0 - 6.0	>6.0
	Proposed Condition			For you you you you you yo
	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			

Appendix B. Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form Page 4 of 4

Reach ID:	BOLTON S1R2						
		Function-based Rapid	Reach Level Stream Assessment				
			Category				
Parameter	Measurement	Functioning	Functioning-at-Risk	Not Functioning			
		Stream Function Py	Stream Function Pyramid Level 4 Physicochemical				
r Quality and Nutrients 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			
ate lot c	Existing Condition			X			
≥ s	Proposed Condition						
5	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	n yan a yan a yaya yaya yaya yaya yaya	X				
	Proposed Condition		X				
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason						
	Stream Function Pyramid Level 5 Biology						
	23. Macroinvertebrate						
is ephemeral)	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						
l stre	Proposed Condition						
Bid Do not complete II	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			
8	Existing Condition			X			
	Proposed Condition	۰ ا م	Dava	Nat			
	25. Fish Presence Existing Condition	Abundant	kare V	Not present			
	Proposed Condition		^				
	Provide description of cause (s) and stability trend and if F can not be potentially achieved, provide reason						

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

B.	Drainage Area	0.43 sq. mile
C.	Difference between bankfull stage and water surface	1.48 fee
D.	Bankfull Width (Measured)	9.76 fee
E.	Bankfull Area (Measured)	12.0 sq. fee
F.	Bankfull Mean Depth (Area/Width)	1.23 fee
G.	Bankfull Width (Regional Curve)	fee
Н.	Bankfull Area (Regional Curve)	sq. fee
I.	Bankfull Mean Depth (Regional Curve)	fee

Area Calculations

II. Stream Classification

Α.	Bankfull W/D, calculate as Bankfull Width		
	Bankfull Mean Depth	7.93	ft/ft.
Β.	Bankfull Max Riffle Depth (Dmax)	2.11	feet
C.	Floodprone Area Width	14	feet
D.	Entrenchment Ratio, calculate as Floodprone Area Width		
	Bankfull Width	1.43	ft/ft.
Ε.	Slope Estimate	0.0016	ft/ft.
F.	Channel Material Estimate		
G.	Rosgen Stream Type	G5c	

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R_1	R ₂	R ₃	R ₄
Low Bank Height (LBH)	10.53	10.21		
Dmax	2.11	1.95		
Bank Height Ratio (LBH/Dmax)	4.99	5.24		
Riffle Length	11'	10'		

Appendix C. Hydraulic and Geomorphic Assessment Data Form Page 2 of 7

B. Weighted Bank Height Ration, calculate

	$\Sigma(Bank Height Ratio_i \times Riffle Length_i)$		
	as ΣRiffle Length	3.26 ft/	′ft.
C.	Entrenchment Ratio from Riffle	1.43 ft/	′ft.

IV. Bedform Diversity

A. Pool Data

	P ₁	P ₂	P ₃	P ₄	P ₅
Station					
Pool to Pool Spacing	100	144			
Pool Spacing Ratio, Pool Spacing Bankfull Width	10.25	14.75			
Pool Depth (max depth at bankfull)	2.86	3.07			
Pool Depth Ratio, Pool Depth Bankfull Mean Depth	2.33	2.5			

В.	Average Pool Spacing Ratio	25	ft/ft.
C.	Average Pool Depth Ratio	2.41	ft/ft.

V. Large Woody Debris⁴

A.	Number of Pieces per 100m	6
В.	Large Woody Debris Index	

⁴ 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

Both banks fairly uniform in BEHI / NBS throughout reach

BEHI/NBS ⁵ Score	Bank Length
High / Mod	600 ft.

Β.	Total Eroding Bank Length	600	ft.
C.	Total Bank Length	600	ft.
D.	Dominant BEHI/NBS Score	High / Moder	ate
E.	Percent of Bank Erosion, calculate as		
	Total Eroding Bank Length		
	Total Bank Length	100	%

VI. Riparian Vegetation

A. Riparian Vegetation Data Measure from Aerial

	Left	Right
Riparian/Buffer Width	20'	80'
RBP Score	10	4

VII. Channel Evolution

- A. Rosgen Channel Type Succession 5
- B. Simon Channel Evolution Model (Stage) Stage 3 degradation
- C. Provide a brief narrative describing the channel evolution trend.

Channel has been modified to condition where floodplain is not accessible, resembling

a low-gradient gully.

⁵ Rosgen, D. 2014. River Stability Field Guide (Second Edition). Wildland Hydrology, Fort Collins, CO.



Rosgen Channel Type Succession Scenarios



Simon Channel Evolution Model

Appendix C. Hydraulic and Geomorphic Assessment Data Form Page 6 of 7

Large Woody Debris Field Form

Name:						
Stream Name: Stream	2 Reach 2		Stream Type:			
Reach ID:			Avg. Slope:			
Reach Length: 100 m			Bed material:			
Bankfull Width:			<i>2</i>			
Reach Descriptions:						
			Score		-	
Pieces	1	2	3	4	5	Total
Length/Bankfull Width						
Diameter	4"	5"	4"	4"	5-6"	6"
Location	above stream	instream	instream	1/3 in 1/3 out	above stream	above stream
Туре						
Structure		<i>Ja</i>				
Stability	Secured					
Orientation	~45° to ⊥	90° to ⊥	90° to ⊥	135° to ⊥	135° to ⊥	L
Total						
Debris Dams				12 - 12 - 12 - 12 - 12 - 12 - 12 - 12 -		ie.
Length		-	2			
Height						
Structure			· .			
Location						
Stability				R 2.		
Total	÷					

Notes:

Appendix C. Hydraulic and Geomorphic Assessment Data Form Page 7 of 7

LWD Key

			Score		
Pieces	1	2	3	4	5
Length/Bankfull Width	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0	> 1.0
Diameter (Cm)	10 to 20	20 to 30	30 to 40	40 to 50	>50
Location	Zone 4		Zone 3	Zone 2	Zone 1
Туре	Bridge		Ramp	Submersed	Buried
Structure	Plain		Intermediate	2.	Sticky
Stability	Moveable		Intermediate		Secured
Orientation(degrees)	0 to 20	20 to 40	40 to 60	60 to 80	80 to 90
Debris Dams					
Length (% of bankfull width)	0 to 20	20 to 40	40 to 60	60 to 80	80 to 100
Height (% of bankfull depth)	0 to 20	20 to 40	40 to 60	60 to 80	80 to 100
Structure	Coarse		Intermediate		Fine
Location	Partially high flow	In high flow	Partially low flow	Mid low flow	In low flow
Stability	Moveable		Intermediate		Secured

Diameter Conversion

10 cm	0.33	feet
20 cm	0.66	feet
30 cm	0.98	feet
40 cm	1.3	feet
50 cm	1.6	feet

QSSOP for Macroinvertebrate Stream Surveys Revision 5 Page 4 of 17 Effective Date: July 1, 2011

HABITAT ASSESSMENT FIELD SHEET- MODERATE TO HIGH GRADIENT STREAMS (FRONT) (See Protocol E for detailed descriptions and rank information)

STATION ID:			HABITAT ASSESSED BY:			
STREAM NAME	3:		DATE: TIME:			
STATION LOCA	TION:		ECORE	EGION: QC	: Consensus Duplicate	
WBID/HUC:	GI	ROUP:	ASSOC	CIATED LOG #:		
	Optimal	Suboptimal		Marginal	Poor	
1. Epifaunal Substrate/ Available Cover	Over 70% of stream reach has natural stable habitat suitable for colonization by fish and/or macroinvertebrates. Four or more productive habitats are present	Natural stable habitat covers 40-70% of stream reach. Three or more productive habitats present. (If near 70% and more than 3 go to		Natural stable habitat covers 20 -40% of stream reach or only 1- 2 productive habitats present. (If near 40% and more than 2 go to subontimal.)	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 1	12 11	10 9 8 7	5 5 4 3 2 1	
Comments	1000	a second and the work				
				or	the second se	
2.Embeddedness of Riffles	Gravel, cobble, and boulders 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space. If near 25% drop to suboptimal if riffle not layered cobble.	Gravel, cobble and boulders 25-50% surrounded by fine sediment. Niches in bottom layers of cobble compromised. If near 50% & riffles not layered cobble drop to marginal.		Gravel, cobble, and boulder s are 50-75% surrounded by fine sediment. Niche space in middle layers of cobble is starting to fil with fine sediment.	Gravel, cobble, and boulders are more than 75% surrounded by fine sediment. Niche space is reduced to a single layer or is absent.	
Comments				5 + 5 2 1		
comments						
3. Velocity/ Depth Regime	All four velocity/depth regimes present (slow- deep, slow-shallow, fast- deep, fast-shallow).	Only 3 of the 4 present (if fast- is missing score If slow-deep mi score 15.	regimes shallow e lower). issing	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime. Others regimes too small or infrequent to support aquatic populations.	
Comments	20 19 18 17 16	15 14 13 12 11		10 9 8 7 6		
Comments						
4. Sediment Deposition	Sediment deposition affects less than 5% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Sediment depos affects 5-30% of bottom. Slight deposition in po slow areas. Son deposition on is and point bars. to marginal if b approaches 30%	sition of stream ool or ne new slands Move uild-up 6.	Sediment deposition affects 30-50% of stream bottom. Sediment deposits at obstruction, constrictions and bends. Moderate pool deposition.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Commonte	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	5 4 3 2 1	
Comments	199					
5. Channel Flow Status	Water reaches base of both lower banks and streambed is covered by water throughout reach. Minimal productive habitat is exposed.	Water covers > streambed or 22 productive habi exposed.	75% of 5% of tat is	Water covers 25-75% of streambed and/or productive 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	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	5 4 3 2 1	
Comments						

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HABITAT ASSESSMENT FIELD SHEET- MODERATE TO HIGH GRADIENT STREAMS (BACK)

Station ID		Date	Initials		
	Optimal	Suboptimal	Marginal	Poor	
	Channelization, dredging	Channelization, dredging	Channelization,	Over 80% of reach	
6. Channel	rock removal or 4-wheel	or 4-wheel activity up to	dredging or 4-wheel	channelized, dredged or	
Alteration	activity (past or present)	40%. Channel has	activity 40-80% (or less	affected by 4-wheelers.	
	absent or minimal; natural	stabilized. If larger	that has not stabilized.)	Instream habitat greatly	
	meander pattern. NO	reach, channelization is	Artificial structures in	altered or removed.	
825	artificial structures in	historic and stable.	or out of reach may	Artificial structures have	
	reach. Upstream or	Artificial structures in or	have slight affect.	greatly affected flow	
	downstream structures do	out of reach do not affect		pattern.	
	not affect reach.	natural flow patterns.			
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	
Comments					
	Occurrence of re-	Occurrence of re-	Occasional re-	Generally all flat water or	
7. Frequency of	oxygenation zones	oxygenation zones	oxygenation area. The	flat bedrock; little	
re-oxygenation	relatively frequent; ratio	infrequent; distance	distance between areas	opportunity for re-	
zones. Use	of distance between areas	between areas divided by	divided by average	oxygenation. Distance	
frequency of riffle or	divided by average stream	average stream width is 7	stream width is over 15	between areas divided by	
bends for category.	width <7:1.	- 15.	and up to 25.	average stream width >25.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1	
Comments					
	Banks stable: evidence of	Moderately stable:	Moderately unstable:	Unstable: many eroded	
8. Bank Stability	erosion or bank failure	infrequent, small areas of	30-60 % of bank in	area: raw areas frequent	
(score each bank)	absent or minimal: little	erosion mostly healed	reach has areas of	along straight sections and	
Determine left or right	potential for future	over. 5-30% of bank in	erosion; high erosion	bends; obvious bank	
downstream	problems <5% of bank	reach has areas of	potential during floods,	sloughing; 60-100% of	
do monocum.	affected.	erosion. If approaching	If approaching 60%	bank has erosional scars.	
		30% score marginal if	score poor if banks		
		banks steep.	steep.		
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0	
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0	
Comments					
0. 37 4 4	More than 90% of the	70-90% of the bank	50-70% of the bank	Less than 50% of the bank	
9. Vegetative	bank covered by	covered by undisturbed	covered by undisturbed	covered by undisturbed	
Protective	undisturbed vegetation.	vegetation. One class	vegetation. Two	vegetation or more than 2	
(score each bank)	All 4 classes (mature trees,	may not be well	classes of vegetation	classes are not well	
from top of bank to base	understory frees, shrubs,	represented. Disruption	may not be well	represented or most	
of bank. Determine left	groundcover) are	evident but not effecting	represented. Non-native	vegetation has been	
or right side by facing	to grow not walk.	full plant growth. Non-	vegetation may be	cropped. Non-native	
downstream	nio grow naturally. All	natives are rare ($< 30\%$)	common (30-50%).	vegetation may dominate	
SCOPE (I.P.)	Left Perk 10 0	0 7 6	5 4 2	(> 50%)	
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0 2 1 0	
Comments					
	Average width of riparian	Average width of	Average width of	Average width of riparian	
10. Riparian	zone > 18 meters.	riparian zone 12-18	riparian zone 6-11	zone <6 meters. Score	
Vegetative Zone	Unpaved footpaths may	meters. Score high if	meters. Score high if	high if areas less than 6	
Width	score 9 if run-off potential	areas < 18 meters are	areas less than 12	meters are small or are	
(score each bank.) Zone	is negligible.	small or are minimally	meters are small or are	minimally disturbed.	
begins at top of bank.		disturbed.	minimally disturbed.		
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0	
Comments	Kight Bank 10 9	0 1 0	<u> </u>		
Comments					

Total Score _____ Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

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

Describe

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HABITAT ASSESSMENT FIELD SHEET- LOW GRADIENT STREAMS (FRONT) (See Protocol E for detailed descriptions and rank information)

STATION ID: Bol	STATION ID: Bolton S1R2			HABITAT ASSESSED BY: Brown			
STREAM NAME	Stream 1 Reach 2	····	DATE: 7/9/18 TIME: 1500				
STATION LOCA	ΓΙΟN:		ECOR	EGION: 74 QC:	Consensus Duplicate		
WBID/HUC:	GR	OUP:	ASSO	CIATED LOG #:	· ·		
	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 h covers 30-50% stream reach or than three habit present.	nabitat of less ats are	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	20 19 18 17 16	15 14 13 1	2 11	10 9 8 7 6	5 4 3 2 1		
Comments					•		
2. Channel Substrate Characterization	2. ChannelGood mixture of substrate materials, with gravel and firm sand prevalent; root mats and submergedMixture of soft sand, mud or clay; or substrate is fissured bedrock, some root mats and submerged vegetation presentAll mud, clay, soft sand or fissured bedrock bottom, little or no root mats and submerged vegetation present		Hard-pan clay, conglomerate or predominantly flat bedrock; no root mat or submerged vegetation.				
SCORE 20 19 18 17 16		15 14 13	12 .11	10 9 8 7 6			
Comments				Hardpan small grave	I present in some areas		
3. Pool Variability	Even mix of large- shallow, large-deep, small-shallow, small-deep pools present.	Majority of poo large-deep very shallow.	ols are few	Shallow pools much more prevalent than deep pools.	Majority of pools small- shallow or pools absent.		
SCORE	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	5 4 3 2 1		
Comments				free and a second s			
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 increa bar formation, r from gravel, sar fine sediment; 2 of bottom affec Slight deposition pools.	ease in mostly nd or 20-50% ted. on in	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	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	5 4 3 2 1		
Comments		,					
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 > streambed and/o 25% of product habitat is expos	75% of or < ive ed.	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 Comments	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	5 4 3 2 1		

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Station () Dottion (2x12) Date (7x)(3) Initials Elouin 6. Channel Alteration Channelization, dredging of 4-wheal exitivity do sect or maintage instructures in downstream structures in do not affect reach. Suboptimal Channelization, dredging of 4-wheal exitivity 40.80% (or leading and any exitivity 40.80%	HABITAT ASSES	SMENT FIELD SHEET	- LOW GRADIENT STRE	AMS (BACK)	
Optimal Suboptimal Margual Parameter 6. Channel Channelization, dredging or 4-wheel activity uses tor minimal, natural mender partern. No Channelization, artificial structures in reach, channelization is stabilized. If larger reach, channelization is natural flow patterns. Over 80% of reach channelization, artificial structures in out of reach do not affect and freet reach. Over 80% of reach channelization is structures in or out of artificial structures in out of reach do not affect affect. Over 80% of reach channelization is structures in or out of artificial structures in out of reach do not affect affect. Over 80% of reach channelization is structures in or out of artificial structures in out of reach do not affect affect. Over 80% of reach channelization, structures may new greaty affected flow pattern. 7. Channel The bends in the stream increase the informethy stream and stream athy stream and stream at	Station ID Bollon 52		Date 7/9/18	Initia	Is Brown
6. Channelization, Alteration Channelization, druging or 4-wheel activity absent or minimal, natural meander pattern. NO artificial structures in do not affect reach. Channelization, druging or 4-wheel stabilized. If larger reach, channelization is stabilized. If larger reach, channelization is do not affect reach. Channelization, druging or 4-wheel stabilized. If larger reach, channelization is do not affect reach. Channelization artificial structures in out of cach do not affect reach may have slight affect. Channelization, druging or 4-wheel structures in or out out of cach do not affect reach. Channelization, druging or 4-wheel structures in or out out of cach do not affect reach. Channelization, druging or 4-wheel structures in or out out of cach do not affect reach. Channelization, druging or 4-wheel structures in or out and free. Channelization, druging or 4-wheel structures in or out in a straight line. Channelization, druging or 4-wheel structures in or out in a straight line. Channelization, druging or 4-wheel structures in or out in a straight line. Channelization, druging or 4-wheel structures in or out in a straight line. Channelization, druging or 4-wheel structures in or out in a straight line. Channelization, druging or 4-wheel structures in or out in a straight line. 8. CORE 20 19 18 17 16 15 14 12 10 9 8 7 6 5 4 3 2 1 8. CORE 20 19 18 17 16		Optimal	Suboptimal	Marginal	Poor
6. Channel dredging or 4-wheel alteration or 4-wheel alteration or 4-wheel alteration Alteration dredging or 4-wheel animial, natural meander pattern. NO or 4-wheel average treach, channel has stabilized. If larger reach, channel fasto is historic and stable. or 4-wheel average treach, channel has stabilized. At flarger reach, channel fastor out of reach do not affect affect diverses out of reach do not affect affect. of altered or affect diverses out of reach do not affect affect. 8. CORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Comments The bends in the stream length 3-4 times longer than if it was astraight line. The bends in the stream increase the stream length 2-3 times longer than if it was astraight line. The bends in the stream increase the stream length 10 5 4 3 2 1 Comments D 18 17 16 15 14 13 12 10 9 8 7 6 5 4 3 2 1 Comments The bends in the stream length 3-4 times incream length 3-4 times incream length 3-4 times incream length 3-4 15 4 3 <t< td=""><td></td><td>Channelization,</td><td>Channelization, dredging</td><td>Channelization,</td><td>Over 80% of reach</td></t<>		Channelization,	Channelization, dredging	Channelization,	Over 80% of reach
Alteration activity absent or minimal, natural meander pattern. NO artificial structures in downstream structures and table. activity 40-80% (or stabilized.) Artificial structures in or outs abilized and stable. activity 40-80% (or stabilized.) Artificial attructures in or outs abilized.) Artificial structures in or outs and or affect reach. activity 40-80% (or stabilized.) Artificial attructures in or outs abilized.) Artificial attructures in or outs and a straight inc. activity 40-80% (or stabilized.) Artificial attructures in or outs attrain forease the stream increase t	6. Channel	dredging or 4-wheel	or 4-wheel activity up to	dredging or 4-wheel	channelized, dredged or
minimal; natural meander pattern. No downstream structures do not affect reach. Autificial structures in or out of affect. less that has not stabilized. Afficial structures in or out of affici. Instream habital greatly affect or affici. SCORE 20 19 18 17 16 15 14 13 12 10 9 8 7 6 5 4 3 2 1 Comments The bends in the stream increase the stream increase the stream increase the stream increase the stream nearder scupture. The bends in the stream increase the stream increase the stream increase the stream increase the stream of erosion or bank failure absent or minimal; nittly potential for future problems coston s banks, failure absent or mark stable; of erosion or bank failure absent or mark stable; of erosion or bank failure absent or mark stable; of future problems coston. failure absent or mark stable; banks steep. Moderately stable; mode, fapproaching dows, score por if banks steep. Unstable; many eroded area; raw areas frequent and bends; obvious and bends; obvious and bends; obvious and bends; obvious and bends; obvious many to be well represented. Non- native vegatation. Two classes of vegatation mark overde by undisturbed vegetation. The absent and of the area frequent and vegatation may or out of the bank steep. O- Source of bank and bends; obvious many to be well represented. Non- native vegatation may or out of the bank steep. D S The bends in the strue resolution mark overde by undisturbed vegetation. The core out bank covered by undisturbed vegetation native vegatation may or a	Alteration	activity absent or	40%. Channel has	activity 40-80% (or	affected by 4-wheelers.
meander pattern. NO reach. Upstream or downstream structures in or adversame stream is a stable. structures in or aftect. structures in or reach, Upstream or downstream structures in or downstream structures in or aftect. aftect. Artificial structures aftect. SCORE 20 19 18 17 16 15 14 13 12 11 0 9 5 4 3 2 1 Comments The bends in the stream increase the meander sequence of limited to astright line. The bends in the stream increase the str		minimal; natural	stabilized. If larger	less that has not	Instream habitat greatly
artificial structures in downstream structures do no affect reach structures in or out of downstream structures in a structure in a structures in a structure in a structure problems infraquent, small areas of erosion or bank in failure absent or minimal; little potential by facing downstream. The bends in the stream increase the stream increa		meander pattern. NO	reach, channelization is	stabilized.) Artificial	altered or removed.
reach. Upstream or downstream structures do not affect reach. reach may have slight flow pattern. SCORE 20 9 8 7 6 5 4 3 2 1 Comments The bends in the strain length 3-4 times not limited to sampling reach) The bends in the strain length 3-4 times longer than if it was in a straight line. The bends in the strain length 10 2 times longer than if it was in a straight line. Channel straight; was in a straight line. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 SCORE 20 19 18 17 16 15 13 12 11 10 9 8 7 6 5 4 3 2 1 Comments Banks stable; evidence of crosion or bank facene achaak) Determine left or ight side bif weig downsteam. Moderately stable; findrug proteching downsteam 7 6 5 4 3 2 1 0		artificial structures in	historic and stable.	structures in or out of	Artificial structures may
downstream structures out of reach do not aftect afturd flow patterns. inturd flow patterns. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Comments The bends in the stream increase the stream i		reach. Upstream or	Artificial structures in or	reach may have slight	have greatly affected
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Comments The bends in the stream increase the str		downstream structures	out of reach do not affect	affect.	flow pattern.
Storke 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 3 4 12 11 Comments The bends in the stream increase the stream length 3.4 times in garmal line. The bends in the stream increase the stream length 1.0.2 times longer than if it was in a straight line. The bends in the stream increase the stream length 3.4 times inget than if it was in a straight line. The bends in the stream increase the stream length 3.4 times inget than if it was in a straight line. Channel straight; waterway has been channelized for a long distance. 8. CORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 0 8 6 10 10 9 8 7 6 5 4 3 2 1 0 0 0 0 0 0 0 0 0 0 10 0 8 7 6 5 4 3 2 1 0 0 0 0 0 0	SCODE	do not affect reach.	natural flow patterns.	10 0 9 7 (
Comments The bends in the stream increase the stream increas	Comments	20 19 18 17 10	15 14 15 12 11	10 9 8 7 0	<u> </u>
7. Channel The bends in the stream increase stream increase					
Sinuosity (Entire meander sequence not limited to sampling reach) stream increase the stream length 3-4 times longer than if it was in a straight line. stream increase the stream length 1-2 3 times longer than if it was in a straight line. waterway has been channelized for a long distance. SCORE 20 19 18 17 16 14 13 12 11 10 9 8 7 6 5 4 3 2 1 SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Comments Banks Stablity for future problems of erosion or bank for future problems of some of planks steep. Moderately stable; ovicus and bends; obvicus bank sloughing; 60-100% of bank has erosion or opticat la during forwasteep. Moderately unstable; ovicus bank sloughing; 60-100% of the bank covered by undisturbed vegetation. Socore marginal if bank steep. 20 10 20 0 20 10 0 100% of bank has erosion or opticat bank. Socore marginal if bank sloughing; 60-100% of the bank covered by undisturbed vegetation. Socore cals bank. 10 9 8 7 6 5 4 3	7. Channel	The bends in the	The bends in the stream	The bends in the	Channel straight;
meander sequence not limited to sampling reach) stream length 1-2 times longer than if it was in a straight line. stream length 1-2 times longer than if it was in a straight line. channelized for a long distance. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Comments Banks stable; evidence failure absent or minimal; little potential for future problems <5% of bank affected.	Sinuosity (Entire	stream increase the	increase the stream	stream increase the	waterway has been
not limited to sampling reach) longer than if it was in a straight line. than if it was in a straight line. times longer than if it was in a straight line. distance. SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Comments 8. Bank Stability (score each hank) Determine left or right side by facing downstream. Banks stable; evidence minimal; little potential of failure absent or minimal; little potential banks steep. Moderately unstable; or coion, tigh recoion potential during floods, If approaching 60% score por if banks steep. Unstable; many eroded area; raw areas frequent areas frequent sono bank site SCORE (LB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (LB) Left Bank 10 9 8 7 6 5 4 3 2 2 1 0 SCORE (LB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 2 1	meander sequence	stream length 3-4 times	length 2-3 times longer	stream length 1 to 2	channelized for a long
	not limited to	longer than if it was in	than if it was in a straight	times longer than if it	distance.
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Comments Banks stable; evidence of crosion or bank failure absent or minimal; little potential for future problems of future problems of future problems Moderately stable; infrequent, small areas of erosion; high erosion, high erosion, boy score, poor if banks steep. Unstable; obvious bank sloughing; 60-100% of bank has erosion; high erosion and bends; obvious bank sloughing; 60-100% of bank has erosion; high erosion and bends; obvious bank sloughing; 60-100% of bank has erosion; high erosion areas. SCORE Left Bank 10 9 8 7 6 5 4 3 2 1 0 0 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 10 0% 10 0% 10 0% 0% 10% 0% 10% 0% 10% 0% 0% 10% 0% 0% 0% <	sampling reach)	a straight line.	line.	was in a straight line.	
Comments 8. Bank Stability (score each bank) Determine left or right side by facing downstream. Banks stable; evidence failure absent or minimal; little potential of fature problems <5% of bank affected.	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
8. Bank Stability (score ach bank) Determine left or right side by facing downstream. Banks stable; evidence of crosion or bank findure absent or minimal; little potential for future problems <5% of bank affected.	Comments				
8. Bank Stability (score each bank) bermine left registration by facing downstream. of erosion or bank failure absent or minimal; little potential for future problems <5% of bank affected.		Banks stable; evidence	Moderately stable;	Moderately unstable;	Unstable; many eroded
core cach bank) failure absent or minimal; little potential, for future problems, <5% of bank affected.	8. Bank Stability	of erosion or bank	infrequent, small areas of	30-60 % of bank in	area; raw areas frequent
Determine left or right side by facing downstream. minimal; little potential for future problems <5% of bank affected.	(score each bank)	failure absent or	erosion o 5-30% of bank	reach has areas of	along straight sections
by having dominational constraints for future problems 30% score marginal if banks steep. potential during floods, If approaching 60% score poor if banks steep. bank sloughing; 60-100% of bank has erosional scars. SCORE (LB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (RB) Right Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (RB) More than 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 vegetation from of or bank. are native. Less than 50% of the bank covered by undisturbed vegetation. Two vegetation from of or bank sates of vagetation may not be well represented and allowed to grow naturally. All plants are native. Sond the second of the bank covered by undisturbed vegetation may be common (30-50%). Less than 50% of the bank been cropped. Non-native sate rare (< 30%) SCORE (LB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (LB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (LB) L	Determine left or right side	minimal; little potential	eroded. If approaching	erosion; high erosion	and bends; obvious
<5% of bank affected.banks steep.floods, If approaching flood% score poor if banks steep.100% of bank has erosional scars.SCORE(LB)Left Bank09876543210CommentsOrementsMore than 90% of the bank covered by undisturbed vegetation foor each bank) includes (score each bank) includes thet are greated 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. Non- natives are rare (< 30%)	by facing downstream.	for future problems	30% score marginal if	potential during	bank sloughing; 60-
SCORE (LB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (RB) Right Bank 10 9 8 7 6 5 4 3 2 1 0 Comments More than 90% of the bank covered by undisturbed vegetation. Shrubs, includes vegetation of por 0 bank. Determine leaf or right side by facing downstream More than 90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-native vegetation on allowed to grow naturally. All plants are native. Socore (LB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (LB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (RB) Right Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (RB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 Io Right Bank 10 9 8 7 6 5 4 3 2 1 0 0 </td <td></td> <td><5% of bank affected.</td> <td>banks steep.</td> <td>floods, If approaching</td> <td>100% of bank has</td>		<5% of bank affected.	banks steep.	floods, If approaching	100% of bank has
SCORE (LB) Left Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (RB) Right Bank 10 9 8 7 6 5 4 3 2 1 0 SCORE (RB) Right Bank 10 9 8 7 6 5 4 3 2 1 0 Protective More than 90% of the bank covered by undisturbed vegetation. 70-90% of the bank covered by undisturbed vegetation. 50-70% of the bank covered by undisturbed vegetation. Less than 50% of the bank covered by undisturbed vegetation. So 70% of the bank covered by undisturbed vegetation. Vegetation for the or 10 bank. So 70% of the bank covered by undisturbed vegetation. Vegetation. So 70% of the bank covered by undisturbed vegetation. Vegetation for the well represented. So 70% of the bank covered by undisturbed vegetation may not be well represented. Non-native segetation may be common (30-50%). Less than 50% of the bank covered by undisturbed vegetation. Non-native vegetation may be common (30-50%). Less than 50% of the bank covered by undisturbed vegetation. SCORE (LB) Left Bank 10 9 8 7 6 5 <td></td> <td></td> <td></td> <td>60% score poor if</td> <td>erosional scars.</td>				60% score poor if	erosional scars.
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Comments Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW		Lett Bank 1 9	0 / 0	3 4 3	
Total Score55 Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW	SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE (RB) Comments	Right Bank 10 9	8 7 6	5 4 3	2 1 0

HABITAT ASSESSMENT FIELD SHEET- LOW GRADIENT STREAMS (BACK)

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

Describe

Rater(s): Joel Bingham

Date: 7/9/18

Bolton: Stream 1 Reach 1

Appendix A. Catchment Assessment Form

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

Overall Watershed Conditon Poor

			Description of Catchment Condition		Rating
	Categories	Poor	Fair	Good	(P/F/G)
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	Poor
2	Impervious cover (Hydrology)	Greater than 15%	Between 7% and 15%	Less than 7%	Poor
3	Land Use Change (Hydrology)	Rapidly urbanizing/urban	Single family homes/suburban	Rural communities/slow growth or primarily forested	Fair
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.	Goo
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.	Fair
6	Percent Forested (Watershed) (Hydrology)	<= 20%	>20% and <70%	>=70%	Fair
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	Poo
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	Poc
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	Poo
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.	Poo
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	
13	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	Goo
14	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.	Fair
15	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.	Goo
16	Other				

Catchment Assessment Form 1 of 1

Appendix B. Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form Page 1 of 4

EXISTING a	and PROPOSED RI	EACH LEVEL STRE	AM FUNC	TION-BASED RAPID ASSES	SMENT FIELD DATA
Watershed: Stream: Reach Length: Photo(s):	Loosahatchie Stream 1 Reach 1 582' 1-5		Rater(s): Date: Latitude: Longitude:	Niehaus 7/9/18 35.2784 -89.7166	
Reach ID:	BOLTONS1R1				
		Function-based Rapic	d Reach Lev	el Stream Assessment	
Assessment	Measurement		1	Category	
Parameter	Method	Functioning		Functioning-at-Risk	Not Functioning
		Stream F	unction Pyr	amid Level 1 Hydrology	
	1. Concentrated Flow	No potential for concentrated flow/impairments from adjacent land use	Some potenti restoration si	al for concentrated flow/impairments to reach te, 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		- inc		Χ
Inoff	2. Flashiness	Non-flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover less than 6%	Semi-flash geolog	y flow regime as a result of rainfall patterns, y, and soils, impervious cover 7 - 15%	Flashy flow regime as a result of rainfall patterns, geology, and soils, impervious cover greater than 15%
ĸ	Existing Condition			Х	
	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 F	unction Pyra	amid Level 2 Hydraulics	
	3. Bank Height Ratio (BHR)	1.0-1.2		1.21 - 1.50	>1.50
	Existing Condition				Х
	4a. Entrenchment (Meandering streams in alluvial valleys or Rosgen C, E, DA Streams)	>2.2		2.2 - 2.0	<2.0
	Existing Condition			X	
tability)	4b. Entrenchment (Non meandering streams in colluvial valleys or Rosgen B Streams)	= or >1.4		1.3 - 1.2	<1.2
a c	Existing Condition	X			
Connectivity (Verti	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 equ and rill erosio - 200 ft from del	ally sheet and concentrated flow (minor gully n occurring); hillslopes 10 - 40%; hillslopes 50 stream; ponding or wetland areas and litter or rris 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
olair	Existing Condition				Х
Floodp	Proposed Condition 6. Vertical Stability Extent	Stable: <5% of bottom affected by localized vertical channel down-cutting	Localized Ins vertical	tability: 5-50% of bottom affected by localized stream channel down-cutting or scouring	Widespread Instability: 50% of bottom affected by widespread vertical down- cutting; head cuts present
	Existing Condition	Х			
	Proposed Condition Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason		1		

Appendix B. Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form Page 2 of 4

Reach ID:	BOLTON S1R1			
		Function-based Rapid	Reach Level Stream Assessment	
A	Discourses		Category	
Parameter	Measurement Method	Functioning	Functioning-at-Risk	Not Functioning
		Stream Function Py	rramid Level 3 Geomorphology	
	7. Buffer Width (ft) from top of bank	>50	30 - 49 ft	< 30 ft
	Left Bank Existing			X
	Leπ Bank Proposed Right Bank Existing			Y
	Right Bank Proposed			X
	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			X
	Left Bank Proposed			
	Right Bank Existing Right Bank Proposed			X
rrian Vegetation	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)
Ripa	Left Bank Existing			X
Щ	Left Bank Proposed			V
	Right Bank Proposed			λ
	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		X	
	Left Bank Proposed		×	
	Right Bank Proposed		X	-
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			
		Stream Fund	tion Pyramid Level 3 Geomorphology	
	11. Dominant BEHI/NBS Rating	LAVE LAL LAM, LAH, LAVH, MAVE	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)	Х	M/L	
	Proposed Condition (Right Bank)			
	Existing Condition	X	M/L	
ili (j	(Leπ bank)			
itab	(Left Bank)			
ateral S	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	Х		
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason			

Appendix B. Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form Page 3 of 4

Function-based Rapid Reach Level Stream Assessment						
Assessment	Measurement	Category				
Parameter	Method	Functioning	Functioning-at-Risk	Not Functioning		
	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			X		
	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	very very very very very of		No LWD		
	Proposed Condition					
	15 Percent Riffle <3%	S	treams in Alluviai Valleys (C, E)	1		
	slope	>60 - <70	70 - 80 or 40 - 60	> 80 or < 40		
	Existing Condition			X		
	Proposed Condition					
	Ratio (Watersheds < 10 mi ²)	>4.0 - <5.0	3.0 - 4.0 or 5.0 - 7.0	< 3.0 or >7.0		
	Proposed Condition			<u> </u>		
rsity	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		
n Dive	Existing Condition Proposed Condition					
edfom	17a. Pool Max Depth Ratio/Depth Variability (Gravel Bed Streams)	>1.5	1.2 - 1.5	<1.2		
ň	Existing Condition					
	17b. Pool Max Depth Ratio/Depth Variability (Sand Bed Streams)	>1.2	1.1 - 1.2	<1.1		
	Existing Condition	Х				
	Proposed Condition	Diselevat	Overlight Officers in Collegial Vallage			
	18 Pool-to-Pool Spacing	Woderate	e Gradient Streams in Conuvial Valleys			
	Ratio (3-5% Slope)	0.5- 4.0	4.0 - 6.0	>6.0		
	Existing 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					

Appendix B. Existing and Proposed Reach-Level Stream Function-Based Rapid Assessment Field Data Form Page 4 of 4

Reach ID:	BOLTON S1R1					
		Function-based Rapid	Reach Level Stream Assessment			
			Category			
Assessment Parameter	Measurement	Functioning	Functioning-at-Risk	Not Functioning		
- urumotor	motilou	. unchoning	· unonormig at those	liter unstronling		
	Stream Function Pyramid Level 4 Physicochemical					
r Quality and Nutrients omplete if stream is ephemeral)	21. Water Appearance and Nutrient Enrichment (USDA 1999) (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		
ate lot c	Existing Condition			Х		
≥ š	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			X		
	Proposed Condition					
	Provide description of cause(s) and stability trend and if F can not be potentially achieved, provide reason					
		Ctusom Functio	n Duramid Louel 5 Bieleau			
		Stream Functio	on Pyramid Level 5 Biology			
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)		
ay eam	Existing Condition					
Biolo, not complete if str	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	Only tolerant species <4		
9	Existing Condition			X		
	Proposed Condition					
	25. Fish Presence	Abundant	Rare	Not present		
			X			
	Proposed Condition					
	Provide description of cause (s) and stability trend and if F can not be potentially achieved, provide reason	Fish present: top m species observed s	innow or minnow nails, leeches in pools			

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

Β.	Drainage Area	0.16	sq. miles
C.	Difference between bankfull stage and water surface	No water in	riffles feet
D.	Bankfull Width (Measured)	5.1	feet
E.	Bankfull Area (Measured)	2.5	sq. feet
F.	Bankfull Mean Depth (Area/Width)	0.5	feet
G.	Bankfull Width (Regional Curve)		feet
Н.	Bankfull Area (Regional Curve)		sq. feet
I.	Bankfull Mean Depth (Regional Curve)		feet

Area Calculations

II. Stream Classification

A.	Bankfull W/D, calculate as Bankfull Width		
	Bankfull Mean Depth	 10.14	ft/ft.
Β.	Bankfull Max Riffle Depth (Dmax)	 0.83	feet
C.	Floodprone Area Width	 14.14	feet
D.	Entrenchment Ratio, calculate as Floodprone Area Width		
	Bankfull Width	 2.79	ft/ft.
Ε.	Slope Estimate	 0.0015	ft/ft.
F.	Channel Material Estimate		
G.	Rosgen Stream Type	E5	

III. Floodplain Connectivity

A. Bank Height/Riffle Data

	R ₁	R ₂	R ₃	R ₄
Low Bank Height (LBH)	3.16	3.86	3.43	
Dmax	0.94	1.13	1.01	
Bank Height Ratio (LBH/Dmax)	3.36	3.42	3.40	
Riffle Length	98'	31'	23'	

Appendix C. Hydraulic and Geomorphic Assessment Data Form Page 2 of 7

B. Weighted Bank Height Ration, calculate

	$\Sigma(Bank Height Ratio_i \times Riffle Length_i)$		
	$\Delta S = \Sigma Riffle Length$	3.38	ft/ft.
C.	Entrenchment Ratio from Riffle	2.79	ft/ft.

IV. Bedform Diversity

A. Pool Data

	P ₁	P ₂	P ₃	P ₄	P ₅
Station	22	130	196	273	432
Pool to Pool Spacing	108	66	77	59	71
Pool Spacing Ratio, Pool Spacing Bankfull Width	16.62	10.15	11.85	9.08	10.92
Pool Depth (max depth at bankfull)	1.88	1.65	1.39	2.05	1.29
Pool Depth Ratio, Pool Depth Bankfull Mean Depth	3.76	3.3	2.78	4.1	2.58

Β.	Average Pool Spacing Ratio	1.59	ft/ft.
C.	Average Pool Depth Ratio	3.30	ft/ft.

V. Large Woody Debris⁴

Α.	Number of Pieces per 100m	No qualifying LWD
В.	Large Woody Debris Index	

⁴ 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

Appendix C. Hydraulic and Geomorphic Assessment Data Form Page 3 of 7

VI. Lateral Stability

A. Bank Data

	BEHI/NBS ⁵ Score	Bank Length
Left	Low / Low	582.7'
Right	Low / Low	582.7'

Β.	Total Eroding Bank Length	0	ft.
C.	Total Bank Length	1165.4	ft.
D.	Dominant BEHI/NBS Score	Low / Low	
Ε.	Percent of Bank Erosion, calculate as		
	Total Eroding Bank Length		
	Total Bank Length	0	%

VI. Riparian Vegetation

A. Riparian Vegetation Data

	Left	Right
Riparian/Buffer Width	30'	10'
RBP Score	2	2

VII. Channel Evolution

- A. Rosgen Channel Type Succession 5
- B. Simon Channel Evolution Model (Stage) 3
- C. Provide a brief narrative describing the channel evolution trend.

Little to no access to floodplain.

Channel has been modified to condition resembling a low gradient. The existing channel has partially recovered to a Type E within and overwide ditch.

⁵ Rosgen, D. 2014. River Stability Field Guide (Second Edition). Wildland Hydrology, Fort Collins, CO.



Rosgen Channel Type Succession Scenarios



Simon Channel Evolution Model

Appendix C. Hydraulic and Geomorphic Assessment Data Form Page 6 of 7

Large Woody Debris Field Form

Name:		й 				
Stream Name:	ream Name: Stream Type:					
leach ID: Avg. Slope:						
Reach Length:	each Length: Bed material:					
Bankfull Width:			a).			
Reach Descriptions:						
			Score			
Pieces	1	2	3	4	5	Total
Length/Bankfull Width						
Diameter						
Location				Ε.		
Туре						
Structure						
Stability		ίθ.				
Orientation						
Total	2					
Debris Dams				-		ie.
Length		-	2			
Height				6		
Structure			× .			~
Location					2	
Stability						
Total	÷.					

Notes:

Appendix C. Hydraulic and Geomorphic Assessment Data Form Page 7 of 7

LWD Key

	Score					
Pieces	1	2	3	4	5	
Length/Bankfull Width	0.2 to 0.4	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0	> 1.0	
Diameter (Cm)	10 to 20	20 to 30	30 to 40	40 to 50	>50	
Location	Zone 4		Zone 3	Zone 2	Zone 1	
Туре	Bridge		Ramp	Submersed	Buried	
Structure	Plain		Intermediate	2.	Sticky	
Stability	Moveable		Intermediate		Secured	
Orientation(degrees)	0 to 20	20 to 40	40 to 60	60 to 80	80 to 90	
Debris Dams						
Length (% of bankfull width)	0 to 20	20 to 40	40 to 60	60 to 80	80 to 100	
Height (% of bankfull depth)	0 to 20	20 to 40	40 to 60	60 to 80	80 to 100	
Structure	Coarse		Intermediate		Fine	
Location	Partially high flow	In high flow	Partially low flow	Mid low flow	In low flow	
Stability	Moveable		Intermediate		Secured	

Diameter Conversion

10 cm	0.33	feet
20 cm	0.66	feet
30 cm	0.98	feet
40 cm	1.3	feet
50 cm	1.6	feet

QSSOP for Macroinvertebrate Stream Surveys Revision 5 Page 4 of 17 Effective Date: July 1, 2011

HABITAT ASSESSMENT FIELD SHEET- MODERATE TO HIGH GRADIENT STREAMS (FRONT) (See Protocol E for detailed descriptions and rank information)

STATION ID:			HABITAT ASSESSED BY:			
STREAM NAME:			DATE: TIME:			
STATION LOCATION:			ECOREGION: OC: Consensus Duplicate			
WBID/HUC: GROUP:		ROUP:	ASSOC	CIATED LOG #:		
	Optimal	Suboptimal		Marginal	Poor	
1. Epifaunal Substrate/ Available Cover	Over 70% of stream reach has natural stable habitat suitable for colonization by fish and/or macroinvertebrates. Four or more productive habitats are present	Natural stable habitat covers 40-70% of stream reach. Three or more productive habitats present. (If near 70% and more than 3 go to		Natural stable habitat covers 20 -40% of stream reach or only 1- 2 productive habitats present. (If near 40% and more than 2 go to subontimal.)	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 1	12 11	10 9 8 7	5 5 4 3 2 1	
Comments	1000	a second and the work				
				01	the second se	
2.Embeddedness of Riffles	Gravel, cobble, and boulders 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space. If near 25% drop to suboptimal if riffle not layered cobble.	Gravel, cobble and boulders 25-50% surrounded by fine sediment. Niches in bottom layers of cobble compromised. If near 50% & riffles not layered cobble drop to marginal.		Gravel, cobble, and boulder s are 50-75% surrounded by fine sediment. Niche space in middle layers of cobble is starting to fil with fine sediment.	Gravel, cobble, and boulders are more than 75% surrounded by fine sediment. Niche space is reduced to a single layer or is absent.	
Comments		10 14 15	12 11		5 + 5 2 1	
comments						
3. Velocity/ Depth Regime	All four velocity/depth regimes present (slow- deep, slow-shallow, fast- deep, fast-shallow).	Only 3 of the 4 present (if fast- is missing score If slow-deep mi score 15.	regimes shallow e lower). issing	Only 2 of the 4 habitat regimes present (if fast- shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime. Others regimes too small or infrequent to support aquatic populations.	
Comments	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6		
Comments						
4. Sediment Deposition	Sediment deposition affects less than 5% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.	Sediment deposition affects 5-30% of stream bottom. Slight deposition in pool or slow areas. Some new deposition on islands and point bars. Move to marginal if build-up approaches 30%.		Sediment deposition affects 30-50% of stream bottom. Sediment deposits at obstruction, constrictions and bends. Moderate pool deposition.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
Commonto	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	5 4 3 2 1	
Comments						
5. Channel Flow Status	Water reaches base of both lower banks and streambed is covered by water throughout reach. Minimal productive habitat is exposed.	Water covers > 75% of streambed or 25% of productive habitat is exposed.		Water covers 25-75% of streambed and/or productive 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	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	5 4 3 2 1	
Comments						
Division of Water Pollution Control QSSOP for Macroinvertebrate Stream Surveys Revision 5: Page 5 of 17 Effective Date: July 1. 2011

HABITAT ASSESSMENT FIELD SHEET- MODERATE TO HIGH GRADIENT STREAMS (BACK)

Station ID		Date	Initials	
	Optimal	Suboptimal	Marginal	Poor
	Channelization, dredging	Channelization, dredging	Channelization,	Over 80% of reach
6. Channel	rock removal or 4-wheel	or 4-wheel activity up to	dredging or 4-wheel	channelized, dredged or
Alteration	activity (past or present)	40%. Channel has	activity 40-80% (or less	affected by 4-wheelers.
	absent or minimal; natural	stabilized. If larger	that has not stabilized.)	Instream habitat greatly
	meander pattern. NO	reach, channelization is	Artificial structures in	altered or removed.
825	artificial structures in	historic and stable.	or out of reach may	Artificial structures have
	reach. Upstream or	Artificial structures in or	have slight affect.	greatly affected flow
	downstream structures do	out of reach do not affect		pattern.
	not affect reach.	natural flow patterns.		
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Comments				
	Occurrence of re-	Occurrence of re-	Occasional re-	Generally all flat water or
7. Frequency of	oxygenation zones	oxygenation zones	oxygenation area. The	flat bedrock; little
re-oxygenation	relatively frequent; ratio	infrequent; distance	distance between areas	opportunity for re-
zones. Use	of distance between areas	between areas divided by	divided by average	oxygenation. Distance
frequency of riffle or	divided by average stream	average stream width is 7	stream width is over 15	between areas divided by
bends for category.	width <7:1.	- 15.	and up to 25.	average stream width >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Comments				
	Banks stable: evidence of	Moderately stable:	Moderately unstable:	Unstable: many eroded
8. Bank Stability	erosion or bank failure	infrequent, small areas of	30-60 % of bank in	area: raw areas frequent
(score each bank)	absent or minimal: little	erosion mostly healed	reach has areas of	along straight sections and
Determine left or right	potential for future	over. 5-30% of bank in	erosion; high erosion	bends; obvious bank
downstream	problems <5% of bank	reach has areas of	potential during floods,	sloughing; 60-100% of
do monocum.	affected.	erosion. If approaching	If approaching 60%	bank has erosional scars.
		30% score marginal if	score poor if banks	
		banks steep.	steep.	
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Comments				
0. 37 4 4	More than 90% of the	70-90% of the bank	50-70% of the bank	Less than 50% of the bank
9. Vegetative	bank covered by	covered by undisturbed	covered by undisturbed	covered by undisturbed
Protective	undisturbed vegetation.	vegetation. One class	vegetation. Two	vegetation or more than 2
(score each bank)	All 4 classes (mature trees,	may not be well	classes of vegetation	classes are not well
from top of bank to base	understory frees, shrubs,	represented. Disruption	may not be well	represented or most
of bank. Determine left	groundcover) are	evident but not effecting	represented. Non-native	vegetation has been
or right side by facing	to grow not walk.	full plant growth. Non-	vegetation may be	cropped. Non-native
downstream	nio grow naturally. All	natives are rare ($< 30\%$)	common (30-50%).	vegetation may dominate
SCOPE (I.P.)	Left Perk 10 0	0 7 6	5 4 2	(> 50%)
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0 2 1 0
Comments				
	Average width of riparian	Average width of	Average width of	Average width of riparian
10. Riparian	zone > 18 meters.	riparian zone 12-18	riparian zone 6-11	zone <6 meters. Score
Vegetative Zone	Unpaved footpaths may	meters. Score high if	meters. Score high if	high if areas less than 6
Width	score 9 if run-off potential	areas < 18 meters are	areas less than 12	meters are small or are
(score each bank.) Zone	is negligible.	small or are minimally	meters are small or are	minimally disturbed.
begins at top of bank.		disturbed.	minimally disturbed.	
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
Comments	Kight Bank 10 9	0 1 0	<u> </u>	
Comments				

Total Score _____ Comparison to Ecoregion Guidelines (circle): ABOVE or BELOW

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

Describe

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HABITAT ASSESSMENT FIELD SHEET- LOW GRADIENT STREAMS (FRONT) (See Protocol E for detailed descriptions and rank information)

STATION ID: Bolton				HABITAT ASSESSED BY: J. Bingham		
STREAM NAME: Stream 1			DATE: 7/9/18 TIME: 0800			
STATION LOCATION: Reach 1			ECOR	ECOREGION: 74 OC: Consensus Duplicate		
WBID/HUC:	WBID/HUC: GROUP:			ASSOCIATED LOG #:		
	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 h covers 30-50% stream reach or than three habit present.	tural stable habitat vers 30-50% of eam reach or less in three habitats are esent.		Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 1	2 11	10 9 8 7 6	5 4 3 2 1	
Comments					•	
2. Channel Substrate Characterization SCORE Comments	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. 20 19 18 17 16	Mixture of soft mud or clay; or substrate is fiss bedrock, some r mats and subme vegetation prese 15 14 13	sand, ured root erged ent. 12 .11	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.	
3. Pool Variability	Even mix of large- shallow, large-deep, small-shallow, small-deep pools present.	Majority of poo large-deep very shallow.	ls are few	Shallow pools much more prevalent than deep pools.	Majority of pools small- shallow or pools absent.	
SCORE 20 19 18 17 16		15 14 13	12 11	10 9 8 7 6	5 4 3 2 1	
Comments				_		
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 increa bar formation, r from gravel, sar fine sediment; 2 of bottom affec Slight deposition pools.	ease in nostly nd or 20-50% ted. n in	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	20 19 18 17 16	15 14 13	12 11	10 9 8 7 6	5 4 3 2 1	
Comments		,				
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 > streambed and/o 25% of product habitat is expos	75% of or < ive ed.	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.	
Comments	20 17 10 1/ 10	13 14 13	14 11	1 10 2 0 1 0		

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Station ID Bolton S1	21	Data 7/9/18	Initia	
Station ID Dottono II	Ontimal	Date 1/9/10	Manginal	Book
	Champlingtion	Suboptimal	Charginal	Poor Over 800/ of reach
	Channelization,	Channelization, dredging	Channelization,	Over 80% of reach
6. Channel	dredging or 4-wheel	or 4-wheel activity up to	dredging or 4-wheel	channelized, dredged or
Alteration	activity absent or	40%. Channel has	activity 40-80% (or	affected by 4-wheelers.
	minimal; natural	stabilized. If larger	less that has not	Instream habitat greatly
	meander pattern. NO	reach, channelization is	stabilized.) Artificial	altered or removed.
	artificial structures in	historic and stable.	structures in or out of	Artificial structures may
	reach. Upstream or	Artificial structures in or	reach may have slight	have greatly affected
	downstream structures	out of reach do not affect	affect.	flow pattern.
SCODE	do not affect reach.	natural flow patterns.	10 0 9 7 (
Comments	20 19 18 17 10	15 14 15 12 11	10 9 8 7 0	<u>J 4 J 2 1</u>
Comments				
7. Channel	The bends in the	The bends in the stream	The bends in the	Channel straight;
Sinuosity (Entire	stream increase the	increase the stream	stream increase the	waterway has been
meander sequence	stream length 3-4 times	length 2-3 times longer	stream length 1 to 2	channelized for a long
not limited to	longer than if it was in	than if it was in a straight	times longer than if it	distance.
sampling reach)	a straight line.	line.	was in a straight line.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Comments				
	Banks stable: evidence	Moderately stable:	Moderately unstable:	Unstable: many eroded
8. Bank Stability	of erosion or bank	infrequent, small areas of	30-60 % of bank in	area: raw areas frequent
(score each bank)	failure absent or	erosion o 5-30% of bank	reach has areas of	along straight sections
Determine left or right side	minimal: little potential	eroded. If approaching	erosion: high erosion	and bends; obvious
by facing downstream.	for future problems	30% score marginal if	potential during	bank sloughing: 60-
	<5% of bank affected.	banks steep.	floods. If approaching	100% of bank has
			60% score poor if	erosional scars.
			banks steep.	
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Comments	_			
	More than 90% of the	70-90% of the bank	50-70% of the bank	Less than 50% of the
9. Vegetative	bank covered by	covered by undisturbed	covered by	bank covered by
Protective	undisturbed vegetation.	vegetation. One class	undisturbed	undisturbed vegetation
(score each bank) includes	All 4 classes (mature	may not be well	vegetation. Two	or more than 2 classes
to base of bank Determine	trees, understory trees,	represented. Disruption	classes of vegetation	are not well represented
left or right side by facing	shrubs, groundcover) are	evident but not effecting	may not be well	or most vegetation has
downstream	represented and	full plant growth. Non-	represented. Non-	been cropped. Non-
	allowed to grow	natives are rare $(< 30\%)$	native vegetation may	native vegetation may
			native vegetation may	
	naturally. All plants		be common (30-50%).	dominate (> 50%)
	naturally. All plants are native.		be common (30-50%).	dominate (> 50%)
SCORE (LB)	naturally. All plants are native. Left Bank 10 9 Right Bank 10 9	<u>8 7 6</u> 8 7 6	be common (30-50%). 5 4 3	dominate (> 50%)
SCORE (LB) SCORE (RB) Comments	naturally. All plants are native. Left Bank 10 9 Right Bank 10 9	8 7 6 8 7 6	be common (30-50%). 5 4 3 5 4 3	dominate (> 50%) 2 1 0 2 1 0
SCORE (LB) SCORE (RB) Comments	naturally. All plants are native. Left Bank 10 9 Right Bank 10 9	8 7 6 8 7 6	be common $(30-50\%)$.	dominate (> 50%) 2 1 0 2 1 0 Average width of
SCORE (LB) SCORE (RB) Comments	naturally. All plants are native. Left Bank 10 9 Right Bank 10 9 Average width of riparian zone > 18	8 7 6 8 7 6 Average width of	be common (30-50%). 5 4 3 5 4 3 Average width of riparian zone 6-11	dominate (> 50%) 2 1 0 2 1 0 Average width of rinarian zone <6 meters
SCORE (LB) SCORE (RB) Comments 10. Riparian Vegetative Zone	naturally. All plants are native. Left Bank 10 9 Right Bank 10 9 Average width of riparian zone > 18 meters. Unnaved	8 7 6 8 7 6 Average width of riparian zone 12-18 meters Score high if	be common (30-50%). 5 4 3 5 4 3 Average width of riparian zone 6-11 meters. Score high if	dominate (> 50%) 2 1 0 2 1 0 Average width of riparian zone <6 meters. Score high if areas less
SCORE (LB) SCORE (RB) Comments 10. Riparian Vegetative Zone Width	naturally. All plants are native. Left Bank 10 9 Right Bank 10 9 Average width of riparian zone > 18 meters. Unpaved footpaths may score 9	8 7 6 8 7 6 Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are	Average width of riparian zone 6-11 meters. Score high if areas less than 12	dominate (> 50%) 2 1 0 2 1 0 Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small
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HABITAT ASSESSMENT FIELD SHEET- LOW GRADIENT STREAMS (BACK) Effective Date: July 1, 2011

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

Describe

























WETLAND AND OTHER WATERS DELINEATION REPORT

For the Smokestack Mitigation Bank Site Shelby County, Tennessee

Prepared for:

Resource Environmental Solutions Attn: Mr. Alec Sheaff 5020 Montrose Blvd., Suite 650 Houston, TX 77006

Project No.: 11596 **Date:** June 17, 2019

Prepared by:



5070 Stow Rd. Stow, OH 44224 800-940-4025 www.EnviroScienceInc.com Smokestack Mitigation Bank Site Final Report Document Date: 6/17/2019 Project No.: 11596 Prepared for: Mr. Alec Sheaff Client Solutions Manager RES

Authorization for Release

The analyses, opinions, and conclusions in this document are based entirely on EnviroScience's unbiased, professional judgement. EnviroScience's compensation is not in any way contingent on any action or event resulting from this study. Neither EnviroScience nor any EnviroScience employee has any vested interest in the property examined in this study.

The undersigned attest, to the best of their knowledge, that this document and the information contained herein is accurate and conforms to EnviroScience's internal Quality Assurance standards.

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EXECUTIVE SUMMARY

EnviroScience, Inc. performed a delineation of wetlands and other waters in November 2018 for Resource Environmental Solutions (RES) at the Smokestack Mitigation Bank Site project location. The project area consists of three parcels north of Evergreen Road in the City of Lakeland, Shelby County, Tennessee. The parcel numbers are L0141 00269, A0141 00270, and L0141 00124. The project area is approximately 360 acres and is bound to the north by the Loosahatchie River and to the south by a railroad line. A small portion in the southwest corner of the project area is located south of the railroad line. The approximate center coordinates of the project area are 35.283139, -89.713232. The maps provided in Appendix A depict the project area.

The project area is comprised of rural agricultural property. Five (5) distinct vegetative communities were identified within the project area, including three (3) wetland community types. The majority of the project area is agricultural field, with narrow riparian forest along the Loosahatchie River, Clear Creek, and several other smaller onsite streams and ditches. The surrounding land use is primarily agricultural, with residential development to the south.

Fifty-two (52) wetlands were identified within the project area, accounting for approximately 20.648 acres of wetland onsite. The onsite wetlands are comprised of palustrine forested (PFO), palustrine scrub-shrub (PSS), and palustrine emergent (PEM) vegetative communities.

In addition, thirty-three (33) streams, ditches and wet weather conveyances, for a total of 18,374 linear feet (5.894 acres), were identified within the project area. Thirteen (13) of these features are considered stream, the remaining features are ditches or wet weather conveyances. No open water aquatic resources were identified within the project area.

Wetlands and waterbodies are under the jurisdiction of the Tennessee Department of Environmental Conservation (TDEC) and/or U.S. Army Corps of Engineers (USACE). No filling may occur within these areas without their written permission. Please contact the Memphis Environmental Field Office of TDEC at (901) 371-3000 or the Memphis District USACE at (901) 544-3682 before working in these areas.



1.0 INTRODUCTION AND DESCRIPTION

EnviroScience, Inc. performed a delineation of wetlands and other waters in November 2018 for RES at the Smokestack Mitigation Bank Site project location. The project area consists of three parcels north of Evergreen Road in the City of Lakeland, Shelby County, Tennessee. The parcel numbers are L0141 00269, A0141 00270, and L0141 00124. The project area is approximately 359.42 acres and is bound to the north by the Loosahatchie River and to the south by a railroad line. A small portion in the southwest corner of the project area extends south of the railroad line. The approximate center coordinates of the project area are 35.283139, -89.713232. The maps provided in Appendix A depict the project area.

The project area is comprised of rural agricultural property. Five (5) distinct vegetative communities were identified within the project area, including three (3) wetland community types. The majority of the project area is agricultural field, with narrow riparian forested corridors along the Loosahatchie River, Clear Creek, and several other smaller onsite streams and ditches. The surrounding land use is primarily agricultural, with residential development to the south.

The project area is in the Loosahatchie River drainage basin (Hydrologic #08010209), which drains approximately 736 square miles in western Tennessee. The project area is within the Mississippi Valley Loess Plains ecoregion (Griffith et al., 1997) of Tennessee. The project area is located within the area covered by the Atlantic and Gulf Coastal Plain Regional Supplement (USACE, 2010) and associated plant list (Lichvar, 2016). The project area is regulated by the USACE Memphis District.

2.0 METHODS

Government agencies regulate coastal and inland waters for commerce, flood control, and water quality. These water bodies provide numerous functions and values necessary to protect and sustain our quality of life. Wetlands comprise a significant portion of regulated waters. USACE and U.S. Environmental Protection Agency (USEPA) jointly define wetlands as:

"Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The remaining deepwater aquatic habitats (open waters) are defined by the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) as:

". . . areas that are permanently inundated at mean annual water depths >6.6 ft or permanently inundated areas <6.6 ft in depth that do not support rooted emergent or woody plant species."

The methods used for determining and delineating wetlands and open waters strictly adhere to those found in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (USACE, 2010). Wetlands and open water boundaries were determined by the disappearance of one or more of their diagnostic characteristics.

Ordinary high water marks (OHWM) defined the outermost regulatory boundaries of ephemeral and open waters.



Each sample plot and the perimeter of each wetland and other water was surveyed and marked in the field with plain pink flags and pink "wetland boundary" flags, respectively. A global positioning system (GPS) unit with submeter accuracy was used, in conjunction with aerial photography and topographic maps, for the survey. Computer Aided Design (CAD) software was used to determine wetland dimensions and Geographic Information Systems (GIS) software was used to produce a map of the project area showing wetlands and other waters.

2.1 WETLANDS

2.1.1 Determination

A review of secondary literature sources was performed to find known wetlands and other significant ecological resources and areas with high potential for wetlands in or near the proposed project area. Resources included the following:

- 1. U.S. Geological Survey (USGS) topographic maps
- 2. National Wetlands Inventory (NWI) maps
- 3. Web Soil Survey
- 4. Aerial Photographs
- 5. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map

A field inspection of the project area was then completed to identify major plant communities and to visually locate potential wetlands. The routine, onsite (Level 2) wetland determination was used to perform the delineation. Wetland communities were classified according to the classification scheme of Cowardin et al. (1979) (Table 2.1). Non-wetland communities were classified as one of the categories described in Table 2.2.

