Shelby County Government
Office of Resilience

Big Creek National Disaster Resilience Design Project

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Big Creek National Disaster Resilience Design Project

Appendix A

Conceptual Plan

BIG CREEK - AREA 01

MILLINGTON, TN MASTER PLAN

NORTH

GRAPHIC SCALE

0 100 200 400

SCALE IN FEET

DEVELOPMENT GRAPHIC PREPARED TO ILLUSTRATE DEVELOPMENT POTENTIAL AND IS SUBJECT TO FINAL DESIGN AND APPROVALS. BOUNDARY AND TOPOGRAPHY PROVIDED BY OTHERS. BOUNDARY AND TOPOGRAPHY USED FOR CREATION OF OVERALL COMPOSITE DEVELOPMENT ILLUSTRATION. THIS DOCUMENT IS THE PROPERTY OF DALHOFF THOMAS design|studio AND MAY NOT BE REPRODUCED WITHOUT PRIOR WRITTEN CONSENT.

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BIG CREEK - AREA 02

MILLINGTON, TN MASTER PLAN

DALHOFF THOMAS DESIGN STUDIO

BIG CREEK - AREA 03

MILLINGTON, TN MASTER PLAN

NORTH

GRAPHIC SCALE

0 40 80 160

SCALE IN FEET

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Appendix B

Big Creek Basin-Wide Drainage Study

FINAL SUMMARY REPORT

BIG CREEK BASIN-WIDE DRAINAGE STUDY

SHELBY COUNTY, TENNESSEE

SHELBY AND TIPTON COUNTIES, TN

PREPARED FOR:

SHELBY COUNTY GOVERNMENT

PREPARED BY:

BARGE WAGGONER SUMNER AND CANNON, INC.

ENSAFE, INC.

THY, INC.

and

DALHOFF THOMAS DESIGN STUDIO

AUGUST, 2015

TABLE OF CONTENTS

APPENDICES

I. BACKGROUND AND PURPOSE

As a result of repeated flooding in the past, Shelby County officials requested that the Barge Waggoner Sumner and Cannon, Inc. (BWSC) team, which also includes EnSafe, Inc., and THY, Inc. investigate the current conditions of Big Creek by producing detailed updated hydrologic and hydraulic models to predict its performance for various theoretical storms and for the historic flood of May 1-2, 2010. These models, once calibrated, would then be used to evaluate the effects of proposed improvement projects to help eliminate or reduce the flooding in Millington, TN and adjacent areas. The purpose and scope of this investigation is not to develop detailed proposed construction projects, but instead to take a broad look at several conceptual approaches. These approaches focused on reducing flooding levels and improving water quality and included preparing preliminary, planning-level opinions of probable construction costs for the studied alternatives. The results of this study will provide local officials the data needed to assess the proposed alternatives, determine funding needs and make reasonable decisions on the best solution to provide resiliency against future flood damages.

II. STUDY AREA

The area studied included the entire drainage basin of Big Creek and its tributaries. This covers an area of approximately 155 sq. mi., with approximately 110 sq. mi. of that lying in Shelby County and the remaining approximately 45 sq. mi. in Tipton County. As can be seen on the basin map, (Figure 1 above) Big Creek itself is fed by numerous tributaries draining significant areas of the two counties. Flow in Big Creek begins in the headwaters, flows southerly into Shelby County, then westerly along the south side of Millington and then southerly again to its mouth at the Loosahatchie River, a distance of almost thirty miles.

III. METHODOLOGY

The methodology for the study was as follows:

- Collect all readily-available data for the Big Creek drainage basin and for the stream itself, including additional field survey data.
- Develop a HEC-HMS hydrologic model of the basin capable of replicating the steady-state flows from the Shelby County FEMA Flood Insurance Study for the appropriate theoretical storms. The HEC-HMS model was also developed to be capable of using historic NOAA rainfall data to synthesize the unsteady state flows for the May, 2010 record flood.
- Develop and calibrate a HEC-RAS hydraulic model of the basin capable of modeling both steady state and unsteady state flows to evaluate potential improvement projects for the basin.
- Develop and analyze conceptual proposed improvements to provide resiliency against the potential damages from future flooding and improve existing water quality levels.

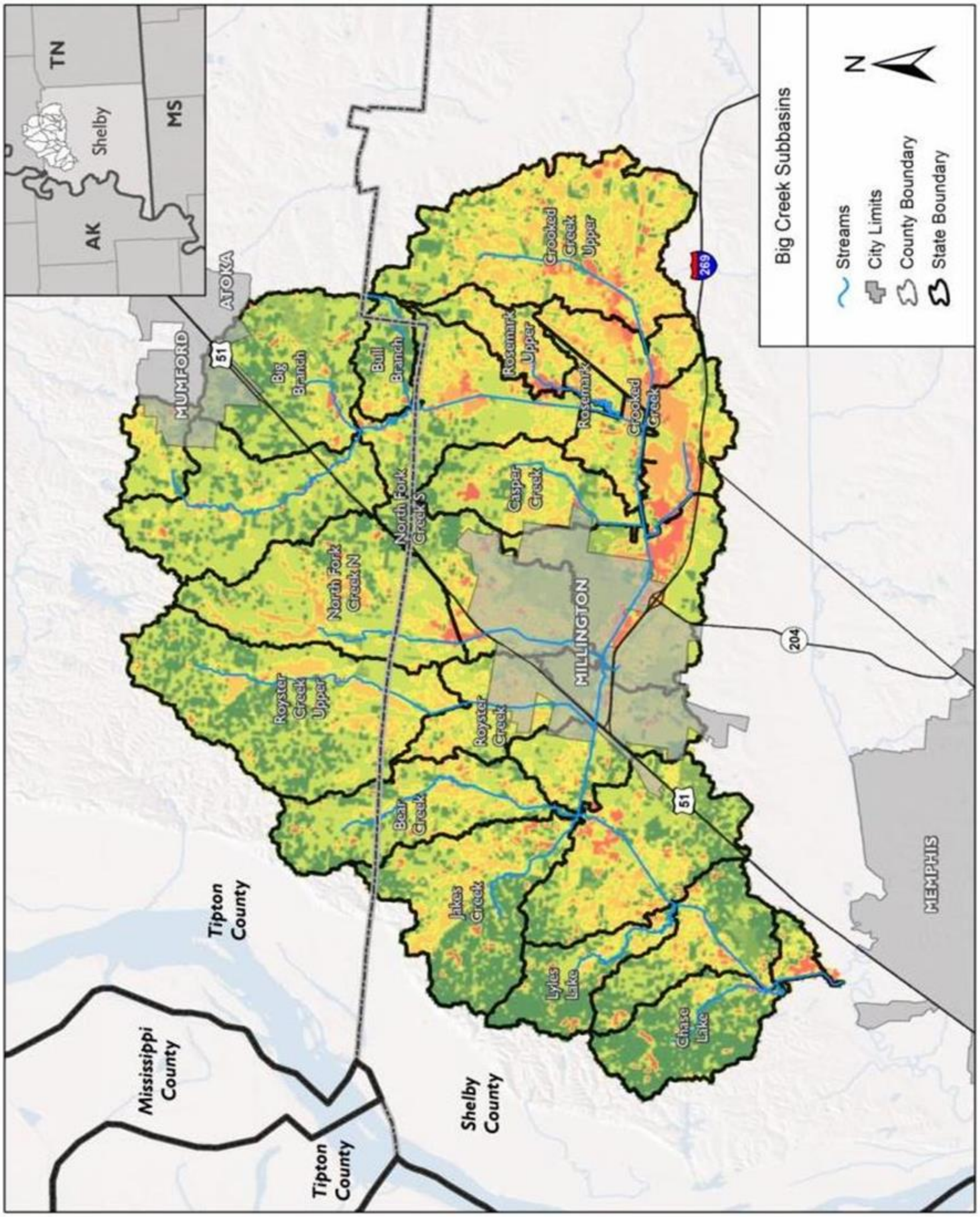


FIGURE 1

BIG CREEK DRAINAGE BASIN

SHELBY AND TIPTON COUNTIES, TN

IV. DATA COLLECTION

Initially BWSC and EnSafe canvassed local and federal agencies and collected a large amount of background data on the Big Creek Drainage Basin before beginning any actual calculations. These agencies and the types of data retrieved included:

- Shelby County Government-GIS data, bridge inspection reports, design plans, historical studies and reports on streams in the basin
- Tipton County Government-GIS data and bridge reports
- Tennessee Department of Environment and Conservation (TDEC)-water quality data on basin streams
- Memphis District, U.S. Army Corps of Engineers (USACE)-historical studies and reports
- City of Millington-flooding records and photographs.
- U.S. Department of Agriculture, Natural Resources Services (NRCS)-basin soils data
- The Federal Emergency Management Agency (FEMA) Current Effective HEC-RAS hydraulic computer model of Big Creek was obtained for use in modeling both the current and proposed future performance of the stream to evaluate the effectiveness of potential improvement projects.
- National Weather Service-Doppler radar rainfall data for the May 1-2, 2010 storm event.
- U.S.G.S. land use data

The collected existing data was reviewed and the background information obtained was used in formulating the hydrologic and hydraulic models which were used to develop and analyze prospective improvement projects in the remaining stages of the study. Historical studies of the Big Creek drainage basin have been performed by various governmental, local, and regional organizations during the past 50 years. A summary of selected historical studies and reports evaluated as part of this Study is included as Appendix A. The cited studies/field reconnaissance should be reviewed for additional information, if needed.

Another significant data collection effort consisted of the taking updated field cross-sections of the Big Creek channel from its mouth at the Loosahatchie River to its headwaters west of Munford in Tipton County. This was a significant effort consisting of collecting a total of 73 new channel cross-sections in the two counties, as well as field-locating the corners and deck elevations of all existing bridges within the surveyed reach. These new cross-sections were strategically located with some coinciding with existing sections in the current FEMA model, so they could be field-verified and others at new locations where additional information was desired to improve the quality of the current model. Topographic information for verifying/updating the overbank portions of the model cross-sections was not field surveyed due to the tremendous time and cost required to do so. Instead this data was obtained at a much more reasonable cost and with an acceptable level of accuracy from the recently-updated LIDAR and other GIS topographic information provided by the two counties. The field-surveyed channel sections and LIDAR/GIS data for the overbanks were merged to provide the complete valley sections needed for the HEC-RAS model.

V. HYDROLOGIC MODELING

In the development of the scope for the project, the Client opted to have a new hydrologic model developed for the entire Big Creek basin. This was done using the industry-standard HEC-HMS (Hydrologic Modeling System) software augmented with the HEC-GeoHMS geospatial hydrology toolkit. This allowed BWSC to efficiently manipulate and analyze the massive quantities of GIS data for the basin and automatically develop many of the input parameters required for the actual HEC-HMS model to produce the calculated flows for the basin. For instance, HEC-GeoHMS is able to analyze digital terrain data to delineate drainage paths and watershed sub-basin boundaries into a hydrologic data structure that represents the drainage network. GIS soils and land use data can quickly be managed to produce NRCS runoff curve numbers (CN's) for predicting the basin's response in terms of a runoff amount from a given rainfall occurring across the basin. For this project, it was especially important to be able to use actual rainfall records to produce design flows for a known historic flooding event, the May 1-2, 2010 flood which inundated huge portions of the U.S. Navy's Millington NSA facility and the City of Millington, TN itself, as well adjacent agricultural and residential areas of Shelby County. Using the Gridded Rainfall option, BWSC was able to input the rainfall from this historic storm into HEC-HMS using NOAA National Weather Service (NWS) NEXRAD radar rainfall records for the Memphis, TN weather station and generate the runoff from the storm to be used in the subsequent hydraulic modeling of Big Creek. Graphical representations of some of the HEC-HMS input data are presented below. Figure 2 shows the Basin topography as represented by the recently updated digital terrain data.

Land use data for the basin is critical in the SCS (NRCS) methodology for determining the Runoff Curve Numbers (CN's) used to predict the portion of a given rainfall event which contributes to the surface runoff that the basin streams have to accommodate. Given the size of the Big Creek basin, extracting this data from the GIS database is by far the most efficient way to assimilate this data. Figure 3 below shows the land use data obtained from the GIS database.

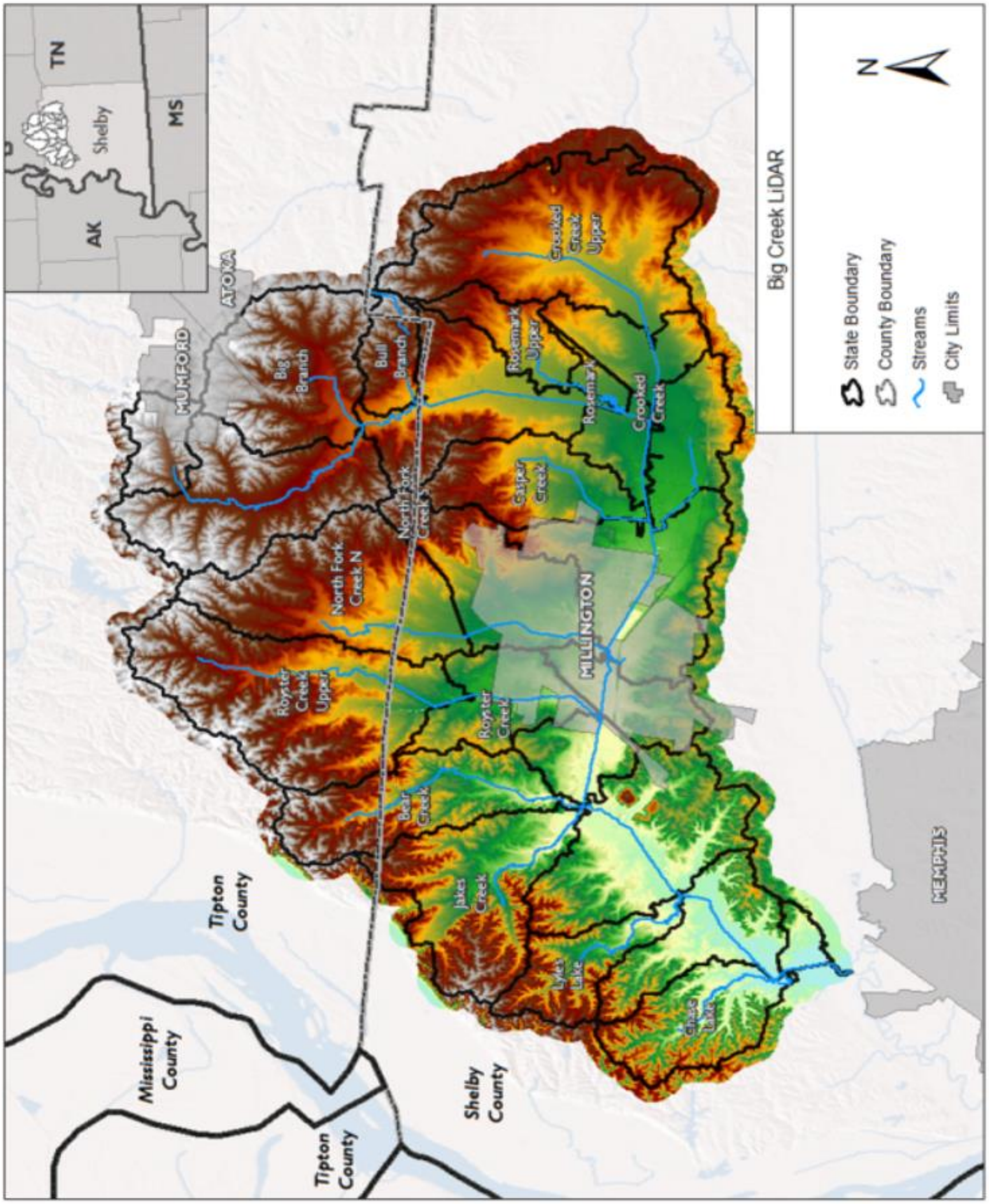


FIGURE 2

BIG CREEK BASIN TOPOGRAPHY

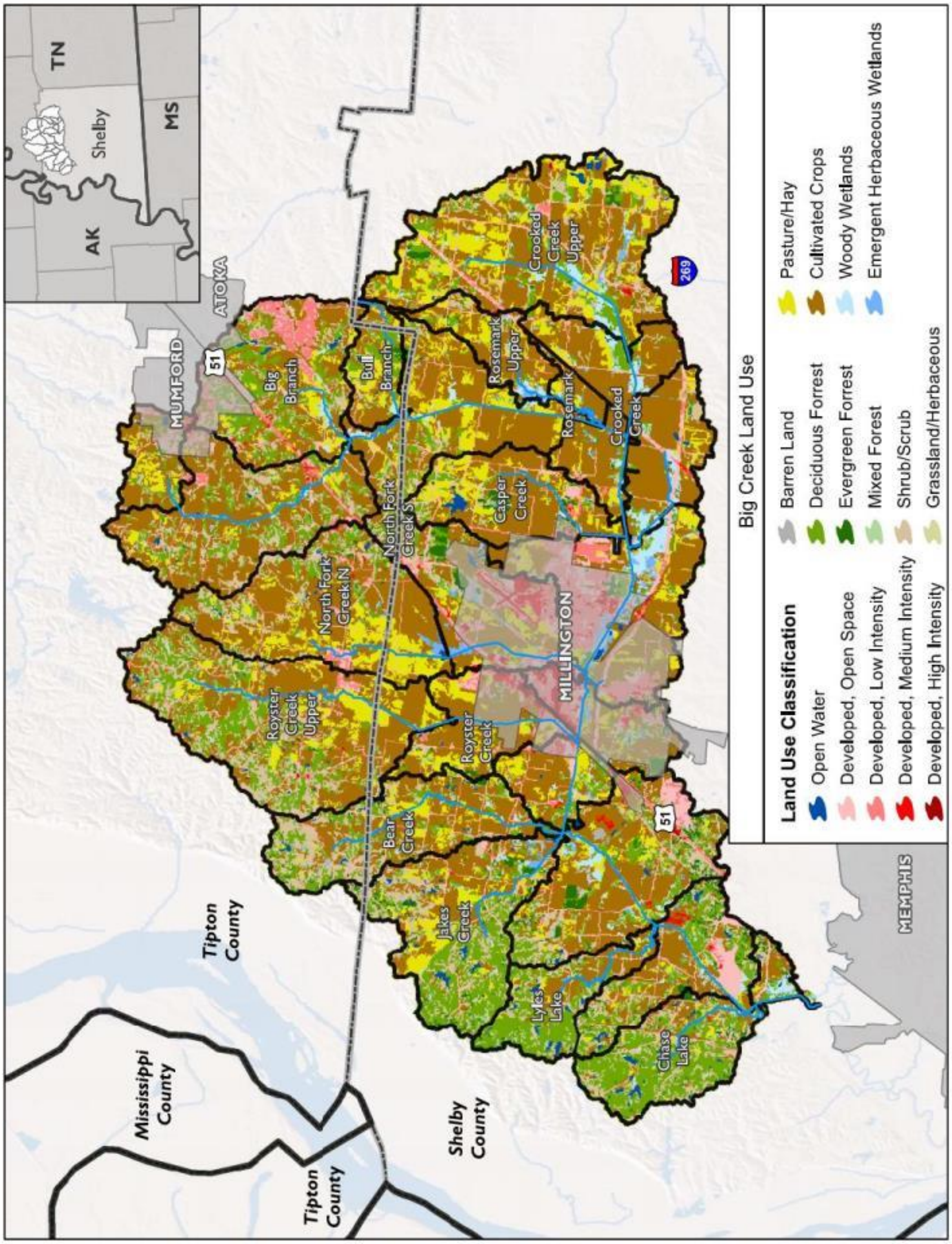


FIGURE 3

BIG CREEK BASIN LAND USE

In addition to topography and land use, another important factor in estimating runoff from storms occurring in the basin using the SCS method is the soil type. The U.S.D.A. Soil Conservation Service (now named the Natural Resources Conservation Service, or NRCS) developed an extensive classification system containing hundreds of individual classes for soils based on their physical properties. However, for use in the SCS method in estimating runoff from storms, all the classifications are grouped into one of four Hydrologic Soils Groups (HSG's) based on their drainage properties:

- Group A – low runoff potential when thoroughly wet. Typically these are sandy, gravelly soils with low clay content.
- Group B – moderately low runoff potential when thoroughly wet. Typically these are sandy loam or loamy sand type soils.
- Group C – moderately high runoff potential when thoroughly wet. Typically these are loam, silt loams, sandy clay loams and silty clay loam type soils.
- Group D – high runoff potential when thoroughly wet. Typically these are clay type soils with a low sand content.

The HSG's for the Big Creek drainage basin, as extracted from the GIS database, are shown in Figure 4 below. As would be expected from a general knowledge of local soils, the majority of the basin soils fall in the Group B and C (moderately low and moderately high runoff potential, respectively) categories with some significant areas of Group D (high runoff clayey soils) located in some of the stream floodplains.

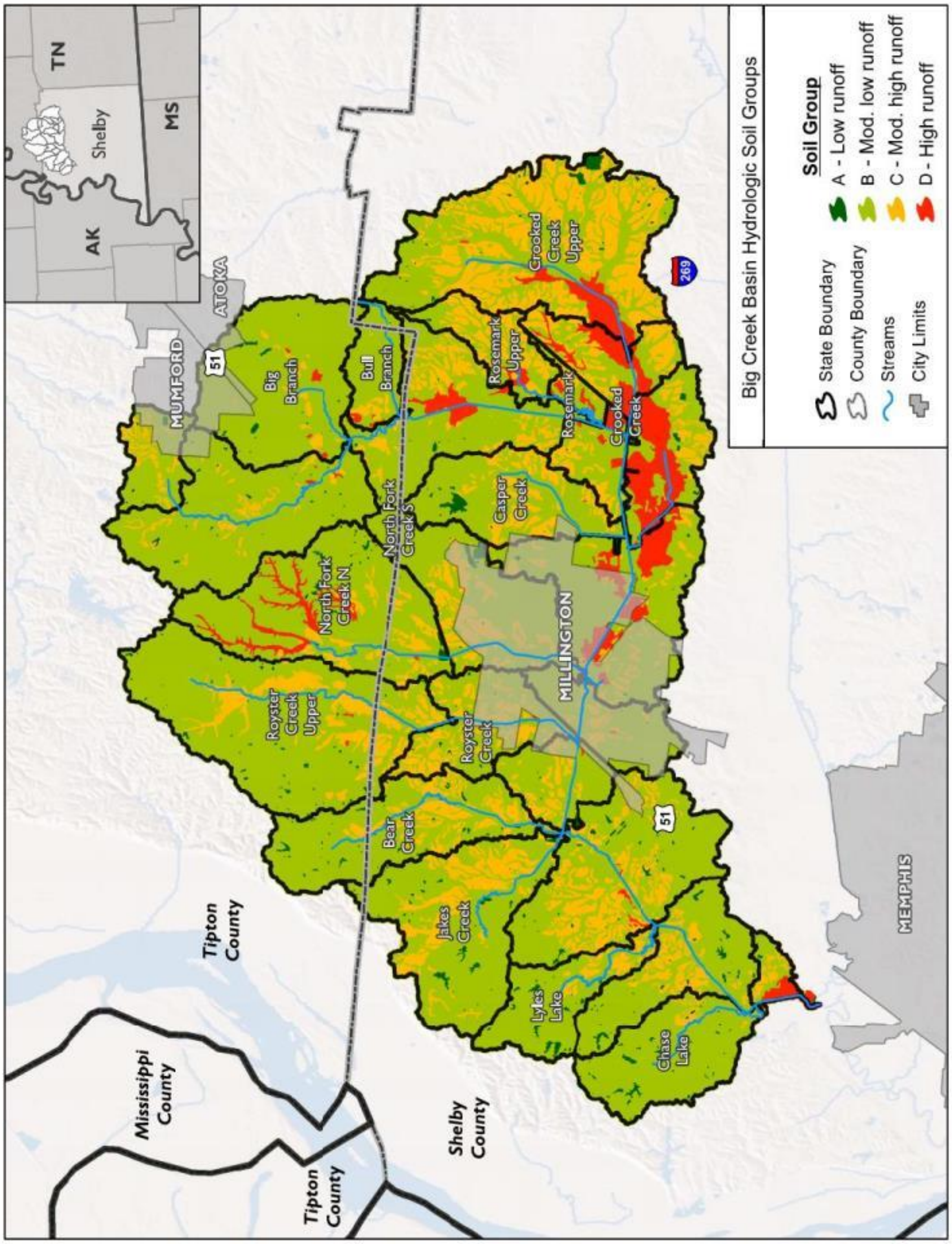


FIGURE 4

BASIN HYDROLOGIC SOIL GROUPS

The ultimate purpose of developing the various parameters discussed above is to calculate SCS runoff curve numbers (CN’s) for the areas of the basin. These can then be used in the HEC-HMS model to estimate the amount of direct runoff produced by any theoretical or historic storm imposed on the basin and consequently the amount of flow to be used in evaluating the basin streams’ performance for that storm using the appropriate hydraulic (HEC-RAS) model. Curve numbers typically range from the upper 50’s for wooded areas in good condition to the upper 90’s for impervious (paved) areas. The higher the CN for a given location, the more runoff it will produce. Inspection of the CN data generated for the Big Creek Basin indicates it to be reasonable with the majority of the basin assigned numbers in the 70’s, while the more developed areas and more intensely cultivated agricultural areas are assigned numbers in the 80’s and the less-developed, more wooded fringes of the basin are in the 60’s. See Figure 5 below for information on the basin CN’s.

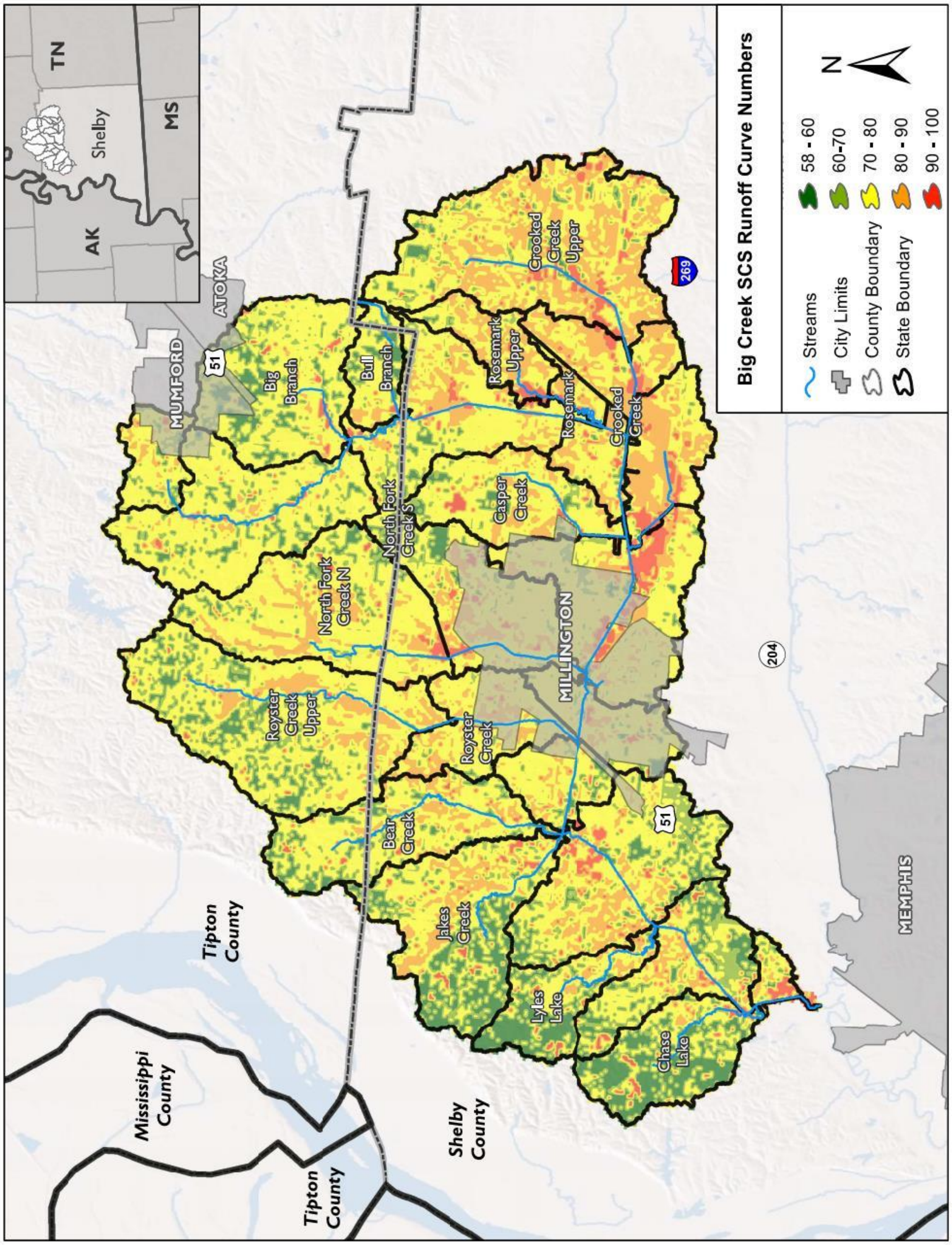


FIGURE 5

BASIN SCS RUNOFF CURVE NUMBERS

Once the physical parameters of the basin are adequately represented, the other primary input needed to generate flows is precipitation data. Flows for the steady-state modeling of the traditional “FEMA” flows are generated using standard unit hydrographs and theoretical total rainfall amounts having an assumed average return frequency and duration. i.e. the “100-yr., 24-hr. storm”. Since a major task for this study was to evaluate conceptual improvement projects to determine their performance for the historic May, 2010 storm, BWSC had to be able to replicate that specific storm and use the resulting hydrograph to evaluate potential improvement projects.

To accomplish this, BWSC used the National Weather Service NEXRAD Radar rainfall records for the storm and a method available within HEC-HMS known as the “Gridded Rainfall Method” to not only impose the recorded rainfall on the basin, but to distribute it both in time and spatially across the basin to reflect the movement of the storm system as it physically traversed across the basin. The hydrographs generated at the points of interest can then be digitally stored and imported directly into the HEC-RAS model for the required hydraulic modeling. Obviously the progression of the storm can’t be shown in a static figure in this report, but Figure 6 below does show the total amounts of rainfall which occurred over the different parts of the Big Creek Basin during the two-day period of May 1 and 2, 2010. As shown on Figure 6, according to NWS rainfall records, the Big Creek Basin experienced between 9 and 13 total inches of rainfall during this storm.

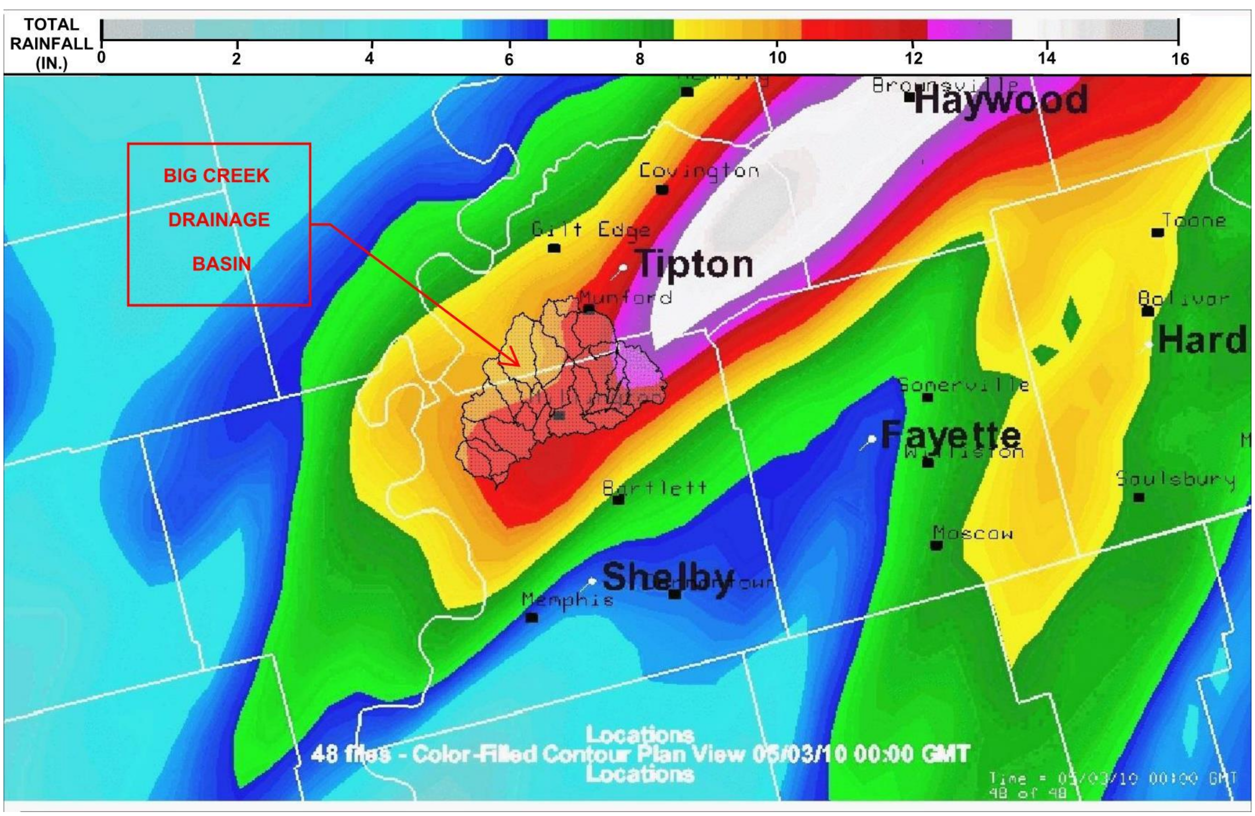


FIGURE 6

TOTAL RAINFALL, MAY 1-2, 2010 STORM

VI. HYDRAULIC MODELING

Once the required data had been assembled and the design flows developed for use in evaluating existing conditions and proposed improvements, HEC-RAS was used to do the hydraulic modeling and calculate water surface elevations at points of interest along Big Creek. HEC-RAS is a very powerful and widely-accepted hydraulic software, conceived and developed specifically for the types of analyses needed for this project. BWSC started with the FEMA model of Big Creek which used for the Shelby County Flood Insurance Study (FIS) effective February 6, 2013. Use of this model allowed BWSC to quickly develop a working model of Big Creek that only had to be updated and extended upstream. In order to assure that the model was still viable, new field surveyed channel cross-sections were taken at the locations of many of the existing sections in the current model for comparison. In addition, new channel sections were also taken at numerous locations where BWSC modelers determined that additional cross-sectional data in these areas would enhance the accuracy of the model. At both of these types of locations, field survey included the channel itself and a short distance past top bank on either side. Surveying of the broad, flat floodplains either side of the channel would have been extremely laborious and time-consuming, so BWSC used Client-provided LIDAR aerial topography data which readily available and provided acceptable accuracy for the project. Since the HEC-RAS model obtained from FEMA was done for the Shelby County FIS, it only extended as far up Big Creek as the Shelby-Tipton County line. In order to have a more complete picture of the flows in the basin, BWSC collected channel and bridge sections past this point upstream to Drummonds Road east of Munford, approximately another eight miles past the end of the FEMA model.

Once the data collection was complete, the information from the various sources had to be combined, shifted and, where previous data existed, compared to verify and/or appropriately adjust it to produce the final sections to be used in the HEC-RAS model. The cross-section data in the existing HEC-RAS model was collected in an x,y coordinate system that was not tied to the Tennessee State Plane Coordinate System, but the GIS topographic data and the field cross-sections were, so horizontal shifting of the data had to be done where the older cross-sections existed. An example of this process is shown in Figure 7 below for the cross-section at Big Creek River Mile 7.78. The existing FEMA section there is represented by the dashed green line on the plot. An updated section for this location was produced by cutting a cross-section using the digital elevation data for the location, as shown by the dashed blue line on the plot. It is interesting to note that the LIDAR data in the overbanks appears to provide more detail on the existing ground elevations than the older FEMA data, but doesn’t extend to the bottom of the channel, because the LIDAR beam doesn’t penetrate a water surface. The final cross-section to be included in the updated model is a composite of the most appropriate portions of the other lines, as shown by the solid red line on the plot.

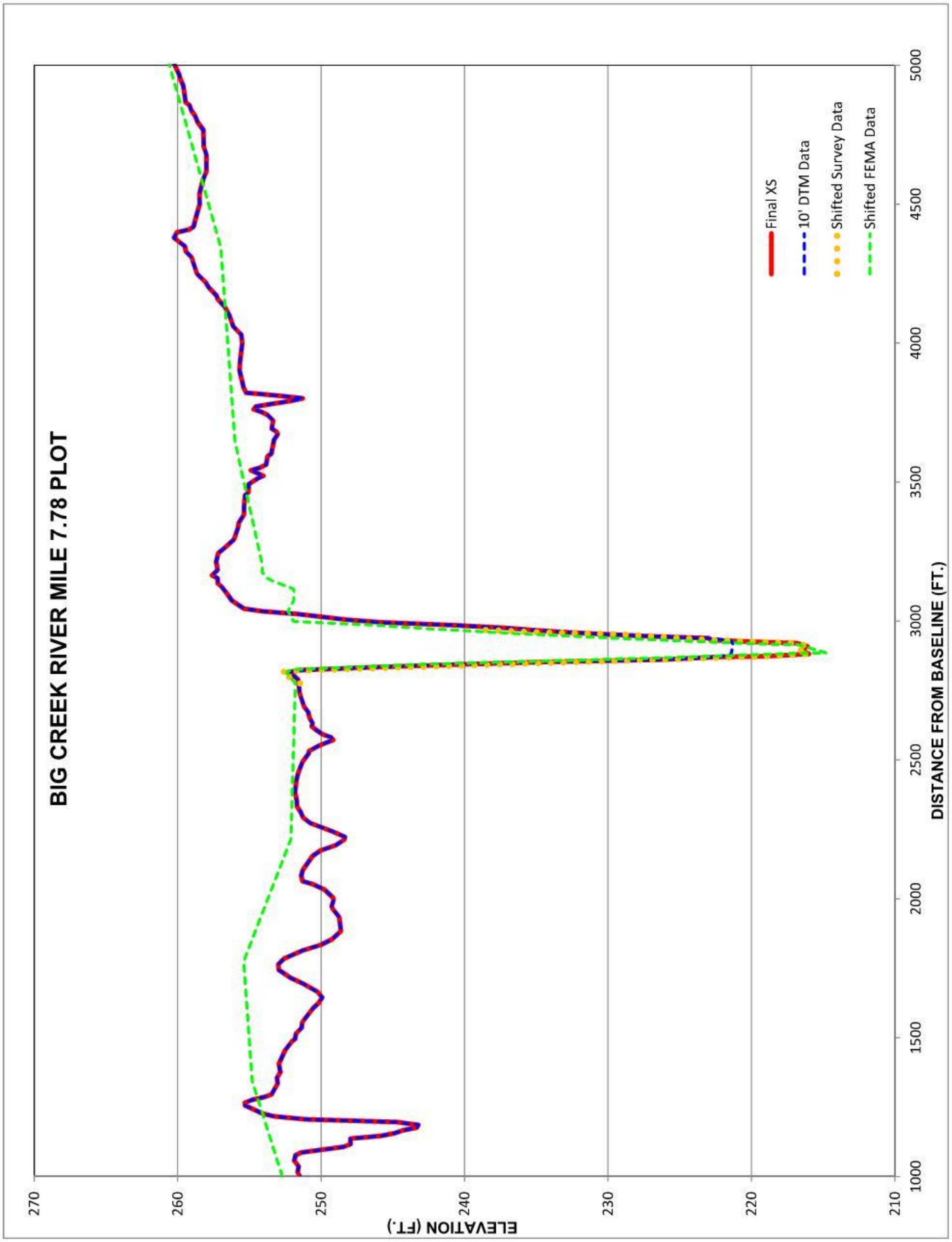


FIGURE 7

COMPOSITE HEC-RAS CROSS-SECTION

Once the adjustments to the HEC-RAS model had been made and the design flows established, the model had to be run and calibrated. The steady state model was calibrated using the same return frequency flows as the FEMA Flood insurance Study, specifically, 100-yr., and 500-yr. Calibration of the May, 2010 unsteady-state model was less direct since there were no published elevations for it and the one existing stream gage on this reach of Big Creek was put out of service by the floodwaters. However, there were some high water records and aerial photographs available from the time of storm. The model was run and inundation mapping produced from the results. These were compared to the available data and modifications made to refine the results to more closely fit the available records. After several iterations a HEC-RAS model was produced that, when the calculated hydrograph for the May, 2010 storm was routed along Big Creek, it produced peak water surface elevations that correlated well with the available records. An example of this can be seen in Figure 8 below which shows a comparison of the calculated inundation areas in the vicinity of the U.S Highway 51 crossing over Big Creek with actual aerial photography of the same area during the storm. At this point the model calibration was considered complete and work moved forward to the conceptual identification and evaluation of potential projects to mitigate flooding and improve water quality in the Big Creek Basin.

Aerial Photo of Actual Flooding May, 2010

Inundation Map Calculated by HEC-RAS Model

FIGURE 8

ACTUAL VS. CALCULATED MAY, 2010 FLOODING AT HWY 51

Once the preliminary model runs had been established, EnSafe began working on the sediment modelling portion of the project. It was quickly realized that inputs for the sediment module required a manual compilation of the input data for each of the 23 significant reach cross-sections. This required a spreadsheet conversion for both the 100-year and 500-year flood conditions.

EnSafe used the NRCS database to find the soil type for the lowest layer available in the database and then converted that to the coding required by the HEC-RAS sediment module. The model also required bed gradation by soil type over 20 grade classes. This information was derived using the NRCS database by utilizing several soil attributes then converting to the data required by the model. Fortunately the soils in the Big Creek Drainage Basin are very similar. A diagram of the soils information analyzed for this is shown as Figure B-1 (Appendix B).

Once the model had the appropriate input for the 100-year and 500-year flooding conditions, model runs were completed with and without the proposed control structures. This occurred with many iterations and changes to the input parameters including the various sediment transport equations. Figure B-2 (Appendix B) presents one of the model outputs for the 500 year flood conditions. This output shows the current creek bottom elevations as the dark black line with the blue line showing the bottom elevations after the 500 year storm event concluded. This run included a proposed control structure identified as Alternative 1 Site 1 at approximate river mile (RM) 16. The model is showing considerable scour along most of the channel. However, just upstream of the proposed control structure at RM16, sediment is shown as dropping out (the blue line being above the black existing channel bottom) because of the reduction in flow velocity from the flood control structure.

Subsequent model runs included modifying the sediment transport equations that appeared to better represent the fine silty soils in northern Shelby and southern Tipton counties. Figure B-3 (Appendix B) presents a combined graph showing model runs with and without the proposed Alternative 1 Site 1 structure. Although this graph is a little less significant in the scouring overall, it still shows the proposed structure causing localized sediment build up behind the structure. Also, it is notable that there is no real significant sediment transport reduction over the full extent of the channel with the construction of the proposed flood control structure. A similar result occurred with the model using the 100-year and the May 2010 flow parameters. Much of the similarity is attributed to the extremely high flows and velocities predicted to occur in the channel during these extreme storm events.

In an effort to determine if the proposed control structures would improve sediment scour, EnSafe looked at smaller storm events. BWSC developed flow estimates for 2, 5, and 10-years storm events the proposed Alternative 1 Site 1 structure and provided these to EnSafe. EnSafe then manually converted these flows into the quasi-unsteady flows required by the sediment transport module of the model.

With the geometry of the Alternative 1 Site 1 structure, the model predicts that a 2-year storm would pass flows without much impediment (Figure B-4, Appendix B). Notice that the red line changes very little from the base channel bottom elevations.

During this analysis, EnSafe determined that the Sediment Analysis does not appear to consider the pooling effect behind the Alternative 1 Site 1 structure in terms of the total flow (i.e., cubic feet per second); although, it did seem to modify the velocity. As a result, EnSafe subsequently modified a quasi-unsteady flow file to better match the results of the unsteady hydraulic model.

The result for the 5-year storm frequency is shown in Figure B-5 (Appendix B). The model predicts more erosion with the Alternative 1 Site 1 structures for several miles downstream, likely due to the increased velocity and duration of the flow out of the structure. However, at the lower river miles, the model predicts an improvement; with the net change for the full channel reach being nearly zero. Given these results of the sediment transport modeling performed within the HEC-RAS model, the installation of flood control structures in the Big Creek drainage basin at the proposed location appears to have minimal (if any) effect on improving sediment loading in the channel or bank erosion issues.

VII. FLOOD MITIGATION AND WATER QUALITY IMPROVEMENT ALTERNATIVES

Once a working, calibrated HEC-RAS model was available, the BWSC Team proceeded to identify conceptual-level projects to evaluate with respect to their flood mitigation potential and effects on basin water quality. These projects took into account our review of past studies of the project area as well as newer approaches to flood mitigation such as multi-use concepts like the development of areas that can provide recreational opportunities the majority of the time, but also provide floodwater storage and/or conveyance from time to time without sustaining extensive damage. The alternatives evaluated fell within one of four categories:

- Alternative 1 - Temporary Floodwater Detention Sites
- Alternative 2 - Enhanced Structural Protection (Levee)
- Alternative 3 - High Flow Diversion
- Alternative 4 - Increased Channel/Overbank Flow Capacity

One of the primary criteria for evaluation of an alternative was its capability to enable the system to pass the peak flow from the May, 2010 flood without overtopping of the existing levee at the Naval Support Activity Mid-South (River Miles 10.24-11.85). It should be noted here that this is an independent criteria established by the Client and is not the equivalent of the FEMA process of “certifying” or “accrediting” a levee, which is related to the 1%-annual chance storm (commonly called the 100-yr. storm) and carries specific structural and operational mandates which are not included under the scope of services for this project and have not been evaluated here. These alternatives are described in more detail below and the results of the investigations are presented in later sections of this report.

Alternative 1 - Temporary Floodwater Detention Sites

One of the most commonly-used methods of reducing flood flows in a reach is to construct detention structures upstream of the reach where the reduction in floodwater elevation is desired. This structure serves to reduce flood flows downstream by temporarily storing a portion of the high flows and releasing it slowly over a longer period of time to the downstream reach. The most critical reach of Big Creek in terms of potential flood damages is from U.S. Highway 51 upstream to Sledge Road since this is the most highly developed portion of the basin. Consequently, areas were investigated for potential detention sites along Big Creek upstream of Sledge Road. Four sites were identified for evaluation:

- Big Creek Site No.1 approximately 1,500 feet upstream of Millington-Arlington Road at Big Creek River Mile (BCRM) 16.3
- Big Creek Site No. 2 at the Shelby-Tipton County Line, BCRM 19.0
- Big Creek Site No. 3 approximately 300 feet upstream of Watson Road, southwest of Munford in Tipton County at BCRM 23.3
- Site No. 4 approximately 6,000 feet downstream of Drummonds Road, also southwest of Munford at BCRM 25.4.

Two additional detention sites were located on two of the major tributaries to Big Creek.

- Crooked Creek, with an 18.4 square mile drainage area, enters Big Creek not far upstream of Sledge Road at BCRM 14.7. With its large drainage area and relative lack of development, it presented a potentially viable detention structure location. A site on Crooked Creek approximately 1,200 feet upstream of Donnell Road was chosen for consideration.
- Royster Creek, another major tributary of Big Creek with a drainage area of 18.3 sq. mi., enters Big Creek at BCRM 8.3. This is downstream of the primary area where water surface elevations reductions were being sought, but it was assumed that if peak flows were reduced, it might allow the creek upstream of there to function more efficiently, especially if this site were combined with another detention structure further upstream. A potential site on Royster Creek was identified at approximately 2,000 feet upstream of West Union Road.

Alternative 2- Enhanced Structural Protection (Levee)

This alternative was developed to be a focused approach to provide a low cost alternative to specifically address the flooding of the Naval Support Activity Mid-South during the May, 2010 event. It involved examining the location and extent of the overtopping and evaluating the effects to adjacent areas of modifying the existing levee to mitigate the potential of overtopping from a similar flood event.

Alternative 3 - High Flow Diversion

This alternative was developed as a non-traditional type of approach to reducing water surface elevations without having to acquire land rights for the large areas associated with regional detention facilities. The flow from Crooked Creek currently joins Big Creek at BCRM 14.7. With a drainage area of 18.4 sq. mi. at the confluence, Crooked Creek represents about 36% of the total drainage area (51.4 sq. mi.) after the two streams join. Significantly reducing the contribution from Crooked Creek would have a major effect on the peak flows in the area of primary concern downstream. Currently the combined flow travels westerly through Millington to downstream of U.S. Highway 51 and then turns and runs southwesterly to the Loosahatchie River, a stream distance of about 15 miles, and enters the Loosahatchie at LRM 7.9. The concept for this alternative is that during high flows on Crooked Creek a large portion of the flow would be diverted across the intervening ridge and into the Loosahatchie River at about mile 19.8, well upstream of where Big Creek currently enters at mile 7.9. This could potentially increase Loosahatchie River flows downstream of the diversion entry point, but the theory is that the diverted Crooked Creek flow (from a drainage area of 18.4 sq. mi.) will peak well ahead of the main flow in the Loosahatchie River which has a 520 sq. mi. drainage area at that point and the resulting composite hydrograph will not be significantly affected. The alignment of the excavated diversion channel could be set to roughly follow existing drainage ways to minimize the amount of cut, and consequently the amount of land acquisition required, but there would still be a maximum cut on the order of 50 feet in depth at the crest of the intervening ridge and new drainage structures would be required where the channel crossed Paul Barrett Parkway (future I-269) and Pleasant Ridge Road. The effects of this alternative on the water elevations along Big Creek were evaluated as a part of this study, but a detailed analysis of the actual effects on the Loosahatchie River must be performed before pursing this alternative further, and that analysis was not within the scope of this project.

It is possible that some water quality impacts may occur with this alternative given that it will reduce the volume of water traveling downstream and potentially reducing channel erosion and scour downstream of the diversion channel. However, the downstream improvements in water quality will depend upon how frequently the diversion channel is utilized to redirect storm water from Big Creek. As previously mentioned, other water quality parameters are not anticipated to be significantly impacted without the implementation of additional BMPs throughout the drainage basin.

Alternative 4 - Increased Channel/Overbank Flow Capacity

This alternative consists of providing additional flow area in the left overbank along the critical reach of Big Creek from U.S. Highway 51 to Sledge Road. Several different scenarios within this alternative were evaluated, consisting primarily of various combinations of: increasing flow by reducing the Manning's friction factor, providing additional flow area by excavating in the south overbank and increasing existing bridge waterway openings to reduce bridge backwater effects.

VIII. ALTERNATIVES ANALYSIS AND RESULTS- HYDRAULICS

Alternative 1 - Temporary Floodwater Detention Sites

Big Creek Site No. 1. As mentioned above, BWSC performed preliminary investigations of six different floodwater detention sites in the Big Creek Drainage Basin. The most downstream Big Creek site, Site No. 1, was just upstream of Millington-Arlington Road. This site has a contributing drainage area of 28.23 sq. mi. and is in a broad, flat floodplain area which is primarily cultivated agricultural land with some wooded area adjacent to the old creek course and scattered residential development in the higher portions. The proposed dam, as evaluated, is approximately 6,800 feet long with a maximum height of about eighteen feet above normal valley bottom elevation. Conceptual design calculations indicate this site would be able to accomplish the stated objective of lowering calculated water surface elevation for the May , 2010 storm to at, or below, the existing top of levee elevation. Reductions in the May, 2010 water surface elevations ranged from approximately 2.4 feet at the East Levee down to about 0.6 feet at the west end of the Navy levee to only about 0.1 feet at U.S. Highway 51.

Big Creek Site No. 2. This site is located on Big Creek at the Shelby-Tipton County line. The drainage area at this point is 24.33 sq. mi. and is mixture of cultivated and wooded terrain. The original location was set slightly farther downstream using U.S.G.S. quadrangle maps, but had to be adjusted upstream slightly when aerial photography showed that a new electrical substation had been built in the area. Preliminary calculations were run for this site, but it was found that the existing topography did not allow for sufficient flood storage to significantly affect the water surface elevations in the primary area of concern downstream.

Big Creek Sites No. 3. And 4. These sites are located upstream of U.S. Highway 51 southwest of Munford. After it was determined that Site No. 2 was ineffective, only cursory evaluations of these two sites were done and it was apparent that limited available flood storage capacity and adjacent development of the area would prevent these sites from meeting project objectives. Structures in this area might prove to be practical and effective at solving more localized problems in that vicinity such as flooding of downstream roads or residences, but their effects would be very localized and would not be seen as far downstream as the area of concern.

Locations of the all four Big Creek sites are shown graphically in Figure 9 below.

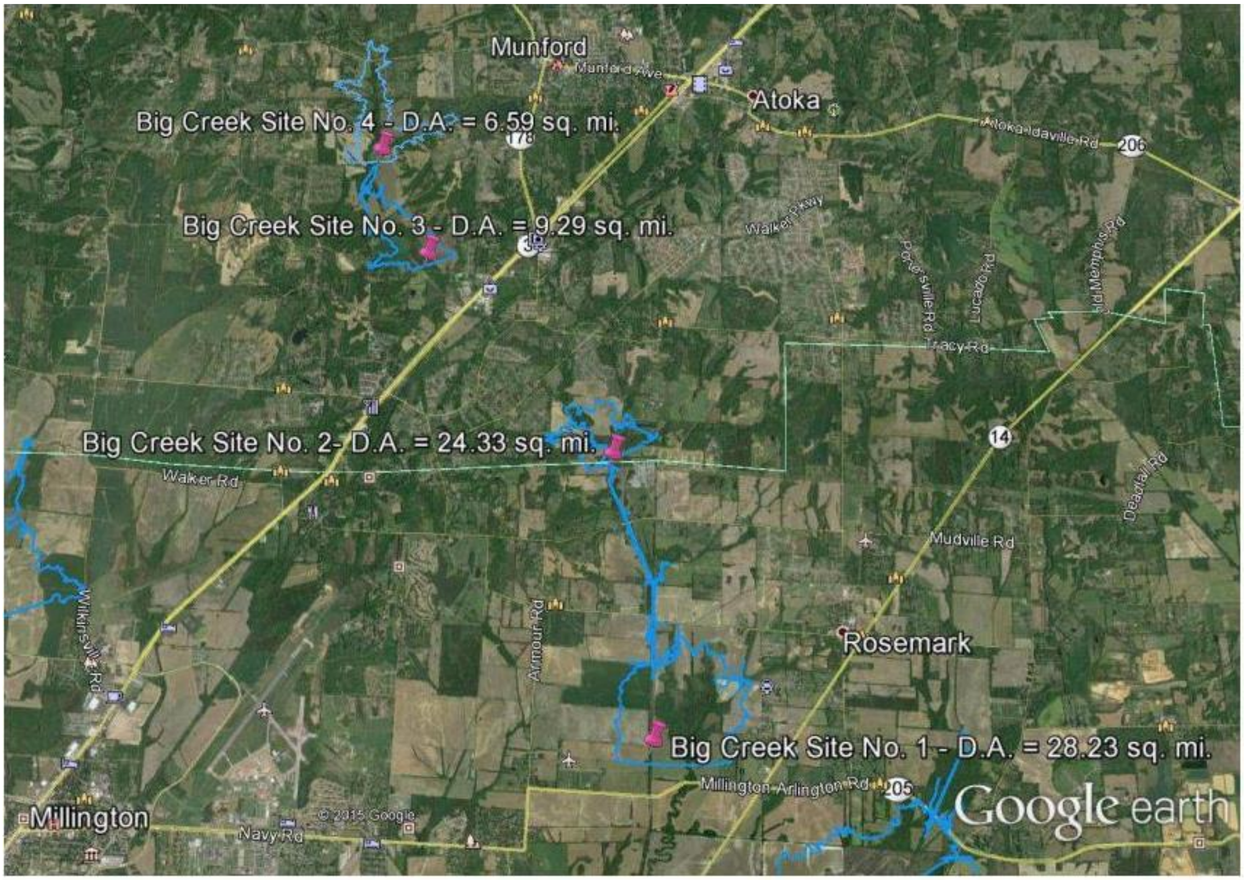


FIGURE 9

BIG CREEK POTENTIAL DAM SITES

Crooked Creek Site. It was desired that the potential dam on Crooked Creek be located as far downstream as possible to maximize its effects. Donnell Road crosses Crooked Creek approximately one mile upstream of its mouth. The potential site location was set just upstream of the road to eliminate road alteration costs from the project. This site has a drainage area of 14.78 sq. mi. and is a mixture of cultivated agricultural land and woodlands; however the woodlands have been heavily timbered recently. Calculations for the conceptual design showed that constructing this site alone would meet project objectives at the upper end of Navy Levee, but not at the downstream end, but would have virtually no effect in the area near U.S. Highway 51. The location of the site is shown in Figure 10 below.