Table 2.1 Wetland Communities (Cowardin et al. 1979)

Community	Description
PEM	Palustrine Emergent
PSS	Palustrine Scrub-Shrub
PFO	Palustrine Forested
POW	Palustrine Open Water

Table 2.2 Non-wetland Communities

Community	Description
Urban/ Maintained	Regularly maintained land; residential; industrial
Agricultural	Land used for producing crops or raising livestock; cropland; pastureland
Cleared	Disturbed areas devoid of most vegetation from recent clearing, grading, or filling
Open Field	Herbaceous community without woody vegetation
Old Field	Herbaceous community having woody vegetation coverage of <50%
Scrub-Shrub	Community dominated by woody vegetation <6 m (20 ft) tall
Forest	Community dominated by woody vegetation >6 m (20 ft) tall



Sample plots were established within each natural community and potential wetland within the project area. Complete data for each sample plot were collected and recorded on the USACE Routine Wetland Determination Data Forms contained in the applicable USACE Regional Supplement (USACE, 2010). Vegetation, hydrology, and soils were evaluated at each sample plot.

2.1.1.1 Vegetation

To detect the presence or absence of hydrophytic vegetation, four plant strata were evaluated within specific radii of the plot center. Each stratum was ranked by aerial cover in descending order of abundance. Table 2.3 provides information on each vegetative stratum.

Stratum	Definition	Survey Area
Tree	Woody plants > or equal to 3 in. (7.6 cm) diameter at breast height (dbh), regardless of height	30 ft (9.1 m) radius
Sapling/shrub	Woody plants <3 in. (7.6 cm) dbh and <u>></u> 3.28 ft (1 m) tall	15 ft (4.6 m) radius
Herbaceous	Herbs and woody plants less than 3.28 ft (1 m) in height	5 ft (1.5 m) radius
Woody vines	Woody vines >3.28 ft (1 m) in height	30 ft (9.1 m) radius

Table	2.3	Vegetative Strat	а
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Percent dominance was obtained for each species and within each stratum. Dominant species are those that, cumulatively totaled in order of abundance, immediately exceed 50% and also include any individual species with an abundance of 20% or more (USACE, 2010). Dominant taxa were identified using recognized local guides: nomenclature follows the *National List of Scientific Plant Names* (USDA, 1982). Following the identification of each plant species present within the plot, all dominant species within each stratum were assigned a wetland indicator status according to Lichvar (2016). Indicators are summarized in Table 2.4.

Table 2.4 Plant Indicators

Indicator	Category	Definition	
OBL	Obligate Wetland	Almost exclusively (>99% of occurrences) found in wetlands	
FACW	Facultative Wetland	Most likely found in wetlands (67-99% of occurrences)	
FAC	Facultative	Equally likely found in wetlands or nonwetlands (34-66%)	
FACU	Facultative Upland	Most likely found in nonwetlands (1-33% occurrence in wetlands)	
UPL	Obligate Upland	Almost exclusively found in nonwetlands (<1% occurrence in wetlands)	

An "NI" (no indicator) designation represents species where not enough information is available to assign an indicator; an "NL" (no listing) designation is given to species whose identification was not determined sufficiently enough to assign an indicator. Once the indicator status is assigned to each dominant species, the evaluator can perform the percent dominance test according to the protocol outlined within the applicable Regional Supplement (USACE, 2010) to determine if the plot meets the criterion for hydrophytic vegetation.



2.1.1.2 Hydrology

To detect the presence or absence of wetland hydrology, surface and subsurface hydrologic indicators were evaluated at the sample plot and throughout the adjacent community. Primary sources of wetland hydrology include direct precipitation, headwater flooding, backwater flooding, groundwater, or any combination of these. When obtaining data at each sample plot, the evaluator observes evidence of hydrology. Primary indicators of hydrology (only one of these is necessary to indicate sufficient wetland hydrology) include the presence of surface water, water marks, sediment deposits, drift deposits, etc. (USACE, 2010). Secondary indicators of hydrology (which requires two or more at each sample plot) include surface soil cracks, drainage patterns, crayfish burrows, etc. (USACE, 2010).

2.1.1.3 Soils

The upper horizons of the soil at each sample plot were examined to detect the presence or absence of hydric soils indicators. Current USACE guidance requires the evaluator to assess the upper 20 inches of soil for hydric soil characteristics. Most indicators of hydric soils require an assessment of soil matrix color and mottle characteristics (Environmental Laboratory, 1987; USACE, 2010) for each horizon. These characteristics were determined by comparing a moist sample with the *Munsell Soil Color Chart* (Munsell Color, 2009) or *The Globe Soil Color Book* (Visual Color Systems, 2004).

2.1.2 Cowardin Wetland Classification

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory uses the *Classification of Wetlands and Deepwater Habitats of the United States* to classify wetland habitat types (Cowardin et al., 1979). This classification system is hierarchical and defines five major systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The Palustrine system was the only type of wetland system identified within the project area and is defined as including all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean driven-derived salts is below 0.5 percent (Cowardin et al., 1979).

2.2 OTHER WATERS

Other waters include ephemeral and open waters. These waters are broken down into two categories: 1) ponds and lakes; and 2) streams and rivers.

2.2.1 Ponds and Lakes

Palustrine systems other than wetlands, and lacustrine waters are addressed as ponds and lakes, respectively. These non-linear open waters may harbor important aquatic communities such as vegetated shallows (aquatic bed) and mud flats. They are classified according to Cowardin et al. (1979).

2.2.2 Streams and Rivers

Riverine systems are linear flowing waters bounded by a channel. Cowardin et al. (1979) divides these systems into four groups; however, for the purpose of this report, streams are placed into one of the three regulatory types listed below.

- Ephemeral: An ephemeral stream only conveys runoff precipitation and meltwater. It is permanently located above the water table and is most often dry.
- Intermittent: An intermittent stream is located below the water table for parts of the year but does have dry periods.



Perennial: A perennial stream typically has flowing water throughout the entire year.

In addition to flow characteristics, USACE has defined other regulatory categories that apply to streams, which are listed below (USACE and USEPA, 2007).

- <u>Traditional Navigable Waters (TNW)</u>: All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide.
- <u>Relatively Permanent Waters (RPW)</u>: Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months).
- <u>Non-Relatively Permanent Waters (Non-RPW)</u>: Non-navigable tributaries of traditional navigable waters that are not relatively permanent where the tributaries typically do not have continuous flow at least seasonally (e.g., typically three months).

USACE and USEPA will assert jurisdiction under the Clean Water Act on TNWs and all wetlands adjacent to them, non-navigable tributaries of TNWs that are RPW, and wetlands that directly abut such tributaries. In addition, the agencies will assert jurisdiction over every water body that is not an RPW if that water body is determined (on the basis of a fact-specific analysis) to have a significant nexus with a TNW.

"A significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or an insubstantial effect on the chemical, physical, and/or biological, integrity of a TNW. Principal considerations when evaluating significant nexus include the volume, duration, and frequency of the flow of water in the tributary and the proximity of the tributary to a TNW, plus the hydrologic, ecologic, and other functions performed by the tributary and all of its adjacent wetlands."

In 2015, USEPA and USACE issued the Clean Water Rule, which attempts to clarify the definition of waters of the U.S. On October 9, 2015, the Sixth U.S. Circuit Court of appeals issued a nationwide Order of Stay barring implementation of the rule pending appeal. On August 16, 2018, the U.S. District Court for the District of South Carolina issued a nationwide injunction barring implementation of the stay in 26 states, including Tennessee. The Clean Water Rule uses several bright line definitions involving distance from downstream waters or other regulated waters to claim jurisdiction over rivers, stream, and wetlands.

Jurisdictional Waters of the U.S. (WOTUS) were identified and the North Carolina Division of Water Quality (NCDWQ) – Methodology for Identification of Intermittent and Perennial Streams and Their Origins, Version 4.11 (NCDWQ, 2010) was used, as well as stream and tributary defining characteristics and the three regulatory types described in Section 2.2.2.

2.2.3 Hydrologic Determinations

The state of Tennessee requires identification of Waters of the State (WOS) by a certified Hydrologic Professional. The state of Tennessee defines WOS as streams; all other linear features are defined as wet weather conveyances.

A "wet weather conveyance" means, notwithstanding any other law or rule to the contrary, manmade or natural watercourses, including natural water courses that have been modified by channelization:



- 1. That flow only in direct response to precipitation runoff in their immediate locality;
- 2. Whose channels are at all times above the groundwater table;
- 3. That are not suitable for drinking water supplies; and
- 4. In which hydrological and biological analyses indicate that, under normal weather conditions, due to naturally occurring ephemeral or low flow there is not sufficient water to support fish or multiple populations of obligate lotic aquatic organisms whose life cycles includes an aquatic phase of at least two months."

Stream and hydrologic determinations were performed using the Tennessee Department of Environmental Conservation (TDEC) Guidance for Making Hydrologic Determinations (HD), Version 1.4, to identify and locate the boundaries of stream/wet weather conveyance (WWC) features (TDEC, 2011).

Prior to conducting field work, relevant background information was reviewed, including site location (Appendix A, Figure 1), topography (Appendix A, Figure 2), the National Wetlands Inventory Map (Appendix A, Figure 3), the Shelby County Soils Map data (Appendix A, Figure 4), Aerial Photography Site Map (Appendix A, Figure 5), and the most recent FEMA Flood Insurance Rate Map (Appendix A, Figure 6).

EnviroScience established the survey area of the watercourse along the property extent and fixed its location using a Trimble differential global positioning system (dGPS) accurate to within one (1) meter. The water feature was then assessed using the previously mentioned methodologies. Biologists photo documented all resources that were encountered within the assessed survey area.

3.0 LITERATURE REVIEW

The following sections detail background information on the project area and contain further explanation of the various maps located in Appendix A.

3.1 USGS TOPOGRAPHIC MAP

The USGS 7.5-minute topographic series map of the site (Arlington Quadrangle) is shown on Figure 2 (Appendix A). The project area is generally flat. Elevations within the project area range from approximately 240 feet above mean sea level (AMSL) to 270 feet AMSL. The Loosahatchie River is depicted along the northern boundary of the project area. Clear Creek Canal is depicted as a channelized stream flowing north through the eastern portion of the project area. Several smaller streams, oxbows, and wetlands are depicted within the project area. The streams indicated on the USGS topographic map were field identified. Due to the agricultural land use present throughout much of the site, most of the oxbows and wetlands depicted on the USGS topographic map have been heavily altered or were not present during the field survey.

3.2 NWI MAP

The NWI map (Arlington Quadrangle) of the project area is shown on Figure 3 (Appendix A). Five (5) riverine systems and six (6) wetlands are depicted within the project area. The Loosahatchie River is depicted as a lower perennial riverine system with an unconsolidated bottom that is permanently flooded and excavated (R2UBHx). An unknown perennial riverine system with an unconsolidated bottom that is permanently flooded corresponds to a portion of Clear Creek. An intermittent riverine system with a streambed that is seasonally flooded and excavated (R4SBCx) corresponds to Stream S-1. An unknown perennial riverine system with an unconsolidated bottom



that is permanently flooded (R5UBH) is depicted overlaying an oxbow; this feature corresponds to Stream S-3, which was field identified as a short, ephemeral stream draining the adjacent agricultural field. An intermittent riverine system with a streambed that is seasonally flooded (R4SBC) is depicted on the NWI map flowing into Clear Creek. This feature was not identified in the field, and an agricultural field exists within its location. A complex of wetlands was identified in the approximate location of this former stream; these include Wetlands W-37, W-38, W-39, W-40, and W-47.

A small palustrine, broad-leaved deciduous scrub-shrub wetland that is seasonally flooded (PSS1C) is depicted in the northeastern portion of the project area and corresponds to Wetland W-23. The linear palustrine, broad-leaved deciduous forested wetland that is seasonally flooded (PFO1C), located in the northeastern portion of the project, corresponds with Stream S-21; no wetlands were field identified within the riparian corridor along this stream. Similarly, a large portion of Clear Creek is depicted as a palustrine, broad-leaved deciduous forested wetland that is seasonally flooded and excavated (PFO1Cx) on the NWI map. Very little wetland was field identified within the riparian forest along this portion of Clear Creek. Three (3) palustrine, persistent emergent wetlands that are seasonally flooded (PEM1C), located in the eastern half of the project area, are depicted on the NWI map. These wetlands roughly correspond to Wetland W-30, W-43, W-44, and W-49.

3.3 COUNTY SOIL SURVEY

The project area is found on the *Soil Survey of Shelby County, Tennessee* and was accessed on the Soil Survey Geographic (SSURGO) Database (USDA Web Soil Survey, 2016) (Appendix A, Figure 4). Six (6) soil types were identified within the project area. In addition to the indicated soils, water (W) was also identified for a total of 2.422 acres (0.7 of a percent of the project area). The onsite soils are summarized in Table 3.1, below.

Symbol	Soil Name	Status	Common Landform	Percent Hydric	Acres in Project Area	Percent Within Project Area
Fm	Falaya silt loam	Non-hydric with hydric inclusions	flood plains	9	156.97	44.6
GaB	Grenada silt loam, 2 to 5 percent slopes	Non-hydric	loess hills	0	0.043	0.1
GaC3	Grenada silt loam, 5 to 8 percent slopes, severely eroded	Non-hydric	loess hills	0	0.74	0.2
GaD2	Grenada silt loam, 8 to 12 percent slopes, eroded	Non-hydric	loess hills	0	0.49	0.1
He	Henry silt loam	Hydric	stream terraces	100	2.85	0.8
Wv	Waverly silt loam, 0 to 2 percent slopes, occasionally flooded, long duration	Hydric	flood plain steps	100	187.96	53.5

Table 3.	1 Soil Types	Mapped in	Shelby	County
			<u> </u>	

*ND = No Data



3.4 AERIAL PHOTOGRAPHY

A recent aerial photograph of the project area is shown in Figure 5 (Appendix A). The project area is located within a rural agricultural setting and the Loosahatchie River is shown flowing along the northern boundary. A railroad line is located along the southern boundary. Land use visible on the aerial imagery include agricultural field and riparian forest. Streams and wetlands are depicted throughout the project area. No structures are visible within the project area. The surrounding land use is primarily agricultural, with some residential development to the south.

3.5 FEMA FLOOD INSURANCE RATE MAP

The Federal Emergency Management Agency (FEMA) produces Flood Insurance Rate Maps (FIRM), which show the locations of predictable floodplain during precipitation flood events. The FIRM map of the project area was examined and is included in Appendix A (Figure 6). Most of the project area is located within the identified 100-year floodplains of the Loosahatchie River and Clear Creek. Further coordination with local agencies may be required before any ground-disturbance activities within the designated floodplain commence.

3.6 U.S. FISH AND WILDLIFE SERVICE

The project area was reviewed for suitable habitat for federally listed species whose known range includes Shelby County, Tennessee. The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) was searched to determine which federally listed species may be present within the project area (USFWS, 2018). These species are the federally endangered Indiana bat (*Myotis sodalis*), the federally threatened northern long-eared bat (*Myotis septentrionalis*), and the bald eagle (*Haliaeetus leucocephalus*), a federal species of concern. The IPaC search also specified three (3) birds of conservation concern, including the prothonotary warbler (*Protonotaria citrea*), the red-headed woodpecker (*Melanerpes erythrocephalus*), and the wood thrush (*Hylocichla mustelina*). Additionally, the IPaC specified results for NWI wetlands; for a more detailed discussion of onsite NWI wetlands, see Section 3.2 of this report.

Living or dead trees with shedding or peeling bark or cavities may serve as roosting trees for the Indiana bat and/or the northern long-eared bat. In addition, sheds and barns may serve as roosting habitat for the northern long-eared bat. No winter hibernaculum, barns, or sheds were observed within the project area. The areas of onsite forest were of varying successional stages. Specific habitat trees were not identified as part of this project. However, any forested areas may provide habitat for the Indiana bat or northern long-eared bat. A description of the tree species growing within the onsite forested community is described below in Section 4.1. Representative photographs of potential roost trees (PRTs) are located in Appendix B. If this project has federal ties (including impacts to onsite wetlands), coordination with USFWS is required prior to tree clearing. If trees must be cleared, USFWS will likely require that clearing be completed between October 1st and March 31st.

The bald eagle nests in large trees near water. No bald eagles or nests were observed within or adjacent to the project area. The Loosahatchie River may provide potential habitat for the bald eagle.

The IPaC reports a probability of presence for migratory birds within 10 km grid cells overlapping the defined project area, with variable levels of survey effort. IPaC recommends avoiding and/or minimizing impacts to birds of conservation concern to the extent possible. These species are most vulnerable to disturbance during the breeding season. Breeding season for the prothonotary warbler is listed as April 1 through July 31; breeding season for the red-headed woodpecker is



listed as May 10 through September 10; and breeding season for the wood thrush is listed as May 10 through August 31. None of these species were observed onsite; however, the wetland delineation field work was conducted in November, which is after the fall migration. The onsite riparian forest could potentially be used as migratory stopover habitat and/or breeding habitat for these species.

A desktop search of IPaC was conducted for this report for informational purposes only. If consultation under Section 7 of the Endangered Species Act is required, an official list should be requested from IPaC. Additionally, a significant portion of the project area lays within a FEMA regulatory floodway, further coordination with local, state, and/or federal agencies may be required.

3.7 TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Information regarding rare and state listed species was obtained through a county search of the Rare Species Dataviewer on the TDEC website (TDEC, 2018). Results from the search included a total of thirty-one (31) species and one (1) animal assemblage. Four (4) of these are state endangered, including the Bewick's wren (Thryomanes bewickii), willow aster (Symphyotrichum praeltum), the interior population of the least tern (Sternula antillarum athalassos), and the ovate catchfly (Silene ovata). Seven (7) species in the search results are state threatened, including Harvey's beakrush (Rhynchospora harveyi), the blue sucker (Cycleptus elongatus), the sweetbay magnolia (Magnolia virginiana), the northern pinesnake (Pituophis melanoleucus melanoleucus), the lark sparrow (Chondestes grammacus), the red starvine (Schisandra glabra), and the copper iris (Iris fulva). Ten (10) species in the search results are classified as "deemed in need of management" within Tennessee, including the southeastern shrew (Sorex longirostris), the bald eagle (Haliaeetus leucocephalus), the piebald madtom (Noturus gladiator), the cerulean warbler (Dendroica cerulea), the naked sand darter (Ammocrypta beani), the barking treefrog (Hyla gratiosa), the eastern woodrat (Neotoma floridana illinoensis), the barn owl (Tyto alba), the Mississippi kite (Ictinia mississippiensis), and the Swainson's warbler (Limnothlypis swainsonii). Four (4) species in the search results are classified as "special concern" in Tennessee, including the cedar elm (Ulmus crassifolia), American ginseng (Panax quinquefolius), multiflowered mudplantain (Heteranthera multiflora), and featherfoil (Hottonia inflata). American ginseng is also listed as "commercially exploited." Six (6) species in the search results are classified as "rare, not state listed" in Tennessee, including the bronze copper (Lycaena hyllus), the striped whitelip (Webbhelix multilineata), the southern cricket frog (Acris gryllus), the southern hickorynut (Obovaria jacksoniana), the Bell's vireo (Vireo bellii), and the fatmucket (Lampsilis siliquoidea). The animal assemblage in the search results, a heron rookery, is also classified as "rare, not state listed" in Tennessee. While surveys for these species were outside of the scope of this project, a noteworthy observation was the presence of tree frog tadpoles (Hyla sp.) within Wetland W-3. If construction activities are planned; further coordination with TDEC may be required prior to ground disturbance.



4.0 **RESULTS**

Thirty-five (35) sample plots were established within five (5) vegetative communities. Three (3) of these communities are considered wetland. Table 4.1 summarizes the sample plot data.

Sample Plot	Photo*	Community**	Hydrophytic Vegetation	Wetlands Hydrology	Hydric Soil	Status	Location
1	1	Forest	х			Non- Wetland	SP-1
2	2	PFO	Х	Х	Х	Wetland	W-1
3	3	PEM	Х	Х	Х	Wetland	W-7
4	4	Agricultural Field				Non- Wetland	SP-4
5	5	Agricultural field				Non- Wetland	SP-5
6	6	PEM	Х	Х	Х	Wetland	W-6
7	7	PEM	Х	Х	Х	Wetland	W-8
8	8	PEM	Х	Х	Х	Wetland	W-9
9	9	Forest	Х	Х		Non- Wetland	SP-9
10	10	Agricultural Field				Non- Wetland	SP-10
11	11	PEM	Х	Х	Х	Wetland	W-13
12	12	PEM	Х	Х	Х	Wetland	W-16
13	13	Agricultural Field				Non- Wetland	SP-13
14	14	PEM	Х	Х	Х	Wetland	W-14
15	15	PEM	Х	Х	Х	Wetland	W-18
16	16	PFO	Х	Х	Х	Wetland	W-19
17	17	PSS	Х	Х	Х	Wetland	W-19
18	18	PEM	Х	Х	Х	Wetland	W-19
19	19	Forest				Non- Wetland	SP-19
20	20	PFO	Х	Х	Х	Wetland	W-23
21	21	PEM	Х	Х	Х	Wetland	W-22
22	22	Forest	Х			Non- Wetland	SP-22
23	23	PFO	Х	Х	Х	Wetland	W-26
24	24	Forest	Х			Non- Wetland	SP-24
25	25	PEM	Х	Х	Х	Wetland	W-30
26	26	PEM	Х	Х	Х	Wetland	W-33
27	27	Agricultural Field				Non- Wetland	SP-27
28	28	PEM	Х	Х	Х	Wetland	W-41
29	29	PEM	Х	Х	Х	Wetland	W-38
30	30	PEM	Х	Х	Х	Wetland	W-47

Table 4.1 Sample Plot Results



Sample Plot	Photo*	Community**	Hydrophytic Vegetation	Wetlands Hydrology	Hydric Soil	Status	Location
31	31	PFO	Х	Х	Х	Wetland	W-49
32	32	Forest	Х		Х	Non- Wetland	SP-32
33	33	Forest	Х			Non- Wetland	SP-33
34	34	PSS	Х	Х	Х	Wetland	W-45
35	35	Agricultural Field				Non- Wetland	SP-35

*photos are located in Appendix B

**PEM = Palustrine Emergent; PSS = Palustrine Scrub-Shrub; PFO = Palustrine Forest

Each sample plot, delineated wetland, and other waters are illustrated in Figure 5 (Appendix A). The following section describes general conditions found within each plant community and summarizes information from the data forms, located in Appendix C. Representative photographs are included in Appendix B.

4.1 NON-WETLANDS

Two (2) upland communities, agricultural field and forest, exist within the project area. Dominant species in each community are discussed below; complete vegetative data is included in the Sample Plot forms provided in Appendix C. The agricultural field community is represented by Sample Plots 4, 5, 10, 13, 27, and 35. The dominant species within the herbaceous layer of this community include soybean (*Glycine max*, UPL), buttercup (*Ranunculus* sp., c.f. *R. acris*), and wild chives (*Allium schoenoprasum*, FACU).

The onsite forest community is represented by Sample Plots 1, 9, 19, 22, 24, 32, and 33. The dominant tree species within the forest community include silver maple (Acer saccharinum, FAC), box elder (Acer negundo, FAC), red maple (Acer rubrum, FAC), American sycamore (Platanus occidentalis, FACW), river birch (Betula nigra, FACW), southern red oak (Quercus falcata, FACU), water oak (Quercus nigra, FAC), eastern cottonwood (Populus deltoides, FAC), sweet-gum (Liquidambar styraciflua, FAC), and slippery elm (Ulmus rubra, FAC). The dominant species within the shrub stratum include American elm (Ulmus americana, FAC), privet (Ligustrum sp., NL), common pawpaw (Asimina triloba, FAC), box elder, shagbark hickory (Carya ovata, FACU), slippery elm, choke cherry (Prunus virginiana, FACU), green ash (Fraxinus pennsylvanica, FACW), and shingle oak (Quercus imbricaria, FAC). The herbaceous stratum is dominated by wintercreeper (Euonymus fortunei, UPL), white panicled American-aster (Symphyotrichum lanceolatum, FACW), farewell-summer (Symphyotrichum lateriflorum, FAC), Japanese honeysuckle (Lonicera japonica, FACU), poison ivy (Toxicodendron radicans, FAC), river-bank wild rye (Elymus riparius, FACW), and non-native bamboo (Phyllostachys sp., NL). The dominant species within the woody vine stratum include river-bank grape (Vitis riparia, FACW) and poison ivy.

4.2 WETLANDS

Fifty-two (52) wetlands were identified and delineated within the project area. The onsite portions of these wetlands consist of PEM, PSS, and PFO vegetative communities. Wetland results are given in Table 4.2 and are briefly described in the following section. Wetland size has been determined for the portion of the wetland within the project area. These wetlands are illustrated in Figure 5 (Appendix A).



Wetlan	d	Photo*	Cowardin Class	Size Within Project Area (acres)	Preliminary Jurisdictional Evaluation	Map Page Location**
W-1		36	PFO	0.136	Jurisdictional	5.01
W-2		37	PFO	0.042	Jurisdictional	5.01
W-3		38	PFO	0.073	Jurisdictional	5.01, 5.02
W-4		39	PEM	0.038	Jurisdictional	5.02
W-5		40	PEM	0.016	Jurisdictional	5.02
W-6		41	PEM	0.438	Jurisdictional	5.02, 5.08
W-7		42	PEM	0.058	Jurisdictional	5.02
W-8		43	PEM	0.132	Jurisdictional	5.02
W-9		44	PEM	0.059	Jurisdictional	5.02
W-10		45	PEM	0.132	Jurisdictional	5.03
W-11		46	PEM	0.048	Jurisdictional	5.03
W-12		47	PEM	0.466	Jurisdictional	5.03
W-13		48	PEM	0.159	Jurisdictional	5.03
W-14		49	PEM	4.465	Jurisdictional	5.03, 5.04, 5.09, 5.10
W-15	1	50	PEM	0.209	Jurisdictional	5.04
W-16		51	PEM	0.806	Jurisdictional	5.04
W-17		52	PEM	0.572	Jurisdictional	5.04, 5.05
W-18		53-54	PEM	0.034	Jurisdictional	5.05
			PEM	3.305		
VV-19		55-59	PSS PEO	0.590	Jurisdictional	5.07
W-20		60	PEM	0.110	Jurisdictional	5.07
W-21		61	PFO	0.023	Jurisdictional	5.07
W/ 00		60	PEM	0.537	lumia di ati ana l	E 07
VV-22		02	PFO	0.042	Junsuictional	5.07
W/ 00	а	62.64	PEM	0.104	lumia di ati ana l	5.07
VV-23	h	03-04	PFO	0.437	Jurisdictional	
W-24	D D	65	PEM	0.021	Jurisdictional	5.08
W-25		66	PEM	0.029	Jurisdictional	5.08
W-26		67	PFO	0.068	Jurisdictional	5.08
W-27		68	PEM	0.071	Jurisdictional	5.08
		60	PEM	0.038	ار سنم مازمه: ا	5.09
W-28		69	PFO	0.059	JURISCICTIONAL	5.08
W-29		70	PEM	0.019	Jurisdictional	5.08
W-30		71-72	PEM PFO	0.065	Jurisdictional	5.08

Table 4.2 Wetland Results within the Project Area



Wetland	Photo*	Cowardin Class	Size Within Project Area (acres)	Preliminary Jurisdictional Evaluation	Map Page Location**
W-31	73	PEM	0.062	Jurisdictional	5.08
W-32	74	PEM	0.225	Jurisdictional	5.08
W-33	75	PEM	0.642	Jurisdictional	5.08
W-34	76	PEM	0.069	Jurisdictional	5.08
W-35	77	PEM	0.116	Jurisdictional	5.09
W-36	78	PEM	0.083	Jurisdictional	5.09
W-37	79	PEM	0.667	Jurisdictional	5.09
W-38	80	PEM	0.242	Jurisdictional	5.09
W-39	81	PEM	0.434	Jurisdictional	5.09
W-40	82	PEM	0.980	Jurisdictional	5.09
W-41	83	PEM	0.700	Jurisdictional	5.09
W-42	84	PEM	0.265	Jurisdictional	5.09
W-43	85	PEM	0.055	Jurisdictional	5.10
W-44	86	PEM	0.265	Jurisdictional	5.10
W-45	87-88	PEM	0.040	Jurisdictional	5 10
	01.00	PSS	0.009	Varioalotional	
W-46	89	PEM	0.178	Jurisdictional	5.10
W-47	90	PEM	0.282	Jurisdictional	5.10
W-48	91	PEM	0.043	Jurisdictional	5.10
\ <u>\</u> /_/Q	92-93	PEM	0.429	lurisdictional	5 10
VV- 4 3		PFO	0.361	Junsaictional	5.10
W-50	94	PSS	0.007	Jurisdictional	5.10
W-51	95	PEM	0.117	Jurisdictional	5.11
W-52	96	PEM	0.036	Jurisdictional	5.11
Tot	tal Wetlands		20.648		

*photos are located in Appendix B

**Site map located in Appendix A, Figure 5.

The majority of onsite wetlands are depressional wetlands within the agricultural fields and are generally dominated by annual, PEM vegetation. This includes Wetlands W-4, W-5, W-6, W-7, W-8, W-9, W-10, W-11, W-12, W-13, W-14, W-15, W-16, W-17, W-18, W-20, W-24, W-25, W-27, W-29, W-31, W-32, W-33, W-34, W-35, W-36, W-37, W-38, W-39, W-40, W-41, W-42, W-43, W-44, W-46, W-47, W-48, W-51, and W-52. These wetlands are represented by Sample Plots 3, 6, 7, 8, 11, 12, 14, 15, 26, 28, 29, and 30. The dominant herbaceous species within most of these wetlands are rough barnyard grass (*Echinochloa muricata*, FACW), fall panic grass (*Panicum dichotomiflorum*, FACW), tall buttercup (*Ranunculus acris*), chufa (*Cyperus esculentus*, FAC), mild water-pepper (*Persicaria hydropiper*, OBL), blunt spike-rush (*Eleocharis obtusa*, OBL), water-purslane (*Ludwigia palustris*, OBL), rusty flat sedge (*Cyperus odoratus*, FACW), and soybeans. Some of the wetland along the edges of the agricultural fields include more perennial vegetation as dominant species; presumably the regular disturbance due to farming is less



intensive in these areas. These species include lamp rush (*Juncus effusus*, OBL), Allegheny monkey-flower (*Mimulus ringens*, OBL), white panicled American-aster (*Symphyotrichum lanceolatum*, FACW), and common fox sedge (*Carex vulpinoidea*, FACW). Common indicators of wetland hydrology within these wetlands include surface water, a high water table, soil saturation, saturation visible on aerial imagery, crayfish burrows, geomorphic position, and the FAC-neutral test. Other indicators of wetland hydrology that were less frequently observed within these wetlands include water stained leaves, an algal mat or crust, a shallow aquitard, recent iron reduction in tilled soils, aquatic fauna (diving beetles), and oxidized rhizospheres in living roots. The hydric soil indicator within most depressional wetlands within agricultural field was depleted matrix, although redox depressions and iron-manganese masses occurred as well.

Wetlands W-1, W-2, and W-3 are moderately small, depressional PFO wetlands in the riparian forest along the Loosahatchie River near the northern boundary of the project area, west of Clear Creek. These wetlands are represented by Sample Plot 2. The dominant species within the tree and shrub strata is silver maple (*Acer saccharinum*, FAC). The herbaceous stratum within these wetlands is very sparsely vegetated without dominant plant species. Sweet wood-reed (*Cinna arundinacea*, FACW) is present in small amounts. Indicators of wetland hydrology present within these wetlands include standing water, water marks, drift deposits (in Wetland W-1), water stained leaves, sparsely vegetated concave surface, saturation visible on aerial imagery, and geomorphic position. The hydric soil indicators within these wetlands are depleted matrix and redox depressions.

Wetland W-19 is a moderately large wetland in the northeastern corner of the project area. This wetland contains PFO, PSS, and PEM vegetative communities represented by Sample Plots 16, 17, and 18, respectively. The dominant tree species within the PFO community is willow oak (*Quercus phellos*, FACW). American hornbeam (*Carpinus caroliniana*, FAC) is the dominant shrub species within this community. The dominant herbaceous species within this community include fowl manna grass (*Glyceria striata*, OBL) and Japanese honeysuckle (*Lonicera japonica*, FACU). The PSS community has a shrub stratum dominated by green ash saplings. Common fox sedge and shallow sedge (*Carex lurida*, OBL) are the dominant herbaceous species within this community. The PEM community is dominated by mild water-pepper and is similar to many of the other PEM wetlands within the agricultural fields. Hydrology indicators within this wetland include a high water table, soil saturation, water stained leaves, saturation visible on aerial imagery, geomorphic position, and the FAC-neutral test. The hydric soil indicator within this wetland is a depleted matrix.

Wetland W-21 is a PFO wetland that extends into the northeast portion of the project area. The community within this wetland is represented by Sample Plot 16 and is discussed in the description for Wetland W-19.

Wetlands W-22 and W-23 are both wetlands in the northeast portion of the project area that are composed of a PEM community within the agricultural field and a PFO community within the adjacent forest. The PFO community is represented by Sample Plot 20 and the PEM community is represented by Sample Plot 21. The dominant tree species within the PFO community is silver maple. The shrub stratum is dominated by American elm (*Ulmus americana*, FAC) and green ash. The dominant species within the herbaceous stratum is farewell-summer. The dominant species within the PEM community is soybean, with the crop showing visible signs of stress due to the hydrology. Wetland hydrology indicators within these wetlands include a high water table, water stained leaves, an algal mat or crust, drainage patterns, saturation visible on aerial imagery, and



the FAC-neutral test. The soils within these wetlands have a depleted matrix, an indicator of hydric soils.

Wetlands W-26 and W-28 are PFO wetlands within the riparian forest west of Clear Creek. A portion of Wetland W-28 extends into the agricultural field and has a PEM community very similar to the majority of the PEM wetlands within the agricultural field. Sample Plot 23 represents the PFO community within these wetlands. Silver maple and American elm are the dominant tree species within this community. The herbaceous stratum is dominated by white grass (*Leersia virginica*, FACW), small-spike false nettle (*Boehmeria cylindrica*, FACW), and green ash, though overall it is sparsely vegetated. Indicators of wetland hydrology within these wetlands include standing water, water stained leaves, sparsely vegetated concave surface, and geomorphic position. Hydric soil indicators within these wetlands include depleted matrix and redox depressions.

Wetland W-30 is a small depressional wetland along the edge of the agricultural field with a PEM community represented by Sample Plot 25. The dominant herbaceous species within this community is rough barnyard grass. The northern portion of this wetland extends into the forest, and the PFO community is dominated by silver maple. The indicators of wetland hydrology present within this wetland include surface water, a high water table, soil saturation, water stained leaves, crayfish burrows, saturation visible on aerial imagery, geomorphic position, and the FAC-neutral test. Soils within this wetland have a depleted matrix, and indicator of hydric soils.

Wetland W-49 is located in the southeastern corner of the project area and has PEM and PFO vegetative communities. The PEM community is similar to most of the other PEM communities within the onsite agricultural fields. The PFO community is represented by Sample Plot 31. The tree stratum within this wetland is dominated by silver maple, American sycamore, red maple, and American elm. Green ash and American elm are the dominant species within the shrub stratum. The herbaceous stratum is sparsely vegetated, with water oak (*Quercus nigra*, FAC) and black willow (*Salix nigra*, OBL) seedlings present. Surface water, a high water table, soil saturation, drainage patterns, and moss trim lines are all present, indicating wetland hydrology. The soils have a depleted matrix indicative of hydric soils.

Wetlands W-45 and W-50 are small wetlands along the edge of the agricultural field west of Clear Creek. Sandy outwash from the agricultural field is present around these wetlands, and this is visible from the aerial imagery. The western portion of Wetland W-45 is a PEM community with vegetation similar to the other PEM wetlands within the agricultural fields. The eastern portion of W-45 and all of W-50 are PSS communities represented by Sample Plot 34. The dominant shrub species within this community include river birch (*Betula nigra*, FACW) and eastern cottonwood. The dominant species within the herbaceous stratum are eastern cottonwood and an unknown plant within the Asteraceae family. Indicators of wetland hydrology include surface water, inundation visible on aerial imagery, water stained leaves, drainage patterns, and geomorphic position. The hydric soil indicator present within these wetlands is a depleted matrix.

4.3 STREAMS, RIVERS, AND WET WEATHER CONVEYANCE

Thirty-three (33) features were identified and delineated within the project area as streams, rivers, or wet weather conveyances (WWC). Thirty-one (31) of these features were assessed using the methods described in Section 2.2.3. Clear Creek Canal was not assessed due to a previous hydrologic determination upstream of the project area completed in 2011 (Determination ID 2841). The Loosahatchie River was not assessed due to high water levels; however, because of the size,



discharge, and onsite tributaries that assessed as perennial (i.e., Clear Creek and S-21), the Loosahatchie River is also assumed to be perennial. All on-site features were also assessed and assigned presumed jurisdiction under either TDEC or USACE. Based on the Clean Water Rule: Definition of "Water of the United States", thirteen (13) features are believed to waters of the United States and regulated under the Clean Water Act and therefore under USACE jurisdiction. Stream and wet weather conveyance assessment results are summarized in Table 4.3 and Table 4.4. Locations of these features are depicted in Figure 5 (Appendix A). Representative photographs are included in Appendix B, habitat data forms are provided in Appendix D, and Calculation of Normal Weather is included in Appendix E.

Feature		Photo*	Hydrologic Determination (TDEC)	Presumed Jurisdiction**	Average Bankfull Width (feet)	Length Within Project Area (linear feet)	Area within the Project Area (acres)
Clear Creek		224-226	NA	USACE	39.96	4,196	3.849
Loosahatchie River	a b	227-229	NA	USACE	118.67	245 684	0.224
S-1	a	97-100	Stream	USACE	3.75	383	0.033
S-2	D	101-106	WWC	TDEC	5.6	3,648	0.298
S-3		107-109	WWC	TDEC	1.9	106	0.005
S-4		110-116	WWC	USACE	2.4	271	0.015
S-5		117-119	WWC	TDEC	2.4	143	0.008
S-6		120-122	WWC	TDEC	2.6	58	0.003
S-7		123-126	WWC	TDEC	3.5	196	0.016
S-8		127-129	WWC	TDEC	2.4	88	0.005
S-9		130-133	WWC	TDEC	2.4	75	0.004
S-10		134-135	WWC	TDEC	1.25	32	0.001
S-11		136-138	WWC	TDEC	2.5	33	0.002
S-12		139-140	WWC	TDEC	3	56	0.004
S-13		141-143	WWC	TDEC	1.5	39	0.001

Table 4.3 Stream and Wet Weather Conveyance Determination and Presumed Jurisdiction Results within the Project Area


Feature	Photo*	Hydrologic Determination (TDEC)	Presumed Jurisdiction**	Average Bankfull Width (feet)	Length Within Project Area (linear feet)	Area within the Project Area (acres)
S-14	144-147	WWC	USACE	1.8	101	0.004
S-15	148-150	WWC	TDEC	1.5	82	0.003
S-16	151-153	WWC	TDEC	1.3	35	0.001
S-17	154-156	WWC	TDEC	3	52	0.004
S-18	157-158	WWC	TDEC	2	18	0.001
S-19	159-171	Stream	USACE	3.9	772	0.069
S-20	172-177	WWC	USACE	4.1	230	0.022
S-21	178-183	Stream	USACE	8	1,558	0.286
S-22	184-190	WWC	TDEC	5.7	199	0.026
S-23	191-193	WWC	USACE	2.9	53	0.004
S-24	194-197	WWC	TDEC	1.8	92	0.004
S-25	198	WWC	USACE	0.7	18	<0.001
S-26	199-202	WWC	TDEC	2.4	295	0.016
S-27	203-207	WWC	TDEC	8.9	183	0.037
S-28	208-209; 214	WWC	TDEC	3.2	152	0.011
S-29	210-213	WWC	USACE	1.7	51	0.002
S-30	215-219	WWC	TDEC	6	586	0.081
S-31	220-223	WWC	USACE	4.2	83	0.008
Т	18,374	5.894				

*photos are located in Appendix B ** jurisdiction must be verified by USACE and TDEC



Feature		Assesse	d Reach**				
		Upstream Extent (lat/long)	Downstream Extent (lat/long)	Extent (lat/long)		TDEC/NCDWQ Classification	
Clear Creek		NA	NA	NA	NA	NA	
Loosahatchie River	a b	NA	NA	NA	NA	NA	
S-1	a b	35.277256, -89.716571	35.278482, -89.716638	23.75	25.5	Stream/Intermittent	
S-2		35.277650, -89.719465	35.284513, -89.719306	17.5*	19	WWC/Ephemeral	
S-3		35.285325, -89.717235	35.285260, -89.716897	9.5	11	WWC/Ephemeral	
S-4		35.285057, -89.716114	35.285292, -89.716838	13	15.5	WWC/Ephemeral	
S-5		35.285587, -89.716337	35.285254, -89.716543	10.25	11.75	WWC/Ephemeral	
S-6		35.284495, -89.717043	35.284510, -89.716851	9.5	11	WWC/Ephemeral	
S-7		35.284457, -89.716196	35.284447, -89.716821	13.25	14.75	WWC/Ephemeral	
S-8		35.282856, -89.717080	35.282885, -89.716813	9	10.5	WWC/Ephemeral	
S-9		35.281885, -89.717014	35.281897, -89.716783	10.75	12.5	WWC/Ephemeral	
S-10		35.281287, -89.716854	35.281287, -89.716747	10.75	12.25	WWC/Ephemeral	
S-11		35.281308, -89.716648	35.281285, -89.716727	10.75	12.25	WWC/Ephemeral	
S-12		35.280668, -89.716912	35.280699, -89.716728	7.5	9	WWC/Ephemeral	
S-13		35.280589, -89.716598	35.280600, -89.716703	11.5	13	WWC/Ephemeral	
S-14		35.280219, -89.716388	35.280241, -89.716684	12	13.5	WWC/Ephemeral	
S-15		35.279268, -89.716942	35.279295, -89.716680	7.5	9	WWC/Ephemeral	
S-16		35.279146, -89.716567	35.279117, -89.716654	11	12.5	WWC/Ephemeral	
S-17		35.278609, -89.716473	35.278618, -89.716632	9	10.5	WWC/Ephemeral	
S-18		35.277938, -89.716487	35.277959, -89.716596	13	14.5	WWC/Ephemeral	
S-19		35.274701, -89.718959	35.275581, -89.720782	18*	19.5	Stream/Intermittent	

Table 4.4 Stream and Wet Weather Conveyance Assessment Results within the Project Area



	Assesse	d Reach**			TDEC/NCDWQ Classification	
Feature	Upstream Extent (lat/long)	Downstream Extent (lat/long)	TDEC HD Score	NCDWQ Score		
S-20	35.288668, -89.708645	35.288171, -89.708188	15	17.5	WWC/Ephemeral	
S-21	35.287042, -89.710498	35.286304, -89.711157	25	26.5*	Stream/Perennial	
S-22	35.286391, -89.710212	35.286724, -89.710654	12.25	13.75	WWC/Ephemeral	
S-23	35.287324, -89.707429	35.287201, -89.707270	6.25	8.75	WWC/Ephemeral	
S-24	35.286985, -89.707401	35.287236, -89.707359	4.5	6	WWC/Ephemeral	
S-25	35.285673, -89.707420	NA	Primary #2	6.5	WWC/Ephemeral	
S-26	35.280398, -89.711078	35.280408, -89.710125	10.25	11.75	WWC/Ephemeral	
S-27	35.280569, -89.709407	35.280459, -89.709845	10.5	12	WWC/Ephemeral	
S-28	35.278936, -89.710244	35.278881, -89.709836	9.75	11.25	WWC/Ephemeral	
S-29	35.279284, -89.707575	35.279228, -89.707421	13.75	15.25	WWC/Intermittent	
S-30	35.278767, -89.707467	35.278749, -89.709318	9.75	11.25	WWC/Ephemeral	
S-31	35.288197, -89.714127	35.288002, -89.714079	15.5	16.5	WWC/Intermittent	

* indicates assessors judgement overruled total score

**NA indicates not assessed

The Loosahatchie River, Clear Creek Canal, Stream S-1, and Stream S-2 are the larger streams within the project area. The Loosahatchie River is a channelized stream that flows from the northeast and along the northern portion of the project area. The Loosahatchie River is a tributary to the Mississippi River; the confluence is located northwest of Memphis.

Clear Creek Canal, also known as Cypress Creek, Stream S-1, and S-2 are tributaries to the Loosahatchie River. Clear Creak Canal, Stream S-1, and S-2 are channelized and generally flow south to north.

S-1 is an intermittent stream that originates south of the project area and flows north to the Loosahatchie River through the central portion of the project area. This stream has been severely altered and functions also as channelized drainage for the agricultural field. The stream accounts for 3,848 feet of waterway within the project area. Many of the other water features that were assessed flow into S-1. The substrate is composed primarily of sand and silt.

S-2 is an agricultural ditch/WWC that originates in the southwestern corner of the project area and flows north to the Loosahatchie River along the western edge of the project area. This feature is channelized, and the excavated castings are along the upland edges of the ditch. The feature



accounts for 3,648 feet of waterway within the project area. Pools are present within S-2 and become intermittent pools towards the Loosahatchie River. The substrate is composed primarily of sand and silt.

S-3 is an ephemeral/WWC that originates at the eastern edge of the western soybean field in the project area. This feature is a rill composed of approximately 106ft of linear channel. S-3 flows east into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of sand and silt.

S-4 is an ephemeral/WWC that originates at the western edge of the central soybean field in the project area. The feature is a rill composed of approximately 271ft of linear channel. S-4 flows west into S-1. The downstream portion of S-4 had a defined bed and bank. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of sand and silt.

S-5 is an ephemeral/WWC that originates at the western edge of the central soybean field in the project area. This feature is a rill composed of approximately 143ft of linear channel. S-5 flows southwest into S-4. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of sand and silt.

S-6 is an ephemeral/WWC that originates at the eastern edge of the western soybean field in the project area. This feature is a rill composed of approximately 58ft of linear channel. S-6 flows east into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of sand and silt.

S-7 is an ephemeral/WWC that originates at the western edge of the central soybean field in the project area. This feature is a rill composed of approximately 196ft of linear channel. S-7 flows west into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. Substrate is composed of clay and silt.

S-8 is an ephemeral/WWC that originates at the eastern edge of the western soybean field in the project area. This feature is a rill composed of approximately 88ft of linear channel. S-8 flows east into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of sand and silt.

S-9 is an ephemeral/WWC that originates at the eastern edge of the western soybean field in the project area. This feature is a rill composed of approximately 75ft of linear channel. S-9 flows east into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of sand and silt.

S-10 is an ephemeral/WWC that originates at the eastern edge of the western soybean field in the project area. This feature is a rill composed of approximately 32ft of linear channel. S-10 flows east into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of silt.

S-11 is an ephemeral/WWC that originates at the western edge of the central soybean field in the project area. This feature is a rill composed of approximately 33ft of linear channel. S-11 flows west into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of silt and sand.



S-12 is an ephemeral/WWC that originates at the eastern edge of the western soybean field in the project area. This feature is a rill composed of approximately 56ft of linear channel. S-12 flows east into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of silt and sand.

S-13 is an ephemeral/WWC that originates at the western edge of the central soybean field in the project area. This feature is a rill composed of approximately 39ft of linear channel. S-13 flows west into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of silt and sand.

S-14 is an ephemeral/WWC that originates at the western edge of the central soybean field in the project area. This feature is a rill composed of approximately 101ft of linear channel. The downstream portion of S-14 had a clearly defined bed and bank. S-14 flows west into S-1 and has a hydrologic connection with Wetland W-14. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of silt and sand.

S-15 is an ephemeral/WWC that originates at the eastern edge of the western soybean field in the project area. This feature is a rill composed of approximately 82ft of linear channel. S-15 flows east into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of silt and sand.

S-16 is an ephemeral/WWC that originates at the western edge of the central soybean field in the project area. This feature is a rill composed of approximately 35ft of linear channel. S-16 flows west into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of silt.

S-17 is an ephemeral/WWC that originates at the western edge of the central soybean field in the project area. This feature is a rill composed of approximately 52ft of linear channel. S-17 flows west into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of silt and sand.

S-18 is an ephemeral/WWC that originates at the western edge of the central soybean field in the project area. This feature is a rill composed of approximately 41ft of linear channel. S-18 flows west into S-1. The channel was observed to be dry <24hrs after a significant rain event that occurred prior to the field assessment. The substrate is composed primarily of silt and sand.

S-19 is an intermittent stream within the southwestern parcel located south of the railroad tracks. This stream originates offsite and generally flows northwestern within the project area. The riparian area of this stream is both in soybean field and forested sections. Offsite to the west, the stream pools due to drainage alterations in a neighboring field. S-19 is composed of approximately 772ft of linear channel. The substrate is composed primarily of silt and clay.

S-20 is an ephemeral/WWC that originates in a wetland within a soybean field in the northeastern portion of the project area. This feature flows in a southeastern direction into Stream S-21. Alterations to this feature indicate that it was originally constructed in order to drain a low laying area within the agricultural field. This area is wetland and identified as W-22. S-20 is approximately 230 linear feet of channel. The substrate is composed primarily of silt and sand.

S-21 is a perennial stream that flows from east of the project area and southwest through the northeastern portion of the project area. This waterway is 1,558 linear feet and flows into Clear



Creek. S-21 is connected to an offsite stream that flows along the eastern boundary of the project area. The substrate is composed of silt and hardpan.

S-22 is an ephemeral/WWC that originates in the northern end of the southeastern soybean field. This feature originates on the edge of the soybean field and flows northwesterly. The feature is 199 linear feet and drains into S-21. The substrate is composed of silt and sand.

S-23 is an ephemeral/WWC that originates at the edge of the eastern soybean field on the eastern edge of the project area. This rill feature is approximately 53 linear feet of channel and flows southeast to an offsite unnamed feature that flows along the western boundary of the project area. The downstream portion of S-23 has a clearly defined bed and bank. The substrate is composed primarily of silt and sand.

S-24 is an ephemeral/WWC that originates at the edge of the eastern soybean field on the eastern edge of the project area. This feature flows north into S-23. The rill feature is approximately 92 linear feet of channel. The substrate is composed primarily of silt and sand.

S-25 is an ephemeral/WWC that originates at the edge of the eastern soybean field on the eastern edge of the project area. This feature flows east to an offsite unnamed feature. The feature has a poorly defined bed and bank and is partially vegetated. This feature is approximately 18 linear feet. The substrate is composed primarily of silt and sand.

S-26 is an ephemeral/WWC that is located near the eastern edge of the central soybean field in the southern portion of the project area. S-26 is 295 linear feet in length and flows through soybean field, Wetland W-45, and a riparian forest of Clear Creek before draining into it. The substrate is composed of silt.

S-27 is an ephemeral/WWC that originates on the western edge of the western soybean field, located in the southeastern portion of the project area. This feature originates at the edge of the riparian forest of Clear Creek. This feature is 183 linear feet and flows west into Clear Creek. The substrate is composed primarily of silt and sand.

S-28 is an ephemeral/WWC that originates on the eastern edge of the central soybean field, located in the south-central portion of the project area. This feature flows through Wetland W-50 located on the edge of the riparian forest and into Clear Creek. This feature is 152 linear feet. The substrate is composed primarily of silt and sand.

S-29 is an intermittent stream that drains Wetland W-49 and is located in the southeastern portion of the project area. The stream becomes defined near the eastern edge of the wetland and flows east toward an offsite unnamed stream. Although the "Presence of baseflow" metric was not available due to recent rainfall (~36hrs prior to assessment), baseflow would have been present after 48hrs and beyond due to the amount of standing water in the PEM/PFO wetland. Due to the presence of prolonged baseflow, feature was determined to be intermittent. The substrate is composed primarily of silt and sand.

S-30 is an ephemeral/WWC that originates east of the project area. This feature flows west through a wooded area in the southeastern portion of the project area and is 696 linear feet. The substrate is composed primarily of silt.

S-31 is an intermittent/WWC that provides hydrologic connection between Wetland W-1 and Wetland W-3. The feature flows in a northern direction through the riparian forest along the



Loosahatchie River. S-31 is approximately 83 linear feet. The substrate is composed primarily of silt and sand.

4.4 PONDS AND LAKES

No open water aquatic resources were identified within the project area.



5.0 REGULATORY JURISDICTION

The streams, wetlands, wet weather conveyance, and deepwater habitats described in this document are under the jurisdiction of USACE and/or TDEC. Wetlands are regulated by Sections 401 and 404 of the Clean Water Act and state wetland laws, including the Aquatic Resource Alteration Permit (ARAP) program. No filling may occur in these areas without their written permission. Please contact the Memphis Environmental Field Office of TDEC at (901) 371-3000 or the Memphis District USACE at (901) 544-3682 before working in these areas.

The following information is excerpted and summarized from the 2007 U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook.

"In 2001, the ... U.S. Supreme Court's decision in the *Solid Waste Agency of Northern Cook County* (*SWANCC*) v. *Corps* held that isolated, intrastate, non-navigable waters could not be regulated under the CWA based solely on the presence of migratory birds. Following the SWANCC decision it generally was believed that a water body (including a wetland) was subject to CWA jurisdiction if the water body was part of the U.S. territorial seas, or a traditional navigable water, or any tributary to a traditional navigable water, or a wetland adjacent to any one of the above. In addition, isolated wetlands and other waters might be considered jurisdictional where they had the necessary link to either navigable waters or interstate commerce."

In the state of Tennessee, the Tennessee Water Quality Control Act of 1977 defines waters of the state in broad terms: "waters means any and all water, public or private, on or beneath the surface of the ground, that are contained within, flow through, or border upon Tennessee or any portion thereof, except those bodies of water confined to and retained within the limits of private property in single ownership that do not combine or effect a junction with natural surface or underground waters." Therefore, isolated wetlands not under the jurisdiction of USACE are still regulated by TDEC and require an ARAP.

"In 2006, the Supreme Court once again addressed the jurisdictional scope of Section 404 of the CWA, specifically the term "the waters of the U.S.," in *Rapanos v. U.S.* and in *Carabell v. U.S.* (hereafter referred to as Rapanos).

The decision provides two new analytical standards for determining whether water bodies that are not traditional navigable waters (TNWs), including wetlands adjacent to those non-TNWs, are subject to CWA jurisdiction: (1) if the water body is relatively permanent, or if the water body is a wetland that directly abuts (e.g., the wetland is not separated from the tributary by uplands, a berm, dike, or similar feature) a relatively permanent water body (RPW), or (2) if a water body, in combination with all wetlands adjacent to that water body, has a significant nexus with TNWs. CWA jurisdiction over TNWs and their adjacent wetlands was not in question in this case, and, therefore, was not affected by the Rapanos decision. In addition, at least five of the Justices in Rapanos agreed that CWA jurisdiction exists over all TNWs and over all wetlands adjacent to TNWs.

The Memo states that the [USACE and USEPA] will assert jurisdiction over the following categories of water bodies: TNWs; all wetlands adjacent to TNWs; non-navigable tributaries of TNWs that are relatively permanent (i.e., tributaries that typically flow year-round or have continuous flow at least seasonally); and wetlands that directly about such tributaries. In addition, the agencies will assert jurisdiction over every water body that is not an RPW if that water body is determined (on the basis of a fact-specific analysis) to have a significant nexus with a TNW. The classes of water body that are subject to CWA jurisdiction only if such a significant nexus is demonstrated are: non-navigable tributaries that do not typically flow year-round or have continuous flow at least seasonally; wetlands adjacent to such tributaries; and wetlands adjacent to but that do not directly about a relatively permanent, non-navigable



tributary. A significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or an insubstantial effect on the chemical, physical, and/or biological, integrity of a TNW. Principal considerations when evaluating significant nexus include the volume, duration, and frequency of the flow of water in the tributary and the proximity of the tributary to a TNW, plus the hydrologic, ecologic, and other functions performed by the tributary and all of its adjacent wetlands."

6.0 ASSUMPTIONS AND DISCLAIMERS

The constant influence of human activity on the project area can result in a rapid change of ecological boundaries. Over time, natural succession and changes in hydrology can also affect their boundaries. The precision of GPS collected data is subject to variation caused by canopy cover, atmospheric interference, and satellite configuration. Because slight inaccuracies are possible, all acreages and derived boundaries presented in this report are approximate.

The results and conclusions contained in this report apply to the year and date in which the data were collected. This report is not considered officially valid until it is approved by USACE. The report is then valid for a period of five years. Refer to the USACE Regulatory Guidance Letter # 94-1 (23 May 1994).



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Appendix A

Figures

































Basemap courtesy of Esri.



Basemap courtesy of Esri.









Appendix B

Photographs



Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 1. Sample Plot 1 representing a forest community within the project area.



Photo 2. Sample Plot 2 representing a palustrine forested (PFO) wetland community within Wetland W-1.



Photo 3. Sample Plot 3 representing a palustrine emergent (PEM) wetland community within Wetland W-7.



Photo 4. Sample Plot 4 representing an agricultural field community within the project area.



Photo 5. Sample Plot 5 representing an agricultural field community within the project area.



Photo 6. Sample Plot 6 representing a PEM wetland community within Wetland W-6.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 7. Sample Plot 7 representing a PEM wetland community within Wetland W-8.



Photo 8. Sample Plot 8 representing a PEM wetland community within Wetland W-9.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 9. Sample Plot 9 representing a forest community within the project area.



Photo 10. Sample Plot 10 representing an agricultural field community within the project area.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 11. Sample Plot 11 representing a PEM wetland community within Wetland W-13.



Photo 12. Sample Plot 12 representing a PEM wetland community within Wetland W-16.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 13. Sample Plot 13 representing an agricultural field community within the project area.



Photo 14. Sample Plot 14 representing a PEM wetland community within Wetland W-14.
Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 15. Sample Plot 15 representing a PEM wetland community within Wetland W-18.



Photo 16. Sample Plot 16 representing a PFO wetland community within Wetland W-19.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 17. Sample Plot 17 representing a palustrine scrub-shrub (PSS) wetland community within Wetland W-19.



Photo 18. Sample Plot 18 representing a PEM wetland community within Wetland W-19.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 19. Sample Plot 19 representing a forest community within the project area.



Photo 20. Sample Plot 20 representing a PFO wetland community within Wetland W-23.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 21. Sample Plot 21 representing a PEM wetland community within Wetland W-22.



Photo 22. Sample Plot 22 representing a forest community within the project area.



Photo 23. Sample Plot 23 representing a PFO wetland community within Wetland W-26.



Photo 24. Sample Plot 24 representing a forest community within the project area.



Photo 25. Sample Plot 25 representing a PEM wetland community within Wetland W-30.



Photo 26. Sample Plot 26 representing a PEM wetland community within Wetland W-33.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 27. Sample Plot 27 representing an agricultural field community within the project area.



Photo 28. Sample Plot 28 representing a PEM wetland community within Wetland W-41.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 29. Sample Plot 29 representing a PEM wetland community within Wetland W-38.



Photo 30. Sample Plot 30 representing a PEM wetland community within Wetland W-47.



Photo 31. Sample Plot 31 representing a PFO wetland community within Wetland W-49.



Photo 32. Sample Plot 32 representing a forest community within the project area.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 33. Sample Plot 33 representing a forest community within the project area.



Photo 34. Sample Plot 34 representing a PSS wetland community within Wetland W-45.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 35. Sample Plot 35 representing an agricultural field community within the project area.



Photo 36. Wetland W-1 (PFO) facing west.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 37. Wetland W-2 (PFO) facing east.



Photo 38. Wetland W-3 (PFO) facing west.



Photo 39. Wetland W-4 (PEM) facing west.



Photo 40. Wetland W-5 (PEM) facing south.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 41. Wetland W-6 (PEM) facing west.



Photo 42. Wetland W-7 (PEM) facing west.



Photo 43. Wetland W-8 (PEM) facing east.



Photo 44. Wetland W-9 (PEM) facing south.



Photo 45. Wetland W-10 (PEM) facing east.



Photo 46. Wetland W-11 (PEM) facing west.



Photo 47. Wetland W-12 (PEM) facing south.



Photo 48. Wetland W-13 (PEM) facing north.



Photo 49. Wetland W-14 (PEM) facing east.



Photo 50. Wetland W-15 (PEM) facing east.



Photo 51. Wetland W-16 (PEM) facing south.



Photo 52. Wetland W-17 (PEM) facing south.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 53. Wetland W-18 (PEM) facing east.



Photo 54. Wetland W-18 (PEM) facing west.



Photo 55. Wetland W-19 (PEM) facing north.



Photo 56. Wetland W-19 (PEM) facing east.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 57. Wetland W-19 (PFO) facing east.



Photo 58. Wetland W-19 (PFO) facing south.



Photo 59. Wetland W-19 (PSS) facing east.



Photo 60. Wetland W-20 (PEM) facing north.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 61. Wetland W-21 (PFO) facing north.



Photo 62. Wetland W-22 (PEM) facing west.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 63. Wetland W-23 (PEM) facing northeast.



Photo 64. Wetland W-23 (PFO) facing east.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 65. Wetland W-24 (PEM) facing north.



Photo 66. Wetland W-25 (PEM) facing south.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 67. Wetland W-26 (PFO) facing northeast.



Photo 68. Wetland W-27 (PEM) facing east.



Photo 69. Wetland W-28 (PFO) facing east.



Photo 70. Wetland W-29 (PEM) facing northeast.



Photo 71. Wetland W-30 (PEM) facing south.



Photo 72. Wetland W-30 (PFO) facing north.



Photo 73. Wetland W-31 (PEM) facing north.



Photo 74. Wetland W-32 (PEM) facing south.



Photo 75. Wetland W-33 (PEM) facing southeast.



Photo 76. Wetland W-34 (PEM) facing northeast.



Photo 77. Wetland W-35 (PEM) facing east.



Photo 78. Wetland W-36 (PEM) facing north.



Photo 79. Wetland W-37 (PEM) facing south.



Photo 80. Wetland W-38 (PEM) facing south.



Photo 81. Wetland W-39 (PEM) facing north.



Photo 82. Wetland W-40 (PEM) facing east.



Photo 83. Wetland W-41 (PEM) facing east.



Photo 84. Wetland W-42 (PEM) facing north.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 85. Wetland W-43 (PEM) facing west.



Photo 86. Wetland W-44 (PEM) facing south.
Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 87. Wetland W-45 (PEM) facing west.



Photo 88. Wetland W-45 (PSS) facing south.



Photo 89. Wetland W-46 (PEM) facing north.