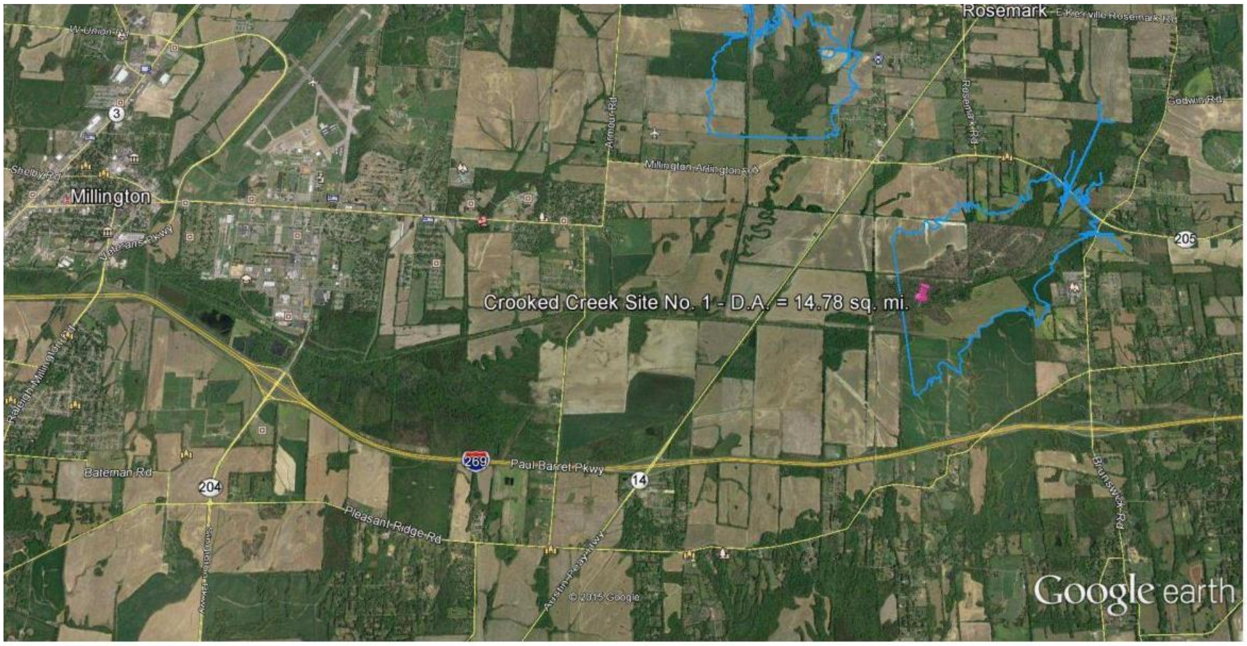


FIGURE 10

CROOKED CREEK POTENTIAL DAM SITE

Royster Creek Site. Royster Creek enters Big Creek just downstream of U.S. Highway 51. While this is downstream of the primary area of concern, the intent was to evaluate whether reducing peak flows, and consequently peak water surface elevations here, could have beneficial impacts upstream due to lower backwater elevations. These beneficial impacts would probably be even more pronounced if the site were constructed in combination with another dam further upstream. The Royster Creek Site is proposed to be located approximately 0.4 miles upstream of West Union Road and has a drainage area of 14.74 sq. mi., almost exactly the same as the Crooked Creek site. The potential inundated area is almost entirely agricultural, either row crop or pasture. Calculations for the conceptual design of the site showed some reductions in the water surface elevations near Highway 51 for the smaller storms modelled, but not for the Design storm. The site did show promise in combination with others as discussed below. The location of the site is shown in Figure 11 below.

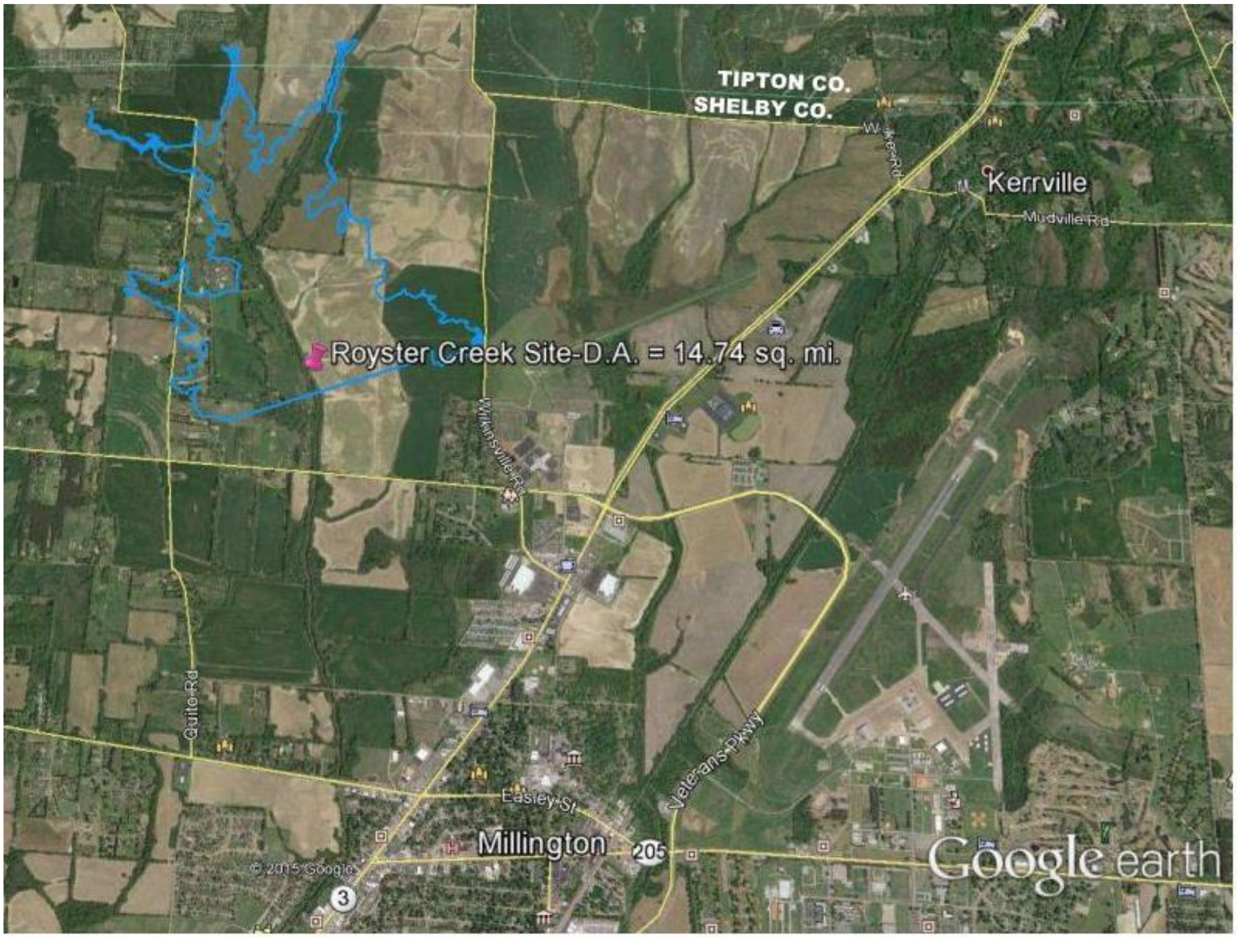


FIGURE 11

ROYSTER CREEK POTENTIAL DAM SITE

Site Combinations. The Big Creek Dam No. 1 alternative provided the desired results in the upper portion of the focus reach, but the extent of the water surface reductions diminish at the west end of Navy Levee and downstream to Highway 51. A scenario was developed combining Big Creek Dam No. 1 with the Crooked Creek Dam. (The relative locations of these two dams can be seen in Figure 10 above.) This combination did provide water surface reductions all the way down to Highway 51, but the reductions of about two feet from the East Levee down to the west end of Navy Levee were about twice the target value of a foot and came at a cost of about 155% of the cost of just the Big Creek Site No. 1 alone. This was because both of those sites were upstream of the focus reach.

Another combination was evaluated which consisted of constructing both the Crooked Creek and Royster Creek sites. This scenario was expected to distribute the impacts more evenly throughout the focus reach with the dams located at either end of it. The calculations performed indicated the assumption was correct with a fairly uniform reduction in water surface elevation throughout the reach. The combined estimated construction cost for these two dams was very close to that for Big

Creek Dam No. 1 alone and the hydraulic results were also very similar. Essentially, if one of these two alternatives presented advantages in terms of ease of permitting, right-of-way acquisition, etc., then they could be considered interchangeable in relation to expected flood protection benefits.

Stream Assessment of Big Creek. An evaluation of the current conditions and aquatic resources on Big Creek in the vicinity of the proposed Big Creek Alternative 1 Site 1 and Crooked Creek Site 1 locations was performed by EnSafe in August 2014. Each creek was assessed at the following three locations:

- At the proposed location of the flood control structure;
- 0.25-miles upstream of the proposed flood control structure; and
- 0.75-miles downstream of the proposed flood control structure.

The landscapes of Big Creek and Crooked Creek at the assessed locations are comprised of poorly drained loam with evidence of soil erosion on the steeper upland soils. Oak-hickory and southern floodplain forest are the naturally occurring communities; however, much of the forestland in these areas has been converted to cropland.

The portion of Big Creek that was evaluated at the proposed flood control structure location contained consistent channel bottom width and flow characteristics through the assessed reach. The channel banks were fully vegetated with dense herbaceous vegetation and sporadic trees within the top banks; with channel widths varying between 14-18 feet. Soils in this area were fairly consistent, with more clay noted near the channel bed. Established forests were present from the top bank to the adjacent farm fields. Erosional areas were present only on the outside bends of the stream and silty clay soils dominant vertically along the channel banks.

Upstream of the proposed flood control area, vegetation on the channel banks became sparse and evidence of channel evolution was evident. The channel was noted to be incising and abandoning its floodplain; however, the banks are geotechnically stable.

The portion of Crooked Creek that was evaluated at the proposed flood control structure appeared to have downcut sufficiently to accommodate increased stream flow, with unstable, retreating banks and numerous exposed roots visible and the channel bed having been eroded to the fragipan. Channel width remained fairly consistent, at approximately 30 feet. Failed bank material had been scoured away and the enlarged channel had become disconnected from its former floodplain in some areas. The adjacent forest area had been recently logged and dense herbaceous and scrub/shrub vegetation was present.

The effects of repeated inundation from flood control structures on both Big Creek and Crooked Creek could result in change in the current vegetation structure from forested areas to invasive and/or opportunistic species (for example, privet and Japanese Honeysuckle), which are better suited to adapt to such a change in habitat. Alteration of the current forested areas could also increase the potential for erosion in these areas if a significant reduction in the number of hardwood trees and their associated root structures were to occur.

A copy of EnSafe's stream assessment report, including cross-sections of the assessed areas, location maps, and a photo log is included as Appendix C.

Alternative 2 – Enhanced Levee Protection. This scenario does not represent a broad range improvement plan for the conditions which exist in the focus reach described above, but instead is a very localized approach to a situation which was discovered in the data collection phase of the work on this project. Local officials reported, and it is supported by aerial photography of the event, that during the May, 2010 flood event, water entered the NSA Mid-South property from both the upstream and downstream directions. Since the downstream end of the levee system is not connected to high ground, floodwaters were able to back into the Navy property from the west. However, in this storm the water reached a high enough elevation that it also overtopped the levee at the upstream end which runs perpendicular to Big Creek, usually referred to as the "East Levee". The significance of this is that the elevation of the upstream levee is about six feet higher than at the downstream end, so if the upper levee had not been overtopped, the water elevation on the Navy property would have been significantly lower and the inundated areas much smaller. This alternative consisted of assuming the East Levee was raised to prevent overtopping during the design storm and determining if upstream properties would be adversely affected. The routing calculations showed that the alternative would not adversely affect upstream owners by raising water surface elevations on their properties, but the beneficial impacts would also be limited to only the NSA Mid-South property. The location of the East Levee is shown below.

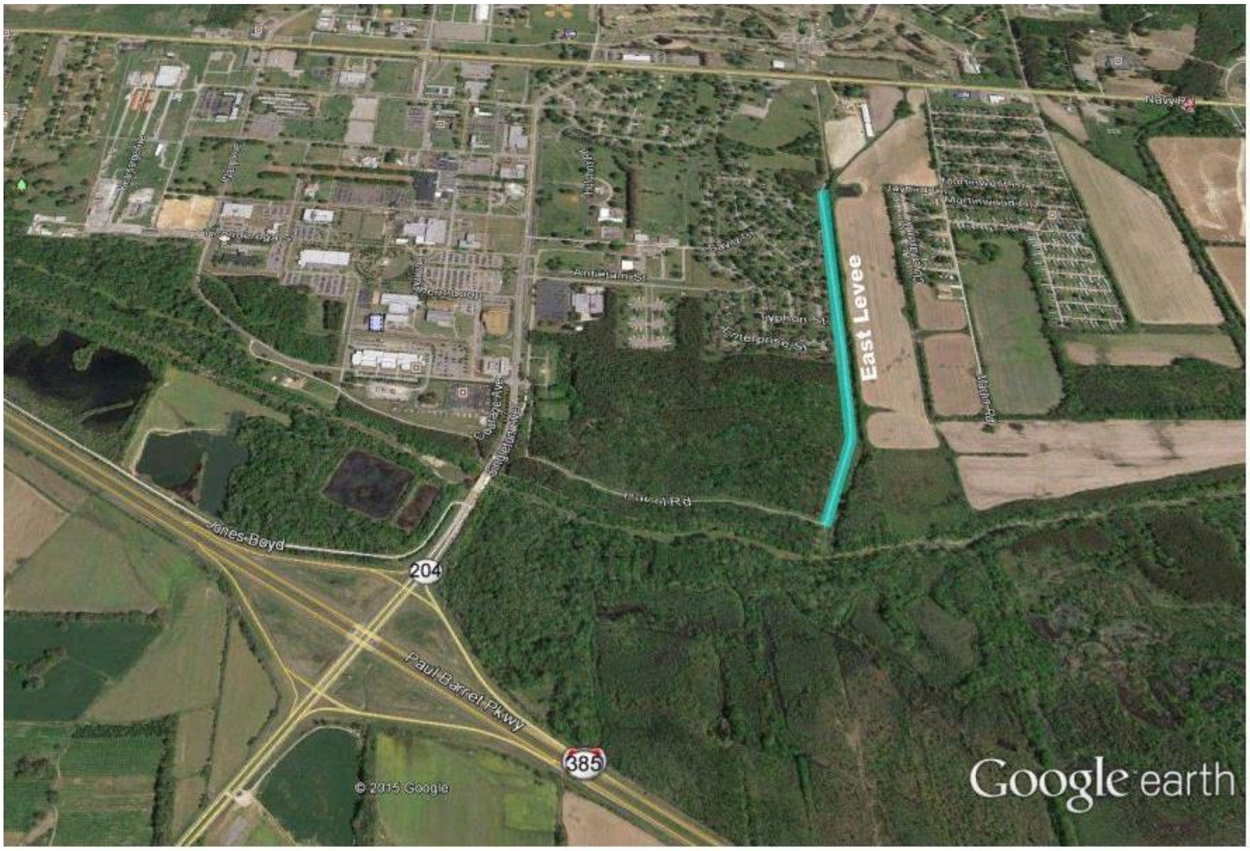


FIGURE 12

NSA MID-SOUTH EAST LEVEE

Alternative 3 – Crooked Creek High Flow Diversion. This alternative consists of providing a channel that diverts water during high flows from Crooked Creek to the south, crossing the intervening ridge and flowing to the Loosahatchie River. All the flow from the Big Creek Basin currently enters the Loosahatchie River from the mouth of Big Creek at LRM 7.9, but the flow from the Diversion would enter almost 12 miles upstream of there at LRM 19.8. Preliminary hydraulic modeling was done for this conceptual scenario as a part of this study and it was found to meet project criteria of reducing calculated water surface elevations for the May, 2010 storm to below the existing elevation of the top of the levee. However, the effects of this alternative on the hydraulics of the Loosahatchie River must be evaluated before serious consideration is given to pursuing this alternative further. Diverting flow from Crooked Creek will add flow to the Loosahatchie, but with a drainage area of only about 18 sq. mi. compared to 520 sq. mi. for the Loosahatchie River, the hydrograph for the flow from the diversion can be expected to peak well ahead of that for the river. The overall effect on the hydrograph for the river is expected to be inconsequential, but this does need to be confirmed by hydraulic modeling.

FIGURE 13

POTENTIAL CROOKED CREEK DIVERSION CHANNEL

Alternative 4 – Increased Channel/Overbank Flow Capacity. This alternative consisted of evaluating several possibilities for improving the conveyance in the south overbank throughout the focus reach (from U.S. Highway 51 to Sledge Road) in order to reduce water surface elevations. The right (north) overbank in this focus reach is already heavily developed, so modifications on that side for increasing conveyance are not practical. The left overbank area is this reach is confined between Big Creek and Paul Barrett Parkway (Future I-269) and is completely un-developed consisting almost entirely of woodlands and/or borrow pits from the construction of Paul Barrett Parkway. If this area can be cleared and maintained, the resistance to flow in the overbanks will be reduced and consequently water surface elevations lowered. This hydraulic scenario was evaluated and it was determined that these improvements alone were beneficial, but did not meet project objectives. The next iteration for this alternative involved making a bench-type cut in the left overbank to provide additional flow area for the larger storms. It was recognized that clearing such a large area (approximately 1,000 acres) for improved drainage would probably not be widely acceptable unless some type of amenities were installed as a part of the overall project. Dalhoff Thomas Design Studio (DTD) studied the area and developed an overall conceptual plan for public-use recreational amenities which could be installed in the overbank area without restricting flows. These improvements also incorporated sustainable components to improve wildlife habitat and provide an overall environmentally friendly approach. The public sustainability improvements are capable of experiencing occasional flood flows without excessive damage. The bench cut was set just above the calculated water surface for the 10-yr. storm to reduce the expected frequency of flooding of smaller storms but still have additional conveyance available for larger storms. This scenario was evaluated and found to meet project objectives in most locations, but in places did not provide any freeboard for potential future higher water surface values due to development in the basin. The next scenario modeled involved adding additional waterway opening under Raleigh-Millington Road in the form of a new, large box culvert in the overbank. This did provide the desired freeboard along the levee, but due to increased flows, produced higher water surface elevations at U.S. Highway 51 than existing conditions. This problem was removed by including additional waterway opening (a large box culvert in the overbank) at Highway 51. Since conveyance was increased significantly in the left overbank, the velocities for the proposed alternative in that area were reviewed for increased erosion potential. All the calculated velocities for the reach away from the bridge faces were found to be below the generally-accepted West Tennessee threshold for erosive flow of 5 feet per second. An overall view of the project area and enlargements of the three areas showing potential development plans are shown in the Figures 14-17 which follow.

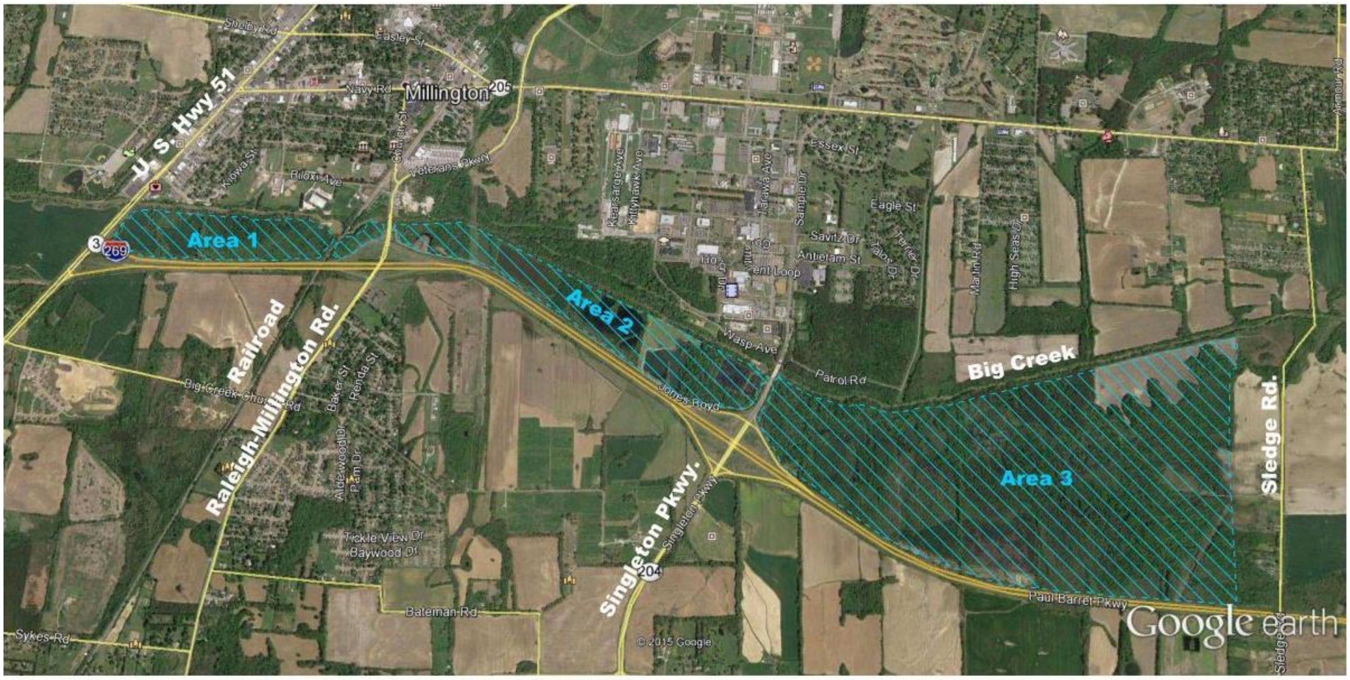


FIGURE 14

ALTERNATIVE 4 - INCREASED LEFT BANK CONVEYANCE CAPACITY

FIGURE 15

ALTERNATIVE 4 - AREA 1 IMPROVEMENTS

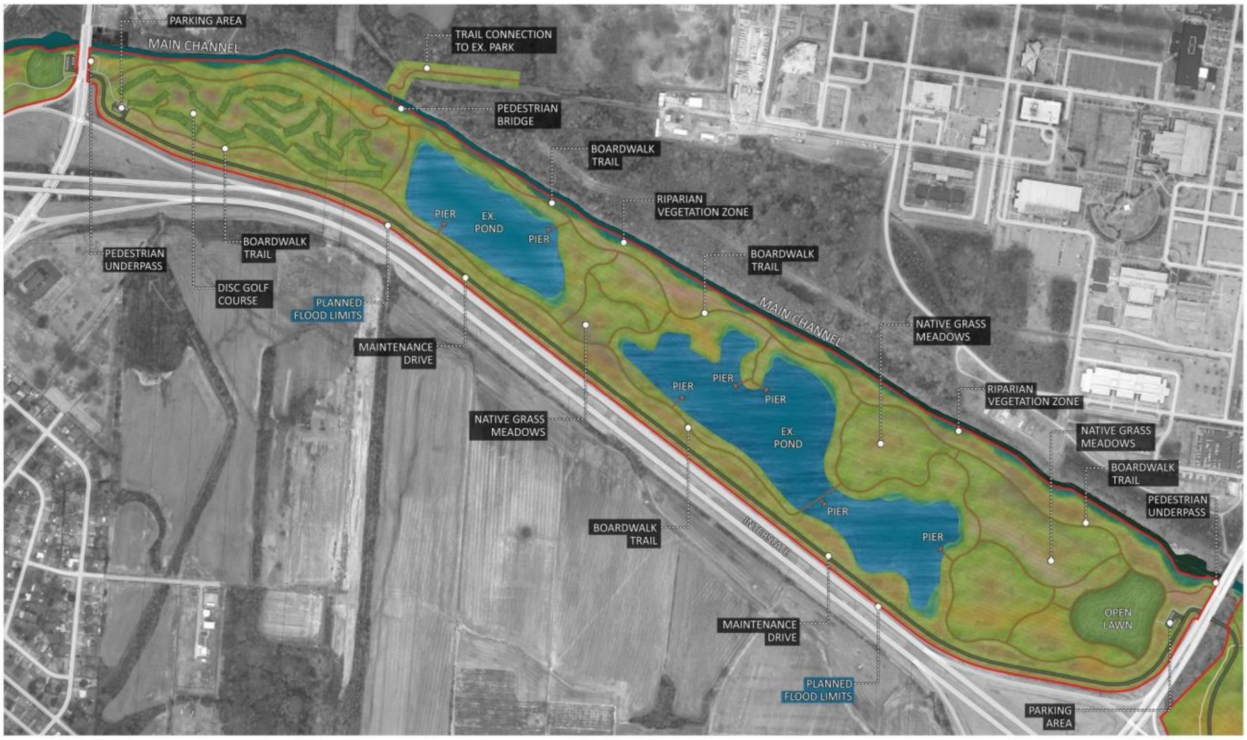


FIGURE 16

ALTERNATIVE 4 - AREA 2 IMPROVEMENTS

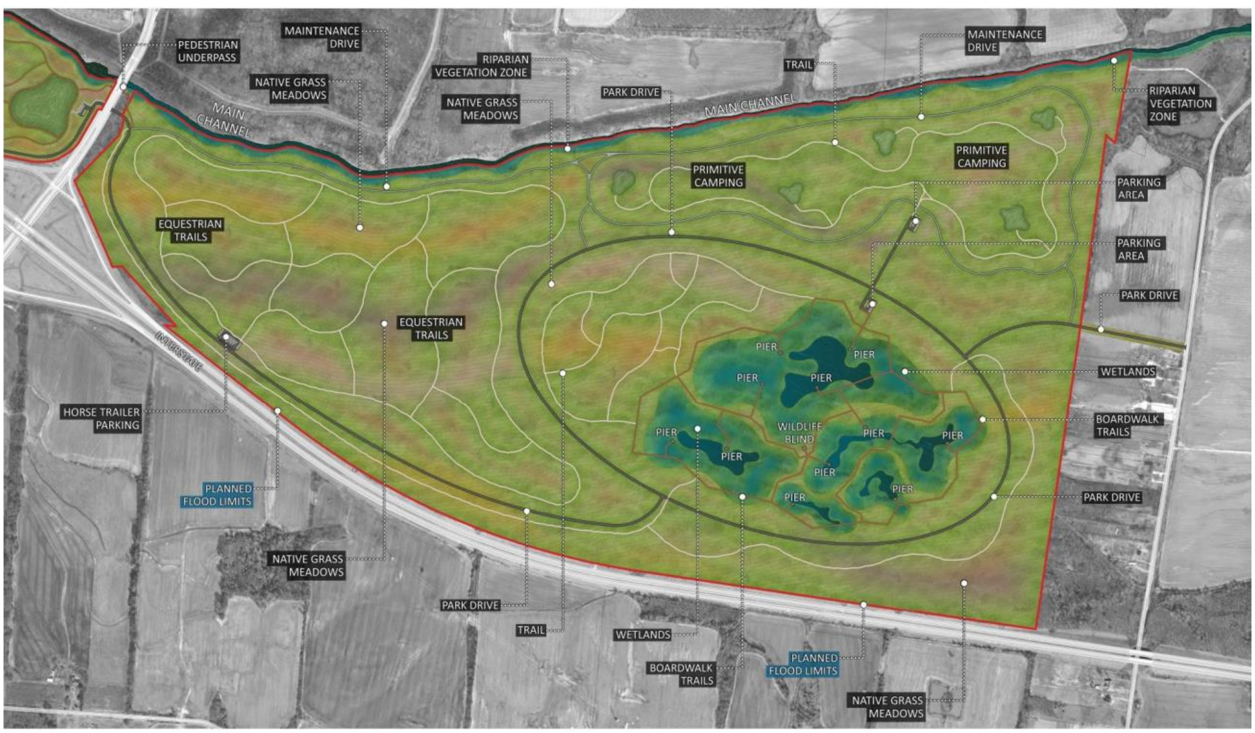


FIGURE 17

ALTERNATIVE 4 - AREA 3 IMPROVEMENTS

Summary of Hydraulic Results. Of the many alternatives evaluated, four appeared to accomplish the project objective of keeping the May, 2010 storm water surface elevations below the top elevation of the existing NSA Mid-South Levee. The results for the four alternatives judged to best meet the study objectives are presented in Table 1 and Figure 18 below. The potential improvements all have pros and cons associated with each of them that will be discussed in more detail later in this report.

Table 1.

Big Creek Water Surface Elevations for May, 2010 Storm

Existing Conditions and Various Study Alternatives

Big Creek River Mile	NSA Mid-South Levee Top Elevations (ft)	Existing Conditions Water Surface Elevation	Alt. 1 - Site 1: Big Creek Dam No. 1	Alt 1. - Crooked Creek Dam & Royster Creek Dam	Alt. 3: Crooked Creek Diversion	Alt. 4-F: Excavate Left Overbank, Add Box Culverts at Raleigh-Millington Rd. and Highway 51, Install Recreational Facilities
8.44 = U.S. Highway 51						
8.45		258.61	258.62	258.72	258.68	258.78
8.61		259.58	259.57	259.57	259.61	259.25
8.91		259.94	259.92	259.88	259.94	259.38
9.30		261.69	261.05	261.11	261.05	260.56
9.31 = I. C. Railroad						
9.32		262.5	261.46	261.55	261.45	261.13
9.54		263.58	262.39	262.55	262.35	262.48
9.55 = Raleigh-Millington Rd.						
9.56		264.45	263.27	263.51	263.18	262.44
9.74		265.37	264.76	265.07	264.63	263.4
9.99		266.17	265.71	265.90	265.54	264.16
10.08		266.43	265.94	266.12	265.75	264.44
10.14		266.52	266.03	266.20	265.83	264.54
10.24	266.06	266.69	266.20	266.35	266.00	264.79

Table 1. – cont'd.

Big Creek River Mile	NSA Mid-South Levee Top Elevations (ft)	Existing Conditions Water Surface Elevation	Alt. 1 - Site 1: Big Creek Dam No. 1	Alt 1. - Crooked Creek Dam & Royster Creek Dam	Alt. 3: Crooked Creek Diversion	Alt. 4-F: Excavate Left Overbank, Add Box Culverts at Raleigh-Millington Rd. and Highway 51, Install Recreational Facilities
10.62	266.68	266.79	266.27	266.41	266.06	264.92
10.84	267.25	267.12	266.59	266.7	266.38	265.21
11.05	269.59	268.20	267.57	267.60	267.36	266.00
11.12	270.13	268.43	267.74	267.78	267.53	266.26
11.31	270.42	270.07	269.05	269.16	268.71	267.89
11.32 = Singleton Pkwy.						
11.33	271.09	270.33	269.33	269.46	268.94	268.39
11.54	272.23	273.34	271.07	271.24	270.63	271.39
11.85	273.20	273.87	271.76	271.90	271.41	271.58
12.12		274.29	272.26	272.39	271.97	271.76
12.29		274.67	272.63	272.76	272.36	271.97
12.60		275.48	273.60	273.69	273.38	272.50
12.85		276.63	274.87	274.98	274.66	273.42
13.18		277.85	276.00	276.20	275.72	274.60
13.45		279.52	277.55	277.80	277.19	276.15
13.69		281.63	280.27	280.65	279.76	279.66
13.70 = Sledge Rd.						

The effectiveness of the various alternatives relative to each other is shown graphically in Figure 18 below.

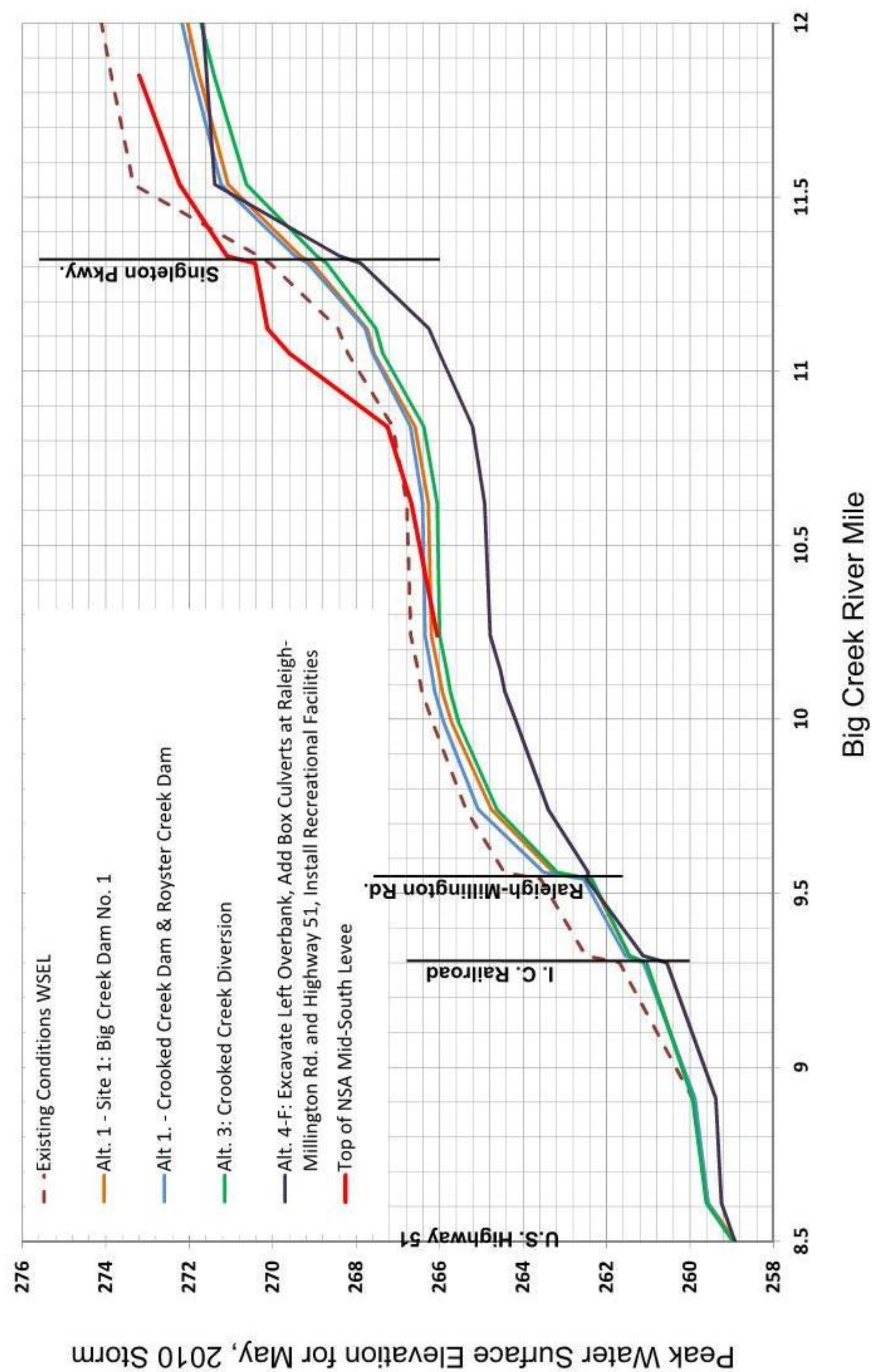


Figure 18

Graphic Comparison of Alternatives

IX. ALTERNATIVES ANALYSIS AND RESULTS- WATER QUALITY

For purpose of this Study, the water quality analysis relates primarily to sediment and erosion issues based upon the sediment transport module within the HEC-RAS model. Below is a brief discussion of the water quality analysis for each of the four alternatives.

Alternative 1 - Temporary Floodwater Detention Sites

The evaluators concentrated their analysis on the Alternative 1 Site 1 temporary detention structure since the hydraulic analysis indicated that it could meet the goals of the study. All other detention structures would perform similarly in terms of the sediment transport model. The model runs for the 500-year and May 2010 flood conditions indicated that although there would be sediment drop out immediately above the structure, erosion downstream from the structure would be similar with and without the structure. This would be expected, since the volume of water in these extreme storm events is so high that erosion is inevitable.

Possible improvement to erosion and scour issues relating to the various alternatives are more likely at smaller storm events. The 2-year and 5-year storm frequencies were modeled to evaluate the impact to sediment transport. Given the final structure evaluated at Alternative 1 Site 1, the model showed little to no improvement at a 2-year storm frequency. This is largely due to the fact that the structure would detain little to no water at the structure, passing the flows unimpeded. The model output for this 2-year event is shown on Figure B-4. For the 5-year storm event, the model results were mixed (see Figure B-5) with higher sediment transport for about 6 miles downstream of the structure and lower sediment transport for the last 10 miles of the stream channel. The net volume of sediment transport over the entire reach of the Big Creek channel was effectively zero.

As a result of the limitations of the sediment transport module of the HEC-RAS model and the conditions used for the flood evaluation, there appears to be little to no improvement to sediment water quality as a result of the proposed temporary detention structures. Other channel improvements would need to be considered to show improvements to erosion and scour. These improvements may include stream bank stabilization using a variety of techniques from structural (riprap or hard armor) to bioengineering methods (live staking, brush mattresses, etc.)

In terms of other water quality issues such as nutrient, bacteria or dissolved oxygen loads, the temporary detention structures would not be expected to improve these parameters. To improve those parameters other BMPs would need to be implemented along the channel.

Alternative 2 - Enhanced Structural Protection (Levee)

There are no apparent water quality advantages resulting from an enhanced levee.

Alternative 3 - High Flow Diversion

It is possible that some water quality impacts may occur with this alternative given that it will reduce the volume of water traveling downstream and potentially reduce erosion and scour downstream of the diversion channel. However, the impacts will be very dependent on what frequency of a storm event is allowed to be diverted. Additional water quality parameters will not be significantly impacted without the installation of additional BMPs along the channel.

Alternative 4 - Increased Channel/Overbank Flow Capacity

Although not modeled, this alternative with the added culverts under Raleigh-Millington Road and Highway 51 would likely provide erosion and scour protection improvements in the reaches downstream of Sledge Road. The project could include streambank protection as well as reducing velocities downstream of the project. Additional water quality parameters will not be significantly impacted without the installation of additional BMPs along the channel.

As documented in several of the historical studies performed for Big Creek, implementation of BMPs have historically been identified as a key component to improving overall water quality throughout the Big Creek drainage basin:

- Converting existing cropland to pastureland (USDA, 1968);
- Implementing new farming practices (e.g., conservation tilling and crop rotation) (USDA, 1988);
- Increasing non-farmed tree plantings and erosion buffer areas in the vicinity of the receiving creeks and tributaries (USDA, 1988; and NRCS, 2002); and
- Reducing nonpoint source contributions from urban areas (e.g., illicit discharges of sanitary waste; leaking septic systems, runoff from domestic animal pens) (TDEC, 2011).

While it is recognized that implementation of upland BMPs may reduce the potential for erosion and sediment loss; storm water runoff from pastureland also has the potential to increase coliform bacteria loading downstream, if livestock grazing occurs in the area (TDEC, 2011).

X. DISCUSSION OF RESULTS

The graphs shown above are for the studied alternatives that produced results consistent with the stated project objective of reducing the peak water surface elevation for the passage of the May, 2010 storm to an elevation at or below the existing top elevation of the NSA Mid-South Levee. It bears repeating here that this is an independent criteria established by the Client and is not the equivalent of the FEMA process of “certifying” or “accrediting” a levee which is related to the 1%-annual chance storm (commonly called the 100-yr. storm) and carries specific structural and operational mandates which have not been evaluated under the scope of services for this project.

The analyses of the Alternative 1 (Temporary Floodwater Detention) scenarios produced two viable approaches: a large dam on Big Creek itself just upstream of Millington-Arlington, or two smaller, but still significant dams-one on Crooked Creek near its mouth and one on Royster Creek just upstream of West Union Road. Hydraulic results for the two scenarios were very similar with calculated water surface elevations between them varying less than 0.4 feet throughout the focus reach. Estimated construction and land acquisition costs (see Section XI. for more details on costs) for the two are also approximately equal at about $17M. Current land use for the three sites is fairly similar with the Royster Creek site proposed inundation area being primarily agricultural land while the other two are a mixture of woods and agriculture. Given that the two detention options are so similar in cost and flood reduction benefits, the preferred option should be chosen based on the expected ease of constructability. Given the current regulatory climate toward the construction of new dams and the large estimated area of required land acquisition (approximately 1,800 acres), either scenario will offer substantial permitting and public relations challenges.

Alternative 2 (Levee Enhancement) would just involve raising the top of the NSA Mid-South Levee at its upstream end to an elevation above the peak water surface of the May, 2010 storm at that location and would not provide any reductions in predicted water surface elevations on Big Creek. The benefits produced would come from the fact that floodwaters entering the NSA facility would be backwater coming in at the downstream end of the levee which is approximately six feet lower than at the East Levee upstream.

Alternative 3 (Crooked Creek Diversion) also produced acceptable water surface elevations in the focus reach by diverting some of the Crooked Creek flow across the intervening ridge to the south and into the Loosahatchie River. The resulting water surface elevations for Big Creek under this alternative were found to very closely approximate those for the two scenarios of Alternative 1, generally falling within one-half foot of them. (See Figure 18.) The estimated construction plus land acquisition costs is similar to those for the Alternative 1 scenarios, totaling about $13M. The estimated land acquisition costs are much lower for this alternative than for the Alternative 1 scenarios, but the construction costs are much greater due to two new hydraulic structures which will be required where the new channel crosses Paul Barrett Parkway and Pleasant Ridge Road. Even though all the flow in Big Creek eventually makes its way to the Loosahatchie River, diverting a large portion of the Crooked Creek flow into the Loosahatchie approximately twelve miles farther upstream will be viewed suspiciously by landowners within the reach between the mouth of Big Creek and the entry point of the diverted flow. A detailed hydraulic modeling of the Loosahatchie River will be required to allay these fears and prove mathematically that the volume of water diverted and the timing of the peak on the hydrograph for that flow are such that water surface elevations on the Loosahatchie River are not adversely affected. This modeling is necessary before serious consideration is given to pursing this alternative further. Assuming the modeling supports this theory, this alternative will probably still require significant justification of the concept since those most affected by the construction are on higher ground and would not directly feel the benefits associated with the project like the property owners adjacent to Big Creek.

Using the Alternative 4 (Increased Flow Capacity) approach, a scenario was developed to accomplish the project objectives. This consisted of evaluating various modifications to the south overbank area between Big Creek and Paul Barrett Parkway to increase floodwater conveyance. Early trial scenarios consisting of clearing and excavating a broad bench cut in the overbank area provided the desired results of keeping water surface elevations below the top of the existing levee in the upper portion of the focus reach. However, unlike the other alternatives which reduced flows, this one increased flows in the focus reach. As a result, water surface elevations at Raleigh-Millington Road and U.S. Highway 51 were increased over existing conditions. This situation was eliminated by adding additional waterway openings at the bridge crossings in the form of concrete box culverts in the overbanks. The resulting alternative, designated 4-F, performed as well or better than the other alternatives in the area of the existing NSA Mid-South Levee and also provided greater water surface reductions downstream of there to U.S. Highway 51. As with all the alternatives, there will be some permitting challenges which will have to be overcome. Excavating the south overbank area will require removing the existing vegetation. The vegetation will be replaced with lower-growing vegetation that will be maintained to some degree. This will reduce the Manning's friction coefficient for the area and contribute to the increased flow capacity. To make such a major modification to the overbanks appealing to the general public, it was recognized that the addition of significant new and sustainable public amenities would have to be an integral part of the overall improvement plan under this alternative. A conceptual plan was developed to create athletic fields, an outdoor amphitheater, a disc golf course, camping area and several miles of pedestrian, biking and even equestrian trails in native grass meadow, open-water and wetlands environments along the south side of Big Creek. This project comes with a significant price tag and may need to be constructed in phases as discussed in the costs section of this report.

Regardless of which flood prevention measure may be chosen and ultimately constructed, all potential solutions evaluated as part of this study, will require coordination with TDEC and the USACE, Memphis District. In April 2014, EnSafe met with representatives from TDEC at the TDEC Memphis Environmental Field Office to discuss the conceptual alternatives recommended by the historical studies completed for flood prevention in the Big Creek basin and the alternatives being considered as part of this Study. The discussion focused on what permitting considerations TDEC might require for construction of a new flood prevention structure.

TDEC acknowledged that recent flood events in the Big Creek basin seemed to justify the need for additional flood prevention measures to be undertaken. However, TDEC also stressed that any proposed flood prevention improvements would need to be designed so that year-round base flow conditions in Big Creek post-construction would mimic pre-construction conditions, as much as possible.

TDEC also stressed that construction of any flood improvement structures that alter a stream, river, lake, or wetland and result in a disturbed area of greater than five acres would require an Aquatic Resource Alteration Permit (ARAP) to be obtained from TDEC prior to construction.

TDEC did acknowledge, however, that demonstration of a net positive gain in wetlands upstream from a constructed flood control structure (and/or a net zero loss in wetlands downstream of a flood control structure) could be taken into consideration when determining the amount of compensatory wetland mitigation that may be required from construction; as well as obtaining local support for the project.

The following questions were asked of TDEC during the meeting; however, a formal response has not been received as of the date of this report:

1. Is there a minimum storm event flow that TDEC would want to see modeled or demonstrated as being unimpeded through a proposed flood control structure (e.g., , flows associated with a 5-year/24-hour event)?

2. Does TDEC recognize "avoidable structures" that would not be acceptable for flood mitigation efforts and would dry basin flood control structures be considered as such? If so, what other structures would TDEC consider to be "avoidable" and therefore not acceptable for flood control?

3. Are there structures/elements for flood control and/or improving water quality that TDEC considers "more favorable" or has seen be successfully implemented on similar projects?

XI. OPINIONS OF PROBABLE CONSTRUCTION COST

The opinions of probable construction cost were developed for the four conceptual alternatives described in detail above. Construction unit prices were derived from online Tennessee Department of Transportation (TDOT), Construction Division's "Average Bid Prices" webpage located at: ***http://www.tdot.state.tn.us/construction/Average_Bid_Prices.htm***. The first cost estimating work developed for this project was completed in 2014, so the 2013 prices from the website were used as the latest available data. For consistency, these same unit prices have been retained for cost estimating of additional or revised alternatives developed since that time. The latest data now available (2014) were reviewed once they became available and weren't found to vary significantly from those used previously. Unit prices from the website were adjusted as was felt necessary based significant differences in factors such as quantity of the item, local conditions, etc. Where unit costs for certain items were not available from the TDOT website, other sources such as past BWSC construction project records and conversations with local contractors were used.

Land acquisition costs were calculated using a cost per acre which was furnished to BWSC by Shelby County Government. This unit cost was reduced significantly for the Alternate 4 scenarios because this area is not readily arable and is landlocked to a large degree between Big Creek and access-controlled Paul Barrett Parkway. Using this methodology, Engineer's Opinions of Probable Construction Costs were developed for the various Alternatives/Scenarios. These are summarized in Table 2 below along with the hydraulic effects associated with those scenarios.

TABLE 2.
COMPARISON OF VARIOUS STUDY ALTERNATIVES
BIG CREEK DRAINAGE STUDY
SHELBY COUNTY, TN & CITY OF MILLINGTON GOVERNMENT

ALTERNATIVES	APPROX. EST'D. CONSTRUCTION COST	APPROXIMATE ESTIMATED LAND COST	APPROXIMATE TOTAL COST[1]	DECREASE IN WATER SURFACE ELEV. FOR 500-YR. STORM AT: U.S. HWY 51	DECREASE IN WATER SURFACE ELEV. FOR 500-YR. STORM AT: SINGLETON PKWY.	DECREASE IN WATER SURFACE ELEV. FOR MAY, 2010 STORM AT: U.S. HWY 51	DECREASE IN WATER SURFACE ELEV. FOR MAY, 2010 STORM AT: SINGLETON PKWY.
ALTERNATE #1-TEMPORARY DETENTION UPSTREAM							
Big Creek Dam #1	$2,970,000	$13,500,000	$16,470,000	0.08	1.07	0.96	1.52
Crooked Creek Dam	$2,380,000	$7,500,000	$9,880,000	0.12	1.36	0.00	0.89
Royster Creek Dam	$1,880,000	$5,250,000	$7,130,000	0.32	0.03	0.00	0.00
Big Crk. #1 & Crooked Crk. Dams	$5,350,000	$21,000,000	$26,350,000	0.27	2.15	1.26	2.69
Crooked Crk. & Royster Crk. Dams	$4,260,000	$12,750,000	$17,010,000	0.54	1.39	0.98	1.19
ALTERNATE #2-ENHANCED LEVEE PROTECTION							
Raise East Navy Base Levee	$340,000	$0	$340,000	0.00	0.00	0.00	0.00
ALTERNATE #3-HIGH FLOW DIVERSION							
Crooked Creek Diversion	$11,970,000	$1,130,000	$13,100,000	0.12	1.36	1.25	1.04
ALTERNATE #4-INCREASE SOUTH OVERBANK CONVEYANCE [2]							
Alt. A-Clear LOB, Add Imprvmnts.	$13,200,000	$2,300,000	$15,500,000	0.39	0.80	N/A	0.47
Alt. B-Excavate LOB, Add Imprvmnts.	$34,700,000	$2,300,000	$37,000,000	0.40	2.70	N/A	1.44
Alt. F-Excvtn., Rec. Impts., Imp. Hwy 51 & Ra-Mill	$36,900,000	$2,300,000	$39,200,000	0.40	2.90	0.33	1.89

1. Design costs and construction contingincies are not included in these numbers.
2. Only the costs for Phase I of the Recreational Improvements are included here.

XII. ANTICIPATED PROJECT BENEFITS AND POTENTIAL FUNDING SOURCES

Depending on the proposed scope, flood control projects in the Big Creek drainage basin and any expected benefits either upstream and downstream of the proposed structures, numerous state and Federal grant programs exist that could provide potential funds for performing the work. Many of these grant programs are competitive in nature and require the recipient to share a portion of the total award; however, given the number of existing grant programs and the potential award amounts available, some of the grants available could provide significant financial assistance for improving flood control in the basin.

Highlights of potential grant programs that may apply to flood control in the Big Creek drainage basin as follows:

- Pre-Disaster Mitigation Program (Tennessee Emergency Management Agency [TN EMA]/Federal Emergency Management Agency [FEMA])
    - Acquisition/demolition of repetitively flooded residences;
    - Construction of retention/detention ponds;
    - Awards (typical): $400,000 - $8,000,000

- Flood Mitigation Assistance Program (TN EMA/FEMA)
    - Acquisition/demolition of repetitively flooded residences;
    - Construction of retention/detention ponds;
    - Awards (typical): $37,000 - $12,000,000

- Nonpoint Source Implementation (TDEC)
    - Design and implementation of animal waste BMPs for stream, lake, and estuary watersheds;
    - Implementation of basin-wide landowners education outreach;
    - Awards (typical): $400,000 - $8,000,000

- Regional Conservation Partnership Program (NRCS)
    - Mitigation of farmland erosion
    - Improvements to water quality
    - Awards (typical): up to $10,000,000

- Land and Water Conversation Fund (National Park Service)
    - Land acquisition for development of outdoor recreation (parks, sports fields, picnic areas)
    - Awards (typical): $5,000 - $2,500,000

- Recreation Trails Program (TDEC)
    - Acquisition of land for bike trail construction, maintenance, and rehabilitation
    - Awards (typical): Varies

More information on these grant programs (and others) is presented in Appendix D. The grant programs presented in Appendix D do not represent a complete accounting of all of the grant programs that exist or every program that may be applicable to potential flood control projects; however, they present programs for which information was readily available and were determined to possibly be applicable to the alternatives evaluating as part of this Study.

APPENDIX A

SUMMARY OF SELECTED BIG CREEK HISTORICAL STUDIES AND REPORTS

***Big Creek Watershed Investigation Report, Chickasaw-Metropolitan Surface Water Management Survey* (U.S. Department of Agriculture, 1968)**

One of the first studies to focus on the Big Creek Drainage Basin was performed by the U.S. Department of Agriculture (USDA). During this study, the USDA evaluated historical flooding east of Highway 51 into the upper reaches of Crooked Creek and two of its tributaries – Casper Creek and North Fork Creek.

This evaluation recommended the following actions be performed to reduce the frequency of flooding in the Crooked Creek, Casper Creek, and North Fork Creek basins:

- Convert cropland in the basins to pastureland, which would potentially reduce sediment erosion during rain events.
- Construct a floodwater control structure in Tipton County, Tennessee.
- Perform more frequent clearing and grubbing, excavation of material from the main channels of each creek, and regular maintenance throughout the watershed.
    - In some places, channels are almost completely blocked by fallen trees.
    - Sediment deposition on brush and debris significantly reduces flow.

The study estimated that implementation of the recommendations could have the following benefit to the Big Creek drainage basin:

- Eliminate of the 2-year flood event from the entire watershed.
- Eliminate of the 100-year flood event for North Fork Creek.
- Reduce the number of acres flooded annually by up to 85%.

The study also estimated that capital costs associated with the recommended actions to be approximately $418,000 and $449,500 for the flood control structure in Tipton County and the channel improvements, respectively. Adjusted for inflation, these costs would be approximately $2.8M and $3.0M, respectively in 2015 dollars.

***Big Creek and Tributaries Watershed* (U.S. Army Corps of Engineers, Memphis District, Date Unknown)**

In the mid-1970's (exact date is unknown) the U.S. Army Corps of Engineers (USACE), Memphis District, prepared a background of the Big Creek watershed, the overall flood situation and associated factors, as well as a review of past floods and future predicted floods.

There were no gage records available for any of the streams evaluated at the time of this study; therefore, high water marks from past floods, interviews with local residents, and newspaper articles were used to summarize past floods. This study acknowledged the occurrence of flooding from the Big Creek Drainage Canal, Royster Creek, North Fork Creek, and Casper Creek during all seasons of the year; with water levels rising from a bankfull stage to extreme flood peaks within 5-10 hours. The study also acknowledged that the most severe and frequent flood damage occurs along North Fork Creek in the reach between Navy Road and North Avenue.

The study also used the Standard Project Flood and the Intermediate Regional Flood as its basis for predicting potential impacts from future flood events. The Standard Project Flood is loosely defined as the largest flood most likely to ever occur under the existing runoff characteristics of the drainage basin. The Intermediate Regional Flood is defined as one that could occur once in 100 years on the average although it could occur in any year (i.e., a “100-year storm”). The rainfall used in the study to compute the Standard Project Flood was 19.0 inches in a four-day period with the highest 24-hour intensity being 15.3 inches. The rainfall used to compute the Intermediate Regional Flood was 7.95 inches in a 24-hour period with the highest one-hour intensity being 3.50 inches.

The study identified several bridges within the Big Creek watershed whose underclearance elevation was at or below the estimated water surface elevation resulting from an Intermediate Regional Flood and that would represent areas for flooding to most likely occur during high water flows (Table 1).

Table 1 – Elevation Data for
Bridges Across Big Creek, Royster Creek, North Fork Creek, and Casper Creek)

Identification	Underclearance Elevation (feet, mean sea level)	Water Surface Elevation (feet, mean seal level)	
		Intermediate Regional Flood	Standard Project Flood
Big Creek, U.S. Hwy. 51	257.5	257.3	259.7
Big Creek, U.S. Hwy 51	262.2	257.8	260.6
Big Creek, I.C.R.R.	261.7	259.7	267.6
Big Creek, Raleigh-Millington Rd.	261.6	260.9	268.1
Big Creek, Sledge Rd.	281.2	279.4	280.5
Big Creek, Millington-Arlington Rd.	293.6	292.4	293.9
Big Creek, Kerrville-Rosemark Rd.	303.5	306.6	310.0
Royster Creek, Shelby Rd.	263.2	261.4	266.3
Royster Creek, Cuba-Millington Rd.	264.0	265.4	267.6
Royster Creek, West Union Rd.	273.2	271.9	274.7
North Fork Creek, Navy Rd.	265.1	266.4	270.6
North Fork Creek, I.C.R.R.	267.2	267.1	271.9
North Fork Creek, North Ave.	270.6	272.6	273.4
North Fork Creek, U.S. Hwy. 51	281.8	280.6	280.7
Caspar Creek, Navy Rd.	282.2	283.6	284.1

Watershed Plan – Environmental Assessment, Big Creek Watershed, Shelby and Tipton Counties, Tennessee **(USDA Soil Conservation Service, 1988)**

This Watershed Plan - Environmental Assessment was prepared at the request of the local sponsors and the Shelby and Tipton County Soil Conservation Districts. Damages resulting from severe cropland erosion and sedimentation in the Big Creek Watershed prompted the local sponsors, landowners and operators to seek accelerated technical assistance from the USDA's Soil Conservation Service (SCS). This Watershed Plan outlined watershed problems, identified opportunities, summarized and analyzed resource data, and provided a proposed plan of action for the installation of land treatment practices that will reduce cropland erosion to acceptable levels. It was prepared by the sponsors in cooperation with watershed landowners and operators and the United States Department of Agriculture's Soil Conservation Service and Forest Service, and other concerned agencies and organizations.

The primary recommendation of this plan was to minimize erosion in the watershed in order to protect surrounding cropland, mitigate damage to downstream forest land due to sedimentation, and to improve water quality in the river. Land treatment practices were recommended as shown in
Table .

Table 2—Recommended Land Treatment per 1988 Watershed Plan

Land Use	Treatment Practice	Affected Area (acres)
Soybeans and corn	Conservation tillage systems	5,165
Cotton	Contour stripcropping	1,230
--	Conservation cropping sequence	317
--	Terrace systems	499
--	Pasture and hayland planting	1,438
--	Tree planting	560
--	Critical area treatment	355
Roadways	Vegetative plantings	75
	Total Affected Cropland =	**9,563**

Detailed maps showing proposed or actual areas for treatment were not included in the Plan, nor is any further definition of "critical area treatment." Capital cost for the project was estimated at $925,190 with O&M costs of $67,270 annually (in 1988 US dollars). Implementation time was estimated at ten years.

The projected impact of the watershed plan was threefold: conversion of 2,250 acres of cropland to grassland and forest land, reduction of erosion from an average of 65 tons per acre per year to between 4 and 22 tons per acre per year, and improvement of water quality.

Chickasaw Basin Authority Report for New Levees **(Chickasaw Basin Authority, 1989)**
In 1989, a study performed by the Chickasaw Basin Authority (CBA) evaluated what improvements in various flood elevations could be obtained from the construction of dry basin, flood control structures north and east of Millington, Tennessee:

- Royster Creek (Site 2);
- Big Creek (Site 4); and
- North Fork Creek (Site 5).

The study estimated that construction of the three flood control structures could reduce the flood elevation from the 100-year, 500-year, and the Christmas Flood of 1987 by more than two feet throughout Big Creek from Singleton Parkway to the confluence with Royster Creek (Exhibit 1).