Photo 90. Wetland W-47 (PEM) facing southeast.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 91. Wetland W-48 (PEM) facing south.



Photo 92. Wetland W-49 (PEM) facing south.



Photo 93. Wetland W-49 (PFO) facing north.



Photo 94. Wetland W-50 (PSS) facing east.



Photo 95. Wetland W-51 (PEM) facing east.



Photo 96. Wetland W-52 (PEM) facing north.



Photo 97. Shows S-1 vegetated riparian, bordering soy fields on each side. Manmade levee on the left descending bank (11/5/18)



Photo 98. S-1 from middle of assessed reach, facing upstream (11/5/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 99. Culverted crossing of S-1 with aquatic vegetation (11/5/18)



Photo 100. Shows S-1 downstream of the culvert, facing downstream (11/5/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 101. S-2, facing upstream, showing the upper end of the reach (11/5/18)



Photo 102. S-2, facing downstream, showing the upper end of the reach (11/5/18)



Photo 103. S-2 facing upstream show the incised channel (11/5/18)



Photo 104. Depicts the middle of the S-2 reach with aquatic vegetation, defined bed and banks (11/5/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 105. S-2 lower end of reach, shows decreased water in channel (11/5/18)



Photo 106. Shows S-2 becomes intermittent in lower reach (11/5/18)



Photo 107. Upper reach of S-3, shows lack of defined bed and bank before running into wood line (11/13/18)



Photo 108. S-3, showing channel becomes more defined within the wood line, but little evidence feature consistently moves water (11/13/18)



Photo 109. S-3, showing confluence with S-1. Presence of leaves still in channel after large rain events indicates hydraulic use is low (11/13/18)



Photo 110. Large headcut at top of feature S-4 (11/13/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 111. S-4 channel, facing downstream (11/13/18)



Photo 112. S-4 showing weak banks and small floodplain (11/13/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 113. S-4 lower reach, showing stronger bed and bank before confluence with S-5 (11/13/18)



Photo 114. S-4 with incoming S-5 feature (11/13/18)



Photo 115. Incised S-4 channel (11/13/18)



Photo 116. Confluence of S-4 with S1, facing downstream (11/13/18)



Photo 117. Upper reach of S-5, showing developing channel (11/13/18)



Photo 118. Defined bed and bank of S-5 (11/13/18)



Photo 119. S-5 lower reach, before confluence with S-4, facing downstream (11/13/18)



Photo 120. Depicts the channel of S-6, facing downstream (11/13/18)



Photo 121. Headcut at the top of feature S-6 (11/13/18)



Photo 122. S-6, showing upland vegetation dominates the lower reach's channel before confluence with S-1 (11/13/18)



Photo 123. Top of feature S-7 (11/13/18)



Photo 124. Formation of S-7 channel (11/13/18)



Photo 125. S-7 starting to incise through the soil profile (11/13/18)



Photo 126. Defined channel of S-7, facing downstream (11/13/18)



Photo 127. Depicts the channel of feature S-8, facing downstream (11/13/18)



Photo 128. Large headcut with standing water at the top of S-8 (11/13/18)



Photo 129. S-8, showing lower reach is dominated by upland vegetation. (11/13/18)



Photo 130. Shows entire S-9 feature with defined bed and bank (11/13/18)



Photo 131. Shows headcut at top of S-9 (11/13/18)



Photo 132. S-9, showing channel incision but upland plants present in channel (11/13/18)



Photo 133. Channel passing through riparian zone of feature S-1 before confluence (11/13/18)



Photo 134. Shows extremely short feature with incision of S-10 (11/13/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 135. Shows headcut into defined channel of feature S-10 (11/13/18)



Photo 136. Formation of S-11 off soy field, facing downstream (11/13/18)



Photo 137. S-11 channel, showing defined channel through incision and confluence with S-1 (11/13/18)



Photo 138. S-11 showing short defined channel as headcut developed off soy field (11/13/18)



Photo 139. S-12 upper reach with undefined banks and upland vegetation (11/13/18)



Photo 140. Shows poorly defined channel with encroaching upland vegetation of S-12 as the feature joins S-1 (11/13/18)



Photo 141. Formation of S-13 channel, facing downstream (11/13/18)



Photo 142. S-13 channel, facing downstream (11/13/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 143. S-13 confluence with S-1, showing vegetated channel (11/13/18)



Photo 144. Top of S-14 feature, showing channel formation facing downstream (11/13/18)



Photo 145. S-14 mid-reach, facing downstream (11/13/18)



Photo 146. Lower reach of S-14, showing large pool and headcut (11/13/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 147. S-14 confluence with S-1 (11/13/18)



Photo 148. Upper reach of S-15, shows poor channel definition and developed in-channel structure (11/13/18)



Photo 149. Middle of S-15 reach, shows overly wide channel with poor banks and bed (11/13/18)



Photo 150. Lower reach of S-15 shows elements of primary indicator #2 for WWC (11/13/18)



Photo 151. S-16 at top of feature, showing drainage off soy field (11/13/18)



Photo 152. Middle of S-16 reach, facing downstream (11/13/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 153. S-16 at confluence with S-1, facing downstream (11/13/18)



Photo 154. S-17 showing headcut at top of feature and water source from soy field (11/13/18)



Photo 155. S-17 from top of feature, facing downstream (11/13/18)



Photo 156. S-17 showing large pool, facing downstream (11/13/18)



Photo 157. S-18 from top of feature, facing downgradient (11/13/18)



Photo 158. S-18 showing headcut at top of feature (11/13/18)
Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 159. Top of assessment area for S-19, at culverted crossing. (11/14/18)



Photo 160. Feature S-19 coming out of wood line and into soy field, showing intermittent water in channel (11/14/18)



Photo 161. S-19 winding through soy field with intermittent water, additional drainage coming from offsite feature into S-19 (11/14/18)



Photo 162. Additional offsite feature draining into S-19 (11/14/18)



Photo 163. S-19, large pool in feature, upland grasses present in the channel (11/14/18)



Photo 164. S-19, showing sorting of substrates in channel (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 165. S-19, showing reach lacks defined bed and bank and dominated by upland vegetation (11/14/18)



Photo 166. Feature S-19 runs into wood line where bed and bank features become more defined (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 167. S-19, defined bed and bank with wetland plants in channel (11/14/18)



Photo 168. Wetland plants present in S-19 channel (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 169. More hydrophytic plants present in S-19 channel (11/14/18)



Photo 170. S-19, headcut present where channel is covered by a complex of roots, water present in channel again (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 171. Large pool present at lower end of reach, S-19 ends after bend (11/14/18)



Photo 172. Wetland provides source water for feature S-20, facing upstream (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 173. Start of drainage feature S-20, facing downstream (11/14/18)



Photo 174. Water present in S-20's channel ~36hrs after significant rain event (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 175. S-20, showing water level at bank full, facing downstream (11/14/18)



Photo 176. S-20 channel shows low sinuosity and wrack lines along channel margins (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 177. Increased gradient of S-20 as feature drains into Clear Creek (11/14/18)



Photo 178. Top of S-21 assessed reach, showing water flowing in channel (~36hrs after rain event) (11/14/18)



Photo 179. S-21, showing water level is at bankful nearly 48hrs after last rain event, indicating consistent discharge (11/14/18)



Photo 180. S-21, showing riffle pool complex with depositional feature (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 181. S-21, showing hydrologic diversity in feature (11/14/18)



Photo 182. Headcut causing incision through the profile as just upstream of confluence with Clear Creek (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 183. S-21, immediately upstream of the confluence with Clear Creek., facing downstream (11/14/18)



Photo 184. Head of feature S-22, showing large headcut at edge of the soy field (11/14/18)



Photo 185. S-22 entering wood line, facing downstream (11/14/18)



Photo 186. S-22, shows channel in wood line, facing downstream (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 187. S-22, Shows rooted vegetation within the channel (11/14/18)



Photo 188. S-22, showing strong bed and bank of relic channel and small active channel (11/14/18)



Photo 189. S-22, showing section has little sinuosity as it drains into Clear Canal Creek (11/14/18)



Photo 190. Feature S-22 dumps into Clear Canal Creek (11/14/18)



Photo 191. S-23, facing upstream, rills formed off soy field (11/6/18).



Photo 192. S-23, facing downstream, showing the receiving tributary backing up into the S-23 channel (11/6/18).



Photo 193. S-23, showing backed-up water in channel from receiving stream (11/6/18).



Photo 194. S-24 upper extent, facing downstream (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 195. Depicts a poorly defined S-24 channel with upland vegetation, facing downstream (11/14/18)



Photo 196. S-24 channel shows little sinuosity and is dry ~36hrs after significant rain event (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 197. S-24, showing water in lower reach due to flooding in the receiving feature (11/14/18)



Photo 198. S-25, qualifies for primary indicator #1, lacks defined bed and bank, dominated by upland veg. (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 199. Formation of S-26 feature in a wetland, facing downstream (11/14/18)



Photo 200. S-26 relic channel transition to wetland (11/14/18)



Photo 201. S-26, channel within relic channel, indicating change in drainage pattern (11/14/18)



Photo 202. S-26 dumping into Clear Creek (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 203. Head of feature S-27, starting on edge of field and draining into wood line (11/14/18)



Photo 204. Shows feature S-27'S channel is dominated with previous years leaf class (11/14/18)



Photo 205. S-27 channel shows little signs of hydrologic use, facing downstream (11/14/18)



Photo 206. S-27, section shows weak bank features (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 207. Feature S-27 prior to draining into Clear Creek (11/14/18)



Photo 208. S-28 originating in wetland (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 209. Shows S-28 has a wetland in relic channel (11/14/18)



Photo 210. Shows wetland that feature S-29 drains, facing upstream (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 211. Top of feature S-29, facing downstream (11/14/18)



Photo 212. S-29, small drainage feature, showing undefined banks and leaf litter in channel (11/14/18)



Photo 213. Feature S-29 draining into larger (off-site) feature (11/14/18)



Photo 214. Small S-28 channel within larger relic channel before confluence with Clear Creek (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 215. Upstream end of S-30 assessment area (11/14/18)



Photo 216. Showing swale of S-30, facing downstream (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 217. S-30 channel, showing previous year's leave within channel, indicating relic channel (11/14/18)



Photo 218. Shows low sinuosity of S-30 (11/14/18)



Photo 219. End of S-30 prior to confluence with Clear Creek (11/14/18)



Photo 220. Top of S-31, facing downstream from wetland (11/6/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 221. S-31, showing channel and drainage into wetland (11/6/18)



Photo 222. S-31 facing upstream towards wetland (11/6/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 223. S-31 showing pooled water, however <48hrs since last significant rain event (11/6/18)



Photo 224. Clear Creek facing south, upstream (11/5/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 225. Clear Creek facing north, downstream (11/5/18)



Photo 226. Clear Creek substrate (11/5/18)



Photo 227. Loosahatchie River facing east, upstream (11/5/18)



Photo 228. Loosahatchie River facing west, downstream (11/5/18)



Photo 229. Loosahatchie River substrate (11/5/18)



Photo 230. Typical potential roost tree (PRT) for endangered bat species within the project area.
Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 231. Typical PRT for endangered bat species within the project area.



Photo 232. Typical PRT for endangered bat species within the project area.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 233. Typical PRT for endangered bat species within the project area.



Photo 235. Typical PRT for endangered bat species within the project area.

Appendix C

Routine Wetland Determination Data Forms



WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Survey Survey K M H when Bur A	a bakelant I shall a man ultiland
Project/Site: <u>Sportestary Petitabula parte Site</u> City	County: Sampling Date:
Applicant/Owner: <u>FCS / TUOT</u>	' State: 10 Sampling Point: 21 1
Investigator(s): 13. Slaby, Envirascinci, Inc. Sec	tion, Township, Range:
Landform (hillslope, terrace, etc.): <u>terrace</u> Loca	al relief (concave, convex, none): Slope (%):
Subregion (LRR or MLRA): <u>LRR P134</u> Lat: <u>35.2</u>	<u> 78079</u> Long: <u>-89.713979</u> Datum: WG5 84
Soil Map Unit Name: Waverly silt learn, Oto 2% Slapes, occash	enelly fleeded, long dwellen NWI classification: U/A
Are climatic / hydrologic conditions on the site typical for this time of year?	Yes No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly distu	urbed? Are "Normal Circumstances" present? Yes No
Are Vegetation, Soil, or Hydrology naturally problem	natic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing sa	mpling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes X	
Hydric Soil Present? Yes No X	Is the Sampled Area
Wetland Hydrology Present? Yes No	within a Wetland? Yes No
Remarks:	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LF	RU) Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor	(C1) Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres	along Living Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Ir	on (C4) Crayfish Burrows (C8)
Drift Deposits (B3) Recent Iron Reduction i	n Tilled Soils (C6) Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remai	rks) Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Surface Water Present? Yes No Depth (inches):	
Water Table Present? Yes No Depth (inches):	——
Saturation Present? Yes No Depth (inches): (includes capillary fringe)	Wetland Hydrology Present? Yes No
Describe Recorded Data (stream gauge, monitoring well, aerial photos, pr	evious inspections), if available:
Demoke	
Remarks.	

VEGETATION (Four Strata) - Use scientific na	mes of pl	lants.		Sampling Point: <u>SP-1</u>
201	Absolute	Dominant	Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size: <u>20</u>). 1. Actr Saccherlant	<u>% Cover</u> SS	<u>Species?</u> Y	<u>Status</u> FA-C	Number of Dominant Species 5 (A)
2. Acer regimes	15	Ý	FAC	
3 Platanes occidentalis	15	Y	FACH	Total Number of Dominant
A ACIT AND MARA	16		FAC	(B)
- Alling analitan	10		FAC	Percent of Dominant Species
5. MPWS arthreada	<u> </u>	 	IIDI	That Are OBL, FACW, or FAC: (A/B)
6. QUARTINS GIT. VEINTING		<u></u>	010	Prevalence Index worksheet:
7	-		·	Total % Cover of: Multiply by:
8. <u> </u>		<u> </u>	<u> </u>	
		= Total Cov	/er	
50% of total cover: <u>57.</u>	<u>5</u> 20% of	total cover	: 25	FACW species x 2 =
Sapling/Shrub Stratum (Plot size:)	ana ang sana sa	n an an Anna Anna An Anna Anna Anna Anna	an an an an a' sao an	FAC species $x^3 = $
1. Ulmus americana	3	Y.	FAC	FACU species x 4 =
2 Lighterum Sig.	2	Y	NL	UPL species x 5 =
2 A cinco toilte	2	- V	263	Column Totals: (A) (B)
COLL'S LARUE ARGE	<u>-</u>		EACID	
- QUARTANE A DEAL	<u> </u>	<u> </u>	ITAC ITAC	Prevalence Index = B/A =
5. <u>Welling Alger</u>		<u></u>	TH	Hydrophytic Vegetation Indicators:
6				1 - Rapid Test for Hydrophytic Vegetation
7				2 - Dominance Test is >50%
8				3 - Prevalence Index is ≤3.0 ¹
15		= Total Cov	ver 1 av	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	<u>5</u> 20% of	total cover	: <u>1.8</u>	
Herb Stratum (Plot size: 5')				¹ Indicators of hydric coil and watland hydrology must
1 ENONYMUS FORTUNE!	80	Y	UPL	be present, unless disturbed or problematic.
2 Logitta japonica	10	N	FACU	Definitions of Four Vegetation Strata:
2 Supphynderichium la deri Florum	7	AL	FAC	
		A \	CAOIN	Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or
4. Critic aroundaces		<u> </u>	FAC W	height
5. SMITTLA TOTALAGETUTIL	<u> </u>	<u></u>	FACIN	
6. Jolidaya attissima / canavisis	1	<u> </u>	FACU	Sapling/Shrub – Woody plants, excluding vines, less
7. Viola CATA SOLOFIA	<u> </u>	<u></u>	FAC	than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8. Unk. dicot		N	NC	Herb – All herbaceous (non-woody) plants, regardless
9				of size, and woody plants less than 3.28 ft tall.
10				Weady vine All weady vince gracter than 2.29 ft in
11.				height.
12			11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	104	= Total Cov	/er	
50% of total cover 52		total cover	20.8	$p^{(1)} = p^{(1)} p^{(1)} p^{(2)} p^$
Weady Vine Stratum (Plat size: 301)	20 /0 01		•	
Voody vine Stratum (Flot size,)				
1				
Z				
3				
4		<u> </u>		
5				Hydrophytic
		= Total Cov	/er	Vegetation
50% of total cover:	20% of	total cover	:	Present? Yes <u>/ No</u>
Remarks: (If observed, list morphological adaptations belo	w).			
	,			

Sampling Point: <u>5P-1</u>

Profile Desc	cription: (Describe f	to the depth i	needed to document the indicator or confirm	n the absence of indicators.)
Depth (inches)	<u>Matrix</u>		Redox Features	Texture Remarks
D-l	INVR 4/3	100		Silev home
1-16	INTER UIU			ella lastan
1-10	1048 11-1	100		- Dirik Ional
	<u> </u>			
•				
¹ Tvpe: C=Co	oncentration, D=Depl	etion, RM=Re	educed Matrix. MS=Masked Sand Grains.	² Location: PL=Pore Lining, M=Matrix.
Hydric Soil	ndicators: (Applica	able to all LR	Rs, unless otherwise noted.)	Indicators for Problematic Hydric Soils ³ :
Histosol	(A1)	-	Polyvalue Below Surface (S8) (LRR S, T, L	J) 1 cm Muck (A9) (LRR O)
Histic Ep	pipedon (A2)	-	Thin Dark Surface (S9) (LRR S, T, U)	2 cm Muck (A10) (LRR S)
Black Hi	stic (A3)		Loamy Mucky Mineral (F1) (LRR O)	Reduced Vertic (F18) (outside MLRA 150A,B)
Hydroge Stratified	n Sulfide (A4)	-	Loamy Gleyed Matrix (F2)	Piedmont Floodplain Soils (F19) (LKK P, S, I)
Organic	Bodies (A6) (LRR P.	т. U)	Redox Dark Surface (F6)	(MLRA 153B)
5 cm Mu	cky Mineral (A7) (LR	R P, T, U)	Depleted Dark Surface (F7)	Red Parent Material (TF2)
Muck Pr	esence (A8) (LRR U)		Redox Depressions (F8)	Very Shallow Dark Surface (TF12)
1 cm Mu	ck (A9) (LRR P, T)	-	Marl (F10) (LRR U)	Other (Explain in Remarks)
Depleted	Below Dark Surface	e (A11)	Depleted Ochric (F11) (MLRA 151)	T) ³ Indicators of hydrophytic vegetation and
Coast Pr	airie Redox (A16) (M	LRA 150A)	Umbric Surface (F13) (LRR P. T. U)	wetland hydrology must be present.
Sandy M	lucky Mineral (S1) (L	RR O, S)	Delta Ochric (F17) (MLRA 151)	unless disturbed or problematic.
Sandy G	leyed Matrix (S4)	-	Reduced Vertic (F18) (MLRA 150A, 150B)	
Sandy R	edox (S5)	-	Piedmont Floodplain Soils (F19) (MLRA 14	19A)
Stripped	Matrix (S6)	- 	Anomalous Bright Loamy Soils (F20) (MLR	A 149A, 153C, 153D)
Restrictive L	aver (if observed):	, 1, 0)		
Tvoe:	,			
Depth (inc	hes):		_	Hvdric Soil Present? Yes No
Remarks:			_	

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Smakestack Mitigalian Bank Slye City/County: Lakelon	1 Shelby Sampling Date: 11/6/2018
Applicant/Owner: KES/TDOT	State: Sampling Point:
Investigator(s): B. Slaby, Envire Science, Inc. Section, Township, Range	9.
Landform (hillslope, terrace, etc.): Depression Local relief (concave, con	vex. none): Cancave Slope (%):
Subregion (LBR or MLRA): L R R P134 Lat: 35,288,221 Lor	-89,714323 Datum: WG584
Call Man Unit Nome. For Landa Silly Landas (FM)	
Son Map Onit Name. <u>For Party 2011 Today of CTTTT</u>	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes No	(If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly disturbed? Are "No	ormal Circumstances" present? Yes <u>X</u> No
Are Vegetation, Soil, or Hydrology naturally problematic? (If need	ed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing sampling point loc	ations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes No Is the Sampled Au Hydric Soil Present? Yes No within a Wetland? Wetland Hydrology Present? Yes No within a Wetland?	rea No
PFO PFO	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
🔀 Surface Water (A1) Aquatic Fauna (B13)	$\underline{\times}$ Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LRR U)	Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor (C1)	Moss Trim Lines (B16)
X Water Marks (B1) Oxidized Rhizospheres along Living Roots (C	3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Iron (C4)	Crayfish Burrows (C8)
A Drift Deposits (B3) Recent Iron Reduction in Tilled Soils (C6)	Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remarks)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)
	Sphagnum moss (D8) (LRR 1, U)
Field Observations:	
Mater Table Present? Yes No Depth (inches):	
Saturation Present? Ves No Depth (inches): Wata	
(includes capillary fringe)	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if	available:
Remarks:	

EGETATION (Four Strata) – Ose scientific f				
	Absolute	Dominant	Indicator	Dominance Test worksheet:
. ACET Sacherinum	<u>% Cover</u>	<u> </u>	FAC	Number of Dominant Species (A)
		<u></u>		Total Number of Dominant
·				Species Across All Strata: (B)
•				Percent of Dominant Species 100 (A/E
•		· · · · · · · · · · · · · · · · · · ·		Prevalence Index worksheet:
			······	Total % Cover of: Multiply by:
ан ал	$\frac{85}{5}$	= Total Cov	rer 17	OBL species X1 = FACW species X2 =
50% of total cover: <u>1(</u> apling/Shrub Stratum (Plot size: 15/)	20% of	total cover	· <u> </u>	FAC species x 3 =
Arer Sacharinnm	5	<u> Y </u>	FAC	FACU species x 4 =
· · · · · · · · · · · · · · · · · · ·	e da l'estre al l'estre	· .		UPL species $x 5 = $ (D)
الا من الا من الا من المراجع				
•				Prevalence Index = B/A =
•				1 - Rapid Test for Hydrophytic Vegetation
				\times 2 - Dominance Test is >50%
•				3 - Prevalence Index is ≤3.0 ¹
50% of total cover: 2	5 20% of	= Total Cov total cover	er	Problematic Hydrophytic Vegetation ¹ (Explain)
erb Stratum (Plot size: 5/)	10700		·	¹ Indicators of hydric soil and wetland hydrology must
Cinna armidiadea		N	FACW	be present, unless disturbed or problematic.
•			<u> </u>	Definitions of Four Vegetation Strata:
·			in the second se	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) of more in diameter at breast height (DBH), regardless of
•			<u>is</u> , <u>s</u> ,	height.
Alexandra and a second and as	· · · · · · · · ·			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, regardles
••••••••••••••••••••••••••••••••••••••	(of size, and woody plants less than 3.28 ft tall.
1				Woody vine – All woody vines greater than 3.28 ft in height.
2	<u> </u>			
	5 000	= Total Cov	rer	
Voody Vine Stratum (Plot size: 30/)	<u> </u>	total cover	<u></u>	
·				
		••••••		
-				
				Hudrophytic
• <u></u>		= Total Cov	rer	Vegetation
50% of total cover:	20% of	total cover		Present? Yes <u>^ No</u>
emarks: (If observed, list morphological adaptations be	elow).			

SO	L
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Sampling Point: <u>SP-2</u>

Profile Des	cription: (Describe i	to the dept	h needed to docum	ent the i	ndicato	r or confirm	the absence of indicators.)
Depth (inches)	Color (moist)	%	Color (moist)	Features %	s Type ¹	Loc ²	Texture Remarks
0-4	10 YR 5/3	90	IOYR 3/6	9	C	PLM	silty loarn distinct redex care,
			104R all	1	C	PL	distinct redox cant.
4-16	IDYR 5/2	75	5 YR 314	22	C	pL/M	silfy loom promenent redox care,
	,		2.54R 2.5/3	3 3	<u> </u>	PLIM	promining redax canc.
¹ Type: C=C	oncentration, D=Depl	etion, RM=I	Reduced Matrix, MS=	=Masked	Sand G	rains.	² Location: PL=Pore Lining, M=Matrix.
Hydric Soil	Indicators: (Applica	able to all L	RRs, unless otherw	vise note	ed.)		Indicators for Problematic Hydric Soils ³ :
Histosol	(A1)		Polyvalue Belo	w Surfac	ce (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O)
Black H	istic (A3)		Loamy Mucky	ace (S9) Mineral ((LKK S (F1) (LR	R (1, U)	2 cm Muck (A10) (LRR S) Reduced Vertic (E18) (outside MLRA 150A B)
Hvdroae	en Sulfide (A4)		Loamy Gleved	Matrix (I	F2)	(O)	Piedmont Floodplain Soils (F19) (LRR P. S. T)
Stratified	d Layers (A5)		Z Depleted Matri	x (F3)	,		Anomalous Bright Loamy Soils (F20)
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark Su	urface (F	6)		(MLRA 153B)
5 cm Mu	ıcky Mineral (A7) (LR	R P, T, U)	Depleted Dark	Surface	(F7)		Red Parent Material (TF2)
Muck Pr	esence (A8) (LRR U))	X Redox Depres	sions (F8	3)		Very Shallow Dark Surface (TF12)
1 cm Mu	ick (A9) (LRR P, T)		Marl (F10) (LR	RU)	<i></i>		Other (Explain in Remarks)
Deplete	d Below Dark Surface	e (A11)	Depleted Ochri	ic (F11) ((MLRA '	151) (IPD O D 1	
	ark Surface (A12) rairie Redov (A16) (M	I PA 150A)	Iron-Manganes	5e Masse	S (F12)		i) Indicators of hydrophytic vegetation and wetland bydrology must be present
Sandy M	lucky Mineral (S1) (L	RR O. S)	Delta Ochric (F	= (1°13) (1 = 17) (ML	ERR 151)	i, 0)	unless disturbed or problematic
Sandy G	Bleved Matrix (S4)		Reduced Vertic	c (F18) (I	MLRA 1	, 50A, 150B)	
Sandy R	edox (S5)		Piedmont Floor	dplain So	oils (F19) (MLRA 149	AA)
Stripped	Matrix (S6)		Anomalous Bri	ght Loan	ny Soils	(F20) (MLRA	A 149A, 153C, 153D)
Dark Su	rface (S7) (LRR P, S,	, T, U)	www.w				
Restrictive	Layer (If observed):						
Depth (in	shes):						
Remarks:							
Kendras.							

WETLAND	DETERMINATION	DATA	FORM -	 Atlantic and 	Gulf Coastal	Plain Region

Project/Site: <u>SmoKestack Mitigation Back Site</u> City/County Applicant/Owner: <u>RES / TDOT</u>	r: LaKeland / Shelby Sampling Date: 11/5/2018 State: TN Sampling Point: SP-3				
Investigator(s): B. Stary, EnviroScitnet, Inc. Section, To	wnship, Range:				
Landform (hillslope, terrace, etc.):	(concave, convex, none): <u>ContaUt</u> Slope (%):				
Subregion (LRR or MLRA): LRR P134 Lat: 35.28775	D Long: - 89,715329 Datum: UGS 84				
Soil Man Unit Name: Wayer al Silt loave Ord's share accessionable	Flecked Logdweller (WWW classification: N/A				
Are climatic / hydrologic conditions on the site typical for this time of year? Yes					
Are Vareatefier					
Are vegetation, Soli, or Hydrology significantly disturbed?	Are Normal Circumstances present? Yes <u>· · · </u> No				
Are vegetation, Soil, or Hydrology naturally problematic?	(If needed, explain any answers in Remarks.)				
SUMMARY OF FINDINGS – Attach site map showing samplin	g point locations, transects, important features, etc.				
Hydrophytic Vegetation Present? Yes No Is the set of the	ne Sampled Area nin a Wetland? Yes <u>X</u> No				
Remarks: PEM whin Ag Fillt					
HYDROLOGY					
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)				
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)				
X Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)				
High Water Table (A2) Marl Deposits (B15) (LRR U)	Drainage Patterns (B10)				
Saturation (A3) Hydrogen Sulfide Odor (C1)	Moss Trim Lines (B16)				
Water Marks (B1) Oxidized Rhizospheres along L Sediment Dependence of Reduced Irsm (C4)	Living Roots (C3) Dry-Season Water Lable (C2)				
Sealment Deposits (B2) Presence of Reduced from (C4) Craylish Burrows (Co)				
Drift Deposits (B3) Recent Iron Reduction in Tilled Soils (C6) Algal Mat or Cruct (B4) Thin Muck Surface (C7) Comparison (D2)					
Algar Mat of Clust (B4) Thin Muck Surface (C7) Ceonorphic Position (D2)					
Inundation Visible on Aerial Imagery (B7)	X FAC-Neutral Test (D5)				
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)				
Field Observations:					
Surface Water Present? Yes X No Depth (inches):					
Water Table Present? Yes X No Depth (inches): 0					
Saturation Present? Yes X No Depth (inches): //	Wetland Hydrology Present? Yes <u>X</u> No				
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous	inspections), if available:				
Pemerke					

ree Stratum (Plot size: 30)	Absolute Dominant Indicator <u>% Cover Species? Status</u>	Number of Dominant Species
• • • • • • • • • • • • • • • • • • •	···	Total Number of Dominant
		Percent of Dominant Species
		Prevalence Index worksheet:
<u> </u>	Constanting of the	Total % Cover of: Multiply by:
	= Total Cover	OBL species x 1 =
50% of total cover:	20% of total cover:	FACW species x 2 =
apling/Shrub Stratum (Plot size:15 ')	an a	FAC species x 3 =
		FACU species x 4 =
	te thurs the	UPL species x 5 =
	ne server ser	Column Totals: (A) (E
		Prevalence Index = B/A =
······		Hydrophytic Vegetation Indicators:
		K 1 - Rapid Test for Hydrophytic Vegetation
		2 - Dominance Test is >50%
		3 - Prevalence Index is ≤3.0 ¹
	= Total Cover	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of total cover:	·····································
rb Stratum (Plot size:)	95 Y FACH	¹ Indicators of hydric soil and wetland hydrology must
Reamon line E.E. Acris	2 N FACS	Definitions of Four Vagatation Strata:
Glucian max		Demittons of Four Vegetation Strata.
		Tree – Woody plants, excluding vines, 3 in. (7.6 cm) more in diameter at breast height (DBH), regardless
n na serie se serie de la constance. Light de la constance		Sapling/Shrub – Woody plants, excluding vines, les than 3 in. DBH and greater than 3.28 ft (1 m) tall.
gali a se Barta		Herb – All herbaceous (non-woody) plants, regardles of size, and woody plants less than 3.28 ft tall.
•		Woody vine - All woody vines greater than 3.28 ft in
•		height.
•	······	
	<u>99</u> = Total Cover	
50% of total cover: 49	5 20% of total cover: 19,8	
oody Vine Stratum (Plot size: 30')		
		Hydrophytic
	= Total Cover	Vegetation
50% of total cover:	20% of total cover:	Present? Yes <u>No</u>
emarks: (If observed, list morphological adaptations be		I
Received, ist morphological adaptations be	1 a fair and fair	1. base to all
ranunchius has separa torge	is a two mon troom -	we are but other wise looks lik
K. acris and lacks the bu	Ibous base of R. 6	nlborns
5 A	· • • • •	The second s

Depth Matrix Redox Features (inches) Color (moist) % Type! Loc" Texture Remarks (j13) 10 YR S/2 70 SYR<4//6 30 C PL/M Silty Lexn plantact hight cand (j16) 10 YR S/2 95 SYR<4//6 S (PL/M Silty Lexn plantact hight cand (j16) 10 YR S/2 95 SYR<4//6 S (PL/M Silty Lexn plantact hight cand (j16) 10 YR S/2 95 SYR<4//6 S (PL/M Clar Lexn (Lawn (<td< th=""><th>Profile Description: (Describe to the depth</th><th>needed to document the indicator or confirm the absence of indicators.)</th></td<>	Profile Description: (Describe to the depth	needed to document the indicator or confirm the absence of indicators.)
Internals 0 SQR (H)/6 0 PL/M Stilly learn pLobit (All and the second s	Depth <u>Matrix</u> (inches) Color (moist) %	<u>Redox Features</u>
I_3-16 IO YR S/2 95 SYR 4/6 S PG/M Clay (term Part Not C I_3-16 IO YR S/2 95 SYR 4/6 S PG/M Clay (term I_3-16 IO YR S/2 95 SYR 4/6 S PG/M Clay (term I_3-16 IO YR S/2 95 SYR 4/6 S PG/M Clay (term I_13-16 IO YR S/2 95 SYR 4/6 S Clay (term Indicators: PL=Pore Lining, M=Matrix. Hydrois Oil Indicators: (Applicable to all LRRs, unless otherwise noted.) Indicators for Problematic Hydric Soils*: Indicators for Problematic Hydric Soils*: Histos Dipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 em Muck (A10) (LRR S) Black Histic (A3) Loamy Gleyed Matrix (F2) Peledmont Floodpialn Soils (F10) (LRR P, S, T Stratified Layers (A5) X Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) Mokek Presence (A8) (LRR P, T) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (Mineral (S1) Umbric Surface (F11) (MLRA 151) Other (Explain in Remarks)	0-13 10 YR 5/2 70	SYR 4/6 30 C. PLIM Sitty loon Drahat NLY cont
Image: Section of the section of th	(1-16 INYR 5/7 95	SYR 416 5 (PUM Clay toom
"Type:: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ³ Location: PL=Pore Lining, M=Matrix. Hydric Soli Indicators: (Applicable to all LRRs, unless otherwise noted.) Indicators for Problematic Hydric Solis ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histosol (A2) Thin Dark Surface (S8) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outside MLRA 150A, E Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Solis (F19) (LRR P, S, T Stratified Layers (A5) Z Depleted Matrix (F3) Anomalous Bright Loamy Solis (F20) Organic Bodies (A6) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Mucky Mineral (A7) (LRR P, T, U) Depleted Ochric Surface (F7) Red Parent Material (TF2) Muck Y Gresence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 mm Muck (A9) (LRR P, T, U) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Depleted Below Dark Surface (A12) Iron-Manganese Masses (F12) (LRR O, P, T) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic. Sandy Micky Mineral (S1) (LRR O, S)<		
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.) Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histosol (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outside MLRA 150A, E Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T Stratified Layers (A5) Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 om Muck (A9) (LRR P, T) Mari (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Chric (F11) (MLRA 151) Other (Explain in Remarks) Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (LRR P, T, U) wetland hydrology must be present, unless disturbed or problematic. Sandy Gleyed Matrix (S4) Reduced Vertic (F13) (MLRA 150A, 150B) anomalous Bright Loamy Soils		
Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. *Location: PL=Pore Lining, M=Matrix. Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S9) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histosol (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outside MLRA 150A, E Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) alndicators of hydrophytic vegetation and Coast Prairie Redox (A16) (MLRA 150A) Umbric Surface (F3) (LRR P, T, U) wetland hydrology must be present, Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F13) (MLRA 150A, 150B) anomalous Bright Loamy S		
Histosol (A1) Polyvalue Below Surface (S3) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histosol (A1) Polyvalue Below Surface (S3) (LRR S, T, U) 2 cm Muck (A10) (LRR O) Histosol (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR P) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outside MLRA 150A, I Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks) Caset Prairie Redox (A16) (MLRA 150A) Umbric Surface (F13) (LRR P, T, U) wetland hydrology must be present, unless disturbed or problematic. Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 150A, 150B) sandy Redox (S5) Piedmont Floodplain Soils (F20) (MLRA 149A) Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A) Anomalous Bright Loamy Soil	Type: C=Concentration, D=Depletion, RM=R	duced Matrix, MS=Masked Sand Grains. ² Location: PL=Pore Lining, M=Matrix.
Depth (inches): Hydric Soil Present? Yes X No Remarks: No	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) Restrictive Layer (if observed): Type:	Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outside MLRA 150A, Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T) Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) Redox Dark Surface (F6) (MLRA 153B) Depleted Dark Surface (F7) Red Parent Material (TF2) Warl (F10) (LRR U) Other (Explain in Remarks) Depleted Ochric (F11) (MLRA 151) Iron-Manganese Masses (F12) (LRR O, P, T) Delta Ochric (F13) (LRR P, T, U) Wetland hydrology must be present, unless disturbed or problematic. Reduced Vertic (F18) (MLRA 150A, 150B) Piedmont Floodplain Soils (F20) (MLRA 149A) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)
	Depth (inches):	Hydric Soil Present? Yes <u>No</u> No

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: <u>Smalle shall Milightim Bark Site</u> City/County: <u>Lakeland Stelley</u> Sampling Date: <u>11/5/2018</u> Applicant/Owner: <u>RES / TDOT</u> State: <u>TN</u> Sampling Point: <u>SP-4</u> Investigator(s): <u>B. Slaby, Envitastinct, Tat.</u> Section, Township, Range: Landform (hillslope, terrace, etc.): <u>rolling Former Alcodoptata</u> Local relief (concave, convex, none): <u>Dane</u> Slope (%): Subregion (LRR or MLRA): <u>LRR - P134</u> Lat: <u>35-287563</u> Long: <u>-77-715175</u> Datum: <u>LGS74</u> Soil Map Unit Name: <u>Waverly sitt team, 0-27. slopes, occasionally Alcoded, Locadourdean (Wv)</u> NWI classification: <u>N/A</u> Are climatic / hydrologic conditions on the site typical for this time of year? Yes <u>No</u> (If no, explain in Remarks.) Are Vegetation <u>Soil</u> , or Hydrology <u>significantly disturbed?</u> Are "Normal Circumstances" present? Yes <u>X</u> No Are Vegetation <u>Soil</u> , or Hydrology <u>naturally problematic?</u> (If needed, explain any answers in Remarks.)					
SUMMARY OF FINDINGS – Attach site map showing sam	ipling point locations, transects, important features, etc.				
Hydrophytic Vegetation Present? Yes NoX Hydric Soil Present? Yes NoX Wetland Hydrology Present? Yes NoX	Is the Sampled Area within a Wetland? Yes No				
HYDROLOGY					
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)				
Primary Indicators (minimum of one is required: check all that apply)	Surface Soil Cracks (B6)				
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Venetated Concave Surface (B8)				
High Water Table (A2) Marl Deposits (B15) (LRF	Cui Operation of the second contract o				
Saturation (A3) Hvdrogen Sulfide Odor (C	C1) Moss Trim Lines (B16)				
Water Marks (B1) Oxidized Rhizospheres a	long Living Roots (C3) Dry-Season Water Table (C2)				
Sediment Deposits (B2) Presence of Reduced Iron	n (C4) Crayfish Burrows (C8)				
Drift Deposits (B3) Recent Iron Reduction in	Tilled Soils (C6) Saturation Visible on Aerial Imagery (C9)				
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Position (D2)				
Iron Deposits (B5) Other (Explain in Remarks) Shallow Aquitard (D3)					
Inundation Visible on Aerial Imagery (B7) FAC-Neutral Test (D5)					
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)				
Field Observations:					
Surface Water Present? Yes No Depth (inches):					
Water Table Present? Yes No Depth (inches):					
Saturation Present? Yes No Depth (inches): (includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photos, prev	Wetland Hydrology Present? Yes No X				
Remarks:					

201	Absolute	Dominant Indicator	Dominance Test worksheet:
<u>e Stratum</u> (Plot size: <u>)∨</u>)	<u>% Cover</u>	<u>Species?</u> <u>Status</u>	Number of Dominant Species Image: Are OBL, FACW, or FAC: Image: Are OBL, FACW, or
			Total Number of Dominant
		••••••••••••••••••••••••••••••••••••••	Percent of Dominant Species SD7. (A
	- <u></u>		Provalance Index worksheet:
		<i>i</i>	Total % Cover of Multiply by:
n Marine Santa Santa Ang kanang santa			OBI species x1 =
and the second		= Total Cover	FACW species x 2 =
50% of total cover:	20% of	total cover:	FAC species x 3 =
ling/Shrub Stratum (Plot size: 5)			FACU species x 4 =
ېر د د د			UPL species x 5 =
			Column Totals: (A)
			Prevalence Index = B/A =
			Hydrophytic Vegetation Indicators:
			1 - Rapid Test for Hydrophytic Vegetation
ануунун улуу — — — — — — — — — — — — — — — — —	• •••••••		2 - Dominance Test is >50%
		= Total Cover	$3 - Prevalence index is \le 3.0^{\circ}$
50% of total cover:		total cover:	Problematic Hydrophytic Vegetation (Explain)
Stratum (Plot size: 5)			1. at the second s
Glucine max	95	Y UPL	be present, unless disturbed or problematic.
Renmentus cof. acris	30	Y FACW	Definitions of Four Vegetation Strata:
Allium schoenoprishm	5	N FACU	
Pooceal Sp. (yound, sterile)	5	Norman NG	Tree – Woody plants, excluding vines, 3 in. (7.6 cm more in diameter at breast height (DBH) regardles
	• - j		height.
		· · · · · ·	Sapling/Shrub - Woody plants, excluding vines, le
and state of a state of the		<u> </u>	than 3 in. DBH and greater than 3.28 ft (1 m) tall.
an the second to be a state of the second			Herb – All herbaceous (non-woody) plants, regardl of size, and woody plants less than 3.28 ft tall.
	- <u></u>		Woody vine – All woody vines greater than 3.28 ft
	·		in ign.
	125	= Total Cover	
50% of total cover: 62 -	5 20% of	total cover: 25	
dy Vine Stratum (Plot size: 30)			
,,,			
			Hydrophytic
		= Total Cover	Vegetation
50% of total cover:	20% of	total cover:	Present? Yes No <u></u>
narks: (If observed, list morphological adaptations bel	 SW).		
Promon les Signinge			
Lannaholder accounts by			

Sampling Point: ______

Profile Des	cription: (Describe t	o the depth ne	eded to docu	ment the i	ndicator	or confirm	the absence of indi	cators.)	
(inches)	Color (moist)	%C	olor (moist)	%	Type1	Loc ²	Texture	Remarks	;
0-16	10 VR 4/4	100	, , ,				Silly Loope	actively	Ermad
									-101 - 10 (
			<u></u>				·····		
·	·				*****				
<u></u>									
¹ Type: C=C	oncentration D=Deple	etion RM=Redu	Iced Matrix M	– IS=Masked	Sand Gra	ains	² Location: PL=Pc	relinino M≕Ma	trix
Hydric Soil	Indicators: (Applica	ble to all LRRs	, unless othe	rwise note	ed.)		Indicators for Pro	blematic Hydri	c Soils ³ :
Histosol	(A1)		Polyvalue B	elow Surfa	ce (S8) /L	.RR S. T. U)	1 cm Muck (A	9) (LRR O)	
Histic E	pipedon (A2)		Thin Dark S	urface (S9)	(LRR S.	T. U)	2 cm Muck (A	10) (LRR S)	
Black H	istic (A3)		Loamy Much	v Mineral ((F1) (LRR	(O)	Reduced Vert	ic (F18) (outside	MLRA 150A.B)
Hydroge	en Sulfide (A4)		Loamy Gley	ed Matrix (F2)		Piedmont Flo	odplain Soils (F1	9) (LRR P, S, T)
Stratified	d Layers (A5)		Depleted Ma	atrix (F3)			Anomalous B	ight Loamy Soils	(F20)
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark	Surface (F	6)		(MLRA 153	B)	
5 cm Mu	icky Mineral (A7) (LR	R P, T, U)	Depleted Da	ark Surface	(F7)		Red Parent N	aterial (TF2)	
Muck Pr	esence (A8) (LRR U)		Redox Depr	essions (F8	3)		Very Shallow	Dark Surface (Tf	-12)
1 cm Mu	ick (A9) (LRR P, T)		Marl (F10) (I	LRR U)			Other (Explain	n in Remarks)	
Deplete	d Below Dark Surface	(A11)	Depleted Oc	chric (F11)	(MLRA 15	51)	2		
Thick Da	ark Surface (A12)		Iron-Mangar	nese Masse	es (F12) (I	LRR O, P, 1	T) °Indicators o	f hydrophytic veg	etation and
Coast P	rairie Redox (A16) (M	LRA 150A)	Umbric Surfa	ace (F13) (LRR P, T,	, U)	wetland hy	drology must be	present,
	lucky Mineral (S1) (LI	RR 0, S)	Delta Ochric	:(F1/)(ML 	RA 151)	04 4700	unless dist	urbed or problem	natic.
Sandy G	Bieyed Matrix (S4)		Reduced ve	ertic (F18) (I		UA, 150B)			
Sanuy P	Matrix (S6)			Douplain Si Bright Loop	OIIS (F19) av Saile (E	(WILKA 149 520) (MI PA	94) \ 4408 4530 4530)		
Dark Su	rface (S7) (IRR P. S.	т ну —	Anomalous		ity Solis (r	-20) (INLINA	(145A, 155C, 155D)		
Restrictive	Laver (if observed):	1, 0,				1			
Tyne'									4
Depth (in							Hudria Sail Draca	t2 Vac	
							Hyunc Son Fleser		
Remarks:									

Project/Site: Smokestack Mitigation Back Site City/County: Lakeland / Shelby sampling Date: Applicant/Owner: RES/TDOT Sampling Point: Investigator(s): B. Slaby, Enviro Science Inc. Section, Township, Range: Landform (hillslope, terrace, etc.): DIMA Farmer Flood Ald Local relief (concave, convex, none): ______ AQAC Slope (%): Subregion (LRR or MLRA): LRR P134 Lat: 35.287475 Long: -89.713662 ___ Datum: WGS 94 Soil Map Unit Name: Waverly still loom, 0-27. slopes, occasionally fledded, long duration (h)v) NWI classification: 11/A Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ 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 No Is the Sampled Area Yes _____ No __ Hydric Soil Present? Yes No X within a Wetland? Wetland Hydrology Present? Yes _____ No __ Remarks: Ag Field - Saybeans HYDROLOGY Wetland Hydrology Indicators: Secondary Indicators (minimum of two required) Primary Indicators (minimum of one is required; check all that apply) ____ Surface Soil Cracks (B6) ____ Surface Water (A1) ____ Sparsely Vegetated Concave Surface (B8) ____ Aquatic Fauna (B13) ____ High Water Table (A2) ____ Marl Deposits (B15) (LRR U) ____ Drainage Patterns (B10) ____ Saturation (A3) ____ Hydrogen Sulfide Odor (C1) ____ Moss Trim Lines (B16) ____ Water Marks (B1) ____ Oxidized Rhizospheres along Living Roots (C3) ____ Dry-Season Water Table (C2) ____ Sediment Deposits (B2) ____ Presence of Reduced Iron (C4) Crayfish Burrows (C8) Drift Deposits (B3) Recent Iron Reduction in Tilled Soils (C6) Saturation Visible on Aerial Imagery (C9) ____ Geomorphic Position (D2) ____ Algal Mat or Crust (B4) Thin Muck Surface (C7) Iron Deposits (B5) Other (Explain in Remarks) Shallow Aquitard (D3) ____ Inundation Visible on Aerial Imagery (B7) FAC-Neutral Test (D5) Water-Stained Leaves (B9) ____ Sphagnum moss (D8) (LRR T, U) Field Observations: Yes _____ No ____ Depth (inches): _ Surface Water Present? Water Table Present? Yes No X Depth (inches): X Depth (inches): _____ Wetland Hydrology Present? Yes _____ No ____ Yes No Saturation Present? (includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: Remarks

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

/EGETATION (Four Strata) – Use scientific r	names of plants.	· ·	Sampling Point:
Tree Stratum (Plot size: 30)	Absolute Dominant % Cover Species?	Indicator Status	Dominance Test worksheet:
1			Number of Dominant Species That Are OBL, FACW, or FAC: (A)
2			Total Number of Dominant
3		<u> </u>	Species Across All Strata:(B)
4	······		Percent of Dominant Species
5			That Are OBL, FACW, or FAC: (A/B)
7	· · ·		Prevalence Index worksheet:
8	···· · · · · · · · · · · · · · · · · ·		Total % Cover of: Multiply by:
	= Total Cov	er.	OBL species x 1 =
50% of total cover;	20% of total cover		FACW species x 2 =
Sapling/Shrub Stratum (Plot size: 15)		18 - P	FAC species x 3 = x 3 =
1			FACU species x 4 =
2.	·		UPL species x 5 =
3			Column Totals: (A) (B)
4			Prevalence Index = B/A =
5			Hydrophytic Vegetation Indicators:
6			1 - Rapid Test for Hydrophytic Vegetation
7			2 - Dominance Test is >50%
8			3 - Prevalence Index is ≤3.0 ¹
	= Total Cov	/er	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of total cover		and a statement of the
Herb Stratum (Plot size:)	80 Y	npl	¹ Indicators of hydric soil and wetland hydrology must
2 RAMAGALUS COF. ACRIS	- 25 4	FACW	Definitions of Four Vegetation Strata:
3 Allium Schemenceshim	10 N	FACI	
4. Poorgae Sp. (small, sterile)	<u>5</u> N	NL	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of
5			height.
6	and the second second		Sapling/Shrub – Woody plants, excluding vines, less
7.	· · · · · · · · · · · · · · · · · · ·		
9			Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
10			Woody vine - All woody vines greater than 3.28 ft in
11			height.
12	120		the state of the s
	$\frac{160}{160} = \text{Total Cov}$	^{rer} フレ	
50% of total cover:	20% of total cover		
VVoody Vine Stratum (Plot size: <u>JU</u>)			
2			
3			
4		······	
5.			Hydrophytic
	= Total Cov	/er	Vegetation
50% of total cover:	20% of total cover	:	Present? Yes No
Remarks: (If observed, list morphological adaptations b	elow).	· · · · · · · · ·	

Sampling Point: <u>SP-5</u>

Profile Desc	ription: (Describe t	o the depth r	eeded to docu	ment the i	ndicator o	or confirm	the absence of indi	cators.)	
Depth	Matrix		Red	ox Feature	s				
(inches)	Color (moist)		Color (moist)	%	Type ¹	Loc ²	Texture	Remarks	~ 1
0-16	104R 419						Silty loam	actively.	tarmed
							÷	1	
	2								
					<u> </u>				
					<u> </u>				
¹ Type: C=Co	oncentration, D=Deple	etion, RM=Re	duced Matrix, N	IS=Masked	i Sand Gra	ins.	² Location: PL=Po	re Lining, M=Matr	ix.
Hydric Soil I	ndicators: (Applica	ble to all LRF	Rs, unless othe	erwise note	ed.)		Indicators for Pro	blematic Hydric	Soils':
Histosol	(A1)	_	Polyvalue B	elow Surfa	ce (S8) (LF	RR S, T, U)	1 cm Muck (A	9) (LRR O)	
Histic Ep	ipedon (A2)		Thin Dark S	urface (S9)) (LRR S, 1	Γ, U)	2 cm Muck (A	10) (LRR S)	
Black Hi	stic (A3)	-	Loamy Muc	ky Mineral ((F1) (LRR	0)	Reduced Verti	ic (F18) (outside l	MLRA 150A,B)
Hydroge	n Sulfide (A4)	-	Loamy Gley	ed Matrix (F2)		Piedmont Floo	odplain Soils (F19)	(LRR P, S, T)
Stratified	Layers (A5)		Depleted M	atrix (F3)			Anomalous Br	ight Loamy Soils ((F20)
Organic	Bodies (A6) (LRR P,	T, U) _	_ Redox Dark	Surface (F	6)		(MLRA 153)	3) 	
5 cm Mu	cky Mineral (A7) (LRI	₹ P, T, U) _	Depleted Da	ark Surface	(F7) €		Red Parent M	aterial (TF2)	
MUCK Pr		-	_ Redox Depr		8)		Very Shallow	Dark Surface (1F1	2)
	CK (AY) (LKK P, I)	-	_ Mari (F10) (/MIDA 45	4)	Other (Explain	in Remarks)	
Thick Da	rk Surface (A12)	(ATT) _	Depieted Ot	анно (втт) раса Масси	(MLKA 13		³ Indicators of	hydrophytic yeae	tation and
Coast Pr	airie Redov (A16) (M	- RA 150A)	I on-Mangal	ace (F13) (IRRPT		wetland hv	drology must be n	resent
Sandy M	ucky Mineral (S1) (LF	R O. S)	Delta Ochric	: (F17) (ML	RA 151)	0,	unless dist	urbed or problems	itic
Sandy G	leved Matrix (S4)		Reduced Ve	ertic (F18) (MLRA 150	A. 150B)			
Sandy R	edox (S5)	_	Piedmont FI	oodplain S	oils (F19) (MLRA 149	A)		
Stripped	Matrix (S6)		 Anomalous	Bright Loan	ny Soils (F	20) (MLRA	149A, 153C, 153D)		
Dark Sur	face (S7) (LRR P, S,	T, U) –	_	•					
Restrictive L	ayer (if observed):								
Туре:			-						
Depth (inc	hes):						Hydric Soil Presen	t? Yes	No X
Remarks:			-			1			
rtomanto.									
	÷								
							ine i		

WETLAND DETERMINATION DATA FOR	M – Atlantic and Gulf Coastal Plain Region
WETLAND DETERMINATION DATA FORM Project/Site: SmoKestack Miligalian Bank Site City/C Applicant/Owner: RES/TDOT City/C Investigator(s): B. Slaby, Eavite Science, Fac. Sector Landform (hillslope, terrace, etc.): Depression Local Subregion (LRR or MLRA): LRR P 3 4 Lat: 35,24 Soil Map Unit Name: Waverry silt lears 0-27. slepts, occasionally flooder Are climatic / hydrologic conditions on the site typical for this time of year? Y Are Vegetation , Soil , or Hydrology naturally problema SUMMARY OF FINDINGS – Attach site map showing sam Hydrophytic Vegetation Present? Yes No Hydrophytic Soil Present? Yes No No No	M - Atlantic and Gulf Coastal Plain Region county: Lake and Stellby Sampling Date: 11/5/2018 State: TN Sampling Point: SP - 6 on, Township, Range:
Remarks: PEM Win Ag Field HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) X Surface Water (A1) X High Water Table (A2) Marl Deposits (B15) (LRF X Saturation (A3) Water Marks (B1)	Secondary Indicators (minimum of two required)
Water Marks (B1) Oxidized Rhizospheres a Sediment Deposits (B2) Presence of Reduced Iro Drift Deposits (B3) Recent Iron Reduction in Algal Mat or Crust (B4) Thin Muck Surface (C7) Iron Deposits (B5) Other (Explain in Remark Water-Stained Leaves (B9) Vater-Stained Leaves (B9)	Iong Living Roots (C3) Dry-Season Water Table (C2) n (C4) X Tilled Soils (C6) X Saturation Visible on Aerial Imagery (C9) X Geomorphic Position (D2) (cs) Shallow Aquitard (D3) FAC-Neutral Test (D5) Sphagnum moss (D8) (LRR T, U)
Field Observations: Yes X No Depth (inches): Surface Water Present? Yes X No Depth (inches): Water Table Present? Yes X No Depth (inches): Saturation Present? Yes X No Depth (inches): (includes capillary fringe) Describe Recorded Data (stream gauge. monitoring well, aerial photos, pre	5
Remarks:	

301	Absolute Dominant Indicator	Dominance lest worksheet:
<u>Stratum</u> (Plot size: <u>)</u> (Plot size: <u>)</u> (Plot size: <u>)</u>	<u> Cover Species?</u> Status	Number of Dominant Species
		Total Number of Dominant ((B)
en e		Percent of Dominant Species ////////////////////////////////////
		Prevalence Index worksheet:
	••••••••••••••••••••••••••••••••••••••	Total % Cover of: Multiply by:
		OBL species x 1 =
		FACW species x 2 =
		FAC species
ng/Shrub Stratum (Plot size: 1997)		FACU species x 4 =
ter taxe (18		UPL species x 5 =
and the second secon	26	Column Totals: (A) (B)
		Hydrophytic Vegetation Indicators:
		X 1 - Rapid Test for Hydrophytic Vegetation
		2 - Dominance Test is >50%
		3 - Prevalence Index is ≤3.0 ¹
	= Total Cover	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of total cover:	e providenci pre e pre e compositione e pre estato de la compositione de la composition de la composition de la
<u>Stratum</u> (Plot size:)	mo 1/ Selana	¹ Indicators of hydric soil and wetland hydrology must
Echinochlag muricage	SU Y FACW	be present, unless disturbed or problematic.
Knuchters cite acris	20 N FACW	Definitions of Four Vegetation Strata:
Glycine max UnK. app. dicat seeding (Lemiacene?)	No UPL	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
		Herb – All herbaceous (non-woody) plants, regardless
		Woody vine – All woody vines greater than 3.28 ft in beight
	102 = Total Cover	
50% of total cover: 51	20% of total cover: 20.4	$L^{(1)} = - \mathcal{D}_{\pi}^{(2)} \mathcal{D}_{\pi}^{(2)}$
dv Vine Stratum (Plot size: 30/		
(rior size)		
		Hydrophytic
	= Total Cover	Present? Yes No
50% of total cover:	20% of total cover:	
arks: (If observed, list morphological adaptations below	N).	

Profile Des	cription: (Describe t	o the depti	n needed to docum	nent the l	indicator	or confirm	the absence of i	ndicators.)	
Depth	Matrix		Redox	Feature	<u>s</u>				
(inches)	Color (moist)	<u>%</u>	Color (moist)	%	<u>Type'</u>		Texture	Remarks	
0-12	104K 5/2	_ 80	5 YK 31 5	15	<u> </u>	PL/M	Silly loons	prominent rede	x conc.
			SYR 314	5	С	PL/M	ŝ		
12-16	10YR 6/1	75	7.5 4R 4/6	5	(PLIM	Siller loop	DEOUNDARAY Ne	ox Sont
	1040 L1/2	20	1.2 11 10				2111 10094		INIC THE R. C.
	10 K 113						·		
					<u></u>				
	opcentration D-Deple	tion RM-E	Peduced Matrix MS	-Mackac		·	² Location: DL		triv
Hydric Soil	Indicators: (Applica	ble to all L	RRs. unless other	wise not	ed.)	21113.	Indicators for	Problematic Hydrid	Soils ³ :
Histosol	(Δ1)		Polyvalue Rel	ow Surfa	ce (S8) (I	RRSTIN	1 cm Muck	(A9) (I RR O)	Conc.
Histic Et	pipedon (A2)		Thin Dark Sur	face (S9)	(LRR S.	T. U)	2 cm Muck	(A10) (LRR S)	
Black H	stic (A3)		Loamy Mucky	Mineral	(F1) (LRR	O)	Reduced V	(ertic (F18) (outside	MLRA 150A,B)
Hydroge	n Sulfide (A4)		Loamy Gleyed	d Matrix (F2)	,	Piedmont I	loodplain Soils (F19) (LRR P, S, T)
Stratified	d Layers (A5)		🔀 Depleted Mati	rix (F3)			Anomalous	Bright Loamy Soils	(F20)
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark S	Surface (F	6)		(MLRA 1	53B)	
5 cm Mu	icky Mineral (A7) (LRI	R P, T, U)	Depleted Dark	k Surface	(F7)		Red Paren	t Material (TF2)	
Muck Pr	esence (A8) (LRR U)		Redox Depres	ssions (F	8)		Very Shall	ow Dark Surface (TF	12)
Depleter	ICK (A9) (LKK P, T) I Below Dark Surface	(411)	Depleted Och	κκ υ) ric (E11)	/MI DA 14	(d)	Other (Exp	iain in Remarks)	
Thick Da	ark Surface (A12)	(((())))	Iron-Mandane	ese Mass	(III C A 1 C	,, LRR O. P. 1	r) ³ Indicator	s of hydrophytic yea	etation and
Coast P	rairie Redox (A16) (M	LRA 150A)	Umbric Surfac	ce (F13) (LRR P, T	U)	wetland	hydrology must be	present.
Sandy N	lucky Mineral (S1) (LI	RR 0, S)	Delta Ochric (F17) (ML	RA 151)	,	unless o	listurbed or problem	atic.
Sandy G	eleyed Matrix (S4)		Reduced Vert	ic (F18) (MLRA 15	0A, 150B)			
Sandy R	edox (S5)		Piedmont Floor	odplain S	oils (F19)	(MLRA 149	IA)		
Stripped	Matrix (S6)		Anomalous Br	right Loar	ny Soils (I	=20) (MLRA	149A, 153C, 153	3D)	
Dark Su	rface (S7) (LRR P, S,	T, U)							
Restrictive	Layer (il observed):								
Type:	4								
	cnes):						Hydric Soli Pre	sent? Yes (No
Remarks:									
									1

WETLAND DETERMINATION DATA FORM	 Atlantic and Gulf Coastal Plain Region
Project/Site: <u>Smokesteck Mitladion Bark Side</u> City/Con Applicant/Owner: <u>RES / TDO T</u> Investigator(s): <u>B. Slaby</u> , <u>Enviro Science</u> , <u>The</u> , <u>Section</u> Landform (hillslope, terrace, etc.): <u>Depression</u> Local re Subregion (LRR or MLRA): <u>LRR P134</u> Lat: <u>35.287</u> Soil Map Unit Name: <u>Waverfy silt learn</u> 0-2% <u>slapes</u> , <u>accasionally floc</u> Are climatic / hydrologic conditions on the site typical for this time of year? Yes Are Vegetation, Soil, or Hydrology significantly disturbe Are Vegetation, Soil, or Hydrology naturally problemati SUMMARY OF FINDINGS - Attach site map showing samp	unty: La Keland / Shelby Sampling Date: $11/5/2018$ State: TN Sampling Point: SP-7 State: TN Sampling Point: SP-7 Joint Concave, convex, none): Concave Slope (%): Point Long: -89.715175 Datum: $UGS84$ addd, Land Grother (Wy) NWI classification: N/A s No (If no, explain in Remarks.) ed? Are "Normal Circumstances" present? Yes No c? (If needed, explain any answers in Remarks.) Point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes X No I Hydric Soil Present? Yes X No I Wetland Hydrology Present? Yes X No I Remarks: PEM U/IA Ag -Field	s the Sampled Area within a Wetland? Yes <u>K</u> No
HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one is required: check all that apply) X Surface Water (A1) Aquatic Fauna (B13) X High Water Table (A2) X Saturation (A3) Water Marks (B1) Oxidized Rhizospheres alor Drift Deposits (B2) Presence of Reduced Iron Reduction in Till Algal Mat or Crust (B4) Thin Muck Surface (C7) Iron Deposits (B5) Other (Explain in Remarks) Inundation Visible on Aerial Imagery (B7) X	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) (C4) Saturation Visible on Aerial Imagery (C9) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Sphagnum moss (D8) (LRR T, U)
X Water-Stained Leaves (B9) Field Observations: X Surface Water Present? Yes Water Table Present? Yes Yes X No Depth (inches): (includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photos, previo Remarks:	Wetland Hydrology Present? Yes No Duss inspections), if available:

•

201	Absolute	Dominant Indicator	Dominance Test worksheet:	,
ee Stratum (Plot size:)	% Cover	Species? Status	Number of Dominant Species That Are OBL, FACW, or FAC:	(A)
			Total Number of Dominant Species Across All Strata:	(B)
	· ·····		Percent of Dominant Species That Are OBL, FACW, or FAC:	100 (A/B)
	·		Prevalence Index worksheet:	
and the second	·	State of the South	Total % Cover of:	Multiply by:
		= Total Cover	OBL species X 1	=
50% of total cover:	20% of	total cover:	FACW species x 2	
pling/Shrub Stratum (Plot size: 15)		an a	FAC species x 3	······································
			FACU species x 4	ana ang ang ang ang ang ang ang ang ang
1		 	UPL species x 5	—
	1 a a a a a a a a a a a a a a a a a a a	· · · ·	Column Totals: (A)	(B)
			Prevalence Index = B/A = _	· · · · ·
	•		Hydrophytic Vegetation Indicate	irs:
			1 - Rapid Test for Hydrophytic	Vegetation
	•	·····	X 2 - Dominance Test is >50%	
			3 - Prevalence Index is ≤3.0 ¹	
50% of total cover:	20% of	= Total Cover	Problematic Hydrophytic Vege	station1 (Explain)
erb Stratum (Plot size:)	1 -	17 Same	¹ Indicators of hydric soil and wetla	nd hydrology must
Knunchins cit. acris	<u>_60</u>	Y FACW	be present, unless disturbed or pre-	oblematic.
Ammannia Coccinea	<u> </u>	N OBL	Definitions of Four Vegetation S	trata:
Paaceae Sp. (young, sterile)	<u> </u>	N. N.C.	Tree - Woody plants, excluding vi	nes. 3 in. (7.6 cm) or
Rorippa painstris	<u>- 1.138 (1993)</u>	<u>NOBL</u>	more in diameter at breast height	(DBH), regardless of
Carex sp. (Sterile)		N NL	height.	
	<u>n 1995</u>	10 - 2000 - 2000 - 2000 	Sapling/Shrub – Woody plants, e than 3 in. DBH and greater than 3	xcluding vines, less .28 ft (1 m) tall.
e deservição de compositor de la compositor En compositor de la composi			Herb – All herbaceous (non-wood of size, and woody plants less that	y) plants, regardless n 3.28 ft tall.
•			Woody vine – All woody vines gre	ater than 3.28 ft in
		and the second sec		
	66	= Total Cover		
50% of total cover:	3 20% of	total cover: 13.2		
oody Vine Stratum (Plot size: <u>50 * 50 * 50 *</u>)				
	. <u></u>			
	•			
		= Total Cover	Vegetation	
50% of total cover:		total cover:	Present? Yes	No
omerke: (If observed, list merchological adentations hal	20 70 0I		l	
	JW).			
Karmenins has separs folded like R. gorts and I are an	a few	1 mm From	Ale base, but otherwit	se looks
The second multiple and the	ANIAON)	rose of K	- Dulbosus.	