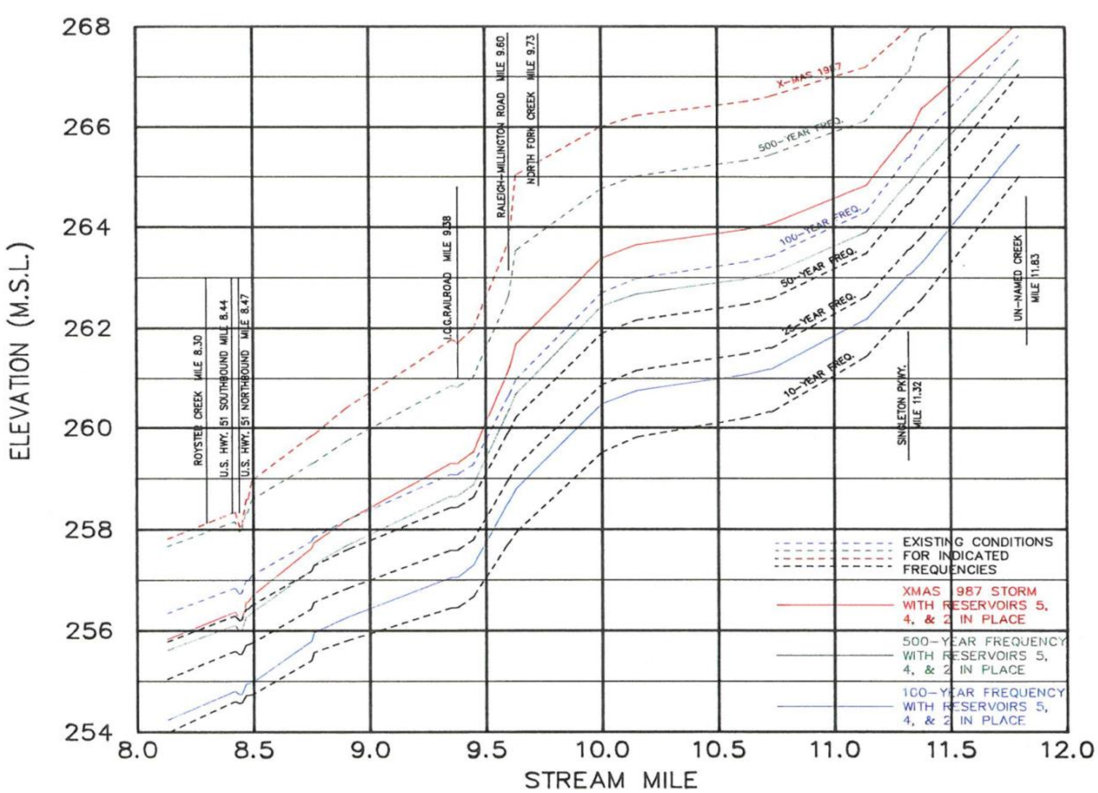


Exhibit 1. Big Creek Water Surface Profiles (CBA, 1989)

The CBA study estimated that construction of the three, dry-basin flood control structures would create a total flood pool of approximately 2,400 acres at a cost of $9.4M (2015 adjusted - $17.9M):

- Royster Creek (Site 2) - $3.0M (2015 adjusted - $5.8M);
- Big Creek (Site 4) - $4.0M (2015 adjusted - $7.6M); and
- North Fork Creek (Site 5) - $2.4M (2015 adjusted - $4.5M).

CBA and City of Millington Feasibility Study Dry Retention Lake Site Nos. 2 (Royster Creek) and 4 (Big Creek) **(Continental Engineering Inc., 2000)**

In 2000, Continental Engineering Inc. (Continental) prepared a Hazard Mitigation Grant Program (HMGP) application seeking financial support for the construction of an earthen dam on Big Creek at the location designated as Site 4 by the CBA in their 1989 study.

The HMGP application stated that construction of the dam at Site 4 could provide storm water retention for approximately 30 inches of rain in a 6-hour period (a storm event greater than a 1,000-year event[1]); equivalent to the Possible Maximum Precipitation (PMP) requirement established by the Tennessee Safe Dams Act and exceeds the necessary storm water retention for a 500-year storm event. The HMGP application requested $5.6M to aid in the construction of the earthen dam at CBA Site 4.

Continental's HMGP application also provided, as an alternative to construction of the earthen dam at CBA Site 4, a request for approximately $2.8M to construct a dam of similar retention capacity at the location designated as Site 2 on Royster Creek by the CBA in their 1989 study.

Field Reconnaissance of Big Creek and the Wolf River Following a Rainfall Event **(James Pendergrass, 2001)**

In November 2001, the Big Creek Drainage Basin experienced a storm event that deposited approximately 5.86 inches of rain in a 24-hour period[2]. Such a storm event in West Tennessee would be classified as between a 10-year (5.56 inches/24-hours) and 25-year (6.6inches/24 hours) event[1].

The following pictures were taken by James Pendergrass (USACE?) during a field reconnaissance of Big Creek.

[1] The National Oceanic and Atmospheric Association (NOAA) defines a 1,000-year storm in West Tennessee as one providing up to 9.66 inches of precipitation in a 6-hour period.

[2] www.weatherunderground.com

Picture No. 8 - Big Cr., TN - @ Highway 51 - Looking D.S. - 29 Nov 01
11:12 am - Millington Gage 35.53

Picture No. 12 - Big Cr., TN - @ Sledge Rd. - Looking D.S. - 29 Nov 01
12:18 pm - Water Surface 14.5 ft. Below D.S. Rail - Millington Gage 34.83

Picture No. 14 - Big Cr., TN - @ Millington-Arlington Rd. - Looking D.S. - 29 Nov 01
12:28 pm - Water Surface 18.3 ft. Below D.S. Rail - Millington Gage 34.74

***Big Creek Watershed Proposal* (USDA NRCS, 2002)**

In 2002, the USDA and the NRCS prepared a proposal with recommended improvements for Big Creek in north Shelby County, Tennessee, and south Tipton County, Tennessee, which included a combination of the following:

- Grade control structures;
- Flood control reservoirs and lower stream bed modifications; and
- Upstream conservation.

A total of 51 grade control structures (Exhibit 2) were proposed along Big Creek in Shelby County to decrease flow velocities in Big Creek; which would reduce run-off, sedimentation, and channel erosion and ultimately improving water quality. It was estimated that construction of each grade control structure could cost between $7,000-$25,000, depending on the size and location of each structure.

Exhibit 2. Typical Grade Control Structure

The proposed flood control reservoirs and lower stream bed modifications involved the construction of a series of reservoirs along Big Creek between Singleton Parkway on the east and Highway 51 on the west, south of Millington, TN. These reservoirs would provide additional flood protection for Millington and the Naval Support Activity Mid-South, while creating wetlands habitats for fish and local wildlife.

The recommended upstream conservation for Tipton County involved the construction of additional flood control structures in the Big Creek tributaries in south Tipton County and creating erosion buffer zones (up to 160 feet wide) by planting native grasses on either side of blue-line streams (those streams shown in blue on USGS topographic maps) in the area.

Millington 205 Study **(Tennessee Wildlife Resources Agency, 2004)**

In 2004, the Tennessee Wildlife Resources Agency (TWRA) evaluated three sections of the Big Creek Basin under Section 205 of the 1948 Flood Control Act (a statute designed to handle requests for small flood control projects not specifically approved by Congress). The study is based on a Christmas 1987 storm in the area which flooded 600 structures, including some land on the south side of the Millington Naval Base. The study initially investigated three sections of the creek, but narrowed its focus to one section based on benefit-cost analysis. The sub-basin of interest was between Highway 51 and the Illinois Central Railroad, shown in Exhibit 3.

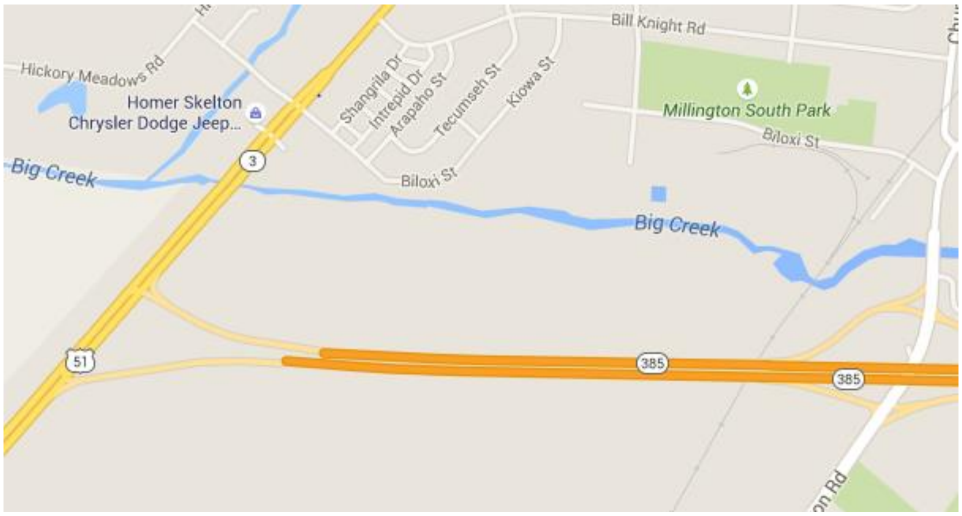


Exhibit 3. Big Creek Section of Interest for *Millington 205 Study* (2004)

The remainder of the document is the official agreement between the United States Government and the City of Millington, Tennessee for the Section 205 study. Appendices include a scope of previous studies, which concluded that further evaluations and studies will be necessary to adequately assess alternatives for flood control. Appendices also include detailed calculations for the summarized Segment A approach, as well as previous studies and proposals. Relevant to the Millington Base in particular are a 1968 study that specifically mentions frequent flooding in the area around the Base, several detailed hydrographs of the Christmas 1987 storm and related Big Creek stages, and a September 1987 letter from the law office of Fisher, Avery, Yawn & Smith recommending over $15 million in flood control spending for the area.

***Big Creek Feasibility Study* (USACE, 2007)**

In March 2007, the USACE delivered a presentation on Big Creek to City of Memphis Mayor A.C. Wharton, Jr., centered on flood prevention in Big Creek with an environmental, rather than economic, argument.

This proposal focused on preserving wetlands, arresting gully formation, and creating a greenway with a bike/hike trail along the river. The proposed project area is between Highway 51 and Singleton Parkway, and between Highway 385 and the southern bank of Big Creek (Exhibit 4).

Exhibit 4. Area of Interest for *Big Creek Feasibility Study* (USACE, 2007)

The study provided two alternatives: creation of a new floodplain or partial restoration of the original floodplain. Partial restoration allowed for slightly more habitat gain at a lower cost than floodplain creation, so partial restoration was the recommended alternative.

Partial restoration would require construction of a dam and spillway along the south bank of Big Creek. Flood waters would rise over the top of the dam and flow into a created pool habitat, then slowly be returned to Big Creek via a spillway (Exhibit 5). This design would provide energy dissipation to arrest gully formation, and would retain water to create wetland areas. Six acres would be cleared for construction, 80 acres would be reforested, 10 acres would be planted with native warm-season grasses, and a 14,500 foot bike/hike trail would be constructed for a total cost of $3.5 million (2007 dollars).

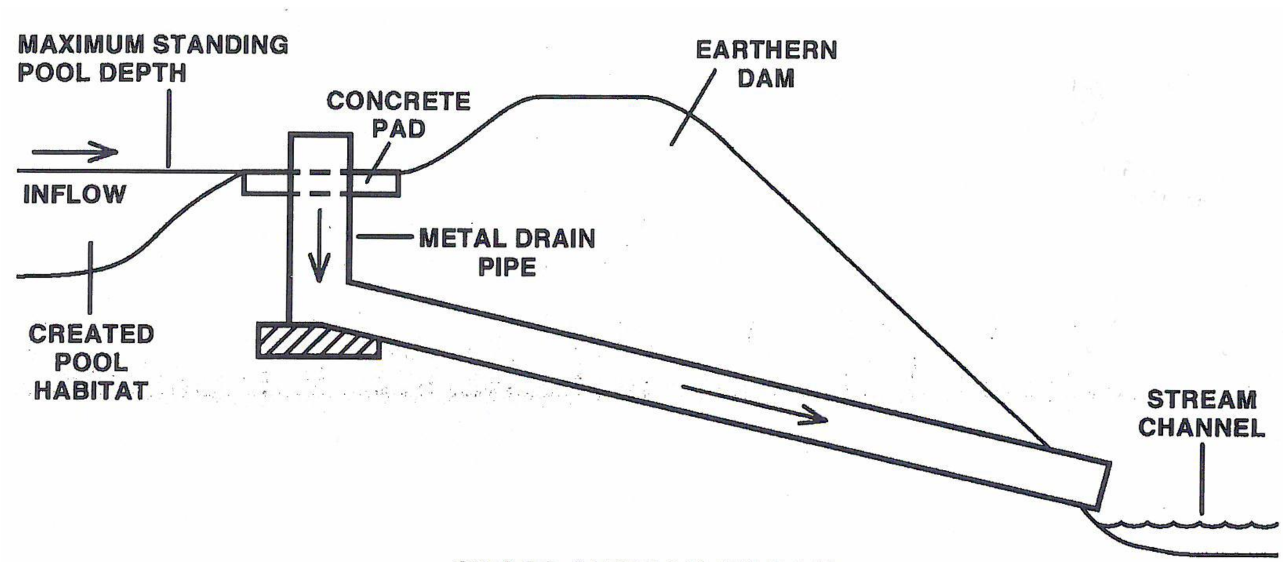


Exhibit 5. Cross-Section of Dam and Spillway from *Big Creek Feasibility Study* (USACE, 2007)

The presentation provided conceptual schematics and a detailed cost estimate, as well as a cost sharing estimate (63.5% Federal funds, 36.5% local funds).

***Water Quality Analysis and Proposed TMDLs for e. Coli in Loosahatchie River Watershed* (Tennessee Department of Environment and Conservation, 2011)**

In 2011, the Tennessee Department of Environment and Conservation (TDEC) prepared a summary of the water quality, including identifying e. Coli-impacted water bodies in the Loosahatchie River Watershed; which included all three sub-watersheds of Big Creek:

- Big Creek, Upper (Sub-watershed 0301)
  - Big Creek @ Millington-Arlington Rd. (BIG1C15.8SH)
  - Big Creek @ Meade Lake Rd./Grave Springs Rd. (BIG1C20.8TI)
  - Crooked Creek Canal @ Donnell Rd. (CROOK1C1.3SH)
- Big Creek, Middle (Sub-watershed 0302)
  - Big Creek @ Hwy 51 bridge near Millington (BIG1C8.4SH)
  - Big Creek @ Sledge Rd. (BIG1C13.6SH)
  - North Fork Creek @ Navy Rd. (NFORK000.6SH)
  - Royster Creek @Shelby Rd. (ROYST1C0.9SH)
- Big Creek, Lower (Sub-watershed 0303)
  - Bear Creek @ Shelby Rd. (BEAR001.2SH)

- Big Creek @ Fite Rd. (BIG1C1.0SH)

- Jakes Creek @ Shake Rag Rd. (JAKES000.3SH)

TDEC's summary identified runoff from agricultural areas and forests as having a greater impact on degredations in water quality in the Loosahatchie River Watershed than runoff from urban areas, as presented in Exhibit 6 below.

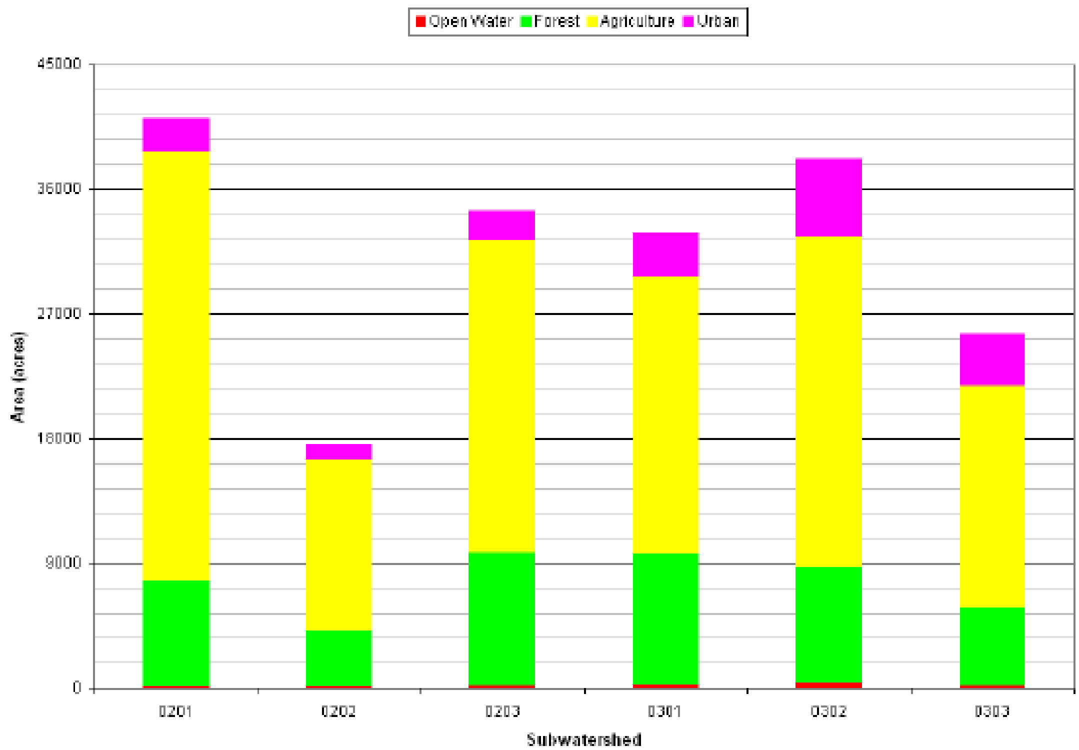


Exhibit 6. Impacted Waterbodies in the Loosahatchie River Watershed (TDEC, 2011).

***Impacted Water Bodies in the Loosahatchie River Watershed* (Civil & Environmental Consultants, Inc., 2012).**

As a follow-on to TDEC's 2011, *Water Quality Analysis and Proposed TMDLs for e. Coli in Loosahatchie River Watershed*, Civil and Environmental Consultants, Inc. (CEC) collected additional water quality samples from streams Shelby County where receiving stream from permitted Municipal Separate Storm Sewer Systems (MS4s) were included on the current 303(d) list as an impaired waterbody. As part of this study, CEC collected samples from the Upper, Middle, and Lower Big Creek sub-watersheds. Concentrations of e. Coli in samples collected from the sub-watersheds ranged from 11-99#CFU/100 milliliters (ml); however, this is less than the geometric mean standard for water quality in Tennessee.

CEC's study did not investigate sediment loading in the Big Creek drainage basin.

APPENDIX B

SEDIMENT MODELLING OUTPUT

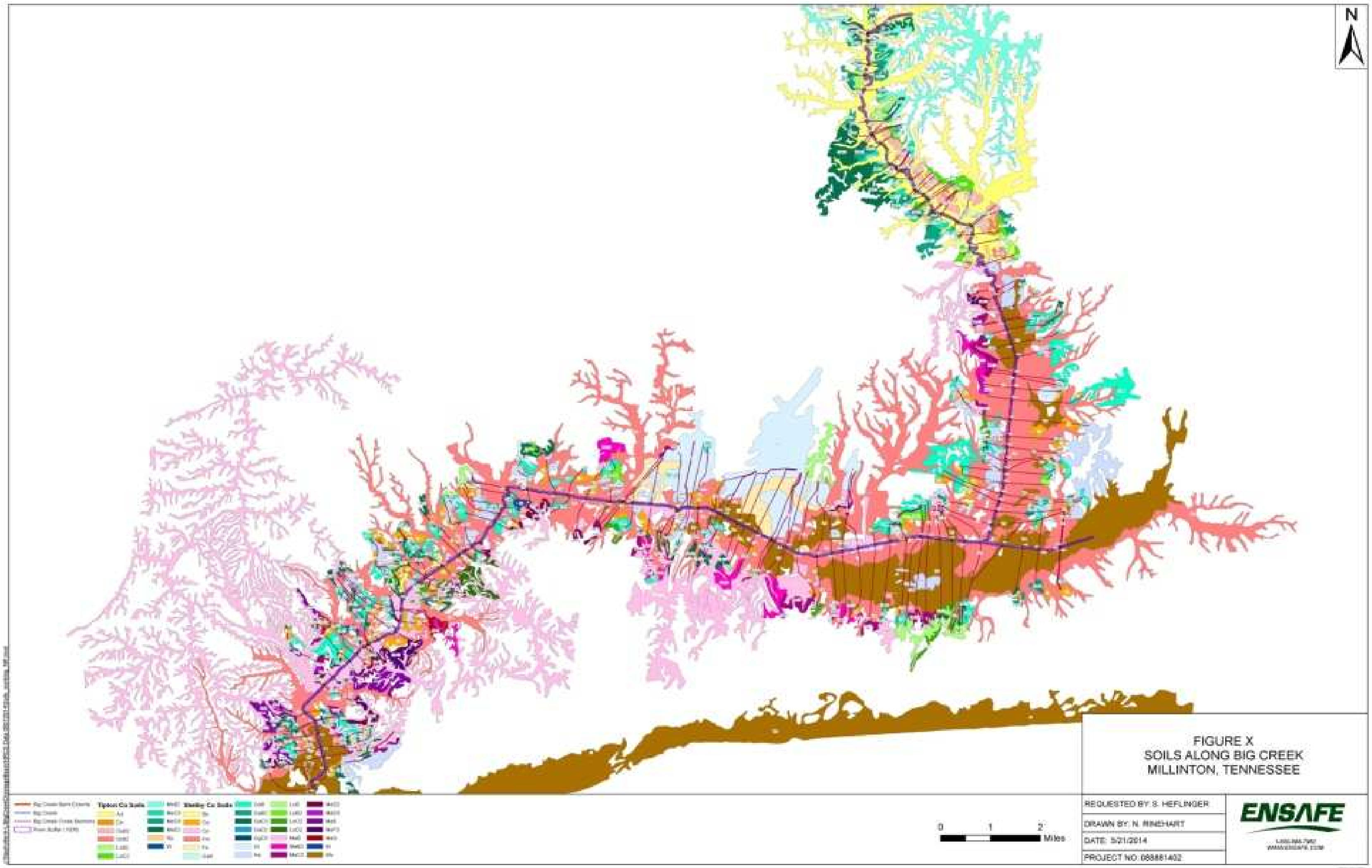


FIGURE B-1

IDENTIFIED SOIL TYPES ALONG BIG CREEK

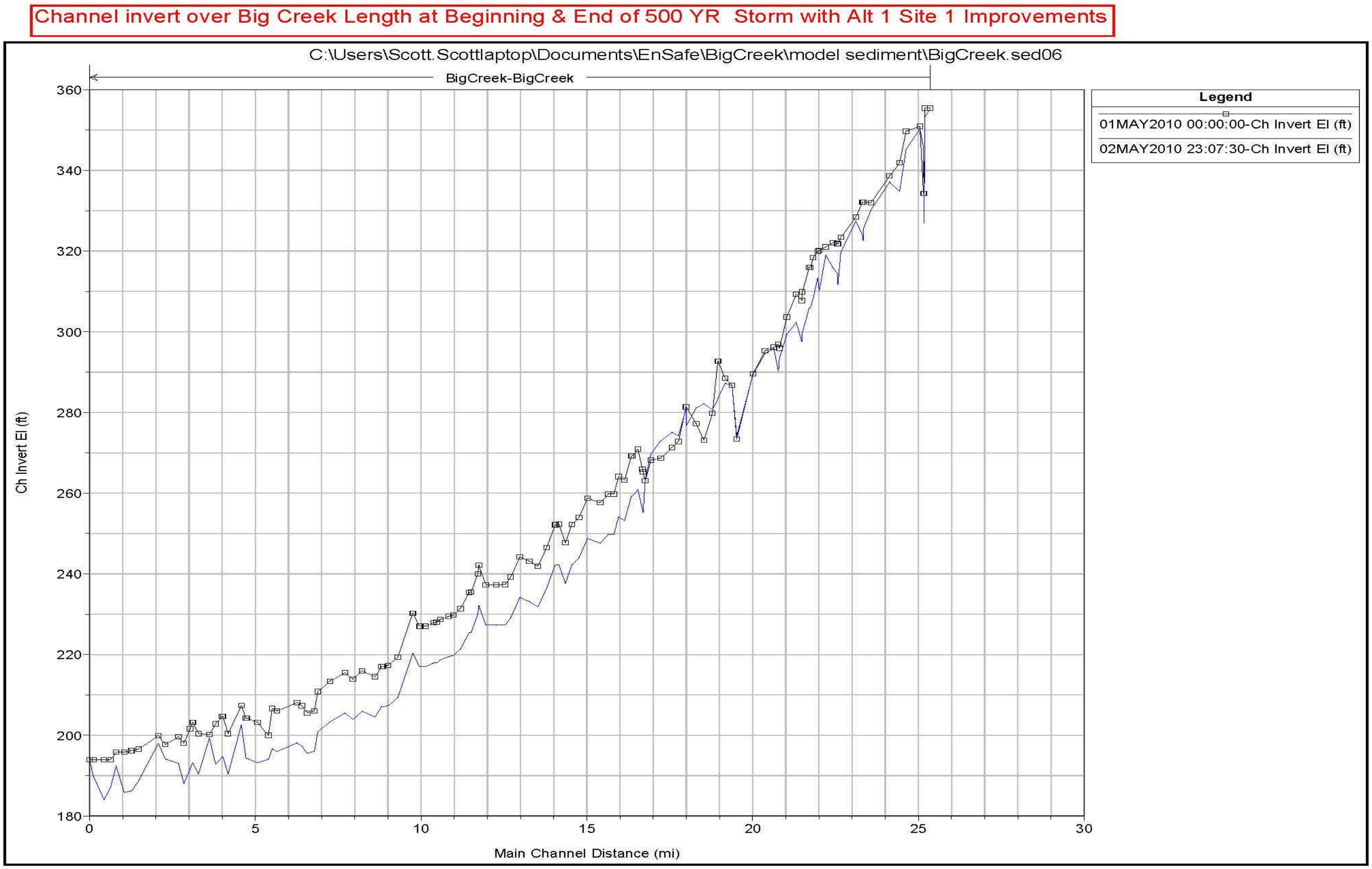


FIGURE B-2

MODELED SEDIMENT TRANSPORT FROM A 500-YEAR STORM EVENT

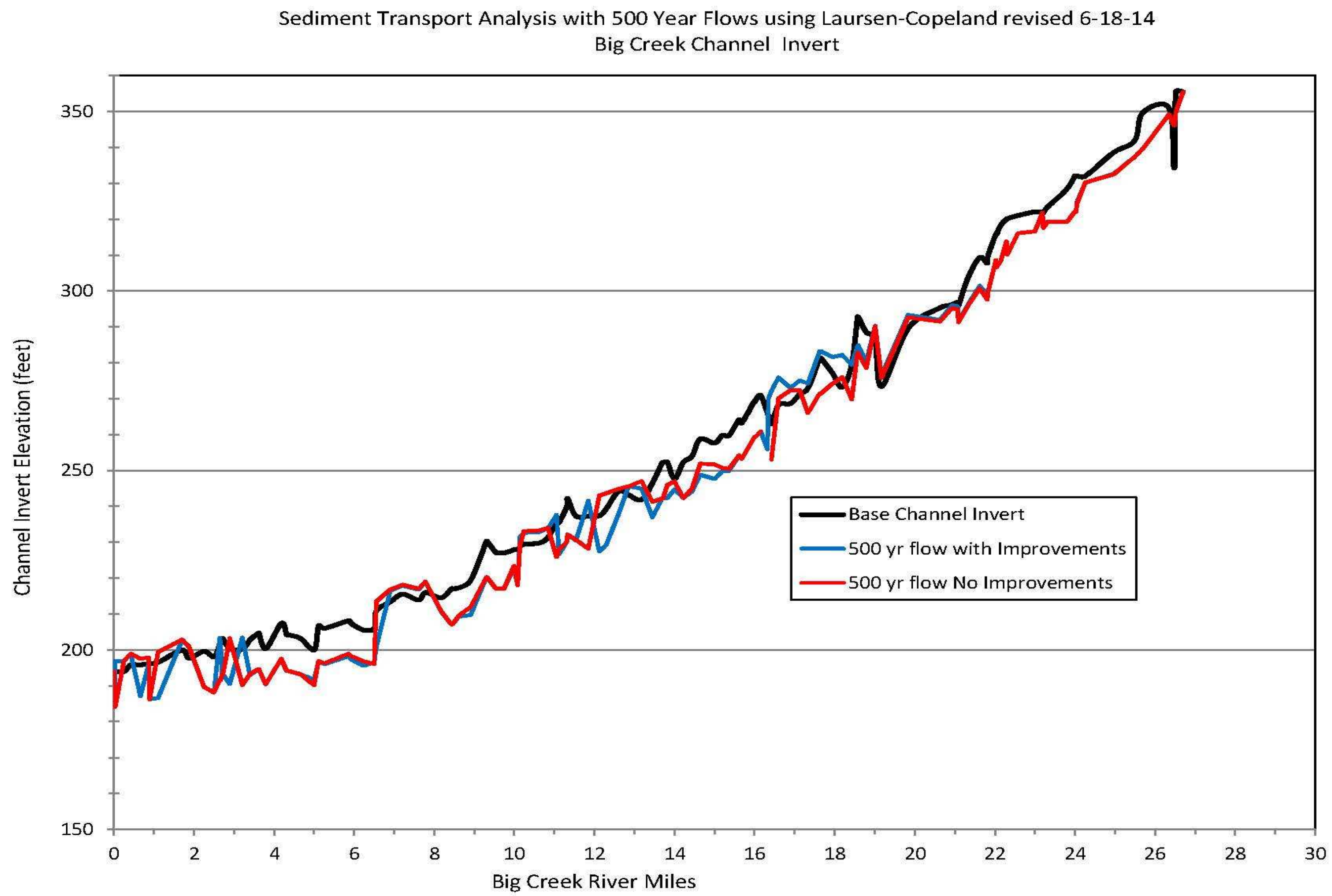


FIGURE B-3

MODELED SEDIMENT TRANSPORT FROM A 500-YEAR STORM EVENT WITH AND WITHOUT ALTERNATIVE 1 SITE 1 STRUCTURE

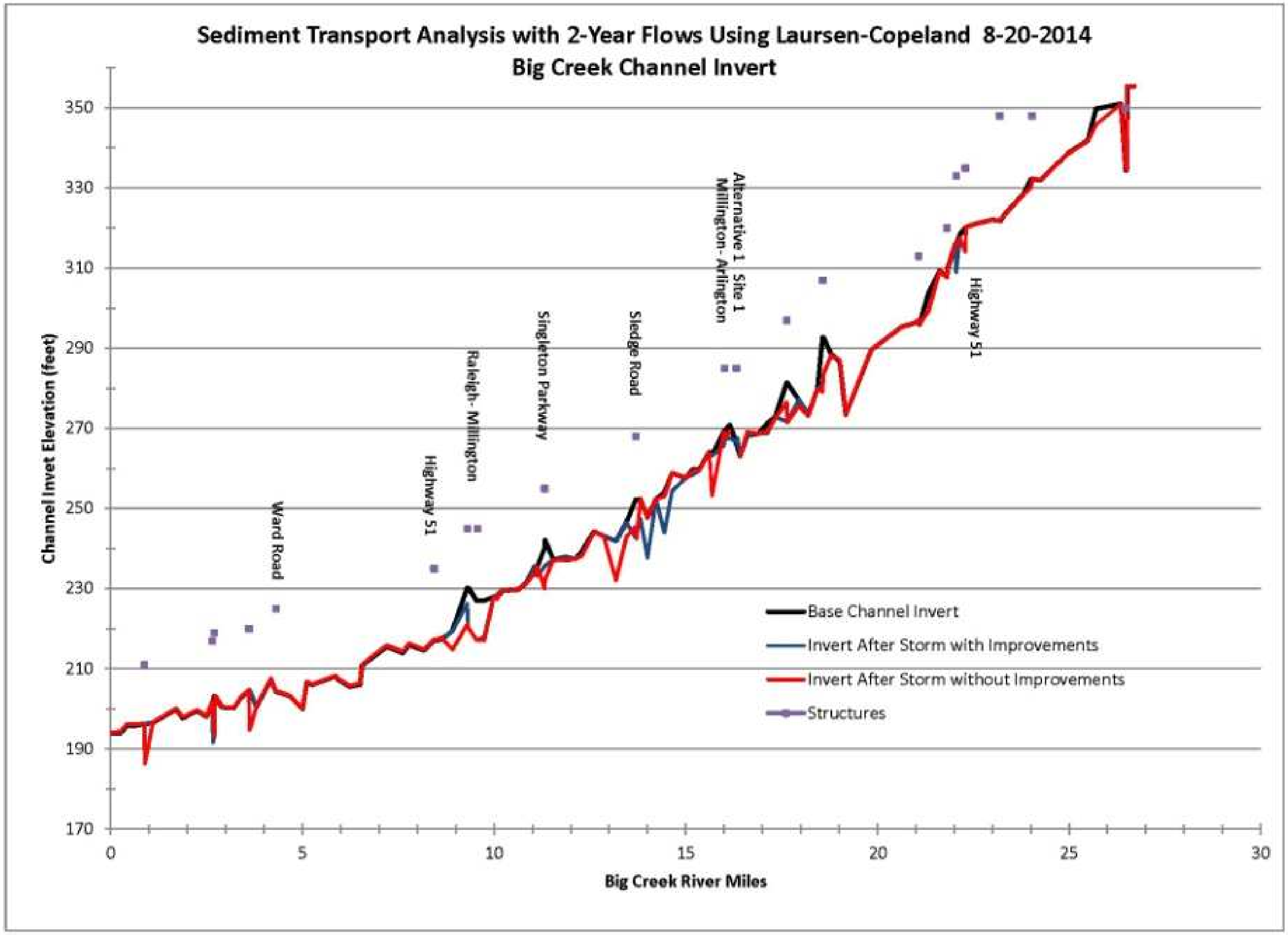


FIGURE B-4

MODELED SEDIMENT TRANSPORT FROM A 2-YEAR STORM EVENT

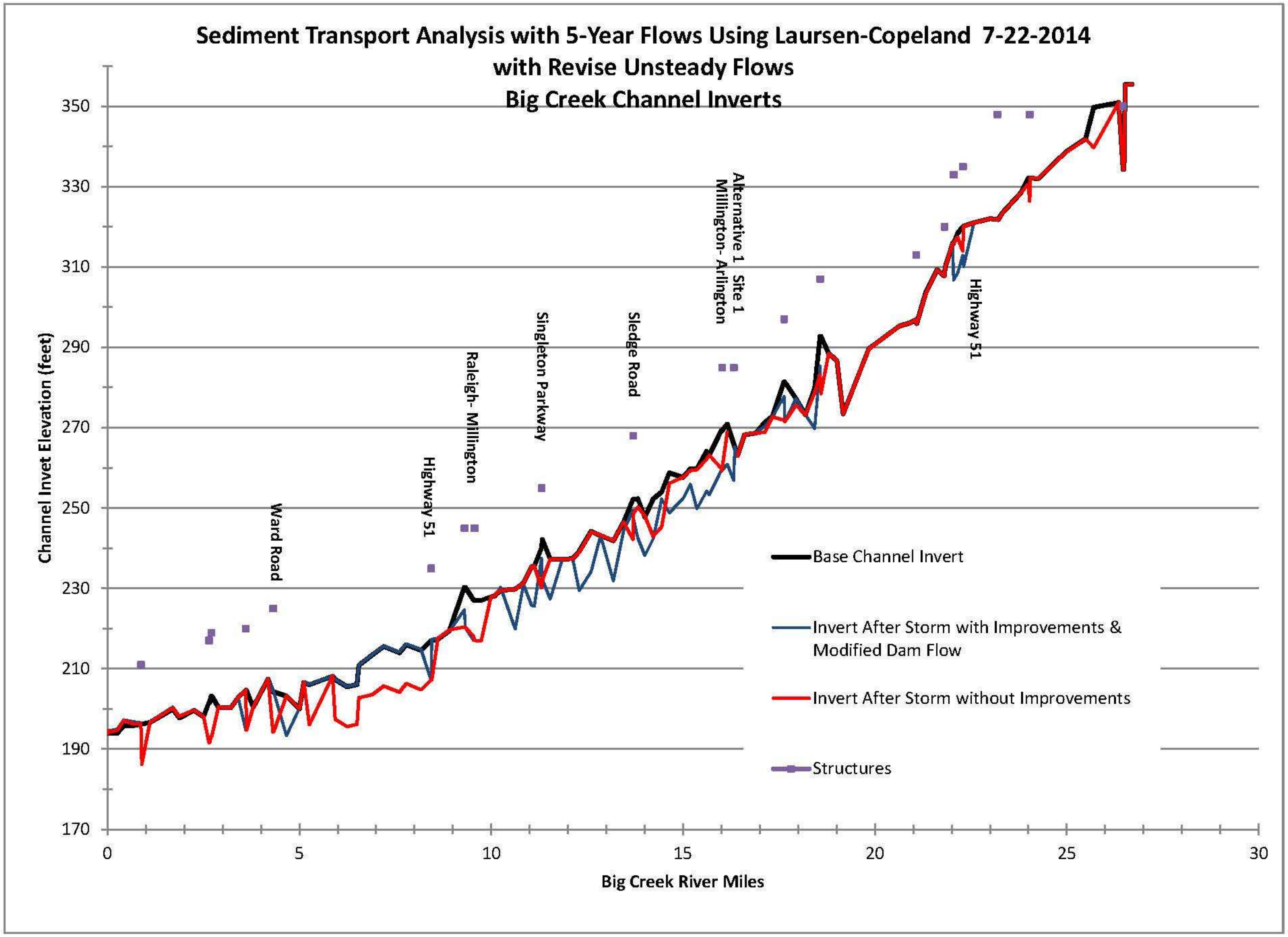


FIGURE B-5

MODELED SEDIMENT TRANSPORT FROM A 5-YEAR STORM EVENT

APPENDIX C

BIG CREEK STREAM ASSESSMENT

5724 Summer Trees Drive | Memphis, Tennessee 38134| Telephone 901-372-7962 | Facsimile 901-372-2454 | www.ensafe.com

May 19, 2015

Mr. Geoff Pope
Sr. Project Manager/Engineer
EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134

Re: Big Creek Stream Assessments

Dear Mr. Pope:

Thank you for allowing EnSafe Inc. to provide ecological survey services associated with proposed Big Creek Drainage Study. Stream evaluations were conducted on August 11, 2014, to evaluate the aquatic resources in Big Creek (Figure 1) and Crooked Creek (Figure 2) in Shelby County, Tennessee. The purpose of the investigation was to assess the two streams for morphology and flow characteristics. A literature review was also conducted to determine physical properties, which could influence stream characteristics.

Big Creek and Crooked Creek were assessed at the proposed location of the flood control structure, 0.25 mile upstream, and 0.75 mile downstream, to provide details of each stream throughout the reach. Data collected included a cross section of the channel, vegetation composition, with water and flow characteristics. Details are provided below with attached photographs and drawings at each sampled location.

Landscape Attributes

The landscape contains homogeneous areas of geography, topography, climate, and soils that support similar plant and animal life. The two streams are contained within Level IV subecoregion Loess Plains (74b) comprised of gently rolling, irregular plains, 250 to 500 feet in elevation, with loess up to 50 feet thick. Soil erosion can be a problem on the steeper upland Alfisol soils while bottomland soils are primarily Entisols. According to the Natural Resources Conservation Service, the dominant soil types within and adjacent to the two streams have been classified as Falaya silt loam (Fm) and Waverly silt loam (Wv). Fm and Wv are described as a natural drainage class of somewhat poorly drained and poorly drained soils, respectively.

The project site is located within the Loosahatchie River watershed (HUC 08010209) via Big Creek. Oak-hickory and southern floodplain forests are the natural vegetation communities, although much of the forest has historically been converted to cropland.

Stream Details

The first stream included in this survey is Big Creek (08010209021_300) with the proposed flood control structure located north of Highway 205. It is included on the Tennessee Department of Environment and Conservation (TDEC) 303(d) list as an impaired stream due to low dissolved oxygen (DO), total phosphorus, physical substrate habitat alteration, loss of biological integrity due to siltation, and Escherichia coli (E. coli). The pollutant source is runoff from non-irrigated crop production, channelization, and discharges from municipal separate storm sewer system (MS4) areas.

The portion of Big Creek that was included in this survey was characterized into three zones relative to the flood control structure. The first, located at the proposed flood control structure (Figure 3), contained stagnant and turbid water due to an unidentified downstream obstruction or beaver dam. Channel bottom width and flow characteristics remained consistent through this reach. The channel banks were fully vegetated with dense herbaceous vegetation and sporadic trees within the top banks. Established forests were present from the top bank to the adjacent farm fields. Erosional areas were present only on the outside bends of the stream and silty clay soils were dominant vertically along the channel banks.

Upstream of the proposed flood control area, vegetation on the channel banks becomes sparse and evidence of channel evolution is evident. According to the Stream Evolution Model, this section of Big Creek has reached Stage III–Degradation. The channel is incising and abandoning its floodplain while the banks are stable geotechnically. Upstream (Figure 4) and downstream (Figure 5) sections of Big Creek were also assessed and details are contained with the attached cross sections.

The second stream included in this survey is Crooked Creek (08010209021_0600) with the proposed flood control structure located east of Donnell Road. Crooked Creek is included on the TDEC 303(d) list as an impaired stream due to total phosphorus, low DO, physical substrate habitat alteration, and E. coli. The pollutant source is non-irrigated crop production, channelization, and discharges from MS4 areas.

The portion of Crooked Creek that was included in this survey was characterized in three areas relative to the flood control structure. The first, located at the proposed flood control structure downstream of the road crossing (Figure 6), was a highly eroded feature containing a moderate flow of turbid water. The soils appeared to have eroded to fragipan preventing further vertical erosion. The adjacent forest area had been recently logged and dense herbaceous and scrub/shrub vegetation was present.

The channel appears to have downcut sufficiently to accommodate increased stream flow. The stream is incising with unstable, retreating banks that collapse by slumping. Failed material is scoured away and the enlarged channel has become disconnected from its former floodplain indicating the stream has evolved to State IV-Degradation and widening. Upstream (Figure 7) and downstream (Figure 8) sections of Crooked Creek were also assessed and details are contained with the attached cross sections.

We appreciate the opportunity to continue supporting you on the Big Creek Drainage Study. We would welcome the opportunity to support you in any additional studies or permitting that may be required to complete the project.

If additional information is required, do not hesitate to contact me at (901) 372-7962 or email me at byates@ensafe.com.

Sincerely,

EnSafe Inc.

Brian Yates

By: Brian Yates
Senior Ecologist

Enclosures: Cross Sections
Location Maps
Photographic Documentation

ENSAFE

Sample Locations

NHD Flowline

Canal/Ditch

Stream/River

NHD Waterbody

Lake/Pond

Swamp/Marsh

0 650 1,300 1,950 Feet

FIGURE 1
SAMPLING LOCATIONS
BIG CREEK DRAINAGE

REQUESTED BY: Brian Yates

DRAWN BY: J London

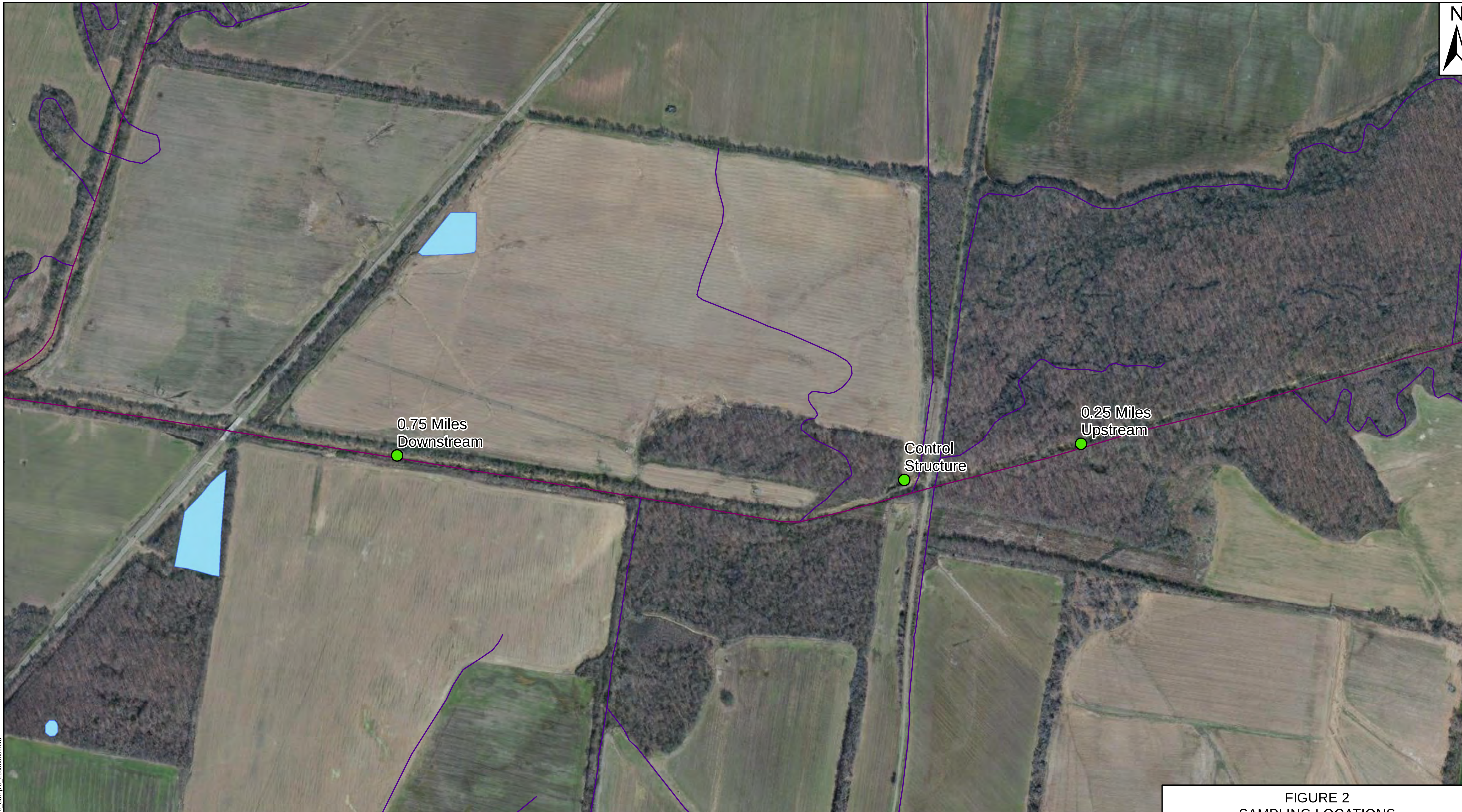
DATE: 5/19/2015

PROJECT NO: 0888814024

ENSAFE
1-800-588-7962
WWW.ENSAFE.COM

X:\Big_Creek\Big_Creek_Drainage_Sample_Locations.mxd

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Sample Locations

NHD Flowline

Stream/River

Canal/Ditch

NHD Waterbody

Lake/Pond

0 650 1,300 1,950 Feet

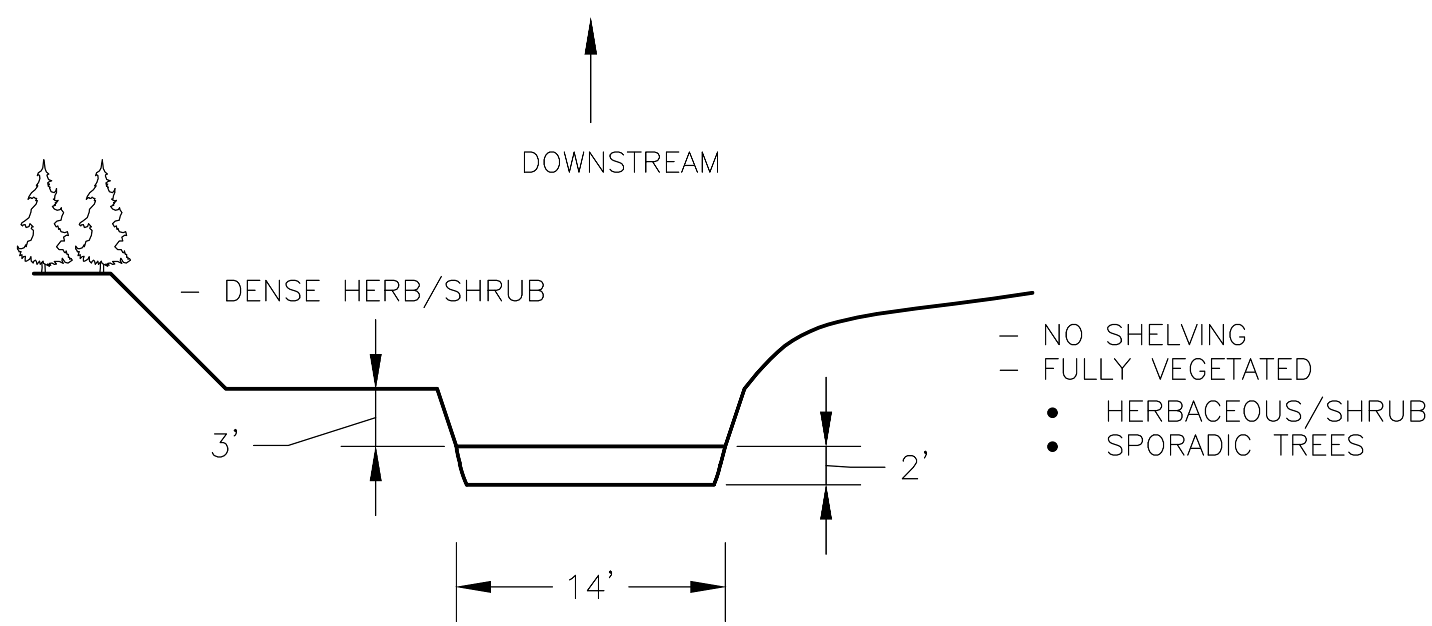
FIGURE 2
SAMPLING LOCATIONS
CROOKED CREEK DRAINAGE

REQUESTED BY: Brian Yates	ENSAFE
DRAWN BY: J London	1-800-588-7962
DATE: 5/19/2015	WWW.ENSAFE.COM
PROJECT NO: 0888814024	

X:\Big_Creek\Crooked_Creek_Drainage_Sample_Locations.mxd

→ 35.34684 / −89.79991

- SILTY CLAY THROUGHOUT PROFILE
- BANKS FULLY VEGETATED
- STAGNANT, TURBID WATER – LIKELY BEAVER DAM
- CHANNEL BOTTOM CONSISTENT WIDTH/DEPTH
- EVIDENCE OF FLOWS ON BENCH – WRACK LINES, DEBRIS ACCUMULATION
- EROSIONAL AREAS ONLY ON OUTSIDE OF BENDS
- SIDE CHANNEL OBSERVED



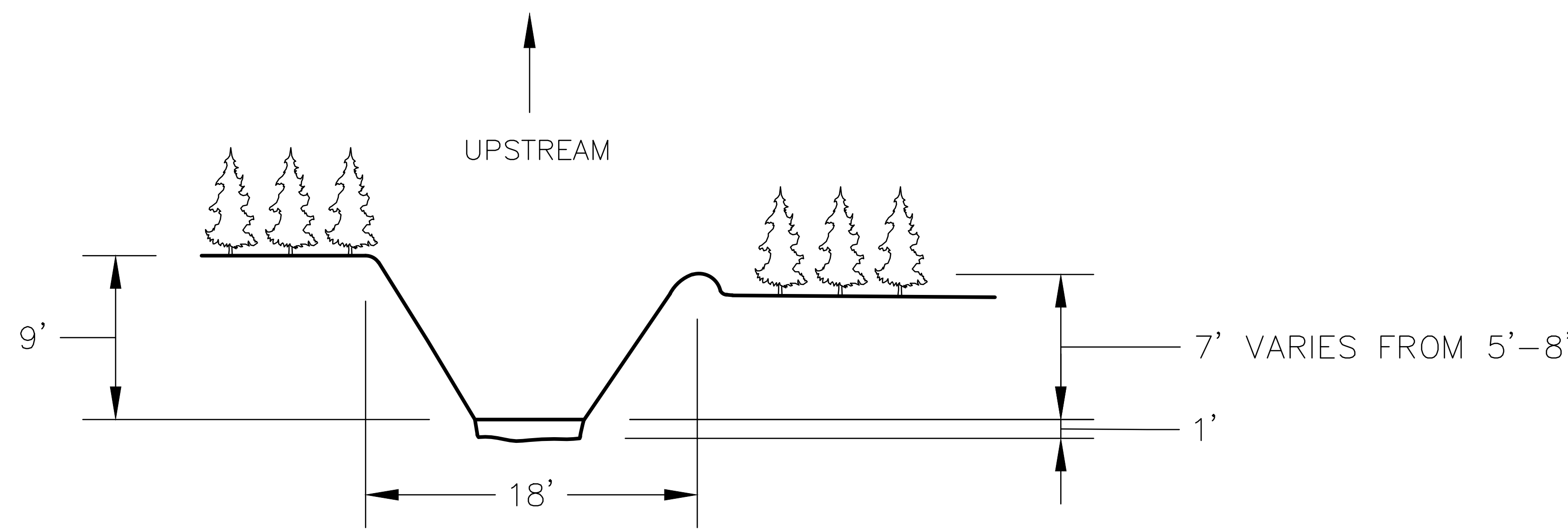
10 0 10
SCALE FEET

FIGURE 3
BIG CREEK – CONTROL STRUCTURE
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.
DWG DATE: 05/18/15	(800) 588-7962
DWG NO: 14024_C004	www.ensafe.com

35.34882 / -89.79993

- SPORADIC VEGETATION ON BANKS UNTIL TOP BANK
- NO FLOW; TURBID WATER
- SOILS FAIRLY CONSISTENT - MORE CLAY NEAR CHANNEL BED
- WRACK LINES AND MATTED DEBRIS ~ 5' ON CHANNEL BANKS
- LARGE ESTABLISHED FOREST FROM TOP BANK TO FARM FIELDS



10 0 10
SCALE FEET

FIGURE 4
BIG CREEK - 0.25 MILE UPSTREAM
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.
DRAWN BY: C.CORLEONE
DWG DATE: 05/18/15
DWG NO: 14024_C005

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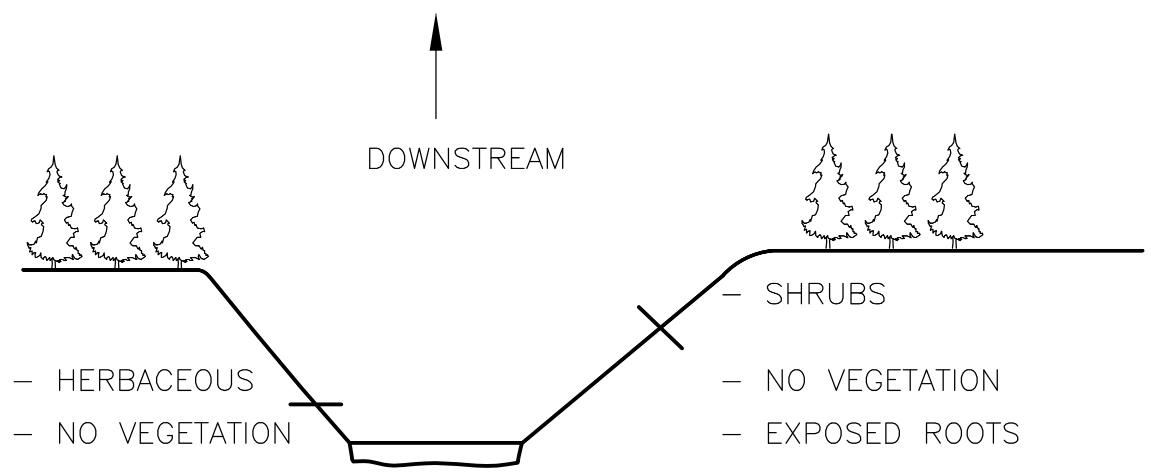
I:\CAD PROJECTS\14024 BIG CREEK DRAINAGE\Plans\14024_C005_BIG CREEK_0.25 MILE UPSTREAM.dwg

35.33791 / −89.80488

- STAGNANT, TURBID WATER
- CONSISTENT SOILS THROUGHOUT
- SOME DEBRIS ACCUMULATIONS IN CHANNEL
- ESTABLISHED FOREST OUTSIDE OF TOP BANK



10 0 10

SCALE FEET

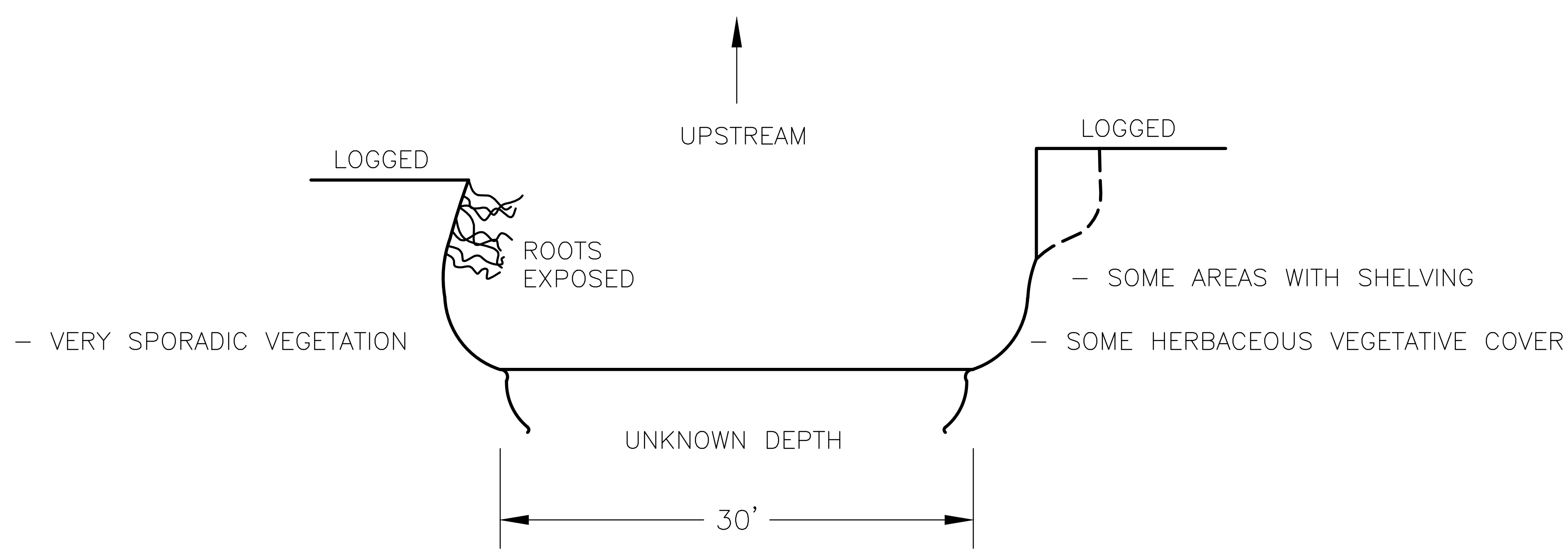
FIGURE 5
BIG CREEK – 0.75 MILE DOWNSTREAM
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.
DWG DATE: 05/18/15	(800) 588-7962
DWG NO: 14024_C006	www.ensafe.com