SOIL						Sampling Point:	SP7
Profile Description: (I	Describe to the dep	th needed to docun	nent the indic	ator or confirm	the absence of in	dicators.)	
Depth	Matrix	Redo	x Features				
(inches) Color ((moist) %	Color (moist)	<u>_%</u> _ <u>Ty</u>	pe ¹ Loc ²	<u>Texture</u>	Remarks	
0-16 10/K	5/2 50	SYR 3/4	20 (<u>PLM</u>	Silfy law	planninent redak	Cant.
					¥	•	
					······		
······							
·····			. <u> </u>				
•••**							
	n D-Depletion PM	-Deduced Matrix MS	-Macked San	d Grains	² Location: DL-	Pore Lining M-Matrix	
Hydric Soil Indicators	: (Applicable to all	LRRs, unless other	wise noted.)	u Grains.	Indicators for F	Pole Lining, M-Mainx. Problematic Hydric Soil	ls ³ .
Histosol (A1)	. (Applicable to all	Dolwalue Re	low Surface (S		1 cm Muck		
Histic Eninedon (A)	2)	Thin Dark Su	rface (S9) (I R	0) (LKK 0, 1, 0, R S. T. II)	2 cm Muck	(A3) (LRR C) (A10) (LRR S)	
Black Histic (A3)	-)	Loamy Mucky	Mineral (F1)		Reduced Ve	ertic (F18) (outside MLR	RA 150A.B)
Hydrogen Sulfide (/	A4)	Loamy Gleye	d Matrix (F2)	,	Piedmont F	loodplain Soils (F19) (LF	RR P, S, T)
Stratified Layers (A	.5)	X Depleted Mat	rix (F3)		Anomalous	Bright Loamy Soils (F20)
Organic Bodies (A6	6) (LRR P, T, U)	Redox Dark S	Surface (F6)		(MLRA 15	53B)	
5 cm Mucky Minera	al (A7) (LRR P, T, U)	Depleted Dar	k Surface (F7)		Red Parent	Material (TF2)	
Muck Presence (A8	B) (LRR U)	Redox Depre	ssions (F8)		Very Shallo	w Dark Surface (TF12)	
1 cm Muck (A9) (LI	RR P, T)	Marl (F10) (L	RRU)		Other (Expla	ain in Remarks)	
Depieted Below Da		Depleted Ocr	ITIC (FIII) (IVILE	(A 131) 12) (I BB O B 1	T) ³ Indicators	of hydrophytic vegetatic	n ond
Coast Prairie Redo	x (A16) (MI RA 150)	In on-Marigane Limbric Surfa	ce (F13) (I RR	P T II)	wetland	bydrology must be prese	ant and
Sandy Mucky Mine	ral (S1) (LRR O. S)	Delta Ochric	(F17) (MLRA 1	51)	unless di	sturbed or problematic.	ли,
Sandy Gleyed Matr	ix (S4)	Reduced Ver	tic (F18) (MLR.	A 150A, 150B)			
Sandy Redox (S5)		Piedmont Flo	odplain Soils (I	F19) (MLRA 149	DA)		
Stripped Matrix (S6)	Anomalous B	right Loamy So	oils (F20) (MLRA	A 149A, 153C, 153	D)	
Dark Surface (S7) (LRR P, S, T, U)						
Restrictive Layer (if of	oserved):						
Туре:						/	
Depth (inches):					Hydric Soil Pres	ent? Yes <u>X</u> N	o
Remarks:					· · · · · · ·		
х.							

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Principal Sundhatz K of the too Rock Sto	Strigeneral Kla & / Shally and Du 11/5/2019
Applicant/Ounce: RES / TNOT	City/County: <u>L2Rc12n 0 1 7700 14</u> Sampling Date:
Applicant/Owner: <u>FED 1 100 [</u>	State: Sampling Point:
Investigator(s): K. W2/12A	Section, Township, Range:
Landform (hillslope, terrace, etc.): <u>dep Veshion</u>	Local relief (concave, convex, none): <u>Lont2Ve</u> Slope (%): <u>I</u>
Subregion (LRR or MLRA): <u>LRP P134</u> Lat: _	35,286344 Long: 89, 118450 Datum: WGS8
Soil Map Unit Name: FM-F2/242 S.H lozm	NWI classification:າ ຜ
Are climatic / hydrologic conditions on the site typical for this tim	e of year? Yes No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology signif	icantly disturbed? Are "Normal Circumstances" present? Yes $_$ No $___$
Are Vegetation, Soil, or Hydrology nature	ally problematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map sho	wing sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes X No Hydric Soil Present? Yes X No Wetland Hydrology Present? Yes Yes No Remarks: PEM in AG Field	Is the Sampled Area
HYDROLOGY	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that a	apply) Surface Soil Cracks (86)
Surface Water (A1) Aquatic Faur	a (B13) Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposit	s (B15) (LRR U) Drainage Patterns (B10)
X Saturation (A3) Hydrogen Su	Ifide Odor (C1) Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhi	zospheres along Living Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of	Reduced Iron (C4) Crayfish Burrows (C8)
Drift Deposits (B3) Recent Iron F	Reduction in Tilled Soils (C6) X Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Si	urface (C7) <u>×</u> Geomorphic Position (D2)
Iron Deposits (B5) Other (Explai	in in Remarks) Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Surface Water Present? Yes No / Depth (in	1ches):
Saturation Present? Yes <u>↓</u> No <u></u> Depth (in (includes capillary fringe)	nches): <u>10"</u> Wetland Hydrology Present? Yes <u>No</u> No
Describe Recorded Data (stream gauge, monitoring well, aerial	photos, previous inspections), if available:
Remarks:	

rspy

Sampling Point: <u>SP-8</u>

VEGETATION (Four Strata) – Use scientific names of plants.

20	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size:)	% Cover	Species	<u>Status</u>	Number of Dominant Species
1				That Are OBL, FACW, or FAC: (A)
2				
2				Total Number of Dominant
		••••••		(B)
4			· ·····	Percent of Dominant Species
5		****		That Are OBL, FACW, or FAC: (A/B)
6			. <u></u>	
7				Prevalence Index worksheet:
8				Total % Cover of:Multiply by:
······································		- Total Ca		OBL species x 1 =
500/ -01-1-1-5				FACW species x 2 =
	20% 01	total cove	r;	FAC species x 3 =
Sapling/Shrub Stratum (Plot size:)				
1				
2			-	UPL species x 5 =
3				Column Totals: (A) (B)
4		<u></u>	• ••••••	
۳۰,			·	Prevalence Index = B/A =
٥	•••••			Hydrophytic Vegetation Indicators:
6		 	-	1 - Rapid Test for Hydrophytic Vegetation
7		R-110111-101-1	-	2 - Dominance Test is >50%
8			-	3 - Prevalence Index is ≤3.0 ¹
		= Total Co	ver	Droblematic Hydrophytic Vegetetion ¹ (Eveloin)
50% of total cover: 5	20% of	total cove	r.	
	2070 01		··	
Herb Stratum (Plot size:)	11	4	r # 1	¹ Indicators of hydric soil and wetland hydrology must
1. Lyperus BSLidentus			FAL	be present, unless disturbed or problematic.
2. Rannenless zers	20	1	FACW	Definitions of Four Vegetation Strata:
3. Glycing max	10	N	UPL	Trop Mondu plants evoluting vings 3 in (7.6 cm) or
4 Pha anat	5	N	FALV	more in diameter at breast beight (DBH) regardless of
5 Projecto solutois	10	N	hal	height.
S. FOINDD & DEWARDING	<u> </u>			
6.				Sapling/Shrub – Woody plants, excluding vines, less
7				than 3 in. DBH and greater than 3.28 ft (1 m) tail.
8				Herb – All herbaceous (non-woody) plants, regardless
9				of size, and woody plants less than 3.28 ft tall.
10				
11	AT 10 10 10 10 10 10 10 10 10 10 10 10 10			Woody vine – All woody vines greater than 3.28 ft in
			• •••••••••••••••	Height.
12.		****	-	
7	40	= Total Co	ver	
50% of total cover:ンク	20% of	total cove	r:	
Woody Vine Stratum (Plot size:)				
1				
L.				
3.				
4				
5				Hydrophytic
		= Total Co	ver	Vegetation _/
50% of total cover:	20% of	total cove	r:	Present? Yes <u>X</u> No
Demarka: //fahaanind list marshalasiaal adoptations hala				1
Remarks: (If observed, list morphological adaptations beio	W).			

Profile Des	cription: (Describe t	to the dept	h needed to docun	nent the i	indicator	or confirm	n the absence	of indicators.)
Depth	Matrix		Redo	<u>x Feature</u>	s			
(inches)	Color (moist)		Color (moist)		Type	_Loc ²	<u> </u>	Remarks
0-9	104R 53	30	104R 572	45	RW	<u> </u>	2,1+4 102~	
			7.SYR 516	15	C	PLAC		
			7.5412 4/4	10	C	PLIC		
9-20	7.542 Sh	7.0	54R 3/4	15	۹		Sandy	Managan
			- un uli			<u> </u>		- mageneze masses
		<u> </u>	1598 114			m	<u> </u>	-
	<u></u>							
¹ Type: C=C	oncentration, D=Deple	etion. RM=I	Reduced Matrix, MS	S=Masked	Sand Gr	ains	² Location	PI =Pore Lining M=Matrix
Hydric Soil	Indicators: (Applica	ble to all L	RRs, unless other	wise note	ed.)		Indicators	for Problematic Hydric Soils ³ :
Histosol	(A1)		Polyvalue Bel	low Surfa	ce (S8) /L	.RR S. T. L	J) 1 cm M	luck (A9) (LRB O)
Histic Ep	pipedon (A2)		Thin Dark Sur	rface (S9)	(LRR S,	T, U)	2 cm N	luck (A10) (LRR S)
Black Hi	stic (A3)		Loamy Mucky	/ Mineral ((F1) (LRR	(Ó)	Reduce	ed Vertic (F18) (outside MLRA 150A, B)
Hydroge	n Sulfide (A4)		Loamy Gleye	d Matrix (F2)		Piedmo	ont Floodplain Soils (F19) (LRR P, S, T)
Stratified	l Layers (A5)		🔆 Depleted Mat	rix (F3)			Anoma	lous Bright Loamy Soils (F20)
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark S	Surface (F	6)		(MLF	RA 153B)
5 cm Mu	cky Mineral (A7) (LR	R P, T, U)	Depleted Darl	k Surface	(F7)		Red Pa	arent Material (TF2)
Muck Pr			Redox Depres	SSIONS (F	3)		Very Si	hallow Dark Surface (TF12)
Depleter	t Relow Dark Surface	(Δ11)	Iviali (F IU) (LI	KK U) iric (E11) i	(MI DA 4)	54.)	Other (Explain in Remarks)
Thick Da	rk Surface (A12)	(711)	iron-Mangane	ese Masse	(MEINA 1.		T) ³ Indic	ators of hydrophytic vegetation and
Coast Pr	airie Redox (A16) (M	LRA 150A)	Umbric Surfac	ce (F13) (LRR P, T	. U)	weti	and hydrology must be present.
Sandy M	lucky Mineral (S1) (LF	RR 0, S)	Delta Ochric (F17) (ML	RA 151)		unle	ess disturbed or problematic.
Sandy G	leyed Matrix (S4)		Reduced Vert	ic (F18) (I	MLRA 15	0A, 150B)		·
Sandy R	edox (S5)		Piedmont Floo	odplain So	oils (F19)	(MLRA 14	9A)	
Stripped	Matrix (S6)		Anomalous Br	right Loan	ny Soils (I	=20) (MLR	A 149A, 153C,	153D)
Dark Sur	Tace (S/) (LKR P, S,	1, 0)					· · · · · · · · · · · · · · · · · · ·	
TITO	ayer (il observeu).							
Type:	۲							
Depth (Inc	nes):						Hydric Soil	Present? Yes <u> </u>
Remarks:								

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Pla	in Region
Project/Site: Smoke stack Miltgetten Bark Site City/County: Lakeland / Shelby state: TN state: TN	Sampling Date: <u>11/6/2017</u> Sampling Point: <u>SP-9</u>
Investigator(s): B. Slaby, Enviroscience, Inc. Section, Township, Range:	
Landform (hillslope, terrace, etc.): Leptersten Local relief (concave, convex, none):	Slope (%):
Subregion (LRR or MLRA): LRR P 134 Lat: 35,287/62 Long: -89,7/687	3 Datum:
Soil Map Unit Name: Falava Silt loam (Fm) NWI classifica	tion:/
Are climatic / hydrologic conditions on the site typical for this time of year? Yes K No (If no, explain in Re	marks.)
Are Vegetation . Soil or Hydrology significantly disturbed? Are "Normal Circumstances" pro	esent? Yes 🗙 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 No Is the Sampled Area Hydric Soil Present? Yes No within a Wetland? Yes Wetland Hydrology Present? Yes No Yes Yes	NoX
Remarks: Forest	
HYDROLOGY	
Wetland Hydrology Indicators: Secondary Indicators	ors (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	racks (B6)
Surface Water (A1) Aquatic Fauna (B13) Sparsely Vege	etated Concave Surface (B8)
High Water Fable (A2) Man Deposits (BF3) (LRK 0) Drainage Patter	enis (B16) es (B16)
Water Marks (B1) Oxidized Rhizospheres along Living Roots (C3) Dry-Season W	/ater Table (C2)
Sediment Deposits (B2) Presence of Reduced Iron (C4) Crayfish Burro	ws (C8)
Drift Deposits (B3) Recent Iron Reduction in Tilled Soils (C6) Saturation Visi	ble on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7) X Geomorphic P	osition (D2)
Iron Deposits (B5) Other (Explain in Remarks) Shallow Aquita	ard (D3)
Inundation Visible on Aerial Imagery (B7) FAC-Neutral T Schoopurm ma	est (D5)
Eield Observations:	
Surface Water Present? Yes X No Depth (inches): 51	
Water Table Present? Yes No X Depth (inches):	
Saturation Present? Yes No Depth (inches): Wetland Hydrology Present	? Yes X No
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Standing weder due to heavy rains the night before	

VEGETATION (Fou	' Strata) – L	lse scientific	names of plants.
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701	Absolute	Dominant	Indicator	Dominance Test worksheet:
ree <u>Stratum</u> (Plot size: <u></u>)	<u>% Cover</u>	Species?	Status	Number of Dominant Species 5
Acer Saccharinnm		<u> </u>	FAC	That Are OBL, FACW, or FAC: (A)
Acer negundo		<u> </u>	FAC	Total Number of Dominant
Betula nigra	25	<u> Y </u>	FACW	Species Across All Strata:
Ulmus andericana		N_	FAC	
				Percent of Dominant Species
				That Ale OBL, FACW, of FAC (All
				Prevalence Index worksheet:
				Total % Cover of:Multiply by:
<u></u>	00	- Tatal Ca		OBL species x 1 =
500/ -54-1-1 115				FACW species x 2 =
	20% of	total cover	<u> </u>	FAC species x 3 =
apling/Shrub Stratum (Plot size:)	10	Y		FACU species x 4 =
Aller regindo	()	<u> </u>	FAL	LIPI species x 5 =
ACT Sacharinny			FAC	
<u>Cellis laevigata</u>		<u></u>	FACW	
Fraxinus punsylvanica		<u></u>	FACW	Prevalence Index = B/A =
Lighstrum Sp.	<u> </u>	N	NL	Hydrophytic Vegetation Indicators:
J @				1 - Rapid Test for Hydrophytic Vegetation
				X 2 - Dominance Test is >50%
				2 - Dominance results >50%
		= Total Cov	/er	3 - Prevalence index is \$5.0
50% of total cover:	5 20% of	total cover	3.4	Problematic Hydrophytic Vegetation' (Explain)
	<u>10</u> 20% 01	total cover		earctive State of the tay of the second
erb Stratum (Plot size:)	25	V	EACL)	¹ Indicators of hydric soil and wetland hydrology must
Symphystrichum laaceolatum			TARIN	be present, unless disturbed or problematic.
Cinna ermillacea		<u> </u>	FACH	Definitions of Four Vegetation Strata:
Lonicera japonica	/	<u> </u>	FACU	Tree - Woody plants, excluding vines, 3 in, (7.6 cm)
Euonymus fortunei	<u> </u>	<u>,a N s s</u>	OPL	more in diameter at breast height (DBH), regardless of
a Arres		<u>. 1</u>	<u></u>	height.
all the states of the states o		$M_{\rm eff} = 10^{-1} M_{\rm eff}$		Sanling/Shrub - Woody plants, excluding vines, less
			- <u></u>	than 3 in. DBH and greater than 3.28 ft (1 m) tall.
		1.1		a suveration
$1 \sim 1^{-22} \delta \sim \delta \delta \delta \gamma^{3} \gamma \gamma^{3}$				Herb – All herbaceous (non-woody) plants, regardles
· · · · · · · · · · · · · · · · · · ·				
	·····			Woody vine - All woody vines greater than 3.28 ft in
1	·			height.
2	- 32			and the second
and was parter of the		= Total Cov	/er	
50% of total cover:	<u>)</u> 20% of	total cover	:	
loody Vine Stratum (Plot size: 30')	an an Ari			
Toxicodendron radicons	3	N	FAC	
	<u> </u>	<u> </u>		
				Hydrophytic
	نے کے	= Total Cov	/er	Vegetation Xes No
		total cover	: 0.6	
50% of total cover: 1.	<u>)</u> 20% of			
50% of total cover: <u>1</u> • emarks: (If observed, list morphological adaptations be	<u>)</u> 20% of slow).			
50% of total cover: <u>1</u> * emarks: (If observed, list morphological adaptations be	<u></u> 20% of →low).			
50% of total cover: <u>1.</u> emarks: (If observed, list morphological adaptations be	<u></u> 20% of ∋low).			
50% of total cover: <u>1</u> .	<u>ે </u> 20% of ∋low).			
50% of total cover: <u>1</u> . emarks: (If observed, list morphological adaptations be	<u>3</u> 20% of ∋low).			
50% of total cover: <u>1</u> . emarks: (If observed, list morphological adaptations be	<u>এ 20% of</u> ୬low).			
50% of total cover: <u>1</u> . emarks: (If observed, list morphological adaptations be	<u>এ 20% of</u> ३low).			

Sampling Point: SP - 9

Depth		Matrix			Redox	Features	s				-	
(inches)		<u>wanta</u>		<u>Color (m</u>	oist) 1010	<u>_%</u>			Texture	F	<u>∢emarl</u> ₄\	(<u>s</u>
0-1		RK 4/3	12	0.01	d.3/d	<u> </u>	<u>_</u>	rL/M	Silly loons.	Disfinct F	·Uck	CON(,
				IOYR	. 316	20	<u> </u>	PWM		Distinct re	Jek	canc,
7-14	<u> </u>	YR 414	90						Silly lan			
	10	VR 5/3	10						ĩ			
		tion D=Deple	tion RM=6	educed M	atriv MS				² Location	Pl =Pore Lining	1 M=N	atriv
ydric Soil	Indicato	rs: (Applical	ole to all Li	Rs, unle	ss other	wise note	ed.)		Indicators f	or Problemati	c Hyd	ric Soils ³ :
Histoso	l (A1)			Poly	value Bel	ow Surfac	ce (S8) (I	.RR S, T, U) 1 cm M	Jck (A9) (LRR	O)	
Histic E	pipedon ((A2)		Thin	Dark Sur	face (S9)	(LRR S,	T, U)	2 cm M	uck (A10) (LRF	r S)	
Black H	listic (A3)			Loam	ny Mucky	Mineral ((F1) (LR F	R O)	Reduce	d Vertic (F18) ((outsid	le MLRA 150A,
Hydrog	en Sulfide	e (A4)		Loan	ny Gleyed	d Matrix (I	F2)		Piedmo	nt Floodplain S	Soils (F	19) (LRR P, S, 1 Ila (520)
Stratifie	o Layers	(AD) AG) (I RR P .	r 11)	Depr	v Dark S	ix (ro) Jurface (F	6)		Anomai	OUS Bright Loai A 153B)	my So	IS (F20)
5 cm M	ucky Mine	eral (A7) (LRF	(P. T. U)	Deple	eted Dark	(Surface	(F7)		Red Pa	rent Material (T	F2)	
Muck P	resence (A8) (LRR U)	· · · · · · · · · ·	Redo	x Depres	ssions (F8	8)		Very Sh	allow Dark Sur	-, face ("	ΓF12)
1 cm M	uck (A9)	(LRR P, T)		Marl	(F10) (LF	RR U)			Other (E	Explain in Rem	arks)	·
_ Deplete	d Below I	Dark Surface	(A11)	Depl	eted Och	ric (F11)	(MLRA 1	51)	_			
Thick D	ark Surfa	ce (A12)		Iron-I	Mangane	se Masse	es (F12) (LRR O, P,	T) ³ Indica	tors of hydroph	nytic ve	getation and
Coast F	rairie Re	dox (A16) (MI	.RA 150A)	Umb	ric Surfac	ce (F13) (LRR P, 1	', U)	wetla	and hydrology r	must b	e present,
Sandy I	Muckv Mil	neral (S1) /I E	ROSI	Delta	Ochric (F17) (ML	.RA 151)		unle	ss disturbed or	proble	matic.
O a a b b b					السمار المسم	- (E40) (I	841 10 8 44	08 4000				
Sandy (Gleyed M	atrix (S4)		Redu	Iced Vert	ic (F18) (I		0A, 150B)	٥٨)			
Sandy (Sandy l Stripped	Gleyed M Redox (Si 1 Matrix (atrix (S4) 5) S6)		Redu Piedr	iced Vert mont Floo nalous Br	ic (F18) (i odplain So ight Loan	MLRA 15 oils (F19) ny Soils (ioa, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C,	153D)		
Sandy (Sandy I Stripped Dark Su	Gleyed M Redox (S d Matrix (Inface (S7	atrix (S4) 5) S6) /) (LRR P. S.	T, U)	Redu Piedr Anon	iced Vert mont Floo nalous Br	ic (F18) (l odplain So ight Loan	MLRA 13 oils (F19) ny Soils (60A, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C,	153D)		
Sandy (Sandy I Stripped Dark Su Restrictive	Gleyed M Redox (S d Matrix (Irface (S7 Layer (if	atrix (S4) 5) S6) 7) (LRR P, S, observed):	T, U)	Redu Piedr Anon	iced Vert mont Floo nalous Br	ic (F18) (I odplain So ight Loan	MLRA 13 oils (F19) ny Soils (60A, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C,	153D)		
Sandy (Sandy f Stripped Dark Su Restrictive Type:	Gleyed M Redox (S d Matrix (Irface (S7 Layer (if	atrix (S4) 5) S6) 7) (LRR P, S, observed):	т, U)	Redu Piedr Anon	iced Vert mont Floo nalous Br	ic (F18) (I odplain So right Loan	MLRA 15 oils (F19) ny Soils (0A, 150B) (MLRA 14 F20) (MLR.	9A) A 149A, 153C,	153D)		
Sandy (Sandy I Stripped Dark Su estrictive Type: Depth (in	Gleyed M Redox (S Matrix (Inface (S7 Layer (if	atrix (S4) 5) S6) 7) (LRR P, S, observed):	T, U)	Redu Piedr Anon	uced Vert mont Floo nalous Br	ic (F18) (I odplain Se ight Loan	MLRA 15 oils (F19) ny Soils (60A, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F	153D) Present? Ye	s	No
Sandy (Sandy f Dark Su testrictive Type: Depth (in :emarks:	Gleyed M Redox (Si Matrix (Inface (S7 Layer (if ches):	atrix (S4) 5) S6) 7) (LRR P, S, observed):	T, U)	Redu Piedr Anon	iced Vert mont Floo nalous Br	ic (F18) (I odplain So ight Loan	MLRA 15 oils (F19) ny Soils (60A, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F	153D) Present? Ye	s	No
Sandy (Sandy f Stripped Dark Su estrictive Type: Depth (in emarks:	Gleyed M Redox (S Matrix (Inface (S7 Layer (if	atrix (S4) 5) S6) 7) (LRR P, S, observed):	T, U)	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 15 oils (F19) ny Soils (00, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F	153D) Present? Ye	s	NoX
Sandy (Sandy Stripper Dark Su estrictive Type: Depth (in emarks:	Sleyed M Redox (Si d Matrix (urface (S7 Layer (if cches): 50(atrix (S4) 5) S6) ') (LRR P, S, observed):	τ, υ) 	Redu Piedr Anon	iced Vert mont Floo nalous Br	ic (F18) (I odplain So right Loan	MLRA 15 oils (F19) ny Soils (60A, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F	153D) Present? Ye	s	<u> </u>
Sandy (Sandy f Dark Su estrictive Type: Depth (in emarks:	Seleved M Redox (S: d Matrix () inface (S7 Layer (If cches): $\int o(($	pittari (S4) 5) S6) () (LRR P, S, observed):	τ, υ) Jul	Redu Piedr Anon 	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 1: oils (F19) ny Soils (00, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	s	<u> </u>
Sandy (Sandy f Dark Su Destrictive Type: Depth (in emarks:	Gleyed M Redox (S: d Matrix () Inface (S7 Layer (If ches): 5 o`((atrix (S4) 5) S6) () (LRR P, S, observed): ρ(Υ	τ, υ) Jul soil	Redu Piedr Anon 	iced Vert mont Floc nalous Br	ic (F18) (I odplain So right Loan	MLRA 1: oils (F19) ny Soils (60A, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Sfandh	153D) Present? Ye	s	<u> </u>
Sandy (Sandy I Stripper Dark Su estrictive Type: Depth (in emarks:	Gleyed M Redox (S: d Matrix (- urface (S7 Layer (if cches): 50 ((atrix (S4) 5) S6) (LRR P, S, observed): ρ(Ψ	τ, υ) Jul soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So right Loan	MLRA 13 oils (F19) ny Soils (Pat Fal	90, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stand M	153D) Present? Ye	s	<u> </u>
Sandy (Sandy I Stripped Dark St estrictive Type: Depth (in emarks:	Gleyed M Redox (S: d Matrix (- urface (S7 Layer (If 	p[++	τ, υ) Jul soil	Redu Piedr Anon 	iced Vert mont Floc nalous Br	ic (F18) (I odplain Sc right Loan	MLRA 1: oils (F19) ny Soils (Par Fau	150B) (MLRA 14 F20) (MLR 4 of	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	s	No X
Sandy (Sandy I Stripped Dark St estrictive Type: Depth (in emarks:	Gleyed M Redox (S: d Matrix (- urface (S7 Layer (if cches): 5 0 ((atrix (S4) 5) S6) 7) (LRR P, S, observed):	τ, υ) Jul Soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 1: oils (F19) ny Soils (Par Fa L	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stand M	153D) Present? Ye	s	no_X
Sandy (Sandy I Stripped Dark Su estrictive Type: Depth (in emarks:	Gleyed M Redox (S: d Matrix (- irrface (S7 Layer (if cches): 5 o`((atrix (S4) 5) S6) (LRR P, S, observed): ρ[τ λγβτίς	τ, υ) Jul Soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 1: oils (F19) ny Soils (fat	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	s	No_X
Sandy (Sandy I Stripped Dark Su estrictive Type: Depth (in emarks:	Gleyed M Redox (S: J Matrix (- Inface (S7 Layer (if cches):	pitt by frie	τ, υ) Jul Soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 1: oils (F19) ny Soils (Par Fac	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Standla	153D) Present? Ye	S	No_X
Sandy (Sandy Stripped Dark Su estrictive Type: Depth (in emarks:	Seleyed M Redox (S: d Matrix () Inface (S7 Layer (If ches): 50`((plur (S4) (S6) () (LRR P, S, observed): plur hybric	τ, υ) Jul soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So right Loan	MLRA 1: oils (F19) ny Soils (Par Fac	00, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	s	<u> </u>
Sandy (Sandy I Stripped Dark Su estrictive Type: Depth (in emarks:	Gleyed M Redox (S: d Matrix (- urface (S7 Layer (if cches): 50 ((atrix (S4) 5) S6) () (LRR P, S, observed):	τ, υ) Jul soil	Redu Piedr Anon 	iced Vert mont Floc nalous Br	ic (F18) (I odplain So right Loan	MLRA 1: oils (F19) ny Soils (Par Fac	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	s	<u> </u>
Sandy (Sandy k Stripped Dark Su estrictive Type: Depth (in emarks:	Seleyed M Redox (S: d Matrix (- urface (S7 Layer (If 	atrix (S4) 5) S6) () (LRR P, S, observed): ρ(τ hγθric	τ, υ) Jul soil	Redu Piedr Anon 	iced Vert mont Floc nalous Br	ic (F18) (I odplain So right Loan	MLRA 1: oils (F19) ny Soils (fat	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stand M	153D) Present? Ye	S	<u> </u>
Sandy (Sandy f Stripped Dark Su estrictive Type: Depth (in emarks:	Gleyed M Redox (S: d Matrix (- irface (S7 Layer (if 	atrix (S4) 5) S6) () (LRR P, S, observed):	τ, υ) Jul soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So right Loan	MLRA 13 oils (F19) ny Soils (Pat	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stand M	153D) Present? Ye	s	<u> </u>
Sandy (Sandy Stripped Dark Su Type: Depth (in demarks:	Gleyed M Redox (S: d Matrix (- irface (S7 Layer (if 	pitt bis so biserved): pitt hydric	τ, υ) Jul soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 1: oils (F19) ny Soils (fat	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	s	<u> No X</u> Duddle
Sandy (Sandy Stripped Dark Su restrictive Type: Depth (in remarks:	Gleyed M Redox (S: d Matrix (- irface (S7 Layer (if cches): 5 o`({	pitt bis pitt bis pitt bis pitt by brit	τ, υ) Jul soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 1: oils (F19) ny Soils (fat	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	S	<u> No X</u> Smddle
Sandy (Sandy Stripped Dark Su Restrictive Type: Depth (in Remarks:	Gleyed M Redox (S: d Matrix (- irrface (S7 Layer (iff cches):	pitt hydric	τ, υ) Jul Soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 1: oils (F19) ny Soils (fac	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Standla	153D) Present? Ye	S	No X
Sandy (Sandy Stripped Dark St Restrictive Type: Depth (in Remarks:	Gleyed M Redox (S: d Matrix (- irrface (S7 Layer (if cches):	pitt by frie	τ, υ) Jul Soil	Redu Piedr Anon	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 1: oils (F19) ny Soils (Par Fac	00, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	S	<u>No</u>
Sandy (Sandy I Stripped Dark Su Restrictive Type: Depth (in Remarks:	Gleyed M Redox (S: d Matrix (- rrface (S7 Layer (if cches):	pit (LRR P, S, observed):	τ, υ) Jul Soil	Redu Piedr Anon 	iced Vert mont Floc nalous Br	ic (F18) (I odplain So ight Loan	MLRA 1: oils (F19) ny Soils (Par Fac	00, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	s	No X
Sandy (Sandy I Stripped Dark Su Restrictive Type: Depth (in remarks:	Gleyed M Redox (S: J Matrix (- Inface (S7 Layer (if cches):	p(4 hydric p(4 hydric	τ, υ) Jul soil	Redu Piedr Anon 	iced Vert mont Floc nalous Br	ic (F18) (I odplain So right Loan	MLRA 1: oils (F19) ny Soils (Par Fac	00, 150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	s	<u> </u>
Sandy (Sandy Stripped Dark Su estrictive Type: Depth (in emarks:	Gleyed M Redox (S: J Matrix (- Inface (S7 Layer (if cches): 5 o`((p(+ hydric hydric	τ, υ) 	Redu Piedr Anon 	iced Vert mont Floc nalous Br	ic (F18) (I odplain So right Loan	MLRA 1: oils (F19) ny Soils (Par Fac	150B) (MLRA 14 F20) (MLR	9A) A 149A, 153C, Hydric Soil F Stadh	153D) Present? Ye	s	<u> </u>

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Siles Son Winto / Mitrating	Row Cite one	and lake	151.11. 2010 21 11/5/2010
Project/Site:	<u>O'ente site</u> City/C	Jounty: <u>FEREION ON</u>	
Applicant/Owner: KC/1001			State: <u>N</u> Sampling Point: <u>SF10</u>
Investigator(s): K. Warred, Envirade in	section Section	on, Township, Range: _	
Landform (hillslope, terrace, etc.): Flat	Local	l relief (concave, convex	:, none): <u>Лопе</u> Slope (%): <u></u>
Subregion (LRR or MLRA): LRRP13-(Lat: <u>35,28186</u>	D Long:	-89, 718770 Datum: W6884
Soil Map Unit Name: Fm - F2/242	slt Lozon		NWI classification: none
Are climatic (bydrologic conditions on the site	typical for this time of year?	(as X No	
Are Vegetetien Ceil or their	logu sizzifezztu distu		
	significantly distur	nd? Are Norma	al Circumstances" present? Yes <u>No</u> No
Are Vegetation, Soil, or Hydro	logy naturally problem	atic? (If needed,	explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attack	n site map showing san	npling point locati	ons, transects, important features, etc.
Hydrophytic Vegetation Present? Ye	es No X		
Hydric Soil Present? Ye	es No	Is the Sampled Area	. X
Wetland Hydrology Present? Ye	es No	within a wetland?	Yes No
Remarks:		L	
Agricultural Field			
HYDROLOGY			
Wetland Hydrology Indicators:			Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is requir	ed; check all that apply)		Surface Soil Cracks (B6)
Surface Water (A1)	Aquatic Fauna (B13)		Sparsely Vegetated Concave Surface (B8)
High Water Table (A2)	Marl Deposits (B15) (LRF	₹ U)	Drainage Patterns (B10)
Saturation (A3)	Hydrogen Sulfide Odor (0	C1)	Moss Trim Lines (B16)
Water Marks (B1)	Oxidized Rhizospheres a	long Living Roots (C3)	Dry-Season Water Table (C2)
Sediment Deposits (B2)	Presence of Reduced Iron	n (C4)	Crayfish Burrows (C8)
Drift Deposits (B3)	Recent Iron Reduction in	Tilled Soils (C6)	Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4)	Thin Muck Surface (C7)		Geomorphic Position (D2)
Iron Deposits (B5)	Other (Explain in Remark	s)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)		FAC-Neutral Test (D5)
Water-Stained Leaves (B9)			Sphagnum moss (D8) (LRR T, U)
Field Observations:			
Surface Water Present? Yes N	lo Depth (inches):		
Water Table Present? Yes N	lo Depth (inches):		
Saturation Present? Yes N	lo <u>X</u> Depth (inches):	Wetland H	Hydrology Present? Yes No 🗶
(includes capillary tringe) Describe Recorded Data (stream gauge, mor	nitorino well aerial photos, prev	vious inspections) if ava	ailable [.]
	moning work, admar prioroo, pro-		
Remarks:			
richano.			

r583

Sampling Point: _____

VEGETATION (Four Strata) – Use scientific names of plants.

2.0	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size:)	% Cover	Species	<u>Status</u>	Number of Dominant Species
1				That Are OBL, FACW, or FAC: (A)
2				Total Number of Dominant
3				Species Across All Strata; (B)
4.				
5				Percent of Dominant Species
6.	****			
7				Prevalence Index worksheet:
<i>r</i>			••••••••••	Total % Cover of: Multiply by:
8				OBL species x 1 =
		= Total Co	ver	FACW species $15 \times 2 = 30$
50% of total cover:	20% of	total cove	r:	
Sapling/Shrub Stratum (Plot size: 15)				EACH opening $\frac{7}{2}$ α α β β
1				FACU species $x = 0$
2				UPL species 30 $x_5 = 20$
3.				Column Totals: $X \ge (A) = 500$ (B)
4.				Prevalence lodex = P(A = 4, 2 +
5.				
6				Hydrophytic vegetation indicators:
7				1 - Rapid Test for Hydrophytic Vegetation
				2 - Dominance Test is >50%
8			• ••••••••••••••••••••••••••••••••••••	3 - Prevalence Index is ≤3.01
		= Total Co	ver	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of	total cove	r:	
Herb Stratum (Plot size:)	_	. 1		¹ Indicators of hydric soil and wetland hydrology must
1. <u>Glycing max</u>	50	<u> </u>	UPL	be present, unless disturbed or problematic.
2. Allium schuenanszshm	15	2	FACU	Definitions of Four Vegetation Strata:
3. Rannenhung zuric	15	N	FACW	Tree Meedy plants evaluating viscos 2 in (7.6 cm) or
4. Poz andensis	5	N	FALV	more in diameter at breast height (DBH), regardless of
5			·	height.
6				
7				than 3 in DBH and greater than 3 28 ft (1 m) tall
<i>1</i> ,				
8.				Herb – All herbaceous (non-woody) plants, regardless
9			-	of size, and woody plants less than 3.28 π tail.
10		*****		Woody vine - All woody vines greater than 3.28 ft in
11.			• ••••••	height.
12				
	85	= Total Co	ver	
50% of total cover:	20% of	total cove	r:	
Woody Vine Stratum (Plot size: 30)				
1.				
······································	******			
3				
3.				
4				
5			·	Hydrophytic
		= Total Co	ver	Present? Yes No
50% of total cover:	20% of	total cove	r:	
Remarks: (If observed, list morphological adaptations belo	w).			

Profile Description: (Describe to the depth needed t	o document the indicator or confirm	the absence of indicators.)
Depth Matrix	Redox Features	
(inches) Color (moist) % Color (m	oist) % Type ¹ Loc ² .	Texture Remarks
0-14 104R 4/1 100 104R	s/2 is	Sitty to day loan
14-18 1040 4/1 40 7.54R.	1/ 5 RM M	silty day to day loam
Intro uto		
<u> </u>		
¹ Type: C=Concentration, D=Depletion, RM=Reduced M	atrix, MS=Masked Sand Grains.	² Location: PL=Pore Lining, M=Matrix.
Hydric Soil Indicators: (Applicable to all LRRs, unles	ss otherwise noted.)	Indicators for Problematic Hydric Soils ³ :
Histosol (A1) Poly	alue Below Surface (S8) (LRR S, T, U)	1 cm Muck (A9) (LRR O)
Histic Epipedon (A2) Thin	Dark Surface (S9) (LRR S, T, U)	2 cm Muck (A10) (LRR S)
Black Histic (A3)	y Mucky Mineral (F1) (LRR O)	Reduced Vertic (F18) (outside MLRA 150A, B)
Hydrogen Sulfide (A4) Loan	y Gleyed Matrix (F2)	Piedmont Floodplain Soils (F19) (LRR P, S, T)
Stratified Layers (A5) Deple	eted Matrix (F3)	Anomalous Bright Loamy Soils (F20)
Organic Bodies (A6) (LRR P, T, U) Redc	x Dark Surface (F6)	(MLRA 153B)
5 cm Mucky Mineral (A7) (LRR P, T, U) Deple	eted Dark Surface (F7)	Red Parent Material (TF2)
Muck Presence (A8) (LRR U) Redc	x Depressions (F8)	Very Shallow Dark Surface (TF12)
1 cm Muck (A9) (LRR P, T) Mari	(F10) (LRR U)	Other (Explain in Remarks)
Depleted Below Dark Surface (ATT) Deple	AREG OCHTIC (F11) (WLKA 151)	³ Indiactors of hydrophytic vegetation and
Coast Prairie Redov (A16) (MI RA 150A)	ic Surface (E13) (LRR D T 1)) indicators of hydrophytic vegetation and wetland bydrology must be precent
Sandy Mucky Mineral (S1) (I RR O S) Delta	Ochric (E17) (MIRA 151)	upless disturbed or problematic
Sandy Gleved Matrix (S4)	ced Vertic (F18) (MLRA 150A, 150B)	uness distarbed of problematic.
Sandy Redox (S5)	nont Floodplain Soils (F19) (MLRA 149	A)
Stripped Matrix (S6)	alous Bright Loamy Soils (F20) (MLRA	149A, 153C, 153D)
Dark Surface (S7) (LRR P, S, T, U)		
Restrictive Layer (if observed):		
Туре:		
Depth (inches):		Hydric Soil Present? Yes No
Pemarke:		
Nonaks.		

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Smokestack Mitigation Bank Site City/C	ounty: Lakeland /Shelby Sampling Date: 11/5/2018
Applicant/Owner: RES/TDOT	State: TN Sampling Point: SP-1
Investigator(s): R.Warra, Envire Science, Loc. Section	n Township Range:
l andform (hillslope terrace etc.): Dc 0 (cM/ch.a.	relief (concave convex pope): Lancade Slope (%):
Subragion (I BB or MI BA): LRR P [34 Lat: 35 783 AG	12 Long 29, 719182 Datum b/4584
Call Mar Hait Names Flore Ellipson a 14 June 14	
Soli wap Unit Name:	
Are climatic / hydrologic conditions on the site typical for this time of year? Ye	es No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly disturb	bed? Are "Normal Circumstances" present? Yes <u>X</u> No
Are Vegetation, Soil, or Hydrology naturally problema	tic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing sam	pling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes X No Hydric Soil Present? Yes X No Wetland Hydrology Present? Yes X No	Is the Sampled Area w-13 within a Wetland? Yes X No
Remarks: PEM in AG Feld	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
<u>X</u> Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)
A High Water Table (A2) Mari Deposits (B15) (LRR	LU) Drainage Patterns (B10)
A Saturation (A3) — Hydrogen Suilide Odor (C	(1) Woss Trim Lines (BTo)
Sediment Deposits (B2) Presence of Reduced Iror	X = Crayfish Burrows (C8)
Drift Deposits (B3)	Tilled Soils (C6) \bigvee Saturation Visible on Aerial Imageny (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7)	\times Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remarks	s) X Shallow Aguitard (D3)
Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Surface Water Present? Yes <u>X</u> No <u>2</u> Depth (inches):	
Water Table Present? Yes <u>X</u> No Depth (inches):	
Saturation Present? Yes <u>X</u> No <u>Depth</u> (inches):	Wetland Hydrology Present? Yes <u>X</u> No
Describe Recorded Data (stream gauge, monitoring well, aerial photos, prev	vious inspections), if available:
Remarks:	

Sampling Point: <u>SP/</u>

VEGETATION (Four Strata) - Use scientific names of plants.

22	Absolute Dominant Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>50</u>)	<u>% Cover Species? Status</u>	Number of Dominant Species
1.		That Are OBL, FACW, or FAC: (A)
2.		Total Number of Dominant
3		Species Across All Strata: (B)
4	· ······	Descent of Descinget Operation
5		That Are OBL EACW or EAC:
6		
7.		Prevalence Index worksheet:
. 8.		Total % Cover of:Multiply by:
*	= Total Cover	OBL species x 1 =
50% of total cover:	20% of total cover:	FACW species x 2 =
Sepling/Shrub Stratum (Dist size:	20 % of total cover:	FAC species x 3 =
		FACU species x 4 =
1. _		UPL species x 5 =
2	······	Column Totals: (A) (B)
3		
4.		Prevalence Index = B/A =
5		Hydrophytic Vegetation Indicators:
6		1 - Rapid Test for Hydrophytic Vegetation
7		X 2 Dominance Tect is >50%
8.		2 - Drouglange Index is <3.01
	= Total Cover	5 - Prevalence index is \$5.0
50% of total cover:	20% of total cover:	Problematic Hydrophytic Vegetation (Explain)
Herb Stratum (Blot size: 5)		,
HEID Stratum (FIG Size)	20 FAUL V	Indicators of hydric soil and wetland hydrology must
1. ECHINOCHIOS MILARIZZZ	20 51/200	be present, unless disturbed of problematic.
2. CAD COWS esculentus	- <u>JO</u> FAC T	Definitions of Four Vegetation Strata:
3. <u>F2nisum Aichotomittorum</u>	- FACW IN	Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or
4. Glyline mex.	<u>6 072 N</u>	more in diameter at breast height (DBH), regardless of
5. Kennenhan Zeris	<u>3</u> FACW N	height.
6		Sapling/Shrub – Woody plants, excluding vines, less
7		than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8		Herb - All berbaceous (non-woody) plants, repardlass
9.		of size, and woody plants less than 3.28 ft tall.
10.		
11		Woody vine – All woody vines greater than 3.28 ft in height
12		noight.
12.	71 - Tables	
50% of total cover.	20% of total cover:	
Woody Vine Stratum (Plot size:)		
1		
2		
3		
4		
5		Hydrophytic
	= Total Cover	Vegetation /
50% of total cover:	20% of total cover:	Present? Yes <u>V</u> No
Remarks: (If observed, list morphological adaptations belo		
	···· ,·	

Profile Des	cription: (Describe	to the dept	th needed to docun	nent the ir	ndicator	or confiri	m the absence	of indicators.)
Depth	Matrix		Redo	x Features				
(inches)	<u>Color (moist)</u>	%	Color (moist)	%	_Type ¹	_Loc ²	Texture	Remarks
0-6	104R 5/1	40	7.54R 414	15	<u> </u>	PL/M	LIZY lozm	Mananese
	LOYR 4/1	60	7.5424/6	5	6	PUM		
	1040 412			·	*******			
1 2	1-12 110	<u></u>	- /:			·	1 4 1 1	
6-20	10416 611		54R 516	20		m	Uzy" uzylo	200.
	IOYR S/1	15					. ,	
	IOYR 612	15						
		·				<u></u>	·	
¹ Type: C=C	oncentration, D=Depl	etion, RM=	Reduced Matrix, MS	S=Masked	Sand Gr	ains.	² Location:	PL=Pore Lining, M=Matrix.
Hydric Soil	Indicators: (Applica	able to all I	RRs, unless other	wise note	d.)		Indicators	for Problematic Hydric Soils ³ :
Histosol	(A1)		Polyvalue Be	low Surfac	e (S8) (L	.RR S, T, I	U)1 cm M	luck (A9) (LRR O)
Histic Ep	oipedon (A2)		Thin Dark Su	rface (S9)	(LRR S,	T, U)	2 cm M	luck (A10) (LRR S)
Black Hi	istic (A3)		Loamy Mucky	Mineral (F1) (LRR	t O)	Reduce	ed Vertic (F18) (outside MLRA 150A,B)
Hydroge	en Sulfide (A4)		Loamy Gleye	d Matrix (F	-2)		Piedmo	ont Floodplain Soils (F19) (LRR P, S, T)
Stratified	d Layers (A5)	-	A Depleted Mat	rix (F3)			Anoma	Ious Bright Loamy Soils (F20)
Organic	Bodies (A6) (LRR P,	1, U)	Redox Dark S	Surface (F6) (F7)			(A 153B) Mataila (TEO)
D CM Mu	icky Mineral (A7) (LR		Depleted Dar	K SULTACE	(F7)			arent waterial (TF2)
	esence (Ao) (LKK U)		Mod (E10) (L)		Very Si	nallow Dark Surface (1F12)
Depleter	H Relow Dark Surface	(A11)	Depleted Och	ric (E11) (MIRA 14	51)		Explain in Remarks)
Thick Da	ark Surface (A12)		X Iron-Mangane	ese Masse	s (F12) (T) ³ Indice	ators of hydrophytic vegetation and
Coast Pr	rairie Redox (A16) (M	LRA 150A) Umbric Surfa	ce (F13) (I	.RR P. T	. U)	, , wetl	and hydrology must be present
Sandy M	lucky Mineral (S1) (L	RR O, S)	Delta Ochric ((F17) (MLF	RA 151)	, -,	unie	ess disturbed or problematic.
Sandy G	Sleyed Matrix (S4)		Reduced Verl	tic (F18) (N	ILRA 15	0A, 150B))	
Sandy R	edox (S5)		Piedmont Flo	odplain Sc	ils (F19)	(MLRA 14	49A)	
Stripped	Matrix (S6)		Anomalous B	right Loam	y Soils (l	F20) (MLF	RA 149A, 153C,	153D)
Dark Sur	rface (S7) (LRR P, S,	T, U)						
Restrictive L	.ayer (if observed):							
Туре:								
Depth (inc	ches):						Hydric Soil	Present? Yes <u>×</u> No
Remarks:				·				
Project/Site: Smokestzck Mitu	iztion Bank Site	City/County: LzKeland	Ishelby Samplir	ng Date: 11/5/2018				
---	---	---------------------------------------	---------------------------------------	-----------------------				
Applicant/Owner: <u>RES/TDOT</u>	1		State: <u>TN</u> Samplin	ig Point: $SPIZ$				
Investigator(s): B. Warren; Envi	sobringe INL.	Section, Township, Range;						
Landform (billslope, terrace, etc.): $\hat{D}_{z,0,c}$	a litia a	Local relief (concave, conve	x popel: Cample X	Slope (%): A= 1				
Culture (I DD an NI DA) / PP P12	d 1. 25 1	Locarrelier (concave, conve	-vi 218802					
Subregion (LRR or MLRA):	<u> </u>	1953 - Long:	81, 110803	Datum: <u>013_0</u> °				
Soil Map Unit Name: WV - Woverly	Silt 182m, 0 to	2 percent slage	NWI classification:	none				
Are climatic / hydrologic conditions on the	site typical for this time of ye	ar? YesX_ No	(If no, explain in Remarks.)					
Are Vegetation, Soil, or H	ydrology significantly	disturbed? Are "Norm	al Circumstances" present?	Yes <u>X</u> No				
Are Vegetation, Soil, or H	ydrology naturally pro	blematic? (If needed	, explain any answers in Ren	narks.)				
SUMMARY OF FINDINGS - Att	ach site map showing	sampling point locat	ions, transects, impo	rtant features, etc.				
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present?	Yes <u>X</u> No Yes <u>X</u> No Yes <u>X</u> No	Is the Sampled Area within a Wetland?	Yes_乂No	W-16				
Remarks:	······	······						
PEM within AG Field								
HYDROLOGY								
Wetland Hydrology Indicators:			Secondary Indicators (min	imum of two required)				
Primary Indicators (minimum of one is re	quired; check all that apply)		Surface Soil Cracks (B	36)				
X Surface Water (A1)	Aquatic Fauna (B13	3)	Sparsely Vegetated C	oncave Surface (B8)				
$\underline{ imes}$ High Water Table (A2)	Marl Deposits (B15)) (LRR U)	Drainage Patterns (B1	0)				
$\underline{\times}$ Saturation (A3)	Hydrogen Sulfide O	dor (C1)	Moss Trim Lines (B16)				
Water Marks (B1)	Oxidized Rhizosphe	eres along Living Roots (C3)	Dry-Season Water Tal	ble (C2)				
Sediment Deposits (B2)	Presence of Reduce	ed Iron (C4)	Crayfish Burrows (C8)	I				
Drift Deposits (B3)	🔀 Recent Iron Reduct	ion in Tilled Soils (C6)	X Saturation Visible on A	Aerial Imagery (C9)				
Algal Mat or Crust (B4)	Thin Muck Surface	(C7)	\underline{X} Geomorphic Position (D2)				
Iron Deposits (B5)	Other (Explain in Re	emarks)	🔀 Shallow Aquitard (D3)					
Inundation Visible on Aerial Imagery	(B7)		FAC-Neutral Test (D5))				
Water-Stained Leaves (B9)			Sphagnum moss (D8)	(LRR T, U)				
Field Observations:		11						
Surface Water Present? Yes X	_ No Depth (inches):	+ 1						
Water Table Present? Yes X	_ No Depth (inches):	9						
Saturation Present? Yes X	_ No Depth (inches):	0 ^{~~} Wetland	Hydrology Present? Yes	<u> </u>				
(Includes capillary tringe) Describe Recorded Data (stream gauge)	monitoring well aerial photos	s previous inspections) if av	ailable:					
	them were used protect							
Pemarke:								
Kemarks.								

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VEGETATION (Four Strata) – Use scientific na	ames of plants.	Sampling Point: <u>SPIZ</u>
30	Absolute Dominant Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size:)	<u>% Cover Species? Status</u>	Number of Dominant Species 1 (A)
3 -		Total Number of Dominant Species Across All Strata: 2 (B)
4		Percent of Dominant Species
5 6	· ·······	That Are OBL, FACW, or FAC: <u>50</u> (A/B)
7		Prevalence Index worksneet:
8		Total % Cover of: Multiply by:
	85 = Total Cover	OBL species x 1 =
50% of total cover:	20% of total cover:	FACW species $60 \times 2 = 60$
Sapling/Shrub Stratum (Plot size: 15)	ČÝ	FAC species x 3 =
1		FACU species x 4 =
2		UPL species 25 x 5 = 25
2	-	Column Totals: 85 (A) 245 (B)
4		Prevalence index = $B/A = 2.8\%$
5		Hydrophytic Vegetation Indicators:
6		1 - Rapid Test for Hydrophytic Vegetation
7		2 - Dominance Test is >50%
8		\overline{X} 3 - Prevalence Index is $\leq 3.0^{1}$
	= Total Cover	Broblematic Hydrophytic Vegetation ¹ (Evaluin)
50% of total cover:	20% of total cover:	
Herb Stratum (Plot size: 5)		
1 Echicandalus and the	40 Y FACH	he present upless disturbed or problematic
2 Alution of the second	SE Y UPL	Definitions of Four Vegetation Strata:
2. <u>Algenne ng 2 v</u>	20 N EAL	Deminions of Four Vegetation Strata.
3. FRANALMA 2005		Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
4.		more in diameter at breast height (DBH), regardless of
5		neight.
6		Sapling/Shrub - Woody plants, excluding vines, less
7		than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8		Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
10		
11		Woody vine – All woody vines greater than 3.28 ft in height
12		noight.
12,		
500/ of table on table		
	20% of total cover:	
woody vine Stratum (Plot size: <u>50</u>)		
1		
2	-	
3	-	
4		
5		Hydrophytic
	= Total Cover	Vegetation
50% of total cover:	20% of total cover:	Present? Yes <u>No</u>
Remarks: (If observed, list morphological adaptations hel	 OW).	

SOIL

Depth (inches)	• • • • • •	the dep	In needed to	accument the i	indio di o i	or comm	in the absence	,
(Interiosy	Color (moist)	%	Color (moi	Redox Features	S Type ¹	1.002	Texture	Bemarks
7-17	INVE 4/1	40	7.5 VP S	$\frac{1}{12}$ 15			LOAMY	
1.6	INTE 111	<u> </u>		<u>15</u>			<u> </u>	
	1016 11-	40	27K 71	· · · · · · · · · · · · · · · · · · ·				
			5416 21-	<u> </u>				
2-20	10YR 6/1	70	542 518	7				
·	107E 5/3	23						
	<u></u>							
ⁱ Type: C=Co	ncentration, D=Depl	etion, RM=	Reduced Mat	ix, MS=Masked	Sand Gra	lins.	² Location:	PL=Pore Lining, M=Matrix.
Hydric Soil Ir	ndicators: (Applica	ble to all	LRRs, unless	otherwise note	ed.)		Indicators	for Problematic Hydric Soils ³ :
Histosol ((A1) inorden (A2)		Polyval	ue Below Surface	ce (S8) (L	RR S, T, I	U)1 cm M	uck (A9) (LRR O)
Black His	tic (A3)			Mucky Mineral ((LKK S, (F1) (IRR	() ()	2 cm M	UCK (A10) (LKK S) ad Vertic (E18) (outside MLRA 150A R
Hydroger	n Sulfide (A4)		Loamy	Gleved Matrix (F2)	0,	Piedmo	ont Floodplain Soils (F19) (LRR P. S. T)
Stratified	Layers (A5)		Deplete	d Matrix (F3)	,		Anomal	lous Bright Loamy Soils (F20)
Organic E	Bodies (A6) (LRR P,	T, U)	Redox	Dark Surface (F	6)		(MLR	A 153B)
5 cm Muc	ky Mineral (A7) (LR	R P, T, U)	Deplete	d Dark Surface	(F7)		Red Pa	rent Material (TF2)
MUCK Pre			Redox Marl (E	Depressions (F8	3)		Very St	nallow Dark Surface (TF12)
Depleted	Below Dark Surface	(A11)	Deplete	d Ochric (F11)	(MLRA 15	1)		
Thick Dar	k Surface (A12)	(,	X Iron-Ma	nganese Masse	es (F12) (I		T) ³ Indica	ators of hydrophytic vegetation and
Coast Pra	airie Redox (A16) (M	LRA 150A	.) <u> </u> Umbric	Surface (F13) (LRR P, T,	U)	wetla	and hydrology must be present,
Sandy Mu	ucky Mineral (S1) (LI	RR O, S)	Delta O	chric (F17) (ML	RA 151)		unle	ss disturbed or problematic.
Sandy Gle	eyed Matrix (S4)		Reduce	d Vertic (F18) (I	MLRA 15)A, 150B) MUDA 4/	10.4.)	
Strinned I	Matrix (S6)		Pleumo	ous Bright Loan	ov Soils (F19)	20) (MU 6	19A) 14 1494 1530	153D)
Dark Surf	ace (S7) (LRR P. S.	T, U)	/ thomas	ous pright coun	19 0013 (1	20) (ME	IA 140A, 1000,	1350)
Restrictive La	ayer (if observed):						· ·	
Туре:								
Depth (inch	nes):						Hydric Soil I	Present? Yes <u>No</u> No
temarks.								

WETLAND DETERMINATION DATA	FORM – Atlantic and	Gulf Coastal Plain Region

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Project/Site/ <u>MOKeST2CK/II-IVATION DZARSTC</u> City/C	Sounty: <u>LaReland Jone Lan</u> Sampling Date: <u>17012019</u>
Applicant/Owner: KE//DO/	State: <u>IN/</u> Sampling Point: <u>SP-13</u>
Investigator(s): K. Warren, Enviroscience, Inc. Section	on, Township, Range:
Landform (hillslope, terrace, etc.): Flat Local	relief (concave, convex, none): <u>No ne</u> Slope (%): <u>O -)</u>
Subregion (LRR or MLRA): <u>LLP P134</u> Lat: <u>3.5, 2.78384</u>	t Long: <u>189, 71830+</u> Datum: WGS &4
Soil Map Unit Name: WV-Waverly silt lozm. D +2 percent	t slades NWI classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Y	res No (If no. explain in Remarks.)
Are Vegetation . Soil . or Hydrology significantly distur	bed? Are "Normal Circumstances" present? Yes 📈 No
Are Vegetation , Soil , or Hydrology naturally problema	atic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing sam	pling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes No X	Is the Sampled Area
Motiond Hydrology Procent? Yes No X	within a Wetland? Yes <u>No X</u>
Remarks:	
Ath tield	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LRE	R U) Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor (C	C1) Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres a	long Living Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Iro	n (C4) Cravfish Burrows (C8)
Drift Deposits (B3)	Tilled Soils (C6) Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remark	(s) X Shallow Aguitard (D3)
Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Surface Water Present? Yes No <u>X</u> Depth (inches):	
Water Table Present? Yes <u>No X</u> Depth (inches):	
Saturation Present? Yes No X Depth (inches):	Wetland Hydrology Present? Yes No 🔀
Describe Recorded Data (stream gauge, monitoring well, aerial photos, pre	vious inspections), if available:
Remarks:	

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Sampling Point: <u>58</u>13

VEGETATION (Four Strata) - Use scientific names of plants.

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1.0	Absolute Dominant Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>50</u>)	<u>% Cover Species?</u> Status	Number of Dominant Species
1		That Are OBL, FACW, or FAC: (A)
2		Total Number of Dominant 7
3		Species Across All Strata:(B)
4		
5		That Are OBL FACW or FAC: 23 (A/B)
6		
7.		Prevalence Index worksheet:
8		Total % Cover of:Multiply by:
···		OBL species x 1 =
500/ of total across		FACW species 25 x 2 = 50
	20% of total cover:	FAC species O x 3 = O
		FACU species 20 x 4 = 80
1		UPI species $\leq 2 \leq 2 \leq 2$
2		Column Totals: 95 (A) 380 (B)
3		
4		Prevalence Index = B/A =
5		Hydrophytic Vegetation Indicators:
6		1 - Rapid Test for Hydrophytic Vegetation
7		2 - Dominance Test is >50%
8		3 - Prevalence Index is $< 3.0^{1}$
	= Total Cover	Droblemetic Hydrophytic Vegetetion ¹ (Evaluin)
50% of total cover:	20% of total cover	
Herb Stratum (Plot size: 5)		1
1 (a) march (Plot size)	50 4 101	Indicators of hydric soil and wetland hydrology must
2 Allie and acas	$\frac{50}{70}$ $\frac{1}{1}$ $\frac{572}{50}$	Definitions of Four Verstation Strate:
2. Allum schoenz promin	25 I EAUL	Definitions of Four vegetation Strata:
3. EENNALING ZENS	<u>20 7 FALW</u>	Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or
4		more in diameter at breast height (DBH), regardless of
5		neight.
6		Sapling/Shrub - Woody plants, excluding vines, less
7		than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8		Herb – All herbaceous (non-woody) plants, regardless
9		of size, and woody plants less than 3.28 ft tail.
10.		Menducing All-wards sizes greates then 2.20.6 in
11.		height.
12		
	= Total Cover	
50% of total cover:		
Mandul Vine Otation (Distaine)		
1		
ь		
2		
3		
4		
5		Hydrophytic
	= Total Cover	Vegetation
50% of total cover:	20% of total cover:	Present? Yes No A
Remarks: (If observed, list morphological adaptations belo	N).	