I:\CAD PROJECTS\14024 BIG CREEK DRAINAGE\Plans\14024_C006_BIG CREEK_0.75 MILE DOWNSTREAM.dwg

35.32339 / -89.79107

- TURBID WATER
- MODERATE FLOW
- UNDER CUT BANKS
- SOILS ERODED THROUGH PROFILE TO CLAY – CLAY FRAGIPAN AT CHANNEL BOTTOM
- JUST UPSTREAM OF BRIDGE
  - RIP RAP AROUND CROSSING ABUTMENTS – RESTRICTING BASE FLOW IN CHANNEL BOTTOM
  - LARGE QUANTITY OF DEBRIS AT CROSSING
- FORESTED AREA SURROUNDING CHANNEL PREVIOUSLY LOGGED – NOW DENSE HERBACEOUS AND SCRUB SHRUB LAYER



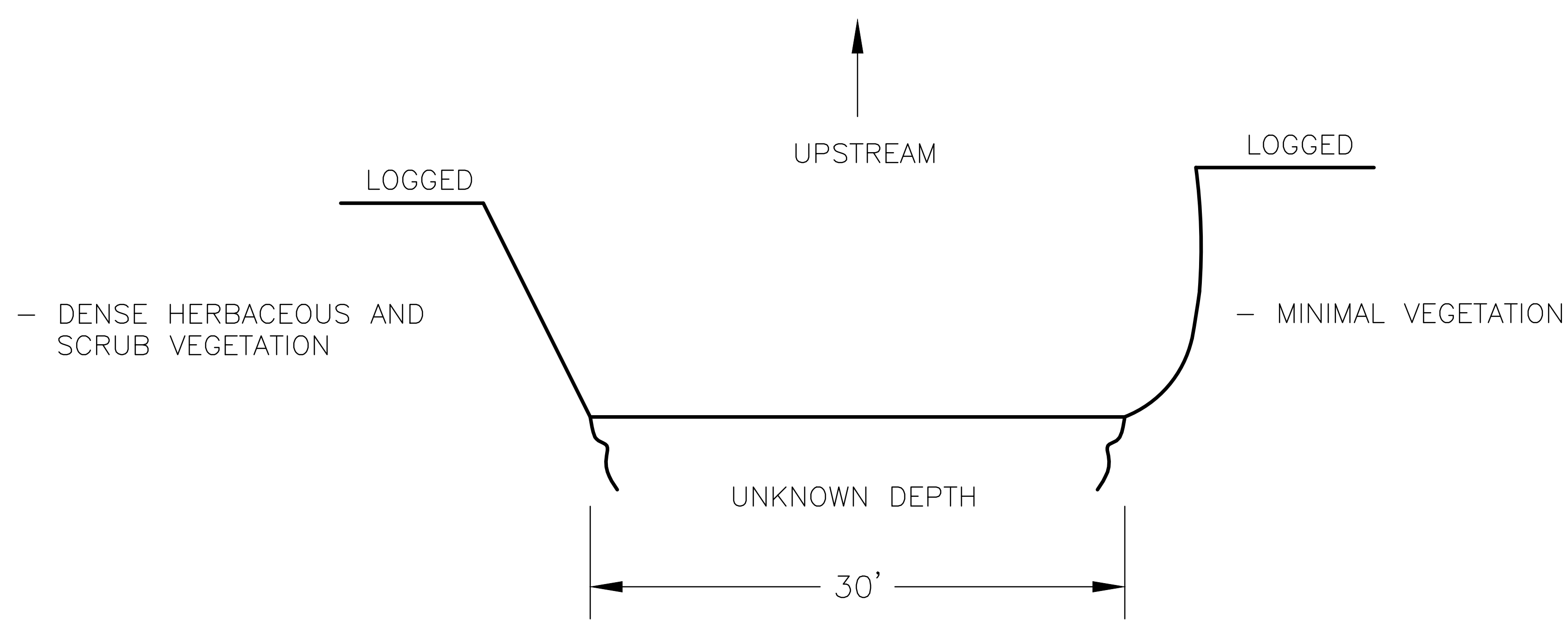
10 0 10
SCALE FEET

FIGURE 6
CROOKED CREEK – CONTROL STRUCTURE
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.
DWG DATE: 05/15/15	(800) 588-7962
DWG NO: 14024_C001	www.ensafe.com

35.32422 / -89.786914

- TURBID WATER
- VERY LITTLE FLOW OBSERVED
- LARGE TREES DOWNED ON BANKS AND IN CHANNEL – LIKELY FOR LOGGING



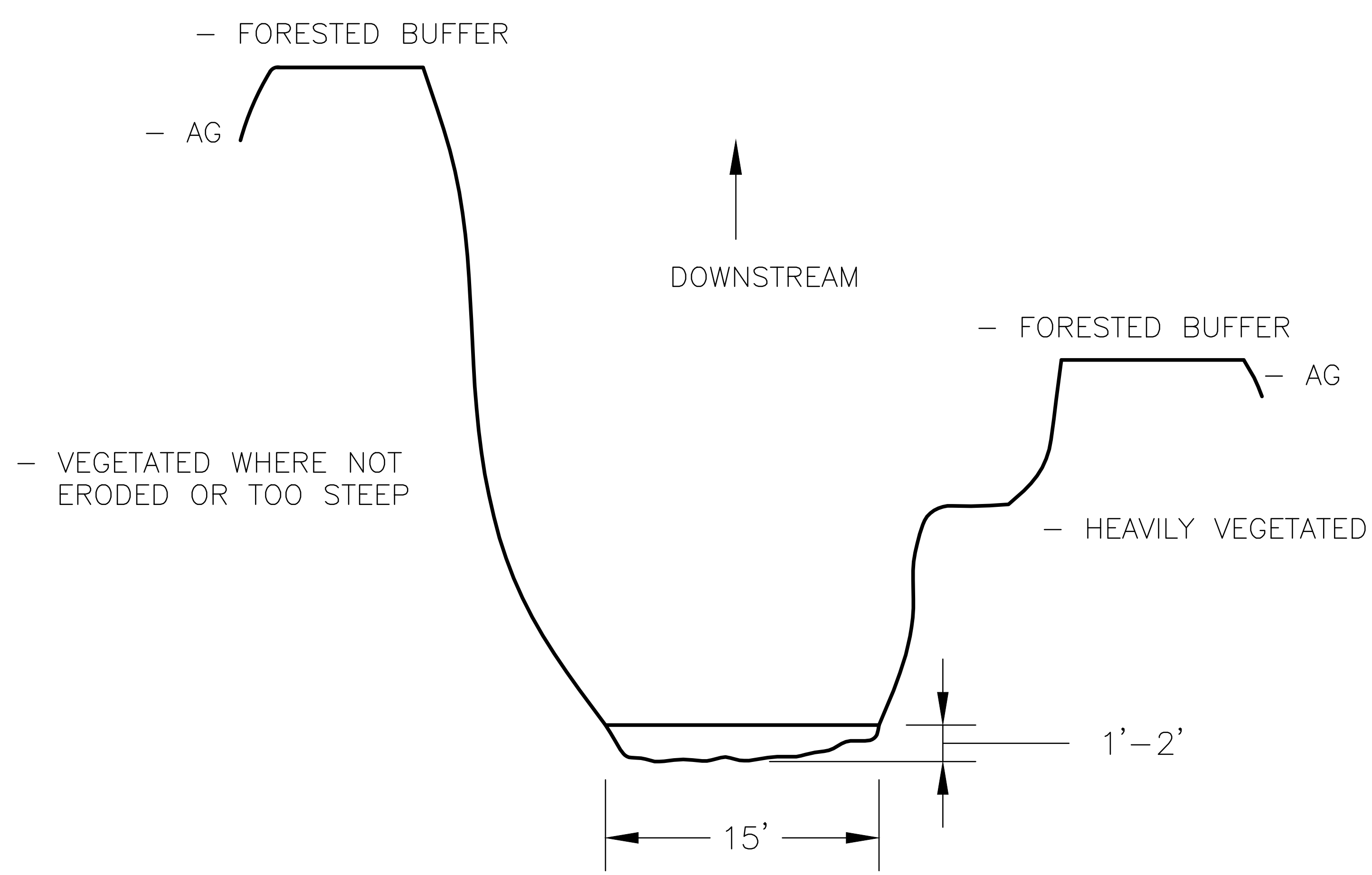
10 0 10
SCALE FEET

FIGURE 7
CROOKED CREEK – 0.25 MILES UPSTREAM
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.
DWG DATE: 05/15/15	(800) 588-7962
DWG NO: 14024_C002	www.ensafe.com

35.323479 / −89.803106

- ERODED TO CLAY FROGIPAN
- BANKS MOSTLY VEGETATED WITH WOODY AND HERBACEOUS SPECIES – VERY WEEDY AND THICK
- WRACK LINES, MATTED DEBRIS UP TO 20' IN VEGETATION
- MINIMAL FLOW
- FORESTED ON TOP BANKS IN SMALL BUFFER TO ADJACENT ROW CROPS



10 0 10
SCALE FEET

FIGURE 8
CROOKED CREEK – 0.75 MILES DOWNSTREAM
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.
DWG DATE: 05/15/15	(800) 588-7962
DWG NO: 14024_C003	www.ensafe.com

Photo 1: A view of Big Creek at the approximate location of the flood control structure. Photo was taken facing downstream (south).

Photo 2: A view of Big Creek at the approximate location of the flood control structure. Photo was taken facing upstream (north).

Photo 3 A view of Big Creek approximately 0.25 mile upstream of the flood control structure. Photo was taken facing downstream (south).

Photo 4: A view of Big Creek approximately 0.25 mile upstream of the flood control structure. Photo was taken facing upstream (north).

Photo 5: A view of Big Creek approximately 0.75 mile downstream of the flood control structure. Photo was taken facing downstream (south).

Photo 6: A view of Big Creek approximately 0.75 mile downstream of the flood control structure. Photo was taken facing upstream (north).

Photo 7: A view of Crooked Creek at the approximate location of the flood control structure. Photo was taken facing upstream (east).

Photo 8: A view of Crooked Creek at the approximate location of the flood control structure near the crossing of Donnell Road. Photo was taken facing downstream (west).

Photo 9: A view of Crooked Creek approximately 0.25 mile upstream of the flood control structure. Photo was taken facing downstream (west).

Photo 10: A view of Crooked Creek approximately 0.25 mile upstream of the flood control structure. Photo was taken facing upstream (east).

Photo 11: A view of Crooked Creek approximately 0.75 mile downstream of the flood control structure. Photo was taken facing downstream (west).

APPENDIX D

SELECTED GRANT PROGRAMS AVAILABLE FOR POTENTIAL FLOOD CONTROL PROJECTS

Grant	Managing Agency	Purpose	Funding						Competitive?	Example Eligible Projects	Limitations
			Share	Amounts	Avg. No. of Applicants/Awards	Max. Award	Median Award	Min. Award			
Pre-Disaster Mitigation Program[1,2]	TN EMA	Assist states in reducing overall risk to the population and structures from future hazard events, while reducing reliance on future Federal funding	75% Federal 25% non-Federal	• FY15 – $23M • FY14 – $25M • FY13 – $25M • FY12 – $35.5M • FY11 – $49.9M	60 / Varies	$3M	$248,800	$1,637	Nationwide	• Acquisition/Demolition of repetitively flooded residences. • Construction of retention/detention ponds, drainage improvements, elevation of roadways, etc. • Creating/updating Hazard Mitigation Plans	• Total amount allocated to TN distributed by TN EMA based upon need • Application must be coordinated through State Hazard Mitigation Officer
Hazard Mitigation Grant Program[3,4]	TN EMA	Provide funding for mitigation measures following a disaster	75% Federal 25% non-Federal	• FY15 – TBD • FY14 – $1.68B • FY13 – $712M • FY12 – $915M	Varies depending on number and severity of disasters	$36.3M	$605,094	$2,130	Statewide	• Acquisition/Demolition of repetitively flooded residences. • Construction of retention/detention ponds, drainage improvements, elevation of roadways, etc. • Creating/updating Hazard Mitigation Plans	• Total amount allocated to TN distributed by TN EMA based upon need • Requires a Presidential-declared disaster for funding to be allocated (post-disaster) • Application must be submitted within 12 months of disaster declaration • Application must be coordinated through State Hazard Mitigation Officer
Flood Mitigation Assistance Program[5,6]	TN EMA	Reduce claims under the National Flood Insurance Program (NFIP)	• Max. 100% Federal (severe, repetitive loss properties); • Max. 90% Federal (repetitive loss properties); • Max. 75% Federal (NFIP-insured properties)	• FY15 – $150M • FY14 – $100M • FY13 – $120M • FY12 – $40M • FY11 – $40M	30-40 / Not Available	$12.2M	$915,485	$37,500	Nationwide	• Acquisition/Demolition of repetitively flooded residences. • Construction of retention/detention ponds, drainage improvements, elevation of roadways, etc. • Creating/updating Hazard Mitigation Plans (flood hazard portion only)	• Total amount allocated to TN distributed by TN EMA based upon need • Application must be coordinated through State Hazard Mitigation Officer • Projects to be funded must appear in Shelby County Hazard Mitigation Plan

[1] http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf
[2] https://ofmpub.epa.gov/apex/watershedfunding/f?p=116:2:0::NO::P2_X_PROG_NUM,P2_X_YEAR:22,2015
[3] http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf
[4] https://ofmpub.epa.gov/apex/watershedfunding/f?p=116:2:0::NO::P2_X_PROG_NUM,P2_X_YEAR:35,2015
[5] http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf
[6] https://ofmpub.epa.gov/apex/watershedfunding/f?p=116:2:6941460346982::NO::P2_X_PROG_NUM,P2_X_YEAR:31,2015

Grant	Managing Agency	Purpose	Funding						Competitive?	Example Eligible Projects	Limitations
			Share	Amounts	Avg. No. of Applicants/Awards	Max. Award	Median Award	Min. Award			
Nonpoint Source Implementation[7]	TDEC/ Department of Agriculture	Promote the development and implementation of watershed-based plans to improve water quality, focusing on watersheds with water quality impairments caused by nonpoint sources	60% Federal 40% State (recipients within state are often required to provide the 40% state match)	• FY15 – TBD • FY14 – $159M • FY13 – $156M • FY12 – $165M • FY11 – $175M	Varies	$8.4M	$2.8M	$422K	Nationwide	• Installation of BMPs for animal waste • Design and implementation of BMPs for stream, lake, and estuary watersheds, including monitoring • Basin-wide landowner education programs	• Total amount allocated to TN distributed by TN Department of Agriculture
Regional Conservation Partnership Program[8,9]	NRCS	Establish partnerships for innovative, workable and cost-effective approaches to benefit farming, ranching, and forest operations, local economies, and the communities and resources in a watershed or other geographic area.	Not stated	• FY15 – $225M • FY14 – $394M	• FY 2014: 600 applicants, 210 awards	$10M	Not stated	$0	Nationwide	• Mitigation of farmland erosion • Preservation of wetland wildlife habitats • Improvements to water quality	• Total funding will depend on government sequester
Land and Water Conservation Fund, State and Local Assistance Program[10]	National Park Service	Acquisition and development of land and water for outdoor recreation purposes	1:1 match federal funds to other funding sources	• FY2015 – $45M[11]	• FY15 expect 300 awards	$2.5M	Not stated	$5K	Nationwide	Land acquisition and development grants may be in support of a wide range of outdoor recreation uses, such as city parks, playgrounds, picnic areas, campgrounds, bike trails, swimming pools, and sports fields; as well as for infrastructure that supports these activities such as restrooms.	• Statutory requirement that funds must be obligated within 3 years of award

7 https://ofmpub.epa.gov/apex/watershedfunding/f?p=116:2:0::NO::P2_X_PROG_NUM,P2_X_YEAR:44,2015
8 http://www.grants.gov/web/grants/search-grants.html?keywords=regional%20conservation
9 http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/farmbill/rcpp/
10 http://www.grants.gov/web/grants/search-grants.html?keywords=land%20and%20water%20conservation%20fund,%20state%20and%20local%20assistance%20program
11 http://www.nps.gov/ncrc/programs/lwcf/funding.html

Grant	Managing Agency	Purpose	Funding						Competitive?	Example Eligible Projects	Limitations
			Share	Amounts	Avg. No. of Applicants/Awards	Max. Award	Median Award	Min. Award			
Wetlands Reserve Program[12,13]	NRCS	Achieve wetlands functions and wildlife habitat on every acre enrolled in the program.	Covers 100% of permanent easement and restoration costs, or 75% of 30-year easement and restoration costs.	• Varies[14]	Varies	Not stated	Not stated	Not stated	Nationwide	Restoration of wetlands on: • Farmed wetlands, • Prior converted wetlands, • Wetlands farmed under natural conditions, • Former or degraded wetlands • Lands substantially altered by flooding, and • Riparian areas	• At least 70 percent of the wetland and upland areas will be restored to the natural condition to the extent practicable; the remaining 30 percent of the project area may be restored to other than natural conditions.
Wetlands Program Development Grants[15]	U.S. EPA	Encourage comprehensive wetlands program development by promoting the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution.	75% Federal 25% Local	• Varies	Varies	$600K per fiscal year	$220K per fiscal year	$20K per fiscal year	Nationwide	• Development of a wetlands protection, restoration, or management program or support enhancement/refinement of an existing program.	• Funds cannot be used for implementation of individual mitigation projects, mitigation banks, or in-lieu-fee mitigation programs.
Recreation Trails Program (RTP)[16,17]	TDEC	Funding for acquisition for trails, trail construction, maintenance, rehabilitation, and for trail head support facilities.	80% State 20% Local	• FY14: $1.2M	Varies	Not stated	Not stated	Not stated	Statewide	• Creation of bike trails	• Must be ADA compliant • Grant projects must be on publicly owned land

TN EMA – Tennessee Emergency Management Agency
TDEC – Tennessee Department of Environment and Conservation
NRCS – National Resources Conservation Service
U.S. EPA – United States Environmental Protection Agency
FY – Fiscal Year
TBD – To be determined
ADA – Americans with Disabilities Act

M – $1,000,000
K – $100,000

[12] http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands/
[13] http://www.federalgrantswire.com/wetlands-reserve-program.html#.VYQ6-BH774Z
[14] http://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/fb08_cp_wrp.html
[15] http://www.federalgrantswire.com/wetland-program-development-grants.html#.VYRABRH774Z
[16] http://www.tn.gov/environment/recreation/recreation_grants.shtml
[17] http://www.tn.gov/environment/recreation/docs/2014-rtp-project-manual.pdf

APPENDIX A

SUMMARY OF SELECTED BIG CREEK HISTORICAL STUDIES AND REPORTS

***Big Creek Watershed Investigation Report, Chickasaw-Metropolitan Surface Water Management Survey* (U.S. Department of Agriculture, 1968)**

One of the first studies to focus on the Big Creek Drainage Basin was performed by the U.S. Department of Agriculture (USDA). During this study, the USDA evaluated historical flooding east of Highway 51 into the upper reaches of Crooked Creek and two of its tributaries – Casper Creek and North Fork Creek.

This evaluation recommended the following actions be performed to reduce the frequency of flooding in the Crooked Creek, Casper Creek, and North Fork Creek basins:

- Convert cropland in the basins to pastureland, which would potentially reduce sediment erosion during rain events.
- Construct a floodwater control structure in Tipton County, Tennessee.
- Perform more frequent clearing and grubbing, excavation of material from the main channels of each creek, and regular maintenance throughout the watershed.
    - In some places, channels are almost completely blocked by fallen trees.
    - Sediment deposition on brush and debris significantly reduces flow.

The study estimated that implementation of the recommendations could have the following benefit to the Big Creek drainage basin:

- Eliminate of the 2-year flood event from the entire watershed.
- Eliminate of the 100-year flood event for North Fork Creek.
- Reduce the number of acres flooded annually by up to 85%.

The study also estimated that capital costs associated with the recommended actions to be approximately $418,000 and $449,500 for the flood control structure in Tipton County and the channel improvements, respectively. Adjusted for inflation, these costs would be approximately $2.8M and $3.0M, respectively in 2015 dollars.

***Big Creek and Tributaries Watershed* (U.S. Army Corps of Engineers, Memphis District, Date Unknown)**

In the mid-1970's (exact date is unknown) the U.S. Army Corps of Engineers (USACE), Memphis District, prepared a background of the Big Creek watershed, the overall flood situation and associated factors, as well as a review of past floods and future predicted floods.

There were no gage records available for any of the streams evaluated at the time of this study; therefore, high water marks from past floods, interviews with local residents, and newspaper articles were used to summarize past floods. This study acknowledged the occurrence of flooding from the Big Creek Drainage Canal, Royster Creek, North Fork Creek, and Casper Creek during all seasons of the year; with water levels rising from a bankfull stage to extreme flood peaks within 5-10 hours. The study also acknowledged that the most severe and frequent flood damage occurs along North Fork Creek in the reach between Navy Road and North Avenue.

The study also used the Standard Project Flood and the Intermediate Regional Flood as its basis for predicting potential impacts from future flood events. The Standard Project Flood is loosely defined as the largest flood most likely to ever occur under the existing runoff characteristics of the drainage basin. The Intermediate Regional Flood is defined as one that could occur once in 100 years on the average although it could occur in any year (i.e., a "100-year storm"). The rainfall used in the study to compute the Standard Project Flood was 19.0 inches in a four-day period with the highest 24-hour intensity being 15.3 inches. The rainfall used to compute the Intermediate Regional Flood was 7.95 inches in a 24-hour period with the highest one-hour intensity being 3.50 inches.

The study identified several bridges within the Big Creek watershed whose underclearance elevation was at or below the estimated water surface elevation resulting from an Intermediate Regional Flood and that would represent areas for flooding to most likely occur during high water flows (Table 1).

Table 1 – Elevation Data for Bridges Across Big Creek, Royster Creek, North Fork Creek, and Casper Creek)

Identification	Underclearance Elevation (feet, mean sea level)	Water Surface Elevation (feet, mean seal level)	
		Intermediate Regional Flood	Standard Project Flood
Big Creek, U.S. Hwy. 51	257.5	257.3	259.7
Big Creek, U.S. Hwy 51	262.2	257.8	260.6
Big Creek, I.C.R.R.	261.7	259.7	267.6
Big Creek, Raleigh-Millington Rd.	261.6	260.9	268.1
Big Creek, Sledge Rd.	281.2	279.4	280.5
Big Creek, Millington-Arlington Rd.	293.6	292.4	293.9
Big Creek, Kerrville-Rosemark Rd.	303.5	306.6	310.0
Royster Creek, Shelby Rd.	263.2	261.4	266.3
Royster Creek, Cuba-Millington Rd.	264.0	265.4	267.6
Royster Creek, West Union Rd.	273.2	271.9	274.7
North Fork Creek, Navy Rd.	265.1	266.4	270.6
North Fork Creek, I.C.R.R.	267.2	267.1	271.9
North Fork Creek, North Ave.	270.6	272.6	273.4
North Fork Creek, U.S. Hwy. 51	281.8	280.6	280.7
Caspar Creek, Navy Rd.	282.2	283.6	284.1

***Watershed Plan – Environmental Assessment, Big Creek Watershed, Shelby and Tipton Counties, Tennessee* (USDA Soil Conservation Service, 1988)**

This Watershed Plan - Environmental Assessment was prepared at the request of the local sponsors and the Shelby and Tipton County Soil Conservation Districts. Damages resulting from severe cropland erosion and sedimentation in the Big Creek Watershed prompted the local sponsors, landowners and operators to seek accelerated technical assistance from the USDA's Soil Conservation Service (SCS). This Watershed Plan outlined watershed problems, identified opportunities, summarized and analyzed resource data, and provided a proposed plan of action for the installation of land treatment practices that will reduce cropland erosion to acceptable levels. It was prepared by the sponsors in cooperation with watershed landowners and operators and the United States Department of Agriculture's Soil Conservation Service and Forest Service, and other concerned agencies and organizations.

The primary recommendation of this plan was to minimize erosion in the watershed in order to protect surrounding cropland, mitigate damage to downstream forest land due to sedimentation, and to improve water quality in the river. Land treatment practices were recommended as shown in
Table .

Table 2—Recommended Land Treatment per 1988 Watershed Plan

Land Use	Treatment Practice	Affected Area (acres)
Soybeans and corn	Conservation tillage systems	5,165
Cotton	Contour stripcropping	1,230
--	Conservation cropping sequence	317
--	Terrace systems	499
--	Pasture and hayland planting	1,438
--	Tree planting	560
--	Critical area treatment	355
Roadways	Vegetative plantings	75
	Total Affected Cropland =	**9,563**

Detailed maps showing proposed or actual areas for treatment were not included in the Plan, nor is any further definition of "critical area treatment." Capital cost for the project was estimated at $925,190 with O&M costs of $67,270 annually (in 1988 US dollars). Implementation time was estimated at ten years.

The projected impact of the watershed plan was threefold: conversion of 2,250 acres of cropland to grassland and forest land, reduction of erosion from an average of 65 tons per acre per year to between 4 and 22 tons per acre per year, and improvement of water quality.

Chickasaw Basin Authority Report for New Levees **(Chickasaw Basin Authority, 1989)**

In 1989, a study performed by the Chickasaw Basin Authority (CBA) evaluated what improvements in various flood elevations could be obtained from the construction of dry basin, flood control structures north and east of Millington, Tennessee:

- Royster Creek (Site 2);
- Big Creek (Site 4); and
- North Fork Creek (Site 5).

The study estimated that construction of the three flood control structures could reduce the flood elevation from the 100-year, 500-year, and the Christmas Flood of 1987 by more than two feet throughout Big Creek from Singleton Parkway to the confluence with Royster Creek (Exhibit 1).

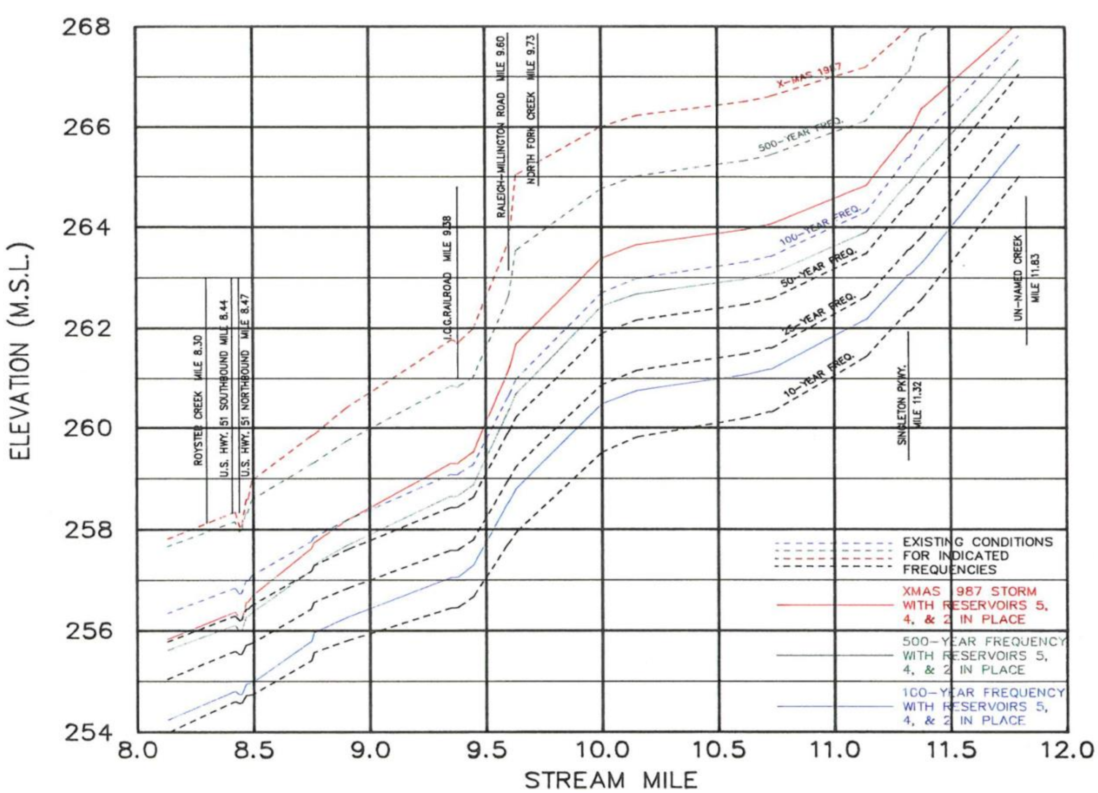


Exhibit 1. Big Creek Water Surface Profiles (CBA, 1989)

The CBA study estimated that construction of the three, dry-basin flood control structures would create a total flood pool of approximately 2,400 acres at a cost of $9.4M (2015 adjusted - $17.9M):

- Royster Creek (Site 2) - $3.0M (2015 adjusted - $5.8M);
- Big Creek (Site 4) - $4.0M (2015 adjusted - $7.6M); and
- North Fork Creek (Site 5) - $2.4M (2015 adjusted - $4.5M).

CBA and City of Millington Feasibility Study Dry Retention Lake Site Nos. 2 (Royster Creek) and 4 (Big Creek) **(Continental Engineering Inc., 2000)**

In 2000, Continental Engineering Inc. (Continental) prepared a Hazard Mitigation Grant Program (HMGP) application seeking financial support for the construction of an earthen dam on Big Creek at the location designated as Site 4 by the CBA in their 1989 study.

The HMGP application stated that construction of the dam at Site 4 could provide storm water retention for approximately 30 inches of rain in a 6-hour period (a storm event greater than a 1,000-year event[1]); equivalent to the Possible Maximum Precipitation (PMP) requirement established by the Tennessee Safe Dams Act and exceeds the necessary storm water retention for a 500-year storm event. The HMGP application requested $5.6M to aid in the construction of the earthen dam at CBA Site 4.

Continental's HMGP application also provided, as an alternative to construction of the earthen dam at CBA Site 4, a request for approximately $2.8M to construct a dam of similar retention capacity at the location designated as Site 2 on Royster Creek by the CBA in their 1989 study.

Field Reconnaissance of Big Creek and the Wolf River Following a Rainfall Event **(James Pendergrass, 2001)**

In November 2001, the Big Creek Drainage Basin experienced a storm event that deposited approximately 5.86 inches of rain in a 24-hour period[2]. Such a storm event in West Tennessee would be classified as between a 10-year (5.56 inches/24-hours) and 25-year (6.6inches/24 hours) event[1].

The following pictures were taken by James Pendergrass (USACE?) during a field reconnaissance of Big Creek.

[1] The National Oceanic and Atmospheric Association (NOAA) defines a 1,000-year storm in West Tennessee as one providing up to 9.66 inches of precipitation in a 6-hour period.

[2] www.weatherunderground.com

Picture No. 8 - Big Cr., TN - @ Highway 51 - Looking D.S. - 29 Nov 01
11:12 am - Millington Gage 35.53

Picture No. 12 - Big Cr., TN - @ Sledge Rd. - Looking D.S. - 29 Nov 01
12:18 pm - Water Surface 14.5 ft. Below D.S. Rail - Millington Gage 34.83

Picture No. 14 - Big Cr., TN - @ Millington-Arlington Rd. - Looking D.S. - 29 Nov 01
12:28 pm - Water Surface 18.3 ft. Below D.S. Rail - Millington Gage 34.74

***Big Creek Watershed Proposal* (USDA NRCS, 2002)**

In 2002, the USDA and the NRCS prepared a proposal with recommended improvements for Big Creek in north Shelby County, Tennessee, and south Tipton County, Tennessee, which included a combination of the following:

- Grade control structures;
- Flood control reservoirs and lower stream bed modifications; and
- Upstream conservation.

A total of 51 grade control structures (Exhibit 2) were proposed along Big Creek in Shelby County to decrease flow velocities in Big Creek; which would reduce run-off, sedimentation, and channel erosion and ultimately improving water quality. It was estimated that construction of each grade control structure could cost between $7,000-$25,000, depending on the size and location of each structure.

Exhibit 2. Typical Grade Control Structure

The proposed flood control reservoirs and lower stream bed modifications involved the construction of a series of reservoirs along Big Creek between Singleton Parkway on the east and Highway 51 on the west, south of Millington, TN. These reservoirs would provide additional flood protection for Millington and the Naval Support Activity Mid-South, while creating wetlands habitats for fish and local wildlife.

The recommended upstream conservation for Tipton County involved the construction of additional flood control structures in the Big Creek tributaries in south Tipton County and creating erosion buffer zones (up to 160 feet wide) by planting native grasses on either side of blue-line streams (those streams shown in blue on USGS topographic maps) in the area.

Millington 205 Study **(Tennessee Wildlife Resources Agency, 2004)**

In 2004, the Tennessee Wildlife Resources Agency (TWRA) evaluated three sections of the Big Creek Basin under Section 205 of the 1948 Flood Control Act (a statute designed to handle requests for small flood control projects not specifically approved by Congress). The study is based on a Christmas 1987 storm in the area which flooded 600 structures, including some land on the south side of the Millington Naval Base. The study initially investigated three sections of the creek, but narrowed its focus to one section based on benefit-cost analysis. The sub-basin of interest was between Highway 51 and the Illinois Central Railroad, shown in Exhibit 3.

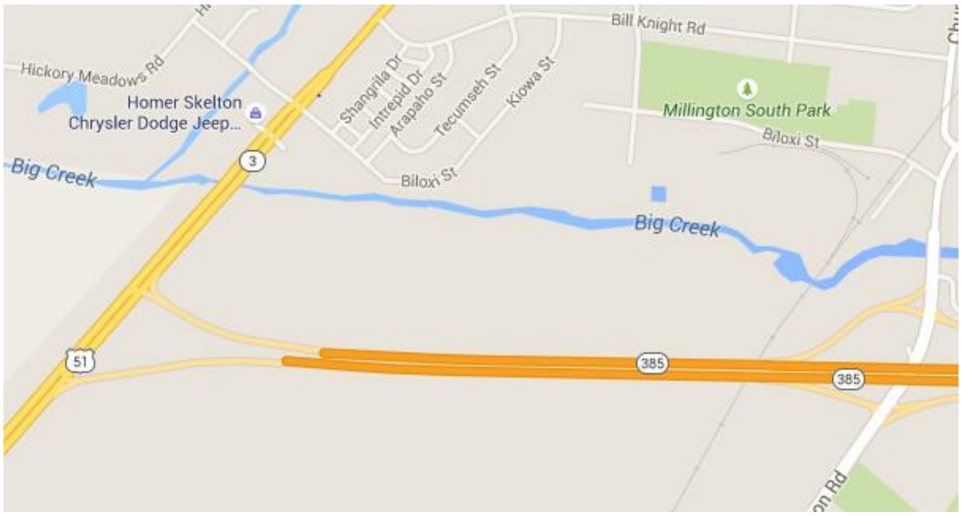


Exhibit 3. Big Creek Section of Interest for *Millington 205 Study* (2004)

The remainder of the document is the official agreement between the United States Government and the City of Millington, Tennessee for the Section 205 study. Appendices include a scope of previous studies, which concluded that further evaluations and studies will be necessary to adequately assess alternatives for flood control. Appendices also include detailed calculations for the summarized Segment A approach, as well as previous studies and proposals. Relevant to the Millington Base in particular are a 1968 study that specifically mentions frequent flooding in the area around the Base, several detailed hydrographs of the Christmas 1987 storm and related Big Creek stages, and a September 1987 letter from the law office of Fisher, Avery, Yawn & Smith recommending over $15 million in flood control spending for the area.

***Big Creek Feasibility Study* (USACE, 2007)**

In March 2007, the USACE delivered a presentation on Big Creek to City of Memphis Mayor A.C. Wharton, Jr., centered on flood prevention in Big Creek with an environmental, rather than economic, argument.

This proposal focused on preserving wetlands, arresting gully formation, and creating a greenway with a bike/hike trail along the river. The proposed project area is between Highway 51 and Singleton Parkway, and between Highway 385 and the southern bank of Big Creek (Exhibit 4).

Exhibit 4. Area of Interest for *Big Creek Feasibility Study* (USACE, 2007)

The study provided two alternatives: creation of a new floodplain or partial restoration of the original floodplain. Partial restoration allowed for slightly more habitat gain at a lower cost than floodplain creation, so partial restoration was the recommended alternative.

Partial restoration would require construction of a dam and spillway along the south bank of Big Creek. Flood waters would rise over the top of the dam and flow into a created pool habitat, then slowly be returned to Big Creek via a spillway (Exhibit 5). This design would provide energy dissipation to arrest gully formation, and would retain water to create wetland areas. Six acres would be cleared for construction, 80 acres would be reforested, 10 acres would be planted with native warm-season grasses, and a 14,500 foot bike/hike trail would be constructed for a total cost of $3.5 million (2007 dollars).

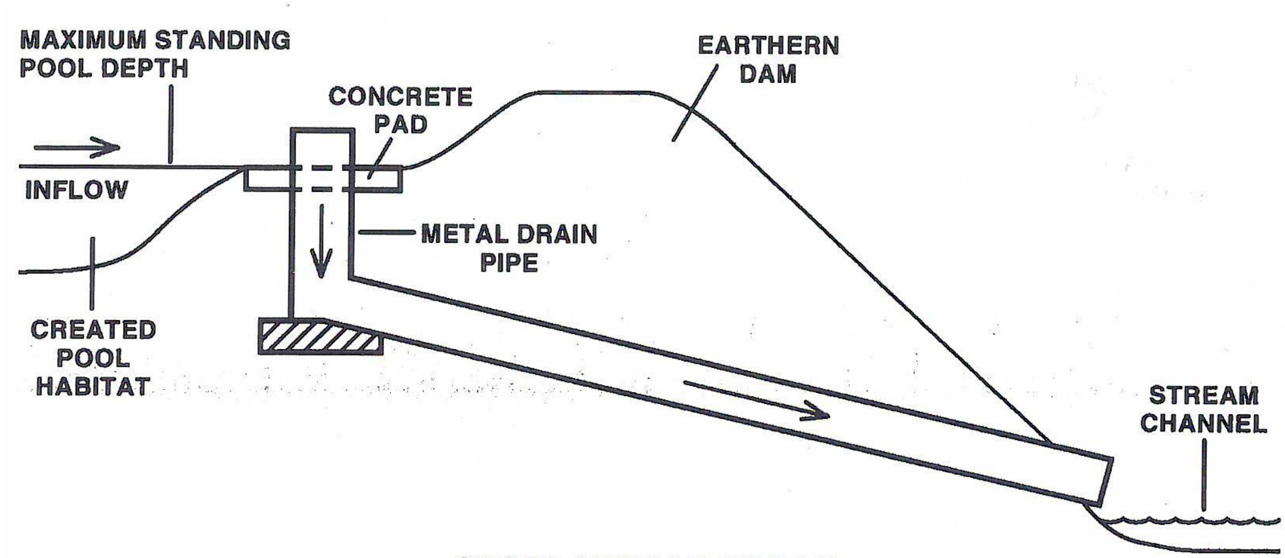


Exhibit 5. Cross-Section of Dam and Spillway from *Big Creek Feasibility Study* (USACE, 2007)

The presentation provided conceptual schematics and a detailed cost estimate, as well as a cost sharing estimate (63.5% Federal funds, 36.5% local funds).

***Water Quality Analysis and Proposed TMDLs for e. Coli in Loosahatchie River Watershed* (Tennessee Department of Environment and Conservation, 2011)**

In 2011, the Tennessee Department of Environment and Conservation (TDEC) prepared a summary of the water quality, including identifying e. Coli-impacted water bodies in the Loosahatchie River Watershed; which included all three sub-watersheds of Big Creek:

- Big Creek, Upper (Sub-watershed 0301)
  - Big Creek @ Millington-Arlington Rd. (BIG1C15.8SH)
  - Big Creek @ Meade Lake Rd./Grave Springs Rd. (BIG1C20.8TI)
  - Crooked Creek Canal @ Donnell Rd. (CROOK1C1.3SH)
- Big Creek, Middle (Sub-watershed 0302)
  - Big Creek @ Hwy 51 bridge near Millington (BIG1C8.4SH)
  - Big Creek @ Sledge Rd. (BIG1C13.6SH)
  - North Fork Creek @ Navy Rd. (NFORK000.6SH)
  - Royster Creek @Shelby Rd. (ROYST1C0.9SH)
- Big Creek, Lower (Sub-watershed 0303)
  - Bear Creek @ Shelby Rd. (BEAR001.2SH)

- Big Creek @ Fite Rd. (BIG1C1.0SH)

- Jakes Creek @ Shake Rag Rd. (JAKES000.3SH)

TDEC's summary identified runoff from agricultural areas and forests as having a greater impact on degredations in water quality in the Loosahatchie River Watershed than runoff from urban areas, as presented in Exhibit 6 below.

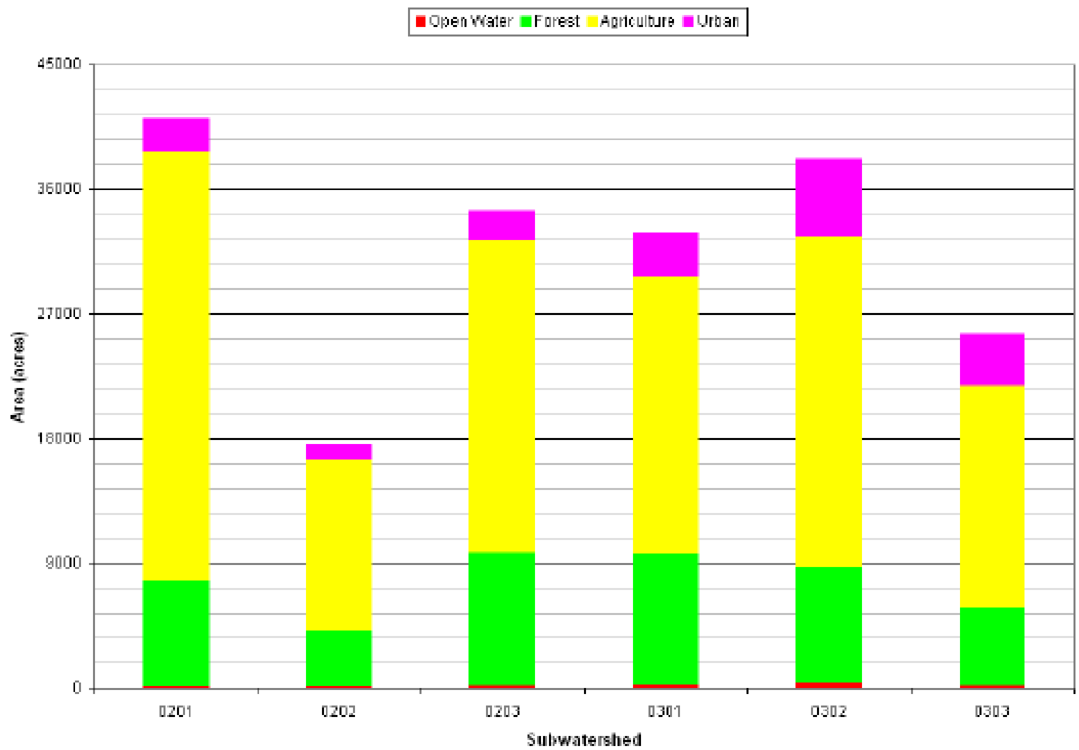


Exhibit 6. Impacted Waterbodies in the Loosahatchie River Watershed (TDEC, 2011).

***Impacted Water Bodies in the Loosahatchie River Watershed* (Civil & Environmental Consultants, Inc., 2012).**

As a follow-on to TDEC's 2011, *Water Quality Analysis and Proposed TMDLs for e. Coli in Loosahatchie River Watershed*, Civil and Environmental Consultants, Inc. (CEC) collected additional water quality samples from streams Shelby County where receiving stream from permitted Municipal Separate Storm Sewer Systems (MS4s) were included on the current 303(d) list as an impaired waterbody. As part of this study, CEC collected samples from the Upper, Middle, and Lower Big Creek sub-watersheds. Concentrations of e. Coli in samples collected from the sub-watersheds ranged from 11-99#CFU/100 milliliters (ml); however, this is less than the geometric mean standard for water quality in Tennessee.

CEC's study did not investigate sediment loading in the Big Creek drainage basin.

APPENDIX B

SEDIMENT MODELLING OUTPUT

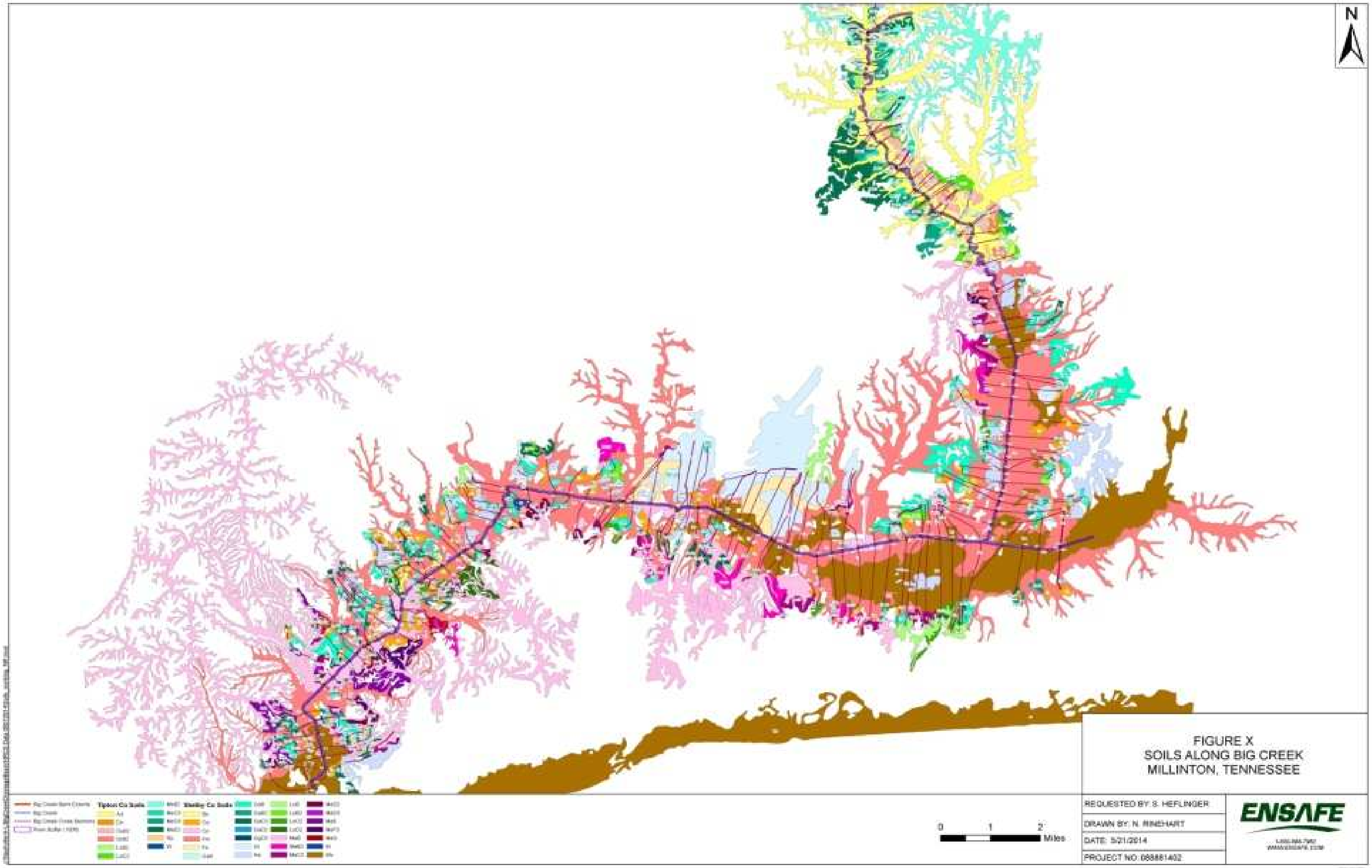


FIGURE B-1

IDENTIFIED SOIL TYPES ALONG BIG CREEK

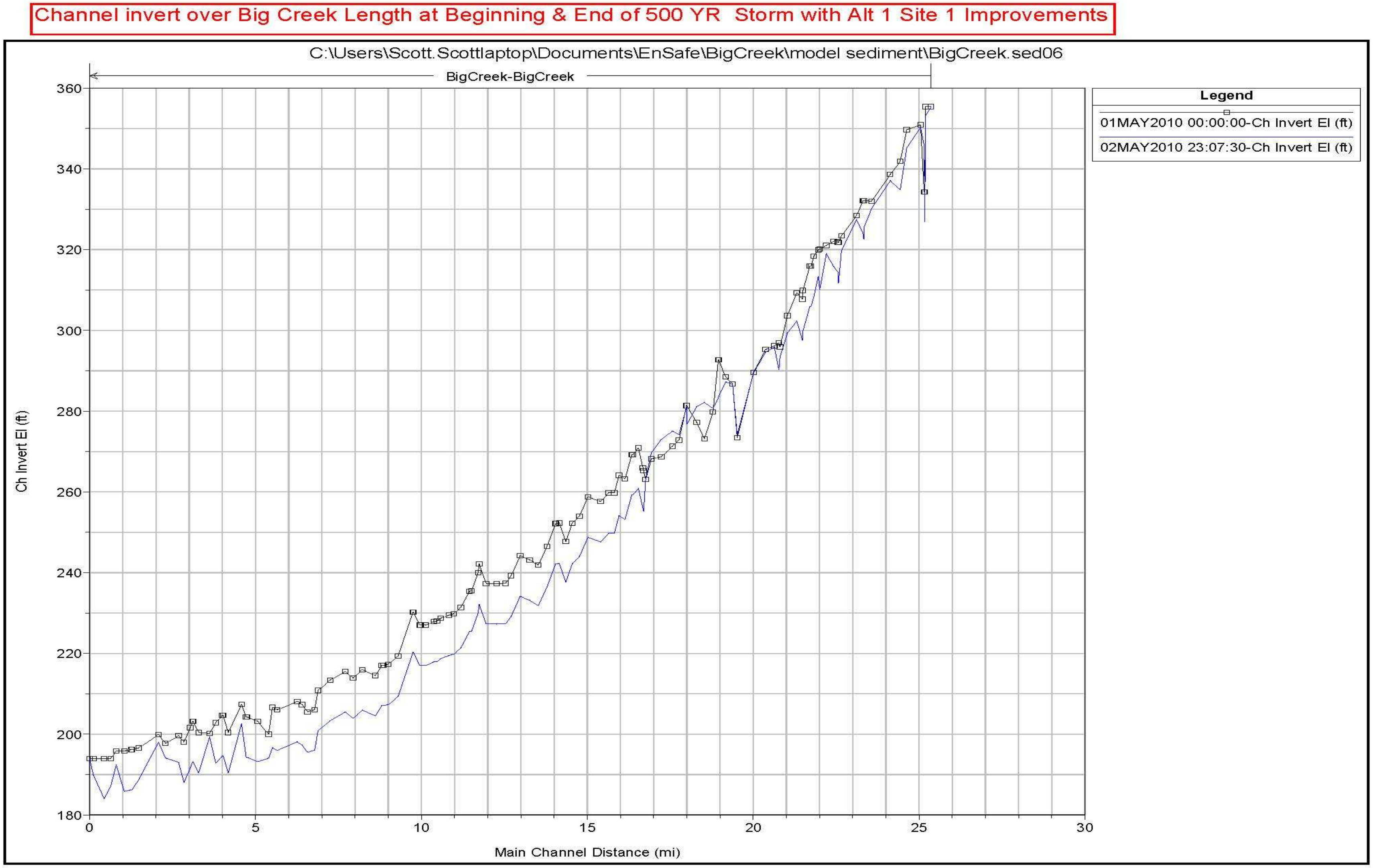


FIGURE B-2

MODELED SEDIMENT TRANSPORT FROM A 500-YEAR STORM EVENT

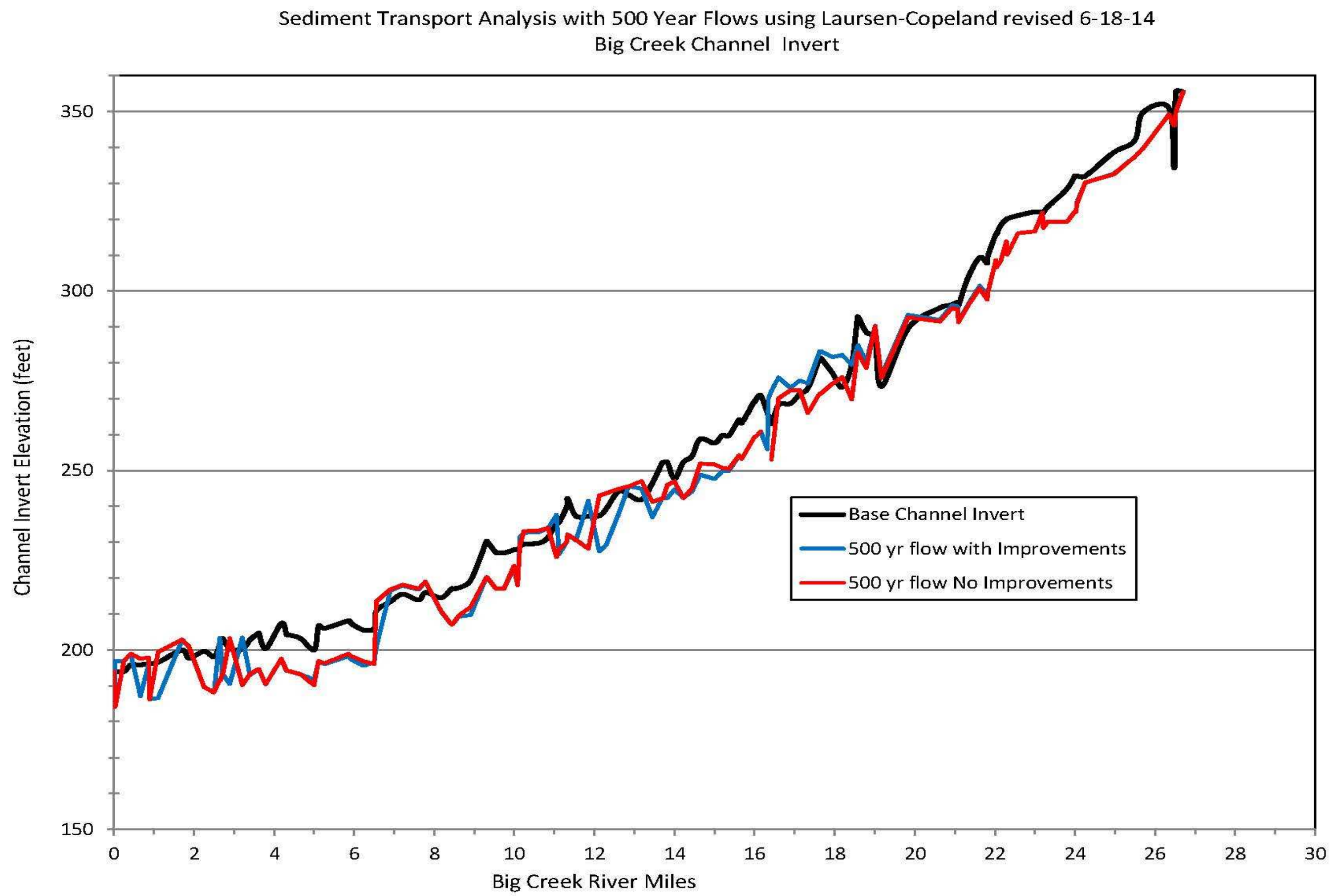


FIGURE B-3

MODELED SEDIMENT TRANSPORT FROM A 500-YEAR STORM EVENT WITH AND WITHOUT ALTERNATIVE 1 SITE 1 STRUCTURE

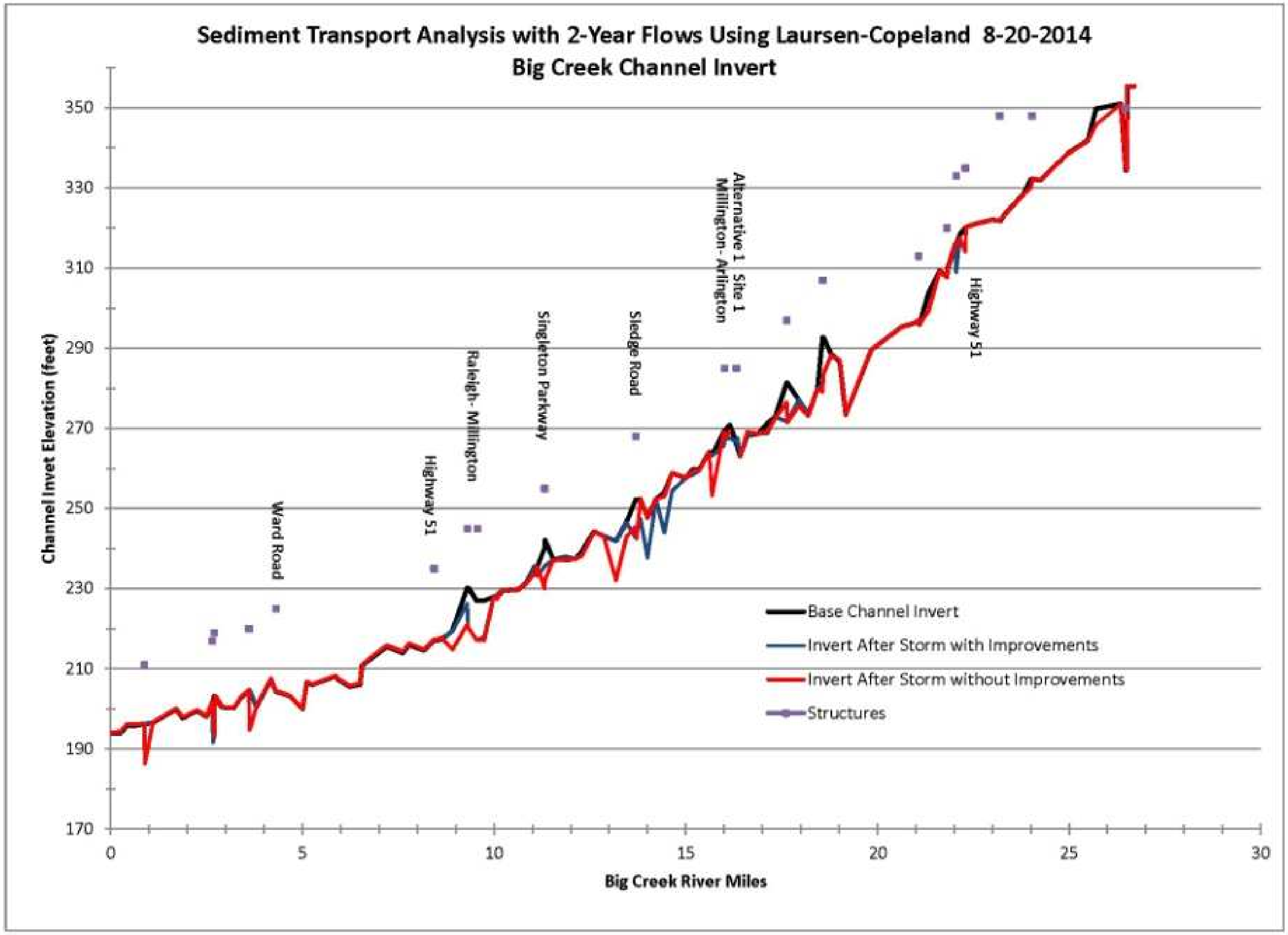


FIGURE B-4

MODELED SEDIMENT TRANSPORT FROM A 2-YEAR STORM EVENT

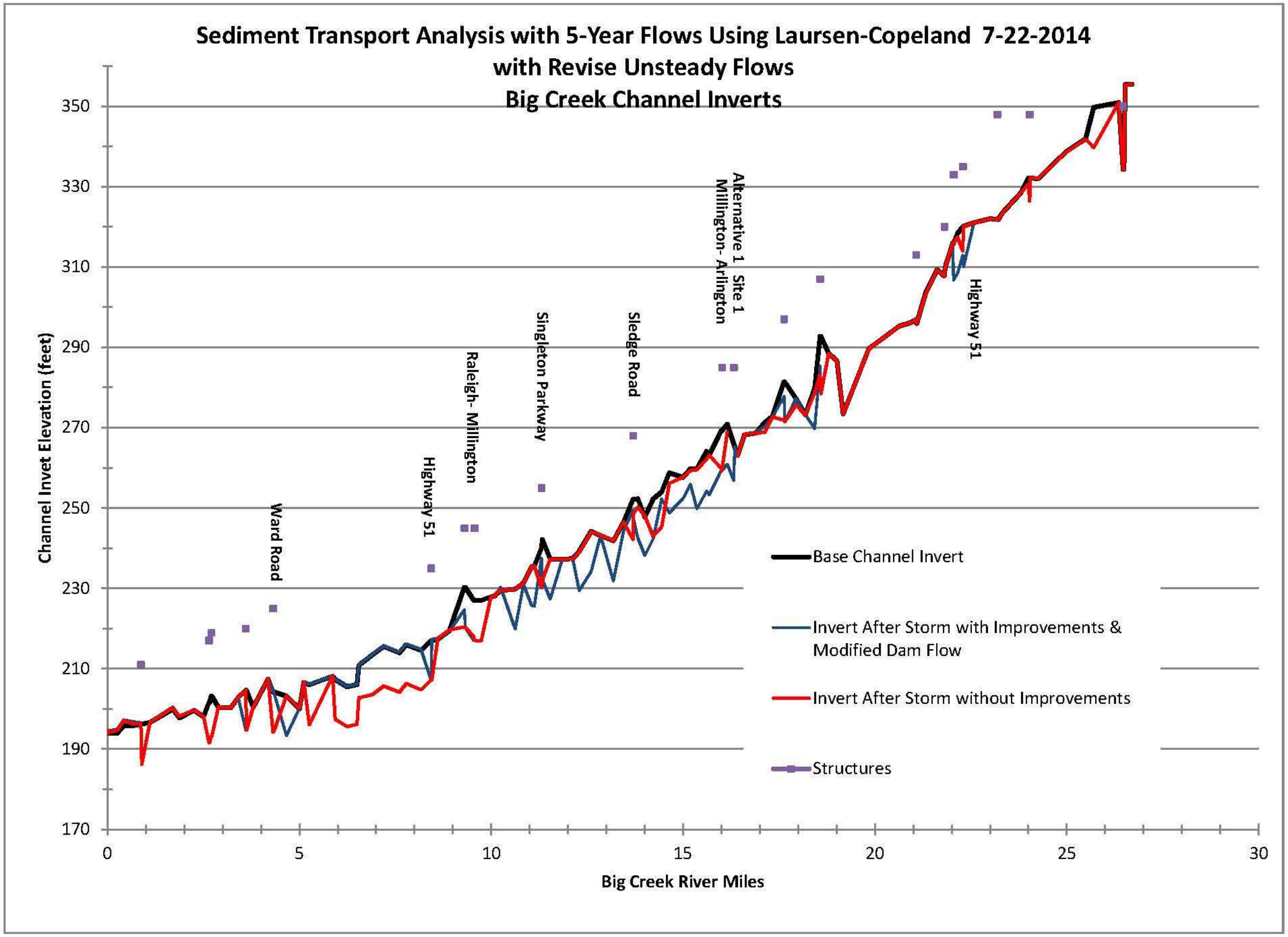


FIGURE B-5

MODELED SEDIMENT TRANSPORT FROM A 5-YEAR STORM EVENT

APPENDIX C

BIG CREEK STREAM ASSESSMENT

5724 Summer Trees Drive | Memphis, Tennessee 38134| Telephone 901-372-7962 | Facsimile 901-372-2454 | www.ensafe.com

May 19, 2015

Mr. Geoff Pope
Sr. Project Manager/Engineer
EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134

Re: Big Creek Stream Assessments

Dear Mr. Pope:

Thank you for allowing EnSafe Inc. to provide ecological survey services associated with proposed Big Creek Drainage Study. Stream evaluations were conducted on August 11, 2014, to evaluate the aquatic resources in Big Creek (Figure 1) and Crooked Creek (Figure 2) in Shelby County, Tennessee. The purpose of the investigation was to assess the two streams for morphology and flow characteristics. A literature review was also conducted to determine physical properties, which could influence stream characteristics.