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Sampling Point: <u>SP13</u>

Profile Desc	ription: (D	escribe	to the dep	th needed to docu	ment the i	ndicator	or confirm	n the absence	of indicators	:.)	
Depth		Matrix		Red	ox Feature	s T	1 2	-		<u> </u>	
		noist)	<u> % </u>	Color (moist)	%	Type	Loc-		Silty c	24 to cl	Put lozna
0-18	104K	413	100					lozmy		1.00	
18-20	104R	5/1	80	104R 416	<u> 12 </u>		Pl/m	Llzy cy			
				101R 3/4	8	6	pllm	1			
			*******				.				
									••••••		
											.
¹ Type: C=C		. D≕Dep	letion. RM=	Reduced Matrix. N	S=Masked	I Sand Gr	ains.	² Location:	PL=Pore Lini	na. M=Matri	X.
Hydric Soil	ndicators:	(Applic	able to all	LRRs, unless othe	erwise note	ed.)		Indicators	for Problema	atic Hydric S	Soils ³ :
Histosol	(A1)			Polyvalue B	elow Surfa	ce (S8) (L	.RR S. T. U	J) 1 cm N	luck (A9) (LR	R O)	
Histic Ep	pipedon (A2))		Thin Dark S	urface (S9)	(LRR S,	T, U)	2 cm N	luck (A10) (LI	RRS)	
Black Hi	stic (A3)			Loamy Mucl	ky Mineral ((F1) (LRF	ε Ó)	Reduc	ed Vertic (F18) (outside N	/ILRA 150A,B)
Hydroge	n Sulfide (A	.4)		Loamy Gley	ed Matrix (F2)		Piedm	ont Floodplain	Soils (F19)	(LRR P, S, T)
Stratified	l Layers (A5	i)		Depleted Ma	atrix (F3)			Anoma	lous Bright Lo	oamy Soils (I	F20)
Organic	Bodies (A6)	(LRR P	, T, U)	Redox Dark	Surface (F	6)		(MLF	RA 153B)		
5 cm Mu	cky Mineral	(A7) (LF	RR P, T, U)	Depleted Da	ark Surface	(F7)		Red Pa	arent Material	(TF2)	-
Muck Pr	esence (A8))	Redox Depr	essions (F	8)		Very S	hallow Dark S	Surface (TF1	2)
1 cm Mu	CK (A9) (LR	RP, I)	~ (1 1 1)	Mari (F10) (LRR U)	/	E4 \	Other (Explain in Re	marks)	
Depietet	rk Surface (A12)	e (ATT)	Iron-Mandar	ning (FTT) nese Massi	(WERA)		T) ³ Indic	ators of hydro	nhvtic veget	tation and
Coast Pr	airie Redox	(A16) (N	ALRA 150A	Umbric Surf	ace (F13) (LRR P. T	: U)	wet	and hydrolog	v must be pr	resent
Sandy M	lucky Minera	al (S1) (L	.RR 0, S)	Delta Ochric	(F17) (ML	RA 151)	, -,	unle	ess disturbed	or problema	tic.
Sandy G	leyed Matrix	(S4)		Reduced Ve	ertic (F18) (MLRA 15	i0A, 150B)			•	
Sandy R	edox (S5)			Piedmont FI	oodplain S	oils (F19)	(MLRA 14	9A)			
Stripped	Matrix (S6)			Anomalous	Bright Loar	ny Soils (F20) (MLR	A 149A, 153C,	, 153D)		
Dark Su	face (S7) (L	.RR P, S	s, T, U)								
Restrictive I	ayer (if obs.	served):									
Туре:											~
Depth (inc	:hes):							Hydric Soil	Present?	res	No <u>X</u>
Remarks:											

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region Project/Site: Smokestack MM igollon Back SHC City/County: La Keland / 54161 Sampling Date: 11/6/2018 Applicant/Owner: RES / TDO-Sampling Point: Investigator(s): <u>B. Slaby, Envire Science, Inc.</u> Section, Township, Range: _ Landform (hillslope, terrace, etc.): Depression <u>1255107</u> Local relief (concave, convex, none): <u>Cancave</u> <u>P134</u> Lat: <u>35.279313</u> Long: <u>-89.714179</u> Slope (%): Subregion (LRR or MLRA): <u>LRR</u> Datum: WGS 94 Soil Map Unit Name: WaverH &H hem, O-27, slopes, accessionally Flooded, long duration (Wu) NWI classification: Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.) Are Vegetation _____, Soil _____, or Hydrology ____ ____ significantly disturbed? Are "Normal Circumstances" present? Yes 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? No _____ Is the Sampled Area Hydric Soil Present? No _____ Yes Yes X No____ within a Wetland? Wetland Hydrology Present? Yes No Remarks: Win ag Field - soybeans HYDROLOGY Wetland Hydrology Indicators: Secondary Indicators (minimum of two required) Primary Indicators (minimum of one is required; check all that apply) Surface Soil Cracks (B6) ✓ Surface Water (A1) X Aquatic Fauna (B13) ____ Sparsely Vegetated Concave Surface (B8) \times High Water Table (A2) ____ Marl Deposits (B15) (LRR U) Drainage Patterns (B10) Saturation (A3) ____ Hydrogen Sulfide Odor (C1) Moss Trim Lines (B16) ____ Water Marks (B1) ____ Oxidized Rhizospheres along Living Roots (C3) Dry-Season Water Table (C2) Crayfish Burrows (C8) ____ Sediment Deposits (B2) ___ Presence of Reduced Iron (C4) X Saturation Visible on Aerial Imagery (C9) Drift Deposits (B3) Recent Iron Reduction in Tilled Soils (C6) ____ Algal Mat or Crust (B4) Thin Muck Surface (C7) K Geomorphic Position (D2) \times Other (Explain in Remarks) Shallow Aguitard (D3) Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) X FAC-Neutral Test (D5) Water-Stained Leaves (B9) Sphagnum moss (D8) (LRR T, U) Field Observations: X___ No _____ Depth (inches): ____ Surface Water Present? No Depth (inches): Water Table Present? X____ No _____ Depth (inches): ____ 0 Wetland Hydrology Present? Yes X No Saturation Present? (includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: Remarks: Aquatic Fanna - diving beetles

	inee or plante.	Ouriphing Foline
The Obstance (Distance 201	Absolute Dominant Indicator	Dominance Test worksheet:
		Number of Dominant Species
2	<u> </u>	Total Number of Dominant Species Across All Strata:
4		Percent of Dominant Species 160 Y
5 6		That Are OBL, FACW, or FAC: (A/B)
7		Total % Cover of:Multiply by:
a dette a confirma a constante da con	= Total Cover	OBL species x 1 = FACW species x 2 =
50% of total cover: Sapling/Shrub Stratum (Plot size:1 5 /)	20% of total cover:	FAC species x 3 =
1		FACU species x 4 = UPL species x 5 =
3.	· · · · · · · · · · · · · · · · · · ·	Column Totals: (A) (B)
4		Prevalence Index = B/A =
6		Hydrophytic Vegetation Indicators: X 1 - Rapid Test for Hydrophytic Vegetation
7	-	\times 2 - Dominance Test is >50%
···	= Total Cover	Problematic Hydrophytic Vegetation ¹ (Explain)
Herb Stratum (Plot size: 5 , 50% of total cover:	20% of total cover:	tables to a balance of budges a subsection of budges and the section o
1. Panicum dictotomiflorum	40 Y FACW	be present, unless disturbed or problematic.
3. Rananching Coto actis	a N FACW	Definitions of Four Vegetation Strata:
4. Eleocharis obtasa	N OBL	more in diameter at breast height (DBH), regardless of height.
6. <u>1997 - 1997 - 1997 - 1997 - 1997</u> 7. <u>1997 - 1997 - 1997 - 1997</u> 7. <u>1997 - 1997 - 1997 - 1997</u>		Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8		Herb – All herbaceous (non-woody) plants, regardless
10		Woody vine – All woody vines greater than 3.28 ft in
11 12	-	height.
50% of total cover: 34	$\frac{69}{5} = \text{Total Cover}$ $\frac{5}{5} = 20\% \text{ of total cover} = \frac{3.8}{5}$	
Woody Vine Stratum (Plot size: 301)		
2		
3		
7.		Hydrophytic
5.		Monototion
5 50% of total cover:	= Total Cover 20% of total cover:	Present? Yes <u>No</u>

Sampling Point: <u>SP-14</u>

1	cription: (Describe t	o me dep	th needed to docur	nent the	indicator	or contirn	n the absence	of indicators.)	
Depth	Matrix		Redo	<u>x Feature</u>	s				
(inches)	Color (moist)		<u>Color (moist)</u>	%	<u>Type</u>		<u> </u>	Remarks	
0-11	10 YR 5/2	<u> </u>	7.5 YR 416	25	<u> </u>	PLIM	Silly loom	Prominent redoi	K CONC.
11-14	104R 4/3	85	7.54R 4/4	15	С	PL/M	Silly clar	Faint redax a	αΛC.
							compared		
		·			·				
				• 					

				•					
Type: C=C	oncentration, D=Depl	etion, RM=	Reduced Matrix, MS	S=Maske	d Sand G	rains.	² Location:	PL=Pore Lining, M=Mal	rix.
Hydric Soil	Indicators: (Applica	ble to all	LRRs, unless other	wise not	ed.)		Indicators	or Problematic Hydrid	soils":
Histoso	(A1)		Polyvalue Be	low Surfa	ce (S8) (LRR S, T, I	J)1 cm M	uck (A9) (LRR O)	
Histic E	pipedon (A2)		Thin Dark Su	irface (S9) (LRR S	, T, U)	2 cm M	uck (A10) (LRR S)	
Black H	istic (A3)		Loamy Mucky	y Mineral	(F1) (LRI	R O)	Reduce	d Vertic (F18) (outside	MLRA 150A,B)
Hydroge	en Sulfide (A4)		Loamy Gleye	d Matrix	(F2)		Piedmo	nt Floodplain Soils (F19	9) (LRR P, S, T)
Stratifie	d Layers (A5)		Depleted Mat	trix (⊦3)			Anomal	ous Bright Loamy Soils	(F20)
Organic	Bodies (Ab) (LKK P,	1, U) B D T III	Redox Dark a	Surface (I	-6)		(I¥ILR Ded De	A 153B) rent Meterial (TEO)	
		к Р, I, U)		K Suriace	e(F7)			rent Material (TF2)	(10)
1 cm Mi	Ick (AQ) (LRK U)		Mari (E10) /I		0)		Very Si Other (I	Iallow Dark Suitace (Tr Evolgin in Remarks)	12)
Deplete	d Below Dark Surface	(A11)	Depleted Oct	nric (E11)	MIRA 1	51)			
Depicte	ark Surface (A12)	(/ (11)	Iron-Mangan	ese Mass	es (F12)	(LRR O. P.	T) ³ Indica	tors of hydrophytic yea	etation and
Coast P	rairie Redox (A16) (M	LRA 150A	Umbric Surfa	ce (F13)	(LRR P	(u, . , F. U)	wetla	and hydrology must be	present.
Sandy N	Aucky Mineral (S1) (LI	RR O, S)	Delta Ochric	(F17) (MI	RA 151)	, ,	unle	ss disturbed or problem	atic.
Sandy C	Eleyed Matrix (S4)		Reduced Ver	tic (F18)	MLRA 1	50A, 150B)			
Sandy F	Redox (S5)		Piedmont Flo	odplain S	oils (F19)) (MLRA 14	19A)		
Stripped	I Matrix (S6)		Anomalous B	right Loa	my Soils i	(F20) (MLR	A 149A, 153C,	153D)	
Dark Su	rface (S7) (LRR P, S,	T, U)							
Restrictive	Layer (if observed):								
		-1 × h							
Туре: <u>С</u>	ompaction / pos	sibly cli	<u></u>						
Type: <u>Ĉ</u> Depth (in	ompaction/pos ches): 1411	sibly cli	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): 1411	sibly Cli	<u> </u>				Hydric Soil I	Present? Yes <u>X</u>	No
Type: <u>C</u> Depth (in Remarks:	ompation / pos ches): 1911	sibly Clu	<u></u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): 14 11	sibly Clu	<u></u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sibly cla	<u></u>				Hydric Soil I	Present? Yes <u>X</u>	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>14</u> 11	sibly Cla	<u></u>				Hydric Soil I	Present? Yes <u>X</u>	_ No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>14</u> 11	sibly Clu	<u> </u>				Hydric Soil I	Present? Yes <u>X</u>	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1911</u>	sibly Clu	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>19</u> 11	sibly Clu	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>19</u> 11	sibly Clu	<u>.</u>				Hydric Soil I	Present? Yes X	_ No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>19</u> 11	sibly clu	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>14</u> 11	sibly clu	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pog ches): <u>14</u> 11	sibly clu	<u></u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sibly clu	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sibly clu	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>14</u> 11	sibly cla	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>14</u> 11	sibly cla	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>14</u> 11	sibly cla	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sibly cla	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sibly cla	<u>.</u>				Hydric Soil I	Present? Yes X	No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sibly cla	<u>.</u>				Hydric Soil I	Present? Yes X	_ No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sibly cla	<u>.</u>				Hydric Soil I	Present? Yes X	_ No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sibly cla	<u>.</u>				Hydric Soil I	Present? Yes X	_ No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sbly cla	<u> </u>				Hydric Soil I	Present? Yes X	_ No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>1411</u>	sbly cla	<u> </u>				Hydric Soil I	Present? Yes X	_ No
Type: <u>C</u> Depth (in Remarks:	ompaction / pos ches): <u>14 11</u>	sbly cla	<u> </u>				Hydric Soil I	Present? Yes X	No

Project/Site: SMOKE Stack Mitigation Site City Applicant/Owner: <u>RES / TDDT</u> Investigator(s): <u>ANN GilMOVE</u> , ENVINOSCIMAN Set Landform (hillslope, terrace, etc.): <u>APP(ISION</u> Loc Subregion (LRR or MLRA): <u>LRR P</u> Lat: <u>35.27</u> Soil Map Unit Name: <u>WV - Waveny Silt Ivam (0.2</u> * Are climatic / hydrologic conditions on the site typical for this time of year? Are Vegetation, Soil, or Hydrology significantly dis Are Vegetation, Soil, or Hydrology naturally proble	//County: Lakeland/Shelby Co: Sampling Date: 06 NW 7018 State: TN Sampling Point: 5P-15 ction, Township, Range:
SUMMARY OF FINDINGS – Attach site map showing sa	ampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes No Hydric Soil Present? Yes No Wetland Hydrology Present? Yes No	Is the Sampled Area within a Wetland? Yes <u>Ves</u> No <u>ver</u> Wetland W ⁻ 18
PEM at edge of field connects to d	itch.
HYDROLOGY	
Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
Remarks:	

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Sampling Point: <u>SP-15</u>

Depth (inches) Matrix Color (moist) Redox Features (or moist) Type1 Loc2 Texture Remarks 0 - 2 10 4 2 5 1 95 10 4 2 5 8 15 C M III 10 4 2 5 1 95 10 4 2 5 8
Color (moist) % Color (moist) % Type' Loc' Texture Remarks 0 - 2 10 4 2 5 1 20 10 4 2 5 8 15 20 10 21 20 10 4 2 5 8 15 20 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 21 20 10 20
0-9 104251 95 104258 15 10
G-10 10 V R S 1 20 10 V R S 8 20 M II Image: Stratified Layers (A5) Image: S
Image:
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.) Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outside MLRA 150A,B) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T) Stratified Layers (A5) X Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) Granic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) (MLRA 153B) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Very Shallow Dark Surface (TF12) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks)
Image: intermediate interm
Image:
Image: 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.) Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outside MLRA 150A,B) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T) Stratified Layers (A5) Z Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks)
Image: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. Image: PL=Pore Lining, M=Matrix. Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histic Epipedon (A2) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outside MLRA 150A,B) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T) Stratified Layers (A5) X Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) 5 cm Mucky Mineral (A7) (LRR P, T, U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks)
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.) Indicators for Problematic Hydric Soils ³ :
Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) Indicators for Problematic Hydric Soils ³ : Histosol (A1) Polyvalue Below Surface (S8) (LRR S, T, U) 1 cm Muck (A9) (LRR O) Histosol (A1) Thin Dark Surface (S9) (LRR S, T, U) 2 cm Muck (A10) (LRR S) Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outside MLRA 150A,B) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T) Stratified Layers (A5) X Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) S cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks)
Image: Second State Control (M)
Black Histic (A3) Loamy Mucky Mineral (F1) (LRR O) Reduced Vertic (F18) (outsIde MLRA 150A,B) Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T) Stratified Layers (A5) Z Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151)
Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2) Piedmont Floodplain Soils (F19) (LRR P, S, T) Stratified Layers (A5) X Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151)
Stratified Layers (A5) X Depleted Matrix (F3) Anomalous Bright Loamy Soils (F20) Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151)
Organic Bodies (A6) (LRR P, T, U) Redox Dark Surface (F6) (MLRA 153B) S 5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151)
5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Dark Surface (F7) Red Parent Material (TF2) Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151) Other (Explain in Remarks)
Muck Presence (A8) (LRR U) Redox Depressions (F8) Very Shallow Dark Surface (TF12) 1 cm Muck (A9) (LRR P, T) Marl (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151)
1 cm Muck (A9) (LRR P, 1) Mari (F10) (LRR U) Other (Explain in Remarks) Depleted Below Dark Surface (A11) Depleted Ochric (F11) (MLRA 151)
Depleted Below Dark Surface (ATT) Depleted Ocific (FTT) (MECKA 151)
Thick Dark Surface (A12) Iron-Mangapese Masses (E12) (I RE O.P. T) ³ Indicators of hydronbytic vegetation and
Coast Prairie Redox (A16) (MLRA 150A) Umbric Surface (F13) (LRR P. T. U) wetland hydrology must be present.
Sandy Mucky Mineral (S1) (LRR O, S) Delta Ochric (F17) (MLRA 151) unless disturbed or problematic.
Sandy Gleyed Matrix (S4) Reduced Vertic (F18) (MLRA 150A, 150B)
Sandy Redox (S5) Piedmont Floodplain Soils (F19) (MLRA 149A)
Stripped Matrix (S6) Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)
Dark Surface (S7) (LRR P, S, T, U)
Restrictive Layer (if observed):
Type:
Depth (inches): Hydric Soil Present? Yes A No
Remarks:

VEGETATION (Four Strata) - Use scientific names of plants.

ŧ,

201	Absolute Dominant Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>00</u>)	<u>% Cover Species?</u> Status	Number of Dominant Species
1.		That Are OBL, FACW, or FAC: (A)
2		Total Number of Dominant
3		Species Across All Strata: (B)
4.		
5		Percent of Dominant Species
3		That Are OBL, FACW, or FAC: (A/B)
6		Prevalence Index worksheet:
7.		Total % Cover of: Multiply by:
8		
	= Total Cover	
50% of total cover:	20% of total cover:	FACW species x 2 =
Sapling/Shrub Stratum (Plot size:)		FAC species x 3 =
1		FACU species x 4 =
1.		UPL species x 5 =
۷		Column Totals: (A) (B)
3		
4		Prevalence Index = B/A =
5		Hydrophytic Vegetation Indicators:
6		V 1 - Rapid Test for Hydrophytic Vegetation
7.		2. Deminence Testie > 50%
8	·	
8		3 - Prevalence Index is ≤3.0'
	= I otal Cover	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of total cover:	
Herb Stratum (Plot size: 💆)		¹ Indicators of hydric soil and wetland hydrology must
1. Juncus effusus	25 YUS OBL	be present, unless disturbed or problematic.
2. Mimulus rinauns	10 Yes OBL	Definitions of Four Vegetation Strata:
3 Pensiania nutionales	ID. VPS DBL	-
SUMAONIANTY CAUMON JAMERALATUM	In Del FALAN	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
Eldochais C alabard	In the ADI.	beight
5. <u>Methodals optimis</u>	IV MAS ODV	noight.
6. CAVEN VUIDINICA	10 Mrs FACW	Sapling/Shrub – Woody plants, excluding vines, less
7. LUMPUS VIVAENIUUS	S. NO OBL	than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8. Ater reaundo	5. NO FAC	Herb - All berbaceous (non-woody) plants, regardless
9 RIAMAN MISTRAS	S. NO FAC	of size, and woody plants less than 3.28 ft tall.
10 Aprimstas aidantea	S. NO FACIN	
10. TV P 10110 UTIDUATION		Woody vine - All woody vines greater than 3.28 ft in
11		neight.
12		
	<u> </u>	
50% of total cover: <u>41</u>	20% of total cover: <u>14</u>	
Woody Vine Stratum (Plot size: 30)		
1		
··		
2.		
3		
4		
5		Hydrophytic
	= Total Cover	Vegetation V
50% of total cover:	20% of total cover:	Present? Yes <u>/ No</u>
Remarke: (If observed list morphological adaptations belo		
remains. In observeu, list morphological adaptations beic	, , , , , , , , , , , , , , , , , , ,	

Project/Site: <u>SMOKESTRUK MINGATION SITE</u> City/County: <u>LA</u> Applicant/Owner: <u>RES / TDOT</u> Investigator(s): <u>ANN Gilmore, ENVIROSCIENCE</u> Section, Towns Landform (hillslope, terrace, etc.): <u>HEWRCE</u> Local relief (cor Subregion (LRR or MLRA): <u>HEP P</u> Lat: <u>35, 290641</u> Soil Map Unit Name: <u>WV- WAVENY SITE IDAM (0-21/0 SIDPES</u> Are climatic / hydrologic conditions on the site typical for this time of year? Yes <u>V</u> Are Vegetation <u>Soil</u> , or Hydrology <u>significantly disturbed</u> ? Are Vegetation <u>Soil</u> , or Hydrology <u>naturally problematic</u> ?	Image: State: TN Sampling Date: 04 NOV 2013 State: TN Sampling Point: SP-16 hip, Range: Sope (%): Slope (%): Long: -39.703009 Datum: WGS 84 DOCC. Houden Will classification: MONE No (If no, explain in Remarks.) Are "Normal Circumstances" present? Yes X No (If needed, explain any answers in Remarks.) Sinte leagth in any answers in Remarks.)
	onn locations, transects, important leatures, etc.
Hydrophytic Vegetation Present? Yes No Is the Samuel to the samuel totthe samuel tothe samuel to the samuel tothe samuel to the samuel t	wetland? Yes <u>X</u> No
PFO, Standing H20 observed 05 Nov 2018	ovior to heavy ppt.
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LRR U)	Drainage Patterns (B10)
X Saturation (A3) Hydrogen Sulfide Odor (C1)	Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres along Living	Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Iron (C4)	Crayfish Burrows (C8)
Drift Deposits (B3) Recent Iron Reduction in Tilled Soil	s (C6) Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remarks)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	► FAC-Neutral Test (D5)
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Sunace visiter Present? Tes No Depth (inches):	•
Water Table Present? $\text{Yes} \underline{\mathcal{N}}$ No Depth (inches):	
(includes capillary fringe)	Wetland Hydrology Present? Yes No
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous insp	ections), if available:
Quere alter	
Remarks:	

Sampling Point: SP-16

VEGETATION (Four Strata) – Use scientific names of plants.

201	Absolute	Dominant	Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size: <u>50</u>) 1. QUEVEUS Phellos	<u>% Cover</u>	<u>Species?</u> <u>Y-CS</u>	Status FACW	Number of Dominant Species 3 (A)
2	**********			Total Number of Dominant U Species Across All Strata: (B)
4				Percent of Dominant Species 15
6				
7				Prevalence Index worksheet:
8.				Total % Cover of: Multiply by:
	US	= Total Cov	/er	OBL species x 1 =
50% of total cover: 32.5	20% of	total cover	13	FACW species x 2 =
Sanling/Shrub Stratum (Plot size: 15		9 J		FAC species x 3 =
1 Carpinus caroliniana	3	Ves	FAC	FACU species x 4 =
······································				UPL species x 5 =
2				Column Totals: (A) (B)
4.	A		******	Drovelence Index - B/A -
5				Hydrophytic Vegetation Indicators:
6				1 - Rapid Test for Hydrophytic Vegetation
7				2 - Dominance Test is >50%
8.				3 - Drevelence Index is <3.0 ¹
	3	= Total Cov	/er	5 - Frevalence index is 35.0
, 50% of total cover: 1-5	20% of	total cover	0.6	
Herb Stratum (Plot size: 5				¹ Indicators of hydric soil and wetland hydrology must
1. Aucuna Striata	25	Yes	OBL	be present, unless disturbed or problematic.
2 Lordicera Jabonica	25	Yes	FACU	Definitions of Four Vegetation Strata:
3 Sumphuotichum latenflorum	2	No	FAC	
1 Chasmanthium latifolium	1	No	FAL	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
5				height.
6	<u></u>			
7				than 3 in. DBH and greater than 3.28 ft (1 m) tall.
9	*****			
0.			*****	Herb – All herbaceous (non-woody) plants, regardless
9				
10.				Woody vine – All woody vines greater than 3.28 ft in
11. 				neight.
12.	C2			
71.0		= Total Cov	/er	· ·
SU% of total cover:	20% of	total cover	10.0	
Woody Vine Stratum (Plot size: 22				
1				
2				
3		Percent and the local data		
4				
5		·		Hydrophytic
		= Total Cov	/er	Vegetation
50% of total cover:	20% of	total cover	:	Present? Yes 🔼 No
Remarks: (If observed, list morphological adaptations belo	w).			

Profile Des	cription: (Describe t	o the depti	n needed to docur	nent the i	ndicator	or confirm	the absence	of indicat	ors.)	
Depth	Matrix		Redo	x Features	5	0				
(inches)	Color (moist)		<u>Color (moist)</u>		<u>Type'</u>	Loc ²	Texture		Remarks	
0-4	IUYROI	00	INAROLA	16	<u> </u>	M	SILFIO	am		
4-16	LOYRUL	60	IOYR SIX	40	C	M	and the second			
			,							
				-						
	·	<u></u>								
									_	
¹ Type: C=C	oncentration D=Denle	tion RM=F	Reduced Matrix M	 S=Masked	Sand Gra	ins	² Location:	PI = Pore I	ining M-Matrix	
Hydric Soil	Indicators: (Applica	ble to all L	RRs, unless other	wise note	ed.)		Indicators	for Proble	matic Hydric Soi	ls ³ :
Histosol	(A1)		Polyvalue Be	low Surfac	, e (S8) (LI	RR S. T. U	1 cm N	fuck (A9) (RR O)	
Histic Ep	bipedon (A2)		Thin Dark Su	rface (S9)	(LRR S. 1	п. U)	2 cm N	luck (A10)	(LRR S)	
Black Hi	stic (A3)		Loamy Muck	y Mineral (F1) (LRR	0)	Reduc	ed Vertic (F	-18) (outside ML	RA 150A.B)
Hydroge	n Sulfide (A4)		Loamy Gleye	d Matrix (F	=2)		Piedm	ont Floodpl	ain Soils (F19) (L	RR P, S, T)
Stratified	i Layers (A5)		X Depleted Mat	trix (F3)			Anoma	lous Bright	Loamy Soils (F2))
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark	Surface (Fi	6)		(MLF	RA 153B)		
5 cm Mu	icky Mineral (A7) (LRI	R P, T, U)	Depleted Dar	k Surface	(F7)		Red Pa	arent Mater	ial (TF2)	
			Redox Depre	SSIONS (F8	5)		Very S	hallow Dari	k Surface (TF12)	
T critivio Depleter	Below Dark Surface	(411)	Depleted Oct	кк U) pric (E11) (MIPA 15	43	Other (Explain in	Remarks)	
Thick Da	rk Surface (A12)	(, , , , , , , , , , , , , , , , , , ,	Iron-Mangan	ese Masse	s (F12) (L	'' .RR O. P. 1	r) ³ Indic	ators of hy	drophytic vegetati	on and
Coast Pi	airie Redox (A16) (MI	LRA 150A)	Umbric Surfa	ce (F13) (I	LRR P. T.	U)	wet	and hydrol	oav must be presi	ent.
Sandy M	lucky Mineral (S1) (LF	RR O, S)	Delta Ochric	(F17) (MLI	RA 151)	,	unle	ess disturbe	ed or problematic.	,
Sandy G	leyed Matrix (S4)		Reduced Ver	tic (F18) (I	MLRA 150	A, 150B)				
Sandy R	edox (S5)		Piedmont Flo	odplain Sc	oils (F19) (MLRA 149	A)			
Stripped	Matrix (S6)		Anomalous B	right Loam	ny Soils (F	20) (MLRA	149A, 153C,	153D)		
Dark Sur	tace (S/) (LRR P, S,	T, U)	·····							
Restrictive L	ayer (il observeu).									
Туре:									V	
	nes):						Hydric Soil	Present?	Yes N	lo
Remarks:										

Project/Site: Smokestack Mitigation Site city/County: Lakeland /Shelby Co. Sampling Date: Ob Nov 2014
Applicant/Owner: KES/IDVI State: IN Sampling Point: SP-17
Investigator(s): ANN GIIMORE, ENVIROSCIENCE Section, Township, Range:
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Concave Slope (%):
Subregion (LRR or MLRA): URR p ¹ Lat: 35.290459 Long: -89.708227 Datum: WGS 8
Soil Map Unit Name: W- Waverly Silfloam (0-2% slopes) occ. flooded WI classification: NONC
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
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 Hydric Soil Present? Yes X No within a Wetland? Yes X No Wetland Hydrology Present? Yes X No Wetland W-19 Yes X No Remarks: PSS portion of Wetland. Vetland. Vetland Vetland
HYDROLOGY
Wetland Hydrology Indicators: Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply) Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13) Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LRR U) Drainage Patterns (B10)
🕺 Saturation (A3) Hydrogen Sulfide Odor (C1) Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres along Living Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Iron (C4) Crayfish Burrows (C8)
Drift Deposits (B3) Recent Iron Reduction in Tilled Soils (C6) Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7) Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remarks) Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7) FAC-Neutral Test (D5)
Water-Stained Leaves (B9) Sphagnum moss (D8) (LRR T, U)
Field Observations:
Surface Water Present? Yes No Depth (inches):
Water Table Present? Yes X No Depth (inches): Ov() A
Saturation Present? Yes A No Depth (inches): SAT FACE 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: 9-17

201	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>D</u>)	<u>% Cover</u>	Species?	Status	Number of Dominant Species
1				That Are OBL, FACW, or FAC: (A)
2				Total Number of Dominant
3				Species Across All Strata:(B)
4				
5.				Percent of Dominant Species
6				
7	<u></u>			Prevalence Index worksheet:
	**********			Total % Cover of: Multiply by:
б, <u></u>	••••••••••••••••••••••••••••••		*****	OBL species x 1 =
		= I otal Co	ver	FACW species x 2 =
50% of total cover:	20% of	total cover	· · · · · · · · · · · · · · · · · · ·	FAC species x3 =
Sapling/Shrub Stratum (Plot size:)		1100	-	
1. FLUXINUS DEAINZVIANULON	-02	YES	FACW	
2		······		
3				Column Totals: (A) (B)
4.				Prevalence Index - P/A -
5.				Hydrophytic Vegetation Indicators
6				A Denial Tech for Understelling Verstelling
7				
0				2 - Dominance Test is >50%
°	C.C.			3 - Prevalence Index is ≤3.0'
276		= I otal Co	ver	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover: $\frac{21.9}{21.9}$	<u>20% of</u>	total cover	:	
Herb Stratum (Plot size: 2)	C •	11.00	I	¹ Indicators of hydric soil and wetland hydrology must
1. Cavez Vulpinolara	-50	<u>1985</u>	FACM	be present, unless disturbed or problematic.
2. Cavey Jurida	40	Yes	OBL	Definitions of Four Vegetation Strata:
3. Acer rubrum		No	FAC	Tree Meedy pleate evaluding visco 2 in (7.6 cm) or
4. Doellingicina umballata	5	NO	FACIN	more in diameter at breast height (DBH), regardless of
5		······		height.
6		4 		
7				than 3 in DBH and greater than 3 28 ft (1 m) tall
/				
8.	<u> </u>			Herb – All herbaceous (non-woody) plants, regardless
9				of size, and woody plants less than 3.28 ft tall.
10			·····	Woody vine - All woody vines greater than 3.28 ft in
11				height.
12				
	100	= Total Co	ver	
50% of total cover:	20% of	total cover	: <u>10</u>	
Woody Vine Stratum (Plot size: 301				
1				
2	*******			
2				
			•••••••••••••••••••••••••••••••••••••••	
4				
5				Hydrophytic
		= Total Co	ver	Vegetation Present? Ver No
50% of total cover:	20% of	total cover		
Remarks: (If observed, list morphological adaptations belo	w).			

SOIL								s	ampling Point	<u>SP-17</u>
Profile Des	cription: (Describe	to the dep	th needed to docum	nent the	indicator	or confirm	n the absence	of indicate	ors.)	~
Depth (is shoc)	Matrix		Redo	x Feature	<u>es</u>		Tautomo		D	
		. <u> </u>	LOV NCA	<u>~~~</u> 20	Iype	, <u>LOC</u>		<u>.</u>	Remarks	
<u> </u>	IVYK WII	10	INKOID				<u></u>	P		
<u> </u>				<u> </u>		M				
6-16	10YR61	40	7,5YR 44	30					•	
			8	10	ſ, .	M	······			
				* *		<u> </u>				
		• •	-		•		<u></u>			
						· ·····	······		•••	
¹ Type: C=C	concentration D=Den	letion RM=		Masker	d Sand Gr	aine	² l ocation:		ining M-Matr	
Hydric Soil	Indicators: (Applica	able to all	LRRs. unless other	wise not	red.)	aliis.	Indicators	for Proble	matic Hydric	IX. Snile ³
Histosol	(A1)		Polyvalue Bel	low Surfa	ee (S8) /L	RRSTI	n 1 cm N			00115 .
Histic Er	bibedon (A2)		Thin Dark Sur	rface (S9) (LRR S.	T. U)	2 cm N	luck (A10)	(IRRS)	
Black Hi	istic (A3)		Loamy Mucky	✓ Mineral	(F1) (LRF	1, 0) ₹ 0)	Reduce	ed Vertic (F	(LINE G) (outside l	MLRA 150A.B)
Hydroge	en Sulfide (A4)		Loamy Gleyer	d Matrix ((F2)	,	Piedmo	ont Floodpla	ain Soils (F19)	(LRR P, S, T)
Stratified	d Layers (A5)		🔀 Depleted Matr	rix (F3)			Anoma	lous Bright	Loamy Soils ((F20)
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark S	3urface (F	-6)		(MLR	(A 153B)	-	
5 cm Mu	ucky Mineral (A7) (LR	(R P, T, U)	Depleted Dark	k Surface	; (F7)		Red Pa	arent Materi	ial (TF2)	
Muck Pr	esence (A8) (LRR U))	Redox Depres	ssions (F	8)		Very SI	hallow Dark	Surface (TF1)	2)
1 cm Mu	ick (A9) (LRR P, 1)		Marl (F10) (LF	RR U)			Other (Explain in F	Remarks)	
Depietet	1 Below Dark Surface	; (A11)	Depleted Ochi	ric (F11)	(MLRA 1:	51) 1 PP O P	-) ³ India		·	· ··
Coast Pr	rairie Redox (A12)		I Un-Mangane	Se Wasse	85 (F12) (1 /1 88 8 7		T) Indica	ators of nyu	irophytic vege	tation and
Sandy M	Aucky Mineral (S1) (L	RR O, S)	Delta Ochric ((F17) (ML	RA 151)	, 0)	unless disturbed or problematic			
Sandy G	eleved Matrix (S4)	···· -, -,	Reduced Vert	ic (F18) (MLRA 15	0A. 150B)	0			
Sandy R	edox (S5)		Piedmont Flor	odplain S	oils (F19)	(MLRA 14	9A)			
Stripped	Matrix (S6)		Anomalous Br	right Loar	my Soils (I	F20) (MLR.	A 149A, 153C,	153D)		
Dark Sur	face (S7) (LRR P, S ,	, T, U)								
Restrictive L	ayer (if observed):									
Туре:									V	
Depth (inc	:hes):						Hydric Soil I	Present?	Yes X	No
Remarks:	· · · · · · · · · · · · · · · · · · ·						-L			
										I

Project/Site: Smokestack Mitigation Site City/County: Lakelandy Applicant/Owner: RES/TDOT-	Shelby Co Sampling Date: <u>06 NDV 20</u> 19 State: <u>TN</u> Sampling Point: <u>SP - 19</u>			
Section, Township, Range:	for a ave			
Landform (hillslope, terrace, etc.): <u>MUPICALIVI</u> Local relief (concave, convex	(, none): <u>(MCAVE</u> Slope (%):			
Subregion (LRR or MLRA): LRR P Lat: -35.290050 Long:	- <u>89.709422</u> Datum: WGS 84			
Soil Map Unit Name: WV-Waverly sill loam (0-2010 Slopes) occ. evoc	ted NWI classification: NONE			
Are climatic / bydrologic conditions on the site typical for this time of year? Yes X				
Are Vegetation Soil or Hydrology cignificantly disturbed? Are "Norm				
Are Vegetation, our hydrology significantly distributed? Are Norma	al Circumstances present? Yes <u>A</u> NO			
SUMMARY OF FINDINGS - Attach site map showing sampling point locati	explain any answers in Remarks.)			
Hydrophytic Vegetation Present? Yes No Is the Sampled Area Hydric Soil Present? Yes No within a Wetland? Wetland Hydrology Present? Yes No W- 0	Yes <u> X </u>			
PEM (north of field).				
HYDROLOGY				
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)			
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)			
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)			
Kigh Water Table (A2) Marl Deposits (B15) (LRR U)	Drainage Patterns (B10)			
Saturation (A3) Hydrogen Sulfide Odor (C1)	Moss Trim Lines (B16)			
Water Marks (B1) Oxidized Rhizospheres along Living Roots (C3)	Dry-Season Water Table (C2)			
Sediment Deposits (B2) Presence of Reduced Iron (C4)	Crayfish Burrows (C8)			
Drift Deposits (B3) Recent Iron Reduction in Tilled Soils (C6)	<u>X</u> Saturation Visible on Aerial Imagery (C9)			
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Position (D2)			
Iron Deposits (B5) Other (Explain in Remarks)	Shallow Aquitard (D3)			
Inundation Visible on Aerial Imagery (B7)	1 FAC-Neutral Test (D5)			
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)			
Field Observations:				
Surface Water Present? Yes <u>No A</u> Depth (inches):				
Vater Table Present? Yes <u>A</u> No Depth (inches): <u>A () 1000 State to constant</u>	V III			
(includes capillary fringe)	Hydrology Present? Yes <u>A</u> No			
Describe Recorded Data (stream gauge. monitoring well, aerial photos, previous inspections), if available	ailable:			
Remarks:				
14 ppt on 05 Nov 2018, However standing t	120 thigh Hzo			
LUNK ANDRALLY ALCOLOGICAL CLARKER ALL	IN ANTAL ONE DEMONIS.			

.

		C0.	1000	q_1
Samolino	Point:	-	2002	0

/EGETATION (Four Strata) – Use scientific na	ames of pl	ants.		Sampling Point:
30'	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size:) 1)	<u>% Cover</u>	Species	Status	Number of Dominant Species That Are OBL, FACW, or FAC: (A)
2				Total Number of Dominant Species Across All Strata: (B)
4				Percent of Dominant Species
56				That Are OBL, FACW, or FAC: (A/B)
7				Total % Cover of: Multiply by:
0,		= Total Co		OBL species x 1 =
50% of total cover	20% of	total cover		FACW species x 2 =
	2070 01		•	FAC species x 3 =
Saplind/Shrub Stratum (Plot Size. 10				FACU species x 4 =
]. 				UPL species x 5 =
3.				Column Totals: (A) (B)
4				Prevalence Index = B/A =
5				Hydrophytic Vegetation Indicators:
6		<u></u>	<u></u>	1 - Rapid Test for Hydrophytic Vegetation
7				X 2 - Dominance Test is >50%
8				3 - Prevalence Index is ≤3.0 ¹
		= Total Co	ver	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of	total cover	r:	
1 Persicana hudropiper	70	Ves	OBL	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2 SCIPOUS 80.	IS	No	OBL	Definitions of Four Vegetation Strata:
3 Acer monum	S	NA	FAC	
4				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height
5 6			·	Sapling/Shrub - Woody plants, excluding vines, less
7			·	than 3 in. DBH and greater than 3.28 ft (1 m) tall.
9	·····			of size, and woody plants less than 3.28 ft tall.
10				Woody vine – All woody vines greater than 3.28 ft in height.
12				
: 3 <i>4</i>	40	= Total Co	ver	
50% of total cover: <u>49</u>	20% of	f total cove	r: <u>10</u>	
Woody Vine Stratum (Plot size: 20)				
1	···· ·····			
2				
3				
4				
5				Hydrophytic
		= Total Co	ver	Vegetation Version No.
50% of total cover:	20% of	f total cove	r:	
Remarks: (If observed, list morphological adaptations be	low).			

SOIL

Denth	cription: (Describe Matrix	to the deptr	i needed to docur Redo	Nent the I	naicator (or contirm	i the absence of indica	ators.)
(inches)	Color (moist)	%	Color (moist)	<u>%</u>	Type ¹	Loc ²	Texture	Remarks
0-10	5451	90 -	ISYR58	20	C	M	Silt luam	
	· ····			-			······	
							<u></u>	
				·				
		. <u></u>		·				
				·	<u> </u>		, <u></u>	
1		· · · · · · · · · · ·						
Type: C=C	oncentration, D=Dep	letion, RM=R	Reduced Matrix, MS	S=Masked	Sand Gra	ins.	² Location: PL=Pore	Lining, M=Matrix.
Hyaric Soli	indicators: (Applic	adie to all Li	RRS, Unless other	wise note	ed.)		Indicators for Prob	lematic Hydric Soils":
Histosol	(A1)		Polyvalue Be	low Surfac	ce (S8) (LF	RR S, T, U) 1 cm Muck (A9)	(LRR O)
	pipedon (A2)		I nin Dark Su	Minarol ((LRR S, T	r, u) ()	2 cm Muck (A10) (LRR S)
	istic (A3) an Sulfide (Δ4)			y Minerai (d Matrix (1	FT) (LKK	0)	Reduced Vertic	(F18) (OUISIDE MLRA 150A, B)
Stratified	d Lavers (A5)		Y Depleted Mat	rix (E3)	2)		Anomalous Brid	$f(\mathbf{L}, \mathbf{R}, \mathbf{R}, \mathbf{S}, \mathbf{I}) = f(\mathbf{L}, \mathbf{R}, \mathbf{R}, \mathbf{S}, \mathbf{I})$
Organic	Bodies (A6) (LRR P.	T, U)	Redox Dark 8	Surface (Fi	6)		(MLRA 153B)	
5 cm Mu	ucky Mineral (A7) (LF	R P, T, U)	Depleted Dar	k Surface	(F7)		Red Parent Mate	erial (TF2)
Muck Pr	esence (A8) (LRR U)	Redox Depre	ssions (F8	5)		Very Shallow Da	ark Surface (TF12)
1 cm Mu	ick (A9) (LRR P, T)		Marl (F10) (L	RR U)			Other (Explain ir	Remarks)
Depleter	d Below Dark Surface	e (A11)	Depleted Och	nric (F11) (MLRA 15	1)	_	
Thick Da	ark Surface (A12)		Iron-Mangane	ese Masse	s (F12) (L	.RR 0, P,	T) ³ Indicators of h	ydrophytic vegetation and
Coast Pi	rairie Redox (A16) (N	ILRA 150A)	Umbric Surfa	ce (F13) (I	LRR P, T,	U)	wetland hydro	ology must be present,
Sandy M	UCKY MINERAL (S1) (L	RR 0, 5)	Delta Ochric ((F17) (ML) Ha (F18) /	RA 151)	A 4500)	unless disturt	bed or problematic.
Sandy R	edox (S5)		Piedmont Flo	odolain Sc	VILIKA 100 vile (E10) (MIRA 1705)	0 ^)	
Stripped	Matrix (S6)		Anomalous B	right Loam	ny Soils (F	20) (MLR/	A 149A 153C 153D)	
Dark Su	rface (S7) (LRR P, S	, T, U)			.,			
Restrictive I	ayer (if observed):							
туре: <u>S1</u>	and ind H20	- diff	icult to di	0				
Depth (ind	hes): <u>()</u>			*****			Hydric Soil Present?	Yes X No
Remarks:								

Printer Smoke Stack Mitiantian Site anound akeland/ Shelpy 10 and as Nov 201
Application PES / TD/IT
Applicativowner. 1207 1001 State: IN Sampling Point: 711
Investigator(s): <u>ATTER OTTER TOTO TOTO CONTA</u> Section, Township, Range:
Landform (hillslope, terrace, etc.): TUYACC Local relief (concave, convex, none): +104 Slope (%):
Subregion (LRR or MLRA): <u>LRK r</u> Lat: <u>33. 201264</u> Long: <u>-09. 109030</u> Datum: <u>WG3.8</u> L
Soil Map Unit Name: <u>FM-Falaya Sift 10am</u> NWI classification: <u>None</u>
Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes 📈 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 No _X Is the Sampled Area Hydric Soil Present? Yes No _X Is the Sampled Area Wetland Hydrology Present? Yes No _X within a Wetland? Yes No _X
Remarks: Forest, north of agricultural field.
HYDROLOGY
Wetland Hydrology Indicators: Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply) Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13) Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LRR U) Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor (C1) Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres along Living Roots (C3) Dry-Season water Table (C2) Sediment Denosits (B2) Presence of Reduced Iron (C4) Cravitich Burrows (C8)
Drift Deposits (B3) Recent Iron Reduction in Tilled Soils (C6) Seturation Visible on Aerial Imageny (C0)
Algal Mat or Crust (B4) Thin Muck Surface (C7) Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remarks) Shallow Aguitard (D3)
Inundation Visible on Aerial Imagery (B7) FAC-Neutral Test (D5)
Water-Stained Leaves (B9) Sphagnum moss (D8) (LRR T, U)
Field Observations:
Surface Water Present? Yes No Depth (inches):
Water Table Present? Yes No Depth (inches):
Saturation Present? Yes No _X Depth (inches): Wetland Hydrology Present? Yes No _X (includes capillary fringe)
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Remarks:
No hydrology observed.

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: SP-19

201	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size:)	% Cover	Species?	Status	Number of Dominant Species
1. QUEVOUS talcata	30	Yes	FAUL	That Are OBL, FACW, or FAC: (A)
2. QUEVENS NIGVA	15	Yes	FAC	Tabel Mumber of Decels and
3 OUCYCUS muhlenbernii	10	No	Url	Species Across All Strata: (B)
Cana ovata	Pr	NIA	FATU	
- MALLE APPLIANTIS	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Ala	FACIL	Percent of Dominant Species 11.3 01
5. <u>CUITS VCCCCCCCCCCC</u>		140	<u>rnm</u>	That Are OBL, FACW, or FAC: (A/B)
6	••••••			Brauslanc's Index workshoot
7				
8				O
	68	= Total Co	ver	OBL species 0 $x = 0$
50% of total cover: 32	20% of	f total cover	. 14	FACW species $\frac{22}{2}$ x 2 = $\frac{44}{2}$
Carling/Chruth Stratum (Diat cize: 15			• •	FAC species 25 x 3 = 75
Saping/Shrub Stratum (Plot Size. 10)	in	VIC	FACLI	FACU species $73 \times 4 = 292$
1. <u>CAVNA. OVOLTA</u>	-10-	110	TAUM	$IIPI \text{ species} IV \qquad x 5 = S0$
2. UIMMS YUOVA	10	YES	FAC	$\frac{1}{2} \frac{1}{2} \frac{1}$
3. PMINUS CF. VIVAINIANA	5	Yes	FACU	Column lotais: $(A) = (A)$ (B)
4.		•		Prevalence index = $B/A = -3.5$
5.				
6				nyulophytic vegetation indicators:
7				1 - Rapid Test for Hydrophytic Vegetation
				_ <u>∕_</u> 2 - Dominance Test is >50%
8	ne		<u></u>	3 - Prevalence Index is ≤3.0 ¹
	15	= Total Co	ver	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover: 3	20% of	f total cover	<u> </u>	
Herb Stratum (Plot size: 5				¹ Indicators of hydric soil and wetland hydrology must
1 Innicera Idopnica	25	Vis	FACU	be present, unless disturbed or problematic.
2				Definitions of Four Vegetation Strata
			<u></u>	Deminions of Four Vegetation Otrata.
3				Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or
4			<u> </u>	more in diameter at breast height (DBH), regardless of
5				neight.
6			<u> </u>	Sapling/Shrub – Woody plants, excluding vines, less
7.				than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8				
0				of size, and woody plants less than 3.28 ft tall
				or size, and woody plants less than 5.25 k tail.
10				Woody vine - All woody vines greater than 3.28 ft in
11	·······			height.
12				
	<u>_2s</u> _	= Total Co	ver	
50% of total cover: 3	20% of	f total cover	: 5	
Woody Vine Stratum (Plot size: 30)				
Vitis Vidad	17-	2YV	FACIN	
1. <u>1113 11 PARTON</u>			1/1004	
2		000 to 100		
3.		·		
4				
5				Hydrophytic
	12	= Total Co	ver	Vegetation
50% of total cover:	20% of	f total cove	. 2	Present? Yes No 👗
Pamarke: (If observed, list morphological adaptations hold			·	l
Remarks. (it observed, list morphological adaptations beit	ww.j.			

Profile Description: (Describe to the de	pth needed to document the indicator or confirm	n the absence of indicators.)
Depth <u>Matrix</u>	Redox Features	
<u>(inches)</u> <u>Color (moist)</u> <u>%</u>	<u>Color (moist)</u> <u>%</u> <u>Type'</u> <u>Loc</u> ²	Texture Remarks
0-14 107R414 05	107K514 15	SIT DAM
		<u></u>
<u>.</u>		
		·
		2
Hydric Soil Indicators: (Applicable to a	I RRs. upless otherwise poted)	"Location: PL=Pore Lining, M=Matrix.
Historal (Ad)	Delevative Deleva Outface (OC) (LDD O T L	Indicators for Problematic Hydric Sons :
Histosof (A1) Histic Epipedon (A2)	Polyvalue Below Surface (S8) (LRR S, I, L This Dark Surface (S9) (LRR S, T, U)	J) 1 cm Muck (A9) (LRR O)
Black Histic (A3)	Loamy Mucky Mineral (E1) (LRR O)	2 citrividek (A10) (LKR S) Reduced Vertic (E18) (outcide MLRA 1506 R)
Hydrogen Sulfide (A4)	Loamy Gleved Matrix (E2)	Piedmont Eloodalain Soils (E19) (LRR D. S. T)
Stratified Lavers (A5)	Depleted Matrix (F3)	Anomalous Bright Loamy Soils (E20)
Organic Bodies (A6) (LRR P, T, U)	Redox Dark Surface (F6)	(MLRA 153B)
5 cm Mucky Mineral (A7) (LRR P, T, U	Depleted Dark Surface (F7)	Red Parent Material (TF2)
Muck Presence (A8) (LRR U)	Redox Depressions (F8)	Very Shallow Dark Surface (TF12)
1 cm Muck (A9) (LRR P, T)	Marl (F10) (LRR U)	Other (Explain in Remarks)
Depleted Below Dark Surface (A11)	Depleted Ochric (F11) (MLRA 151)	
Thick Dark Surface (A12)	Iron-Manganese Masses (F12) (LRR O, P,	T) ³ Indicators of hydrophytic vegetation and
Coast Prairie Redox (A16) (MLRA 150	A) Umbric Surface (F13) (LRR P, T, U)	wetland hydrology must be present,
Sandy Mucky Mineral (S1) (LRR O, S)	Delta Ochric (F17) (MLRA 151)	unless disturbed or problematic.
Sandy Gleyed Matrix (S4)	Reduced Vertic (F18) (MLRA 150A, 150B)	24
Sandy Redox (S5) Stripped Matrix (S6)	Pleamont Floodplain Soils (F19) (MLRA 14	9A) A 4494 4530 453D)
Dark Surface (S7) (IRR P. S. T. II)	Anomalous Bright Loarny Solis (F20) (WER	A 149A, 153C, 153D)
Restrictive Laver (if observed):		T
Depth (inches):	1111-1	
Deptil (inches).		Hydric Soil Present? Yes No
Remarks:		

Project/Site: Smolustack Mitigation sile city/ Applicant/Owner: RES /TDOT Investigator(s): ANN Gilmore, Envinscience sect	County: <u>LAKIAND Shully</u> (D. Sampling Date: <u>06 NoV 2018</u> State: <u>TN</u> Sampling Point: <u>SP - 20</u> tion, Township, Range:
Landform (hillslope, terrace, etc.): <u>MUPYLAS(0)</u> Loca	al relief (concave, convex, none): <u>CONCAVE</u> Slope (%):
Subregion (LRR or MLRA): WH P Lat: 35.299	492 Long: - 89.710527 Datum: WGS 84
Soil Map Unit Name: <u>FM - Falaya Silt Ioam</u>	NWI classification: PSSIC
Are climatic / hydrologic conditions on the site typical for this time of year?	Yes No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly distu	ırbed? Are "Normal Circumstances" present? Yes No
Are Vegetation, Soil, or Hydrology naturally problem	natic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing sar	mpling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes X No Hydric Soil Present? Yes X No Wetland Hydrology Present? Yes X No	Is the Sampled Area within a Wetland? Yes <u>X</u> No W-23
PFO-connects to small portion of No standing Hzo on os November b	PEM in agricultural field. Ut water stained leaves observed.
HYDROLOGY	
Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required) Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10) (C1) Moss Trim Lines (B16) along Living Roots (C3) Dry-Season Water Table (C2) on (C4) Crayfish Burrows (C8) Tilled Seile (C6) Vestication Visible on Antice (C2)
	Ks) Asturation Visible on Aerial Imagery (C9) Geomorphic Position (D2) Shallow Aquitard (D3) K FAC-Neutral Test (D5) Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Surface water Present? Yes <u>No</u> Depth (inches):	Those SULVERIE
Saturation Present? Yes <u>No </u> Depth (inches): <u>C</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No
Remarks:	vious inspections), if available:

Sampling Point: SP-20

VEGETATION (Four Strata) – Use scientific names of plants.

2.1	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>30</u>)	% Cover	Species?	Status	Number of Dominant Species
1. Acer saccharinum	45	yes	FACW	That Are OBL, FACW, or FAC: (A)
2				
0				Total Number of Dominant
				Species Across All Strata.
4				Percent of Dominant Species
5				That Are OBL, FACW, or FAC: (A/B)
6			<u></u>	
7.				Prevalence Index worksheet:
8				Total % Cover of:Multiply by:
0	115			OBL species x 1 =
225	<u></u>		/er n	FACW species x 2 =
50% of total cover: <u>UL-3</u>	20% of	total cover	:	FAC species x 3 =
Sapling/Shrub Stratum (Plot size: 12	1.1.	N. C.C.	6.4.6	
1. Ulmus americana		Yes	PARC	
2 FRAXINIAS DEMNSIAIVANICA	Ч	Yes	FACW	UPL species x 5 =
2		**********************	alenderindiarranım.	Column Totals: (A) (B)
			•••••••••••••••••••••••••••••••	
4				Prevalence Index = B/A =
5				Hydrophytic Vegetation Indicators:
6				1 - Rapid Test for Hydrophytic Vegetation
7.				X 2 Dominance Test is >50%
Q				
o	IJ			3 - Prevalence Index is ≤3.0'
~		= 1 otal Co	ver Λ .	Problematic Hydrophytic Vegetation (Explain)
50% of total cover:	20% of	total cover	:	
Herb Stratum (Plot size:)			- A 8	¹ Indicators of hydric soil and wetland hydrology must
1. Sumphyotrichum latentlorum	40	yes	FAL	be present, unless disturbed or problematic.
2 SCIVINAS' SO	3	No	OBU	Definitions of Four Vegetation Strata:
2 PLATANTA MAMOVIALA	2	bla	ABL.	
Larvalle beachings for	1	<u></u>	EMIN	Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or
4. FYAXIVIAS DEMISATVANICA	<u> </u>	<u></u>	LUW .	more in diameter at breast height (DBH), regardless of
5. <u>MVer Succedentananan</u>		<u> </u>	FAL	neight.
6				Sapling/Shrub - Woody plants, excluding vines, less
7				than 3 in. DBH and greater than 3.28 ft (1 m) tall.
0				
0				Herb – All herbaceous (non-woody) plants, regardless
9				or size, and woody plants less than 3.26 it tail.
10				Woody vine - All woody vines greater than 3.28 ft in
11				height.
12				
	ЧЛ	= Total Co	/er	
500 statel			au	
50% of total cover:	20% 0	total cover	<u>. (, (</u>	
Woody Vine Stratum (Plot size: <u>30</u>)	~	alac	1	
1 Campsis radicans	<u> </u>	Yes	FAC	
2.				
3				
		······		
4		<u></u>		
5				Hydrophytic
	3	= Total Co	ver	Vegetation
50% of total cover: 1,5	20% of	total cover	: 0.6	Present? Yes <u>A</u> No
Remarks: (If observed, list morphological adaptations belo				1
Tremarks: (in observed, ist morphological adaptations belo				

SOIL

Profile Des	cription: (Describe	to the depth r	needed to docur	ment the in	ndicator	or confirm	the absence	of indica	tors.)	
Depth	Matrix		Redo	x Features	<u> </u>					
(inches)	Color (moist)	<u>%</u>	Color (moist)		Type'	_Loc ²			Remarks	
0-10	<u>IOYR GIL</u>	96 1	UYE SI8	10	<u> </u>	<u>_M_</u>	<u></u>	2 <u>am</u>		
			· ·							
		·								
	·									
										<u></u>
	<u></u>									
1										
Type: C=C	oncentration, D=Dep	letion, RM=Re	duced Matrix, MS	S=Masked	Sand Gra	iins.	² Location:	PL=Pore	Lining, M=Matrix	(.
Hydric Soil	Indicators: (Applica	able to all LRI	Rs, unless other	rwise note	d.)		Indicators	for Proble	ematic Hydric S	Soils":
Histoso	(A1)	-	Polyvalue Be	low Surfac	e (S8) (L I	RR S, T, U))1 cm M	Muck (A9)	(LRR O)	
Histic E	pipedon (A2)	-	Thin Dark Su	Irface (S9)	(LRR S,	T, U)	2 cm N	Muck (A10)	(LRR S)	
Black H	ISTIC (A3)	-	Loamy Muck	y Mineral (I	F1) (LRR	0)	Reduc	ed Vertic (F18) (outside M	LRA 150A,B)
Hydroge Stratifia	en Sumde (A4)	-	Loamy Gleye	Matrix (F	-2)		Piedm	ont Floodp	lain Soils (F19)	(LRR P, S, T)
Sualifie	Bodies (AS)	т (1) —	Bedoy Dark	ITIX (F3) Surface (E4	2)		Anoma	alous Brign	it Loamy Solis (F	-20)
Organic	icky Mineral (A7) (LRK P,	1,0) <u>-</u> RPTIN	Redox Dark	Sunace (Fo	(57)		(IVILI Pad D	KA 103B) arant Mata		
Senting	esence (A8) (I RR II)		Bedoy Depre	r Ourrace (E8)		Keurs		rk Surfage /TE1°	2
1 cm Mi	ick (A9) (I RR P. T)		Marl (F10) /I	RRIN)		Very d	(Evolain in	Remarks)	-)
Deplete	d Below Dark Surface	- (A11)	Depleted Och	nric (F11) (MLRA 15	1)			(Contarks)	
Thick Da	ark Surface (A12)		Iron-Mangan	ese Masse	s (F12) (L		r) ³ Indic	ators of hy	/drophytic vegeta	ation and
Coast P	rairie Redox (A16) (M	LRA 150A)	Umbric Surfa	ce (F13) (L	.RR P, T,	U)	wet	land hydro	logy must be pre	esent.
Sandy N	lucky Mineral (S1) (L	RR 0, S)	Delta Ochric	(F17) (MLF	RA 151)	,	unie	ess disturb	ed or problemati	C.
Sandy G	Bleyed Matrix (S4)		Reduced Ver	tic (F18) (N	ILRA 150	A, 150B)				
Sandy R	edox (S5)	_	Piedmont Flo	odplain So	ils (F19) (MLRA 149	A)			
Stripped	Matrix (S6)		Anomalous B	right Loam	y Soils (F	20) (MLRA	149A, 153C,	, 153D)		
Dark Su	rface (S7) (LRR P, S,	T, U)								
Restrictive I	_ayer (if observed):	· ·· ce	11.5							
Type: <u>기</u>	anaina Hzo	OITTILL	11 10 419							
Depth (inc	ches):10 ^v		-				Hydric Soil	Present?	Yes <u>X</u>	No
Remarks:										

Project/Site: SMOKESTACK Mitigation Site city	county: Lakel and/Shelpy CO, Sampling Date: 06 NOV 2018
Applicant/Owner: RES /TDIT	State: TN Sampling Point: SP-2
Investigator(s): ANN Gilmore Sect	tion. Township. Range:
Landform (hillslope, terrace, etc.); AUDYESSION	I relief (concave, convex, none); COVICAVE, Slope (%);
Subregion (LRB or MLRA): LRAP Lat: 35,289	234 Long: - 929, 7090 16
Sail Man Unit Name: LAW- LALAY Y LA Silt DAM (0-2.40 Sh	DRA) OCE Floridid man is a long
Son Map Onit Name. <u>USA ACCOUNT A STATE COMPANY</u>	V V
Are climatic / hydrologic conditions on the site typical for this time of year?	Yes No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly distu	rbed? Are "Normal Circumstances" present? Yes <u>1</u> No
Are Vegetation _^, Soil, or Hydrology naturally problem	atic? (If needed, explain any answers in Remarks.)
	inping point locations, transects, important leatures, etc.
Hydrophytic Vegetation Present? Yes <u>Ves</u> No	Is the Sampled Area
Hydric Soil Present? Yes <u>X</u> No	within a Wetland?
Wetland Hydrology Present? Yes <u>k</u> No	Will
Mathon A withour Monicultural field	, problematic wa dure to land
Manual and Contract and the stand	Cil Nichulard france alexing 1
(nevaria and playin ha)	· 2011 MEININGER GAMAN MEDILIA
planting.	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LR	R U) Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor (C1) Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres a	along Living Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Iro	n (C4) Crayfish Burrows (C8)
Drift Deposits (B3) Recent Iron Reduction in	Tilled Soils (C6) <u>A</u> Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remark	(s) Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Water Table Present? Yes V No Depth (inches):	MANE CAIL SUFFACE
Saturation Present? Ver No Dopth (inches):	Mintland Hudenland Bessent? You Y
(includes capillary fringe)	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, pre	vious inspections), if available:
Bomatici	
Remarks.	

Sampling Point: SP-21

VEGETATION (Four Strata) – Use scientific names of plants.

anl	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 20*)	% Cover	Species?	Status	Number of Dominant Species
1				That Are OBL, FACW, or FAC: (A)
2				
2 · · ·			********	Total Number of Dominant
3				Species Across All Strata:
4		<u></u>	·	Percent of Dominant Species
5				That Are OBL, FACW, or FAC: (A/B)
6			,	
7.				Prevalence Index worksheet:
8				Total % Cover of:Multiply by:
. 0,				OBL species x 1 =
		= Total Cov	er	EACW species 0 x 2 = 0
50% of total cover:	20% of	total cover:		$EAC appairs \frac{3}{2} \times 2 = \frac{9}{2}$
Sapling/Shrub Stratum (Plot size: 2)				
1.				FACU species $0 \times 4 = 0$
2				UPL species $\frac{1}{100}$ x 5 = $\frac{100}{100}$
3				Column Totals: <u>73</u> (A) <u>104</u> (B)
3.		*****		1 -17
4				Prevalence Index = $B/A = \frac{V \cdot IO}{IO}$
5				Hydrophytic Vegetation Indicators:
6				1 - Rapid Test for Hydrophytic Vegetation
7.				2 Dominance Tect is >5004
8				
o				$\frac{3}{100}$ - Prevalence index is $\leq 3.0^{\circ}$
		= I otal Cov	er	X Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of	total cover:		
Herb Stratum (Plot size: 💆)				¹ Indicators of hydric soil and wetland hydrology must
1 Glucine max	10	yes	UPL	be present, unless disturbed or problematic.
2 Parauralius arms	12	Νn	FAT,	Definitions of Four Vegetation Strata
- Bachalces will avid	<u> </u>	<u> </u>	EM	beimitions of Four Vegetation of ata.
3. DUT WAVEN VIAIMAVIS		141	FAL	Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or
4		·		more in diameter at breast height (DBH), regardless of
5				height.
6.				Sapling/Shrub – Woody plants, excluding vines, less
*7				than 3 in. DBH and greater than 3.28 ft (1 m) tall.
1				. ,
8		*****		Herb - All herbaceous (non-woody) plants, regardless
9.				of size, and woody plants less than 3.28 ft tall.
10				Woody vine - All woody vines greater than 3.28 ft in
11.				height.
10				
12.	12			
lir	6.4	= I otal Cov	ver NL In	
50% of total cover:	20% of	total cover:	<u><u> </u></u>	
<u>Woody Vine Stratum</u> (Plot size: <u>30</u> ')				
1.				
)				
2.				
3.				
4			-	
5				Hydrophytic
		= Total Cov	er	Vegetation
EQU/ oftatal acuar:	200/ of			Present? Yes 🕺 No
	20% 0	total cover.		
Remarks: (If observed, list morphological adaptations belo	w).			

SOIL

.

(inches)	Matrix		Rede	<u>ox Feature</u>	s			
	Color (moist)	%	Color (moist)	%	Type ¹	_Loc ²	Texture	Remarks
0-6	10YR 612	15	10YE 518	20	C	ΛI	silt loam	
	·	- <u></u>	INVE SIL	C	Δ.	in A	- <u></u>	
			NAK AL			14		
		·					· · · · · · · · · · · · · · · · · · ·	
		·	·····	-				······
Turne: 0-0		lation DM	-Deduced Metalic A				2	·····
lydric Soil	ndicators: (Applica	able to all	IRRE uplace othe	S=Iviasket	a Sand Gr	ains.	Location: PL=Pore	Lining, M=Matrix.
iyunc oon i		able to all	LICKS, Unless offie	I WISE HOL	eu.)		Indicators for Prob	iematic Hydric Solis";
Histosol	(A1)		Polyvalue Be	elow Surfa	ce (S8) (L	.RR S, T,	U) 1 cm Muck (A9)	(LRR O)
Histic Ep	pipedon (A2)		Thin Dark Su	urface (S9)	(LRR S,	T, U)	2 cm Muck (A10) (LRR S)
_ Black Hi	stic (A3)		Loamy Muck	y Mineral	(F1) (LRR	l O)	Reduced Vertic	(F18) (outside MLRA 150A
Hydroge	n Sulfide (A4)		Loamy Gleye	ed Matrix (F2)		Piedmont Flood	plain Soils (F19) (LRR P, S,
Stratified	Layers (A5)		Depleted Ma	trix (F3)			Anomalous Brig	ht Loamy Soils (F20)
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark	Surface (F	6)		(MLRA 153B)	
5 cm Mu	cky Mineral (A7) (LR	R P, T, U)	Depleted Da	rk Surface	(F7)		Red Parent Mate	erial (TF2)
_ Muck Pr	esence (A8) (LRR U)		Redox Depression	essions (F	B)		Very Shallow Da	rk Surface (TF12)
_ 1 cm Mu	ck (A9) (LRR P, T)		Marl (F10) (L	.RR U)			Other (Explain in Control of the	n Remarks)
_ Depleted	Below Dark Surface	e (A11)	Depleted Oc	hric (F11)	(MLRA 1	51)	2	
Thick Da	rk Surface (A12)		Iron-Mangan	ese Mass	es (F12) (LRR O, P	, T) ³ Indicators of h	ydrophytic vegetation and
_ Coast Pr	airie Redox (A16) (M	LRA 150A	 Umbric Surfa 	ice (F13) (LRR P, T	, U)	wetland hydro	ology must be present,
_ Sandy M	ucky Mineral (S1) (L	RR O, S)	Delta Ochric	(F17) (ML	RA 151)		unless distur	ped or problematic.
_ Sandy G	leyed Matrix (S4)		Reduced Ver	rtic (F18) (MLRA 15	0A, 150B)	
Sandy R	edox (S5)		Piedmont Flo	odplain S	oils (F19)	(MLRA 14	49A)	
_ Stripped	Matrix (S6)		Anomalous E	Bright Loar	ny Soils (I	=20) (MLF	RA 149A, 153C, 153D)	
_ Dark Sur	face (S7) (LRR P, S ,	T, U)						
	aver (if observed):							
estrictive L	, ,							
estrictive L								17
Type: Depth (inc	hes):						Hydric Soil Present?	Yes No
Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes No
estrictive L Type: Depth (inc emarks:	hes):			<u></u>			Hydric Soil Present?	Yes No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>V</u> No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u> </u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u> </u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u> No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u> </u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u> No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u> No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u> No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u> No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u> No
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>
estrictive L Type: Depth (inc emarks:	hes):						Hydric Soil Present?	Yes <u>No</u>

WETLAND DETERMINATION DATA FOR	M – Atlantic and Gulf Coastal Plain Region
Project/Site: <u>SMOKESTRUK Mitigation Site</u> City/O Applicant/Owner: <u>PES / TDOT</u> Investigator(s): <u>Ahm Gilmore, Enviroscience</u> Section Landform (hillslope, terrace, etc.): <u>Termu</u> Local Subregion (LRR or MLRA): <u>LRR P</u> Lat: <u>35, 2886</u> Soil Map Unit Name: <u>FM- Falaya silt Ioam</u> Are climatic / hydrologic conditions on the site typical for this time of year? Y Are Vegetation, Soil, or Hydrology significantly disture Are Vegetation, Soil, or Hydrology naturally problema SUMMARY OF FINDINGS - Attach site map showing sam	ounty: <u>Melland</u> <u>(Shulby Go.</u> Sampling Date: <u>Ole</u> NW 2018 State: <u>TN</u> Sampling Point: <u>Sp-22</u> on, Township, Range:
Hydrophytic Vegetation Present? Yes No Hydric Soil Present? Yes No Wetland Hydrology Present? Yes No Remarks: Ripanan Amount Remarks	Is the Sampled Area within a Wetland? Yes No
HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required) Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10) 1) Moss Trim Lines (B16) ong Living Roots (C3) Dry-Season Water Table (C2) r(C4) Crayfish Burrows (C8) Tilled Soils (C6) Saturation Visible on Aerial Imagery (C9) s) Shallow Aquitard (D3) FAC-Neutral Test (D5) Sphagnum moss (D8) (LRR T, U)
Field Observations: Surface Water Present? Yes No Depth (inches): Water Table Present? Yes No Depth (inches): Saturation Present? Yes No Depth (inches): Saturation Present? Yes No Depth (inches): Cincludes capillary fringe) Depth (inches): Describe Recorded Data (stream gauge. monitoring well, aerial photos, prev Remarks: No Mydwlvgy observed.	Wetland Hydrology Present? Yes No X

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point:	<u>sp</u>	-22
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72	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>20</u>)	<u>% Cover</u>	Species?	Status	Number of Dominant Species
1. Populus actuacs	30	yes	FAC	That Are OBL, FACW, or FAC: (A)
2. Activ sacchannum	_25_	Yes	FAC	Total Number of Dominant
3. Acer negundo	18	Yes	FAC	Species Across All Strata:(B)
4				
5				That Are ORL EACING or EAC: 77% (A/R)
6				
7			•	Prevalence Index worksheet:
<i>1</i> .				Total % Cover of:Multiply by:
8	72			OBL species x 1 =
210 2	<u></u>	= Iotal Cov	er Male	FACW species x 2 =
50% of total cover: <u>JUN</u>	20% of	total cover:	17.10	FAC species x 3 =
Sapling/Shrub Stratum (Plot size: 10)	12	100	11/21	
1. LIAUSTRUM VUIGARE	12	<u>va</u>	Mrv	
2. Fraxinus pennsulvanica		<u></u>	FAUN	
3		/		Column Totals: (A) (B)
4				Prevalence index = B/A =
5				Hydrophytic Vegetation Indicators:
6.				1 - Repid Test for Hydrophytic Vegetation
7				
0	******			
0.	12	- Total Ca		3 - Prevalence Index is ≤3.0"
11 6		= Iotal Cov	ula	Problematic Hydrophytic Vegetation' (Explain)
	20% of	total cover:	<u></u>	
Herb Stratum (Plot size:)	1.0	line	CAA	¹ Indicators of hydric soil and wetland hydrology must
1. JUMPHUMUM IATOVITIOVAVII	<u></u>	Yes	FAC	be present, unless disturbed or problematic.
2. EUDNUMUS TORTUNCI	-10-	<u>ycs</u>	UPU	Definitions of Four Vegetation Strata:
3. Cinna anundinacca	<u> </u>	No	FACW	Tree - Woody plants excluding vines 3 in (7.6 cm) or
4				more in diameter at breast height (DBH), regardless of
5.				height.
6.				Sanling/Shrub Woody plants, excluding vines, less
7	<u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>			than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8				
o		******		Herb – All herbaceous (non-woody) plants, regardless
9		······		
10				Woody vine - All woody vines greater than 3.28 ft in
11.				height.
12.	0.0			
e liver	40	= Total Cov	er	
50% of total cover:	20% of	total cover	12	
<u>Woody Vine Stratum</u> (Plot size: <u>30</u> ')				
1. Toxicodendron radicans	20	Ves	FAC	
2. Vitis riparia	10	Yes	FAW	
3				
4				
5				
J	30			Hydrophytic
		= Total Cov		Present? Yes X No
50% of total cover: 15	20% of	total cover		
Remarks: (If observed, list morphological adaptations belo	W).			

SOIL

Profile Des	cription: (Describe	to the depth	needed to docur	nent the in	dicator	or confirm	the absence of indic	ators.)	
Depth	Matrix		Redo	x Features		······			
(inches)	Color (moist)	%	Color (moist)		Туре'	_Loc ²		Remarks	
0-16	LOYR 416	- W					Siltloam		
	· · ·								
			- 47 Lat.			******			······
					<u> </u>				
				-					
¹ Type: C=C	oncentration, D=Dep	letion, RM=R	educed Matrix, M	S=Masked S	Sand Gra	ains.	² Location: PL=Pore	e Lining, M=Matrix.	
Hydric Soil	Indicators: (Applic	able to all LF	Rs, unless other	wise noted	1.)		Indicators for Prob	lematic Hydric Soils ³ :	
Histosol	(A1)		Polyvalue Be	low Surface	e (S8) (L	RR S, T, U)) 1 cm Muck (A9)	(LRR O)	
Histic Ep	pipedon (A2)		Thin Dark Su	rface (S9) (LRR S,	T, U)	2 cm Muck (A1)) (LRR S)	
Black Hi	stic (A3)		Loamy Muck	/ Mineral (F	1) (LRR	0)	Reduced Vertic	(F18) (outside MLRA 1:	50A,B)
Hydroge	en Sulfide (A4)		Loamy Gleye	d Matrix (F2	2)		Piedmont Flood	plain Soils (F19) (LRR P	, S, T)
Stratified	i Layers (A5)		Depleted Mat	rix (F3)			Anomalous Brig	ht Loamy Soils (F20)	
Organic	Bodies (A6) (LRR F	, T, U)	Redox Dark	Surface (F6))		(MLRA 153B))	
5 cm Mu	icky Mineral (A7) (L l	RR P, T, U)	Depleted Dar	k Surface (F	F7)		Red Parent Mai	erial (TF2)	
Muck Pr	esence (A8) (LRR L)	Redox Depre	ssions (F8)			Very Shallow D	ark Surface (TF12)	
1 cm Mu	ick (A9) (LRR P, T)		Marl (F10) (L	RR U)			Other (Explain i	n Remarks)	
Depleted	Below Dark Surfac	e (A11)	Depleted Oct	ric (F11) (N	ILRA 15	51)	2		
Thick Da	ark Surface (A12)		Iron-Mangan	se Masses	i (F12) (L	_RR O, P, 1	T) "Indicators of h	ydrophytic vegetation an	d
Coast Pi	rairie Redox (A16) (I	/LRA 150A)	Umbric Surfa	ce (F13) (LI	RR P, T,	U)	wetland hydr	ology must be present,	
Sandy N	lucky Mineral (S1) (I	.RR 0, S)	Delta Ochric	(F17) (MLR.	A 151)		unless distur	bed or problematic.	
Sandy G	eleyed Matrix (S4)		Reduced Ver	10 (F18) (M	LRA 150	UA, 150B)			
Sandy R	edox (SO)		Pleamont Flo	oopiain Soii	IS (F19) ((NILKA 149	JA)		
Suipped		· T II)	Anomalous B	ngni Loamy	/ 30115 (P	·20) (WILRA	A 149A, 103C, 103D)		
Dark Sui	aver (if observed):	, , , 0)	*****						
Tana	ayer (ir observed).								
Type:									v
Depth (inc	:hes):						Hydric Soil Present	? Yes No	<u>^ </u>
Remarks:									

. WETLAND DETERMINATION DATA FORM – Atla	antic and Gulf Coastal Plain Region
Project/Site: Smakestack Mitigalia Back Sige City/County: L	-ake)and- Shelby Sampling Date: 11/6/2018 State: TN Sampling Point: SP-23
Investigatory B Shall Earth School Tal Section Town	ship Reneed
de arpsua	snip, Kange.
Landform (hillslope, terrace, etc.): <u>Cerrororo</u> Local relief (col	ncave, convex, none); $\underline{Can(a)}$ Slope (%): $\underline{-99}$ 712/155
Subregion (LRR or MLRA): Lat: Lat: Lat:	$\sum_{n=1}^{\infty} Long: \frac{11, 112, 90}{1, 112, 90} Datum: \frac{10}{10, 102}$
Soil Map Unit Name: Waverly silt look, 0-21. slepes, accasionally freded, land	duration (Wy) NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes	_ No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly disturbed?	Are "Normal Circumstances" present? Yes No
Are Vegetation, Soil, or Hydrology naturally problematic?	(If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing sampling p	point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes No Is the S Hydric Soil Present? Yes No within a Wetland Hydrology Present? Yes No within a Remarks: Is the S No Is the S	ampled Area
PFO - narraw, shallow depression deep standing water.	adjacent to excavated pool with
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
X Surface Water (A1) Aquatic Fauna (B13)	K Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LRR U)	Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor (C1)	Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres along Livin	g Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Iron (C4)	Crayfish Burrows (C8)
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remarks)	Shallow Aguitard (D3)
Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)
X Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Surface Water Present? Yes X No Depth (inches):	_
Water Table Present? Yes No X Depth (inches):	-
Saturation Present? Yes No Depth (inches):	_ Wetland Hydrology Present? Yes <u>\</u> No
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous insp	bections), if available:
Remarks:	
pool has surface water, shall	w depression has the other indicators.

201	Absolute	Dominant	Indicator	Dominance Test worksheet:
ree Stratum (Plot size: 30)	<u>% Cover</u>	Species?	Status	Number of Dominant Species
Acer Saccharinum	20	<u> </u>	FAC	That Are OBL, FACW, or FAC: (A)
Ulmus americana	15	Y	FAC	
Querens miana	.5	()	FAC	Total Number of Dominant
Quemic phallas			EACH	(B)
Sucreas prepires			FRON	Percent of Dominant Species
				That Are OBL, FACW, or FAC: (A/E
Second States in the				
e e construction de la construction				Prevalence index worksneet:
				Total % Cover of: Multiply by:
	45	= Total Cov	er	OBL species x 1 =
E0% of total anyon:	5 20% of	total anyon	9	FACW species x 2 =
	20% 0	total cover.		FAC species
pling/Shrub Stratum (Plot size:)	2	٨)	MAL	EACII species x 4 =
anerons phyllos		<u></u>	TACKO	
Celtis Lacvigate		<u>N</u>	FACH	
Fraxing pernsylvation	alah she	N	FACW	Column Totals: (A) (B
	<u></u>	· · · · · · · · · · · · · · · · · · ·		
N				Prevalence Index = B/A =
				Hydrophytic Vegetation Indicators:
				1 - Rapid Test for Hydrophytic Vegetation
				\times 2 - Dominance Test is >50%
				$3 - \text{Prevalence Index is } \leq 3.0^1$
	4	= Total Cov	er	
500/ official courses	2004 of		0.8	Problematic Hydrophytic Vegetation (Explain)
	20% of	total cover:	<u> </u>	n je sa nastro kaj konstrukcija se
<u>rb Stratum</u> (Plot size:)	0	11	M. A. 3	¹ Indicators of hydric soil and wetland hydrology must
Leersia Virghnica		<u> </u>	TACH	be present, unless disturbed or problematic.
Bochmeria cylindrica	I	Y	FACW	Definitions of Four Vegetation Strata:
Fraxing Almerivation		V	FACH	
			17/200	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) of
	<u> </u>		<u>- 1991 - 17 - 18 - 1</u> 9	more in diameter at breast height (DBH), regardless of
	[.]		<u></u>	nungin
in de la companya de			e 1, 7	Sapling/Shrub - Woody plants, excluding vines, less
and the state of the state of the				than 3 in. DBH and greater than 3.28 ft (1 m) tall.
				Last Charles Constant
$\psi(x) = -\frac{1}{2} \psi_{0}^{2} ^{2} x ^{2}$				of size and woody plants less than 3.28 ft tall
•				Woody vine - All woody vines greater than 3.28 ft in
•				height.
	5 :	= Total Cov	er	
50% of total cover:	20% of	total cover:	a 1 - 1 - 1	- 1997 (1997) - 1997 - 1997 (1997) - 1997 - 1997 (1997)
	20,000			
body Vine Stratum (Plot size:)				
		<u></u>		
		<u></u>	<u></u>	Hydrophytic
		= Total Cov	er	Vegetation
50% of total cover:	20% of	total cover:		Present? Yes No
marks: (If observed, list morphological adaptations be	low).			1
marks. In observed, list morphological adaptations be				

Sampling Point: <u>SP-23</u>

Profile Des	cription: (Describe	to the dept	h needed to docun	nent the i	ndicator	or confirm	n the absence of	ofindicators	s.)	
Depth	Matrix		Redox	x Feature	s Traci	1 2	Tastas		Demender	
(incnes) 0-7	LOVE 5/3	<u>~</u>	- COIOR (MOISE)	10	C			- Otomia	Remarks	
		00	7.5 11 16	17	<u> </u>	PLIM	- Silty 100	~ property	NJ FINOK	Canca
			58R 2.5/1		<u> </u>	<u>PL</u>		prom	inent red	ox Cont.
1-16	10 VR 5/2	70	SYR 4/6	30	<u> </u>	PLM	Silty loam	prom	lacat red	ox cont.
							Whigh clay	•		
1		· •								
	· · · · · · · · · · · · · · · · · · ·						·			
				<u></u>		·				
1		·				·				
Type: C=C	Concentration, D=Depl	letion, RM=	Reduced Matrix, MS	S=Masked	i Sand Gr	ains.	Location:	PL=Pore Lini	ng, M=Matri: stie Hydrie 9	X. Poilo ³ :
Hydric Soli			RKS, unless other	wise nou	eu.)	BB C T I	Indicators i			Solis :
Histoso	ninedon (A2)		Thin Dark Su	rface (S9)		- KK 3, 1, U T II)	2 cm Mi	uck (A9) (LR uck (A10) (LI	RU) RRS)	
Black H	listic (A3)		Loamy Mucky	/ Mineral ((F1) (LRI	1, 0, ? O)	Reduce	d Vertic (F18) (outside N	ILRA 150A.B)
Hydrog	en Sulfide (A4)		Loamy Gleye	d Matrix (F2)	,	Piedmo	nt Floodplain	Soils (F19)	(LRR P, S, T)
Stratifie	d Layers (A5)		X Depleted Mat	rix (F3)			Anomal	ous Bright Lo	oamy Soils (I	=20)
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark S	Surface (F	6)		(MLR	A 153B)		
5 cm M	ucky Mineral (A7) (LR	(R P, T, U)	Depleted Dar	k Surface	(F7)		Red Pa	rent Material	(TF2)	,
MUCK P)	Med (E10) (L	SSIONS (FO	5)		Very Sh	allow Dark S	Sufface (TF1) marks)	2)
Deplete	d Below Dark Surface	e (A11)	Depleted Och	ric $(F11)$	(MLRA 1	51)			marks)	
Thick D	ark Surface (A12)	,	Iron-Mangane	ese Masse	es (F12)	LRR O, P,	T) ³ Indica	tors of hydro	phytic veget	ation and
Coast F	Prairie Redox (A16) (N	ILRA 150A) Umbric Surfa	ce (F1 3) (LRR P, 1	, U)	wetla	and hydrolog	y must be pr	esent,
Sandy I	Mucky Mineral (S1) (L	RR 0, S)	Delta Ochric ((F17) (ML	RA 151)		unle	ss disturbed	or problemat	ic.
Sandy (Gleyed Matrix (S4)		Reduced Verl	tic (F18) (MLRA 1	50A, 150B)	0.4)			
Stripper	(SC) Matrix (SC)		Anomalous B	right Loar	olis (F19) nv Soils ((MLKA 14	9A) 14 14 94 1530	153D)		
Dark Su	irface (S7) (LRR P. S	. T. U)		ngni Loui	ny oona (120) (МЕТ	A 145A, 155C,	1550)		
Restrictive	Layer (if observed):	, -, -,								
Type:										
Depth (in	ches):						Hydric Soil F	Present?	res	No
Remarks:							- I			
WETLAND DETERMINATION DATA FOR	M – Atlantic and Gulf Coastal Plain Region									
--	---									
Project/Site: <u>Smok/stack Miliadia Bank S44</u> City/C Applicant/Owner: <u>RES/TDOT</u> Investigator(s): <u>B. Slaby</u> , <u>Enviro SciM(1, Jnc.</u> , Section Landform (hillslope, terrace, etc.): <u>terrac(</u> Local Subregion (LRR or MLRA): <u>LRR P134</u> Lat: <u>35,28</u> Soil Map Unit Name: <u>Wavery silt loom</u> , <u>0.27. slapes</u> , <u>accestantly f</u> Are climatic / hydrologic conditions on the site typical for this time of year? Y Are Vegetation <u>Soil</u> , or Hydrology <u>significantly disture</u> Are Vegetation <u>Soil</u> , or Hydrology <u>naturally problema</u> SUMMARY OF FINDINGS – Attach site map showing same Hydrophytic Vegetation Present? <u>Yes</u> <u>No</u> <u>X</u> Wetland Hydrology Present? <u>Yes</u> <u>No</u> <u>X</u> Remarks: For CA	county:									
HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required) Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) U) Drainage Patterns (B10)									
 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) 	C1) Moss Trim Lines (B16) Iong Living Roots (C3) Dry-Season Water Table (C2) n (C4) Crayfish Burrows (C8) Tilled Soils (C6) Saturation Visible on Aerial Imagery (C9) Geomorphic Position (D2) s) Shallow Aquitard (D3) FAC-Neutral Test (D5) Sphagnum moss (D8) (LRR T, U)									
Field Observations: Surface Water Present? Yes No Depth (inches): Water Table Present? Yes No Depth (inches): Saturation Present? Yes No Depth (inches): (includes capillary fringe) Describe Recorded Data (stream gauge. monitoring well, aerial photos, pre	Wetland Hydrology Present? Yes No									
Remarks:										

VEGETATION (Four Strata) – Use scientific names of plants.

q	Point:	SP	-2	4
×.				_

VEGETATION (Four Strata) - Use scientific nar	nes of pl	ants.		Sampling Point:
241	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size:)	% Cover	Species?	<u>Status</u>	Number of Dominant Species
1. Acer Saccherinnum	40	<u> </u>	FAC	That Are OBL, FACW, or FAC: (A)
2. Quercus nigra	20	<u> </u>	FAL	Total Number of Dominant
3. Acer negurido	1.5	N	FAC	Species Across All Strata:
4. Liquidember Styraci Flue	10	N	FAC	
5 Betula nicha	3	<u>()</u>	FACW	Percent of Dominant Species
				mat Ale OBL, FACW, OF FAC.
7				Prevalence Index worksheet:
	<u> </u>			Total % Cover of: Multiply by:
8	- 61			OBL species x 1 =
ad	0	= Total Cov	/er	FACW species x 2 =
50% of total cover:	20% of	total cover	1/10	FAC species
Sapling/Shrub Stratum (Plot size: 15)	10	V		
1. Lighstrum Sp.	10		NL	
2. Querons rigra	3	<u>N</u>	FAC	
3. Ulmhs americana	2	<u> </u>	FAC	Column Totals: (A) (B)
4. Cillis Lacrigata	2	N	FACW	Prevalence index = $R/A =$
5. Fraxinus Demsylvanica	2	N	FACH)	
6 GULTCHS O.F. Welnolian		1)	DPL	nyurophytic vegetation indicators:
7 Carrie Carrie Carmie	<u> </u>		FAC	1 - Rapid Test for Hydrophytic Vegetation
1. Carpa conversion			171	▲ 2 - Dominance Test is >50%
8	- 2/			3 - Prevalence Index is ≤3.0'
10	de	= Total Cov	r C	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover: 13	20% of	total cover	: <u>J.d</u>	an an thair an thair an an thair an an thair an t
Herb Stratum (Plot size:)		0	. <u>n</u> e en 19	¹ Indicators of hydric soil and wetland hydrology must
1. Lonicera japonica		<u> </u>	FACU	be present, unless disturbed or problematic.
2. Taxicadendran radicons	<u> </u>	<u> </u>	FAC	Definitions of Four Vegetation Strata:
3. Elympis riportus estas	3	- W . Sig	FACH	The Minute last available of the 2 minute 2 minute 2
4 Privous scrotling	2	N.	FACU	more in diameter at breast height (DBH) regardless of
5 9000 contate leaves (seeding)	2	٨)	NL	height.
6 Support hung on 1 (bas) lines	1	·	All	
7 Sy abundaling on 2 (matrilles, and gale	1 lou	 	A1/	than 3 in DBH and greater than 3 28 ft (1 m) tall
7. Simply an inter Conductor	4 <u>47) </u>		11PI	
8. EUONYMUS TOTUNEL				Herb – All herbaceous (non-woody) plants, regardless
9. Prenenties Sp.			NL	of size, and woody plants less than 3.28 ft tall.
10. Cinna armitinalla	<u> </u>	<u></u>	FACN	Woody vine - All woody vines greater than 3.28 ft in
11. Smilex Sp. (Arbicions)		<u></u>	NL	height.
12				
	21	= Total Cov	/er	
50% of total cover: 10.5	 20% of	total cover	4.2	
Woody Vine Stratum (Plot size: 301)				and press and the second se
1				
·				
				-
3				
4				
5				Hydrophytic
		= Total Cov	/er	Vegetation
50% of total cover:	20% of	total cover	:	
Remarks: (If observed, list morphological adaptations belo	w).			
Ligustrum sp. is either	L. sine	nse (F	-Ac)	or L. vulgue (UPL).

	coal
Sampling Point:	22-92

Profile Description: (Describe to the dept	h needed to docu	ment the i	ndicator	or confirm	the absence of	indicators.)	
Depth <u>Matrix</u>	Redo	ox Feature	s Turnel		Toyturo	Demortre	
$\left(\frac{\text{(Incres)}}{1000} - 1000000000000000000000000000000000000$			_Type_		<u> </u>	Remarks	
Inter 1017 June - 100 -					<u></u>		
119 10 FK 119 100					Silly loun	Jundy inclusions	
						19" refuse) (rao	<u>+;)</u>
·							
¹ Type: C=Concentration, D=Depletion, RM=I	Reduced Matrix, M	S=Masked	I Sand Gra	ains.	² Location: Pl	_=Pore Lining, M=Matrix.	
Hydric Soil Indicators: (Applicable to all L	RRs, unless othe	rwise note	ed.)		Indicators for	r Problematic Hydric Soi	s ³ :
Histosol (A1)	Polyvalue Be	elow Surfa	ce (S8) (L	RR S, T, U	l) 1 cm Muc	k (A9) (LRR O)	
Histic Epipedon (A2)	Thin Dark Su	urface (S9)	(LRR S, '	T, U)	2 cm Muc	:k (A10) (LRR S)	A 4504 D)
Hydrogen Sulfide (A4)	Loamy Much	(yivinerai) ed Matrix ((F1) (LKK F2)	0)	Reduced Piedmont	Floodplain Soils (E19) (LF	(A 150A,B) RPST)
Stratified Layers (A5)	Depleted Ma	atrix (F3)			Anomalou	us Bright Loamy Soils (F20)
Organic Bodies (A6) (LRR P, T, U)	Redox Dark	Surface (F	6)		(MLRA	153B)	
5 cm Mucky Mineral (A7) (LRR P, T, U)	Depleted Da	rk Surface	(F7)		Red Pare	nt Material (TF2)	
1 cm Muck (A9) (LRR D T)	Redox Depre		3)		Very Shal	llow Dark Surface (TF12)	
Depleted Below Dark Surface (A11)	Depleted Oc	hric (F11)	(MLRA 15	(1)		plain in Remarks)	
Thick Dark Surface (A12)	Iron-Mangan	ese Masse	es (F12) (I	.RR O, P,	T) ³ Indicato	ors of hydrophytic vegetatic	n and
Coast Prairie Redox (A16) (MLRA 150A)	Umbric Surfa	ace (F1 3) (LRR P, T,	U)	wetlan	d hydrology must be prese	ent,
Sandy Mucky Mineral (S1) (LRR O, S)	Delta Ochric	(F17) (ML rtic (E18) (RA 151) MIRA 150	A 460B)	unless	disturbed or problematic.	
Sandy Redox (S5)	Piedmont Flo	nic (Fio) (oodnlain S	oils (F19)	MLRA 14	94)		
Stripped Matrix (S6)	Anomalous E	Bright Loan	ny Soils (F	20) (MLR	A 149A, 153C, 1	53D)	
Dark Surface (S7) (LRR P, S, T, U)					,		
Restrictive Layer (if observed):							,
Type:							\times
Depth (inches):					Hydric Soil Pr	esent? Yes N	o_ <u>/</u>
Remarks.							
						,	

WETLAND DETERMIN	ATION DATA FORM -	Atlantic and Gu	ulf Coastal Plain Region
WETLAND DETERMINA Project/Site: <u>Smalled A B</u> Applicant/Owner: <u>RES / TDOT</u> Investigator(s): <u>B. Slaby</u> , <u>Envito Scitnet</u> Landform (hillslope, terrace, etc.): <u>depression</u> Subregion (LRR or MLRA): <u>LRR P134</u> Soil Map Unit Name: <u>Waverly sill lookny</u> , 0-5 Are climatic / hydrologic conditions on the site typical Are Vegetation <u>Soil</u> , or Hydrology <u>Are Vegetation</u> , Soil <u>or Hydrology</u>	ATION DATA FORM – AK SIL City/Count , Int. Section, T Local relie Lat: 35, 285 27. Slopes, gccsionally fli I for this time of year? Yes _ significantly disturbed? naturally problematic? map showing sampli	Atlantic and Gu	JIF Coastal Plain Region Shellor Sampling Date: 11/6/2016 State: Th Sampling Point: SP-25 none): Concave Slope (%): %9.712 66 Datum: W65 94 Wu NWI classification: PEM1C If no, explain in Remarks.) Circumstances" present? Yes No xplain any answers in Remarks.) xplain any answers in Remarks.) No Statuments, etc.
Hydrophytic Vegetation Present? Yes X Hydric Soil Present? Yes X Wetland Hydrology Present? Yes X Remarks: PEM at Lage of	No list No list No list Wit	he Sampled Area hin a Wetland? ATV +ral	Yes X No goes ghrough wetland.
HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; che X Surface Water (A1) X High Water Table (A2) Mater Marks (B1) C Sediment Deposits (B2) P Drift Deposits (B3) R Algal Mat or Crust (B4) T Iron Deposits (B5) C Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9)	eck all that apply) Aquatic Fauna (B13) Marl Deposits (B15) (LRR U) Hydrogen Sulfide Odor (C1) Dxidized Rhizospheres along Presence of Reduced Iron (C4 Recent Iron Reduction in Tiller hin Muck Surface (C7) Other (Explain in Remarks)	Living Roots (C3)	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) XCrayfish Burrows (C8) XSaturation Visible on Aerial Imagery (C9) XGeomorphic Position (D2)Shallow Aquitard (D3) XFAC-Neutral Test (D5) Sphagnum moss (D8) (LRR T, U)
Kulter-Stained Leaves (B9) Field Observations: Surface Water Present? Yes Water Table Present? Yes Saturation Present? Yes Saturation Present? Yes Includes capillary fringe) Describe Recorded Data (stream gauge, monitoring Remarks:	Depth (inches): 0 Depth (inches): 0 Depth (inches): 0 well, aerial photos, previous	Wetland H	Sphagnum moss (U8) (LRR T, U) ydrology Present? Yes No

r <u>ree Stratum</u> (Plot size: <u>301)</u>)	Absolute <u>% Cover</u>	Dominant Species?	Indicator <u>Status</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC:	(A)
·				Total Number of Dominant J	(B)
·				Percent of Dominant Species 100 That Are OBL, FACW, or FAC:	(A/E
•				Prevalence Index worksheet:	- 121 .
• <u> </u>				Total % Cover of:Multiply by	
• <u></u> .				OBL species x 1 =	
EQ0/ of total actions		totol agua		FACW species x 2 =	
andia a (Charthan (Dilat alian)	20% 01	total cover	•	FAC species x 3 =	an an tha she tha An tha an tha she tha
apling/shrub stratum (Plot size)				FACU species x 4 =	
	· · · · · · · · · · · · · · · · · · ·			UPL species x 5 =	3
and the second sec		·;		Column Totals: (A)	(E
		·			`
				Hydrophytic Vegetation Indicators:	
				A papid Tool for Hydrophytic Vegetation	
					1
		•••••••••••••••••••••••••••••••••••••••			
·		= Total Co	ver	-3 - Prevalence index is $\leq 3.0^{\circ}$	[.] .
50% of total cover	20% of	total cover	····	Problematic Hydrophytic Vegetation (Ex	plain)
erh Stratum (Plot size: 5		10101 00101	•	1.415-3364,444,454 - 954,444 (1177) (1174) 1.41	19년 <i>8년 67년</i> -
Fchlanchlan mannicata	40	Y	FACLY	he present unless disturbed or problematic	jy must
Pasicum dicholom Clanking	-10	<u></u>	CA2AJ	Definitions of Four Vagetation Strata:	
Glacian marting	$\frac{10}{10}$		DPL ()PL	Deminitions of Four Vegetation Strata.	
So's purch the standard	2	N	ARI	Tree - Woody plants, excluding vines, 3 in. (7	'.6 cm)
Uni Posta a (SAR companyage)	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		- NI	more in diameter at breast height (DBH), rega	Irdiess
Cala trail maile love con thirds	<u> </u>	<u> </u>	EACIN		
Providental Figure Contraction Reading		<u></u>	TACL	Sapling/Shrub – Woody plants, excluding vir than 3 in DBH and greater than 3 28 ft (1 m)	ies, less tall
and town Farmer Clans (conflict)	I	 [] A	AH		
	1		<u> </u>	Herb – All herbaceous (non-woody) plants, re of size, and woody plants less than 3.28 ft tall	gardles
0 1				Woody vine – All woody vines greater than 3 height.	.28 ft in
2				 A statement of the statemen	
	70;	= Total Co	ver		
50% of total cover: 35	20% of	total cover	r: <u>14</u>	· · · · · · · · · · · · · · · · · · ·	
loody Vine Stratum (Plot size: 30 ')					
·					
· · · · · · · · · · · · · · · · · · ·					
·				Hvdrophytic	
		= Total Co	ver	Vegetation	
50% of total cover:	20% of	total cover	r:	Present? Yes <u>Yes</u> No	-
emarks: (If observed, list morphological adaptations below	v).			1	
UnK. Reaceae tous dense, spike-111 When collected. It keyed out to Ga	(MAF) stridiur	orescene m in	e and I Weakley	I was gressing if was an Alo	peevri
Than glumes, However it have not r	conti	Alalan	. 6 .	a diama being which shall	YE
than glumes. However, it does not r	esemble	-1 In Dictory	overkien	when to Lemmas being much shall	40

Sampling Point: <u>SP-25</u>

Profile Description: (Describe to the dept	h needed to document the indicator or confirm	the absence of indicators.)
Depth <u>Matrix</u>	Redox Features	
(inches) Color (moist) %	<u>Color (moist)</u> <u>%</u> <u>Type¹</u> <u>Loc²</u>	Texture Remarks
0-13 10KR 5/2 70	5YR 4/6 29 C PL/M	Siller looms prominent redok conc.
	54R 2.5/2 1 C PL/M	prominent redex conc.
13-16 10YR 413 70	7.5 PR 2.5/3 15 C M	silty loom Faint redax conc.
10 YR 5/3 15	é -	trase Mingonesi conr.
		······································
1		n
Type: C=Concentration, D=Depletion, RM=	Reduced Matrix, MS=Masked Sand Grains.	"Location: PL=Pore Lining, M=Matrix.
Hydric Soil Indicators: (Applicable to all L	RRS, unless otherwise noted.)	Indicators for Problematic Hydric Solis :
HISTOSOI (A1)	Polyvalue Below Surface (S8) (LRR S, I, U) 1 cm Muck (A9) (LRR O)
Black Histic (A3)	Loamy Mucky Mineral (E1) (LRR O)	2 cm Muck (AT0) (LKK 5) Reduced Vertic (E18) (outside MLRA 150A B)
Hydrogen Sulfide (A4)	Loamy Gleved Matrix (F2)	Piedmont Floodplain Soils (E19) (LRR P. S. T)
Stratified Layers (A5)	X Depleted Matrix (F3)	Anomalous Bright Loamy Soils (F20)
Organic Bodies (A6) (LRR P, T, U)	Redox Dark Surface (F6)	(MLRA 153B)
5 cm Mucky Mineral (A7) (LRR P, T, U)	Depleted Dark Surface (F7)	Red Parent Material (TF2)
Muck Presence (A8) (LRR U)	Redox Depressions (F8)	Very Shallow Dark Surface (TF12)
1 cm Muck (A9) (LRR P, T)	Marl (F10) (LRR U)	Other (Explain in Remarks)
Depleted Below Dark Surface (A11)	Depleted Ochric (F11) (MLRA 151)	
Thick Dark Surface (A12)	Iron-Manganese Masses (F12) (LRR O, P, 1	T) Indicators of hydrophytic vegetation and
Coast Prairie Redox (A16) (WLRA 150A)	Delta Ochric (E17) (LRR P, I, U)	wetland hydrology must be present,
Sandy Gleved Matrix (S4)	Reduced Vertic (F18) (MLRA 150A, 150B)	uness disturbed of problematic.
Sandy Redox (S5)	Piedmont Floodplain Soils (F19) (MLRA 14	9A)
Stripped Matrix (S6)	Anomalous Bright Loamy Soils (F20) (MLR/	A 149A, 153C, 153D)
Dark Surface (S7) (LRR P, S, T, U)	¥:	
Restrictive Layer (if observed):		
Туре:		
Depth (inches):		Hydric Soil Present? Yes 🗡 No
Remarks:		L
		•

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

- Smarkestack, Mitigation Site	laveland /shellow (a of NOV2DIS
Project/Site: <u>DFC/TCAT MITIGATION OUT</u> City/Cou	nty: <u>Lalutana</u> Streton Co. Sampling Date: <u>00 Not 0070</u>
Applicant/Owner: MAST ID VI	State: Sampling Point:
Investigator(s): <u>ANN GIIVNOVC</u> , ENVIROSACIA Section,	Township, Range:
Landform (hillslope, terrace, etc.): depression in the Ca Local reli	ief (concave, convex, none): <u>CONCAVE</u> Slope (%):
Subregion (LRR or MLRA): <u>LPP</u> Lat: <u>35, 28597</u>	5 Long: - 89.707885 Datum: WGS 84
Soil Map Unit Name: WV- Waverly Silt loam (0-20% Slop	pes) OCC. flooded NWI classification: hone
Are climatic / hydrologic conditions on the site typical for this time of year? Yes	No (If no, explain in Remarks.)
Are Vegetation , Soil , or Hydrology significantly disturbed	d? 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 sample	ing point locations, transects, important features, etc.
Hudranhutia Versetation Brecont?	
Hydrophytic Vegetation Present? Yes <u>No</u> Is	the Sampled Area
Wetland Hydrology Present? Yes No	ithin a Wetland? Yes <u> </u>
Remarks:	W: 79
PEM in agricultural tield. Wetland	not sustaining very much soylean
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LRR U) Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor (C1)	Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres along	g Living Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Iron (C	Crayfish Burrows (C8)
Drift Deposits (B3) Recent from Reduction in Till	ed Soils (C6) Saturation Visible on Aerial Imagery (C9)
Iron Denosite (B5) Other (Evaluation in Remarks)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	EAC-Neutral Test (D5)
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T. U)
Field Observations:	
Surface Water Present? Yes No X Depth (inches):	
Water Table Present? Yes No Depth (inches):	
Saturation Present? Yes No X Depth (inches):	Wetland Hydrology Present? Yes No
(includes capillary fringe)	
Describe Recorded Data (stream gauge, monitoring weil, aerial photos, previot	is inspections), if available:
Remarks:	
Nendra.	

Sampling Point: SP-26

VEGETATION (Four Strata) - Use scientific names of plants.

es.

221	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>00</u>)	% Cover	Species?	Status	Number of Dominant Species
1				That Are OBL, FACW, or FAC: (A)
2			<u> </u>	Total Number of Dominant
3				Species Across All Strata: (B)
4				Percent of Dominant Species
5				That Are OBL, FACW, or FAC:(00%) (A/B)
6		·		Brouplonge Index workshoet:
7.				Tetal % Onver of Multiply by
8				
		= Total Cov	er	
50% of total cover:	20% of	total cover:		FACW species
<u>Sapling/Shrub Stratum</u> (Plot size: <u>1</u>)				
1				FACU species X 4 =
2				
3				Column Totals: (A) (B)
4		<u></u>		Prevalence Index = B/A =
5				Hydrophytic Vegetation Indicators:
6		<u></u>		1 - Rapid Test for Hydrophytic Vegetation
7.				\mathbf{X} 2 - Dominance Test is >50%
8				$3 - \text{Prevalence Index is } \leq 30^{1}$
		= Total Cov	er	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of	total cover:		
Herb Stratum (Plot size: <u>5</u>)				¹ Indicators of hydric soil and wetland hydrology must
1. Echinochloa municata	15	Yes	FACW	be present, unless disturbed or problematic.
2. Ludwigia palustus	15	Yes	OBL	Definitions of Four Vegetation Strata:
3. Cuperus adoratus	5	No	FACW	
4. Rahunculus acris	3	No	FAC	more in diameter at breast height (DBH), regardless of
5.			f	height.
6.				Sanling/Shrub - Woody plants, excluding vines, less
7				than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8.				
9				of size, and woody plants less than 3.28 ft tall.
10				·····
11	·			Woody vine – All woody vines greater than 3.28 ft in beight
12	·			noight.
12.	38	- Total Cov		
50% of total cover: 9		total cover:	7.6	
Moody Vine Stratum (Plot size: 30)	207001			
2				
2				
۵				
4				
J		Tatal Cau	~ 4	Hydrophytic Vegetation
500/ of total any low			el	Present? Yes No
50% of rotal cover.	20% 011	total cover:		
Remarks: (If observed, list morphological adaptations below	V).			

¢

Depth	Matrix		Redox	Features			Tertune		Demender	
$\frac{(\text{Incres})}{\Lambda - G}$	IDUR 1017	- <u>~</u> ~ ~	LINK SIR	10		pl/m		1/1/A	Remarks	
	151AN 1.17	10 -	CUV CIO		<u></u>	01	L	/		
0-14	10414 012	15 1	1915212	2	<u> </u>	<u> </u>	G.			
			······			· ·	<u> </u>			
						• •	2,		• • • • • • •	
Type: C=C Hydric Soil	Indicators: (Applic	able to all 1	Rs unless ofben	-iviaskeu	Sand G	ains.	Indicators	for Proble	matic Hydric	Soils ³
Histosol			Polyvalue Rei	w Surfac	e (S8) (1	RRSTIN				cons.
Histic E	pipedon (A2)		Thin Dark Sur	face (S9)	(LRR S.	T. U)	1 cm M	/luck (A10)	(LRR S)	
Black H	istic (A3)		Loamy Mucky	Mineral (, F1) (LRI	τO)	Reduc	ed Vertic (F	- 18) (outside l	MLRA 150A, E
Hydroge	en Sulfide (A4)		Loamy Gleyed	l Matrix (F	-2)		Piedm	ont Floodpl	ain Soils (F19)	(LRR P, S, T
Stratifie	d Layers (A5)		X Depleted Matr	ix (F3)			Anoma	alous Bright	Loamy Soils ((F20)
Organic	Bodies (A6) (LRR F	P, T, U)	Redox Dark S	urface (Fi	6)		(MLF	RA 153B)		
5 cm Mi	JCKY Mineral (A7) (L	KR P, T, U)	Depleted Dark	Surface	(F7)		Red P	arent Mater	ial (TF2) h Ourfees (TF3)	
IVIUCK PI		J)	Med (E40) // E	SIONS (F8)		Very S	Fynlain in 1	к Surrace (TF1 Remarks)	2)
i cm ivit Denlete	d Below Dark Surfac	e (A11)	Depleted Och	ic (F11) (MLRA 1	51)		(шхріані ій і	itemaiks)	
Thick D	ark Surface (A12)		Iron-Mangane	se Masse	s (F12)	(LRR O. P. T	") ³ Indic	ators of hyd	drophytic vege	tation and
Coast P	rairie Redox (A16) (I	MLRA 150A)	Umbric Surfac	e (F13) (I	LRR P, 1	r, U)	, wet	land hydrol	ogy must be p	resent,
Sandy N	/lucky Mineral (S1) (LRR O, S)	Delta Ochric (=17) (MLI	RA 151)		unle	ess disturbe	ed or problema	itic.
Sandy C	Gleyed Matrix (S4)		Reduced Verti	c (F18) (I	WLRA 1	50A, 150B)				
Sandy F	Redox (S5)		Piedmont Floor	odplain Sc	oils (F19)	(MLRA 149	A)			
Stripped	Matrix (S6)		Anomalous Br	ight Loam	ny Soils ((F20) (MLRA	149A, 153C	, 153D)		
Dark Su	rface (S/) (LRR P, S	S, T, U)								
Turne	Layer (II observed)	•								
Type:	-t).		_				1	D	v. V	NI -
	cnes):	<i>n.</i> •					Hydric Soli	Present?	Yes	NO
Remarks:										

WETLAND DETERMINATION DATA FOR	M – Atlantic and Gulf Coastal Plain Region
Project/Site: Smokestack Milledia Bark Sile City/	County: Lakeland / Shelby Sampling Date: 11/6/2018
Applicant/Owner: KES / 100)	State: <u>IN</u> Sampling Point: <u>ライ・ス /</u>
Investigator(s): 13. Slaby, Enviro Science, Inc. Section	on, Township, Range:
Landform (hillslope, terrace, etc.): rolling farmer Floodplath Loca	I relief (concave, convex, none): <u>ConVEX</u> Slope (%):
Subregion (LRR or MLRA): <u>LRR P134</u> Lat: <u>30.2</u>	84142 Long: <u>-89, 111752</u> Datum: <u>W658</u> 4
Soil Map Unit Name: Waverly silf loom, 0-27. slopes, occasionally	Fleeded, Jany dwath (Wy) NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year?	res No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly distu	rbed? Are "Normal Circumstances" present? Yes No
Are Vegetation . Soil , or Hydrology naturally problem	atic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing sar	npling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes No Hydric Soil Present? Yes No Wetland Hydrology Present? Yes No	Is the Sampled Area within a Wetland? Yes No
Remarks: Ag Field - Soybeans	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LR	R U) Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor (C1) Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres a	along Living Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Irc	n (C4) Crayfish Burrows (C8)
Drift Deposits (B3) Recent Iron Reduction in	Tilled Soils (C6) Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remark	(s) Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)
Walet-Stalled Leaves (D9)	
Surface Mater Present? Yes No S Depth (inches):	
Water Table Present? Ves No Depth (inches):	
Saturation Present? Yes No Depth (inches):	Wetland Hydrology Present? Yes No
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photos, pre	vious inspections), if available:
Remarks:	

/EGETATION (Four Strata) – Use scientific na	mes of plai	nts.		Sampling Point: $\bigcirc Y - d$
7	Absolute [Dominant	Indicator	Dominance Test worksheet:
Iree Stratum (Plot size: 1.	<u>% Cover</u>	Species?	Status	Number of Dominant Species That Are OBL, FACW, or FAC:
2	. <u> </u>			Total Number of Dominant
3				Species Across All Strata:
4				Demonst of Deminent Species
5		· ····		That Are OBL, FACW, or FAC: (A/B)
6	· ······			
7.			and starting	Prevalence Index worksheet:
8. <u></u>		1. 19 4.9 7	per en la compañía de	Total % Cover of: Multiply by:
and the second	=	Total Cov	er	OBL species x 1 =
50% of total cover:	20% of to	otal cover:		FACW species x 2 =
Sapling/Shrub Stratum (Plot size: 5	1.69.23 Car			FAC species x 3 =
1.				FACU species x 4 =
2	n an an an Anna Anna Anna Anna Anna Ann			UPL species x 5 =
3				Column Totals: (A) (B)
A	· ·····			
T				Prevalence Index = B/A =
o.	· ·····			Hydrophytic Vegetation Indicators:
). 	·			1 - Rapid Test for Hydrophytic Vegetation
-	·	·		2 - Dominance Test is >50%
8	· ·····	· · ·		3 - Prevalence Index is ≤3.0 ¹
	=	Total Cov	er	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of to	otal cover:		and the second
Herb Stratum (Plot size:)	and a	Y.	1152/	¹ Indicators of hydric soil and wetland hydrology must
1. Glycone mox	<u> </u>	1	Urc	be present, unless disturbed or problematic.
2. Rozunchillis cit. echis	<u>_20_</u>	<u>N</u>	FACE	Definitions of Four Vegetation Strata:
3. Allium Schernoptashman	<u> </u>	<u></u>	FACU	Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or
4. <u>Poaclae sp. (young, sterile)</u>	·	N	NU	more in diameter at breast height (DBH), regardless of
5 * 19 and 1	·			height.
6. <u>Ale ale se de la constance de</u>	1995. 	en porta.	a	Sapling/Shrub – Woody plants, excluding vines, less
7				than 3 in. DBH and greater than 3.28 ft (1 m) tall.
88	-	a shekare.	en de l'argen	Herb – All herbaceous (non-woody) plants, regardless
9				of size, and woody plants less than 3.28 ft tall.
10.				Wendy vine All wendy vines greater then 2.29 ft in
11				height.
12.				
	108 =	Total Cov	er	
50% of total cover: 54	20% of to	otal cover:	21.6	[1] A. Barris, "Interstation of the state
Moody Vine Stratum (Plot size: 30')	·			
1				
)				
2				
4	·			
5				Hydrophytic
	=	Total Cov	er	Present? Yes No
50% of total cover:	20% of to	otal cover:		
Remarks: (If observed, list morphological adaptations belo).			

SOIL

Sampling Point: _________

Profile Desc	ription: (Describe	e to the depth i	needed to docur	nent the i	ndicator	or confirm	the absence of ir	ndicators.)	
Depth	Matrix		Redo	x Features	s				
(inches)	<u>Color (moist)</u>		Color (moist)		<u>Type'</u>	Loc ²		Remarks	; > 1
0-16	104K 516	100					Silty Lacks.	actively +	army d
							• 5		

				. <u></u>		<u> </u>			
						·			
¹ Type: C=Co	ncentration, D=De	pletion, RM=Re	duced Matrix, M	S=Masked	Sand Gra	ains.	² Location: PL=	Pore Lining, M=Ma	trix.
Hydric Soil I	ndicators: (Appli	cable to all LR	Rs, unless other	wise note	əd.)		Indicators for F	Problematic Hydri	c Soils ³ :
Histosol	(A1)	-	Polyvalue Be	low Surfac	ce (S8) (L	.RR S, T, U)) 1 cm Muck	(A9) (LRR O)	
Histic Ep	ipedon (A2)		Thin Dark Su	irface (S9)	(LRR S,	T, U)	2 cm Muck	(A10) (LRR S)	
Black His	stic (A3)	-	Loamy Muck	y Mineral ((F1) (LRR	: 0)	Reduced V	ertic (F18) (outside	9 MLRA 150A,B)
Hydroge	n Sulfide (A4)	-	Loamy Gleye	d Matrix (F2)		Piedmont F	loodplain Soils (F1	9) (LRR P, S, T)
Stratified	Layers (A5)		Depleted Mail	trix (F3) Ourfood (F			Anomalous	Bright Loamy Soils	; (F20)
Organic	Bodies (Ab) (LKK i oky Mineral (A7) (I	-, I, U) 	Redox Dark	SUFFACE (F	(E7)		(IVILKA 1: Red Darept	Material (TE2)	
S chi Mu Muck Pre	esence (A8) (I RR I	IN	Depieted Dat	ssions (F	(<i>ГТ)</i> 3)		Very Shallo	Watenal (TF2) W Dark Surface (TI	=12)
1 cm Mu	ck (A9) (LRR P. T)	-	Marl (F10) (L	.RR U))		Other (Expl	ain in Remarks)	12)
Depleted	Below Dark Surfac	ce (A11)	Depleted Ocl	nric (F11)	(MLRA 15	51)		,	
Thick Da	rk Surface (A12)	_	Iron-Mangan	ese Masse	es (F12) (I	LRR 0, P, 1	r) ³ Indicators	of hydrophytic veg	jetation and
Coast Pr	airie Redox (A16) (MLRA 150A)	Umbric Surfa	ce (F13) (LRR P, T,	, U)	wetland	hydrology must be	present,
Sandy M	ucky Mineral (S1) (LRR O, S)	Delta Ochric	(F17) (ML	RA 151)		unless d	isturbed or problem	natic.
Sandy G	leyed Matrix (S4)	-	Reduced Ver	tic (F18) (MLRA 15	0A, 150B)			
Sandy R	Matrix (SS)	-	Pleamont Fic	Pright Loan	0115 (F19) nv Soile (1	(WILKA 149 20) (MI PA	5A) 1 1 1 0 1 1 530 1 53	וח	
Dark Sur	face (S7) (LRR P.	s. т. u)		angin Loan	ity 0013 (1	20) (МЕКА	14 <i>5</i> , 1556, 155	5)	
Restrictive L	ayer (if observed)	:							
Type:			_						
Depth (inc	hes):		_				Hydric Soil Pres	ent? Yes	No
Remarks:									

WETLAND DETERMINATION DATA FOR	M – Atlantic and Gulf Coastal Plain Region
Project/Site: <u>Smakesback Milig An Back Site</u> City/C Applicant/Owner: <u>RES / TDOT</u> Investigator(s): <u>B. Slaby, Enviro Scince Tac</u> , Secti Landform (hillslope, terrace, etc.): <u>Jepression</u> Loca Subregion (LRR or MLRA): <u>LRR P 134</u> Lat: <u>35, 2</u> Soil Map Unit Name: <u>Falaya silt Joan</u> (Fm) Are climatic / hydrologic conditions on the site typical for this time of year? ` Are Vegetation, Soil, or Hydrology significantly distu Are Vegetation, Soil, or Hydrology naturally problem SUMMARY OF FINDINGS - Attach site map showing sar	Sounty: Lokelond Stelley Sampling Date: 11/6/2018 State: TN Sampling Point: SP-29 on, Township, Range:
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Remarks: PEM W/M Soybean Field	Is the Sampled Area within a Wetland? Yes <u>No</u> <u>No</u>
HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) X Surface Water (A1) X High Water Table (A2) Marl Deposits (B15) (LR X Saturation (A3) Sediment Deposits (B2) Presence of Reduced Irc Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9)	Secondary Indicators (minimum of two required)
Field Observations: Surface Water Present? Yes X No Depth (inches): Water Table Present? Yes X No Depth (inches): Saturation Present? Yes X No Depth (inches): (includes capillary fringe)	Image: Description of the second system Image: Description of the second system No Image: Description of the second system Image: Description of the second system Wetland Hydrology Present? Yes Yes No Image: Description of the second system Image: Description of the second system Wetland Hydrology Present? Yes Yes No Image: Description of the second system Evolution inspections), if available: Image: Description of the second system No Image: Description of the second system
Remarks:	

-

201	Absolute	Dominant Indi	cator Dominance Test worksheet:
e <u>Stratum</u> (Plot size:)	<u>% Cover</u>		atus Number of Dominant Species That Are OBL, FACW, or FAC:
	·		Total Number of Dominant (Species Across All Strata: (E
	· · · · · · · · · · · · · · · · · · ·		Percent of Dominant Species 100 (A
			Prevalence Index worksheet:
and a second			Total % Cover of: Multiply by:
		- Total Cover	OBL species x 1 =
50% of total cover:	20% of	f total cover:	FACW species x 2 =
ling/Shrub Stratum (Plot size: 15)			FAC species x 3 =
,			FACU species x 4 =
	a sta a da cara		UPL species x 5 =
	1	- 785.5	Column Totals: (A)
			Prevalence Index = B/A =
			Hydrophytic Vegetation Indicators:
	·		1 - Rapid Test for Hydrophytic Vegetation
			2 - Dominance Test is >50%
			3 - Prevalence Index is ≤3.0 ¹
		= Total Cover	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of	f total cover:	and the second
<u>b Stratum</u> (Plot size:)	50	V EA	¹ Indicators of hydric soil and wetland hydrology mus
PARLOCATOR MARILATA	$\frac{-00}{2}$		De present, unless disturbed or problematic.
Parcent CA. (the a shill)	<u> </u>	<u></u>	
Pouce for pausa state	· <u> </u>		Tree – Woody plants, excluding vines, 3 in. (7.6 cm
anne an	·	<u></u>	height.
n an			Sapling/Shrub Meady plants evaluating vines to
			than 3 in. DBH and greater than 3.28 ft (1 m) tall.
	·		Herb – All herbaceous (non-woody) plants, regardle of size, and woody plants less than 3.28 ft tall.
			Woody vine – All woody vines greater than 3.28 ft height.
·			
in in in		= Total Cover	1.00
50% of total cover: <u>14</u>	20% of	f total cover: <u>1</u>	
ody Vine Stratum (Plot size: <u>JU</u>)			
		<u></u>	
		= Total Cover	Hydropnytic Vegetation
50% of total cover:	 20% of	total cover:	Present? Yes 🔼 No
narks: (If observed, list morphological adaptations belo			
	· · ·) ·		

Sampling Point: <u>SP-28</u>

Profile Desc	ription: (Describe t	to the depth	needed to docur	nent the li	ndicator	or confirm	the absence of	of indicators.)	
Depth	Matrix	<u></u>	Redo	x Features	6				
(inches)	Color (moist)		Color (moist)		_Type ¹		Texture	Remarks	
0-8	10 YR 5/2	<u>65</u>	7.5 VR 4/4	35	<u> </u>	PLM	silplan	Distinct redex	Cont.
8-14	10 YR 5/3	70	54R 3/4	30	<u> </u>	pl/m	Silly Clay log	ens Prominent re	lok tanto
				·	<u> </u>				
		<u></u>				*********			
'Type: C=Co	ncentration, D=Depl	etion, RM=Re	educed Matrix, MS	S=Masked	Sand Gr	ains.	² Location:	PL=Pore Lining, M=Mat	rix.
Hydric Soil I	ndicators: (Applica	able to all LR	Rs, unless other	wise note	ed.)		Indicators f	for Problematic Hydric	soils ³ :
Histosol	(A1)		Polyvalue Be	low Surfac	e (S8) (I	_RR S, T, U	l) 1 cm M	uck (A9) (LRR O)	
Histic Ep	ipedon (A2)		Thin Dark Su	rface (S9)	(LRR S,	T, U)	2 cm M	uck (A10) (LRR S)	
Black His	stic (A3)		Loamy Mucky	y Mineral (F1) (LRF -⊃)	τO)	Reduce	d Vertic (F18) (outside	MLRA 150A,B)
Hydroger			Loamy Gleye	d Matrix (1	-2)		Pleamo	nt Floodplain Solls (F15	(LRR P, S, T)
Stratilied	Layers (AD)	T 11\	Depleted Mat Redex Dark S	FIX (F-3) Surfage (Fi	C)			OUS Bright Loamy Solis	(F20)
Organic I	DOULES (AD) (LKK F,	1, U) R R T 11\	Redux Dark of	Sunace (Fi	0) (57)		(IVILR Red Do	A 1555) rept Material (TE2)	
Sun Muck Pre		к г, I, O)	Bedoy Depre	esione (E8	(F7) 1)		Reu Pa	vellow Derk Surface (TE	(10)
			Marl (E10) /I		"		Very Si	Idiiow Daik Suitace (Tr Evolain in Remarks)	12)
Depleted	Below Dark Surface	(A11)	Depleted Oct	ric (F11) (MIRA 1	51)			
Thick Da	rk Surface (A12)		Iron-Mangan	ese Masse	s (F12)		T) ³ Indica	tors of hydrophytic yea	etation and
Coast Pr	airie Redox (A16) (M	LRA 150A)	Umbric Surfa	ce (F13) (I	LRR P. 1	. U)	wetla	and hydrology must be i	present.
Sandy M	ucky Mineral (S1) (L	RR O, S)	Delta Ochric	(F17) (ML	RA 151)	, -,	unle	ss disturbed or problem	atic.
Sandy GI	eyed Matrix (S4)		Reduced Ver	tic (F18) (I	MLRA 15	50A, 150B)			
Sandy Re	edox (S5)		Piedmont Flo	odplain So	oils (F19)	(MLRA 14	9A)		
Stripped	Matrix (S6)		Anomalous B	right Loam	ny Soils (F20) (MLR	A 149A, 153C,	153D)	
Dark Sur	face (S7) (LRR P, S ,	, T, U)							
Restrictive L	ayer (if observed):								
Туре:			_					\checkmark	
Depth (inc	hes):						Hydric Soil F	Present? Yes 👗	No
Remarks:									
									,

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: SMOKESTACK Mitigation Site city/c	ounty: Lakeland	/Shulby Co. Sampling Date: 061012018
AND GIMANE FAILINSCIENCE	Taurahia Daa	olato outphing i ont
Investigator(s): <u>ATTACTUNITION CONTRACT</u> Section	in, Township, Range:	0.030.0444
Landform (hillslope, terrace, etc.): <u>A-CIVE3510 VI IN TIEIQ</u> Local	relief (concave, convex,	none): (/01/(/////////////////////////////////
Subregion (LRR or MLRA): URK P Lat: 35, 203	<u>277</u> Long: <u>-</u>	<u>-69,708480</u> Datum:WGS 84
Soil Map Unit Name: MV - WAVON M SILF LOAM (0-2%) S	slopes) occ. Ho	odedNWI classification: NONE
Are climatic / hydrologic conditions on the site typical for this time of year? Ye	es No	(If no, explain in Remarks.)
Are Vegetation Soil or Hydrology significantly disturt	bed? Are "Normal	Circumstances" present? Yes X
Are Vegetation, Soil, or Hydrology naturally problema	itic? (If needed, e	explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing sam	pling point location	ons, transects, important features, etc.
Hydrophytic Vegetation Present? Yes X No Hydric Soil Present? Yes X No	Is the Sampled Area within a Wetland? $ \lambda - 38$	Yes No
Remarks: PEM		
HYDROLOGY		
Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)		Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13)		Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LRR	t U)	Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor (C	;1)	Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres al	ong Living Roots (C3)	Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced Iror	ו (C4)	Crayfish Burrows (C8)
Drift Deposits (B3) Recent Iron Reduction in	Tilled Soils (C6)	X Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C7)		Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Remarks	5)	Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B/)		FAC-Neutral Test (D5)
Water-Stained Leaves (B9)		Sphagnum moss (D8) (LRR 1, U)
Surface Water Present? Ves No. Depth (inches):		
Water Table Present? Yes X No. Denth (inches): 16 (bove surface	
Soturation Present? Ves No Depth (inches):	Wetland h	hydrology Present? Yes X No
(includes capillary fringe)	Wettanu t	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, prev	ious inspections), if ava	ilable:
Remarks: NLO OF PPT recieved on OSNON 2018	1. Standing	water observed both
a and so		

A

Sampling Point: <u>SP-29</u>

VEGETATION (Four Strata) - Use scientific names of plants.