Big Creek and Crooked Creek were assessed at the proposed location of the flood control structure, 0.25 mile upstream, and 0.75 mile downstream, to provide details of each stream throughout the reach. Data collected included a cross section of the channel, vegetation composition, with water and flow characteristics. Details are provided below with attached photographs and drawings at each sampled location.

Landscape Attributes
The landscape contains homogeneous areas of geography, topography, climate, and soils that support similar plant and animal life. The two streams are contained within Level IV subecoregion Loess Plains (74b) comprised of gently rolling, irregular plains, 250 to 500 feet in elevation, with loess up to 50 feet thick. Soil erosion can be a problem on the steeper upland Alfisol soils while bottomland soils are primarily Entisols. According to the Natural Resources Conservation Service, the dominant soil types within and adjacent to the two streams have been classified as Falaya silt loam (Fm) and Waverly silt loam (Wv). Fm and Wv are described as a natural drainage class of somewhat poorly drained and poorly drained soils, respectively.

The project site is located within the Loosahatchie River watershed (HUC 08010209) via Big Creek. Oak-hickory and southern floodplain forests are the natural vegetation communities, although much of the forest has historically been converted to cropland.

Stream Details

The first stream included in this survey is Big Creek (08010209021_300) with the proposed flood control structure located north of Highway 205. It is included on the Tennessee Department of Environment and Conservation (TDEC) 303(d) list as an impaired stream due to low dissolved oxygen (DO), total phosphorus, physical substrate habitat alteration, loss of biological integrity due to siltation, and Escherichia coli (E. coli). The pollutant source is runoff from non-irrigated crop production, channelization, and discharges from municipal separate storm sewer system (MS4) areas.

The portion of Big Creek that was included in this survey was characterized into three zones relative to the flood control structure. The first, located at the proposed flood control structure (Figure 3), contained stagnant and turbid water due to an unidentified downstream obstruction or beaver dam. Channel bottom width and flow characteristics remained consistent through this reach. The channel banks were fully vegetated with dense herbaceous vegetation and sporadic trees within the top banks. Established forests were present from the top bank to the adjacent farm fields. Erosional areas were present only on the outside bends of the stream and silty clay soils were dominant vertically along the channel banks.

Upstream of the proposed flood control area, vegetation on the channel banks becomes sparse and evidence of channel evolution is evident. According to the Stream Evolution Model, this section of Big Creek has reached Stage III–Degradation. The channel is incising and abandoning its floodplain while the banks are stable geotechnically. Upstream (Figure 4) and downstream (Figure 5) sections of Big Creek were also assessed and details are contained with the attached cross sections.

The second stream included in this survey is Crooked Creek (08010209021_0600) with the proposed flood control structure located east of Donnell Road. Crooked Creek is included on the TDEC 303(d) list as an impaired stream due to total phosphorus, low DO, physical substrate habitat alteration, and E. coli. The pollutant source is non-irrigated crop production, channelization, and discharges from MS4 areas.

The portion of Crooked Creek that was included in this survey was characterized in three areas relative to the flood control structure. The first, located at the proposed flood control structure downstream of the road crossing (Figure 6), was a highly eroded feature containing a moderate flow of turbid water. The soils appeared to have eroded to fragipan preventing further vertical erosion. The adjacent forest area had been recently logged and dense herbaceous and scrub/shrub vegetation was present.

The channel appears to have downcut sufficiently to accommodate increased stream flow. The stream is incising with unstable, retreating banks that collapse by slumping. Failed material is scoured away and the enlarged channel has become disconnected from its former floodplain indicating the stream has evolved to State IV-Degradation and widening. Upstream (Figure 7) and downstream (Figure 8) sections of Crooked Creek were also assessed and details are contained with the attached cross sections.

We appreciate the opportunity to continue supporting you on the Big Creek Drainage Study. We would welcome the opportunity to support you in any additional studies or permitting that may be required to complete the project.

If additional information is required, do not hesitate to contact me at (901) 372-7962 or email me at byates@ensafe.com.

Sincerely,

EnSafe Inc.

By: Brian Yates
Senior Ecologist

Enclosures: Cross Sections
Location Maps
Photographic Documentation

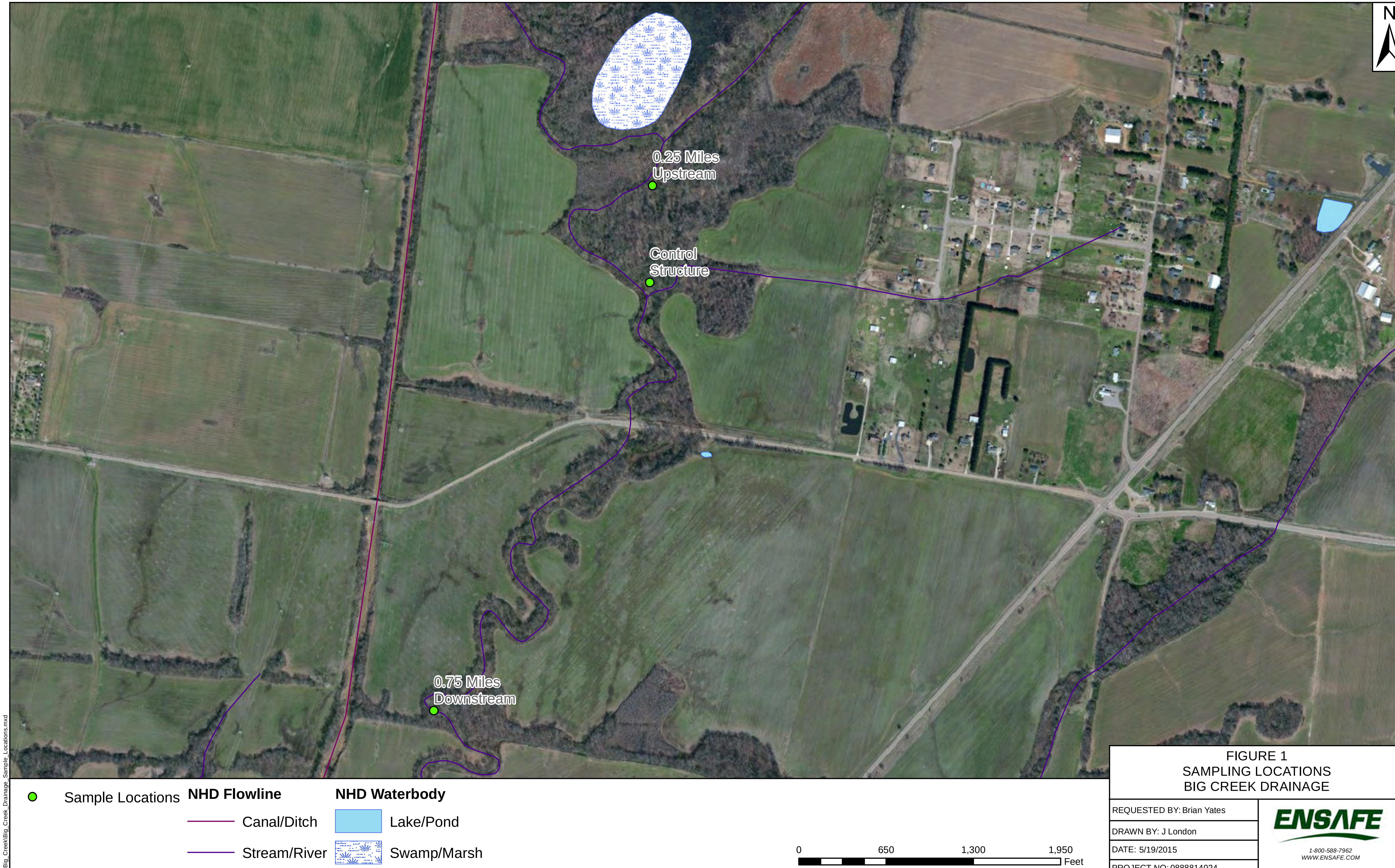
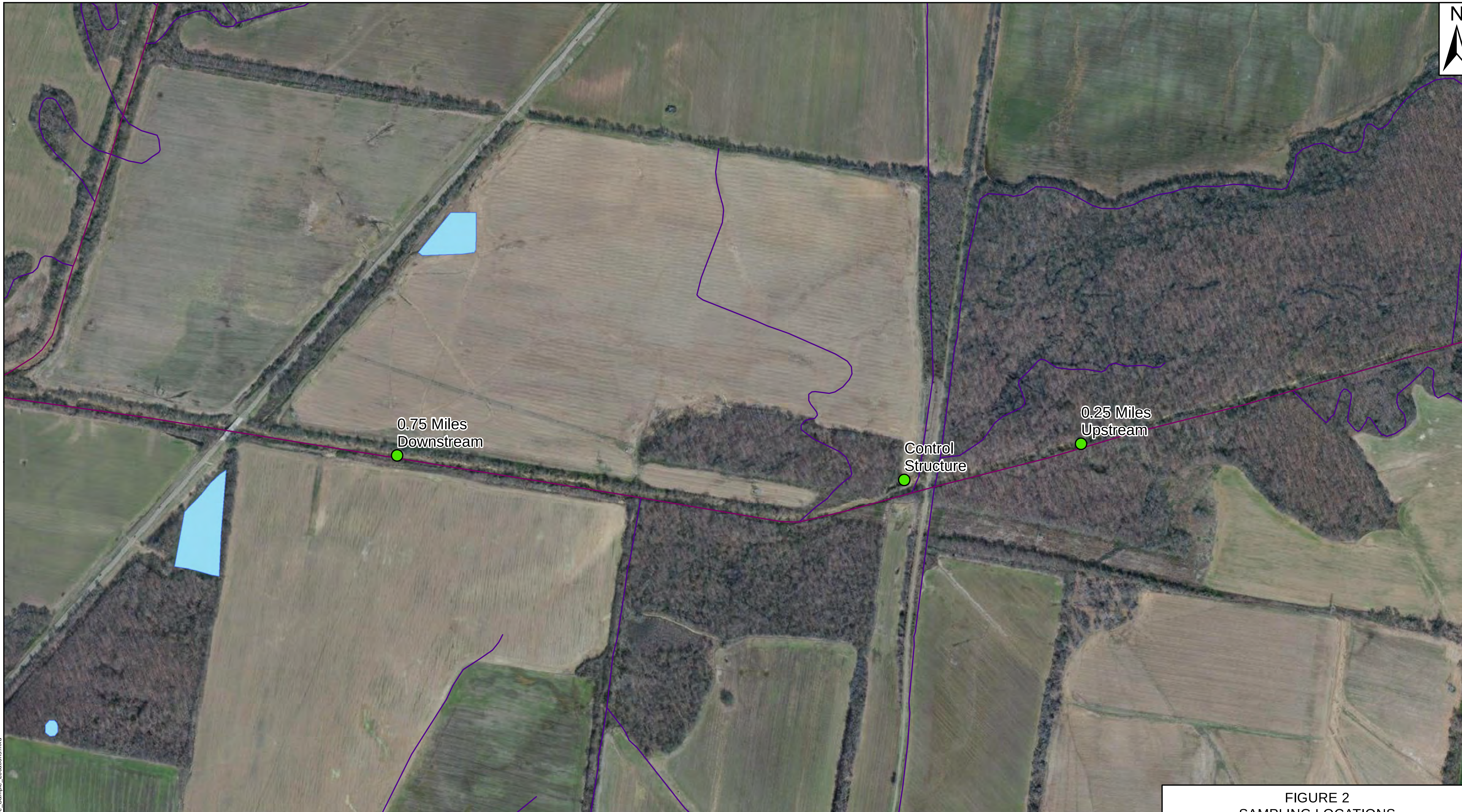


FIGURE 1
SAMPLING LOCATIONS
BIG CREEK DRAINAGE

REQUESTED BY: Brian Yates
DRAWN BY: J London
DATE: 5/19/2015
PROJECT NO: 0888814024

ENSAFE
1-800-588-7962
WWW.ENSAFE.COM

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Sample Locations

NHD Flowline

Stream/River

Canal/Ditch

NHD Waterbody

Lake/Pond

0 650 1,300 1,950 Feet

FIGURE 2
SAMPLING LOCATIONS
CROOKED CREEK DRAINAGE

REQUESTED BY: Brian Yates

DRAWN BY: J London

DATE: 5/19/2015

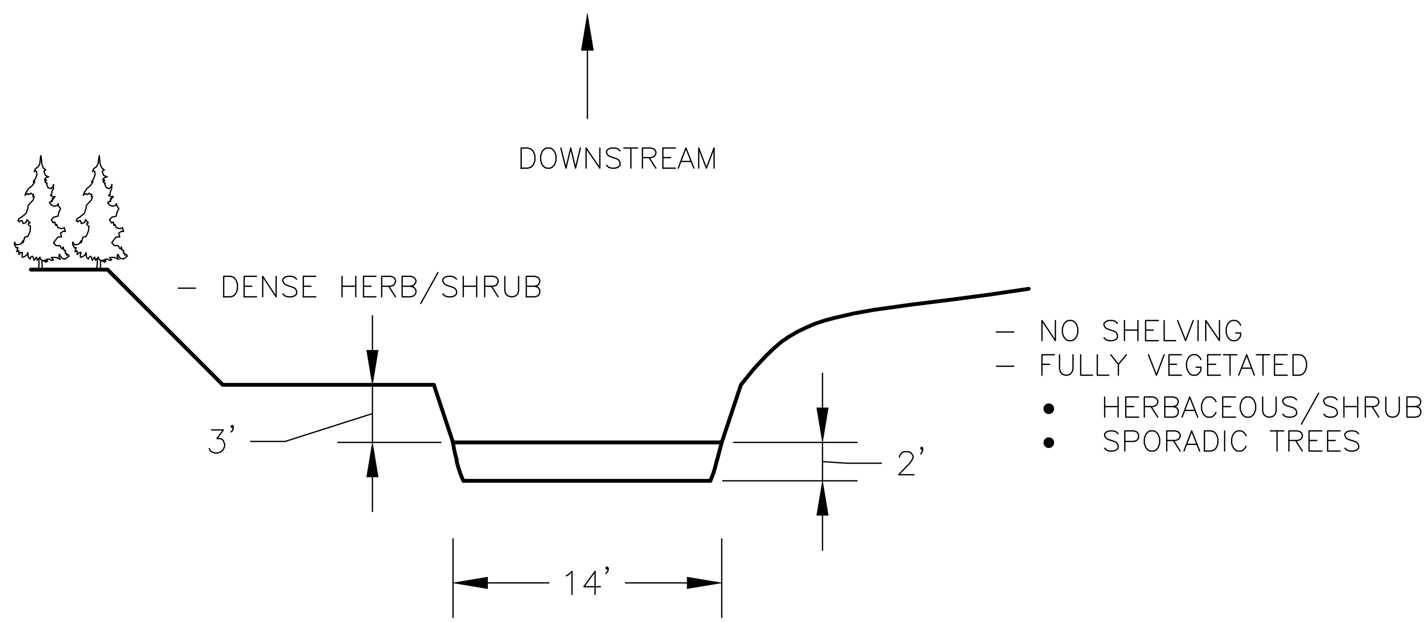
PROJECT NO: 0888814024

ENSAFE
1-800-588-7962
WWW.ENSAFE.COM

X:\Big_Creek\Crooked_Creek_Drainage_Sample_Locations.mxd

→ 35.34684 / −89.79991

- SILTY CLAY THROUGHOUT PROFILE
- BANKS FULLY VEGETATED
- STAGNANT, TURBID WATER – LIKELY BEAVER DAM
- CHANNEL BOTTOM CONSISTENT WIDTH/DEPTH
- EVIDENCE OF FLOWS ON BENCH – WRACK LINES, DEBRIS ACCUMULATION
- EROSIONAL AREAS ONLY ON OUTSIDE OF BENDS
- SIDE CHANNEL OBSERVED



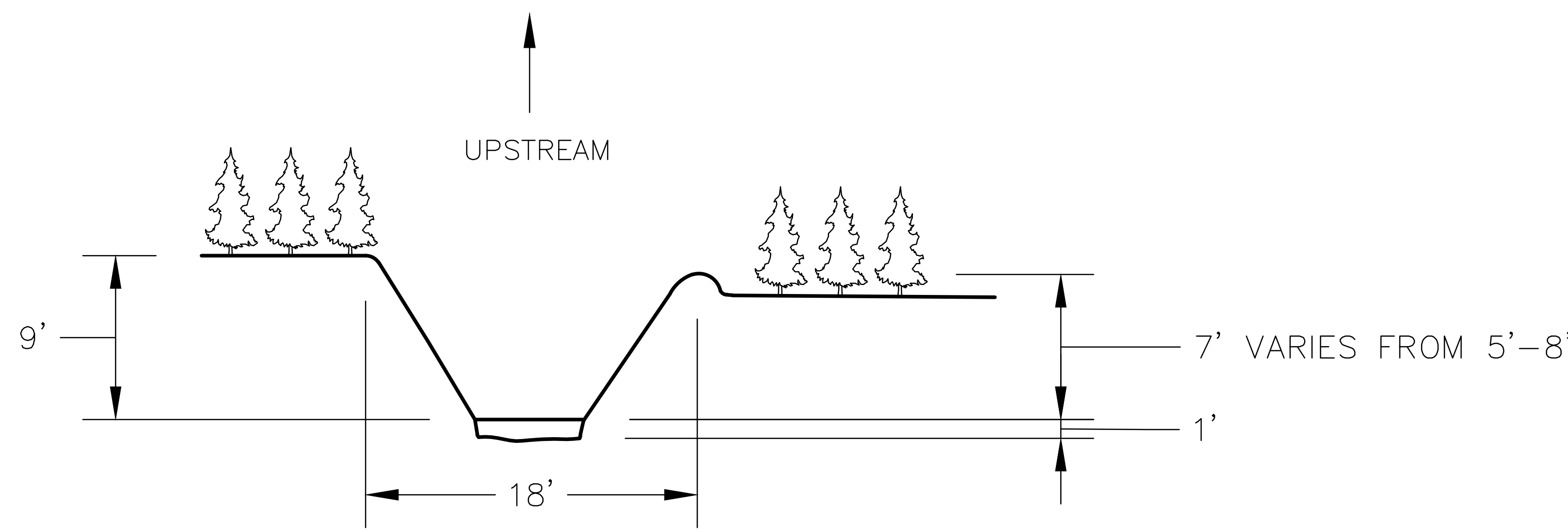
10 0 10
SCALE FEET

FIGURE 3
BIG CREEK – CONTROL STRUCTURE
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.
DWG DATE: 05/18/15	(800) 588-7962
DWG NO: 14024_C004	www.ensafe.com

→ 35.34882 / −89.79993

- SPORADIC VEGETATION ON BANKS UNTIL TOP BANK
- NO FLOW; TURBID WATER
- SOILS FAIRLY CONSISTENT – MORE CLAY NEAR CHANNEL BED
- WRACK LINES AND MATTED DEBRIS ~ 5' ON CHANNEL BANKS
- LARGE ESTABLISHED FOREST FROM TOP BANK TO FARM FIELDS

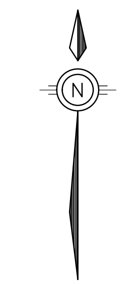


10 0 10

SCALE FEET

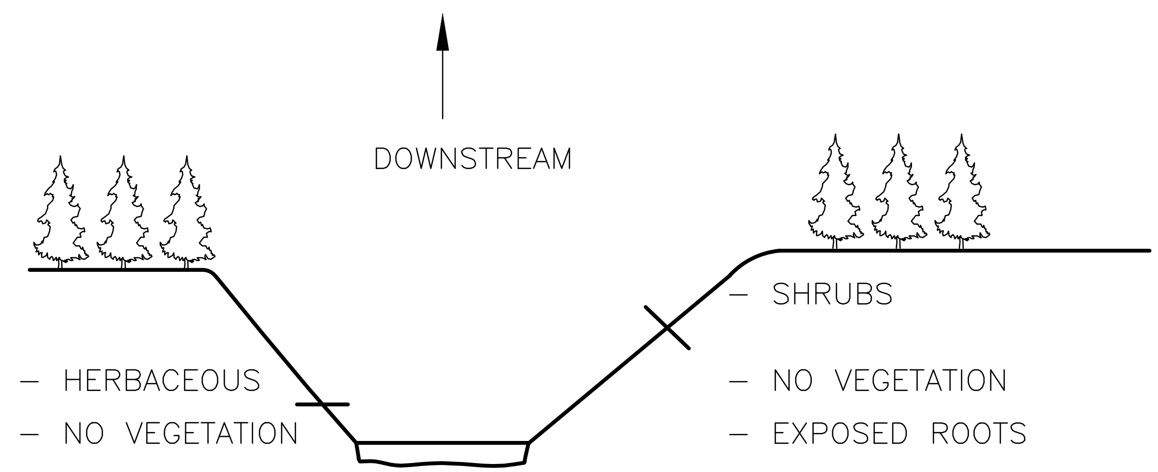
FIGURE 4
BIG CREEK – 0.25 MILE UPSTREAM
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.®
DWG DATE: 05/18/15	(800) 588-7962
DWG NO: 14024_C005	www.ensafe.com



35.33791 / −89.80488

- STAGNANT, TURBID WATER
- CONSISTENT SOILS THROUGHOUT
- SOME DEBRIS ACCUMULATIONS IN CHANNEL
- ESTABLISHED FOREST OUTSIDE OF TOP BANK



10 0 10

SCALE FEET

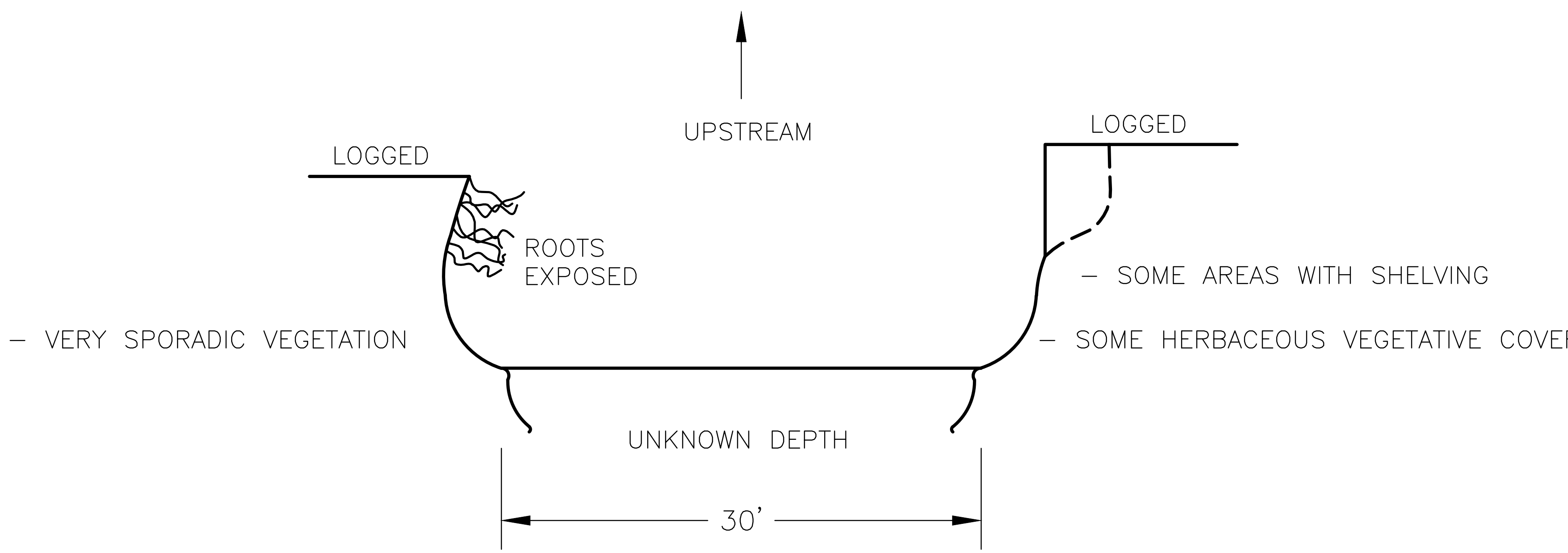
FIGURE 5
BIG CREEK – 0.75 MILE DOWNSTREAM
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.
DWG DATE: 05/18/15	(800) 588-7962
DWG NO: 14024_C006	www.ensafe.com

I:\CAD PROJECTS\14024 BIG CREEK DRAINAGE\Plans\14024_C006_BIG CREEK_0.75 MILE DOWNSTREAM.dwg

→ 35.32339 / -89.79107

- TURBID WATER
- MODERATE FLOW
- UNDER CUT BANKS
- SOILS ERODED THROUGH PROFILE TO CLAY – CLAY FRAGIPAN AT CHANNEL BOTTOM
- JUST UPSTREAM OF BRIDGE
  - RIP RAP AROUND CROSSING ABUTMENTS – RESTRICTING BASE FLOW IN CHANNEL BOTTOM
  - LARGE QUANTITY OF DEBRIS AT CROSSING
- FORESTED AREA SURROUNDING CHANNEL PREVIOUSLY LOGGED – NOW DENSE HERBACEOUS AND SCRUB SHRUB LAYER



10 0 10
SCALE FEET

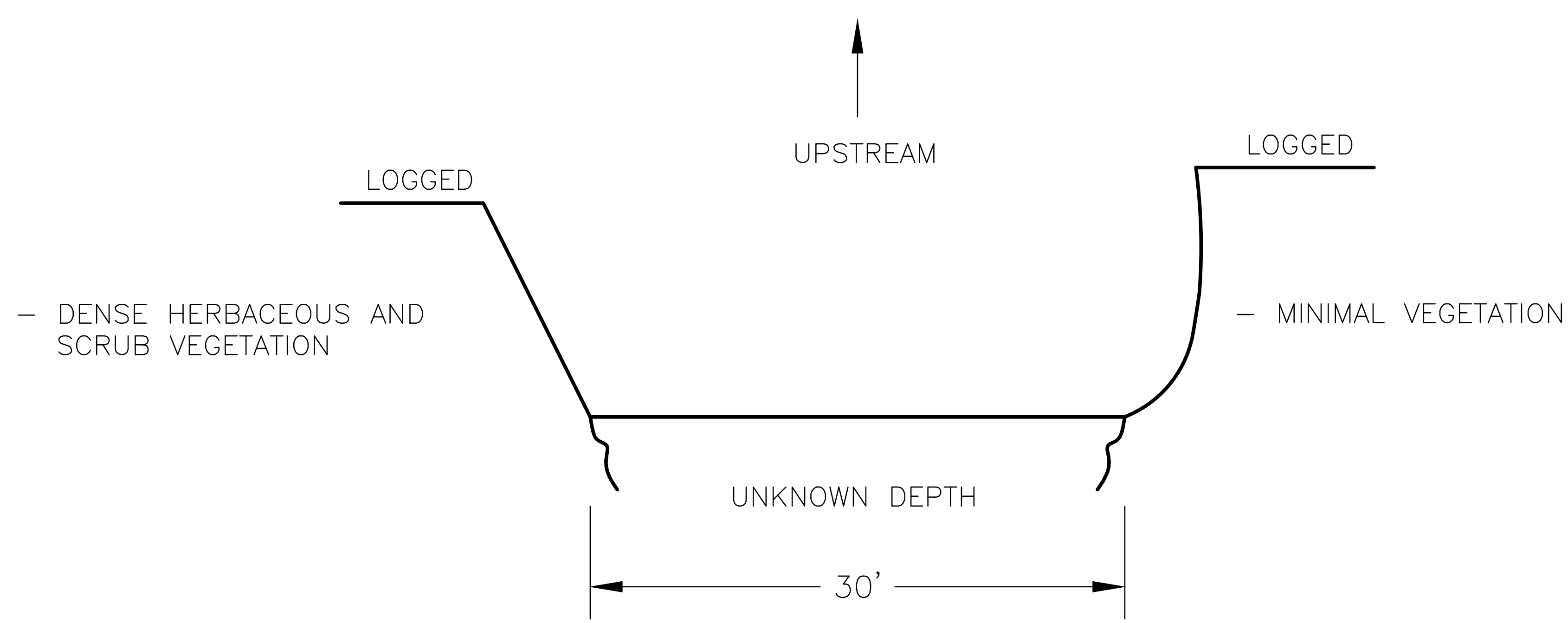
FIGURE 6
CROOKED CREEK – CONTROL STRUCTURE
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.®
DWG DATE: 05/15/15	(800) 588-7962
DWG NO: 14024_C001	www.ensafe.com

I:\CAD PROJECTS\14024 BIG CREEK DRAINAGE\Plans\14024_C001_CROOKED CREEK_CNTR_STRUCTURE.dwg

35.32422 / -89.786914

- TURBID WATER
- VERY LITTLE FLOW OBSERVED
- LARGE TREES DOWNED ON BANKS AND IN CHANNEL – LIKELY FOR LOGGING



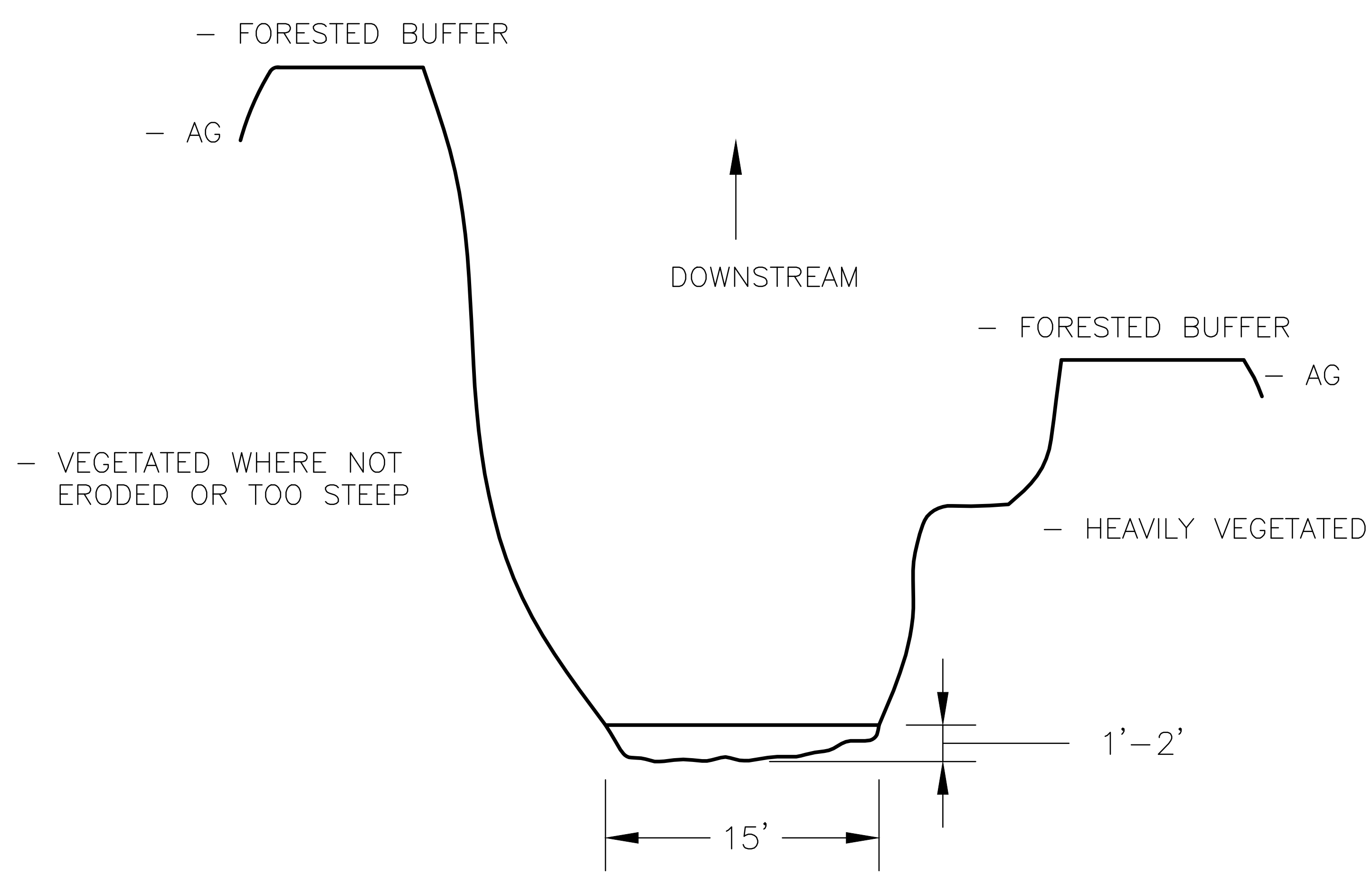
10 0 10
SCALE FEET

FIGURE 7
CROOKED CREEK – 0.25 MILES UPSTREAM
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.®
DWG DATE: 05/15/15	(800) 588-7962
DWG NO: 14024_C002	www.ensafe.com

35.323479 / –89.803106

- ERODED TO CLAY FROGIPAN
- BANKS MOSTLY VEGETATED WITH WOODY AND HERBACEOUS SPECIES – VERY WEEDY AND THICK
- WRACK LINES, MATTED DEBRIS UP TO 20' IN VEGETATION
- MINIMAL FLOW
- FORESTED ON TOP BANKS IN SMALL BUFFER TO ADJACENT ROW CROPS



10 0 10
SCALE FEET

FIGURE 8
CROOKED CREEK – 0.75 MILES DOWNSTREAM
BIG CREEK DRAINAGE STUDY
CITY, STATE

REQUESTED BY: BRIAN Y.	ENSAFE
DRAWN BY: C.CORLEONE	creative thinking. custom solutions.
DWG DATE: 05/15/15	(800) 588-7962
DWG NO: 14024_C003	www.ensafe.com

Photo 1: A view of Big Creek at the approximate location of the flood control structure. Photo was taken facing downstream (south).

Photo 2: A view of Big Creek at the approximate location of the flood control structure. Photo was taken facing upstream (north).

Photo 3 A view of Big Creek approximately 0.25 mile upstream of the flood control structure. Photo was taken facing downstream (south).

Photo 4: A view of Big Creek approximately 0.25 mile upstream of the flood control structure. Photo was taken facing upstream (north).

Photo 5: A view of Big Creek approximately 0.75 mile downstream of the flood control structure. Photo was taken facing downstream (south).

Photo 6: A view of Big Creek approximately 0.75 mile downstream of the flood control structure. Photo was taken facing upstream (north).

Photo 7: A view of Crooked Creek at the approximate location of the flood control structure. Photo was taken facing upstream (east).

Photo 8: A view of Crooked Creek at the approximate location of the flood control structure near the crossing of Donnell Road. Photo was taken facing downstream (west).

Photo 9: A view of Crooked Creek approximately 0.25 mile upstream of the flood control structure. Photo was taken facing downstream (west).

Photo 10: A view of Crooked Creek approximately 0.25 mile upstream of the flood control structure. Photo was taken facing upstream (east).

Photo 11: A view of Crooked Creek approximately 0.75 mile downstream of the flood control structure. Photo was taken facing downstream (west).

APPENDIX D

SELECTED GRANT PROGRAMS AVAILABLE FOR POTENTIAL FLOOD CONTROL PROJECTS

Grant	Managing Agency	Purpose	Funding						Competitive?	Example Eligible Projects	Limitations
			Share	Amounts	Avg. No. of Applicants/Awards	Max. Award	Median Award	Min. Award			
Pre-Disaster Mitigation Program[1,2]	TN EMA	Assist states in reducing overall risk to the population and structures from future hazard events, while reducing reliance on future Federal funding	75% Federal 25% non-Federal	• FY15 – $23M • FY14 – $25M • FY13 – $25M • FY12 – $35.5M • FY11 – $49.9M	60 / Varies	$3M	$248,800	$1,637	Nationwide	• Acquisition/Demolition of repetitively flooded residences. • Construction of retention/detention ponds, drainage improvements, elevation of roadways, etc. • Creating/updating Hazard Mitigation Plans	• Total amount allocated to TN distributed by TN EMA based upon need • Application must be coordinated through State Hazard Mitigation Officer
Hazard Mitigation Grant Program[3,4]	TN EMA	Provide funding for mitigation measures following a disaster	75% Federal 25% non-Federal	• FY15 – TBD • FY14 – $1.68B • FY13 – $712M • FY12 – $915M	Varies depending on number and severity of disasters	$36.3M	$605,094	$2,130	Statewide	• Acquisition/Demolition of repetitively flooded residences. • Construction of retention/detention ponds, drainage improvements, elevation of roadways, etc. • Creating/updating Hazard Mitigation Plans	• Total amount allocated to TN distributed by TN EMA based upon need • Requires a Presidential-declared disaster for funding to be allocated (post-disaster) • Application must be submitted within 12 months of disaster declaration • Application must be coordinated through State Hazard Mitigation Officer
Flood Mitigation Assistance Program[5,6]	TN EMA	Reduce claims under the National Flood Insurance Program (NFIP)	• Max. 100% Federal (severe, repetitive loss properties); • Max. 90% Federal (repetitive loss properties); • Max. 75% Federal (NFIP-insured properties)	• FY15 – $150M • FY14 – $100M • FY13 – $120M • FY12 – $40M • FY11 – $40M	30-40 / Not Available	$12.2M	$915,485	$37,500	Nationwide	• Acquisition/Demolition of repetitively flooded residences. • Construction of retention/detention ponds, drainage improvements, elevation of roadways, etc. • Creating/updating Hazard Mitigation Plans (flood hazard portion only)	• Total amount allocated to TN distributed by TN EMA based upon need • Application must be coordinated through State Hazard Mitigation Officer • Projects to be funded must appear in Shelby County Hazard Mitigation Plan

[1] http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf
[2] https://ofmpub.epa.gov/apex/watershedfunding/f?p=116:2:0::NO::P2_X_PROG_NUM,P2_X_YEAR:22,2015
[3] http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf
[4] https://ofmpub.epa.gov/apex/watershedfunding/f?p=116:2:0::NO::P2_X_PROG_NUM,P2_X_YEAR:35,2015
[5] http://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf
[6] https://ofmpub.epa.gov/apex/watershedfunding/f?p=116:2:6941460346982::NO::P2_X_PROG_NUM,P2_X_YEAR:31,2015

Grant	Managing Agency	Purpose	Funding						Competitive?	Example Eligible Projects	Limitations
			Share	Amounts	Avg. No. of Applicants/Awards	Max. Award	Median Award	Min. Award			
Nonpoint Source Implementation[7]	TDEC/ Department of Agriculture	Promote the development and implementation of watershed-based plans to improve water quality, focusing on watersheds with water quality impairments caused by nonpoint sources	60% Federal 40% State (recipients within state are often required to provide the 40% state match)	• FY15 – TBD • FY14 – $159M • FY13 – $156M • FY12 – $165M • FY11 – $175M	Varies	$8.4M	$2.8M	$422K	Nationwide	• Installation of BMPs for animal waste • Design and implementation of BMPs for stream, lake, and estuary watersheds, including monitoring • Basin-wide landowner education programs	• Total amount allocated to TN distributed by TN Department of Agriculture
Regional Conservation Partnership Program[8,9]	NRCS	Establish partnerships for innovative, workable and cost-effective approaches to benefit farming, ranching, and forest operations, local economies, and the communities and resources in a watershed or other geographic area.	Not stated	• FY15 – $225M • FY14 – $394M	• FY 2014: 600 applicants, 210 awards	$10M	Not stated	$0	Nationwide	• Mitigation of farmland erosion • Preservation of wetland wildlife habitats • Improvements to water quality	• Total funding will depend on government sequester
Land and Water Conservation Fund, State and Local Assistance Program[10]	National Park Service	Acquisition and development of land and water for outdoor recreation purposes	1:1 match federal funds to other funding sources	• FY2015 – $45M[11]	• FY15 expect 300 awards	$2.5M	Not stated	$5K	Nationwide	Land acquisition and development grants may be in support of a wide range of outdoor recreation uses, such as city parks, playgrounds, picnic areas, campgrounds, bike trails, swimming pools, and sports fields; as well as for infrastructure that supports these activities such as restrooms.	• Statutory requirement that funds must be obligated within 3 years of award

[7] https://ofmpub.epa.gov/apex/watershedfunding/f?p=116:2:0::NO::P2_X_PROG_NUM,P2_X_YEAR:44,2015
[8] http://www.grants.gov/web/grants/search-grants.html?keywords=regional%20conservation
[9] http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/farmbill/rcpp/
[10] http://www.grants.gov/web/grants/search-grants.html?keywords=land%20and%20water%20conservation%20fund,%20state%20and%20local%20assistance%20program
[11] http://www.nps.gov/ncrc/programs/lwcf/funding.html

Grant	Managing Agency	Purpose	Funding						Competitive?	Example Eligible Projects	Limitations
			Share	Amounts	Avg. No. of Applicants/Awards	Max. Award	Median Award	Min. Award			
Wetlands Reserve Program[12,13]	NRCS	Achieve wetlands functions and wildlife habitat on every acre enrolled in the program.	Covers 100% of permanent easement and restoration costs, or 75% of 30-year easement and restoration costs.	• Varies[14]	Varies	Not stated	Not stated	Not stated	Nationwide	Restoration of wetlands on: • Farmed wetlands, • Prior converted wetlands, • Wetlands farmed under natural conditions, • Former or degraded wetlands • Lands substantially altered by flooding, and • Riparian areas	• At least 70 percent of the wetland and upland areas will be restored to the natural condition to the extent practicable; the remaining 30 percent of the project area may be restored to other than natural conditions.
Wetlands Program Development Grants[15]	U.S. EPA	Encourage comprehensive wetlands program development by promoting the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution.	75% Federal 25% Local	• Varies	Varies	$600K per fiscal year	$220K per fiscal year	$20K per fiscal year	Nationwide	• Development of a wetlands protection, restoration, or management program or support enhancement/refinement of an existing program.	• Funds cannot be used for implementation of individual mitigation projects, mitigation banks, or in-lieu-fee mitigation programs.
Recreation Trails Program (RTP)[16,17]	TDEC	Funding for acquisition for trails, trail construction, maintenance, rehabilitation, and for trail head support facilities.	80% State 20% Local	• FY14: $1.2M	Varies	Not stated	Not stated	Not stated	Statewide	• Creation of bike trails	• Must be ADA compliant • Grant projects must be on publicly owned land

TN EMA – Tennessee Emergency Management Agency
TDEC – Tennessee Department of Environment and Conservation
NRCS – National Resources Conservation Service
U.S. EPA – United States Environmental Protection Agency
FY – Fiscal Year
TBD – To be determined
ADA – Americans with Disabilities Act

M – $1,000,000
K – $100,000

[12] http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands/
[13] http://www.federalgrantswire.com/wetlands-reserve-program.html#.VYQ6-BH774Z
[14] http://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/fb08_cp_wrp.html
[15] http://www.federalgrantswire.com/wetland-program-development-grants.html#.VYRABRH774Z
[16] http://www.tn.gov/environment/recreation/recreation_grants.shtml
[17] http://www.tn.gov/environment/recreation/docs/2014-rtp-project-manual.pdf

Shelby County Government
Office of Resilience

Big Creek National Disaster Resilience Design Project

Appendix C

Hydrologic Determination

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
Memphis Environmental Field Office
8383 Wolf Lake Drive
Bartlett, TN 38133
Phone 901-371-3000 Statewide 1-888-891-8332 Fax 901-371-3170

September 19, 2018

Mr. Tom Needham
Director of Public Works
Shelby County Government
160 North Main Street
Memphis, TN 38103

Re: Hydrologic Determination #QHP1805.021
Big Creek Resiliency Project
Shelby County, TN

Dear Mr. Needham,

The Division of Water Resources has reviewed the documentation prepared by Mr. Grant Lynch and Mr. Nick Carmean (Qualified Hydrologic Professional #1178-TN18) with Barge Design Solutions seeking concurrence with the report that was submitted in support of the Hydrologic Determinations conducted for the above referenced property in Shelby County, TN.

We are in concurrence with the following submitted assertions:

The channel identified as a wet weather conveyance – WWC/EPH 1 (from coordinates 35.333 Lat., -89.9187 Long. to 35.3312 Lat., -89.9153 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 2 (from coordinates 35.331 Lat., -89.9119 Long. to 35.3318 Lat., -89.9116 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 3 from coordinates 35.3334 Lat., -89.9116 Long. to 35.3335 Lat., -89.9103 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 4 (from coordinates 35.3335 Lat., -89.870314 Long. to 35.51898 Lat., -89.870655 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 5 (from coordinates 35.3363 Lat., -89.9069 Long. to 35.335 Lat., -89.9078 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 6 (from coordinates 35.3323 Lat., -89.9086 Long. to 35.3332 Lat., -89.9088 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 7 (from coordinates 35.3317 Lat., -89.9004 Long. to 35.3324 Lat., -89.9009 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 8 (from coordinates 35.3401 Lat., -89.8873 Long. to 35.3324 Lat., -89.8896 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 9 (from coordinates 35.3325 Lat., -89.8847 Long. to 35.3316 Lat., -89.885 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 10 (from coordinates 35.3216 Lat., -89.8756 Long. to 35.3218 Lat., -89.8762 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 11 (from coordinates 35.3234 Lat., -89.8751 Long. to 35.3243 Lat., -89.8746 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 12 (from coordinates 35.3226 Lat., -89.8697 Long. to 35.3231 Lat., -89.8695 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 13 (from coordinates 35.3212 Lat., -89.8703 Long. to 35.323 Lat., -89.8694 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 14 (from coordinates 35.3255 Lat., -89.8574 Long. to 35.3242 Lat., -89.8572 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 15 (from coordinates 35.3253 Lat., -89.8538 Long. to 35.3252 Lat., -89.8574 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 16 (from coordinates 35.3241 Lat., -89.8555 Long. to 35.3242 Lat., -89.8596 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 17 (from coordinates 35.3274 Lat., -89.90898 Long. to 35.506711 Lat., -89.909171 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 18 (from coordinates 35.3368 Lat., -89.9306 Long. to 35.3361 Lat., -89.9318 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 19 (from coordinates 35.3367 Lat., -89.9289 Long. to 35.3356 Lat., -89.9288 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 20 (from coordinates 35.3421 Lat., -89.9516 Long. to 35.3416 Lat., -89.9513 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 21 (from coordinates 35.3421 Lat., -89.9513 Long. to 35.3413 Lat., -89.9509 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 22 (from coordinates 35.339 Lat., -89.9495 Long. to 35.3382 Lat., -89.9496 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 23 (from coordinates 35.339 Lat., -89.949 Long. to 35.3388 Lat., -89.9492 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 24 (from coordinates 35.3391 Lat., -89.9468 Long. to 35.338 Lat., -89.9479 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 25 (from coordinates 35.3402 Lat., -89.9432 Long. to 35.3375 Lat., -89.9436 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 26 (from coordinates 35.3379 Lat., -89.9423 Long. to 35.3382 Lat., -89.9431 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 27 (from coordinates 35.3378 Lat., -89.9418 Long. to 35.338 Lat., -89.9431 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 28 (from coordinates 35.2882 Lat., -89.9191 Long. to 35.2851 Lat., -89.9191 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 29 (from coordinates 35.2871 Lat., -89.9197 Long. to 35.2868 Lat., -89.9192 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 30 (from coordinates 35.2877 Lat., -89.9175 Long. to 35.2851 Lat., -89.9191 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 31 (from coordinates 35.2867 Lat., -89.9188 Long. to 35.2861 Lat., -89.9186 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 32 (from coordinates 35.2856 Lat., -89.9292 Long. to 35.2847 Lat., -89.9198 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 33 (from coordinates 35.283 Lat., -89.9224 Long. to 35.2828 Lat., -89.9223 Long.) is a wet weather conveyance.

The channel identified as a wet weather conveyance – WWC/EPH 34 (from coordinates 35.2827 Lat., -89.9232 Long. to 35.2826 Lat., -89.9225 Long.) is a wet weather conveyance.

Twenty five channels were identified as streams and the Division agrees with the determination. Additionally, fifty six wetlands were identified and have been confirmed by the Army Corps of Engineers.

Please be informed that alterations to wet weather conveyances are authorized under the General Permit for Alteration of Wet Weather Conveyances (copy enclosed) provided you can meet the Terms and Conditions of the permit. Alterations to streams and wetlands require authorization under an appropriate Aquatic Resource Alteration Permit (ARAP). You can download the ARAP application form at the following web address: http://environment-online.state.tn.us/etdec/DownloadFile.aspx?row_id=CN-1091

If you have any questions, please feel free to contact me at (901) 371-3019 or at Lew.Hoffman@tn.gov.

Thank you,

Lew E. Hoffman

Lew E. Hoffman
Environmental Consultant
Division of Water Resources
Memphis Environmental Field Office

Copy: Grant Lynch, Barge Design Solutions
file

August 31, 2018

Mr. Lew Hoffman (Lew.Hoffman@tn.gov)
TDEC Division of Water Resources
Memphis EFO
8383 Wolf Lake Drive
Bartlett, TN 38133

RE: Request for Review and Concurrence of Hydrologic Determination and Verification of Waters of the State for the Big Creek National Disaster Resilience Design Project, Millington, Shelby County, Tennessee. Barge Project #3508507

Dear Mr. Hoffman,

On behalf of the Shelby County Government, Barge Design Solutions, Inc. (Barge) is submitting the attached Hydrologic Determination Report under the "presumption of correctness" (as amended in Rule 0400-40-17 of the Tennessee Water Quality Control Act of 1977) for the Big Creek National Disaster Resilience Design Project ("Project") located in Millington, Tennessee. **Per the requirements of wet weather conveyance determination reports, we are seeking treatment under §69-3-108(r)**.

1.0 PURPOSE

The purpose of the site assessment was to determine if potentially jurisdictional wetlands and/or streams, using scientifically based principles and applicable State and Federal rules and regulations, were located within the project study area. The information provided in the attached Hydrologic Determination package characterizes the waterbodies located within the project area.

1.1 Study Area

The Project study area consists of four parcels of property located near the town of Millington, Shelby County, Tennessee. The parcels are approximately 2,600 total acres. The largest of the four parcels is located on the north side of Hwy 385 (Paul Barret Pkwy) between Hwy 3 and Sledge Rd in Millington, Tennessee (Attachment A, Figure 1). The second parcel is located east of Russel Bond Drive and south southwest of Epperson Mill Drive and the Millington Waste Water Treatment Facility on the west side of Millington, Tennessee. The third parcel is located south of the central area of Millington, situated on the northeast corner of Raleigh-Millington Road and Duncan Road. The final parcel is located at the southwest corner of Hickory Meadows Road and Quito Road in Millington Tennessee. These areas are located within the Mississippi Valley Loess Plains (74) ecoregion of Tennessee, which is further categorized into the Loess Plains (74b) physiographic region of Tennessee. The west side of the larger parcel is within the Millington topographic quadrangle, and the east side is within the Brunswick topographic quadrangle. The three smaller parcels are located within the Millington topographic quadrangle (Attachment A, Figure 2). The project areas lie within the Big Creek Middle (080102090302), Big Creek Lower (080102090303), and Loosahatchie River-Outlet (080102090406) 12-digit HUCs (Attachment A, Figure 3).

2.0 ENVIRONMENTAL REVIEW

Prior to visiting the project study area, a resource review of available background site information was conducted using the U.S. Fish and Wildlife Service National Wetland Inventory (NWI) database, USDA soils maps, topographic maps, and USGS National Hydrography Dataset (NHD) to determine if jurisdictional features could be found within the area. Major landscapes and vegetation units were identified using aerial imagery before surveying the project study area. This provided information as to the potential conditions that may be encountered within the study area prior to the site visit.

Additionally, as these determinations were completed during multiple visits, a calculation of normal weather conditions was conducted for each trip. (See Tables 3 – 5 – Calculation of Normal Weather Conditions “Bartlett 3.1 NNE, TN US, US1TNSH0032” in the appendices). During each of the site visits, the conditions were considered normal for precipitation.

2.1 Field Investigations

Wetland Boundary Identification

During the months of July 2017, April 2018, and June 2018 Barge, Tioga Environmental Consultants, and Brophy-Heineke & Associates biologists performed a field survey within and directly adjacent to the limits of investigation to determine the presence or absence of jurisdictional waters. Wetland determinations were conducted by Barge, Tioga Environmental Consultants, and Brophy-Heineke & Associates biologists through observing hydrophytic vegetation, hydric soils, and wetland hydrology according the U.S. Army *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region*, *Version 2.0*. The methodologies as set forth in the manual were employed to determine presence or absence of vegetation, hydrology, and hydric soil field indicators. Sample points were chosen based upon representative portions of the study area to confirm visual estimates of field indicators. The Atlantic and Gulf Coastal Plain Data Forms were completed at wetland and upland sample points according to the Manual to confirm boundaries of each ecosystem (see Attachment C-1 for data forms). The boundaries of the wetland were then marked in the field with pink flagging and coordinates were obtained with a GPS unit.