2

<i>A</i> .1	Absolute	Dominant	Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size: <u>30'</u>)	% Cover	Species	<u>Status</u>	Number of Dominant Species
1.				That Are OBL, FACW, or FAC: (A)
2				
3				Total Number of Dominant
3.	<u></u>			Species Across All Strata: (B)
4.	·			Percent of Dominant Species
5				That Are OBL, FACW, or FAC: (A/B)
6				
7				Prevalence Index worksheet:
8.				Total % Cover of:Multiply by:
		= Total Co	ver	OBL species x 1 =
				FACW species x 2 =
	20% of	total cove	r:	FAC species x 3 =
Sapling/Shrub Stratum (Plot size: 17)				
1				PACO species x 4 =
2				UPL species x 5 =
3				Column Totals: (A) (B)
Δ				
4				Prevalence Index = B/A =
ð	·			Hydrophytic Vegetation Indicators:
6				1 - Rapid Test for Hydrophytic Vegetation
7				✓ 2 - Dominance Test is >50%
8.				$\frac{1}{\sqrt{2}}$ 2. Drewnlands Index is < 3.01
		- Total Co		5 - Prevalence index is \$5.0
		- 10lai 00	VCI	Problematic Hydrophytic Vegetation' (Explain)
50% of total cover:	20% of	total cover		
Herb Stratum (Plot size:)	- 0	х г .,		¹ Indicators of hydric soil and wetland hydrology must
1. CUPERUS odoratus	20	Yes	FACIN	be present, unless disturbed or problematic.
2. JUNCUS PEPUSUS	5	No	OBL	Definitions of Four Vegetation Strata:
3 RONUNCULUS ACVIS		NA	FAR.	J
S. ICANARA CONCESSION AND AND AND AND AND AND AND AND AND AN		140	111	Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or
4				more in diameter at breast height (DBH), regardless of
5	<u></u>			neight.
6				Sapling/Shrub – Woody plants, excluding vines, less
7.				than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8				
•				ferb – All nerbaceous (non-woody) plants, regardless
9				of size, and woody plants less than 5.20 it tail.
10				Woody vine - All woody vines greater than 3.28 ft in
11			*******	height.
12				
	26 :	= Total Co	ver	
50% of total cover: 13	20% of	total cover	5.2	
1000000000000000000000000000000000000	20 /0 01			
Woody Vine Stratum (Plot size:)				
1			<u></u>	
2				
3.				
4				
т				
J				Hydrophytic
		= Total Cov	/er	Present2 Ves No
50% of total cover:	20% of	total cover		
Remarks: (If observed, list morphological adaptations belo	₩).			L

SO	L
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Profile Des	cription: (Describe	to the dept	h needed to docu	ment the	indicator	or confirm	n the absence of indica	tors.)
Depth	Matrix Calar (maint)		Rede	ox Feature	S Tumol	1 aa ²	Toyturo	Bomorko
(Inclus)		<u>~</u> .	1000 (11000)	<u></u>		<u> </u>	cill lann	Remarks
	1001 1011		LOUR CLA	_ <u>_ IV</u>	<u> </u>		<u>- 6117 17 Mm</u>	
4-12	109FUIL	- 05 -	107K518	<u> </u>	<u> </u>	<u>M</u>		
<u></u>	·					·		
	·							
	Concentration D-Den	letion PM-	Reduced Matrix M	S-Macker			² Location: DI - Dore	Liping M-Matrix
Hydric Soil	Indicators: (Applic	able to all I	RRs unless of he	nwise not	nd)	airi5.	Indicators for Prob	ematic Hydric Soils ³
Listoro			Delvedue P	niow Surfo	oo (S9) (I	DDCTI	I) 4 om Muck (A9)	
Histoso	i (A1)		Thin Dark Si	urface (S0		ти) ти	7) 1 CHI MUCK (A9) 2 cm Muck (A10)	
Fisht E	lietic (A3)			w Mineral	(E1) (I RE	1, U) 2 (1)	2 cm wuck (Alto	(ERR S) (E18) (outside MLRA 150A B)
Hydrog	en Sulfide (A4)		Loamy Glev	ed Matrix ((F2)	(0)	Piedmont Flood	plain Soils (F19) (IRR P S T)
Stratifie	d Lavers (A5)		X Depleted Ma	atrix (E3)	12)		Anomalous Brid	ht Loamy Soils (F20)
Organic	Bodies (A6) (LRR P.	. T. U)	Redox Dark	Surface (F	6)		(MLRA 153B)	
5 cm M	ucky Mineral (A7) (LF	, , _, RR P, T, U)	Depleted Da	rk Surface	(F7)		Red Parent Mate	erial (TF2)
Muck P	resence (A8) (LRR U)	Redox Depr	essions (F	8)		Very Shallow Da	ark Surface (TF12)
1 cm M	uck (A9) (LRR P, T)		Marl (F10) (I	LRR U)	,		Other (Explain ir	Remarks)
Deplete	d Below Dark Surface	e (A11)	Depleted Oc	hric (F11)	(MLRA 1	51)		
Thick D	ark Surface (A12)		Iron-Mangar	nese Mass	es (F12) (LRR O, P,	T) ³ Indicators of h	ydrophytic vegetation and
Coast F	Prairie Redox (A16) (N	ALRA 150A) Umbric Surfa	ace (F13) (LRR P, T	", U)	wetland hydro	ology must be present,
Sandy I	Mucky Mineral (S1) (L	.RR O, S)	Delta Ochric	(F17) (ML	.RA 151)		unless disturi	ped or problematic.
Sandy (Gleyed Matrix (S4)		Reduced Ve	rtic (F18) (MLRA 15	50A, 150B)		
Sandy F	Redox (S5)		Piedmont Fle	oodplain S	oils (F19)	(MLRA 14	9A)	
Stripped	d Matrix (S6)		Anomalous I	Bright Loar	ny Soils (F20) (MLR	A 149A, 153C, 153D)	
Dark Su	Irface (S7) (LRR P, S	s, T, U)					······	11.1.
Restrictive	Layer (if observed):							
Туре:								1
Depth (in	ches):						Hydric Soil Present?	Yes_ <u> </u>
Remarks:								
	·							

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: Smoke stack Mitigation Site ci	ity/County: Lakeland/Shelby Co. Sampling Date: 05 NOV 2019
Applicant/Owner: RES /TDOT	State: TN Sampling Point: SP-30
Investigatoria ANN Gilmore ENVINOSCILLAGE	
investigator(s). <u>Inter Ortentero portección</u> Si	
Landform (hillslope, terrace, etc.): <u>OUPT COSTUM</u>	Slope (%):
Subregion (LRR or MLRA): LRK F Lat: 20.00	Long: <u>-01.101603</u> Datum: <u>WGS 24</u>
Soil Map Unit Name: $WV = WUV OVV J SUF 100W (0-1)^{\circ}$	10 STOPER JOCC, Floridia NWI classification: NONE
Are climatic / hydrologic conditions on the site typical for this time of year	? Yes No (If no, explain in Remarks.)
Are Vegetation, SoilX_, or Hydrology significantly dis	sturbed? Are "Normal Circumstances" present? Yes No
Are Vegetation, Soil, or Hydrology naturally probl	ematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing s	ampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes <u>Y</u> No	Is the Somelad Area
Hydric Soil Present? Yes No	is the Sampled Area
Wetland Hydrology Present? Yes <u>Yes</u> No	W-47
Remarks:	
Wetland within agricultural (Soybe	an) field. Problemmatic veg oue
to managed realitation (now crop.	likely nervoicide application), as
Well as soil disturbance from tilling	a/planting atc.
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (I	LRR U) Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odd	or (C1) Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizosphere	s along Living Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced	Iron (C4) X Crayfish Burrows (C8)
Drift Deposits (B3) Recent Iron Reduction	1 in Tilled Soils (C6) <u>X</u> Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Thin Muck Surface (C	7) Geomorphic Position (D2)
Iron Deposits (B5) Other (Explain in Rem	arks) Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	_X FAC-Neutral Test (D5)
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Surface Water Present? Yes No Depth (inches):	151
Vater Table Present? Yes <u>No</u> Depth (inches);	
(includes capillary fringe)	vvetiand Hydrology Present? Yes No
Describe Recorded Data (stream gauge, monitoring well, aerial photos,	previous inspections), if available:
Remarks.	

Sampling Point: <u>9-30</u>

VEGETATION (Four Strata) – Use scientific names of plants.

201	Absolute Dominant Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>OU</u>)	<u>% Cover Species? Status</u>	Number of Dominant Species
1		That Are OBL, FACW, or FAC: (A)
2		Total Number of Dominant
3		Species Across All Strata: (B)
4		Percent of Deminent Species
5		That Are OBL, FACW, or FAC: 50 (A/B)
6		
7.		Prevalence Index worksheet:
8.		Total % Cover of:Multiply by:
	= Total Cover	OBL species $\underbrace{U}_{x 1} = \underbrace{U}_{x 1}$
50% of total cover	20% of total cover:	FACW species 25 x 2 = 50
Sapling/Shrub Stratum (Plot size: 15		FAC species x 3 =
Saping/Sindb Stratum (Fior size:)		FACU species x 4 =
L		UPL species 10 x 5 = 100
2.		Column Totals: 47 (A) Sb (B)
3		
4		Prevalence Index = B/A = <u>3.92</u>
5		Hydrophytic Vegetation Indicators:
6		1 - Rapid Test for Hydrophytic Vegetation
7		2 - Dominance Test is >50%
8		3 - Prevalence Index is ≤3.0 ¹
	= Total Cover	X Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of total cover:	planted field
Herb Stratum (Plot size: 5)	20 Non 1101	¹ Indicators of hydric soil and wetland hydrology must
1. GINCINE MAX	yes upl	be present, unless disturbed or problematic.
2. <u>Paranonius acris</u>	15 YES FACW	Definitions of Four Vegetation Strata:
3. Echinochua muricata	ID NO FACW	Tree - Woody plants, excluding vines 3 in (7.6 cm) or
4. Barbarea Vulgaris	Z NO FAC	more in diameter at breast height (DBH), regardless of
5		height.
6.		Sanling/Shrub – Woody plants, excluding vines, less
7		than 3 in. DBH and greater than 3.28 ft (1 m) tall.
8		
Q		Herb – All herbaceous (non-woody) plants, regardless
10		
10		Woody vine – All woody vines greater than 3.28 ft in
11.	·	height.
12.	11-7	
21	-91 = Total Cover	
50% of total cover:	20% of total cover:	
Woody Vine Stratum (Plot size: 20°)		
1		
2		
3.		
4.		
5		Hudrophutin
	= Total Cover	Vegetation
50% of total cover:	20% of total cover:	Present? Yes No
Pamarka: (If observed, list morphological adaptations below		<u>å</u>
Remarks. (in observed, ist molphological adaptations beto	ττ <i>)</i> .	

Depth	Matrix	<u> </u>	Redo	x Features	<u>s</u>			
		100	Color (moist)		Type'	_Loc ²	Texture	Remarks
	2.54 512	<u> </u>					STIFLOAM	
1-10	10 YR 41	00	7.54K 419	10	<u> </u>	<u>M</u>	<u>silty day loam</u>	
			2.54 512	20	D	M	· · ·	
10-16	10VR43	40	LOYR SIB	25	C	Μ.	and a start	
·			BIANK	IS			Mn	
<u></u>		·	Joseph Contraction of the Contra					
¹ Type: C=C	oncentration, D=Dep	letion, RM	=Reduced Matrix, MS	S=Masked	Sand Gr	ains.	² Location: PL=Pore Lin	ing, M=Matrix.
Hydric Soil	Indicators: (Application	able to all	LRRs, unless other	wise note	əd.)		Indicators for Problem	atic Hydric Soils ³ :
Histosol	(A1)		Polyvalue Bei	low Surfac	ce (S8) (L	RR S, T, I	J) 1 cm Muck (A9) (LR	(R O)
HISTIC EP	Dipedon (A2)		I hin Dark Su	rtace (S9)	(LRR S,	T, U)	2 cm Muck (A10) (L	RR S)
Black Hi Hydroge	ISUC (AD) An Sulfide (AA)		Loamy Mucky	/ Mineral (d Matrix ()	(F1) (LKK F2)	0)	Reduced Vertic (F18	3) (outside MLRA 150A,B)
Stratified	d Lavers (A5)		X Depleted Mat	rix (E3)	-2)		Anomalous Bright L	namy Soils (F19) (LKK P, S, 1)
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark S	Surface (Fi	6)		(MLRA 153B)	
5 cm Mu	icky Mineral (A7) (LR	R P, T, U) Depleted Dar	k Surface	(F7)		Red Parent Material	l (TF2)
Muck Pr	esence (A8) (LRR U))	Redox Depre	ssions (F8	3)		Very Shallow Dark S	Surface (TF12)
1 cm Mu	ick (A9) (LRR P, T)		Marl (F10) (LI	RR U)			Other (Explain in Re	marks)
Depleted	d Below Dark Surface	e (A11)	Depleted Och	iric (F11) ((MLRA 1	1)		
Thick Da	ark Surface (A12)		Iron-Mangane	ese Masse	es (F12) (I	.RR O, P,	T) ³ Indicators of hydro	ophytic vegetation and
Coast Pr	raine Redox (A16) (M	ILRA 150	A) Umbric Surfac	ce (F13) (I	LRR P, T,	U)	wetland hydrolog	y must be present,
Sandy N	lucky Mineral (S1) (L	KK 0, 5j	Deita Ochric ((F17) (IVIL)	KA 151) MURA 45	A 460 P)	unless disturbed	or problematic.
Sandy R	edox (S5)		Reduced Ven	nu (mio) (r odolain Sc	VILKA 10	MIPA 14	9.61	
Stripped	Matrix (S6)		Anomalous B	right Loam	nv Soils (F	20) (MLR	A 149A, 153C, 153D)	
Dark Sur	face (S7) (LRR P, S,	, T, U)			.,	20) (, , , , , , , , , , , , , , , , , , ,	
Restrictive L	ayer (if observed):							
Type:								,
Depth (inc	hes):						Hydric Soil Present?	Yes X No
Remarks:								

WETLAND DETERMINATION DATA FO	RM – Atlantic and Gulf Coastal Plain Region
WETLAND DETERMINATION DATA FOR Project/Site: Smakehouse Mingshim Bank Site Project/Site: Smakehouse Mingshim Bank Site Applicant/Owner: RES / T Dot Investigator(s): R. Watren / EnviroScience, Inc. Landform (hillslope, terrace, etc.): Depression Loc Subregion (LRR or MLRA): LPL P134 Lat: 35,2793 Soil Map Unit Name: Wet - Water y Silt Joam, O to 2 Are climatic / hydrologic conditions on the site typical for this time of year? Are Vegetation, Soil, or Hydrology significantly distr Are Vegetation, Soil, or Hydrology naturally probler SUMMARY OF FINDINGS – Attach site map showing sa Hydrophytic Vegetation Present? Yes No	RM - Atlantic and Gulf Coastal Plain Region /County: ////////////////////////////////////
Hydric Soil Present? Yes <u>Y</u> No	within a Wetland? Yes X No
Wetland Hydrology Present? Yes No	
PFO	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)
X Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Marl Deposits (B15) (LF	RR U) X Drainage Patterns (B10)
Saturation (A3) Hydrogen Sulfide Odor	(C1) <u>X</u> Moss Trim Lines (B16)
Water Marks (B1) Oxidized Rhizospheres	along Living Roots (C3) Dry-Season Water Table (C2)
Sediment Deposits (B2) Presence of Reduced in Drift Deposits (B3) Presence of Reduced in	n Tilled Seils (CE) Crayfish Burrows (C8)
Algal Mat or Crust (B4) Thin Muck Surface (C7)	Geomorphic Rosition (D2)
Iron Deposits (B5) Other (Explain in Remai	rks) Shallow Aquitard (D3)
Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)
Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)
Field Observations:	
Surface Water Present? Yes <u>×</u> No Depth (inches):	3
Water Table Present? Yes <u>X</u> No Depth (inches):	
Saturation Present? Yes <u>X</u> No <u>Depth</u> (inches):	Wetland Hydrology Present? Yes <u>V</u> No
(Includes capillary filinge) Describe Recorded Data (stream gauge, monitoring well, aerial photos, pr	evious inspections), if available:
Remarks:	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point:	<u>SP-31</u>
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2 -	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size:)	<u>% Cover</u>	Species?	Status	Number of Dominant Species
1. Acer szuhzrinum	12	<u>FAC</u>		That Are OBL, FACW, or FAC: (A)
2. <u>platanus occidentatis</u>	15	FACW	<u> </u>	Total Number of Dominant
3. Acer rubrum	10	FAL	<u> </u>	Species Across All Strata: (B)
4. Unu zmerazn	10	FAC	<u> </u>	Derest of Deminent Species
5. Betul 2 nigrz		FACW	- h	That Are OBL, FACW, or FAC:
6. Szlix nava	5	FACW	<u></u>	
7. Frexinus senselvence	3	FACW	N	Prevalence Index work sheet:
8. Liguidzaba Stylzcifuz	2	FAC	N	Total % Cover of: Multiply by:
	68 :	= Total Cov	er	OBL species x 1 =
50% of total cover:	20% of	total cover		FACW species x 2 =
Sanling/Shrub Stratum (Plot size: 15)				FAC species x 3 =
1 EKaring Acaded	3	FALW	4	FACU species x 4 =
2 Ward an her her	3	EA/		UPL species x 5 =
2. <u>Simu zmanan</u>		176		Column Totals: (A) (B)
3.				
4				Prevalence Index = B/A =
5				Hydrophytic Vegetation Indicators:
6				1 - Rapid Test for Hydrophytic Vegetation
7	-			2 - Dominance Test is >50%
8				3 - Prevalence Index is ≤3.0 ¹
		= Total Cov	er	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of	total cover:		
Herb Stratum (Plot size: 5)				¹ Indicators of hydric soil and wetland hydrology must
1. Querin niara	l	FAL	۲	be present, unless disturbed or problematic.
2. Salix niara	1	OBL	4	Definitions of Four Vegetation Strata:
3.				
4.				more in diameter at breast height (DBH), regardless of
5			A	height.
6				
7				than 3 in DBH and greater than 3 28 ft (1 m) tall
<i>1</i>	· ······			
8				Herb – All herbaceous (non-woody) plants, regardless
9	·			of size, and woody plants less than 3.28 it tall.
10				Woody vine - All woody vines greater than 3.28 ft in
11	******			height.
12				
		= Total Cov	er	
50% of total cover:	20% of	total cover		
Woody Vine Stratum (Plot size: <u>30</u>)				
1				
2				
3				
4	· · · · · · · · · · · · · · · · · · ·			
5				
5.		- Total Cau		Hydrophytic Vegetation
			er	Present? Yes <u>X</u> No
	20% of	total cover	*···	
Remarks: (If observed, list morphological adaptations belo	W).			

US Army Corps of Engineers

SOIL

Profile Des	cription: (Describe	to the dept	h neede	d to docun	nent the ir	ndicator	or confirm	n the absence	of indicators.)
Depth	Matrix			Redo	<u>x Features</u>	;			
(inches)	Color (moist)	<u>%</u>	Color	(moist)	%	_Type1_		Texture	Remarks
0-20	2.54	60	SYR	4/6	30	<u> </u>	MIPL	Uzy lozm	
		-	7542	5/2	10	1	mlar		
			e e pare	<u> </u>	· <u> </u>		<u> </u>		······································
	<u></u>						*******	····	
¹ Type: C=C	oncentration, D=Dep	letion, RM=F	Reduced	Matrix, MS	S=Masked	Sand Gr	ains.	² Location:	PL=Pore Lining, M=Matrix.
Hydric Soil	Indicators: (Applic	able to all L	RRs, un	less other	wise note	d.)		Indicators	for Problematic Hydric Soils ³ :
Histosol	(A1)		Po	lyvalue Bel	low Surfac	e (S8) (L	.RR S, T, U	J)1 cm M	luck (A9) (LRR O)
Histic Ep	oipedon (A2)		Th	in Dark Su	rface (S9)	(LRR S,	T, U)	2 cm M	luck (A10) (LRR S)
Black Hi	stic (A3)		Lo	amy Mucky	/ Mineral (I	F1) (LRR	R O)	Reduce	ed Vertic (F18) (outside MLRA 150A,B)
Hydroge	n Sulfide (A4)		Lo	amy Gleye	d Matrix (F	-2)		Piedmo	ont Floodplain Soils (F19) (LRR P, S, T)
Stratified	I Layers (A5)		<u> </u>	pleted Mat	rix (F3)			Anoma	lous Bright Loamy Soils (F20)
Organic	Bodies (A6) (LRR P,	, T, U)	Re	dox Dark S	Surface (Fe	5)		(MLR	(A 153B)
5 cm Mu	ICKY MINERAI (A/) (LR	(R P, I, U)	De	pleted Dari	k Surface ((F7)		Red Pa	arent Material (TF2)
	esence (A8) (LKK U)	Re		SSIONS (F8)		Very St	hallow Dark Surface (1F12)
Depleter	t Below Dark Surface	a (Δ11)	IVI2	nleted Och	ric (E11) (MI PA 14	54)		Explain in Remarks)
Depicted	rk Surface (A12)		Uo	n-Mannane	ac (TT) (i se Masse	e (E12) (T) ³ Indice	ators of hydrophytic vegetation and
Coast Pr	airie Redox (A16) (N	ILRA 150A)	110	n Mangano nbric Surfa	ce (F13) (L		: II)	vetl	and hydrology must be present
Sandy M	lucky Mineral (S1) (L	.RR O, S)	De	Ita Ochric (F17) (MLF	RA 151)	, -,	unle	ss disturbed or problematic
Sandy G	leyed Matrix (S4)		Re	duced Vert	ic (F18) (N	ILRA 15	0A, 150B)		
Sandy R	edox (S5)		Pie	dmont Floo	odplain So	ils (F19)	(MLRA 14	9A)	
Stripped	Matrix (S6)		An	omalous Br	right Loam	y Soils (I	F20) (MLR	A 149A, 153C,	153D)
Dark Sur	face (S7) (LRR P, S	, T, U)							
Restrictive L	.ayer (if observed):							1	
Type:									
Depth (inc	hes):							Hydric Soil I	Present? Yes <u>X</u> No
Remarks:									
× .									

WETLAND D	ETERMINATION DATA FOR	M – Atlantic and (Gulf Coastal Pla	ain Region
Project/Site: Smokestzck Mitgat	ion Bank Site City/	County: Lakeland	(Shelby	Sampling Date: 11/6/201
Applicant/Owner: RES/TDOT		,	State: TN	Sampling Point: SP-32
Investigator(s): R.Warren, End.	CaScicaca Jaco Secti	on Township Range:		
Landform (hillslope terrace etc.): Fl	2+ loca	l relief (concave, conve	(none). None	Slope (%):
Subragion (I PP or MI PA): LER 213	4 lat 35 2 7897		- 89. 708060	Olope (16)
Soli Mon Unit Name: VV - Work	La citt lize Ada 2	server the		Datum. <u>VSQ20</u>
Soli Map Unit Name: <u>Wi - Vi aver</u>	$\frac{ V }{ } = \frac{ V }{ V } = $	percent super		
Are climatic / nydrologic conditions on t	ne site typical for this time of year?		(If no, explain in R	emarks.)
Are Vegetation, Soil, or	Hydrology significantly distui	rbed? Are "Norm	al Circumstances" p	resent? Yes <u>No</u> No
Are Vegetation, Soil, or	Hydrology naturally problem	atic? (If needed,	explain any answei	's in Remarks.)
SUMMARY OF FINDINGS – A	ttach site map showing san	npling point locat	ons, transects	, important features, etc
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present?	Yes <u>×</u> No <u> </u>	Is the Sampled Area within a Wetland?	Yes	No_X
Pomarka:				
HYDROLOGY				
Wetland Hydrology Indicators:			Secondary Indica	tors (minimum of two required)
Primary Indicators (minimum of one is	required; check all that apply)		Surface Soil (Cracks (B6)
Surface Water (A1)	Aquatic Fauna (B13)			etated Concave Surface (B8)
High Water Table (A2) Saturation (A3)	Hydrogen Sulfide Odor (R U) C1)	Moss Trim Li	terns (B10) nes (B16)
Water Marks (B1)		along Living Roots (C3)	Drv-Season V	Vater Table (C2)
Sediment Deposits (B2)	Presence of Reduced Irc	on (C4)	Crayfish Burr	ows (C8)
Drift Deposits (B3)	Recent Iron Reduction in	Tilled Soils (C6)	Saturation Vi	sible on Aerial Imagery (C9)
Algal Mat or Crust (B4)	Thin Muck Surface (C7)		Geomorphic I	Position (D2)
Iron Deposits (B5)	Other (Explain in Remark	ks)	Shallow Aquil	tard (D3) Teat (D5)
Water-Stained Leaves (B9)	31y (D7)			oss (D8) (LRR T. U)
Field Observations:		1		
Surface Water Present? Yes _	No <u>X</u> Depth (inches):			
Water Table Present? Yes _	No <u> </u>			
Saturation Present? Yes (includes capillary fringe)	No <u>//</u> Depth (inches):	Wetland	Hydrology Presen	t? Yes No
Describe Recorded Data (stream gaug	je, monitoring well, aerial photos, pre	evious inspections), if av	ailable:	
Remarks:				
itematic.				

ppb

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: <u>SP32</u>

~	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>30</u>)	% Cover	Species?	Status	Number of Dominant Species
1. Acer regurdo	25	<u>+</u>	FAC	That Are OBL, FACW, or FAC: (A)
2. Liquidzmber styrzeiflug	15	<u> </u>	FAL	Total Number of Dominant
3. VIMMS EMERICANZ	10	М	FALW	Species Across All Strata: (B)
4. Platanos occidentalis	10	Ν	FAC	(-/
5	·			Percent of Dominant Species 7 That Are OBL, FACW, or FAC: 7 (A/B)
6				
7			********	Prevalence Index worksheet:
8.				Total % Cover of: Multiply by:
	60	= Total Cov	er	OBL species x 1 =
50% of total cover:	20% of	total cover		FACW species x 2 =
Sapling/Shrub Stratum (Plot size: 15)				FAC species x 3 =
1 ASUMO triloba	5	4	FAC	FACU species x 4 =
	<u> </u>		FACUL	UPL species x 5 =
2. Minus envolcence			EAL	Column Totals: (A) (B)
3. Aler Negurdo			<u> </u>	
4				Prevalence Index = B/A =
5				Hydrophytic Vegetation Indicators:
6				1 - Rapid Test for Hydrophytic Vegetation
7				× 2 - Dominance Test is >50%
8				3 - Prevalence Index is ≤3.0 ¹
	15	= Total Cov	er	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover:	20% of	total cover:		
Herb Stratum (Plot size: 5)				¹ Indiactors of hydrig coil and watland hydrology must
1 Leniera increta	40	FACU	4	be present, unless disturbed or problematic.
2 Acing Anlaho	8	FAC	N	Definitions of Four Vegetation Strata:
2. Taxa literation	~	ELI	N	bennitions of Four Vegetation Strata.
Jula Advanta			N	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
4. VI012 000F2(2				more in diameter at breast height (DBH), regardless of height
5				noight.
6				Sapling/Shrub – Woody plants, excluding vines, less
7				than 3 In. DBH and greater than 3.28 ft (1 m) tail.
8				Herb – All herbaceous (non-woody) plants, regardless
9	<u></u>			of size, and woody plants less than 3.28 ft tall.
10	<u> </u>			Woody vine – All woody vines greater than 3 28 ft in
11				height.
12.				
	58 :	= Total Cov	er	
50% of total cover:	 20% of	total cover:		
Woody Vine Stratum (Plot size: 30)				
1 V. H.S. C.D.	5	NL	4	
2 Taxis Juliu C		FACU	4	
2. 10 FILS BAR DUAL 1 - 2.00				
3				
4				
5				Hydrophytic
		= Total Cov	er	Vegetation
50% of total cover:	20% of	total cover:		
Remarks: (If observed, list morphological adaptations belo	w).			

Sampling Point: <u>SP32</u>

Profile Desc	ription: (Describe	to the depth	n needed to docur	nent the i	ndicator	or confirm	the absence of i	ndicators.)
Depth	Matrix		Redo	x Features	}1		- .	
(inches)	Color (moist)	<u> </u>	Color (moist)	- %	Type		L24	Remarks
0-60	2.57 711	60	3116 716			MITL	102-	
			+-> 114 518	10	<u> </u>	PLIM		
		-		·			,	
	······							······································
		lotion DM-E	Poducod Motrix, M		Sand Cr		² l contiant DI -	-Doro Lining M-Matrix
Hydric Soil	Indicators: (Applic	able to all L	RRs. unless other	wise note	sand Gr ed.)	ains.	Indicators for	Problematic Hydric Soils ³ :
	(A1)		Polyvalue Be	low Surfac	ce (S8) (L	.RR S. T. U) \Box 1 cm Muck	(A9) (LRR O)
Histic Er	bipedon (A2)		Thin Dark Su	rface (S9)	(LRR S,	T, U)	2 cm Muck	(A10) (LRR S)
Black Hi	stic (A3)		Loamy Muck	y Mineral (F1) (LRF	20)	Reduced V	/ertic (F18) (outside MLRA 150A,B)
U Hydroge	n Sulfide (A4)		Loamy Gleye	ed Matrix (I	-2)		Piedmont F	Floodplain Soils (F19) (LRR P, S, T)
Stratified	d Layers (A5)		Depleted Ma	trix (F3)	~ `			s Bright Loamy Soils (F20)
	Bodies (A6) (LRR P	, T, U) 	Redox Dark	Surface (F	6) (E7)			53B) t Matarial (TE2)
	esence (A8) (LRR U	((F, I, U))	Redox Depre	ssions (F8	(<i>F7)</i> 3)		Very Shall	ow Dark Surface (TF12)
1 cm Mu	ick (A9) (LRR P, T)	/	Marl (F10) (L	.RR U)	,		Other (Exp	lain in Remarks)
Depleted	d Below Dark Surfac	e (A11)	Depleted Ocl	hric (F11) (MLRA 1	51)	_	
Thick Da	ark Surface (A12)		Iron-Mangan	ese Masse	es (F12) (LRR 0, P, 1	T) ³ Indicator	s of hydrophytic vegetation and
	rairie Redox (A16) (I Juoky Minoral (S1) (I	MLRA 150A)		ICE (F13) (I /E17) /MI	LRR P, T DA 151)	, U)	wetland	hydrology must be present,
Sandy N Sandy G	lleved Matrix (S4)	-KK 0, 3j		(F18) (I	MLRA 15	0A. 150B)	uniess	disturbed of problematic.
Sandy R	edox (S5)		Piedmont Flo	odplain So	oils (F19)	(MLRA 149	9A)	
Stripped	Matrix (S6)		Anomalous E	Bright Loan	ny Soils (F20) (MLR A	A 149A, 153C, 153	3D)
Dark Su	rface (S7) (LRR P, S	5, T, U)					r	
Restrictive I	_ayer (if observed):							
Dopth (in							Hydria Sail Bra	cont2 You X No
Depth (int	(nes).						Hydric Soli Pre	
Remarks:								

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Smoke Stack Mitigation Site City/ Applicant/Owner: <u>RES/TDOT</u> Investigator(s): <u>AMN Gilmore, Enviroscience</u> Secti Landform (hillslope, terrace, etc.): <u>Fewace</u> Loca Subregion (LRR or MLRA): <u>LRR P</u> Lat: <u>35.279</u> Soil Map Unit Name: <u>WV-Waverly Silf Iaam (0-2%)</u> Are climatic / hydrologic conditions on the site typical for this time of year? M Are Vegetation, Soil, or Hydrology significantly disture Are Vegetation, Soil, or Hydrology naturally problem	County: Laleland/Shelby G., Sampling Date: IS NON 2018 State: TN Sampling Point: SP-33 on, Township, Range:
SUMMARY OF FINDINGS – Attach site map showing san	ipling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Yes X No Hydric Soil Present? Yes No X Wetland Hydrology Present? Yes No Yes	Is the Sampled Area within a Wetland? Yes <u>No X</u>
POVEST above wante of MPVISS Week	(100).
HYDROLOGY	
Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
Surface Water Present? Yes NoX Depth (inches): Water Table Present? Yes NoX Depth (inches): Saturation Present? Yes NoX Depth (inches): (includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photos, pre	Wetland Hydrology Present? Yes No
Remarks: No hydrology observed.	

VEGETATION (Four Strata) - Use scientific names of plants

US Army Corps of Engineers

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				ounipinig / onin
201	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: <u>00</u>) 1. QUUYUUS MIQYA	<u>% Cover</u> 29	Species?	<u>Status</u> FAC	Number of Dominant Species (A)
2. Acer saccharinum	20	<u>Ves</u>	FAC	Total Number of Dominant
Liquidambar sturariflua	<u> 5</u> 5	Yes Noc	FAC	Species Across All Strata: (B)
. <u>Advida v Dav Distant</u>			<u>LVA</u>	Percent of Dominant Species 75% (A/R)
5				
7				Prevalence Index worksheet:
),	70			OBI species
27 0		= Total Co	ver	FACW species x 2 =
50% of total cover:	20% of	f total cove	r:	FAC species x 3 =
Sapling/Shrub Stratum (Plot size: 10)	20	VIDE	FAT.	FACU species x 4 =
Agina avata		<u>YCS</u>	EAUL	UPL species x 5 =
Laurhoun Wilder	5	No	Upl.	Column Totals: (A) (B)
A MUNITARIA AND	· <u> </u>	140	<u>vrv</u>	
······································			·	Prevalence Index = B/A =
).				nyurophytic vegetation indicators:
·				2 - Dominance Test is >50%
3				$3 - Prevalence Index is \leq 3.0^{1}$
	30	= Total Co	ver	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover: <u>15</u>	20% of	f total cove	r:	
Herb Stratum (Plot size: 6 Phullostachus sp. (Invasive Vambbo	1 25	Ves	NL	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. Lonicera, japonica	8	Yes	FACU	Definitions of Four Vegetation Strata:
3. Microstedium viminum	2	NO	FAC -	Tree – Woody plants, excluding vines, 3 in, (7.6 cm) or
4. <u>Symphythichum latenflorum</u>	2	No	FAC	more in diameter at breast height (DBH), regardless of
5. Toxicodudron vadicans		No	FAL	height.
5			. <u></u>	Sapling/Shrub – Woody plants, excluding vines, less
·				
))			· ·····	Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
10	-			Woody vine – All woody vines greater than 3.28 ft in
11		4	• ••••••	height.
12	72			
36	< 10	= Total Co	ver	
50% of total cover: <u>- 404</u>	<u> </u>	f total cove	r: <u>11/0</u>	
Woody Vine Stratum (Plot size: <u>0v</u>)	15	Ves	FALIA	
plannesis varians	5	NO	FAL	
			<u>Ino</u>	
1			•	
۲		******		
	30	= Total Co	ver	Vegetation
			50	Present? Yes 👗 No
50% of total cover 15	20% of	f total cove	r: V	

Sampling Point SP. MA

SOIL

Depth (inches) 0-20	Matrix Color (moist)	<u>%</u> [00	Redo Color (moist)	× Features			Texture Sì [†	Rem	arks
¹ Type: C=C Hydric Soil	oncentration, D=Dep Indicators: (Applic	oletion, RM=R able to all LR	educed Matrix, Mi Rs, unless other	S=Masked S rwise noted	Sand Gra		² Location: 1 Indicators f	PL=Pore Lining, Maior Problematic Hyperbolic	-Matrix. /dric Soils ⁹ :
Histosol Histic Ej Black Hi Hydroge Stratified Organic 5 cm Mu Muck Pr 1 cm Mu Depleted Thick Da Coast Pl Sandy M Sandy G Sandy R Stripped Dark Sui	(A1) bipedon (A2) istic (A3) en Sulfide (A4) d Layers (A5) Bodies (A6) (LRR P, ucky Mineral (A7) (LF resence (A8) (LRR U uck (A9) (LRR P, T) d Below Dark Surface ark Surface (A12) rairie Redox (A16) (N fucky Mineral (S1) (L Beyed Matrix (S4) redox (S5) Matrix (S6) rface (S7) (LRR P, S	, T, U) RR P, T, U)) e (A11) ILRA 150A) .RR O, S)	 Polyvalue Be Thin Dark Su Loamy Muck Depleted Mai Redox Dark 3 Depleted Dark 3 Depleted Dark 3 Depleted Dark 1 (F10) (L Depleted Oct Iron-Mangan Umbric Surfa Delta Ochric Reduced Ver Piedmont Flo Anomalous B 	elow Surface Inface (S9) (I y Mineral (F ed Matrix (F2) trix (F3) Surface (F6) rk Surface (F6) rk Surface (F8) RR U) nric (F11) (M ese Masses ce (F13) (LF (F17) (MLR) tic (F18) (ML sodplain Soil: bright Loamy	e (S8) (LI LRR S, ⁻ 1) (LRR 2) =7) [F12) (L RR P, T, A 151) LRA 150 s (F19) (' Soils (F	RR S, T, U) T, U) O) RR O, P, T U) DA, 150B) MLRA 149 20) (MLRA	 1 cm Ma 2 cm Ma Reduce Piedmoi Anomala (MLR, Red Par Very Sh Other (E 7) ³ Indica wetla unles A) 149A, 153C, 7	uck (A9) (LRR O) uck (A10) (LRR S) d Vertic (F18) (out: nt Floodplain Soils ous Bright Loamy S A 153B) rent Material (TF2) allow Dark Surface Explain in Remarks tors of hydrophytic and hydrology must ss disturbed or prot	side MLRA 150A,B) (F19) (LRR P, S, T) Soils (F20) • (TF12) • vegetation and be present, olematic.
Restrictive L Type: Depth (inc	ayer (if observed):	· · · · · · · · · · · · · · · · · · ·	-				Hydric Soil P	resent? Yes	No _X
ισι παι κ 5 .									

WETLAND DETERMINATION DATA FORM – Atlantic	and Gulf Coastal Plain Region		
Project/Site: <u>Smakestack Mitigatian Bank Site</u> City/County: <u>Lak</u> Applicant/Owner: <u>RES / TDOT</u> Investigator(s): <u>B. Slaby, Envire Science, Inc.</u> Section, Township, F Landform (hillslope, terrace, etc.): <u>depression</u> Local relief (concave Subregion (LRR or MLRA): LRR P134 Lat: 35.280381	el ond Shelby Sampling Date: 11/6/201%		
Soil Map Unit Name: We Will de silt Lean D-276 change accepted by Fledd have	All (WW NUMI algoritagetion: N/A		
Con wap one wante.			
Are climatic / hydrologic conditions on the site typical for this time of year? Yes No	(If no, explain in Remarks.)		
Are Vegetation, Soil, or Hydrology significantly disturbed? Are	e "Normal Circumstances" present? Yes <u>X</u> 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 Sample Hydric Soil Present? Yes X No within a Wetl Wetland Hydrology Present? Yes X No within a Wetl Remarks: Is the Sample No Is the Sample Is the Sample	ed Area and? Yes No		
PSS Recieves outwesh 1	form ag field		
HYDROLOGY			
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)		
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)		
Surface Water (A1) Aquatic Fauna (B13)	Sparsely Vegetated Concave Surface (B8)		
High Water Table (A2) Marl Deposits (B15) (LRR U)	∑ Drainage Patterns (B10)		
Saturation (A3) Hydrogen Sulfide Odor (C1)	Moss Trim Lines (B16)		
Water Marks (B1) Oxidized Rhizospheres along Living Roc	ts (C3) Dry-Season Water Table (C2)		
Sediment Deposits (B2) Presence of Reduced Iron (C4)	Crayfish Burrows (C8)		
Drift Deposits (B3) Recent Iron Reduction in Tilled Soils (C6	i) Saturation Visible on Aerial Imagery (C9)		
Algal Mat or Crust (B4) Thin Muck Surface (C7)	K Geomorphic Position (D2)		
Iron Deposits (B5) Other (Explain in Remarks)	Shallow Aquitard (D3)		
↑ Inundation Visible on Aerial Imagery (B7)	FAC-Neutral Test (D5)		
X Water-Stained Leaves (B9)	Sphagnum moss (D8) (LRR T, U)		
Field Observations:			
Surface Water Present? Yes <u>No</u> Depth (inches); <u>10</u>			
Water Table Present? Yes No Depth (inches):	\checkmark		
Saturation Present? Yes No Depth (inches): V (includes capillary fringe)	/etland Hydrology Present? Yes No		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspection	ns), if available:		
Remarks:			
м.			

ee Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
				That Are OBL, FACW, or FAC:
······································				Total Number of Dominant L Species Across All Strata: (B)
	<u> </u>			Percent of Dominant Species 757. (All That Are OBL, FACW, or FAC:
			*****	Prevalence Index worksheet:
				Total % Cover of: Multiply by:
	· · · · · · · · · · · · · · · · · · ·			OBL species x 1 =
50% of total approx	2004 of	total aguar	ver sa	FACW species x 2 =
ling/Shrub Stratum (Plot size:	20 % 01	total cover	·	FAC species x 3 =
Betwald mista	50	Y	FACL	FACU species x 4 =
Pontabar della iller	20	- \	MAC	UPL species x 5 =
halfactures acreditions		. 3	<u>t ris</u>	Column Totals: (A) (B
				Prevalence Index = B/A =
				Hydrophytic Vegetation Indicators:
			*****	1 - Rapid Test for Hydrophytic Vegetation
				X 2 - Dominance Test is >50%
				3 - Prevalence Index is ≤3.0 ¹
13	<u>~ 60 -</u>	= Total Co	ver	Problematic Hydrophytic Vegetation ¹ (Explain)
50% of total cover: <u>1</u>	20% of	total cover	: <u> 16 </u>	· · · · · · · · · · · · · · · · · · ·
<u>b Stratum</u> (Plot size: <u>5</u>)		V	-10	¹ Indicators of hydric soil and wetland hydrology must
Populus deltaides			- +th	be present, unless disturbed or problematic.
Asteraciae Sp.		<u></u>	-VF	Definitions of Four Vegetation Strata:
JUNCHS Efforshis and an		<u> </u>	OBL	Tree – Woody plants, excluding vines, 3 in. (7.6 cm)
Carex spin (stirile)	d	<u>N</u>	NL	more in diameter at breast height (DBH), regardless of
Campsis radicans		<u></u>	HAC .	neight.
renthornm sedeides		<u></u>	OBL	Sapling/Shrub - Woody plants, excluding vines, less
Ludwigia alternitolla		<u></u>	OBL	than 3 in. DBH and greater than 3.28 ft (1 m) tall.
 Every All States Contract PRAP (2011) Contract 		at 5 - 1 - 1	. : 	Herb – All herbaceous (non-woody) plants, regardles of size, and woody plants less than 3.28 ft tall.
				Woody vine – All woody vines greater than 3.28 ft in height.
-				· · · · · · · · · · · · · · · · · · ·
and the second se	< <u></u>	= Total Cov	ver حلا	1997 - 1997 -
50% of total cover:	<u>20% of</u>	total cover	:	
ody Vine Stratum (Plot size:)				
		<u>.</u>		
	<u></u>		<u> </u>	
				Hydrophytic
			ver	Present? Yes No
50% of total cover:	20% of	total cover	·	
narks: (If observed, list morphological adaptations bel	lOW/).			
Asteracede Sp. fall but sinesce	d, beat v	vp ani	onal T	MAL most have and had a
		/ st		run way nove rescribled symphychickum
				- * * ***

SO	L
----	---

Sampling Point: 5P-34

Profile Desc	ription: (Describe t	o the dept	n needed to docum	ent the	indicato	r or confirn	n the absence	of indicators.)
Depth (inches)	<u>Matrix</u> Color (moist)		Redox Color (moist)	<u>Feature %</u>	s Type ¹	Loc ²	Texture	Remarks
0-5	104R 6/2	75	7.5 YR 3/4	25	C	PLM	silfy loon	prominent ledox Conc.
5-12	10 YR 5/3	60	2.54R 2.5/2	10	C	M	Sand	prominent redex conc.
	7.5 YR 3/3	30						1
12-14	104R 4/6	100					Sout	
14-16	10YR 5/2	60	7.54R.416	25	С	Μ	Sand	prominent redok conc.
			7.5 YR 2.5/3	15	С	M		Distlact rodox conc.
¹ Type: C=Co	oncentration, D=Depl	etion, RM=	Reduced Matrix, MS	=Masked	d Sand G	rains.	² Location:	PL=Pore Lining, M=Matrix.
Hydric Soil I	ndicators: (Applica	able to all L	.RRs, unless other	wise not	ed.)		Indicators	for Problematic Hydric Soils ³ :
Histosol	(A1)		Polyvalue Bel	ow Surfa	ce (S8) (LRR S, T, U	J)1 cm M	uck (A9) (LRR O)
Black Hi	stic (A3)		Loamy Mucky	Mineral	(F1) (LR	, 1, 0, R O)	Reduce	d Vertic (F18) (outside MLRA 150A.B)
Hydroge	n Sulfide (A4)		Loamy Gleye	d Matrix ((F2)	,	Piedmo	nt Floodplain Soils (F19) (LRR P, S, T)
Stratified	l Layers (A5)		🔀 Depleted Matr	rix (F3)			Anomal	ous Bright Loamy Soils (F20)
Organic	Bodies (A6) (LRR P,	T, U)	Redox Dark S	Surface (F	F6)		(MLR	A 153B) ropt Motorial (TE2)
Muck Pr	esence (A8) (LRR U)	к <i>т</i> , I, U)	Depieted Dar	ssions (F	;(<i>F7)</i> 8)		Verv St	nallow Dark Surface (TF12)
1 cm Mu	ck (A9) (LRR P, T)		Marl (F10) (Lf	RRU)	-,		Other (I	Explain in Remarks)
Depleted	Below Dark Surface	e (A11)	Depleted Och	ric (F11)	(MLRA 1	151)		
Thick Da	rk Surface (A12)		Iron-Mangane	se Mass	es (F12)	(LRR O, P,	T) ³ Indica	ators of hydrophytic vegetation and
Sandy M	airie Redox (A16) (iw lucky Mineral (S1) (L	RR O. SI) Ombric Surfac	E (F13) (F17) (ML	(LKK P, .RA 151)	1, 0)	unle	and nydrology must be present, ss disturbed or problematic
Sandy G	leyed Matrix (S4)		Reduced Vert	ic (F18) (MLRA 1	50A, 150B)		
Sandy R	edox (S5)		Piedmont Floo	odplain S	ioils (F19) (MLRA 14	19A)	
Stripped	Matrix (S6)	T 10	Anomalous Br	right Loar	my Soils	(F20) (MLR	RA 149A, 153C,	153D)
Restrictive L	aver (if observed):	, 1, 0)						
Туре:								
Depth (inc	:hes):						Hydric Soil I	Present? Yes <u>X</u> No
Remarks:								
5	uspect the	- +10	Former b	rough	4 M	Sond	to fill	1 LOW SLOOPE SA UL.
5	ials < s	C	. Pull	Ų.	. 1	1		and the second second
-	till, Jand	trom	i ag tield	Llasht	5 th	rough 1	Wetlovd.	Ontwash patterns
V	isible on aer	ia) in	30 110 5.1			*		· · · · · · · · · · · · · · · · · · ·
			· · · · · ·					

12018 -35
<u>)65 8</u> 4
, etc.
9)

Number of Dominant Species
That Are OBL, FACW, or FAC: (A)
Total Number of Dominant Species Across All Strata: (B)
Percent of Dominant Species 507. (A/E
Total % Cover of:
OBL species v 1 =
$- \qquad OPL species \qquad x \ 5 = $
(A) (E
Prevalence Index = B/A =
— 1 - Rapid Test for Hydrophytic Vegetation
2 - Dominance Test is >50%
3 - Prevalence Index is ≤3.0 ¹
Problematic Hydrophytic Vegetation ¹ (Explain)
in the second
Indicators of hydric soil and wetland hydrology must
be present, unless disturbed or problematic.
Definitions of Four Vegetation Strata:
U Tree - Woody plants, excluding vines 3 in (7.6 cm)
 more in diameter at breast height (DBH), regardless of height.
Sapling/Shrub - Moody plants, evoluting vines, less
than 3 in. DBH and greater than 3.28 ft (1 m) tall.
Harb - All berbaceous (pop woods) plants, regardles
of size, and woody plants less than 3.28 ft tall.
Woody vine – All woody vines greater than 3.28 ft in height
.6
—
Hydrophytic Venetation
Present? Yes No X

	-			the absence of t			
(inches) Color (moist) %	Color (moist)	<u>x ⊢eatures</u> % Tvne	¹ Loc ²	Texture Remarks			
0-4 10VR 514 92	5YR 416	8 0	MPI	Silty long	Personalizzation	Jax Cura	
$\frac{1}{1} \frac{1}{1} \frac{1}$				elle l	1148.0 102.10	GEA COAC.	
<u>4-16 1098 414 100</u>				Sitty looks			
	· · · · · · · · · · · · · · · · · · ·						
¹ Type: C=Concentration D=Depletion RM	=Reduced Matrix M	S=Masked Sand (Grains	² Location: PL:	Pore Lining M=M	atrix	
Hydric Soil Indicators: (Applicable to al	LRRs. unless othe	rwise noted.)	Ji un J.	Indicators for	Problematic Hvdr	c Soils ³ :	
Histocol (A1)	Polyvalue Be	alow Surface (S8)	(IRRSTIN	1 cm Muck			
Histic Enjoedon (A2)	Thin Dark St	uface (S9) (I RR :	(ERRO, 1, 0) S T II)	2 cm Muck	(A10) (IRR S)		
Black Histic (A3)	Loamy Muck	v Mineral (F1) (LF	R O)	Reduced \	(ertic (F18) (outsid	e MLRA 150A.B)	
Hydrogen Sulfide (A4)	Loamy Gleve	ed Matrix (F2)		Piedmont I	Floodplain Soils (F1	9) (LRR P. S. T)	
Stratified Lavers (A5)	Depleted Ma	trix (F3)		Anomalous	Bright Loamy Soil	s (F20)	
Organic Bodies (A6) (LRR P, T, U)	Redox Dark	Surface (F6)		 (MLRA 1	53B)	· · · ·	
5 cm Mucky Mineral (A7) (LRR P, T, U) Depleted Da	rk Surface (F7)		Red Paren	t Material (TF2)		
Muck Presence (A8) (LRR U)	Redox Depre	essions (F8)		Very Shall	ow Dark Surface (T	F12)	
1 cm Muck (A9) (LRR P, T)	Marl (F10) (L	.RR U)		Other (Exp	lain in Remarks)		
Depleted Below Dark Surface (A11)	Depleted Oc	hric (F11) (MLRA	151)				
Thick Dark Surface (A12)	Iron-Mangan	ese Masses (F12) (LRR O, P, 1	r) ³ Indicator	s of hydrophytic ve	getation and	
Coast Prairie Redox (A16) (MLRA 150	A) Umbric Surfa	ice (F13) (LRR P,	T, U)	wetland	hydrology must be	present,	
Sandy Mucky Mineral (S1) (LRR O, S)	Delta Ochric	(F17) (MLRA 151)	unless	disturbed or probler	natic.	
Sandy Gleyed Matrix (S4)	Reduced Ver	rtic (F18) (MLRA 1	150A, 150B)				
Sandy Redox (S5)		pooplain Solis (F1)	9) (MLRA 149	IA) 14408 4520 454			
Supped Matrix (S6)		Shynt Loanny Sons		(149A, 155C, 15	(0)		
Restrictive Laver (if observed):							
Traci							
					(0.) Y		
				Hydric Soil Pre	sent? Yes		
Remarks:							
Appendix D

TDEC and NCWRQ Hydrologic Determination Field Data Forms



Tennessee Division	of water Pollution	Control, version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-O	liver Creek	11/5/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-1/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.277257, -89.716571
Previous Rainfall (7-days): 1.9in National Weather Service	(Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry o	drought unknown	
Source of recent %& season precip data: Calculations for N	lormal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 4	
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):		
Severe M	loderate Slię	ght Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	Stream
Secondary Indicator Score (if applicable) =	23.75
Justification / Notes:	

Primary indicator #5 indicates feature is a stream. Seconardy indicators were also assessed and scored >19. Metric #15 was NA due to recent rain event but there is a high liklihood the metric would have a strong score, resulting higher score.

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	s = 3
B. Hydrology (Subtotal: <u>3.75</u>)				

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

C. Biology (Subtotal = <u>10.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

23.75

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

Notes:

Channelized ditch that runs through soy fields. Although Metric #15 was not available due to a significant rain event <48hr before assessment occurred, there was enough moving water, that it would likely still be present >48hr from a rain event. Snails = 12, Oligacheates = 2, Coleoptera = 3, Crayfish = 1, Gambusia = abundent

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/5/18	RES Memphis/S-1	35.277257
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716571
25.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0 Yes =		; = 3	

B. Hydrology (Subtotal: 5.25)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = <u>10.75</u>)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 ; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Notes:

Snails = 12, Oligacheates = 2, Coleoptera = 3, Crayfish = 1, Gambusia = abundent

I ennessee	Division	of water	Pollutic	on Control,	Version 1.4	+
County:	Ν	Named Waterbody:		Date/Time:		
Shelby	L	.oosahatchi	e River-	Oliver Creek		11/5/18
Assessors/Affiliation: Andrew Zimmerman						Project ID:
Site Name/Description: S-2/RES Memphis						
Site Location: Lakeland, TN						
USGS Quad:	F	HUC (12 digit):		Lat/Long:		
Arlington		080102090405		35.276319, -89.719542		
Previous Rainfall (7-days): 2.38in National Weath	her Service	e (Memphis)			
Precipitation this Season vs Normal: very wet	wet	average	dry	drought	unknown	
Source of recent %& season precip data: Calculati	ions for No	ormal Weat	her			
Watershed Size: <1mi ²				Photos Y or	N	
				Number: 6		
Soil Type(s) / Geology: Falaya Silt Loam				-		Source: Soil Web
Surrounding Land Use: Agricultural						
Degree of historical alteration to natural cannel mor	rphology &	hydrology (a	circle one	e):		
Severe	Mo	Iderate	c	liaht	Absent	

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	17.5

Justification / Notes:

Although this feature contains multiple individuals of ephemeroptera, odonata, and coleoptera, it only flows in direct response to precipitation and was constructed with the primary purpose of performing as an agricultural drainage. Portions of the feature are impounded due to sedimentation from the agricultural field and during high flow events within the Loosahatchie River (receiving river) S-2 is further impounded with backwater from the Loosahatchie. S-2 is deeply entrenched by dredging activities and a naturally occurring bed and bank are not easily observed. S-2 contained water but was not flowing within 24hrs of a 0.33in rain event. Water became intermittently pooled towards the bottom of the assessed reach.

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	3 = 3

B. Hydrology (Subtotal: _____)

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

C. Biology (Subtotal = <u>11.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

17.5

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

Notes:

Ephemeroptera = 5, Odonata = 3, Snails = 30, Coleoptera = 6, Frogs = 1

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/5/18	RES Memphis/S-2	35.276319
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.719542
19	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes	= 3

B. Hydrology (Subtotal: <u>3</u>)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	; = 3

C. Biology (Subtotal = <u>11.5</u>)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 ; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Notes:

Ephemeroptera = 5, Odonata = 3, Snails = 30, Coleoptera = 6, Frogs = 1

I ennessee Division	of water Pollution	Control, Version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-O	liver Creek	11/13/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-3/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.285322, -89.717236
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry o	drought unknown	
Source of recent %& season precip data: Calculations for N	lormal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 3	
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):		
Severe M	loderate Slię	ght Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 = Secondary Indicator Score (if applicable) =

WWC	
9.5	

Justification / Notes:

Dry and <24hrs since last sig rain event (previous visit)

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No	No = 0		s = 3
B. Hydrology (Subtotal: <u>3</u>)				
14. Subsurface flow/discharge into channel	0	1	2	3
15. Water in channel and >48 hours since sig. rain	θ	4	2	3
	4.5		0.5	

19. Hydric soils in stream bed or sides of channel	No = 0		Yes	= 1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5
17. Sediment on plants or on debris	0	0.5	1	1.5
16. Leaf litter in channel (January - September)	1.5	4	0.5	θ
15. Water in channel and >48 nours since sig. rain	Ĥ	+	¥	÷

C. Biology (Subtotal = _____)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

9.5

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

Notes:

2 features (~30ft, 15ft) join to form S-3. 2 small headcuts. Assessed area as a WWC, upstream fingers assumed to be WWC based on assessed reach score.

NC DWQ Stream Identification F	Form Version 4.11
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Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-3	35.285322
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.717236
11	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0 Yes =		5 = 3	

B. Hydrology (Subtotal: _____)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Notes:

2 features (~30ft, 15ft) join to form AS26. 2 small headcuts. Assessed area as a ephemeral, upstream features assumed to be WWC based on assessed reach score.

	of water Pollution	Control, Version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-C	Diver Creek	11/13/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-4/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.285055, -89.716115
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown	
Source of recent %& season precip data: Calculations for N	ormal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 7	
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):		
Severe M	/loderate Sli	ght Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC	
Secondary Indicator Score (if applicable) =	13	
Justification / Notes:		
Channel observed to be dry <24hrs after significant rain ev	ent (previous to assessment).	

A. Geomorphology (Subtotal: <u>8</u>)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	= 3

B. Hydrology (Subtotal: 2.5)

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

C. Biology (Subtotal = <u>2.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

13

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

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-4	35.285055
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716115
15.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal: <u>8</u>)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	= 3

B. Hydrology (Subtotal: _____)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

I ennessee Division	of water Pollution	Control, version 1.4			
County:	Named Waterbody:		Date/Time:		
Shelby	Loosahatchie River-C	liver Creek	11/13/18		
Assessors/Affiliation: Andrew Zimmerman			Project ID:		
Site Name/Description: S-5/RES Memphis					
Site Location: Lakeland, TN					
USGS Quad:	HUC (12 digit):		Lat/Long:		
Arlington	0801	02090405	35.285587, -89.716337		
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)				
Precipitation this Season vs Normal: very wet wet average dry drought unknown					
Source of recent %& season precip data: Calculations for N	lormal Weather				
Watershed Size: <1mi ² Photos Y or N					
Soil Type(s) / Geology: Falaya Silt Loam		Source: Soil Web			
Surrounding Land Use: Agricultural					
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):				
Severe M	loderate Slig	ght Absent			

Tennessee Division of Water Pollution Control. Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	10.25
lustification / Notes	

Justification / Notes:

Channel observed to be dry <24hrs after a significant rain event (previous to assessment).

A. Geomorphology (Subtotal:3.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: 2.25)

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

C. Biology (Subtotal = <u>4.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

10.25

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

Notes:

S-5 flows into S-4.

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-5	35.285587
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716337
11.75	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	= 3

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	; = 3

C. Biology (Subtotal = _____)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

I ennessee Division	of water Pollution	Control, Version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-C	liver Creek	11/13/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-6/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.284495, -89.717043
Previous Rainfall (7-days): 0.86in National Weather Servio	ce (Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown	
Source of recent %& season precip data: Calculations for N	ormal Weather		
Watershed Size:<1mi ²		Photos Y or N	
		Number: 3	
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology 8	k hydrology (circle one):		
Severe N	/loderate Sli	ght Absent	

Tennessee Division of Water Pollution Control. Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC	
Secondary Indicator Score (if applicable) =	9.5	
Justification / Notes:		
Observations and the based of the state of t		

Channel observed to be dry <24hrs after a significant rain event (previous to assessment).