Waterbody Identification and Hydrologic Determination

Streams were field verified as waters of the state/waters of the U.S. based on the existence of biology, geomorphology [i.e. defined bed and bank, ordinary highwater mark (OHWM)] and hydrology. Streams that were identified by the United States Geological Survey National Hydrologic Dataset (NHD) and/or topographic maps were targeted for confirmation. Potential streams that were encountered and not identified by NHD or topographic maps were also noted. The coordinates of the centerline of all streams located within the project area were obtained with a GPS unit. On features that were not easily identifiable as streams, hydrologic determinations were performed based on observing hydrological, geomorphological, and biological features according to the *TDEC Guidance for Making Hydrologic Determinations Version 1.4*. The hydrologic determinations were conducted by Nick Carmean, Tennessee Qualified Hydrologic Professional (TN-QHP #1178-TN18) and Angel Fowler, Tennessee Qualified Hydrologic Professional (TN-QHP #1164-TN17). Hydrologic Determination field data sheets are provided in Attachment C-2.

3.0 RESULTS

3.1 Non-wetland Waters

All encountered non-wetland waterbodies are summarized in Table 1 (Attachment B) and displayed in Figures 6a – 6h (Attachment A). Thirty-four (34) wet weather conveyances were identified within the project limits (WWC-1 – WWC-34). Additionally, twenty-five (25) streams (STR-1 – STR-25) are also located within the limits of investigation.

3.2 Wetlands

There are fifty-six (56) wetlands ("WTL-1 – WTL-56") on the site as indicated on Figures 6a – 6h and summarized in Table 2 (Attachment B).

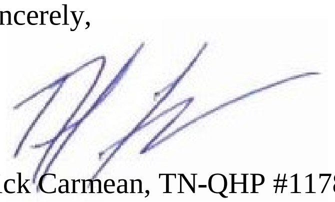
4.0 SUMMARY

Fifty-six wetlands, twenty-five streams, and thirty-four wet weather conveyances were identified during the field investigation (Figures 6a – 6h). Please find the attached hydrologic determination package which includes site maps/figures, HD field data sheets, and a photo summary.

Barge respectfully requests a review and confirmation of our hydrologic determination for the above listed waterbodies and attest that all submitted information is true, accurate and complete. We also request that all appropriate features be verified as waters of the state.

If you have any questions or require additional information, please do not hesitate to contact me at 615-585-4125 (Nick.Carmean@bargedesign.com) or Grant Lynch at 615-252-4246 (Grant.Lynch@bargedesign.com).

Sincerely,



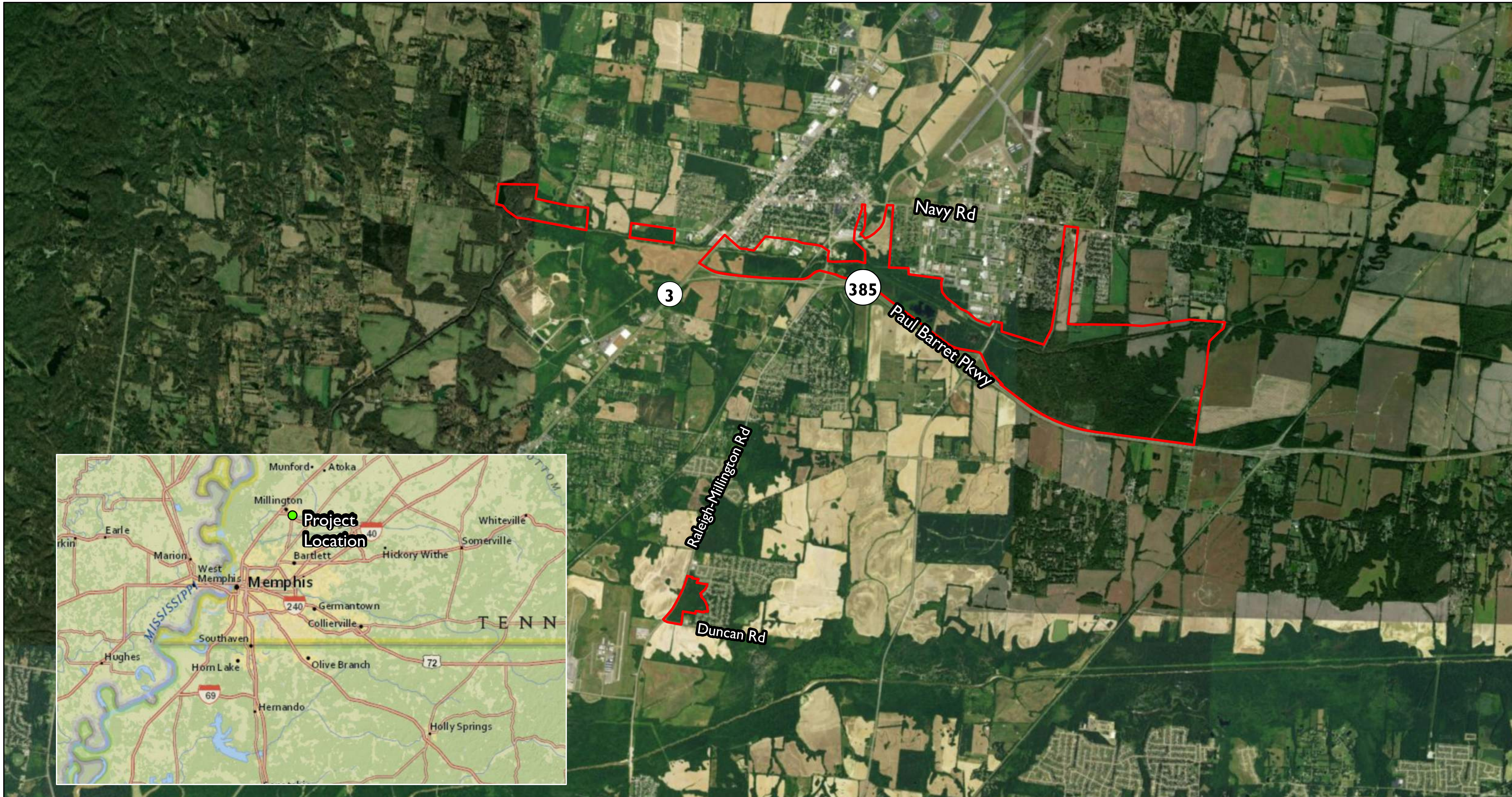
Nick Carmean, TN-QHP #1178-TN18
Project Biologist
Barge Design Solutions, Inc.

Big Creek National Disaster Resiliency Design Project
Millington, Tennessee
Hydrologic Determination Concurrence and
Waters of the State Verification Request

List of Contents

Attachment A

Figures



N

5,000 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

Project Location Map

Big Creek National Disaster Resilience Design Project

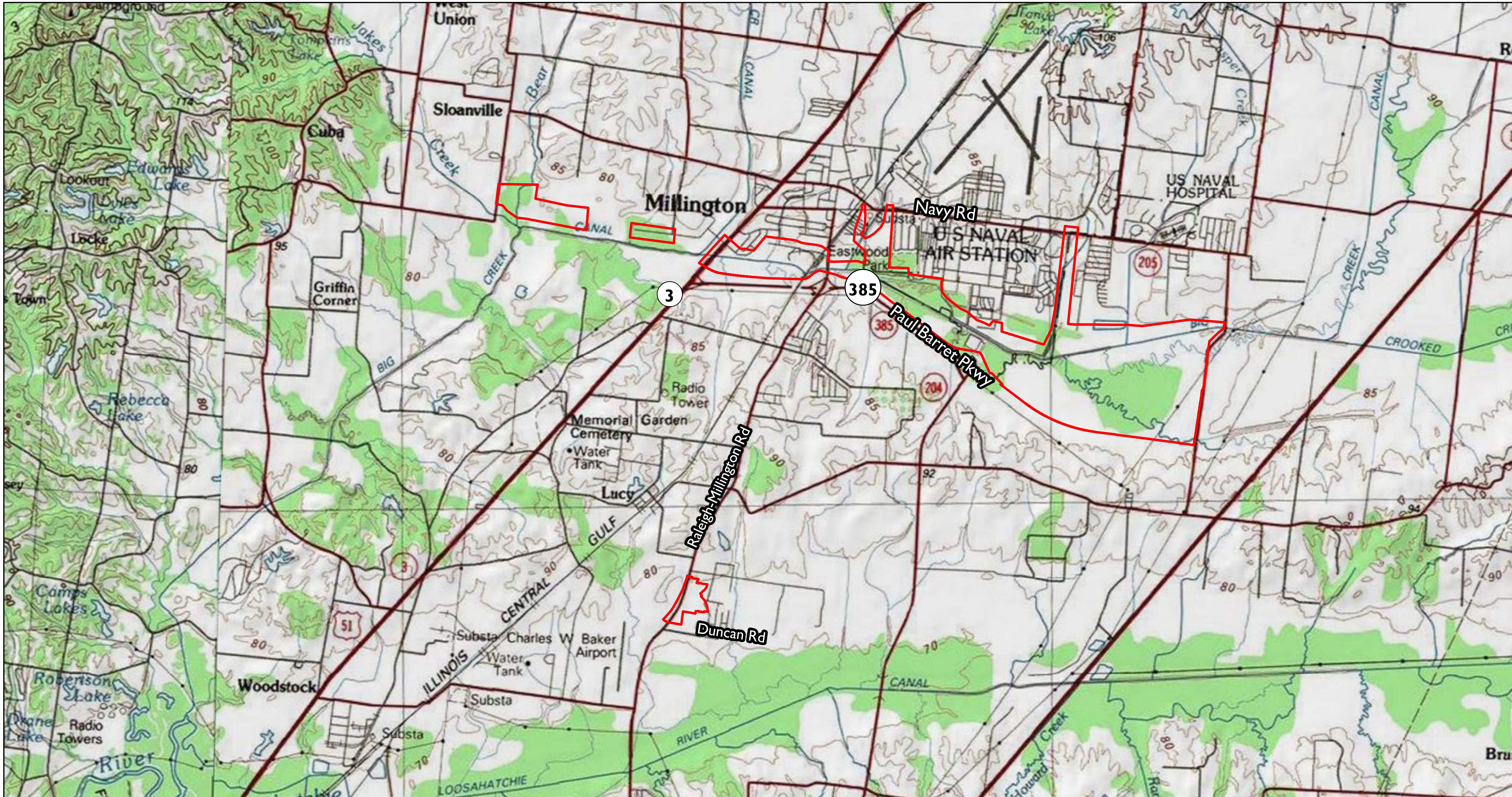
Millington, Shelby County, Tennessee

Project Limits

Figure 1

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 1_Project Location.mxd

Date: 29 August 2018



N

5,000 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Project Topographic Map

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

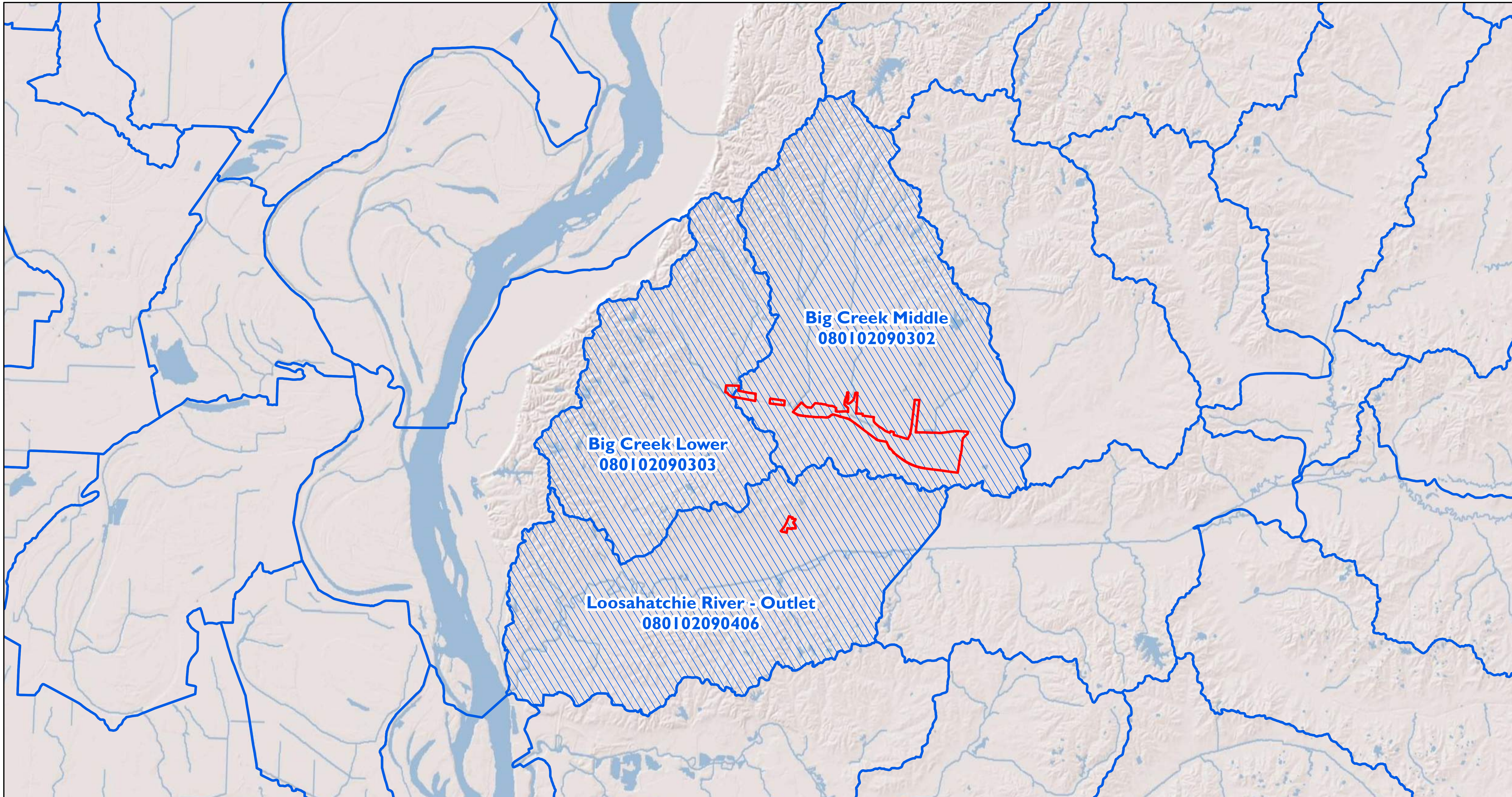
Project Limits

USGS Quadrangles: Millington and Brunswick

Figure 2

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 2_Project Topo.mxd

Date: 30 August 2018



N

15,000 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

HUC 12 Project Watershed Map

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

Project Watershed

HUC 12 Watershed

Figure 3

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 3_HUC 12 Watershed Map.mxd

Date: 30 August 2018

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE

Tioga Environmental Consultants

Soil Units Map - Area 1

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

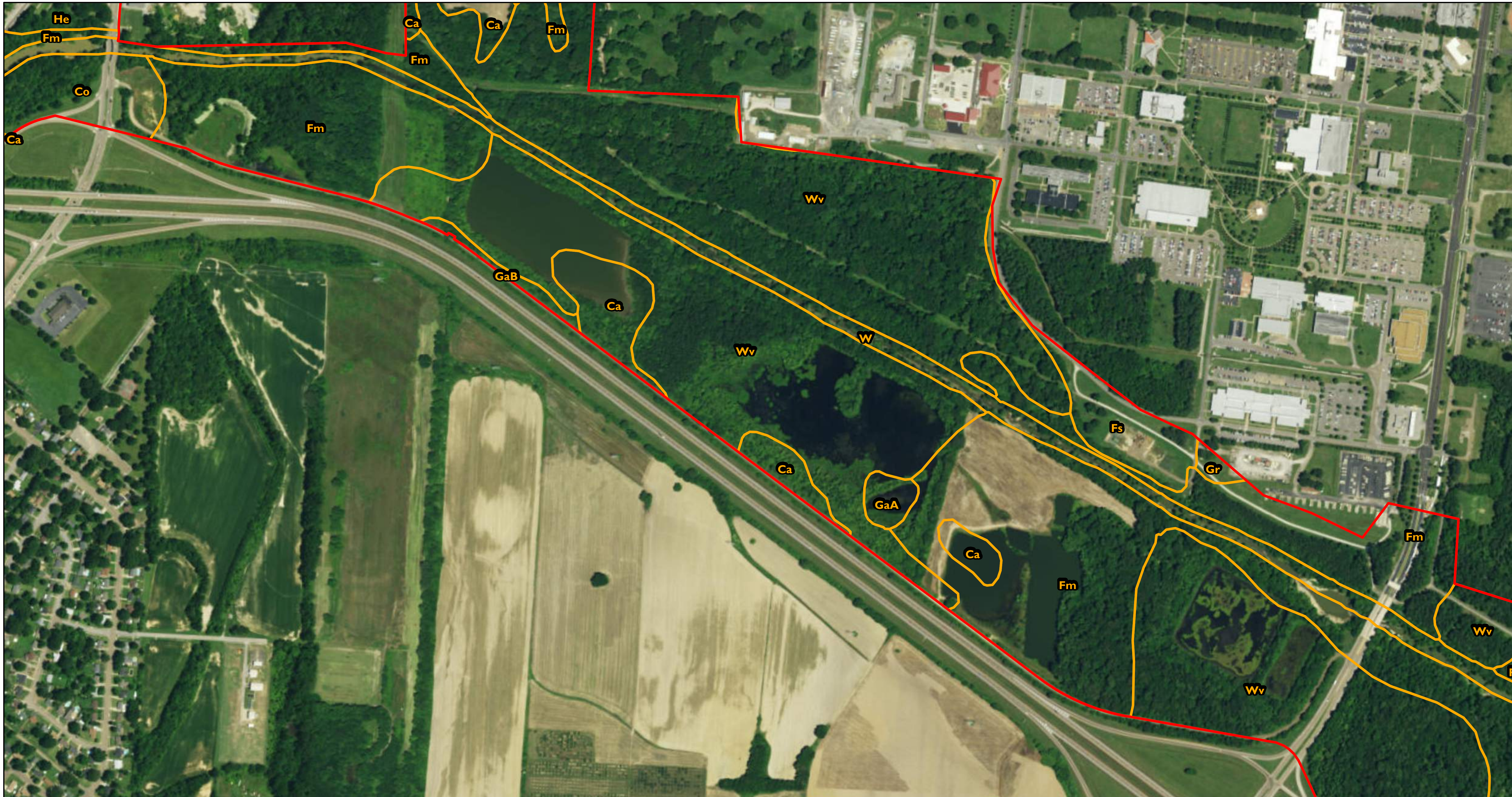
Project Limits

Soil Units

Figure 4a

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4a_Soil Units Area 1.mxd

Date: 30 August 2018



N
650 Feet
Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Soil Units Map - Area 2

Big Creek National Disaster Resilience Design Project

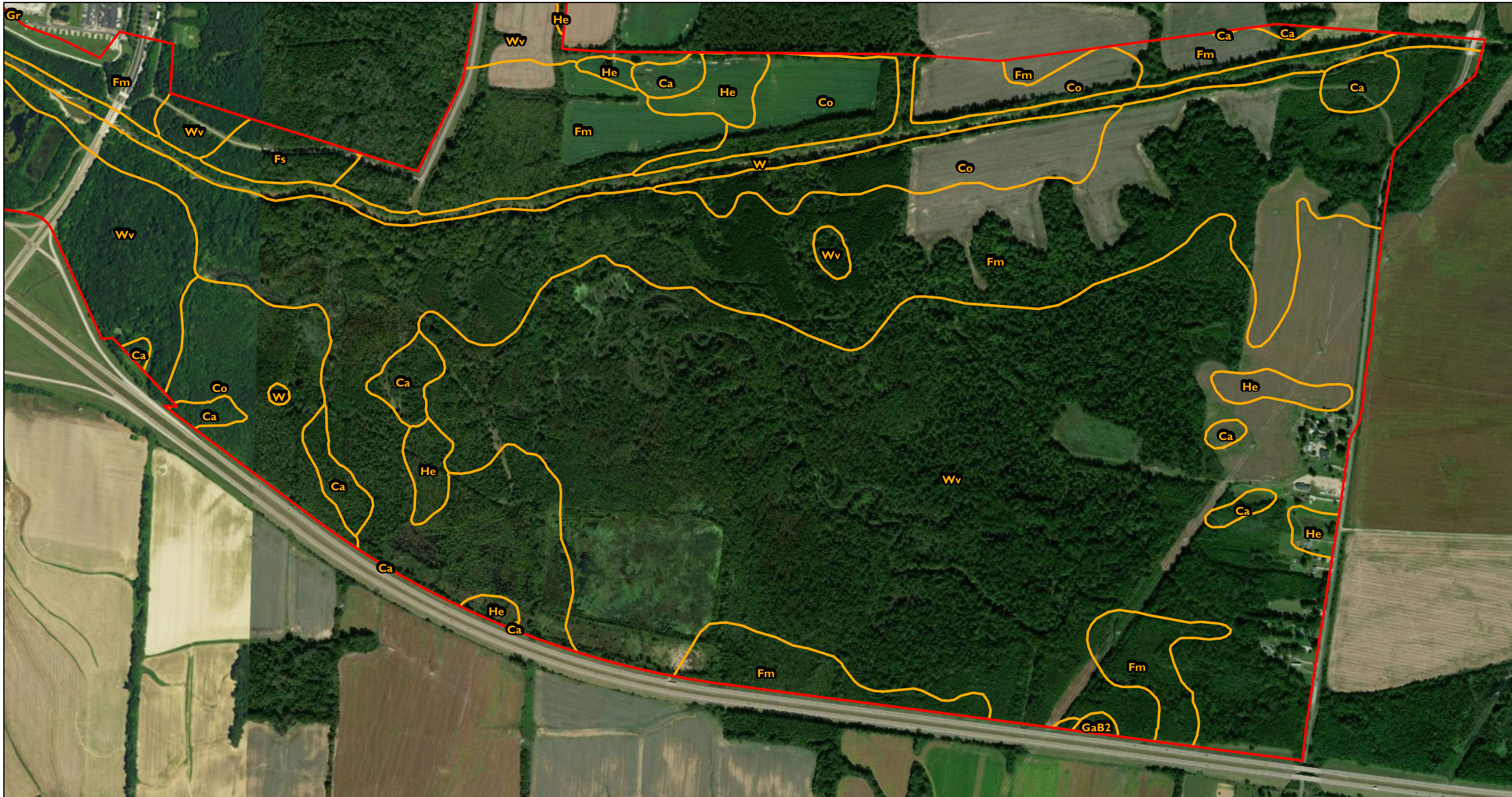
Millington, Shelby County, Tennessee

Project Limits
Soil Units

Figure 4b

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4b_Soil Units Area 2.mxd

Date: 30 August 2018



N

850 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Soil Units Map - Area 3

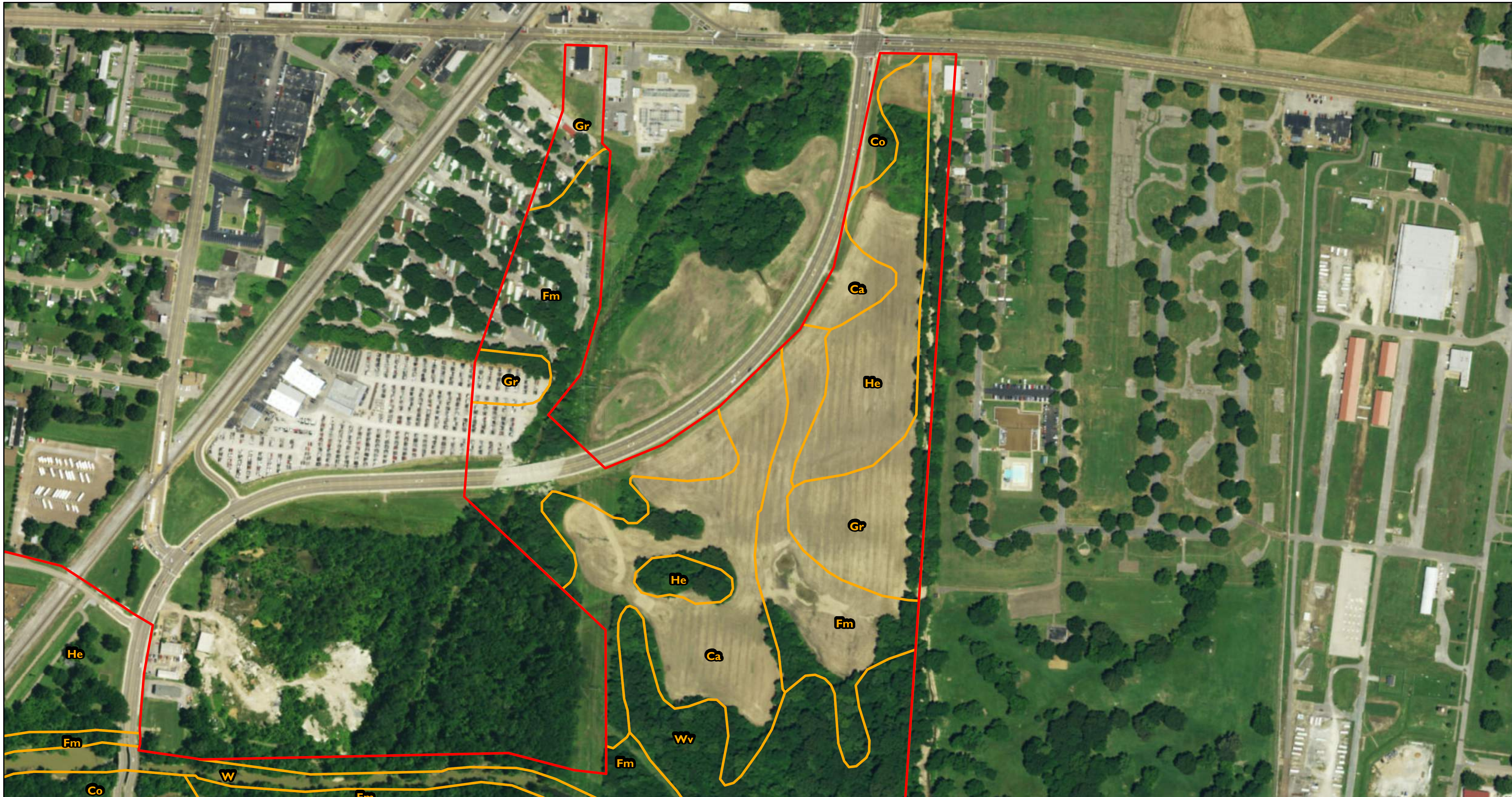
Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

Soil Units

Figure 4c



N

400 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Soil Units Map - Area 4

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

Soil Units

Figure 4d

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4d_Soil Units Map Area 4.mxd

Date: 30 August 2018

N

650 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Soil Units Map - Area 5

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

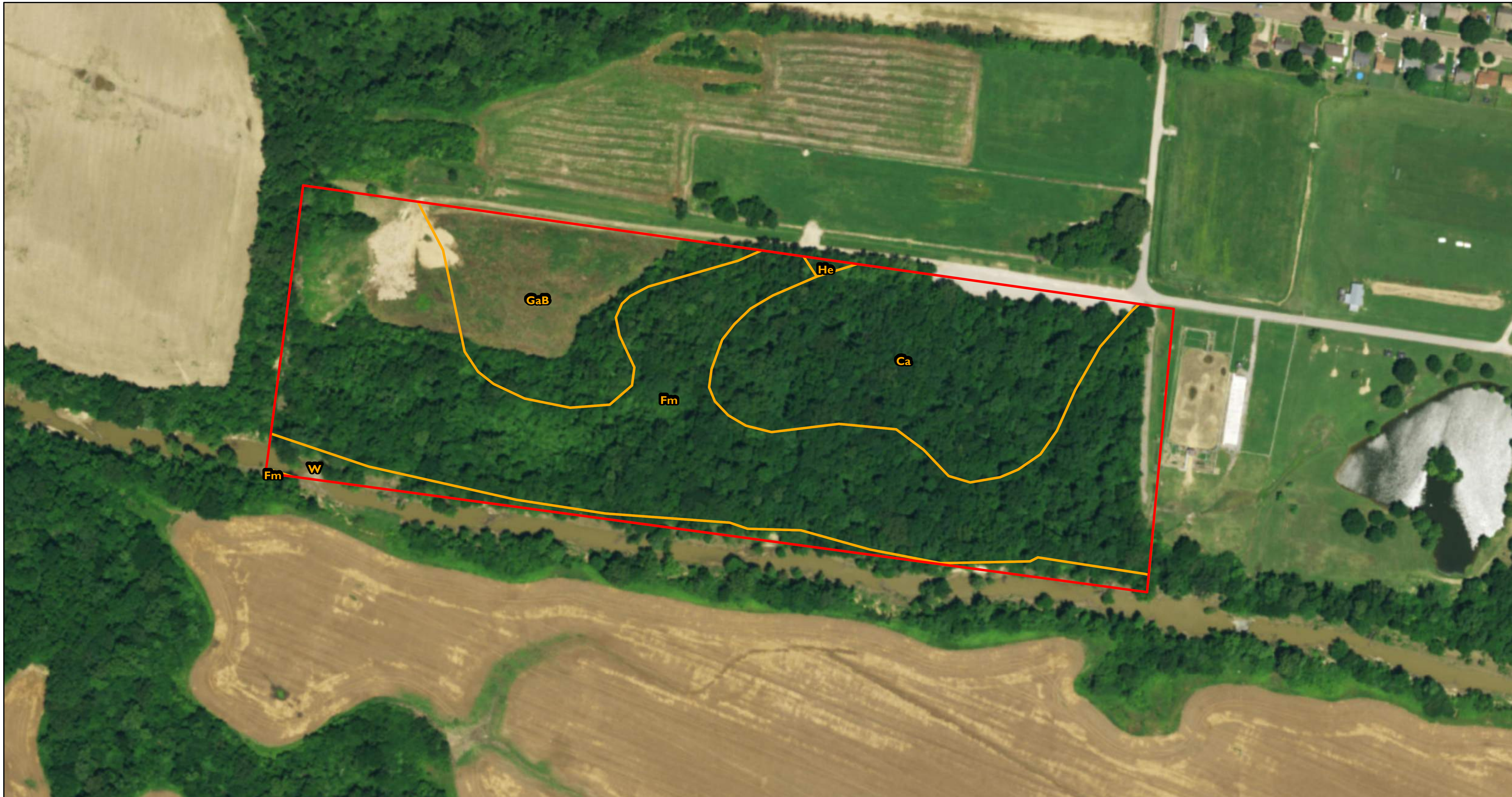
Project Limits

Soil Units

Figure 4e

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4e_Soil Units Area 5.mxd

Date: 30 August 2018



N

250 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE
Tioga

Soil Units Map - Area 6

Big Creek National Disaster Resilience Design Project

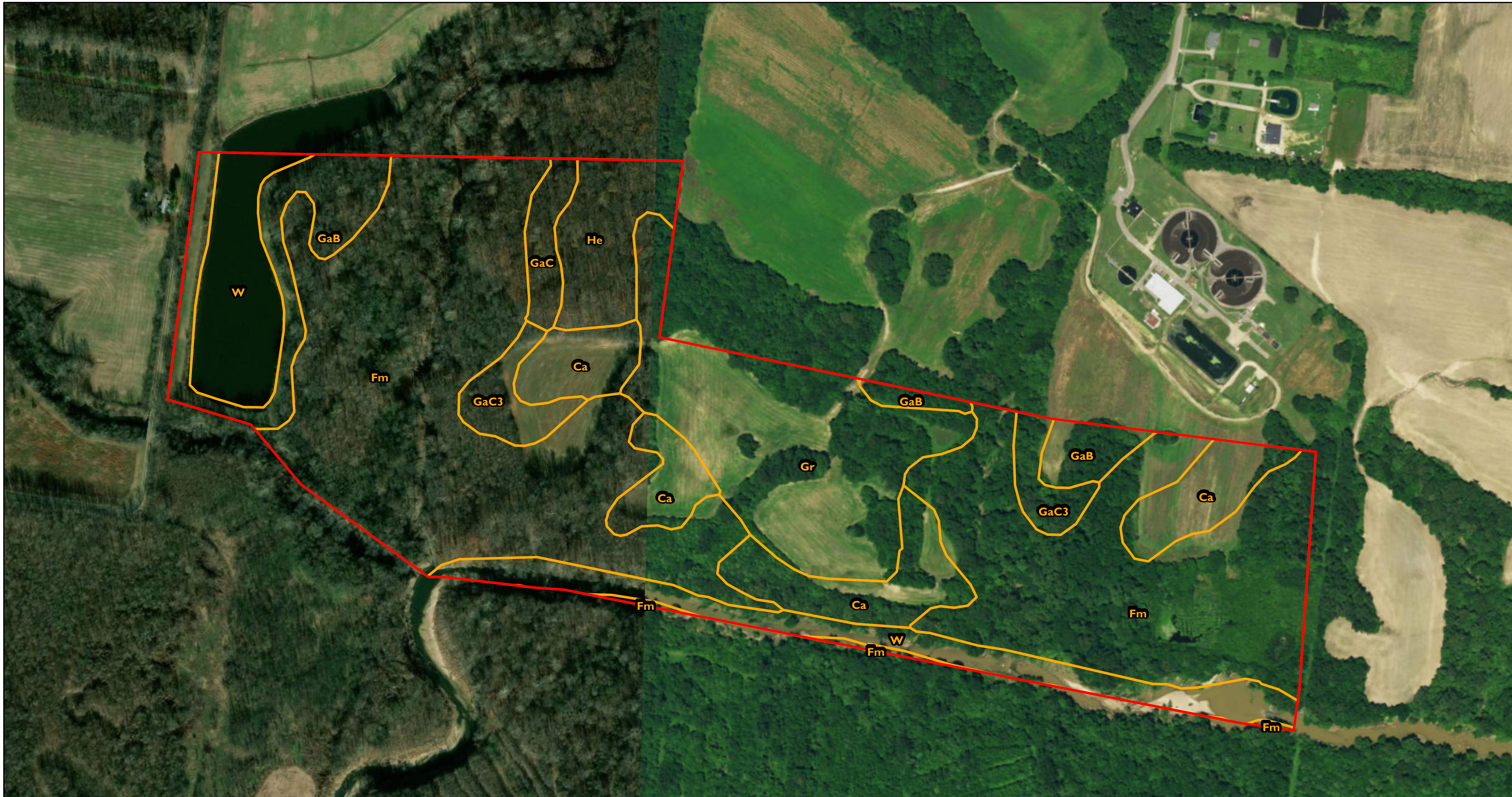
Millington, Shelby County, Tennessee

Project Limits
Soil Units

Figure 4f

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4f_Soil Units Area 6.mxd

Date: 30 August 2018



N

400 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE

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Soil Units Map - Area 7

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

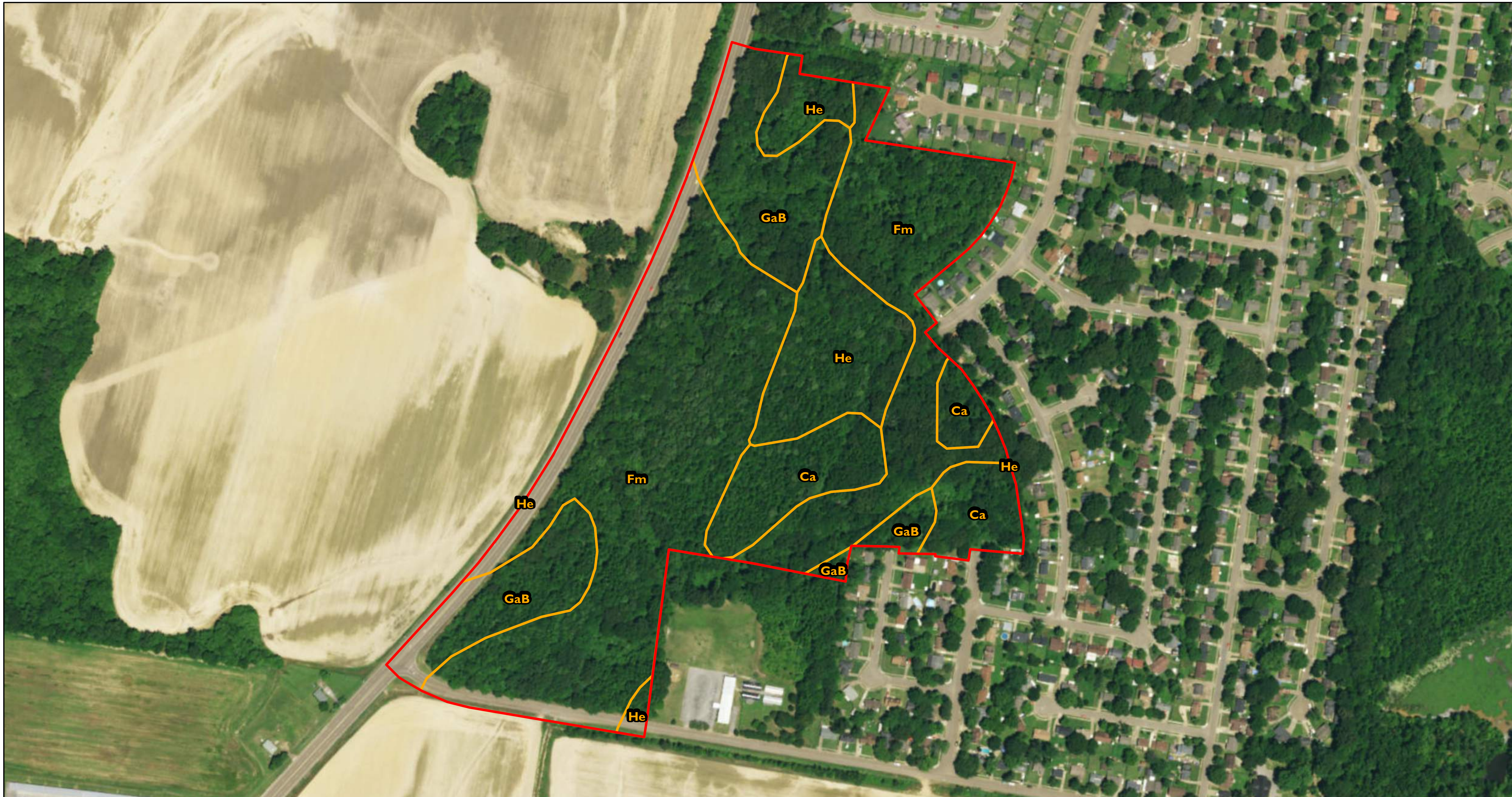
Project Limits

Soil Units

Figure 4g

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4g_Soil Units Area 7.mxd

Date: 30 August 2018



N

350 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Soil Units Map - Area 8

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

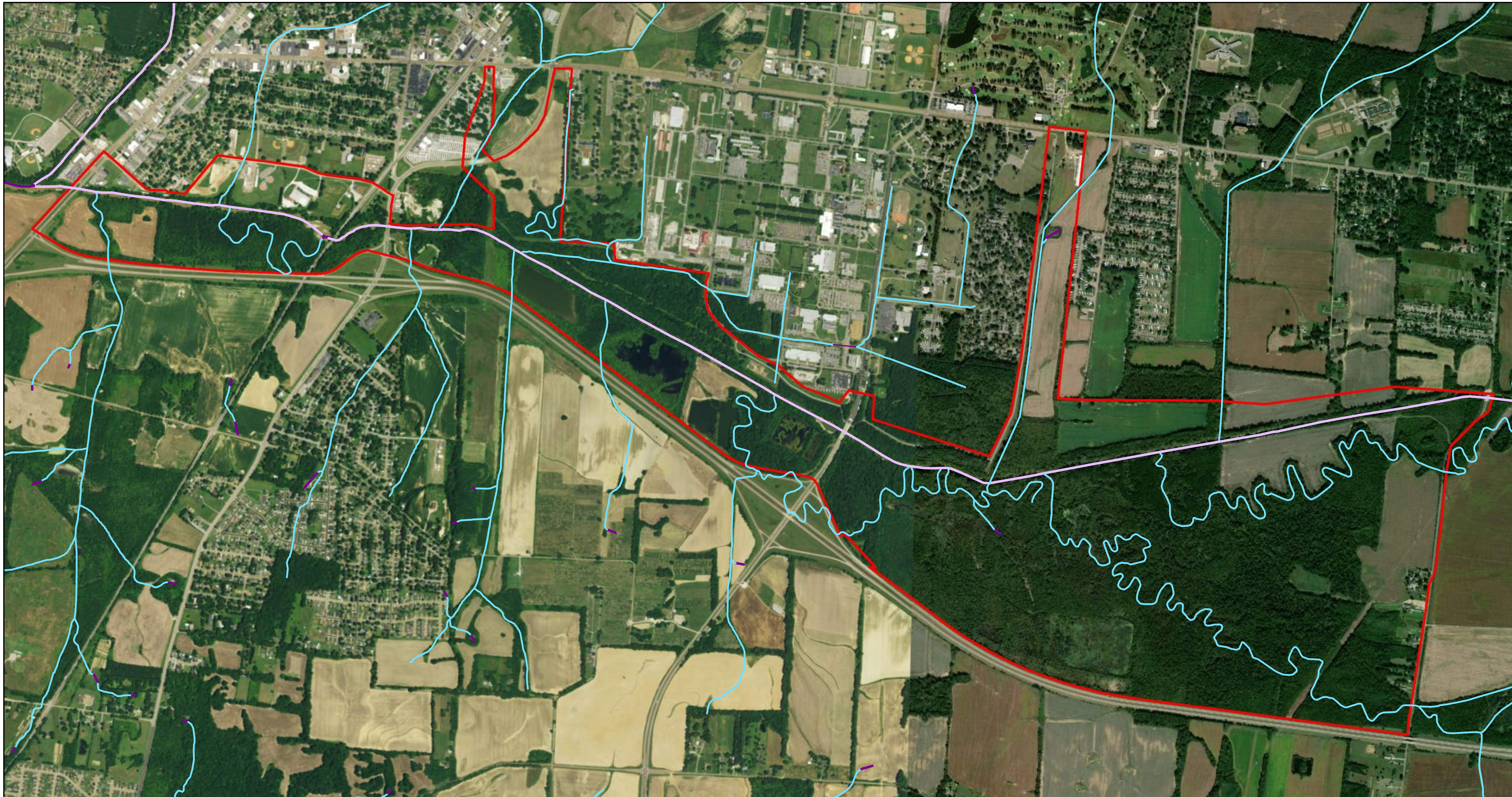
Project Limits

Soil Units

Figure 4h

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4h_Soil Units Area 8.mxd

Date: 30 August 2018



N

1,800 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

National Hydrography Dataset and National Wetlands Inventory Map - Areas 1 to 5

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

TN NHD Flowlines

FType

- ArtificialPath
- CanalDitch
- StreamRiver

NWI Data

- NWI Wetlands

Figure 5a

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 5a_NWI and NHD.mxd

Date: 29 August 2018

N

700 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS.

Tioga ENVIRONMENTAL CONSULTANTS

National Hydrography Dataset and National Wetlands Inventory Map - Areas 6 and 7

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

TN NHD Flowlines

FType

ArtificialPath

CanalDitch

StreamRiver

NWI Data

NWI Wetlands

Figure 5b

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 5b_NWI and NHD.mxd

Date: 29 August 2018

National Hydrography Dataset and National Wetlands Inventory Map - Area 8

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

N

400 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Project Limits

TN NHD Flowlines

FType

ArtificialPath

CanalDitch

StreamRiver

NWI Data

NWI Wetlands

Figure 5c

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 5c_NWI and NHD.mxd

Date: 29 August 2018

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 1

Big Creek National Disaster Resilience Design Project

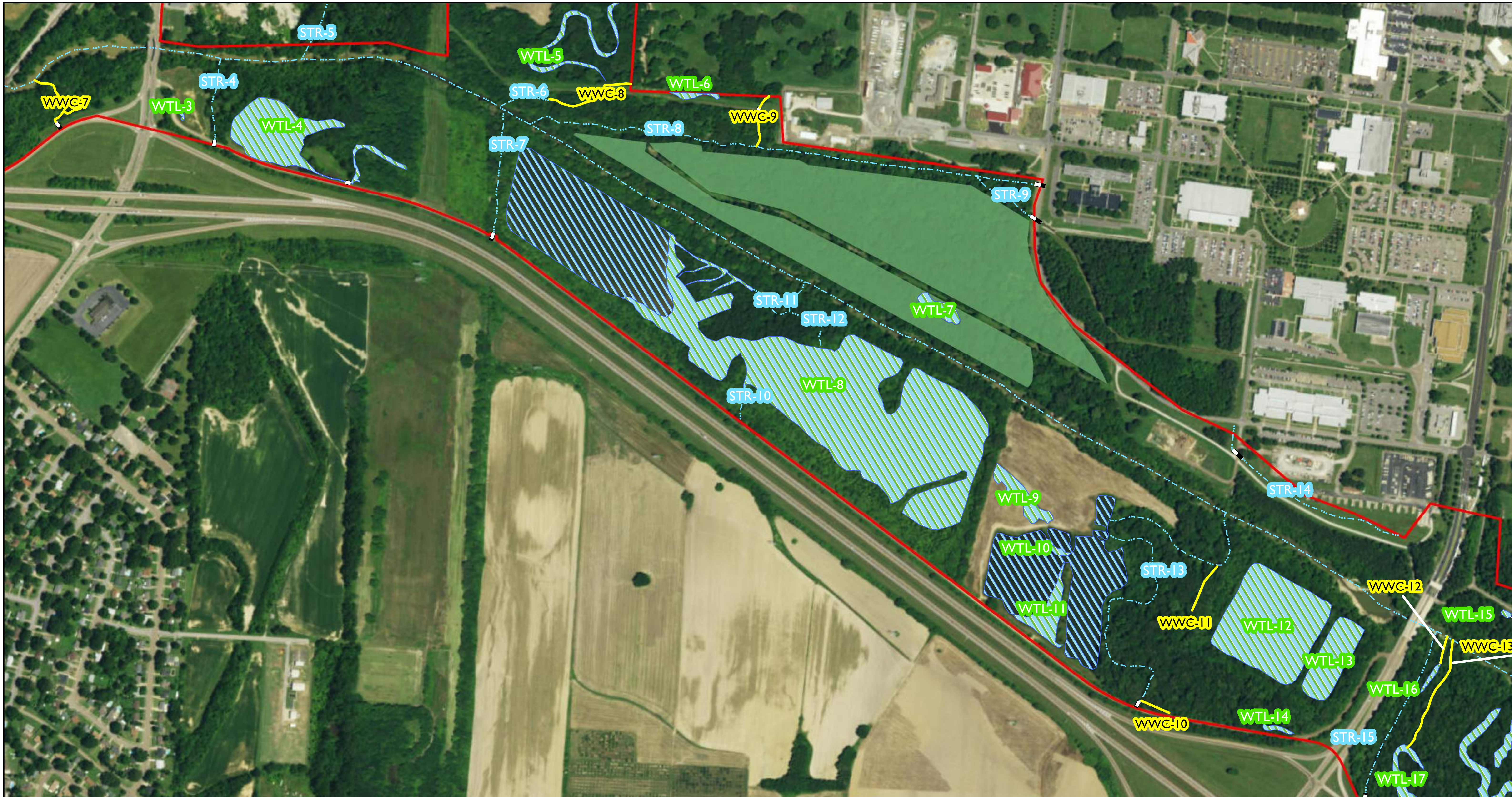
Millington, Shelby County, Tennessee

Project Limits
Wetland
Streams
WWC
Culvert

Figure 6a

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 6a_Approximate Waters_Area 1.mxd

Date: 30 August 2018



N

650 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 2

Big Creek National Disaster Resilience Design Project

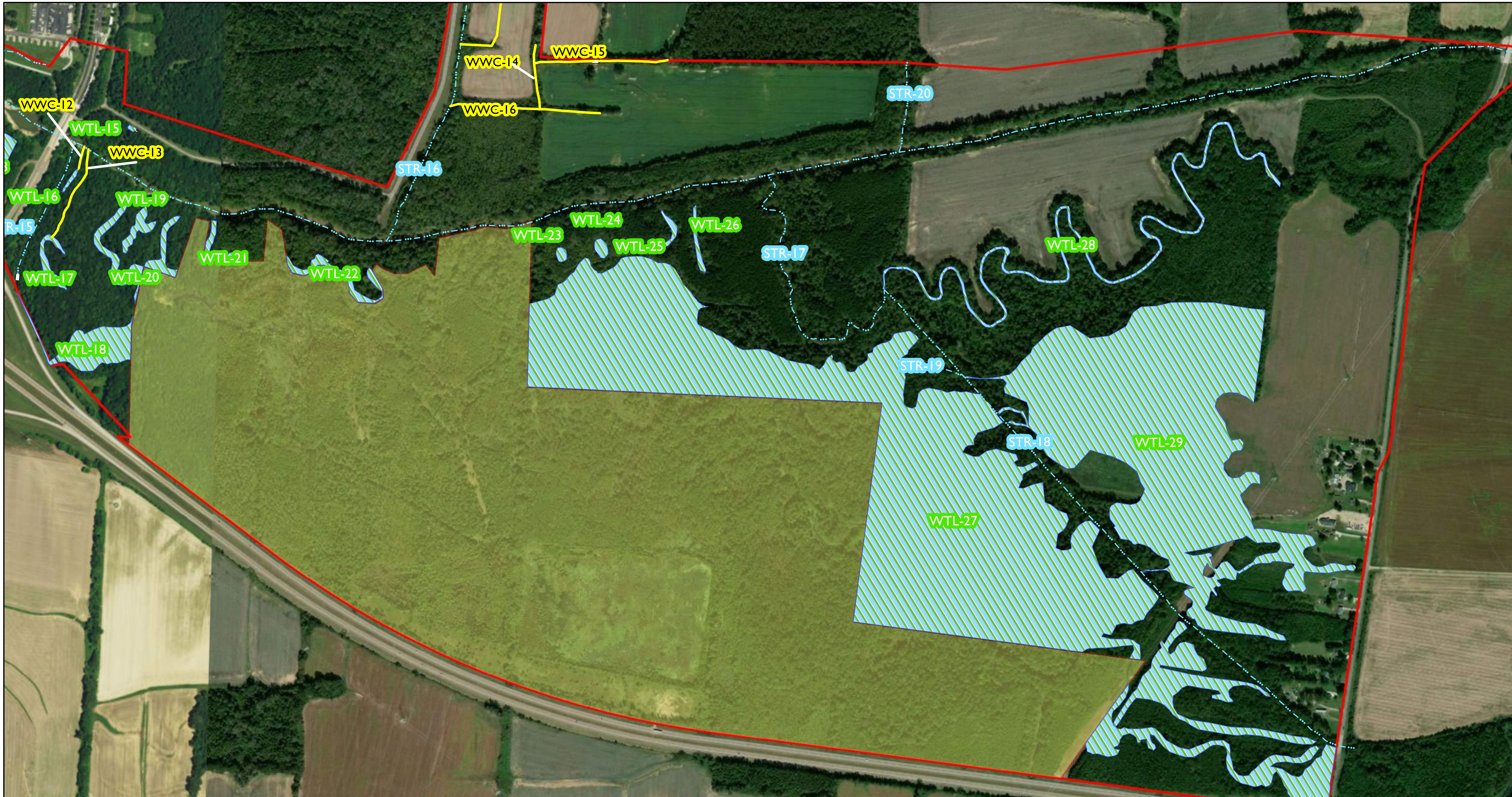
Millington, Shelby County, Tennessee

Project Limits
Wetland
Pond
Contains Wetlands - Federally Protected Area
Streams
WWC
Culvert

Figure 6b

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 6b_Approximate Waters_Area 2.mxd

Date: 30 August 2018



N

800 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 3

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
TDOT Mitigation Area
Streams
WWC
Culvert

Figure 6c

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 6c_Approximate Waters_Area 3.mxd

Date: 30 August 2018

N
425 Feet
Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE
Tioga

Approximate Waters Map - Area 4

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
Streams
WWC
Culvert

Figure 6d

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 6d_Approximate Waters_Area 4.mxd

Date: 30 August 2018

N

650 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 5

Big Creek National Disaster Resilience Design Project

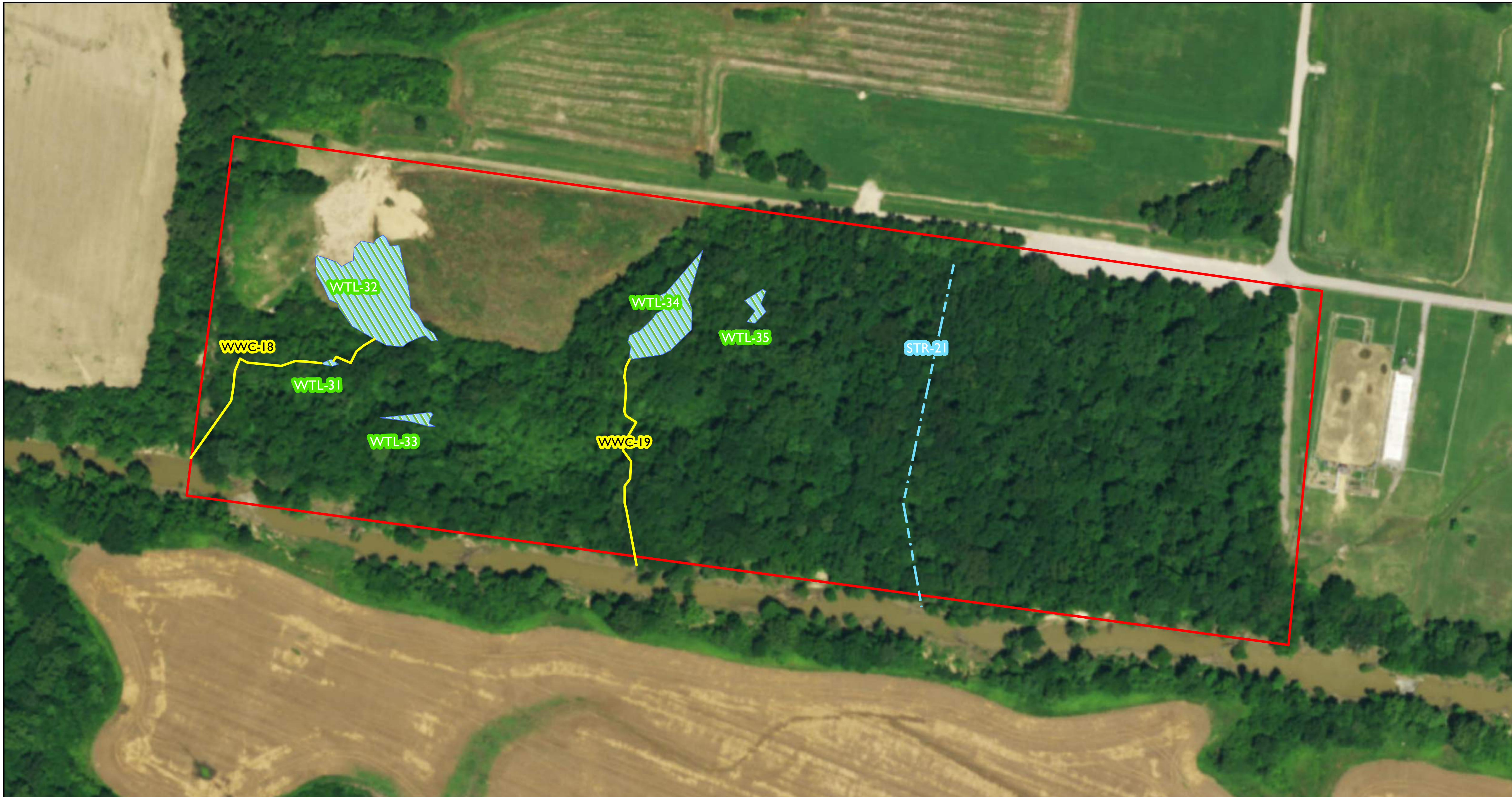
Millington, Shelby County, Tennessee

Project Limits
Wetland
Pond
Streams
WWC
Culvert

Figure 6e

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 6e_Approximate Waters_Area 5.mxd

Date: 30 August 2018



N

200 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 6

Big Creek National Disaster Resilience Design Project

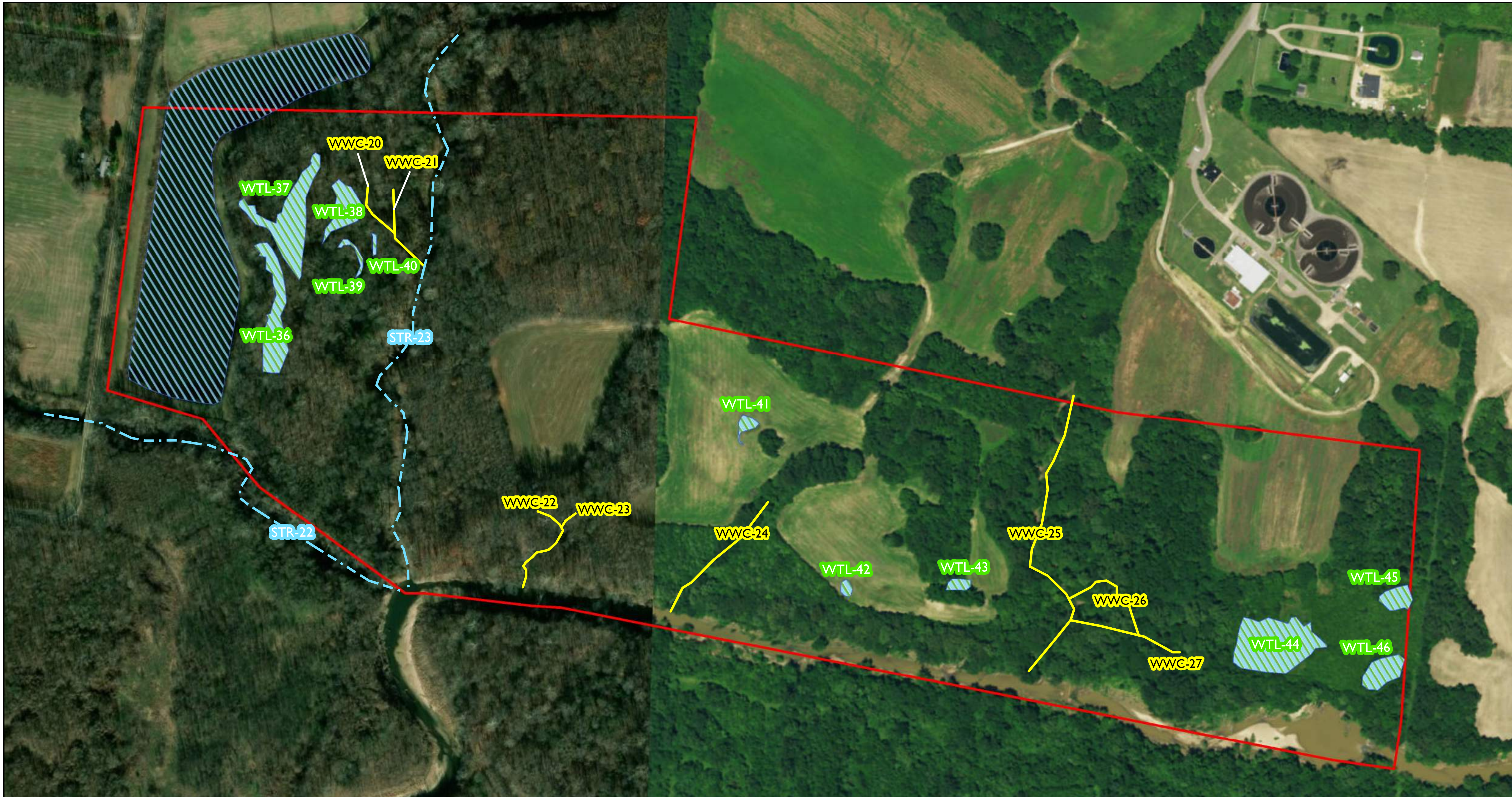
Millington, Shelby County, Tennessee

Project Limits
Wetland
Stream
WWC

Figure 6f

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 6f_Approximate Waters Area 6.mxd