A. Geomorphology (Subtotal: <u>2.5</u>)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	2	3	
2. Sinuous channel	0	1	2	3	
3. In-channel structure: riffle-pool sequences	0	1	2	3	
4. Sorting of soil textures or other substrate	0	1	2	3	
5. Active/relic floodplain	0	1	2	3	
6. Depositional bars or benches	0	1	2	3	
7. Braided channel	0	1	2	3	
8. Recent alluvial deposits	0	0.5	1	1.5	
9. Natural levees	0	1	2	3	
10. Headcuts	0	1	2	3	
11. Grade control	0	0.5	1	1.5	
12. Natural valley or drainageway	0	0.5	1	1.5	
13. At least second order channel on existing USGS or NRCS map	No	= 0		′es = 3	
B. Hydrology (Subtotal:3)					
14. Subsurface flow/discharge into channel	0	1	2	3	
15. Water in channel and >48 hours since sig. rain	θ	4	2	3	
16. Leaf litter in channel (January - September)	1.5	4	0.5	0	
17. Sediment on plants or on debris	0	0.5	1	1.5	

C. Biology (Subtotal = _____)

18. Organic debris lines or piles (wrack lines)

19. Hydric soils in stream bed or sides of channel

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	0	0.5	1	2

0

No = 0

0.5

1

Yes = 1.5

1.5

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

Total Points =

9.5

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

Notes:

Dry and <24hrs since last sig rain event.

NC DWQ Stream Identifica	ation Form Version 4.11
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Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-6	35.284495
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.717043
11	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: _____)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Tennessee Division	of water Pollution	Control, version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-O	liver Creek	11/13/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-7/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	08010	02090405	35.284454, -89.716198
Previous Rainfall (7-days): 1.9in National Weather Service	(Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry o	drought unknown	
Source of recent %& season precip data: Calculations for N	lormal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 4	
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):		
Severe M	loderate Slię	ght Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	13.25
Justification / Notes	

Justification / Notes:

Channel observed to be dry <24hrs after a significant rain event (previous to assessment).

A. Geomorphology (Subtotal: <u>5.75</u>)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No	= 0	Yes = 3	
B. Hydrology (Subtotal: <u>2.5</u>)				
14. Subsurface flow/discharge into channel	0	1	2	3
15. Water in channel and >48 hours since sig. rain	θ	- 1	2	3
16. Leaf litter in channel (January - September)	1.5	1	0.5	θ
17. Sediment on plants or on debris	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5

C. Biology (Subtotal = 5 _)

19. Hydric soils in stream bed or sides of channel

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	0	0.5	1	2

No = 0

Yes = 1.5

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

Total Points =

13.25

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

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-7	35.284454
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716198
14.75	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: _____4___)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	; = 3

C. Biology (Subtotal = <u>5</u>)					
18. Fibrous roots in streambed	3	2	1	0	
19. Rooted upland plants in streambed	3	2	1	0	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	
21. Aquatic mollusks	0	1	2	3	
22. Fish	0	0.5	1	1.5	
23. Crayfish	0	0.5	1	1.5	
24. Amphibians	0	0.5	1	1.5	
25. Algae	0	0.5	1	1.5	
26. Wetland plants in streambed	FACW = 0.75;	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Tennessee Division	of water Pollution	Control, version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-O	liver Creek	11/13/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-8/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.282855, -89.717079
Previous Rainfall (7-days): 1.9in National Weather Service	(Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry o	drought unknown	
Source of recent %& season precip data: Calculations for N	lormal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 3	
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):		
Severe M	loderate Slig	ght Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC	
Secondary Indicator Score (if applicable) =	9	
Justification / Notes:		
Channel observed to be dry <24hrs after a significant rain e	event (previous to assessment).	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	s = 3

B. Hydrology (Subtotal: _____)

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

C. Biology (Subtotal = _____)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

9

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

Notes:

Dry and <24hrs since last sig rain event. Two rills form features. Bank erosion due to sheer flow across field. Headcut = 1

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-8	35.282855
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.717079
10.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal: <u>3</u>)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	= 3

B. Hydrology (Subtotal: ____3___)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	; = 3

C. Biology (Subtotal =)					
18. Fibrous roots in streambed	3	2	1	0	
19. Rooted upland plants in streambed	3	2	1	0	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	
21. Aquatic mollusks	0	1	2	3	
22. Fish	0	0.5	1	1.5	
23. Crayfish	0	0.5	1	1.5	
24. Amphibians	0	0.5	1	1.5	
25. Algae	0	0.5	1	1.5	
26. Wetland plants in streambed	FACW = 0.75;	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

	of water Pollution	Control, Version 1.4		
County:	Named Waterbody:		Date/Time:	
Shelby	Loosahatchie River-C	Diver Creek	11/13/18	
Assessors/Affiliation: Andrew Zimmerman			Project ID:	
Site Name/Description: S-9/RES Memphis				
Site Location: Lakeland, TN				
USGS Quad:	HUC (12 digit):		Lat/Long:	
Arlington	080102090405		35.281882, -89.717015	
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)			
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown		
Source of recent %& season precip data: Calculations for N	ormal Weather			
Watershed Size: <1mi ²		Photos Y or N		
		Number: 4		
Soil Type(s) / Geology: Falaya Silt Loam Source: Soil We				
Surrounding Land Use: Agricultural				
Degree of historical alteration to natural cannel morphology 8	hydrology (circle one):			
Severe N	loderate Sli	ght Absent		

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	10.75
Instification / Notae	

Justification / Notes:

Channel observed to be dry <24hrs after a significant rain event (previous to assessment).

A. Geomorphology (Subtotal: <u>3.5</u>)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	s = 3
B. Hydrology (Subtotal: <u>2.25</u>)				
14. Subsurface flow/discharge into channel	0	1	2	3

19. Hydric soils in stream bed or sides of channel	No = 0		Yes	= 1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5
17. Sediment on plants or on debris	0	0.5	1	1.5
16. Leaf litter in channel (January - September)	1.5	4	0.5	θ
15. Water in channel and >48 hours since sig. rain	θ	4	2	3
14. Subsurface flow/discharge into channel	U	1	2	3

C. Biology (Subtotal = <u>5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

10.75

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

Notes:

Dry and <24hrs since last sig rain event. Short drainage feature off soy field (~40ft), 1 large headcut at top of reach. Several small rills join the feature. Small Sycamore trees in channel.

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-9	35.281882
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.717015
12.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	= 3

B. Hydrology (Subtotal: <u>3.75</u>)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	; = 3

C. Biology (Subtotal = 5.25) 18. Fibrous roots in streambed 3 2 1 0 3 19. Rooted upland plants in streambed 2 1 0 20. Macrobenthos (note diversity and abundance) 0 2 3 1 21. Aquatic mollusks 0 1 2 3 22. Fish 0 0.5 1 1.5 23. Crayfish 0 0.5 1 1.5 24. Amphibians 0 0.5 1 1.5 25. Algae 0 0.5 1 1.5 **FACW = 0.75**; OBL = 1.5; Other = 0 26. Wetland plants in streambed

*perennial streams may also be identified using other methods. See p. 35 of manual

Tennessee Division	of water Pollution	Control, version 1.4		
County:	Named Waterbody:		Date/Time:	
Shelby	Loosahatchie River-C	liver Creek	11/13/18	
Assessors/Affiliation: Andrew Zimmerman			Project ID:	
Site Name/Description: S-10/RES Memphis				
Site Location: Lakeland, TN				
USGS Quad:	HUC (12 digit):		Lat/Long:	
Arlington	0801	02090405	35.281287, -89.716853	
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)			
Precipitation this Season vs Normal: very wet wet average dry drought unknown				
Source of recent %& season precip data: Calculations for N	Iormal Weather			
Watershed Size: <1mi ² Photos Y or N				
		Number: 2		
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web	
Surrounding Land Use: Agricultural				
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):			
Severe M	loderate Sli	ght Absent		

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	10.75
Instification / Notae	

Justification / Notes:

Channel observed to be dry <24hrs after a significant rain event (previous to assessment).

A. Geomorphology (Subtotal:3.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	s = 3

B. Hydrology (Subtotal: _____)

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

C. Biology (Subtotal = _____)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

10.75

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

Notes:

1 headcut at rop of feature. Feature ~30ft. Dry and <24hrs since sig rain event.

NC DWQ Stream Identifica	ation Form Version 4.11
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Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-10	35.281287
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716853
12.25	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No	= 0	Yes	5 = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

I ennessee Divisior	1 of Water Pollution	1 Control, Version 1.4		
County:	Named Waterbody:		Date/Time:	
Shelby	Loosahatchie River-0	Oliver Creek	11/13/18	
Assessors/Affiliation: Andrew Zimmerman			Project ID:	
Site Name/Description: S-11/RES Memphis				
Site Location: Lakeland, TN				
USGS Quad:	HUC (12 digit):		Lat/Long:	
Arlington	080102090405		35.281308, -89.716648	
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)			
Precipitation this Season vs Normal: very wet wet average dry drought unknown				
Source of recent %& season precip data: Calculations for I	Normal Weather			
Watershed Size: <1mi ² Photos Y or N				
Number: 3				
Soil Type(s) / Geology: Falaya Silt Loam Source: Soil Web				
Surrounding Land Use: Agricultural				
Degree of historical alteration to natural cannel morphology &	& hydrology (circle one):			
Severe	Moderate SI	ight Absent		

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	10.75
Instification / Notae	

Justification / Notes:

Channel observed to be dry <24hrs after a significant rain event (previous to assessment).

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No	No = 0 Yes = 3		s = 3
B. Hydrology (Subtotal:)				
14. Subsurface flow/discharge into channel	0	1	2	3

3				
15. Water in channel and >48 hours since sig. rain	θ	4	2	3
16. Leaf litter in channel (January - September)	1.5	1	0.5	θ
17. Sediment on plants or on debris	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel	No	= 0	Yes	= 1.5

C. Biology (Subtotal = <u>5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

10.75

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

NC DWQ Stream Identifica	ation Form Version 4.11
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Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-11	35.281308
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716648
12.25	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal: <u>3</u>)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = <u>5</u>)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

I ennessee Division of Water Pollution Control, Version 1.4						
County:	Named Waterbody:		Date/Time:			
Shelby	Loosahatchie River-Oliver Creek		11/13/18			
Assessors/Affiliation: Andrew Zimmerman	ssors/Affiliation: Andrew Zimmerman		Project ID:			
Site Name/Description: S-12/RES Memphis						
Site Location: Lakeland, TN						
USGS Quad:	HUC (12 digit):		Lat/Long:			
Arlington	080102090405		35.280669, -89.716912			
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)					
Precipitation this Season vs Normal: very wet wet average dry drought unknown						
Source of recent %& season precip data: Calculations for Normal Weather						
Watershed Size: <1mi ² Photos Y or N						
		Number: 2				
Soil Type(s) / Geology: Falaya Silt Loam Source: Soil Web						
Surrounding Land Use: Agricultural						
Degree of historical alteration to natural cannel morphology & hydrology (circle one):						
Severe N	Aoderate Sli	ight Absent				

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =

Secondary Indicator Score (if applicable) =

7.5

Justification / Notes:

Channel observed to be dry <24hrs after a significant rain event (previous to assessment).

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	= 3

B. Hydrology (Subtotal: <u>2</u>)

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

C. Biology (Subtotal = <u>3.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

7.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indcator Score <19 points
NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-12	35.280669
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716912
9	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal: <u>2</u>)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: _____3.5___)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal = <u>3.5</u>)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Tennessee Division	I OI Water Poliution	Control, version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-C	Diver Creek	11/13/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-13/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.280589, -89.716599
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown	
Source of recent %& season precip data: Calculations for N	ormal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 3	
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	k hydrology (circle one):		
Severe M	loderate Sli	ght Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	11.5
Justification / Notes:	

Channel observed to be dry <24hrs after a significant rain event (previous to assessment).

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	
B. Hydrology (Subtotal: <u>3</u>)				
14. Subsurface flow/discharge into channel	0	1	2	3
15. Water in channel and >48 hours since sig. rain	θ	4	2	3
16. Leaf litter in channel (January - September)	1.5	4	0.5	θ
17. Sediment on plants or on debris	0	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5
19. Hydric soils in stream bed or sides of channel	No	No = 0 Ye		= 1.5

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

11.5

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

Notes:

Small feature draining soy field. ~20ft of defined channel.

NC DWQ Stream Identification Form	Version	4.11
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Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-13	35.280589
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716599
13	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: <u>4.5</u>)				
12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No	= 0	Yes	5 = 3

C. Biology (Subtotal =)					
18. Fibrous roots in streambed	3	2	1	0	
19. Rooted upland plants in streambed	3	2	1	0	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	
21. Aquatic mollusks	0	1	2	3	
22. Fish	0	0.5	1	1.5	
23. Crayfish	0	0.5	1	1.5	
24. Amphibians	0	0.5	1	1.5	
25. Algae	0	0.5	1	1.5	
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0				

*perennial streams may also be identified using other methods. See p. 35 of manual

	n of water Pollutio	n Control, Version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-	Oliver Creek	11/13/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-14/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.280217, -89.716391
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown	
Source of recent %& season precip data: Calculations for I	Normal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 4	
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	& hydrology (circle one)		
Severe	Moderate SI	light Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC	
Secondary Indicator Score (if applicable) =	12	
Justification / Notes:		
Channel observed to be dry <24hrs after a significant rain	event (previous to assessment).	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	

B. Hydrology (Subtotal: <u>3</u>)

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

C. Biology (Subtotal = _____)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

12

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

Notes:

Small drainage feature originating from soy field. Apparent downcutting due to runoff.

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-14	35.280217
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716391
13.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes	5 = 3

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	0	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = _____)

18. Fibrous roots in streambed	3	2	1	0	
19. Rooted upland plants in streambed	3	2	1	0	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	
21. Aquatic mollusks	0	1	2	3	
22. Fish	0	0.5	1	1.5	
23. Crayfish	0	0.5	1	1.5	
24. Amphibians	0	0.5	1	1.5	
25. Algae	0	0.5	1	1.5	
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0				

*perennial streams may also be identified using other methods. See p. 35 of manual

Tennessee Division of Water Pollution Control, Version 1.4						
County:	Named Waterbody:		Date/Time:			
Shelby	Loosahatchie River-C	liver Creek	11/13/18			
Assessors/Affiliation: Andrew Zimmerman			Project ID:			
Site Name/Description: S-15/RES Memphis						
Site Location: Lakeland, TN						
USGS Quad:	HUC (12 digit):		Lat/Long:			
Arlington	080102090405		35.279267, -89.716944			
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)					
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown				
Source of recent %& season precip data: Calculations for Normal Weather						
Watershed Size: <1mi ² Photos Y or N						
		Number: 3				
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web			
Surrounding Land Use: Agricultural						
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):					
Severe M	loderate Sli	ght Absent				

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	7.5
Justification / Notes:	
Channel observed to be dry <24hrs after a significant rain e	event (previous to assessment).

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	5 = 3

B. Hydrology (Subtotal: <u>2</u>)

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

C. Biology (Subtotal = <u>3.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

7.5

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

NC DWQ Stream Identification Form	Version	4.11
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Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-15	35.279267
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716944
9	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	= 3

B. Hydrology (Subtotal: _____)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	s = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

I ennessee Division of Water Pollution Control, Version 1.4						
County:	Named Waterbody:		Date/Time:			
Shelby	Loosahatchie River-0	Oliver Creek	11/13/18			
Assessors/Affiliation: Andrew Zimmerman			Project ID:			
Site Name/Description: S-16/RES Memphis						
Site Location: Lakeland, TN						
USGS Quad:	HUC (12 digit):		Lat/Long:			
Arlington	0801	02090405	35.279145, -89.716568			
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)					
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown				
Source of recent %& season precip data: Calculations for N	Normal Weather					
Watershed Size: <1mi ² Photos Y or N						
		Number: 3				
Soil Type(s) / Geology: Waveryly Silt Loam			Source: Soil Web			
Surrounding Land Use: Agricultural						
Degree of historical alteration to natural cannel morphology & hydrology (circle one):						
Severe M	/loderate SI	ight Absent				

Tennessee Division of Water Pollution Control. Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC	
Secondary Indicator Score (if applicable) =	11	
Justification / Notes:		
Channel observed to be dry <24hrs after a significant rain	event (previous to assessment).	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	
B. Hydrology (Subtotal:)				
14. Subsurface flow/discharge into channel	0	1	2	3
15. Water in channel and >48 hours since sig. rain	θ	4	2	3
16. Leaf litter in channel (January - September)	1.5	- 1	0.5	θ
17. Sediment on plants or on debris	0	0.5	1	1.5

C. Biology (Subtotal = 4

18. Organic debris lines or piles (wrack lines)

19. Hydric soils in stream bed or sides of channel

C. Biology (Subtotal =)				
18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	0	0.5	1	2

0

No = 0

0.5

1

Yes = 1.5

1.5

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

Total Points =

11

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

NC DWQ Stream Identification Form	Version	4.11
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Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-16	35.279145
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716568
12.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: _____)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No	= 0	Yes	; = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; 0	FACW = 0.75; OBL = 1.5; Other = 0		

*perennial streams may also be identified using other methods. See p. 35 of manual

I ennessee Division	of water Pollution	Control, Version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-O	liver Creek	11/13/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-17/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.278609, -89.716473
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry o	drought unknown	
Source of recent %& season precip data: Calculations for N	lormal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 3	
Soil Type(s) / Geology: Waveryly Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):		
Severe M	loderate Slig	ght Absent	

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Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic features exists solely due to a process discharge	x	WWC
2. Defined bed and bank absent, dominated by upland vegetation/grass	x	WWC
3. Watercourse dry anytime during February through April 15h, under normal precipitation/groundwater conditions	NA	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	NA	WWC
Presence of multiple populations of obligate lotic or obligate lotic organisms with > 2 month aquatic phase	x	Stream
6. Presence of fish (except Gambusia)	x	Stream
7. Presence of naturally occurring ground water table connection	x	Stream
8. Flowing water in channel and 7 days since last precipitation in local watershed	x	Stream
9. Evidence watercourse has been used as a supply of drinking water	x	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 =	WWC	
Secondary Indicator Score (if applicable) =	9	
Justification / Notes:		
Channel observed to be dry <24hrs after a significant rain	event (previous to assessment).	

A. Geomorphology (Subtotal: <u>3</u>)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	; = 3

B. Hydrology (Subtotal: _____)

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

C. Biology (Subtotal = ______)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

9

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

Notes:

Small drainage rill, originating from soy field.

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-17	35.278609
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716473
10.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:3)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: _____3___)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal =4.5)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Tenr	nessee Divisi	on of Water	Pollutio	on Control,	Version 1.4	4
County:		Named Wat	erbody:			Date/Time:
Shelby		Loosahatcl	Loosahatchie River-Oliver Creek		11/13/18	
Assessors/Affiliation: Andrew Zimmerma	ו			Project ID:		
Site Name/Description: S-18						
Site Location: Lakeland, TN						
USGS Quad:		HUC (12 dig	HUC (12 digit):			Lat/Long:
Arlington			080102090405		35.277937, -89.716479	
Previous Rainfall (7-days): 1.9in Nation	al Weather Serv	vice (Memphis	;)			
Precipitation this Season vs Normal:	very wet wet	average	dry	drought	unknown	
Source of recent %& season precip data:	Calculations for	or Normal Wea	ather			
Watershed Size: <1mi ²				Photos Y o	r N	
				Number: 2		
Soil Type(s) / Geology: Waveryly Silt Lo	am					Source: Soil Web
Surrounding Land Use: Agricultural						
Degree of historical alteration to natural c	annel morpholog	gy & hydrology	(circle on	e):		
s	evere	Moderate	S	Slight	Absent	

Primary Field Indicators Observed

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

WWC

Secondary Indicator Score (if applicable) =

13

Justification / Notes:

Channel observed to be dry <24hrs after a significant rain event (previous to assessment).

A. Geomorphology (Subtotal:6)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	

B. Hydrology (Subtotal: ____2___)

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

C. Biology (Subtotal = ____5.0____)

1				1
18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

13

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

Notes:

Small rill feature which drains off of soy field and into manmade channel.

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-18	35.277937
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.716479
14.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:6)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	= 3

B. Hydrology (Subtotal: _____)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Tennessee Division		1 Control, version 1.4			
County:	Named Waterbody:		Date/Time:		
Shelby	Loosahatchie River-0	Oliver Creek	11/14/18		
Assessors/Affiliation: Andrew Zimmerman			Project ID:		
Site Name/Description: S-19/RES Memphis					
Site Location: Lakeland, TN			-		
USGS Quad:	HUC (12 digit):		Lat/Long:		
Arlington	080102090405		35.274701, -89.718959		
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)				
Precipitation this Season vs Normal: very wet wet average dry drought unknown					
Source of recent %& season precip data: Calculations for N	Normal Weather				
Watershed Size: <1mi ² Photos Y or N					
		Number: 13			
Soil Type(s) / Geology: Falaya Silt Loam / Grenada Comple	ex		Source: Soil Web		
Surrounding Land Use: Agricultural					
Degree of historical alteration to natural cannel morphology &	k hydrology (circle one):				
Severe N	/loderate SI	ight Absent			

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	Stream	
Secondary Indicator Score (if applicable) =	18	
Justification / Notes:		
Although metic #18 was NA due to a significant rain event	in the previous 48hr (~36hrs since significant ra	in

Although metic #18 was NA due to a significant rain event in the previous 48hr (~36hrs since significant rain event at time of assessment), there is a high likelihood that water would still occupy the stream >48hrs after a significant event. The additionally points would score the feature as a stream.

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No	= 0	Yes	= 3

B. Hydrology (Subtotal: _____)

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

C. Biology (Subtotal = <u>6.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

18.25

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

Notes:

Assessed from culverted road crossing in woods, through soy field, and into another woodline, and into neighboring field. Feature ended due to alteration of western field (graded back towards feature). Evidence racoons use feature for scaveging, indication of potenitally stable watercourse.

Adult cranefly = 1, Crayfish = 1, Dragonfly = 1, Snail = 18, Oligocheates = 1

NC DWQ Stream Identification Form	Version	4.11
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Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-19	35.274701
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.718959
21	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes	5 = 3

B. Hydrology (Subtotal: _____)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = <u>7.25</u>)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Notes:

Adult cranefly = 1, Crayfish = 1, Dragonfly = 1, Snail = 18, Oligocheates = 1

Tennessee Division	i of water Pollution	Control, version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Clear Creek Canal		11/14/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-20/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090404		35.288669, -89.708646
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry o	drought unknown	
Source of recent %& season precip data: Calculations for N	lormal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 6	
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):		
Severe M	Ioderate Slig	ght Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =

Secondary Indicator Score (if applicable) =

15 WWC

Justification / Notes:

Although feature drains a wetland, there is evidence the feature was not originally naturally occuring. Channel was dry on previous site visit, indicating water in channel is not consistent after rain events.

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	

B. Hydrology (Subtotal: <u>3</u>)

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

C. Biology (Subtotal = <u>5.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

15

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

Notes:

 \sim 36hrs after sig. rain event and moderate to strong baseflow. Feature drains a delineated wetland. Oligocheate = 1 with moderate effort

NC DWQ Stream Identification F	Form Version 4.11
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Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-20	35.288669
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.708646
17.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes	5 = 3

_____) B. Hydrology (Subtotal:

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = <u>5.5</u>)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Notes:

Although feature drains a wetland, there is evidence the feature was not originally naturally occuring. Channel was dry on previous site visit, indicating water in channel is not consistent after rain events.

I ennessee Division	of water Pollution	Control, Version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-C	liver Creek	11/14/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-21/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.287043, -89.710497
Previous Rainfall (7-days): 0.86in National Weather Servio	ce (Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown	
Source of recent %& season precip data: Calculations for N	Normal Weather		
Watershed Size: <2.59mi ²		Photos Y or N	
		Number: 6	
Soil Type(s) / Geology: Waverly Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	k hydrology (circle one):		
Severe M	/loderate Sli	ght Absent	

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Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =

Stream

Secondary Indicator Score (if applicable) =

25

Justification / Notes:

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	; = 3

B. Hydrology (Subtotal: _____)

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

C. Biology (Subtotal = <u>7.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

25

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

Notes:

Riprap ford crossing upstream daming stream Oligocheates = 3, Scud = 1, Juvenile Asian Clam = 1

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-21	35.287043
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.710497
26.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	; = 3

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	; = 3

C. Biology (Subtotal = _____)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Notes:

Presence of baselfow metric was NA due to recent rainfall, however strong flowing water in channel ~36hrs after rain event. It is likely the feature would score strong if metric were available. Additionally, leaf litter in channel was NA due to season, however flow would not be in channel due to baseflow, would likely score as absent.

If metric #12 and #14 were available, score would be >30, assessor's opinion the feature is a perenial stream

I ennessee Divisior	1 of water Pollution	n Control, version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Clear Creek Canal		11/14/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-22/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090404		35.286387, -89.710211
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown	
Source of recent %& season precip data: Calculations for N	Normal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 7	
Soil Type(s) / Geology: Waverly Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	k hydrology (circle one):	:	
Severe N	/loderate SI	ight Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	
Secondary Indicator Score (if applicable) =	

WWC	
12.25	

Justification / Notes:

Absent	Weak	Moderate	Strong
0	1	2	3
0	1	2	3
0	1	2	3
0	1	2	3
0	1	2	3
0	1	2	3
0	1	2	3
0	0.5	1	1.5
0	1	2	3
0	1	2	3
0	0.5	1	1.5
0	0.5	1	1.5
No	= 0	Yes	; = 3
0	1	2	3
θ	4	2	3
1.5	4	0.5	θ
0	0.5	1	1.5
0	0.5	1 1	1.5 1.5
0 0 No	0.5 0.5 = 0	1 1 Yes	1.5 1.5 = 1.5
0 0 No	0.5	1 1 Yes	1.5 1.5 = 1.5
	Absent 0 0 0 0 0 0 0 0 0 0 0 0 0	Absent Weak 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 0.5 0 0.5 0 0.5 0 0.5 0 1 0 1 0 1.5 No = 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	Absent Weak Moderate 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 0.5 1 0 0.5 1 0 0.5 1 0 0.5 1 0 0.5 1 0 0.5 1 0 0.5 1 0 0.5 1 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 1.5

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	0	0.5	1	2
1 Francis on the management of unleaded when 2 Francis is an	the survey of survey is a			

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

Total Points =

12.25

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

Notes:

Large headcut at top of feature, 2 small headcuts in lower reach, and 1 developing headcut.

NC DWQ Stream Identifica	ation Form Version 4.11
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Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-22	35.286387
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.710211
13.75	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal: <u>8</u>)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	= 3

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; 0	OBL = 1.5; Othe	r = 0	-

*perennial streams may also be identified using other methods. See p. 35 of manual

I ennessee Divisior	of Water Pollution Co	ntrol, Version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Clear Creek Canal		11/14/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-23/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):	Lat/Long:	
Arlington	080102090404		35.287323, -89.707429
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)		
Precipitation this Season vs Normal: very wet wet average dry drought unknown			
Source of recent %& season precip data: Calculations for N	Iormal Weather		
Watershed Size: <1mi ²	Pho	tos Y or N	
	Nun	iber: 0	
Soil Type(s) / Geology: Waverly Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):		
Severe M	Noderate Slight	Absent	

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Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 = Secondary Indicator Score (if applicable) =

WWC	
6.25	

Justification / Notes:

A. Geomorphology (Subtotal:3)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	2	3	
2. Sinuous channel	0	1	2	3	
3. In-channel structure: riffle-pool sequences	0	1	2	3	
4. Sorting of soil textures or other substrate	0	1	2	3	
5. Active/relic floodplain	0	1	2	3	
6. Depositional bars or benches	0	1	2	3	
7. Braided channel	0	1	2	3	
8. Recent alluvial deposits	0	0.5	1	1.5	
9. Natural levees	0	1	2	3	
10. Headcuts	0	1	2	3	
11. Grade control	0	0.5	1	1.5	
12. Natural valley or drainageway	0	0.5	1	1.5	
13. At least second order channel on existing USGS or NRCS map	No	= 0	Yes = 3		
B. Hydrology (Subtotal: <u>2.25</u>)					
14. Subsurface flow/discharge into channel	0	1	2	3	
15. Water in channel and >48 hours since sig. rain	θ	4	2	З	
16. Leaf litter in channel (January - September)	1.5	4	0.5	θ	
17. Sediment on plants or on debris	0	0.5	1	1.5	
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5	
19. Hydric soils in stream bed or sides of channel	No	= 0	Yes	Yes = 1.5	
	INO	- 0	Tes	- 1.3	

C. Biology (Subtotal = <u>1</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

6.25

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

NC DWQ Stream Identifica	ation Form Version 4.11
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Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-23	35.287323
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.707429
8.75	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal: <u>3</u>)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	s = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

I ennessee Division of Water Pollution Control, Version 1.4						
County:	Named Waterbody:		Date/Time:			
Shelby	Clear Creek Canal		11/14/18			
Assessors/Affiliation: Andrew Zimmerman			Project ID:			
Site Name/Description: S-24/RES Memphis						
Site Location: Lakeland, TN						
USGS Quad:	HUC (12 digit):		Lat/Long:			
Arlington	0801	02090404	35.286982, -89.707399			
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)					
Precipitation this Season vs Normal: very wet wet average dry drought unknown						
Source of recent %& season precip data: Calculations for N	Normal Weather					
Watershed Size: <1mi ²		Photos Y or N				
		Number: 4				
Soil Type(s) / Geology: Waverly Silt Loam			Source: Soil Web			
Surrounding Land Use: Agricultural						
Degree of historical alteration to natural cannel morphology 8	k hydrology (circle one):					
Severe M	/loderate Slig	ght Absent				

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =

WWC

Secondary Indicator Score (if applicable) =

4.5

Justification / Notes:

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	= 3

B. Hydrology (Subtotal: <u>2</u>)

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

C. Biology (Subtotal = _____)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

4.5

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

Notes:

Samll trib feature to S-23
NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-24	35.286982
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.707399
6	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal: <u>2</u>)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	= 3

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal =)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; 0	OBL = 1.5; Othe	er = 0	-

*perennial streams may also be identified using other methods. See p. 35 of manual

Hydrologic Determination Field Data Sheet

County:	Named Waterbody:		Date/Time:		
Shelby	Loosahatchie River-C	liver Creek	11/13/18		
Assessors/Affiliation: Andrew Zimmerman			Project ID:		
Site Name/Description: S-25/RES Memphis					
Site Location: Lakeland, TN					
USGS Quad:	HUC (12 digit):		Lat/Long:		
Arlington	080102090405		35.285673, -89.707420		
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)				
Precipitation this Season vs Normal: very wet wet	average dry	drought unknown			
Source of recent %& season precip data: Calculations for N	lormal Weather				
Watershed Size: <1mi ²		Photos Y or N			
		Number: 1			
Soil Type(s) / Geology: Falaya Silt Loam			Source: Soil Web		
Surrounding Land Use: Agricultural					
Degree of historical alteration to natural cannel morphology 8	hydrology (circle one):				
Severe M	loderate Sli	ght Absent			

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 = Secondary Indicator Score (if applicable) =

4.5

Justification / Notes:

WWC due to primary indicator #2

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	2	3	
2. Sinuous channel	0	1	2	3	
3. In-channel structure: riffle-pool sequences	0	1	2	3	
4. Sorting of soil textures or other substrate	0	1	2	3	
5. Active/relic floodplain	0	1	2	3	
6. Depositional bars or benches	0	1	2	3	
7. Braided channel	0	1	2	3	
8. Recent alluvial deposits	0	0.5	1	1.5	
9. Natural levees	0	1	2	3	
10. Headcuts	0	1	2	3	
11. Grade control	0	0.5	1	1.5	
12. Natural valley or drainageway	0	0.5	1	1.5	
13. At least second order channel on existing USGS or NRCS	No = 0		Yes	Yes = 3	
map					
map B. Hydrology (Subtotal:)					
map B. Hydrology (Subtotal:) 14. Subsurface flow/discharge into channel	0	1	2	3	
map B. Hydrology (Subtotal:) 14. Subsurface flow/discharge into channel 15. Water in channel and >48 hours since sig. rain	0	1	2	3	
map B. Hydrology (Subtotal:) 14. Subsurface flow/discharge into channel 15. Water in channel and >48 hours since sig. rain 16. Leaf litter in channel (January - September)	0 0 1.5	1 1 1	2 2 0.5	3 3 0	
map B. Hydrology (Subtotal:) 14. Subsurface flow/discharge into channel 15. Water in channel and >48 hours since sig. rain 16. Leaf litter in channel (January - September) 17. Sediment on plants or on debris	0 0 1.5 0	1 4 4 0.5	2 2 0.5 1	3 3 0 1.5	
map B. Hydrology (Subtotal: <u>1.5</u>) 14. Subsurface flow/discharge into channel 15. Water in channel and >48 hours since sig. rain 16. Leaf litter in channel (January - September) 17. Sediment on plants or on debris 18. Organic debris lines or piles (wrack lines)	0 0 1.5 0 0	1 4 1 0.5 0.5	2 2 0.5 1 1	3 3 0 1.5 1.5	
map B. Hydrology (Subtotal: <u>1.5</u>) 14. Subsurface flow/discharge into channel 15. Water in channel and >48 hours since sig. rain 16. Leaf litter in channel (January - September) 17. Sediment on plants or on debris 18. Organic debris lines or piles (wrack lines) 19. Hydric soils in stream bed or sides of channel	0 0 1.5 0 0 No	1 4 0.5 0.5 = 0	2 2 0.5 1 1 Yes	3 3 0 1.5 1.5 = 1.5	
map B. Hydrology (Subtotal:	0 0 1.5 0 0 No	1 1 4 0.5 0.5 = 0	2 2 0.5 1 1 Yes	3 θ 1.5 1.5 = 1.5	
map B. Hydrology (Subtotal:) 14. Subsurface flow/discharge into channel 15. Water in channel and >48 hours since sig. rain 16. Leaf litter in channel (January - September) 17. Sediment on plants or on debris 18. Organic debris lines or piles (wrack lines) 19. Hydric soils in stream bed or sides of channel C. Biology (Subtotal =) 18. Fibrous roots in channel ¹	0 θ 1.5 0 0 Νο	1 1 1 0.5 0.5 = 0 2	2 2 0.5 1 1 Yes	3 9 1.5 1.5 = 1.5	

	5	2		0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

5

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

NC DWQ Stream Identification Form	Version	4.11
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Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-25	35.285673
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.70742
6.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: <u>3</u>)				
12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No	= 0	Yes	s = 3

C. Biology (Subtotal = <u>3</u>)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4					
County:	Named Waterbody:		Date/Time:		
Shelby	Loosahatchie River-C	Diver Creek	11/13/18		
Assessors/Affiliation: Andrew Zimmerman			Project ID:		
Site Name/Description: S-26/RES Memphis					
Site Location: Lakeland, TN					
USGS Quad:	HUC (12 digit):		Lat/Long:		
Arlington	080102090405		35.280394, -89.711082		
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)				
Precipitation this Season vs Normal: very wet wet average dry drought unknown					
Source of recent %& season precip data: Calculations for N	ormal Weather				
Watershed Size: <1mi ² Photos Y or N					
		Number: 4			
Soil Type(s) / Geology: Waverly Silt Loam			Source: Soil Web		
Surrounding Land Use: Agricultural					
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):				
Severe M	Noderate Sli	ght Absent			

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	10.25
lustification / Notoo	

Justification / Notes:

Lower end of a large relic channel, likely drained natural features before field was present.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal:6)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	2	3	
2. Sinuous channel	0	1	2	3	
3. In-channel structure: riffle-pool sequences	0	1	2	3	
4. Sorting of soil textures or other substrate	0	1	2	3	
5. Active/relic floodplain	0	1	2	3	
6. Depositional bars or benches	0	1	2	3	
7. Braided channel	0	1	2	3	
8. Recent alluvial deposits	0	0.5	1	1.5	
9. Natural levees	0	1	2	3	
10. Headcuts	0	1	2	3	
11. Grade control	0	0.5	1	1.5	
12. Natural valley or drainageway	0	0.5	1	1.5	
13. At least second order channel on existing USGS or NRCS map	No	No = 0 Ye		s = 3	
B. Hydrology (Subtotal: <u>2.25</u>)					
14. Subsurface flow/discharge into channel	0	1	2	3	
15. Water in channel and >48 hours since sig. rain	θ	4	2	3	
1 6. Leaf litter in channel (January - September)	1.5	4	0.5	θ	
17. Sediment on plants or on debris	0	0.5	1	1.5	
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5	
19. Hydric soils in stream bed or sides of channel	No = 0		Yes = 1.5		
C. Biology (Subtotal =)	1				

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

10.25

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

Notes:

No water in channel with percipitation within 24hrs.

NC DWQ Stream Identifica	ation Form Version 4.11
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Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-26	35.280394
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.711082
11.75	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:6)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0 Yes		5 = 3	

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal =)					
18. Fibrous roots in streambed	3	2	1	0	
19. Rooted upland plants in streambed	3	2	1	0	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	
21. Aquatic mollusks	0	1	2	3	
22. Fish	0	0.5	1	1.5	
23. Crayfish	0	0.5	1	1.5	
24. Amphibians	0	0.5	1	1.5	
25. Algae	0	0.5	1	1.5	
26. Wetland plants in streambed	FACW = 0.75;	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Hydrologic Determination Field Data Sheet

I ennessee Division of Water Pollution Control, Version 1.4					
County:	Named Waterbody:		Date/Time:		
Shelby	Clear Creek Canal		11/14/18		
Assessors/Affiliation: Andrew Zimmerman			Project ID:		
Site Name/Description: S-27/RES Memphis					
Site Location: Lakeland, TN					
USGS Quad:	HUC (12 digit):		Lat/Long:		
Arlington	080102090404		35.280565, -89.709407		
Previous Rainfall (7-days): 1.9in National Weather Service	e (Memphis)				
Precipitation this Season vs Normal: very wet wet average dry drought unknown					
Source of recent %& season precip data: Calculations for N	lormal Weather				
Watershed Size: <1mi ²		Photos Y or N			
		Number: 5			
Soil Type(s) / Geology: Waverly Silt Loam			Source: Soil Web		
Surrounding Land Use: Agricultural					
Degree of historical alteration to natural cannel morphology 8	hydrology (circle one):				
Severe M	Noderate Sli	ght Absent			

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 = Secondary Indicator Score (if applicable) =

WWC 10.5

Justification / Notes:

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	= 3

B. Hydrology (Subtotal: _____)

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

C. Biology (Subtotal = _____)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

10.5

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

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-27	35.280565
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.709407
12	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes	= 3

B. Hydrology (Subtotal: ____3___)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	; = 3

C. Biology (Subtotal = <u>4.5</u>)					
18. Fibrous roots in streambed	3	2	1	0	
19. Rooted upland plants in streambed	3	2	1	0	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	
21. Aquatic mollusks	0	1	2	3	
22. Fish	0	0.5	1	1.5	
23. Crayfish	0	0.5	1	1.5	
24. Amphibians	0	0.5	1	1.5	
25. Algae	0	0.5	1	1.5	
26. Wetland plants in streambed	FACW = 0.75; (FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Hydrologic Determination Field Data Sheet

Tennessee Division	of water Pollution	Control, Version 1.4	
County:	Named Waterbody:		Date/Time:
Shelby	Loosahatchie River-O	liver Creek	11/13/18
Assessors/Affiliation: Andrew Zimmerman			Project ID:
Site Name/Description: S-28/RES Memphis			
Site Location: Lakeland, TN			
USGS Quad:	HUC (12 digit):		Lat/Long:
Arlington	080102090405		35.280396, -89.711081
Previous Rainfall (7-days): 1.9in National Weather Service	(Memphis)		
Precipitation this Season vs Normal: very wet wet	average dry o	drought unknown	
Source of recent %& season precip data: Calculations for N	lormal Weather		
Watershed Size: <1mi ²		Photos Y or N	
		Number: 3	
Soil Type(s) / Geology: Wavery Silt Loam			Source: Soil Web
Surrounding Land Use: Agricultural			
Degree of historical alteration to natural cannel morphology &	hydrology (circle one):		
Severe M	loderate Sli	ght Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	WWC
Secondary Indicator Score (if applicable) =	9.75

Justification / Notes:

Lower end of a large relic channel, likely drained natural features before field was present. Small drainage feature now within relic channel, indicating decreased drainage from field alterations.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	= 3

B. Hydrology (Subtotal: _____)

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

C. Biology (Subtotal = <u>3.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

9.75

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

Notes:

Feature starts in a small wetland with willow sp. And sycamore.

NC DWQ Stream Identification Form Version 4.11

Date:	Project/Site:	Latitude:
11/13/18	RES Memphis/S-28	35.280396
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.711081
11.25	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes	= 3

B. Hydrology (Subtotal: 3.25)

12. Presence of baseflow	θ	4	2	എ
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = <u>3.5</u>)

18. Fibrous roots in streambed	3	2	1	0	
19. Rooted upland plants in streambed	3	2	1	0	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	
21. Aquatic mollusks	0	1	2	3	
22. Fish	0	0.5	1	1.5	
23. Crayfish	0	0.5	1	1.5	
24. Amphibians	0	0.5	1	1.5	
25. Algae	0	0.5	1	1.5	
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0				

*perennial streams may also be identified using other methods. See p. 35 of manual

Hydrologic Determination Field Data Sheet

I ennessee Divisior	n of Water Pollutic	n Control, Ve	rsion 1.4	
County:	Named Waterbody:		Date/Time:	
Shelby	Clear Creek Canal			11/14/18
Assessors/Affiliation: Andrew Zimmerman				Project ID:
Site Name/Description: S-29/RES Memphis				
Site Location: Lakeland, TN				
USGS Quad:	HUC (12 digit):			Lat/Long:
Arlington	080102090404		35.279283, -89.707575	
Previous Rainfall (7-days): 0.86in National Weather Servio	ce (Memphis)			
Precipitation this Season vs Normal: very wet wet	average dry	drought un	known	
Source of recent %& season precip data: Calculations for I	Normal Weather			
Watershed Size: <1mi ²		Photos Y or N		
		Number: 4		
Soil Type(s) / Geology: Waverly Silt Loam				Source: Soil Web
Surrounding Land Use: Forested/Agricultural				
Degree of historical alteration to natural cannel morphology δ	& hydrology (circle one)):		
Severe M	Moderate S	light /	Absent	

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 =	Stream
Secondary Indicator Score (if applicable) =	13.75
Justification / Notes:	

Feature drains a small deliniated wetland. Baseflow present but ~36hrs since last sig. rain event. Baseflow would likely be present 48hrs after. Observed baseflow on previous visit. Due to presence of prolonged baseflow, determined to be intermittent alought scored <19

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes	= 3

B. Hydrology (Subtotal: <u>3.25</u>)

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

C. Biology (Subtotal = <u>5.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

13.75

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

Notes:

Feature drains a small deliniated wetland. Baseflow present but ~36hrs since last sig. rain event. Baseflow would likely be present 48hrs after. Observed baseflow on previous visit. Frog =1, Oligachate = 1, Scud = 3

NC DWQ Stream Identification Form Version 4.1	NC	DWQ Stre	am Identification	Form Versior	า 4.11
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Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-29	35.279283
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.707575
15.25	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal: <u>5</u>)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	5 = 3

B. Hydrology (Subtotal: _____)

12. Presence of baseflow	0	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	4	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal = <u>5.5</u>)					
18. Fibrous roots in streambed	3	2	1	0	
19. Rooted upland plants in streambed	3	2	1	0	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	
21. Aquatic mollusks	0	1	2	3	
22. Fish	0	0.5	1	1.5	
23. Crayfish	0	0.5	1	1.5	
24. Amphibians	0	0.5	1	1.5	
25. Algae	0	0.5	1	1.5	
26. Wetland plants in streambed	FACW = 0.75;	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Notes:

Feature drains a small deliniated wetland. Baseflow present but ~36hrs since last sig. rain event. Baseflow would likely be present 48hrs after. Observed baseflow on previous visit. Due to presence of prolonged baseflow, determined to be intermittent alought scored <19 Frog =1, Oligachate = 1, Scud = 3

Hydrologic Determination Field Data Sheet

	h of water Pollution	i Control, version	1.4			
County:	Named Waterbody:		Date/Time:			
Shelby	Loosahatchie River-0	Dliver Creek	11/14/18			
Assessors/Affiliation: Andrew Zimmerman			Project ID:			
Site Name/Description: S-30/RES Memphis						
Site Location: Lakeland, TN						
USGS Quad:	HUC (12 digit):		Lat/Long:			
Arlington	0801	02090405	35.278767, -89.707468			
Previous Rainfall (7-days): 0.86in National Weather Servio	ce (Memphis)					
Precipitation this Season vs Normal: very wet wet average dry drought unknown						
Source of recent %& season precip data: Calculations for I	Normal Weather					
Watershed Size: <1mi ²		Photos Y or N				
Soil Type(s) / Geology: Waverly Silt Loam	Source: Soil Web					
Surrounding Land Use: Forested/Agricultural						
Degree of historical alteration to natural cannel morphology &	& hydrology (circle one):					
Severe	Voderate Sli	ght Absent				

Tennessee Division of Water Pollution Control. Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 = Secondary Indicator Score (if applicable) =

9.75

Justification / Notes:

Secondary Field Indicator Evaluation

Absent	Weak	Moderate	Strong
0	1	2	3
0	1	2	3
0	1	2	3
0	1	2	3
0	1	2	3
0	1	2	3
0	1	2	3
0	0.5	1	1.5
0	1	2	3
0	1	2	3
0	0.5	1	1.5
0	0.5	1	1.5
No	= 0	Yes	= 3
	Absent 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Absent Weak 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 0.5 0 1 0 0.5 0 0.5 0 0.5 0 0.5	Absent Weak Moderate 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 1 2 0 0.5 1 0 1 2 0 1 2 0 0.5 1 0 0.5 1 0 0.5 1 No = 0 0.5 1

B. Hydrology (Subtotal: _____)

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

C. Biology (Subtotal = <u>3.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

9.75

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

Notes:

Bed dominated with leaf litter. Although feature assessed outside of Metric #16 range, it is apparent previous years leaves are still present in channel and have not been displaced by percipitation events. Observed on previous visit, <24hrs after >1in rain event and no water in channel.

NC DWQ Stream Identifica	ation Form Version 4.11
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Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-30	35.278767
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.707468
11.25	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes	= 3

B. Hydrology (Subtotal: ______)

12. Presence of baseflow	0	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	5 = 3

C. Biology (Subtotal = <u>3.5</u>)					
18. Fibrous roots in streambed	3	2	1	0	
19. Rooted upland plants in streambed	3	2	1	0	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	
21. Aquatic mollusks	0	1	2	3	
22. Fish	0	0.5	1	1.5	
23. Crayfish	0	0.5	1	1.5	
24. Amphibians	0	0.5	1	1.5	
25. Algae	0	0.5	1	1.5	
26. Wetland plants in streambed	FACW = 0.75;	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Hydrologic Determination Field Data Sheet

I ennessee Division	of Water Pollutio	n Control, Version 1.4	1		
County:	Named Waterbody: D		Date/Time:		
Shelby	Clear Creek Canal		11/14/18		
Assessors/Affiliation: Andrew Zimmerman			Project ID:		
Site Name/Description: S-31/RES Memphis					
Site Location: Lakeland, TN					
USGS Quad:	HUC (12 digit):		Lat/Long:		
Arlington	0801	02090404	35.288086, -89.714109		
Previous Rainfall (7-days): 0.86in National Weather Servio	e (Memphis)				
Precipitation this Season vs Normal: very wet wet average dry drought unknown					
Source of recent %& season precip data: Calculations for N	Iormal Weather				
Watershed Size: <1mi ²		Photos Y or N			
		Number: 5			
Soil Type(s) / Geology: Waverly Silt Loam Source: Soil Web					
Surrounding Land Use: Forested/Agricultural					
Degree of historical alteration to natural cannel morphology 8	hydrology (circle one)	:			
Severe M	loderate S	light Absent			

Tennessee Division of Water Pollution Control, Version 1.4

Primary Field Indicators Observed

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

NOTE: If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contrary 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 = Secondary Indicator Score (if applicable) =

WWC	
15.5	

Justification / Notes:

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	3
2. Sinuous channel	0	1	2	3
3. In-channel structure: riffle-pool sequences	0	1	2	3
4. Sorting of soil textures or other substrate	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	0.5	1	1.5
9. Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade control	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	

B. Hydrology (Subtotal: <u>3</u>)

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

C. Biology (Subtotal = <u>5.5</u>)

18. Fibrous roots in channel ¹	3	2	1	0
19. Rooted upland plants in channel ¹	3	2	1	0
22. Crayfish in stream (exclude in floodplain)	0	0.5	1	1.5
23. Bivalves/mussels	0	1	2	3
24. Amphibians	0	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	1	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5
28. Wetland plants in channel ²	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 =

15.5

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

Notes:

Iron oxidizing bacteria and Hyla sp. Observed in wetland which the feature drains. Indicates wetland has persistent hydrology.

NC DWQ Stream Identification F	Form Version 4.11
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Date:	Project/Site:	Latitude:
11/14/18	RES Memphis/S-31	35.288086
Evaluator:	County:	Longitude:
Andrew Zimmerman	Shelby	-89.714109
16.5	Stream Determination (circle one)	Other:
Stream is at least intermittent if > 19 or perennial if >30*	Ephemeral Intermittent Perennial	

A. Geomorphology (Subtotal:)	Absent	Weak	Moderate	Strong
1*. Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. Riffle-pool, step-pool, riffle-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10 Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No	= 0	Yes	= 3

B. Hydrology (Subtotal: **3.5**)

12. Presence of baseflow	θ	4	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	θ
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = <u>5.5</u>)				
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	2	3
21. Aquatic mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual

Notes:

Iron oxidizing bacteria and Hyla sp. Observed in wetland which the feature drains. Indicates wetland has persistent hydrology. Assessed as an intermittent stream due to consistent hydrology from wetland.

Appendix E

Calculation of Normal Weather



Calculation of Normal Weather Conditions

		Long-term rainfall records							
	Month	Minus One Std. Dev. (DRY)	Normal(Mean inches)	Plus One Std. Dev. (WET)	Actual Rainfall	Condition (dry, wet, normal)	Condition value	Month weight value	Product of previous two columns
1st prior month*	10/18	2.21	3.98	5.72	3.59	Normal	2	x 3	6
2nd prior month*	9/18	1.53	3.09	5.11	5.27	Normal	2	x2	4
3rd prior month*	8/18	0.92	2.88	4.84	2.07	Normal	2	x1	2
								Sum =	12

Note:

If sum is:	
6-9	Then prior period has been drier than normal
10-14	Then prior period has been normal
15-18	Then prior period has been wetter than normal

Condition	Value
Dry =	1
Normal =	2
Wet =	3

Conclusions:

Past weather in normal condition.

IPaC Information for Planning and Consultation U.S. Fish & Wildlife Service

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Project information

NAME

Smokestack Mitigation Bank Site

LOCATION

Shelby County, Tennessee



DESCRIPTION

Wetland delineation on three parcels (approximately 359.42 acres) to evaluate the suitability of the site for mitigation.

Local office

Tennessee Ecological Services Field Office

NOTFORCONSULTATION

<a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><a><

446 Neal Street Cookeville, TN 38501-4027

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

- 1. Log in to IPaC.
- 2. Go to your My Projects list.
- 3. Click PROJECT HOME for this project.
- 4. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the <u>Ecological Services Program</u> of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact <u>NOAA Fisheries</u> for <u>species under their jurisdiction</u>.

- 1. Species listed under the <u>Endangered Species Act</u> are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the <u>listing status page</u> for more information.
- 2. <u>NOAA Fisheries</u>, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Threatened

Mammals

NAME STATUS	
Indiana BatMyotis sodalisEndangThere is final critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/5949Endang	;ered

Northern Long-eared Bat Myotis septentrionalis No critical habitat has been designated for this species. <u>https://ecos.fws.gov/ecp/species/9045</u>

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described <u>below</u>.

NSU

1. The Migratory Birds Treaty Act of 1918.

2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <u>http://www.fws.gov/birds/management/managed-species/</u> <u>birds-of-conservation-concern.php</u>
- Measures for avoiding and minimizing impacts to birds <u>http://www.fws.gov/birds</u> /management/project-assessment-tools-and-guidance/ conservation-measures.php
- Nationwide conservation measures for birds <u>http://www.fws.gov/migratorybirds</u> /pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS

Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Breeds Sep 1 to Jul 31

Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626

FORCO

Prothonotary Warbler Protonotaria citrea

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds Apr 1 to Jul 31

Breeds May 10 to Sep 10

Wood Thrush Hylocichla mustelina

Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

- 1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
- 2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
- 3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (=)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The

number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

<u>Nationwide Conservation Measures</u> describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. <u>Additional measures</u> and/or <u>permits</u> may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS <u>Birds of Conservation Concern (BCC)</u> and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the <u>Avian Knowledge</u> <u>Network (AKN)</u>. The AKN data is based on a growing collection of <u>survey</u>, <u>banding</u>, <u>and citizen science</u> <u>datasets</u> and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (<u>Eagle Act</u> requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the <u>E-bird Explore Data Tool</u>.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the <u>Avian Knowledge Network (AKN)</u>. This data is derived from a growing collection of <u>survey, banding, and</u> <u>citizen science datasets</u>.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: <u>The Cornell Lab of Ornithology All About Birds Bird</u> <u>Guide</u>, or (if you are unsuccessful in locating the bird of interest there), the <u>Cornell Lab of Ornithology</u> <u>Neotropical Birds guide</u>. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

- 1. "BCC Rangewide" birds are <u>Birds of Conservation Concern</u> (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
- 2. "BCC BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and

3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the <u>Eagle Act</u> requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the <u>Northeast Ocean Data</u> <u>Portal</u>. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the <u>NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird</u> <u>Distributions and Abundance on the Atlantic Outer Continental Shelf</u> project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the <u>Diving Bird Study</u> and the <u>nanotag studies</u> or contact <u>Caleb</u> <u>Spiegel</u> or <u>Pam Loring</u>.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to <u>obtain a permit</u> to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

TATIC

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the <u>National Wildlife Refuge</u> system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to <u>NWI wetlands</u> and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local <u>U.S. Army Corps of</u> <u>Engineers District</u>.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

PEM1C

FRESHWATER FORESTED/SHRUB WETLAND

PFO1A PFO1C PFO1F PSS1C PFO1Cx

RIVERINE R2UBHx R4SBCx <u>R5UBH</u> <u>R4SBC</u>

A full description for each wetland code can be found at the <u>National Wetlands Inventory</u> <u>website</u>

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 1. Eastern parcel within the Site with agricultural soy field vegetation; facing north.



Photo 2. Western parcel within the Site; facing north.


Photo 3. Agricultural land within the western parcel; facing west, toward the adjoining agricultural field and elevated road.



Photo 4. Agricultural field and overhead high-voltage utility transmission line which crosses the northern portion of the Site east-west.



Photo 5. The Loosahatchie River, a channelized perennial stream along the northern boundary of the Site; facing east, upstream.



Photo 6. Clear Creek Canal, a perennial tributary to the Loosahatchie River, located in the central portion of the Site which flows south to north; facing upstream.



Photo 7. Wetland W-3 (PFO) facing west.



Photo 8. Wetland W-4 (PEM) facing west.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 9. Wetland W-5 (PEM) facing south.



Photo 10. Wetland W-6 (PEM) facing west.



Photo 11. Wetland W-7 (PEM) facing west.



Photo 12. Wetland W-8 (PEM) facing east.



Photo 13. Wetland W-9 (PEM) facing south.



Photo 14. Wetland W-10 (PEM) facing east.



Photo 15. Wetland W-11 (PEM) facing west.



Photo 16. Wetland W-12 (PEM) facing south.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 17. Wetland W-13 (PEM) facing north.



Photo 18. Wetland W-14 (PEM) facing east.



Photo 19. Wetland W-15 (PEM) facing east.



Photo 20. Wetland W-16 (PEM) facing south.



Photo 21. Wetland W-17 (PEM) facing south.



Photo 22. Wetland W-18 (PEM) facing east.



Photo 23. Wetland W-18 (PEM) facing west.



Photo 24. Wetland W-19 (PEM) facing north.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 25. Wetland W-19 (PEM) facing east.



Photo 26. Wetland W-19 (PFO) facing east.



Photo 27. Wetland W-19 (PFO) facing south.



Photo 28. Wetland W-19 (PSS) facing east.



Photo 29. Wetland W-20 (PEM) facing north.



Photo 30. Wetland W-21 (PFO) facing north.



Photo 31. Wetland W-22 (PEM) facing west.



Photo 32. Wetland W-23 (PEM) facing northeast.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 33. Wetland W-23 (PFO) facing east.



Photo 34. Wetland W-24 (PEM) facing north.



Photo 35. Wetland W-25 (PEM) facing south.



Photo 36. Wetland W-26 (PFO) facing northeast.



Photo 37. Wetland W-27 (PEM) facing east.



Photo 38. Wetland W-28 (PFO) facing east.



Photo 39. Wetland W-29 (PEM) facing northeast.



Photo 40. Wetland W-30 (PEM) facing south.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 41. Wetland W-30 (PFO) facing north.



Photo 42. Wetland W-31 (PEM) facing north.



Photo 43. Wetland W-32 (PEM) facing south.



Photo 44. Wetland W-33 (PEM) facing southeast.



Photo 45. Wetland W-34 (PEM) facing northeast.



Photo 46. Wetland W-35 (PEM) facing east.

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 47. Wetland W-36 (PEM) facing north.



Photo 48. Wetland W-37 (PEM) facing south.



Photo 49. Wetland W-38 (PEM) facing south.



Photo 50. Wetland W-39 (PEM) facing north.



Photo 51. Wetland W-40 (PEM) facing east.



Photo 52. Wetland W-41 (PEM) facing east.



Photo 53. Wetland W-42 (PEM) facing north.



Photo 54. Wetland W-43 (PEM) facing west.



Photo 55. Wetland W-44 (PEM) facing south.



Photo 56. Wetland W-45 (PEM) facing west.



Photo 57. Wetland W-45 (PSS) facing south.



Photo 58. Wetland W-46 (PEM) facing north.



Photo 59. Wetland W-47 (PEM) facing southeast.



Photo 60. Wetland W-48 (PEM) facing south.



Photo 61. Wetland W-49 (PEM) facing south.



Photo 62. Wetland W-49 (PFO) facing north.



Photo 63. Wetland W-50 (PSS) facing east.



Photo 64. Wetland W-51 (PEM) facing east.



Photo 65. Wetland W-52 (PEM) facing north.



Photo 66. S-1 from middle of assessed reach, facing upstream (11/5/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 67. Culverted crossing of S-1 with aquatic vegetation (11/5/18)



Photo 68. Shows S-1 downstream of the culvert, facing downstream (11/5/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 69. S-2, facing upstream, showing the upper end of the reach (11/5/18)



Photo 70. S-2, facing downstream, showing the upper end of the reach (11/5/18)



Photo 71. S-2 facing upstream show the incised channel (11/5/18)



Photo 72. Upper reach of S-3, shows lack of defined bed and bank before running into wood line (11/13/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 73. S-3, showing channel becomes more defined within the wood line, but little evidence feature consistently moves water (11/13/18)



Photo 74. S-3, showing confluence with S-1. Presence of leaves still in channel after large rain events indicates hydraulic use is low (11/13/18)


Photo 75. Large headcut at top of feature S-4 (11/13/18)



Photo 76. S-4 channel, facing downstream (11/13/18)



Photo 77. Incised S-4 channel (11/13/18)



Photo 78. Defined bed and bank of S-5 (11/13/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 79. S-5 lower reach, before confluence with S-4, facing downstream (11/13/18)



Photo 80. Depicts the channel of S-6, facing downstream (11/13/18)



Photo 81. S-7 starting to incise through the soil profile (11/13/18)



Photo 82. Channel of S-7, facing downstream (11/13/18)



Photo 83. Depicts the channel of feature S-8, facing downstream (11/13/18)



Photo 84. Large headcut with standing water at the top of S-8 (11/13/18)



Photo 85. Shows entire S-9 feature with defined bed and bank (11/13/18)Photo 135.



Photo 86. S-11 channel, showing defined channel through incision and confluence with S-1 (11/13/18)



Photo 87. S-12 upper reach with undefined banks and upland vegetation (11/13/18)



Photo 88. Formation of S-13 channel, facing downstream (11/13/18)



Photo 89. S-14 mid-reach, facing downstream (11/13/18)



Photo 90. Lower reach of S-14, showing large pool and headcut (11/13/18)



Photo 91. Middle of S-15 reach, shows overly wide channel with poor banks and bed (11/13/18)



Photo 92. Middle of S-16 reach, facing downstream (11/13/18)



Photo 93. S-17 from top of feature, facing downstream (11/13/18)



Photo 94. S-18 from top of feature, facing downgradient (11/13/18)



Photo 95. Top of assessment area for S-19, at culverted crossing. (11/14/18)



Photo 96. Feature S-19 coming out of wood line and into soy field, showing intermittent water in channel (11/14/18)

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Photo 97. S-19, large pool in feature, upland grasses present in the channel (11/14/18)



Photo 98. Large pool present at lower end of reach, S-19 ends after bend (11/14/18)



Photo 99. Wetland provides source water for feature S-20, facing upstream (11/14/18)



Photo 100. S-20, showing water level at bank full, facing downstream (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 101. S-20 channel shows low sinuosity and wrack lines along channel margins (11/14/18)



Photo 102. Top of S-21 assessed reach, showing water flowing in channel (~36hrs after rain event) (11/14/18)

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Photo 103. S-21, showing riffle pool complex with depositional feature (11/14/18)



Photo 104. Headcut causing incision through the profile as just upstream of confluence with Clear Creek (11/14/18)

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Photo 105. Head of feature S-22, showing large headcut at edge of the soy field (11/14/18)



Photo 106. S-22, showing strong bed and bank of relic channel and small active channel (11/14/18)



Photo 107. S-22, showing section has little sinuosity as it drains into Clear Canal Creek (11/14/18)



Photo 108. S-23, facing downstream, showing the receiving tributary backing up into the S-23 channel (11/6/18).



Photo 109. S-24 channel shows little sinuosity and is dry ~36hrs after significant rain event (11/14/18)



Photo 110. S-25, qualifies for primary indicator #1, lacks defined bed and bank, dominated by upland veg. (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 111. S-27 channel shows little signs of hydrologic use, facing downstream (11/14/18)



Photo 112. S-29, small drainage feature, showing undefined banks and leaf litter in channel (11/14/18)

Smokestack Mitigation Bank Site Photographed November 5, 6, 13, and 14, 2018



Photo 113. S-30 channel, showing previous year's leave within channel, indicating relic channel (11/14/18)



Photo 114. S-31, showing channel and drainage into wetland (11/6/18)