Date: 30 August 2018



N

350 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 7

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Legend	
	Project Limits
	Wetland
	Pond
	Stream
	WWC

Figure 6g

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 6g_Approximate Waters Area 7.mxd

Date: 30 August 2018

N

380 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE

Tioga

Approximate Waters Map - Area 8

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
Pond
Stream
WWC

Figure 6h

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 6h_Approximate Waters Area 8.mxd

Date: 30 August 2018

Attachment B

Tables

Summary of Non-Wetland Waterbodies Big Creek National Disaster Resilience Design Project					
Waterbody I.D.	**Description**	**Lat/Long Start**	**Lat/Long End**	**Estimated Amount Located in Limits of Investigation (LF)**	**Comments**
STR-1	Intermittent	35.3311/ -89.9152	35.3343/ -89.9158	1,428	Feature originates south of project area via culvert under Hwy 385
STR-2	Intermittent	35.3307/ -89.9101	35.3339/ -89.9103	1,136	
STR-3	Perennial	35.3349/ -89.9078	35.3338/ -89.9083	476	Stream appears to have GW connection at base of storm water structure.
STR-4	Intermittent	35.3314/ -89.8969	35.3329/ -89.8968	545	
STR-5	Perennial	35.3375/ -89.8923	35.3330/ -89.8951	669	North Fork Creek. Stream enters and exits project area at several points.
STR-6	Intermittent	35.3324/ -89.8896	35.3302/ -89.8907	356	
STR-7	Intermittent	35.3299/ -89.8907	35.3322/ -89.8906	816	Feature originates south of project area via culvert under Hwy 385
STR-8	Perennial	35.3310/ -89.8786	35.3319/ -89.8900	3,386	
STR-9	Intermittent	35.3304/ -89.8788	35.3311/ -89.8801	450	
STR-10	Intermittent	35.3267/ -89.8852	35.3272/ -89.8851	276	
STR-11	Intermittent	35.3290/ -89.8850	35.3286/ -89.8842	316	Drains the west side of WTL-8 to STR-12
STR-12	Intermittent	35.3280/ -89.8835	35.3292/ -89.8839	618	Drains the east side of WTL-8
STR-13	Intermittent	35.3217/ -89.8763	35.3252/ -89.8744	3,400	Channel is temporarily interrupted by open-water pond

STR-14	Intermittent	35.3267/ -89.8743	35.3249/ -89.8706	1,181	Possible headwater channel to STR-9
STR-15	Intermittent	35.3201/ -89.8713	35.3231/ -89.8697	1,169	Channel originates south of project area via culvert under Hwy 385
STR-16	Perennial	35.3358/ -89.8561	35.3211/ -89.8613	6,737	
STR-17	Intermittent	35.3203/ -89.8477	35.3228/ -89.8509	2,665	
STR-18	Intermittent	35.3133/ -89.8396	35.3203/ -89.8477	5,652	Extensive channelization
STR-19	Intermittent	35.3186/ -89.8471	35.3185/ -89.8456	552	Tributary to STR-18
STR-20	Perennial	35.3254/ -89.8473	35.3234/ -89.8474	792	Casper Creek
STR-21	Intermittent	35.3372/ -89.9267	35.3354/ -89.9269	732	
STR-22	Perennial	35.3259/ -89.8306	35.3382/ -89.9506	168	Jakes Creek. Most of resource is outside, but adjacent to, project area.
STR-23	Perennial	35.3429/ -89.9507	35.3384/ -89.9510	1,987	Bear Creek
STR-24	Intermittent	35.2851/ -89.9191	35.2842/ -89.9192	412	
STR-25	Intermittent	35.2851/ -89.9173	35.2824/ -89.9226	1,563	
WWC/EPH-1	Wet Weather Conveyance/ Ephemeral Channel	35.3330/ -89.9187	35.3312/ -89.9153	1,712	
WWC/EPH-2	Wet Weather Conveyance/ Ephemeral Channel	35.3310/ -89.9119	35.3318/ -89.9116	360	
WWC/EPH -3	Wet Weather Conveyance/ Ephemeral Channel	35.3334/ -89.9116	35.3335/ -89.9103	478	

WWC/EPH -4	Wet Weather Conveyance/ Ephemeral Channel	35.3363/ -89.9069	35.3350/ -89.9078	588	
WWC/EPH -5	Wet Weather Conveyance/ Ephemeral Channel	35.3331/ -89.9068	35.3335/ -89.9102	1,589	
WWC/EPH -6	Wet Weather Conveyance/ Ephemeral Channel	35.3316/ -89.9003	35.3325/ -89.9009	518	
WWC/EPH -7	Wet Weather Conveyance/ Ephemeral Channel	35.3401/ -89.8873	35.3324/ -89.8896	1,819	
WWC/EPH -8	Wet Weather Conveyance/ Ephemeral Channel	35.3325/ -89.8847	35.3316/ -89.8850	397	
WWC/EPH -9	Wet Weather Conveyance/ Ephemeral Channel	35.3216/ -89.8756	35.3218/ -89.8762	216	
WWC/EPH -10	Wet Weather Conveyance/ Ephemeral Channel	35.3235/ -89.8751	35.3242/ -89.8746	363	
WWC/EPH -11	Wet Weather Conveyance/ Ephemeral Channel	35.3234/ -89.8751	35.3243/ -89.8746	380	
WWC/EPH -12	Wet Weather Conveyance/ Ephemeral Channel	35.3226/ -89.8697	35.3231/ -89.8695	196	
WWC/EPH -13	Wet Weather Conveyance/ Ephemeral Channel	35.3212/ -89.8703	35.3230/ -89.8694	840	
WWC/EPH -14	Wet Weather Conveyance/ Ephemeral Channel	35.3255/ -89.8574	35.3242/ -89.8572	563	

WWC/EPH -15	Wet Weather Conveyance/ Ephemeral Channel	35.3253/ -89.8538	35.3252/ -89.8574	1,172	
WWC/EPH -16	Wet Weather Conveyance/ Ephemeral Channel	35.3241/ -89.8555	35.3242/ -89.8596	1,316	
WWC/EPH -17	Wet Weather Conveyance/ Ephemeral Channel	35.3274/ -89.8576	35.3256/ -89.8594	1,098	
WWC/EPH -18	Wet Weather Conveyance/ Ephemeral Channel	35.3368/ -89.9306	35.3361/ -89.9318	573	
WWC/EPH -19	Wet Weather Conveyance/ Ephemeral Channel	35.3367/ -89.9289	35.3356/ -89.9288	482	
WWC/EPH -20	Wet Weather Conveyance/ Ephemeral Channel	35.3421/ -89.9516	35.3416/ -89.9513	232	
WWC/EPH-21	Wet Weather Conveyance/ Ephemeral Channel	35.3421/ -89.9513	35.3413/ -89.9509	342	
WWC/EPH -22	Wet Weather Conveyance/ Ephemeral Channel	35.3390/ -89.9495	35.3382/ -89.9496	419	
WWC/EPH -23	Wet Weather Conveyance/ Ephemeral Channel	35.3390/ -89.9490	35.3388/ -89.9492	77	
WWC/EPH -24	Wet Weather Conveyance/ Ephemeral Channel	35.3391/ -89.9468	35.3380/ -89.9479	567	
WWC/EPH -25	Wet Weather Conveyance/ Ephemeral Channel	35.3402/ -89.9432	35.3375/ -89.9436	1,185	

WWC/EPH -26	Wet Weather Conveyance/ Ephemeral Channel	35.3379/ -89.9423	35.3382/ -89.9431	434	
WWC/EPH -27	Wet Weather Conveyance/ Ephemeral Channel	35.3378/ -89.9418	35.3380/ -89.9431	439	
WWC/EPH -28	Wet Weather Conveyance/ Ephemeral Channel	35.2882/ -89.9191	35.2851/ -89.9191	1,005	
WWC/EPH -29	Wet Weather Conveyance/ Ephemeral Channel	35.2871/ -89.9197	35.2868/ -89.9192	202	
WWC/EPH -30	Wet Weather Conveyance/ Ephemeral Channel	35.2877/ -89.9175	35.2851/ -89.9191	1,192	
WWC/EPH -31	Wet Weather Conveyance/ Ephemeral Channel	35.2867/ -89.9188	35.2861/ -89.9186	250	
WWC/EPH -32	Wet Weather Conveyance/ Ephemeral Channel	35.2856/ -89.9202	35.2847/ -89.9198	381	
WWC/EPH -33	Wet Weather Conveyance/ Ephemeral Channel	35.2830/ -89.9224	35.2828/ -89.9223	100	
WWC/EPH -34	Wet Weather Conveyance/ Ephemeral Channel	35.2827/ -89.9232	35.2826/ -89.9225	205	

-Table 2- Summary of Wetlands in Limits of Investigation Weakley County Pipeline Project				
Waterbody I.D.	**Description**	**Lat/Long Start**	**Area (Acre)**	**Comments**
WTL-1	Forested Floodplain Wetland	35.3319, -89.9115	1.78	
WTL-2	Forested Floodplain Wetland	35.3322. -89.9088	35.33	
WTL-3	Emergent Wetland	35.3320, -89.8977	0.07	
WTL-4	Forested Floodplain Wetland	35.3314, -89.8956	5.37	
WTL-5	Forested Floodplain Wetland	35.3343, -89.8877	1.23	
WTL-6	Forested Floodplain Wetland	35.3325, -89.8865	0.21	
WTL-7	Shrub/Scrub Wetland	35.3288, -89.8808	0.67	
WTL-8	Forested Floodplain, Shrub/Scrub and Emergent Wetland Complex	35.3284, -89.8864	0.14	
WTL-9	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3255, -89.8792	1.13	
WTL-10	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3245, -89.8782	0.16	
WTL-11	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3234, -89.8782	1.41	

WTL-12	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3233, -89.8733	10.08	
WTL-13	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3227, -89.8720	2.92	
WTL-14	Forested Floodplain and Shrub/Scrub Wetland Complex	35.32135, -89.8732	0.15	
WTL-15	Emergent Wetland	35.3236, -89.8683	0.05	
WTL-16	Forested Floodplain and Emergent Wetland Complex	35.3222, -89.8700	0.14	
WTL-17	Forested Floodplain and Emergent Wetland Complex	35.3203, -89.8704	0.83	
WTL-18	Forested Floodplain and Emergent Wetland Complex	35.3187, -89.8688	4.37	
WTL-19	Forested Floodplain and Emergent Wetland Complex	35.3214, -89.8679	0.86	
WTL-20	Forested Floodplain and Emergent Wetland Complex	35.3204, -89.8672	2.54	
WTL-21	Forested Floodplain and Emergent Wetland Complex	35.3210, -89.8660	0.61	
WTL-22	Forested Floodplain and Emergent Wetland Complex	35.3207, -89.8630	1.37	
WTL-23	Forested Floodplain Wetland	35.3209, -89.8565	0.22	

WTL-24	Forested Floodplain Wetland	35.3211, -89.8554	0.34	
WTL-25	Forested Floodplain Wetland	35.3215, -89.8535	0.56	
WTL-26	Forested Floodplain Wetland	35.3209, -89.8527	0.44	
WTL-27	Forested Floodplain Wetland	35.3155, -89.8445	130.88	
WTL-28	Forested Floodplain Wetland	35.3229, -89.8372	3.80	
WTL-29	Forested Floodplain Wetland	35.3184, -89.84438	70.85	
WTL-30	Emergent Wetland	35.3349, -89.8882	1.38	
WTL-31	Forested Wetland/ Temporarily Flooded	35.3366, -89.9309	0.01	
WTL-32	Emergent/Forested Wetland	35.3368, -89.9306	0.79	
WTL-33	Forested Wetland/ Temporarily Flooded	35.3363, -89.9303	0.03	
WTL-34	Forested Wetland/ Temporarily Flooded	35.3367, -89.9287	0.34	
WTL-35	Forested Wetland/ Temporarily Flooded	35.3369, -89.9280	0.04	
WTL-36	Forested Wetland/ Temporarily Flooded	35.3404, -89.9526	0.69	
WTL-37	Forested Wetland/ Temporarily Flooded	35.3413, -89.9524	0.95	

WTL-38	Forested Wetland/ Temporarily Flooded	35.3416, -89.9520	0.36	
WTL-39	Forested Wetland/ Temporarily Flooded	35.3412, -89.9516	0.05	
WTL-40	Forested Wetland/ Temporarily Flooded	35.3415, -89.9515	0.02	
WTL-41	Forested Wetland/ Temporarily Flooded	35.3398, -89.9470	0.08	
WTL-42	Forested Wetland/ Temporarily Flooded	35.3383, -89.9458	0.05	
WTL-43	Forested Wetland/ Temporarily Flooded	35.3383, -89.9444	0.08	
WTL-44	Forested Wetland/ Temporarily Flooded	35.3377, -89.9411	1.25	
WTL-45	Emergent/ Forested Wetland	35.3383, -899393	0.19	
WTL-46	Emergent/ Forested Wetland	35.3376, -89.9394	0.32	
WTL-47	Forested Wetland/ Temporarily Flooded	35.2886, -89.9201	0.38	
WTL-48	Forested Floodplain Wetland	35.2888, -89.9196	0.31	Located outside of project area.
WTL-49	Forested Floodplain Wetland	35.2878, -89.9175	0.04	
WTL-50	Forested Floodplain Wetland	35.2871, -89.9191	0.09	

WTL-51	Forested Floodplain Wetland	35.2862, -89.9183	0.05	
WTL-52	Forested Floodplain Wetland	35.2855, -89.9193	0.63	
WTL-53	Forested Floodplain Wetland	35.2842, -89.9175	0.003	
WTL-54	Forested Floodplain Wetland	35.2841, -89.9206	0.43	
WTL-55	Forested Floodplain Wetland	36.3060, -88.7073	0.16	
WTL-56	Forested Floodplain Wetland	36.3054, -88.7075	0.84	

Table 3. Calculation of Normal Weather Conditions
Station: Bartlett 3.1 NNE, TN US, US1TNSH0032

	Month	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 Month Prior*	June	2.33069466	4.44	6.549305	3.04	Normal	2	x 3	6
2nd Month Prior*	May	3.26366678	5.6	7.936333	5.48	Normal	2	x 2	4
3rd Month Prior*	April	2.03979504	5	7.960205	6.03	Normal	2	x 1	2
								Sum =	12

Condition Value	
Dry =	1
Normal =	2
Wet =	3

Note:

If sum is:	
6-9	Then period has been drier than normal
10-14	Then period has been normal
15-18	Then period has been wetter than normal

Conclusions:
Overall, the prior 3 months are considered "normal" for precipitation.

Table 4. Calculation of Normal Weather Conditions

Station: Bartlett 3.1 NNE, TN US, US1TNSH0032

	Month	Long-term rainfall records							
		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 Month Prior*	March	3.24568931	5.33	7.414311	6.27	Normal	2	x 3	6
2nd Month Prior*	February	1.83096659	4.11	6.389033	11.83	Wet	3	x 2	6
3rd Month Prior*	January	2.48261434	5.33	8.177386	3.43	Normal	2	x 1	2
								Sum =	14

Condition Value	
Dry =	1
Normal =	2
Wet =	3

Note:

If sum is:	
6-9	Then period has been drier than normal
10-14	Then period has been normal
15-18	Then period has been wetter than normal

Conclusions:
Overall, the prior 3 months are considered "normal" for precipitation.

Table 5. Calculation of Normal Weather Conditions
Station: Bartlett 3.1 NNE, TN US, US1TNSH0032

		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 Month Prior*	May	3.26366678	5.6	7.936333	6.17	Normal	2	x 3	6
2nd Month Prior*	April	2.03979504	5	7.960205	7.6	Normal	2	x 2	4
3rd Month Prior*	March	3.24568931	5.33	7.414311	6.27	Normal	2	x 1	2
								Sum =	12

Note:

If sum is:	
6-9	Then period has been drier than normal
10-14	Then period has been normal
15-18	Then period has been wetter than normal

Condition Value	
Dry =	1
Normal =	2
Wet =	3

Conclusions:
Overall, the prior 3 months are considered "normal" for precipitation.

Attachment C

Data Forms

Attachment C-1

Hydrologic Determination Data Forms

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-1/EPH-1	Date/Time: 7/26/2017 / 18:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3321 / -89.9190
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~9 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam; Ca—Calloway silt loam		Source: WSS
Surrounding Land Use : Agriculture field and highway		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 14.5

Justification / Notes :

Feature is a concrete-lined roadside ditch that becomes completely covered by sediment downstream. Drains into STR-1.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **8.5**)		Absent	Weak	Moderate	Strong
1. Continuous bed and bank		0 ☐	1 ☐	2 ☐	3 ✔
2. Sinuous channel	0.5	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 controls		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**)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = **4**)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 = 14.5

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

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-2	Date/Time: 7/12/2017 / 14:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3311, -89.9119
Previous Rainfall (7-days) : 1.36 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~3 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Ca—Calloway silt loam		Source: WSS
Surrounding Land Use : Deciduous forest		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 15

Justification / Notes :

Drainage feature resulting from roadside runoff.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 9)	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 controls	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)	Absent		Weak		Moderate		Strong	
14. Subsurface flow/discharge into channel	0	✔	1	☐	2	☐	3	☐
15. Water in channel and >48 hours since sig. rain	0	✔	1	☐	2	☐	3	☐
16. Leaf litter in channel (January – September)	1.5	☐	1	☐	0.5	✔	0	☐
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 = 4)	Absent		Weak		Moderate		Strong	
20. Fibrous roots in channel [1]	3	☐	2	✔	1	☐	0	☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-3	Date/Time: 7/12/2017 / 15:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3333 / -89.9105
Previous Rainfall (7-days) : 1.36 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~4.4 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Co—Collins silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☐ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 15

Justification / Notes :

Drainage path between WTL-1 and STR-2.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **10**)	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 controls	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 = **4**)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1 ✔	0.5	0
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**)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	2	1 ✔	0
21. Rooted 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 Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-4	Date/Time: 7/12/2017 / 18:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3360 / -89.9071
Previous Rainfall (7-days) : 1.36 in.		
Precipitation this Season vs. Normal : ☐very wet ☐wet ☐average ☑dry ☐drought ☐unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~268 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fs—Filled land		Source: WSS
Surrounding Land Use : Urban		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑Severe ☐Moderate ☐Slight ☐Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 13

Justification / Notes :

Feature is a large, concrete stormwater drainage feature that is nearly 1 mile long, which accounts for the large drainage area.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	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 controls	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)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ✔	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ✔	1 ☐	0.5 ☐	0 ☐
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 = 6)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ✔	2 ☐	1 ☐	0 ☐
21. Rooted 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 :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-5	Date/Time: 7/12/2017 / 15:45
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3332 / -89.9087
Previous Rainfall (7-days) : 1.36 in.		
Precipitation this Season vs. Normal : ☐very wet ☐wet ☑average ☐dry ☐drought ☐unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~32 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Co—Collins silt loam		Source: WSS
Surrounding Land Use : Deciduous Forest		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑Severe ☐Moderate ☐Slight ☐Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 14

Justification / Notes :

Feature appears to be historically channelized to drain nearby wetland. Channel is overgrown and poorly defined in several reaches.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7)	**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 controls	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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ✔	0.5 ☐	0 ☐
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 = 3)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 = 14

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

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-6	Date/Time: 7/12/2017 / 16:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3323 / -89.9083
Previous Rainfall (7-days) : 1.32 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~11 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Co—Collins silt loam		Source: WSS
Surrounding Land Use : Deciduous Forest		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 14

Justification / Notes :

Feature appears to be historically channelized to drain nearby wetland. Channel is overgrown and poorly defined in several reaches.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7)	**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 controls	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 = 4)	**Absent**		**Weak**		**Moderate**		**Strong**	
14. Subsurface flow/discharge into channel	0	✔	1	☐	2	☐	3	☐
15. Water in channel and >48 hours since sig. rain	0	✔	1	☐	2	☐	3	☐
16. Leaf litter in channel (January – September)	1.5	☐	1	✔	0.5	☐	0	☐
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 = 3)	**Absent**		**Weak**		**Moderate**		**Strong**	
20. Fibrous roots in channel [1]	3	☐	2	✔	1	☐	0	☐
21. Rooted 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 = 14

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

Notes :

Ground Ivy (Glechoma hederacea - FACU) in channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-7	Date/Time: 7/26/2017 / 16:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3320 / -89.9002
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~3 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Co—Collins silt loam		Source: WSS
Surrounding Land Use : Highway at beginning of channel and forested to Big Creek		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17

Justification / Notes :

Hydrology originates in concrete stormwater drainage feature from highway. Channel was observed multiple times due to the need for multiple site visits. Water was only observed in channel in Feb. 2018 under flood conditions.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 12)	**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 controls	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)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 3)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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

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

Notes :

Flow is concentrated by impermeable surfaces leading into a culvert at the beginning of the channel.

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-8	Date/Time: 7/20/2017 / 13:30
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3322, -89.8890
Previous Rainfall (7-days) : Trace amounts		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~40 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 15

Justification / Notes :

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **8**)	**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 controls	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**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ✔	2 ☐	1 ☐	0 ☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-9/EPH-9	Date/Time: 7/26/2017 / 14:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3322 / -89.8849
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~7 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam and Fs—Filled land		Source: WSS
Surrounding Land Use : Public Park and Military Base		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12.5

Justification / Notes :

Channel is historically altered for stormwater drainage. Channel is more defined below culvert where flow is concentrated, but poorly defined and in risk of becoming overgrown above.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **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 controls	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 = **3.5**)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1 ✔	0.5	0
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 = **4**)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	2 ✔	1	0
21. Rooted 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 = 12.5

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

Notes :

Channel is partially incised but not diversity of bed material. Few false nettle observed (FACW).

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-10/EPH-10	Date/Time: 7/26/2017 / 14:30
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3217 / -89.8761
Previous Rainfall (7-days) : 0.11"		
Precipitation this Season vs. Normal : [ ] very wet [ ] wet [ ] average [x] dry [ ] drought [ ] unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~1 acre	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam		Source: WSS
Surrounding Land Use : Forested, nearby road		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : [x] Severe [ ] Moderate [ ] Slight [ ] Absent		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature 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 15th, under normal precipitation / groundwater conditions N/A	[ ]	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 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) = 17

Justification / Notes :

Channelized drainageway near road.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 8)	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 controls	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 = 4)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ✔	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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

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

Notes :

15. Some saturation but no standing water.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-1/EPH-1	Date/Time: 7/26/2017 / 18:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3321 / -89.9190
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~9 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology :		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

Secondary Indicator Score (if applicable) =

Justification / Notes :

Feature is a concrete-lined roadside ditch that becomes completely covered by sediment downstream. Drains into STR-1.

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 controls	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 =)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5	0
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 =)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1	0
21. Rooted 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 = _____________

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

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-12/EPH-12	Date/Time: 7/14/2017 / 16:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3320 / -89.8698
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~1 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam		Source: WSS
Surrounding Land Use : Forested, historically cleared for ag/logging		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 14.5

Justification / Notes :

Channel is full of leaf litter and debris.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **5.5**)	**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 controls	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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ☑	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain N/A	0 ☐	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ☐	0 ☑
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**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☑	2 ☐	1 ☐	0 ☐
21. Rooted 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 = 14.5

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

Notes :

One large headcut. Some VA creeper in channel but not prevalent.

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-13/EPH-13	Date/Time: 7/14/2017 / 18:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3320 / -89.8698
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~4 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam		Source: WSS
Surrounding Land Use : Forested, historically cleared for ag/logging		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 15

Justification / Notes :

Channel is full of leaf litter and debris.

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 controls	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 = **4**)	Absent		Weak		Moderate		Strong	
14. Subsurface flow/discharge into channel	0	✔	1		2		3	
15. Water in channel and >48 hours since sig. rain N/A	0		1		2		3	
16. Leaf litter in channel (January – September)	1.5		1		0.5		0	✔
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**)	Absent		Weak		Moderate		Strong	
20. Fibrous roots in channel [1]	3	✔	2		1		0	
21. Rooted 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 Indicator Score < 19 points

Notes :

One large headcut. Some VA creeper in channel but not prevalent.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-14/EPH-14	Date/Time: 7/19/2017 / 17:00
Assessors/Affiliation: A. Fowler; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3244 / -89.8572
Previous Rainfall (7-days) : Trace amounts		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~8 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam Source: WSS		
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 14

Justification / Notes :

Likely man-made features for farmland drainage. Historic channelization.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 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 controls	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 = 5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ☐	2 ✔	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 = 14

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

Notes :

Some water present in standing pools around partially blocked culvert

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-15/EPH-15	Date/Time: 7/19/2017 / 17:00
Assessors/Affiliation: A. Fowler; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3252 / -89.8561
Previous Rainfall (7-days) : Trace amounts		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~6 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 11

Justification / Notes :

Historic channelization. Farmland drainage.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 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 controls	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 = **3**)	**Absent**		**Weak**		**Moderate**		**Strong**	
14. Subsurface flow/discharge into channel	0	✔	1	☐	2	☐	3	☐
15. Water in channel and >48 hours since sig. rain	0	✔	1	☐	2	☐	3	☐
16. Leaf litter in channel (January – September)	1.5	☐	1	☐	0.5	✔	0	☐
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 = **3**)	**Absent**		**Weak**		**Moderate**		**Strong**	
20. Fibrous roots in channel [1]	3	☐	2	☐	1	✔	0	☐
21. Rooted 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

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

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-16/EPH-16	Date/Time: 7/19/2017 / 16:30
Assessors/Affiliation: A. Fowler; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3242 / -89.8583
Previous Rainfall (7-days) : Trace amounts		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~4 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam	Source: WSS	
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17.5

Justification / Notes :

Debris and fibrous roots in channel. Historic channelization. Farmland drainage.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 8)	**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 controls	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 = **5.5**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ☐	2 ✔	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Few standing pools. Water mostly present as soil saturation.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-17	Date/Time: 4/19/2018 / 10:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3260 / -89.8584
Previous Rainfall (7-days) : 2.2"		
Precipitation this Season vs. Normal : ☐ very wet ☑ wet ☐ average ☐ dry ☐ drought ☐ unknown		
Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~5 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17

Justification / Notes :

Small erosion rill from farm field. Upstream sections of the channel have been disrupted by passage of heavy equipment.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **7.5**)	**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 controls	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 = 6)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1	2 ✔	3
16. Leaf litter in channel (January – September)	1.5	1 ✔	0.5	0
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 = **3.5**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1 ✔	0
21. Rooted 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

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

Notes :

Wrack lines in forested, downstream reach.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-18/EPH-18	Date/Time: 4/18/2017 / 15:30
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3366 / -89.9313
Previous Rainfall (7-days) : 2.2"		
Precipitation this Season vs. Normal : ☐ very wet ☑ wet ☐ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~2 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam		Source: WSS
Surrounding Land Use : Forested with surrounding development		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17

Justification / Notes :

Small drainage channel with heavy leaf litter and woody debris.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **9**)	**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 controls	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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1 ✔	0
21. Rooted 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

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

Notes :

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-19/EPH-19	Date/Time: 4/18/2017 / 15:30
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3359 / -89.9289
Previous Rainfall (7-days) : 2.2"		
Precipitation this Season vs. Normal : ☐ very wet ☑ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~2 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology :		Source: WSS
Surrounding Land Use : Forested with surrounding development		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12

Justification / Notes :

Historic channelization. Area may have been logged in the past. Channel is heavy with leaf litter and other debris

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	**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 controls	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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ✔	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ☐	0 ✔
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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1030
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: STR 24		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.285145, -89.919119
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data :		
Watershed Size : 0.22 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 22.5

Justification / Notes :

Surrounding area has been topographically/vegetatively altered, especially in the residential area and the newly cleared field to the west.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 10.5)	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 controls	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 = 6)	Absent		Weak		Moderate		Strong	
14. Subsurface flow/discharge into channel	0	✔	1		2		3	
15. Water in channel and >48 hours since sig. rain	0		1	✔	2	✔	3	
16. Leaf litter in channel (January – September)	1.5	✔	1		0.5		0	
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 = 6)	Absent		Weak		Moderate		Strong	
20. Fibrous roots in channel [1]	3	✔	2	✔	1		0	
21. Rooted 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 = 22.5

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

Notes :

Soils: 10YR 5/1 ~ 80%, 7.5 YR 4/6 ~10%. Water present through approximately 25% of the channel during site visit. No leaf litter, weak matrix of fibrous roots, no vegetation within channel. 1 frogs observed, others heard. No other aquatic life observed. Wrack lines present throughout reach along bank, near OHWM. Bed and bank fully developed. 2 grade controls observed in reach, on the verge of becoming headcuts. Benches observed throughout and potential for bars in areas observed minimally. Pool areas observed, and few riffles likely if flow was present. Channel meanders slightly through the property.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1030
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: STR 25		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.282698, -89.922520
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data :		
Watershed Size : 0.22 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 25

Justification / Notes :

Surrounding area has been topographically/vegetatively altered.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 11.5)	**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 controls	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 = 6.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ☐	2 ✔	3 ☐
16. Leaf litter in channel (January – September)	1.5 ✔	1 ☐	0.5 ☐	0 ☐
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 = 7)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ✔	2 ☐	1 ☐	0 ☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Soils: 10YR 5/1 ~ 80%, 7.5 YR 4/6 ~20%. Water present through approximately 75% of the channel during site visit. No leaf litter, no fibrous roots, no vegetation within channel. 2 frogs observed, others heard. Few crayfish were observed within the channel as well. Wrack lines present throughout reach along bank, near OHWM. Bed and bank fully developed. 1 medium headcut observed near the top of the reach. Benches observed throughout and potential for bars in areas observed minimally. Pool areas observed, and riffles likely if flow was present. Channel meanders through the property.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Bear Creek	Date/Time: 6-6-18/1030
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 20		
Site Location: Millington, TN, property northeast of Russell Bond Road and Jakes Creek/Big Creek confluence		
USGS quad: Millington, TN	HUC (12 digit): 080102090403	Lat/Long: 35.342097, -89.951585
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam Source: WSS		
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☐ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 9.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	**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 controls	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 = 1.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ☑	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☑	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ☑	0 ☐
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ☑	0 ☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Waterway is a trib to adjacent WWC. No hydric soil within channel. Leaf litter was abundant. No plant life within channel, but Smilax sp. present on/near bank in abundance. Fibrous roots easily detected within soil sample. Some sign of flow in channel, but bed and bank was primarily absent/under-formed. Grade controls present in the form of roots crossing the channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Bear Creek	Date/Time: 6-6-18/1100
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 21		
Site Location: Millington, TN, property northeast of Russell Bond Road and Jakes Creek/Big Creek confluence		
USGS quad: Millington, TN	HUC (12 digit): 080102090403	Lat/Long: 35.341800, -89.951285
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☐ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 16

Justification / Notes :

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7.5)	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 controls	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 = 3.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ✔	0.5 ☐	0 ☐
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)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 = 16

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

Notes :

Waterway is a trib to adjacent Bear Creek. Soil: 10YR 4/2 ~95%, 7.5YR 4/6 ~5%. Leaf litter was abundant near top, but sparse near confluence with Bear Creek. No plant life within channel. Fibrous roots detected within soil sample, but minimal. Sign of flow in channel, bed and bank fully formed. Grade controls present in the form of roots crossing the channel. Head cuts present near confluence due to drastic change in topography to Bear Creek stream bed. No water observed and no aquatic fauna.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Big Creek	Date/Time: 6-6-18/1745
Assessors/Affiliation: Carmean and Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 22		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.338923, -89.949073
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 13.5

Justification / Notes :

Field near this watercourse is routinely tilled.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7.5)	**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 controls	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)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1 ✔	0.5	0
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1 ✔	0
21. Rooted 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 = 13.5

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

Notes :

Trib to Big Creek. Watercourse begins at a large headcut, followed by several grade controls and head cuts. Leaf litter ~15% of stream bed. No vegetation observed in the channel. Fibrous roots detected within soil sample, relatively sparse matrix throughout bed. Bed and bank present in ~95%. Grade controls present in the form of roots crossing the channel. Headcuts present near upper reach and also near Big Creek confluence No water observed and no aquatic fauna. Wrack lines present behind roots. Channel takes several relatively sharp cuts.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-6-18/1745
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 23		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.338923, -89.949073
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 10

Justification / Notes :

Field near this watercourse is routinely tilled.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	**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 controls	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 = 1.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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

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

Notes :

Trib to nearby unnamed watercourse. Watercourse begins at a large headcut near the field opening to the north. Leaf litter ~60% of stream bed. No vegetation observed in the channel. Fibrous roots detected within soil sample, relatively dense matrix throughout bed. Bed and bank present in ~90%. Grade controls present in the form of roots crossing the channel. Headcuts present near confluence with nearby WWC. No water observed and no aquatic fauna. Wrack lines present behind roots. Very straight channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Bear Creek	Date/Time: 6-6-18/1730
Assessors/Affiliation: Carmean and Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 24		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.338762, -89.947034
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 8.5

Justification / Notes :

Field surrounding this watercourse is routinely tilled.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	**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 controls	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 = 1.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 3)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 = 8.5

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

Notes :

Trib to Bear Creek. Watercourse is low drainage area between two fields. Leaf litter <70% of stream bed. Virginia creeper, Smilax sp. and poison ivy present within channel, especially in the upper reach. Fibrous roots detected within soil sample, relatively dense matrix throughout bed. Bed and bank present in ~25%, upper reaches very poor. Grade controls present in the form of roots crossing the channel. Headcuts present near confluence due to drastic change in topography to trib. No water observed and no aquatic fauna. Wrack lines present behind roots. Slight meander and cuts of channel within reach.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Big Creek	Date/Time: 6-6-18/1530
Assessors/Affiliation: Carmean and Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 25		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.340091, -89.943194
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : 0.46 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** n/a

Justification / Notes :

Strong flow observed near confluence with Big Creek. Follow channel up stream to find that nearby WWTP is discharging into channel. No flow/very little water observed above outfall. Deeply incised channel below the outfall.

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 controls	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 =)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5	0
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 =)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1	0
21. Rooted 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 = _____________

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

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-6-18/1530
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 26		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.338340, -89.942864
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 11

Justification / Notes :

It is possible with the addition of logging roads and culverts in this wooded area these drainage patterns were created. However, there is no conclusive evidence of this.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	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 controls	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)	Absent		Weak		Moderate		Strong	
14. Subsurface flow/discharge into channel	0	✔	1		2		3	
15. Water in channel and >48 hours since sig. rain	0	✔	1		2		3	
16. Leaf litter in channel (January – September)	1.5		1	✔	0.5		0	
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 = 4)	Absent		Weak		Moderate		Strong	
20. Fibrous roots in channel [1]	3		2		1	✔	0	
21. Rooted 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

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

Notes :

Trib to stream from Millington WWTP effluent. Leaf litter <25% of stream bed. No plant life within channel. Smilax sp. abundant on banks. Fibrous roots detected within soil sample, scattered throughout bed. Bed and bank present in >75%, upper reaches weak. Grade controls present in the form of roots crossing the channel. Headcuts present near confluence due to drastic change in topography to trib. No water observed and no aquatic fauna. Wrack lines present behind roots within the channel. Obvious meander from top to bottom.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-6-18/1500
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 27		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.337813, -89.942032
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☐ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 9

Justification / Notes :

It is possible with the addition of logging roads and culverts in this wooded area these drainage patterns were created. However, there is no conclusive evidence of this.

Secondary Field Indicator Evaluation

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 controls	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 = 1.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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 = 4)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	2	1 ✔	0
21. Rooted 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 :

Trib to stream from Millington WWTP effluent. Leaf litter was abundant near top, but sparse near confluence. Posion ivy and jewelweed identified within channel, primarily in upper reaches. Fibrous roots detected within soil sample, abundant. No bed and bank in upper 3/4 of waterway. Transforms into more of a gully near confluence. Grade controls present in the form of roots crossing the channel. Headcuts present near confluence due to drastic change in topography to trib. No water observed and no aquatic fauna. Wrack lines present behind roots and trees near the channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1500
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 28		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.286394, -89.918679
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 13.5

Justification / Notes :

Drainageway to WTL-51. Channel starts with strong bed and bank which becomes less defined down-channel. Heavy trash accumulation before confluence with WTL-51.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 5.5)	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 controls	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 = 3.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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 = 4.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	2 ✔	1	0
21. Rooted 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 = 13.5

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

Notes :

Some microstegium in channel in pockets but not prevalent.

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1500
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 29 Down from Wetland		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.285374, -89.919192
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐very wet ☐wet ☑average ☐dry ☐drought ☐unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : He - Henry silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐Severe ☐Moderate ☑Slight ☐Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 12.5

Justification / Notes :

Surrounding area has been topographically/vegetatively altered due to construction activities. In addition nearby impervious surfaces may be affecting this area.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 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 controls	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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 = 12.5

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

Notes :

Soils: 10YR 5/1 ~ 90%, 7.5 YR 4/6 ~10%. Leaf litter present, in abundance, near the top of this waterway, near the start of the nearby wetland boundary. Wrack lines noted behind sweetgum roots acting as multiple grade controls. Fibrous roots noted in channel during determination. Bed and bank nearly present in last 1/4 of channel. Channel has no sorting and no depositional areas. Sinuosity evident in reach, but slight. No standing water, saturation, or vegetation in channel. No aquatic fauna observed during determination. Waterway leads into stream from nearby delineated wetland to the west.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/15:00
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 29 Up from Wetland		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.286877, -89.919259
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam	Source: WSS	
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 16

Justification / Notes :

Channel is a headwater drainageway. Strong bed and bank but otherwise weak geomorphology.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7)	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 controls	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 = 4)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1 ✔	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	2 ✔	1	0
21. Rooted 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 = 16

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

Notes :

Hydric soils observed but recorded colors were lost.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1700
Assessors/Affiliation: Carmean Barge Design		Project ID : 3508507
Site Name/Description: WWC 30 Down from Wetland		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.285875, -89.918769
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : 0.13 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : He - Henry silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17

Justification / Notes :

Residential/impervious surfaces nearby.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7.5)	**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 controls	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 = 4.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ✔	2	3
16. Leaf litter in channel (January – September)	1.5	1 ✔	0.5	0
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)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2 ✔	1	0
21. Rooted 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

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

Notes :

Soils: 10YR 6/1 ~ 90%, 7.5 YR 5/4~10%. Waterway is connected to delineated linear wetland upstream and a stream downstream. Channel has very little sinuosity, slightly meanders. Bed and bank are defined throughout. No aquatic fauna was observed within the reach. No vegetation was located within the channel, upland or wetland. Fibrous roots were present in channel, but were not abundant. Very little leaf litter located within the channel. Wrack lines noted along the sides of the channel. Water in small pockets along the reach. Saturation through 90% of reach. No headcuts or grade controls within reach. This WWC transitions into a stream at a large headcut, which is included in that particular reach.

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1600
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 30 Up from Wetland		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.286065, -89.918548
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐very wet ☐wet ☑average ☐dry ☐drought ☐unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : He - Henry silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐Severe ☐Moderate ☑Slight ☐Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12.5

Justification / Notes :

Residential/impervious surfaces nearby likely cause flashes of current through channel.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	**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 controls	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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ✔	0.5 ☐	0 ☐
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)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 = 12.5

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

Notes :

Soils: 10YR 6/2 ~ 95%, 7.5 YR 5/4~5%. Channel is a relatively short with very little sinuosity. Bed and bank are well defined and the channel appears to carry significant flashy flow. Deeper U shaped channel. No aquatic fauna was observed within the reach. No vegetation was located within the channel, upland or wetland. Fibrous roots were present in channel but not in abundance. Very little leaf litter was present in the channel, but sedimentation was noted on some of it, as well as the small woody debris within the waterway. Wrack lines noted along the sides of the channel, mainly in overhanging roots.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1600
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 31		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.286394, -89.918679
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 10.5

Justification / Notes :

Residential/impervious surfaces nearby.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	**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 controls	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)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Soils: 10YR 6/2 ~ 95%, 7.5 YR 5/4~5%. Channel has noticeable sinuosity, but not significant. Bed and bank are defined in ~70% of the waterway. This channel may carry heavy flow during rain events. No aquatic fauna was observed within the reach. No vegetation was located within the channel, upland or wetland. Fibrous roots were present in channel at a noticeable amount. Leaf litter observed throughout reach. Wrack lines noted along the sides of the channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1345
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 32		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.285051, -89.919982
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Ca - Calloway silt loam and He - Henry silt loam Source: WSS		
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 11

Justification / Notes :

Surrounding area has been topographically/vegetatively altered due to construction activities.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	**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 controls	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 = 3)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1 ✔	0.5 ✔	0
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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1 ✔	0 ✔
21. Rooted 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

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

Notes :

Soils: 10YR 4/1 ~ 80%, 7.5 YR 4/5 ~20%. Leaf litter present, but interspersed, long stretches of the waterway free from litter. Wrack lines noted near roots acting as grade controls. Roots within channel present, in abundance, when examining soil. Bed and bank nearly absent throughout, observed in ~10% of waterway. Channel has no sorting and no depositional areas. Sinuosity evident in reach, but slight. No standing water, saturation, or vegetation in channel. No aquatic fauna observed during determination. Waterway leads into nearby delineated wetland. It appears that this is a connector between two wetland complexes, one in the wooded area and one in the recently cleared field to the west.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1100
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 33		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.283006, -89.922257
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12

Justification / Notes :

Surrounding area has been topographically/vegetatively altered by clearing and construction activities.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	**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 controls	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 = 3)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ☑	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☑	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ☑	0 ☐
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 = 4.5)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ☑	0 ☐
21. Rooted 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 :

Soils: 10YR 4/1 ~ 85%, 7.5 YR 4/5 ~15%. Leaf litter present, but not throughout, various areas are free of debris. Wrack lines present near bottom of channel. Carex sp. observed in channel, not in abundance. Roots within channel present when examining soil. Upland plants absent from channel. Bed and bank weak overall, present in bottom half of waterway, but lost in upper portion. Channel, overall, has very little sorting and no depositional areas. Sinuosity evident in reach, but slight. No standing water in channel, saturation present near confluence with stream. No aquatic fauna observed during determination.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1100
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 34		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.282696, -89.922734
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data :		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam	Source: WSS	
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12

Justification / Notes :

Culverted recently by a construction entrance road. Surrounding area has been topographically/vegetatively altered recently as well.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 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 controls	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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1	0 ✔
21. Rooted 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 :

Soils: 10YR 5/1 ~ 90%, 7.5 YR 4/6 ~10%. Large amounts of leaf litter and small woody debris in the waterway. Few Carex sp. observed in channel, but sparse. Roots within channel very strong. Upland plants completely absent from channel. Bed and bank poor overall, slightly present near confluence with nearby stream. Channel, overall, has very little sorting and no depositional areas. Sinuosity of weak throughout. No water or saturation in channel and no aquatic fauna observed during determination.

Attachment C-2

Wetland Data Forms

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/12/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-1, 2

Investigator(s): Fowler, Lynch, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain depression Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3322 Long: -89.9108 Datum: NAD87

Soil Map Unit Name: Co—Collins silt loam; Ca—Calloway silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** ___ **No** ___

Remarks:

Wetlands 1 and 2 are in similar geographic positions with almost identical wetland indicator characteristics. Both feed into STR-2 via a number of ephemeral channels.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 2"

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 4 days without rain accounts for lack of surface water/saturation.

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

Sampling Point: WTL-1, 2

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	30	X	FAC
2. Ulmus americana	30	X	FAC
3. Populus Deltoides	20	X	FAC
4. Celtis occidentalis	20	X	FACU
5.			
6.			
7.			
8.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		

Sapling/Shrub Stratum (Plot size: ______)			
1. Ulmus americana	20	X	FAC
2. Acer negundo	20	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	40 = Total Cover		
50% of total cover: 20	20% of total cover: 8		

Herb Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Woody Vine Stratum (Plot size: ______)			
1. Toxicodendron radicans	10	X	FAC
2.			
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-1,2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 5/1	50	10YR 5/6	10	C	M	SiL	
	10YR 5/2	40						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/26/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-3

Investigator(s): Fowler, Lynch, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain depression Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3319 Long: -89.8977 Datum: NAD87

Soil Map Unit Name: Co—Collins silt loam, 0 to 2 percent slopes, occasionally flooded, brief duration NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-3

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	10	X	OBL
2. Populus deltoides	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Scirpus sp.	60	X	OBL
2. Ludwigia palustris	20		OBL
3. Iva annua	20		FAC
4. Typha latifolia	15		OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	115 = Total Cover		
50% of total cover: 57.5	20% of total cover: 23		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 6/1	90	10YR 5/6	10	C	M	SiCL	
3+	10YR 7/1	90	10YR 6/8	10	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.   [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks: Some areas of problematic soil were encountered close to road due to fill.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek Resiliency Study City/County: Millington / Shelby Sampling Date: 7/14/2017
Applicant/Owner: Shelby County State: TN Sampling Point: WTL-4
Investigator(s): Jennifer Morrison and Angel Fowler Section, Township, Range: NA
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): <1%
Subregion (LRR or MLRA): LRR P Lat: 35.33089 Long: -89.89386 Datum: NAD83
Soil Map Unit Name: Falaya silt loam (Fm) NWI classification: PFO1A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ___ (If no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ___
Are Vegetation No , Soil No , or Hydrology No 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 within a Wetland?** **Yes** ✔ **No** ___
Hydric Soil Present?	Yes ✔ No ___	
Wetland Hydrology Present?	Yes ✔ No ___	

Remarks:
This wetland plot is located north of Jones Boyd Road, west of the power lines, and south of Big Creek.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	___ Aquatic Fauna (B13)
___ High Water Table (A2)	___ Marl Deposits (B15) **(LRR U)**
✔ Saturation (A3)	___ Hydrogen Sulfide Odor (C1)
✔ Water Marks (B1)	___ Oxidized Rhizospheres along Living Roots (C3)
___ Sediment Deposits (B2)	___ Presence of Reduced Iron (C4)
✔ Drift Deposits (B3)	___ Recent Iron Reduction in Tilled Soils (C6)
___ Algal Mat or Crust (B4)	___ Thin Muck Surface (C7)
___ Iron Deposits (B5)	___ Other (Explain in Remarks)
___ Inundation Visible on Aerial Imagery (B7)	
✔ Water-Stained Leaves (B9)	

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✔ Sparsely Vegetated Concave Surface (B8)
- ✔ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✔ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No ✔	Depth (inches): ___
Water Table Present?	Yes ___	No ✔	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ✔	No ___	Depth (inches): variable

Wetland Hydrology Present? Yes ✔ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-4

Tree Stratum (Plot size: 30' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Celtis laevigata	20	✔	FACW
2. Fraxinus pennsylvanica	15	✔	FACW
3. Platanus occidentalis	15	✔	FACW
4. Asimina triloba	10		FAC
5.			
6.			
	60 = Total Cover		

50% of total cover: 30 20% of total cover: 12

Sapling Stratum (Plot size: 20' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Asimina triloba	10	✔	FACW
2. Acer negundo	10	✔	FAC
3.			
4.			
5.			
6.			
	20 = Total Cover		

50% of total cover: 10 20% of total cover: 4

Shrub Stratum (Plot size: 20' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus americana	5	✔	FAC
2.			
3.			
4.			
5.			
6.			
	5 = Total Cover		

50% of total cover: 2.5 20% of total cover: 1

Herb Stratum (Plot size: 10' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Saururus cernuus	5	✔	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	5 = Total Cover		

50% of total cover: 2.5 20% of total cover: 1

Woody Vine Stratum (Plot size: 10' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Campsis radicans	2	✔	FAC
2.			
3.			
4.			
5.			
	2 = Total Cover		

50% of total cover: 1 20% of total cover: 0.4

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✔ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR5/2	50%	10YR5/6	20%	C	M	silt loam	
	10YR5/1	30%						
5-10	10YR5/2	60%	10YR5/6	10%	C	M	silt loam	
	10YR5/1	30%						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✔ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 2-13-2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-5

Investigator(s): Fowler, Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Oxbow Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3337 Long: -89.8893 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, 0 to 2 percent slopes, occasionally flooded, long duration NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes x No ___	
Wetland Hydrology Present?	Yes x No ___	

Remarks:

Initial field investigation was conducted in Feb. 2018 after flood condition rain events. Area was re-investigated in April 2018 under normal weather conditions and confirmed wetland indicators.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☑ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 4"
Water Table Present?	Yes x	No ___	Depth (inches): at surface
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-5

Tree Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deltoides	30	X	FAC
2. Platanus occidentalis	20	X	FACW
3. Salix nigra	15		OBL
4. Acer rubrum	15		FAC
5.			
6.			
7.			
8.			
	80 = Total Cover		

50% of total cover: 40 20% of total cover: 16

Sapling/Shrub Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Ligustrum sinense	15	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	15 = Total Cover		

50% of total cover: 7.5 20% of total cover: 3

Herb Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	____ = Total Cover		

50% of total cover: ____ 20% of total cover: ____

Woody Vine Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Toxicodendron radicans	5	X	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		

50% of total cover: 2.5 20% of total cover: 1

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

Main body of wetland sparely vegetated due to flooding. However, area is forested and completely covered by canopy. Most vegetation growing on fringe.

SOIL

Sampling Point: WTL-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	92	10YR 4/6	8	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/26/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-6

Investigator(s): Fowler, Lynch, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3324 Long: -89.8866 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, 0 to 2 percent slopes, occasionally flooded, long duration NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland? Yes X No ___**
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 2" where present

Water Table Present? Yes X No ___ Depth (inches): at surface

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): at surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-6

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	
Sapling/Shrub Stratum (Plot size: ______)			
1. Acer negundo	35	X	FAC
2. Populus deltoides	20	X	FAC
3. Ulmus americana	20	X	FACW
4. Platanus occidentalis	15		FACW
5. Fraxinus pennsylvanica	10		FACW
6.			
7.			
8.			
	100 = Total Cover		
50% of total cover: 50		20% of total cover: 20	
Herb Stratum (Plot size: ______)			
1. Microstegium vimineum	60	X	FAC
2. Ludwigia palustrus	30	X	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 = Total Cover		
50% of total cover: 40		20% of total cover: 18	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 4/2	95	7.5YR 4/6	5	C	M	SiL	
1-12	10YR 5/2	80	7/5YR 4/6	15	C	M	SiL	
			7/5YR 2.5/1	5				Mn masses

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/13/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-7

Investigator(s): Fowler, Lynch, Morrison, Gray Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3322 Long: -89.9114 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, 0 to 2 percent slopes, occasionally flooded, long duration NWI classification: PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

Located south of easement in protected area

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X No ___	Depth (inches): 4"	
Water Table Present?	Yes X No ___	Depth (inches): at surface	
Saturation Present? (includes capillary fringe)	Yes X No ___	Depth (inches): at surface	**Wetland Hydrology Present? Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-7

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	50	X	OBL
2. Acer negundo	15	X	FAC
3. Populus deltoides	10		FAC
4.			
5.			
6.			
7.			
8.			
	75 = Total Cover		

50% of total cover: 37.5 20% of total cover: 15

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deloides	10	X	FAC
2. Platanus occidentalis	10	X	FACW
3. Asimina triloba	10	X	FAC
4.			
5.			
6.			
7.			
8.			
	30 = Total Cover		

50% of total cover: 15 20% of total cover: 6

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Saururus cernuus	50	X	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	______ = Total Cover		

50% of total cover: ______ 20% of total cover: ______

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	______ = Total Cover		

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 5/2	47	7.5YR 4/6	30	C	M	SiL	Mn masses make up remaining 3%
	10YR 4/2	20						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/19/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-8

Investigator(s): Fowler, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3276 Long: -89.8857 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, Ca—Calloway silt loam, GaA—Grenada silt loam NWI classification: PEM, PSS, PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:

Large wetland complex with some forested/shrub areas and other open water herbaceous areas

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☑ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): at surface
Water Table Present?	Yes X	No ___	Depth (inches): at surface
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-8

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deltoides (cotton)	50	X	FAC
2. Fraxinus pennsylvanica (green)	40	X	FACW
3. Acer negundo (box)	30		FAC
4. Salix nigra	25		OBL
5. Quercus nigra (water oak)	20		FAC
6.			
7.			
8.			
	165	= Total Cover	
50% of total cover: 82.5	20% of total cover: 33		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Cephalanthus occidentalis	25	X	OBL
2. Salix nigra	15	X	OBL
3. Mimulus alatus	15	X	OBL
4.			
5.			
6.			
7.			
8.			
	55	= Total Cover	
50% of total cover: 27.5	20% of total cover: 11		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Leersia oryzoides	10	X	OBL
2. Rumex crispus	5	X	FAC
3. Juncus effusus	5	X	FACW
4. Carex sp.	5	X	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25	= Total Cover	
50% of total cover: 12.5	20% of total cover: 5		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Apios americana	35	X	FACW
2.			
3.			
4.			
5.			
	35	= Total Cover	
50% of total cover: 17.5	20% of total cover: 7		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 10 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 5/3	70	7.5YR 6/6	30	C	M	Si	
5-14	10YR 5/2	80	7.5YR 5/6	20	C	M	Si	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/19/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-9 - 14

Investigator(s): Fowler, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3250 Long: -89.8787 Datum: NAD87

Soil Map Unit Name: Fm—Falaya silt loam; Ca—Calloway silt loam NWI classification: PSS/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:

these areas are part of a wetland complex that is hydrologically connected by water courses and open water ponds and contain similar indicator characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [x] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 1" where present
Water Table Present?	Yes X	No ___	Depth (inches): 5"
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetlands surrounded by open water ponds

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

Sampling Point: WTL-9 - 14

Tree Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			

50% of total cover: ______ 20% of total cover: ______

Sapling/Shrub Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	20	X	OBL
2. Populus deltoides	5		FAC
3. Diospyros virginiana	5		FAC
4.			
5.			
6.			
7.			
8.			
= Total Cover	30		

50% of total cover: 15 20% of total cover: 6

Herb Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Echinochloa crus-galli	60	X	FACW
2. Carex frankii	15		OBL
3. Juncus effusus	10		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
= Total Cover	85		

50% of total cover: 42.5 20% of total cover: 17

Woody Vine Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
= Total Cover			

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	70	x 2 =	140
FAC species	10	x 3 =	30
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	115 (A)		205 (B)

Prevalence Index = B/A = 1.78

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-9 - 14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-5	10YR 5/1	75	7.5YR 4/6	25	C	M	SiL	
5-14	10YR 4/2	70	7.5YR 4/6	30	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/13/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-15

Investigator(s): Fowler, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3235 Long: -89.8682 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, 0 to 2 percent slopes, occasionally flooded, long duration NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes X No ____		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [x] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): 2"

Water Table Present? Yes X No ____ Depth (inches): at surface

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-15

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ______ 20% of total cover: ______			

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10 20% of total cover: 4			

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Echinochloa crus-galli	80	X	FACW
2. Diodia virginiana	40	X	FACW
3. Ludwigia palustris	10		OBL
4. Rumex crispus	10		FAC
5. Commelina virginica	10		FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	150 = Total Cover		
50% of total cover: 75 20% of total cover: 30			

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover: ______ 20% of total cover: ______			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 4/2	90	10YR 5/8	10	C	M	SiL	
1-4	10YR 4/2	75	10YR 5/8	25	C	M	SiL	
4+	10YR 5/1	35	10YR 5/6	30	C	M	SiL	
	10YR 5/2	35						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/14/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-16 - 22

Investigator(s): Fowler, Lynch, Morrison, Gray Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3201 Long: -89.8702 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, Co—Collins silt loam, Fm—Falaya silt loam NWI classification: PFO/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? **Yes** X **No** ____

Remarks:

Small pockets of wetland saturation/inundation in close proximity with similar indicator characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [x] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [x] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 2-4" where present
Water Table Present?	Yes X	No ____	Depth (inches): at surface
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): at surface

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-16 - 22

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus americana	40	X	FAC
2. Acer rubrum	40	X	FAC
3. Liquidamber styraciflua	10		FAC
4. Quercus lyrata	5		OBL
5. Gleditsia triacanthos	5		FAC
6.			
7.			
8.			
	100	= Total Cover	
50% of total cover: 50		20% of total cover: 20	

Sapling/Shrub Stratum (Plot size:)			
1. Ulmus americana	40	X	FAC
2. Asimina triloba	20	X	FAC
3. Lindera benzoin	5		FACW
4.			
5.			
6.			
7.			
8.			
	65	= Total Cover	
50% of total cover: 32.5		20% of total cover: 13	

Herb Stratum (Plot size:)			
1. Boehmeria cylindrica	65	X	FACW
2. Saururus cernuus	40	X	OBL
3. Campsis radicans	15		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	120	= Total Cover	
50% of total cover: 60		20% of total cover: 24	

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-16 - 22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100						O Horizon
1-2	10YR 2/1	100					SiL	
2-8	10YR 6/1	90	10YR 6/6	10	C	M	SiL	
8+	10YR 6/1	85	10YR 6/4	15	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/27/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-23 - 27 east

Investigator(s): Fowler, Lynch, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3322 Long: -89.9114 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, Fm—Falaya silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes ___ No ___**
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

WTL-27 is a very large wetland area with WTL-23 - 26 being nearby pockets of saturation/inundation with similar indicator characteristics

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [x] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X No ___	Depth (inches): 1-4"	
Water Table Present?	Yes X No ___	Depth (inches): at surface	
Saturation Present? (includes capillary fringe)	Yes X No ___	Depth (inches): at surface	**Wetland Hydrology Present? Yes X No ___**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-23 - 27 east

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus americana	20	X	FAC
2. Salix nigra	20	X	OBL
3. Fraxinus pennsylvanica	5		FACW
4. Platanus occidentalis	5		FACW
5.			
6.			
7.			
8.			
	50 = Total Cover		
50% of total cover: 25	20% of total cover: 10		
Sapling/Shrub Stratum (Plot size: ______)			
1. Fraxinus pennsylvanica	5	X	FACW
2. Platanus occidentalis	5	X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 5		
Herb Stratum (Plot size: ______)			
1. Saururus cernuus	100	X	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-23 - 27 east

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 5/2	75	7.5YR 4/6	20	C	M	SiL	
			7.5YR 4/4	5	C	PL	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek Resiliency Study City/County: Millington / Shelby Sampling Date: 7/18/2017

Applicant/Owner: Shelby County State: TN Sampling Point: WTL-28, 29

Investigator(s): Jennifer Morrison and Margaret Lee Section, Township, Range: NA

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): concave Slope (%): <1%

Subregion (LRR or MLRA): LRR P Lat: 35.32001 Long: -89.83880 Datum: NAD83

Soil Map Unit Name: Waverly silt loam (Wv) NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ☐ (If no, explain in Remarks.)

Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ☐

Are Vegetation No , Soil No , or Hydrology No 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 ☐
Hydric Soil Present?	Yes ✔	No ☐
Wetland Hydrology Present?	Yes ✔	No ☐

Is the Sampled Area within a Wetland? **Yes** ✔ **No** ☐

Remarks:

This wetland plot is located within the easternmost portion of the project, to the west of Sledge Road.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ✔ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ✔ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ✔ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ☐	No ✔	Depth (inches): ______
Water Table Present?	Yes ☐	No ✔	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes ☐	No ✔	Depth (inches): ______

Wetland Hydrology Present? Yes ✔ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Shallow buttressing of trees observed within this area.

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: WTL-28, 29

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar stryaciflua	85	✔	FAC
2. Carya ovata	30	✔	FACU
3. Ulmus americana	8		FAC
4. Quercus pagoda	6		FACW
5. Platanus occidentalis	5		FACW
6. Fraxinus pennsylvanica	4		FACW
	138 = Total Cover		
50% of total cover: 69	20% of total cover: 27.6		

Sapling Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar stryaciflua	6	✔	FAC
2. Carya ovata	4	✔	FACU
3. Cretagus viridis	2		FACW
4.			
5.			
6.			
	12 = Total Cover		
50% of total cover: 6	20% of total cover: 2.4		

Shrub Stratum (Plot size: 15' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus americana	3	✔	FAC
2. Lindera benzoin	2	✔	FACW
3.			
4.			
5.			
6.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Herb Stratum (Plot size: 10' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Carex festucacea	30	✔	FACW
2. Onoclea sensibilis	27	✔	OBL
3. Carex frankii	15		OBL
4. Leersia oryzoides	10		OBL
5. Boehmeria cylindrica	7		FACW
6. Persicaria hydropiperoides	2		OBL
7. Symphotrichum lanceolatum	1		FACW
8.			
9.			
10.			
11.			
	92 = Total Cover		
50% of total cover: 46	20% of total cover: 18.4		

Woody Vine Stratum (Plot size: 10' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Parthenocissus quinquefolia	10	✔	FACU
2. Toxicodendron radicans	5	✔	FAC
3. Smilax rotundifolia	2		FAC
4. Bignonia capreolata	1		FAC
5.			
	18 = Total Cover		
50% of total cover: 9	20% of total cover: 3.6		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 70% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✔ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-28, 29

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR4/1	35%	7.5YR4/6	15%	C	M	silt loam	
	10YR4/2	50%						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ✔ **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 4/19/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-30

Investigator(s): Fowler, Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3354 Long: -89.8895 Datum: NAD87

Soil Map Unit Name: Fm—Falaya silt loam NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [x] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 1 - 6 inches	
Water Table Present?	Yes X	No ___	Depth (inches): at surface	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface	**Wetland Hydrology Present? Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

First site visit was in February 2018, but was reassessed under normal weather conditions due to flood conditions in February.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-30

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Gratiola neglecta	70	X	OBL
2. Ludwigia palustris	20	X	OBL
3. Carex sp.	5		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
50% of total cover: 50		20% of total cover: 20	

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-30

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/1	100						
2-12	10YR 5/1	75	7.5YR 5/8	25	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 4/18/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-31 - 35

Investigator(s): G. Lynch; A. Fowler Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3366 Long: -89.9309 Datum: NAD87

Soil Map Unit Name: Fm—Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

Flooded, oxbow-like depression (WTL-35) and small saturated pockets (WTL-34, 36). The five areas are close in proximity and have similar indicator characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] 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)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): Surface
Water Table Present?	Yes X	No ____	Depth (inches): 6 inches
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): Surface

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-31 - 35

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	60	X	FAC
2. Acer negundo	30	X	FAC
3. Platanus occidentalis	5	X	FACW
4.			
5.			
6.			
7.			
8.			
	95	= Total Cover	
50% of total cover: 47.5	20% of total cover: 19		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	10	X	FAC
2. Asimina triloba	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Rumex crispus	20	X	FAC
2. Ranunculus abortivus	20	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	355 (B)

Prevalence Index = B/A = 2.73

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

Herbaceous vegetation generally contained to open field portion of WTL-33

SOIL

Sampling Point: WTL-31 - 35

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3	10YR 4/2	90	10YR 5/6	10	C	M	SiLo	
2-12	10YR 5/1	85	7.5YR 4/4	15	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-36

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3404 Long: -89.9527 Datum: NAD87

Soil Map Unit Name: Fm-Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [x] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-36

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	35	X	FAC
2. Liquidambar styraciflua	30	X	FAC
3. Platanus occidentalis	15		FACW
4. Populus deltoides	10		FAC
5.			
6.			
7.			
8.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		
Sapling/Shrub Stratum (Plot size:)			
1. Liquidambar styraciflua	10	X	FAC
2. Ulmus rubra	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		
Herb Stratum (Plot size:)			
1. Toxicodendron radicans	15	X	FAC
2. Ampelopsis arborea	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		
Woody Vine Stratum (Plot size:)			
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	15	x 2 =	30
FAC species	115	x 3 =	345
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	130 (A)		375 (B)

Prevalence Index = B/A = 2.88

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-36

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/2	70	5YR 4/4	30	C	M	SiLo	
6-12	10YR 5/2	90	5YR 4/4	10	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-37

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3418 Long: -89.9524 Datum: NAD87

Soil Map Unit Name: GaB - Grenada silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [x] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): Surface
Water Table Present?	Yes X	No ___	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-37

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	25	X	FAC
2. Liquidambar styraciflua	25	X	FAC
3. Platanus occidentalis	20	X	FACW
4. Populus deltoides	20	X	FAC
5.			
6.			
7.			
8.			
	90 = Total Cover		

50% of total cover: 45 20% of total cover: 18

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	15	X	FAC
2. Ulmus rubra	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		

50% of total cover: 10 20% of total cover: 4

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Toxicodendron radicans	15	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	____ = Total Cover		

50% of total cover: ____ 20% of total cover: ____

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	____ = Total Cover		

50% of total cover: ____ 20% of total cover: ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	20	x 2 = 40
FAC species	105	x 3 = 315
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	125 (A)	345 (B)

Prevalence Index = B/A = 2.76

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-37

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 5/1	90	7.5YR 3/4	10	C	M	SiLo	
6-12	10YR 5/1	75	7.5YR 4/4	25	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-38

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3419 Long: -89.9518 Datum: NAD87

Soil Map Unit Name: GaB - Grenada silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ______	**Is the Sampled Area within a Wetland?** **Yes** X **No** ______
Hydric Soil Present?	Yes X No ______	
Wetland Hydrology Present?	Yes X No ______	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [x] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [x] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ______ Depth (inches): Surface

Water Table Present? Yes X No ______ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes X No ______ Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-38

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	30	X	FAC
2. Ulmus rubra	25	X	FAC
3. Platanus occidentalis	20	X	FACW
4. Populus deltoides	20	X	FAC
5.			
6.			
7.			
8.			
	95	= Total Cover	

50% of total cover: 47.5 20% of total cover: 19

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	5	X	FAC
2. Ulmus rubra	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	10	= Total Cover	

50% of total cover: 5 20% of total cover: 2

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Toxicodendron radicans	10	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10	= Total Cover	

50% of total cover: 20% of total cover:

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
		= Total Cover	

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	20	x 2 = 40
FAC species	95	x 3 = 285
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	115 (A)	325 (B)

Prevalence Index = B/A = 2.83

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-38

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2	10YR 4/1	100					SiLo	
2-8	10YR 5/1	90	7.5YR 3/4	10	C	M	SiLo	
8-12	10YR 5/1	75	7.5YR 3/4	25	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-39

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3413 Long: -89.9517 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___	
Water Table Present?	Yes ___	No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 2	**Wetland Hydrology Present? Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-39

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	35	X	FAC
2. Acer negundo	25	X	FAC
3. Platanus occidentalis	10		FACW
4. Ulmus rubra	10		FAC
5.			
6.			
7.			
8.			
	80 = Total Cover		
50% of total cover: 40	20% of total cover: 16		
Sapling/Shrub Stratum (Plot size: ______)			
1. Acer rubrum	20	X	FAC
2. Acer negundo	15	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	35 = Total Cover		
50% of total cover: 17.5	20% of total cover: 7		
Herb Stratum (Plot size: ______)			
1. Sagittaria latifolia	15	X	OBL
2. Microstegium vimineum	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25 = Total Cover		
50% of total cover: 12.5	20% of total cover: 5		
Woody Vine Stratum (Plot size: ______)			
1. Parthenocissus quinquefolia	10	X	FACU
2.			
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.7 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	10	x 2 =	20
FAC species	115	x 3 =	345
FACU species	10	x 4 =	40
UPL species		x 5 =	
Column Totals:	150 (A)		420 (B)

Prevalence Index = B/A = 2.80

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-39

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3	10YR 4/1	100					SiLo	
3-7	10YR 4/1	90	7.5YR 4/4	10	C	M	SiLo	
7-12	10YR 5/1	80	7.5YR 3/4	20	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-40

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3415 Long: -89.9515 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland?	**Yes X No ___**
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___ No X	Depth (inches): ___	
Water Table Present?	Yes ___ No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes X No ___	Depth (inches): 2	**Wetland Hydrology Present? Yes X No ___**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-40

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	35	X	FAC
2. Ulmus rubra	25	X	FAC
3. Platanus occidentalis	15		FACW
4. Populus deltoides	15		FAC
5.			
6.			
7.			
8.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ligustrum sinense	15	X	FAC
2. Ulmus rubra	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Microstegium vimineum	10	X	FAC
2. Toxicodendron radicans	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	15	x 2 = 30
FAC species	115	x 3 = 345
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	130 (A)	375 (B)

Prevalence Index = B/A = 2.88

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-40

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/1	100					SiLo	
2-8	10YR 4/1	90	7.5YR 4/4	10	C	M	SiLo	
8-12	10YR 5/1	75	7.5YR 3/4	25	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ____

Hydric Soil Present? Yes X **No** ____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ____ State: TN Sampling Point: WTL-41

Investigator(s): Carmean and Lynch Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3399 Long: -89.9470 Datum: NAD87

Soil Map Unit Name: Ca - Calloway silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil X, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes ____	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

Located in cleared ag field which caused problematic soils. Soils were compacted and we were not able to get a sample. Clear hydrology and hydrophytic vegetation were present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☑ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-41

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Eleocharis tenuis	15	X	FACW
2. Carex intumescens	15	X	FACW
3. Ludwigia palustris	5		OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35 = Total Cover		
50% of total cover: 17.5		20% of total cover: 7	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	30	x 2 =	60
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	35 (A)		65 (B)

Prevalence Index = B/A = 1.85

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-41

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ______

Remarks:

Agricultural field that has been tilled and compacted multiple times. No clear distinction in soils. Hydrology and vegetation were present though.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-42

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3383 Long: -89.9458 Datum: NAD87

Soil Map Unit Name: Gr - Graded land, silty materials NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No X

Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes ___ No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

Located in cleared ag field which caused problematic soils. Soils were compacted and we were not able to get a sample. Clear hydrology and hydrophytic vegetation were present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☑ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___ No X	Depth (inches): ___	
Water Table Present?	Yes ___ No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___ No X	Depth (inches): ___	**Wetland Hydrology Present? Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-42

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: ______ 20% of total cover: ______

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: ______ 20% of total cover: ______

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Eleocharis tenuis	15	X	FACW
2. Carex intumescens	15	X	FACW
3. Ludwigia palustris	5		OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35 = Total Cover		

50% of total cover: 17.5 20% of total cover: 7

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species	30	x 2 = 60
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	35 (A)	65 (B)

Prevalence Index = B/A = 1.85

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-42

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ______

Remarks:
Agricultural field that has been tilled and compacted multiple times. No clear distinction in soils. Hydrology and vegetation were present though.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-43

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3384 Long: -89.9445 Datum: NAD87

Soil Map Unit Name: Ca - Calloway silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [x] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [x] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 3

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-43

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	40	X	OBL
2. Populus deltoides	20	X	FAC
3. Liquidambar styraciflua	10		FAC
4.			
5.			
6.			
7.			
8.			
	70 = Total Cover		
50% of total cover: 35	20% of total cover: 14		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	15	X	OBL
2. Liquidambar styraciflua	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	25 = Total Cover		
50% of total cover: 12.5	20% of total cover: 5		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Eleocharis tenuis	15	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15 = Total Cover		
50% of total cover:	20% of total cover:		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	55	x 1 = 55
FACW species	15	x 2 = 30
FAC species	40	x 3 = 120
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	110 (A)	205 (B)

Prevalence Index = B/A = 1.86

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-43

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	90	7.5YR 6/6	10	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.
[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ________ State: TN Sampling Point: WTL-44

Investigator(s): Carmean and Lynch Section, Township, Range: ________

Landform (hillslope, terrace, etc.): Cypress depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3380 Long: -89.9407 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [x] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [x] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [x] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [x] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): Surface
Water Table Present?	Yes X	No ___	Depth (inches): Surface
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-44

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Taxodium distichum	65	X	OBL
2. Acer negundo	15		FAC
3. Ulmus rubra	15		FAC
4.			
5.			
6.			
7.			
8.			
	95 = Total Cover		

50% of total cover: 47.5 20% of total cover: 19

Sapling/Shrub Stratum (Plot size: ______)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	____ = Total Cover		

50% of total cover: ____ 20% of total cover: ____

Herb Stratum (Plot size: ______)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	____ = Total Cover		

50% of total cover: ____ 20% of total cover: ____

Woody Vine Stratum (Plot size: ______)			
1. n/a			
2.			
3.			
4.			
5.			
	____ = Total Cover		

50% of total cover: ____ 20% of total cover: ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	65	x 1 = 65
FACW species		x 2 =
FAC species	30	x 3 = 90
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	95 (A)	155 (B)

Prevalence Index = B/A = 1.63

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-44

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-12	10YR 5/1	75	10YR 6/6	25	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-45

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3384 Long: -89.9392 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 2

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-45

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deltoides	85	X	FAC
2. Salix nigra	5		OBL
3.			
4.			
5.			
6.			
7.			
8.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		
Sapling/Shrub Stratum (Plot size:)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species		x 2 =
FAC species	85	x 3 = 255
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	90 (A)	260 (B)

Prevalence Index = B/A = 2.89

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-45

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 6/2	70	7.5YR 5/6	30	C	M	SiLo	
4-12	10YR 4/1	70	7.5YR 5/6	30	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-46

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Cypress depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3375 Long: -89.9394 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☑ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 2

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-46

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	30	X	FAC
2. Ulmus rubra	15	X	FAC
3. Platanus occidentalis	10		FACW
4. Salix nigra	5		OBL
5.			
6.			
7.			
8.			
	60 = Total Cover		

50% of total cover: 30 20% of total cover: 12

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	10	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		

50% of total cover: 20% of total cover:

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Eleocharis tenuis	10	X	FACW
2. Lemna sp.	10	X	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		

50% of total cover: 10 20% of total cover: 4

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:
OBL species	15	x 1 = 15
FACW species	30	x 2 = 60
FAC species	45	x 3 = 135
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	90 (A)	210 (B)

Prevalence Index = B/A = 2.33

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-46

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 5/2	50	7.5YR 5/4	20	C	M	SiLo	
			Gley1 5/10Y	30	D	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5)
- [ ] Organic Bodies (A6) **(LRR P, T, U)**
- [ ] 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- [ ] Muck Presence (A8) **(LRR U)**
- [ ] 1 cm Muck (A9) **(LRR P, T)**
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Coast Prairie Redox (A16) **(MLRA 150A)**
- [ ] Sandy Mucky Mineral (S1) **(LRR O, S)**
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Dark Surface (S7) **(LRR P, S, T, U)**
- [ ] Polyvalue Below Surface (S8) **(LRR S, T, U)**
- [ ] Thin Dark Surface (S9) **(LRR S, T, U)**
- [ ] Loamy Mucky Mineral (F1) **(LRR O)**
- [x] Loamy Gleyed Matrix (F2)
- [x] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Marl (F10) **(LRR U)**
- [ ] Depleted Ochric (F11) **(MLRA 151)**
- [ ] Iron-Manganese Masses (F12) **(LRR O, P, T)**
- [ ] Umbric Surface (F13) **(LRR P, T, U)**
- [ ] Delta Ochric (F17) **(MLRA 151)**
- [ ] Reduced Vertic (F18) **(MLRA 150A, 150B)**
- [ ] Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- [ ] Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- [ ] 1 cm Muck (A9) **(LRR O)**
- [ ] 2 cm Muck (A10) **(LRR S)**
- [ ] Reduced Vertic (F18) **(outside MLRA 150A,B)**
- [ ] Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- [ ] Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- [ ] Red Parent Material (TF2)
- [ ] Very Shallow Dark Surface (TF12)
- [ ] Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: hardpan clay

Depth (inches): 4

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-47

Investigator(s): Carmean Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2887 Long: -89.9201 Datum: NAD87

Soil Map Unit Name: He- Henry silt loam and GaB - Grenada silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes x	No ___	
Wetland Hydrology Present?	Yes x	No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [x] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [x] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): Surface
Water Table Present?	Yes X	No ___	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Standing water in located in very center of wetland.

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

Sampling Point: WTL-47

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	30	X	FACW
2. Liquidambar styraciflua	30	X	FAC
3. Ulmus americana	20	X	FAC
4. Acer negundo	10		FAC
5.			
6.			
7.			
8.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		

Sapling/Shrub Stratum (Plot size: ______)			
1. Liquidambar styraciflua	10	X	FAC
2. Ulmus americana	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size: ______)			
1. Ampelopsis arborea	10	X	FAC
2. Carex sp.	5	X	FACW
3. Toxicodendron radicans	5	X	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Woody Vine Stratum (Plot size: ______)			
1. n/a			
2.			
3.			
4.			
5.			
	______ = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	35	x 2 = 70
FAC species	95	x 3 = 285
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	130 (A)	355 (B)

Prevalence Index = B/A = 2.73

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-47

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2	10YR 4/2	100					SiLo	
2-12	10YR 4/1	85	7.5YR 5/6	15	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ____ State: TN Sampling Point: WTL-49

Investigator(s): Lynch Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Channel Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2877 Long: -89.9174 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No 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 ____	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes x	No ____	
Wetland Hydrology Present?	Yes x	No ____	

Remarks:
Feature collects stormwater runoff and debris in low point of an ephemeral channel.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [x] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [x] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): ~4"

Water Table Present? Yes X No ____ Depth (inches): at surface

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upper end of channel relatively low point in channel downstream of culvert outlet. Area full of organic material and woody debris with no obvious slope. No vegetation within the channel.

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

Sampling Point: WTL-49

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Sapling/Shrub Stratum (Plot size: ____)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Herb Stratum (Plot size: ____)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Woody Vine Stratum (Plot size: ____)			
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** ____

Remarks: (If observed, list morphological adaptations below).

Vegetation not present within channel. Area covered in saturated organic material and woody debris deposits.

SOIL

Sampling Point: WTL-49

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-5	Gley1 7/N	100					SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☑ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:
Soil sample was difficult of obtain due to inundation.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-50

Investigator(s): G. Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2872 Long: -89.9191 Datum: NAD87

Soil Map Unit Name: Fm—Falaya silt loam NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____		
Wetland Hydrology Present?	Yes X	No ____		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): Surface

Water Table Present? Yes X No ____ Depth (inches): 6 inches

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-50

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	20	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		
Sapling/Shrub Stratum (Plot size: ______)			
1. Ulmus rubra	50	X	FAC
2. Acer negundo	15		FAC
3. Ligustrum sinense	15		FAC
4.			
5.			
6.			
7.			
8.			
	80 = Total Cover		
50% of total cover: 40	20% of total cover: 16		
Herb Stratum (Plot size: ______)			
1. Impatiens capensis	50%	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50 = Total Cover		
50% of total cover: 25	20% of total cover: 10		
Woody Vine Stratum (Plot size: ______)			
1. n/a			
2.			
3.			
4.			
5.			
	______ = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-50

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	85	5YR 3/4	15	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-51

Investigator(s): Carmean Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Channel Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2862 Long: -89.9184 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [x] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [x] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes X No ___ Depth (inches): 2 inches

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Upper end of channel adjacent to blocked culvert. Area full of organic material with no obvious slope. No vegetation within the channel.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-51

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____ 20% of total cover: ____			

Sapling/Shrub Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____ 20% of total cover: ____			

Herb Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover: ____ 20% of total cover: ____			

Woody Vine Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover: ____ 20% of total cover: ____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** ____

Remarks: (If observed, list morphological adaptations below).

Vegetation not present within channel. Area covered in saturated organic material.

SOIL

Sampling Point: WTL-51

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	Gley1 7/N	100					SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☑ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-52

Investigator(s): Carmean Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2858 Long: -89.9191 Datum: NAD87

Soil Map Unit Name: He- Henry silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] 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)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [x] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): Surface

Water Table Present? Yes X No ___ Depth (inches): 3

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Standing water in located in very center of wetland.

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

Sampling Point: WTL-52

Tree Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	35	X	FAC
2. Platanus occidentalis	30	X	FACW
3. Ulmus americana	20	X	FAC
4. Acer negundo	5		FAC
5.			
6.			
7.			
8.			
	85 = Total Cover		

50% of total cover: 42.5 20% of total cover: 17

Sapling/Shrub Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	15	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	15 = Total Cover		

50% of total cover: ______ 20% of total cover: ______

Herb Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Impatiens capensis	10	X	FACW
2. Carex sp.	10	X	FACW
3. Toxicodendron radicans	10	X	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30 = Total Cover		

50% of total cover: 15 20% of total cover: 6

Woody Vine Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	50	x 2 = 100
FAC species	85	x 3 = 255
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	135 (A)	355 (B)

Prevalence Index = B/A = 2.63

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-52

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-12	10YR 5/1	75	5YR 3/4	25	C	M	SiLo	FeMn present @ 8"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☑ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-53

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2842 Long: -89.9175 Datum: NAD87

Soil Map Unit Name: Ca - Calloway silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes X	No ___	Depth (inches): 2
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-53

Tree Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			

50% of total cover: ______ 20% of total cover: ______

Sapling/Shrub Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			

50% of total cover: ______ 20% of total cover: ______

Herb Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Carex sp.	10	X	FACW
2. Ranunculus parviflorus	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
= Total Cover	15		

50% of total cover: 7.5 20% of total cover: 3

Woody Vine Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
= Total Cover			

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	10	x 2 = 20
FAC species	5	x 3 = 15
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	15 (A)	35 (B)

Prevalence Index = B/A = 2.33

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

Sparsely vegetated concave surface.

SOIL

Sampling Point: WTL-53

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	100					SiLo	
3-12	10YR 4/1	90	7.5YR 5/6	10	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-54

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2842 Long: -89.9202 Datum: NAD87

Soil Map Unit Name: Ca- Calloway silt loam and Fm-Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] 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)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [x] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): Surface

Water Table Present? Yes X No ___ Depth (inches): 3

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Standing water in pockets. Primarily near the middle of the wetland. Saturation to the surface throughout.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-54

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	30	X	FAC
2. Ulmus americana	30	X	FAC
3. Platanus occidentalis	25	X	FACW
4.			
5.			
6.			
7.			
8.			
	85	= Total Cover	
50% of total cover: 42.5	20% of total cover: 17		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	10	X	FAC
2. Ulmus americana	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Impatiens capensis	15	X	FACW
2. Panicum sp.	10	X	FACW
3. Toxicodendron radicans	5		FAC
4. Carex sp.	5		FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35	= Total Cover	
50% of total cover: 17.5	20% of total cover: 7		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	55	x 2 = 110
FAC species	85	x 3 = 255
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	140 (A)	365 (B)

Prevalence Index = B/A = 2.61

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-54

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/1	90	7.5YR 4/4	10	C	M	SiLo	
2-5	10YR 4/2	40	10YR 5/2	40	D	M	SiLo	
			7.5YR 4/3	20	C	M	SiLo	
5-12	10YR 5/2	70	10YR 5/4	30	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-55

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2835 Long: -89.9220 Datum: NAD87

Soil Map Unit Name: Fm-Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-55

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	30	X	FACW
2. Ulmus americana	25	X	FAC
3. Liquidambar styraciflua	25	X	FAC
4.			
5.			
6.			
7.			
8.			
	80	= Total Cover	
50% of total cover: 40	20% of total cover: 16		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	10	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10	= Total Cover	
50% of total cover: ______	20% of total cover: ______		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Impatiens capensis	30	X	FACW
2. Microstegium vimineum	20	X	FAC
3. Toxicodendron radicans	15		FAC
4. Juncus sp.	10		FACW
5. Carex sp.	10		FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85	= Total Cover	
50% of total cover: 42.5	20% of total cover: 17		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	______	= Total Cover	
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	80	x 2 = 160
FAC species	95	x 3 = 285
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	175 (A)	445 (B)

Prevalence Index = B/A = 2.54

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-55

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/1	100					SiLo	
2-8	10YR 4/3	90	10YR 5/1	10	D	M	SiLo	
8-12	7.5YR 3/2	90	10YR 7/1	10	D	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 4/18/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-56

Investigator(s): Fowler and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Channel Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2833 Long: -89.9228 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam and GaB—Grenada silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Little water present other than saturation. Some hydrology may have been cut off by road and/or blocked culvert.

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

Sampling Point: WTL-56

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	75	X	FAC
2. Ulmus rubra	20		FAC
3. Acer rubrum	10		FAC
4.			
5.			
6.			
7.			
8.			
	105	= Total Cover	

50% of total cover: 52.5 20% of total cover: 21

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	30	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	30	= Total Cover	

50% of total cover: 15 20% of total cover: 6

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Impatiens capensis	50	X	FACW
2. Carex sp.	15	X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65	= Total Cover	

50% of total cover: 32.5 20% of total cover: 13

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
		= Total Cover	

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

Vegetation not present within channel. Area covered in saturated organic material.

SOIL

Sampling Point: WTL-56

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 3/1	100					SiL	
1-3	10YR 4/1	95	7.5YR 4/4	5	C	M	SiL	
3-12	10YR 5/1	75	7.5YR 5/6	25	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

Attachment D

Photo Summary

Photo: 1
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.331617, -89.917922
Feature: WWC-1/EPH-1

Upstream view of WWC-1/EPH-1.

Photo: 2
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.331639, -89.917939
Feature: WWC-1/EPH-1

Downstream view of WWC-1/EPH-1.

Photo: 3
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3310, -89.9119
Feature: WWC-2/EPH-2

Upstream view of WWC-2/EPH-2.

Photo: 4
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3310, -89.9119
Feature: WWC-2/EPH-2

Downstream view of WWC-2/EPH-2.

Photo: 5
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3335, -89.9103
Feature: WWC-3/EPH-3

Upstream view of WWC-3/EPH-3 from the lower reach of the channel.

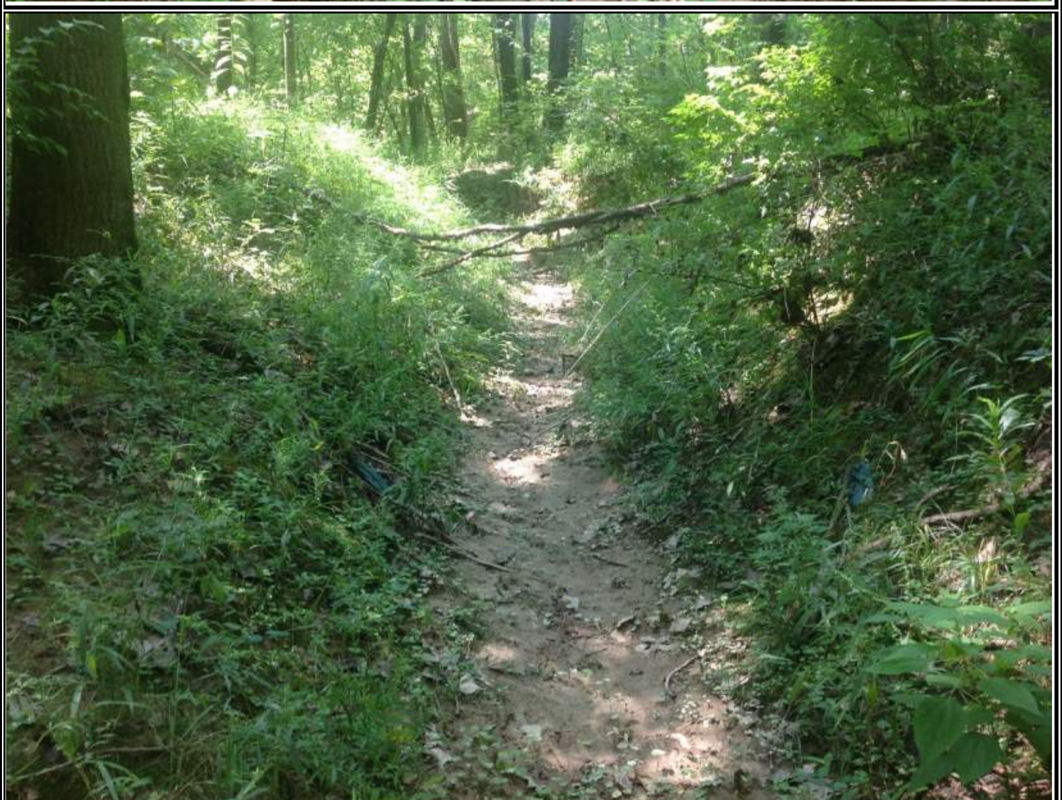


Photo: 6
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3332, -89.9108
Feature: WWC-3/EPH-3

Downstream view of WWC-3/EPH-3 from the upper reach of the channel.

Photo: 7
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3349, -89.9079
Feature: WWC-4/EPH-4

Downstream view of WWC-4/EPH-4 from the northern boundary of the project area.

Photo: 8
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3348, -89.9079
Feature: WWC-4/EPH-4

Upstream view of WWC-4/EPH-4 from the end of the feature where it drains into the tributary to Big Creek (STR-3).

Photo: 9
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3334, -89.9101
Feature: WWC-5/EPH-5

Downstream view of WWC-5/EPH-5 near its confluence with the tributary to Big Creek.

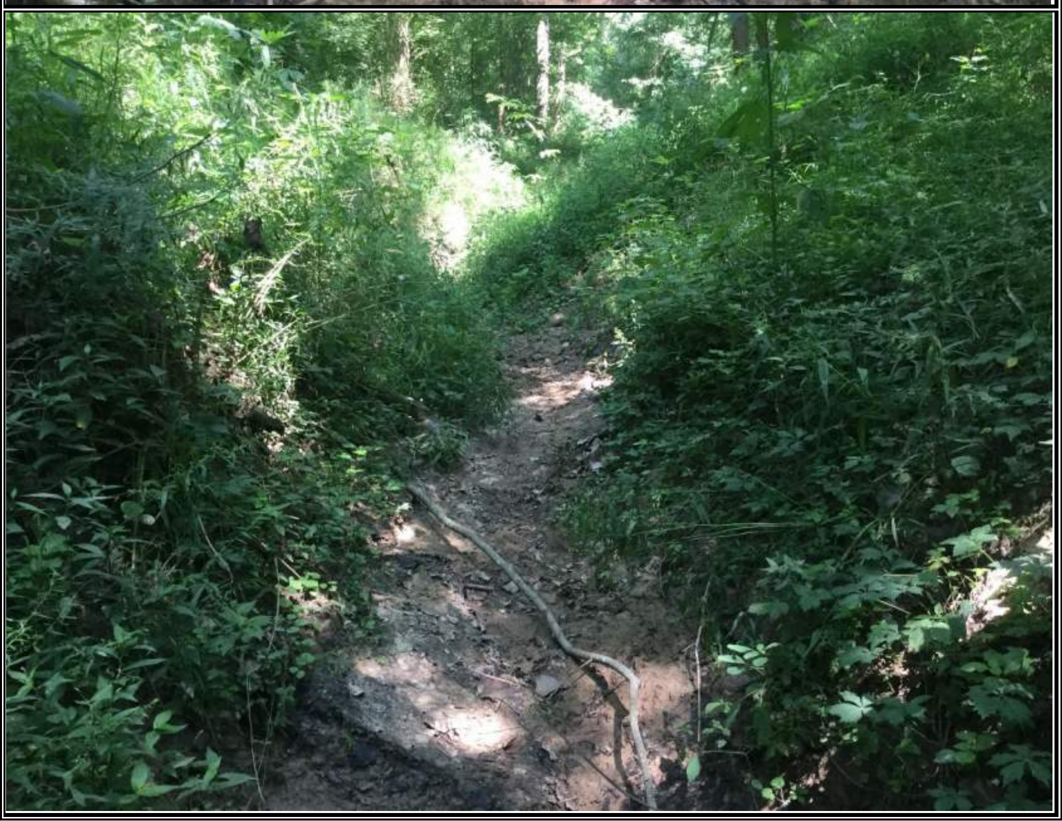


Photo: 10
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3334, -89.9101
Feature: WWC-5/EPH-5

Upstream view of WWC-5/EPH-5.

Photo: 11
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3321, -89.9003
Feature: WWC-6/EPH-6

Downstream view of WWC-6/EPH-6.

Photo: 12
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3322, -89.9003
Feature: WWC-6/EPH-6

Upstream view of WWC-6/EPH-6.

Photo: 13
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3322, -89.9004
Feature: WWC-7/EPH-7

Downstream view of the lower reach of WWC-7/EPH-7.

Photo: 14
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3322, -89.9004
Feature: WWC-7/EPH-7

Upstream view of WWC-7/EPH-7.

Photo: 15
By: A. Fowler
Date: 20 July 2017
Lat/Long: 35.3327, -89.8876
Feature: WWC-8/EPH-8

Downstream view of the upper reach WWC-8/EPH-8.

Photo: 16
By: A. Fowler
Date: 20 July 2017
Lat/Long: 35.3323, -89.8888
Feature: WWC-8/EPH-8

Downstream view of the lower reach of WWC-8/EPH-8.

Photo: 17
By: A. Fowler
Date: 20 July 2017
Lat/Long: 35.3322, -89.9003
Feature: WWC-8/EPH-8

Upstream view of the lower reach of WWC-8/EPH-8.

Photo: 18
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3322, -89.8849
Feature: WWC-9/EPH-9

Upstream view of WWC-9/EPH-9.

Photo: 19
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3322, -89.8849
Feature: WWC-9/EPH-9

Downstream view of WWC-9/EPH-9.

Photo: 20
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3217, -89.8761
Feature: WWC-10/EPH-10

Downstream view of WWC-10/EPH-10.

Photo: 21
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3219, -89.8762
Feature: WWC-10/EPH-10

Upstream view of WWC-10/EPH-10.

Photo: 22
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3226, -89.8697
Feature: WWC-12/EPH-12

Downstream view of WWC-12/EPH-12.

[Note – A photo of WWC-11/EPH-11 was not obtained]

Photo: 23
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3226, -89.8694
Feature: WWC-13/EPH-13

Downstream view of WWC-13/EPH-13.

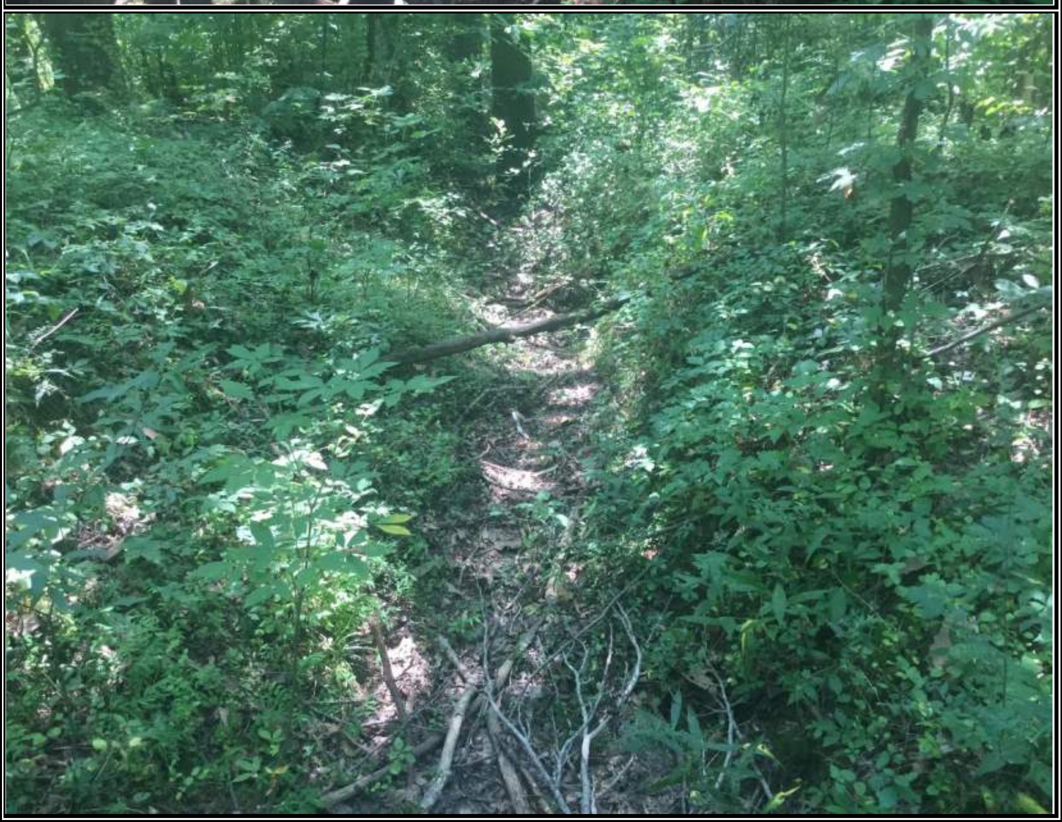


Photo: 24
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3226, -89.8694
Feature: WWC-13/EPH-13

Upstream view of WWC-13/EPH-13.

Photo: 25
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3249, -89.8573
Feature: WWC-14/EPH-14

Upstream view of WWC-14/EPH-14.

Photo: 26
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3249, -89.8573
Feature: WWC-14/EPH-14

Downstream view of WWC-14/EPH-14.

Photo: 27
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3252, -89.8555
Feature: WWC-15/EPH-15

Upstream view of WWC-15/EPH-15.

Photo: 28
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3252, -89.8555
Feature: WWC-15/EPH-15

Downstream view of WWC-15/EPH-15.

Photo: 29
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3241, -89.8572
Feature: WWC-16/EPH-16

Downstream view of WWC-16/EPH-16.

Photo: 30
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3241, -89.8572
Feature: WWC-16/EPH-16

Uptream view of WWC-16/EPH-16.

Photo: 31
By: A. Fowler
Date: 19 April 2018
Lat/Long: 35.3264, -89.8583
Feature: WWC-17/EPH-17

Downstream view of WWC-17/EPH-17.

Photo: 32
By: A. Fowler
Date: 19 April 2018
Lat/Long: 35.3264, -89.8583
Feature: WWC-17/EPH-17

Uptream view of WWC-17/EPH-17 showing the areas of channel disruption.

Photo: 33
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3366, -89.9313
Feature: WWC-18/EPH-18

Uptream view of WWC-18/EPH-18.

Photo: 34
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3366, -89.9309
Feature: WWC-18/EPH-18

Downstream view of WWC-18/EPH-18 where the channel exits WTL-31.

Photo: 35
By: A. Fowler
Date: 18 April 2018
Lat/Long: 35.3362, -89.9289
Feature: WWC-19/EPH-19

Uptream view of WWC-19/EPH-19.

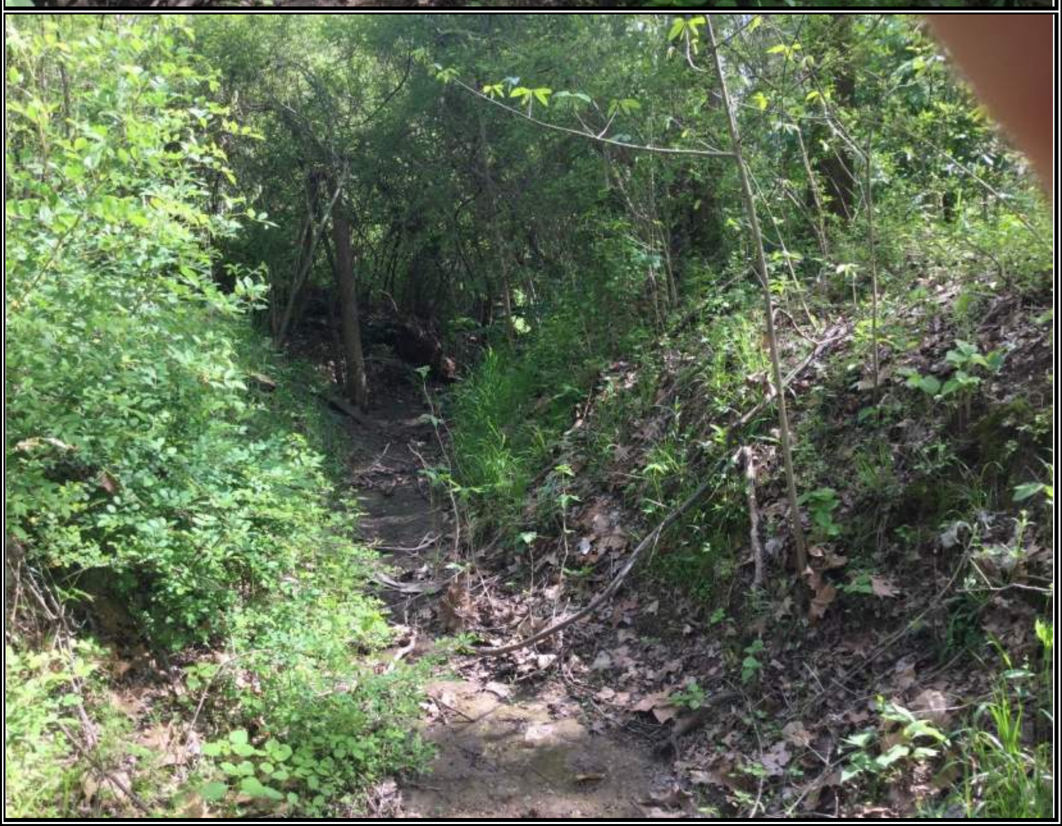


Photo: 36
By: A. Fowler
Date: 18 April 2018
Lat/Long: 35.3366, -89.9289
Feature: WWC-19/EPH-19

Downstream view of WWC-19/EPH-19.

Photo: 37
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3421, -89.9516
Feature: WWC-20/EPH-20

Upstream view of WWC-20/EPH-20 from top of reach.

Photo: 38
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3421, -89.9516
Feature: WWC-20/EPH-20

Downstream view of WWC-20/EPH-20 from top of reach.

Photo: 39
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3415, -89.9511
Feature: WWC-21/EPH-21

Downstream view of WWC-21/EPH-21 near bottom of reach.

Photo: 40
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3420, -89.9513
Feature: WWC-21/EPH-21

Upstream view of WWC-21/EPH-21 near top of reach.

Photo: 41
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3389, -89.9493
Feature: WWC-22/EPH-22

Upstream view of WWC-22/EPH-22 toward grade control start.

Photo: 42
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3390, -89.9495
Feature: WWC-22/EPH-22

Upstream view of WWC-22/EPH-22 near upper reach.

Photo: 43
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3390, -89.9490
Feature: WWC-23/EPH-23

Downstream view of WWC-23/EPH-23 near headcut at top of reach.

Photo: 44
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3389, -89.9491
Feature: WWC-23/EPH-23

View downstream toward confluence of WWC-23/EPH-23 and WWC-22/EPH-22.

Photo: 45
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3391, -89.9468
Feature: WWC-24/EPH-24

Downstream view of WWC-24/EPH-24 near upper reach.

Photo: 46
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3391, -89.9468
Feature: WWC-24/EPH-24

Upstream view of WWC-24/EPH-24 near upper reach.

Photo: 47
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3418, -89.9424
Feature: WWC-25/EPH-25

Upstream view of WWC-25/EPH-25 at WWTP outfall, upstream has no surface water.

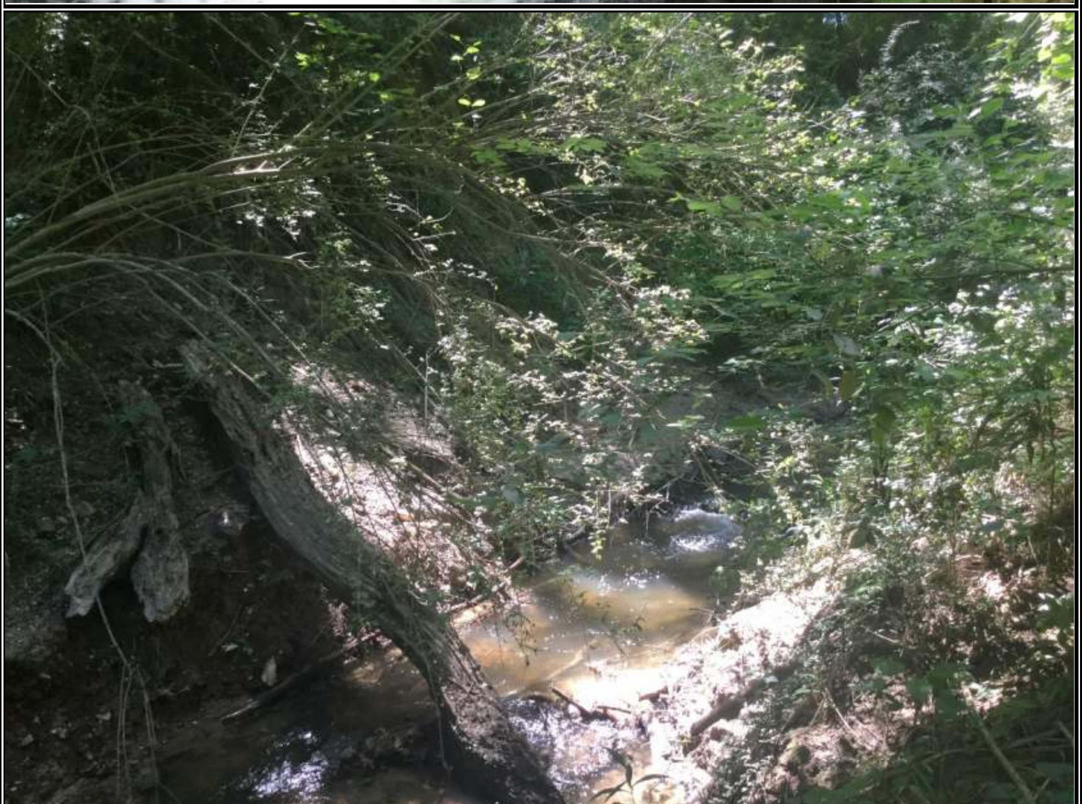


Photo: 48
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3383, -89.9431
Feature: WWC-25/EPH-25

Upstream view of WWC-25/EPH-25 near bottom of reach, above confluence with Big Creek.

Photo: 49
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3383, -89.9430
Feature: WWC-26/EPH-26

Downstream view of WWC-26/EPH-26 near bottom of reach.

Photo: 50
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3382, -89.9424
Feature: WWC-26/EPH-26

Upstream view of WWC-26/EPH-26 toward culvert at top of reach.

Photo: 51
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3378, -89.9418
Feature: WWC-27/EPH-27

Downstream view of WWC-27/EPH-27 near upper reach.

Photo: 52
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3379, -89.9422
Feature: WWC-27/EPH-27

Upstream view of WWC-27/EPH-27 near bottom of reach.

Photo: 53
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2875, -89.9195
Feature: WWC-28/EPH-28

Upstream view of WWC-28/EPH-28 near mid-reach.

Photo: 54
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2873, -89.9194
Feature: WWC-28/EPH-28

Downstream view of WWC-28/EPH-28 near northwestern edge of WTL-51.

Photo: 55
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2871, -89.9197
Feature: WWC-29/EPH-29

Downstream view of the upper reach of WWC-29/EPH-29.

Photo: 56
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2871, -89.9197
Feature: WWC-29/EPH-29

Upstream view of WWC-29/EPH-29 within upper reach.

Photo: 57
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2852, -89.9192
Feature: WWC-29/EPH-29

Upstream view of WWC-29/EPH-29from the confluence with STR-2.

Photo: 58
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2855, -89.9192
Feature: WWC-29/EPH-29

Downstream view of WWC-29/EPH-29from the boundary of WTL-53.

Photo: 59
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2860, -89.9185
Feature: WWC-30/EPH-30

Downstream view of WWC-30/EPH-30 from WTL-52.

Photo: 60
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2851, -89.9191
Feature: WWC-30/EPH-30

Upstream view of WWC-30/EPH-30 near start of STR-24.

Photo: 61
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2861, -89.9185
Feature: WWC-30/EPH-30

Upstream view of WWC-30/EPH-30 as it branches north away from WTL-52.

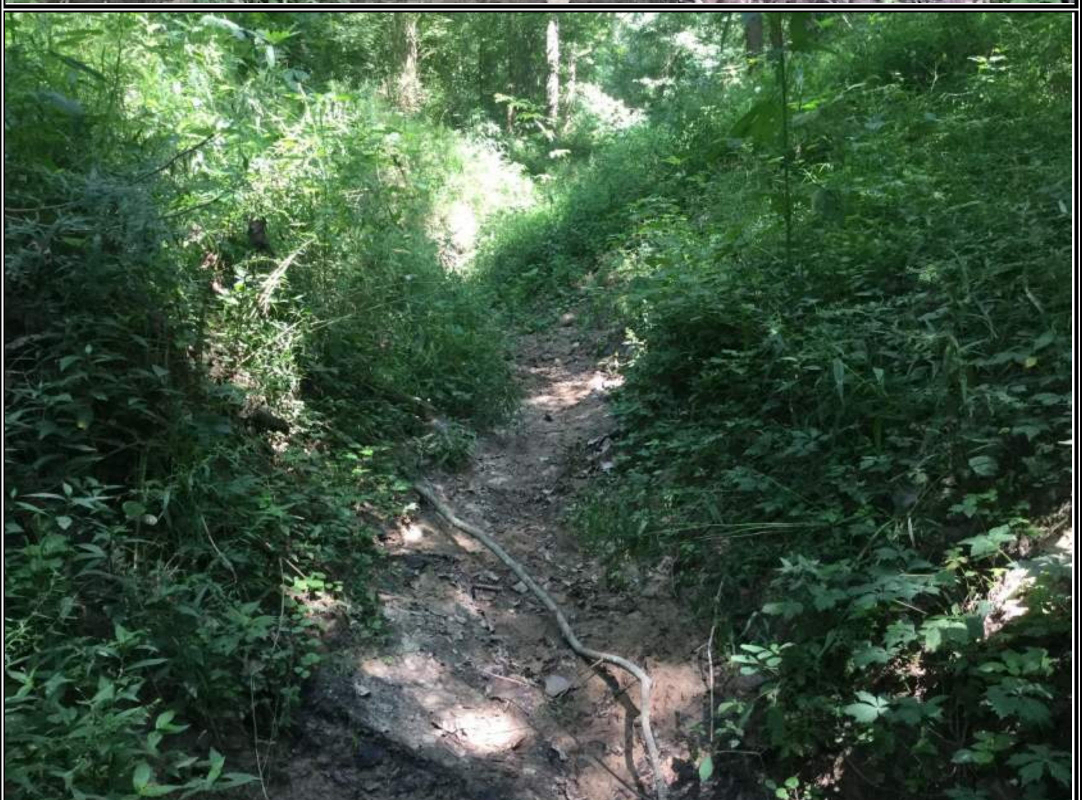


Photo: 62
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2863, -89.9184
Feature: WWC-30/EPH-30

Downstream mid-reach view of WWC-30/EPH-30.

Photo: 63
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2867, -89.9188
Feature: WWC-31/EPH-31

Downstream view of WWC-31/EPH-31.

Photo: 64
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2867, -89.9188
Feature: WWC-31/EPH-31

Upstream view of WWC-31/EPH-31.

Photo: 65
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2856 -89.9202
Feature: WWC-32/EPH-32

Downstream view of WWC-32/EPH-32 from the near top of waterway.

Photo: 66
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2848, -89.9199
Feature: WWC-32/EPH-32

Upstream view of WWC-32/EPH-32 from the lower reach of the channel.

Photo: 67
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2829, -89.9223
Feature: WWC-33/EPH-33

Upstream view of WWC-33/EPH-33.

Photo: 68
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2830, -89.9226
Feature: WWC-33/EPH-33

Downstream view of WWC-33/EPH-33.

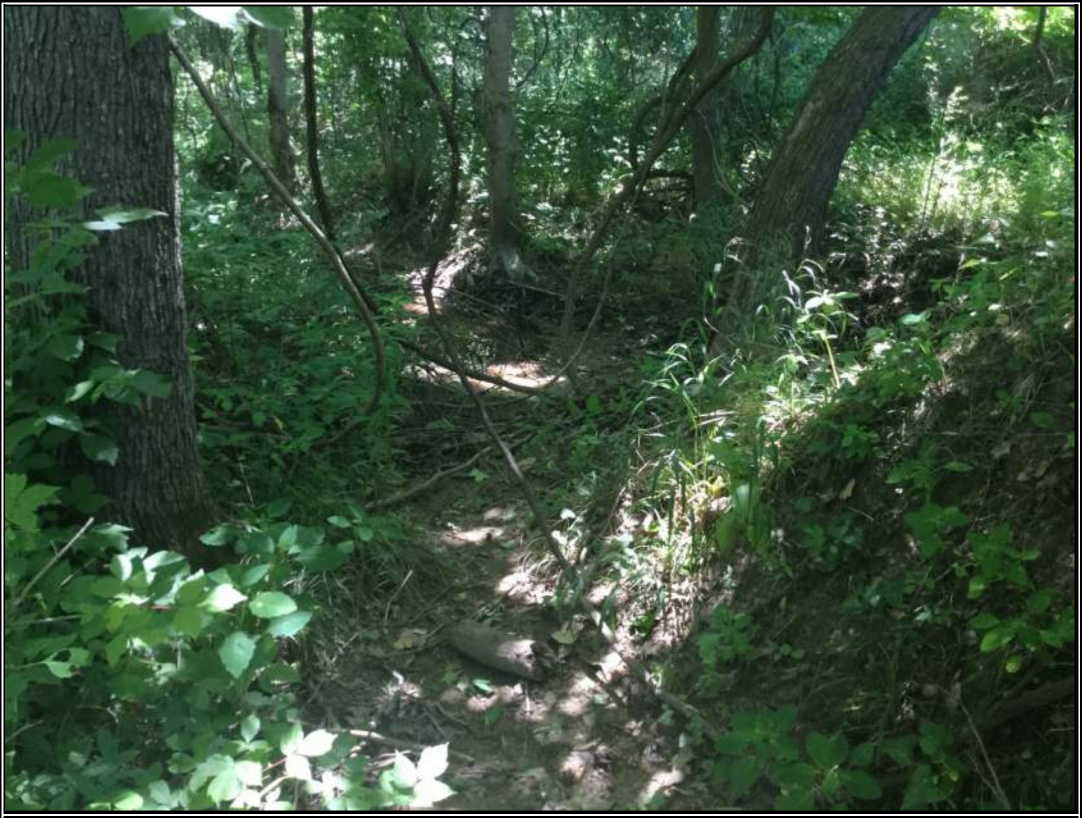


Photo: 69
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9230
Feature: WWC-34/EPH-34

Downstream view of WWC-34/EPH-34 from the upper reach.

Photo: 70
By: A. Fowler
Date: 5 June 2018
Lat/Long: 35.2827, -89.9226
Feature: WWC-34/EPH-34

Downstream view of WWC-34/EPH-34 at confluence with STR-25.

Photo: 71
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9225
Feature: STR-25

Downstream view of STR-25 toward Duncan Road culvert.

Photo: 72
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9225
Feature: STR-25

Downstream view of STR-25 near mid-reach.

Photo: 73
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2851, -89.9191
Feature: STR-24

Upstream view of STR-24 to point where it transitions from WWC-30/EPH-30.

Photo: 74
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2847, -89.9195
Feature: STR-24

Upstream view of STR-24 near mid-reach.

Photo: 75
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3321, -89.9101
Feature: STR-2

Downstream view of STR-2

Photo: 76
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3321, -89.9101
Feature: STR-2

Uptream view of STR-2.

Photo: 77
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3347, -89.9080
Feature: STR-3

Downstream view of STR-3.

Photo: 78
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3347, -89.9080
Feature: STR-3

Uptream view of STR-3.

Photo: 79
By: G. Lynch
Date: 14 July 2017
Lat/Long: 35.3318, -89.8969
Feature: STR-4

Downstream view of STR-4.

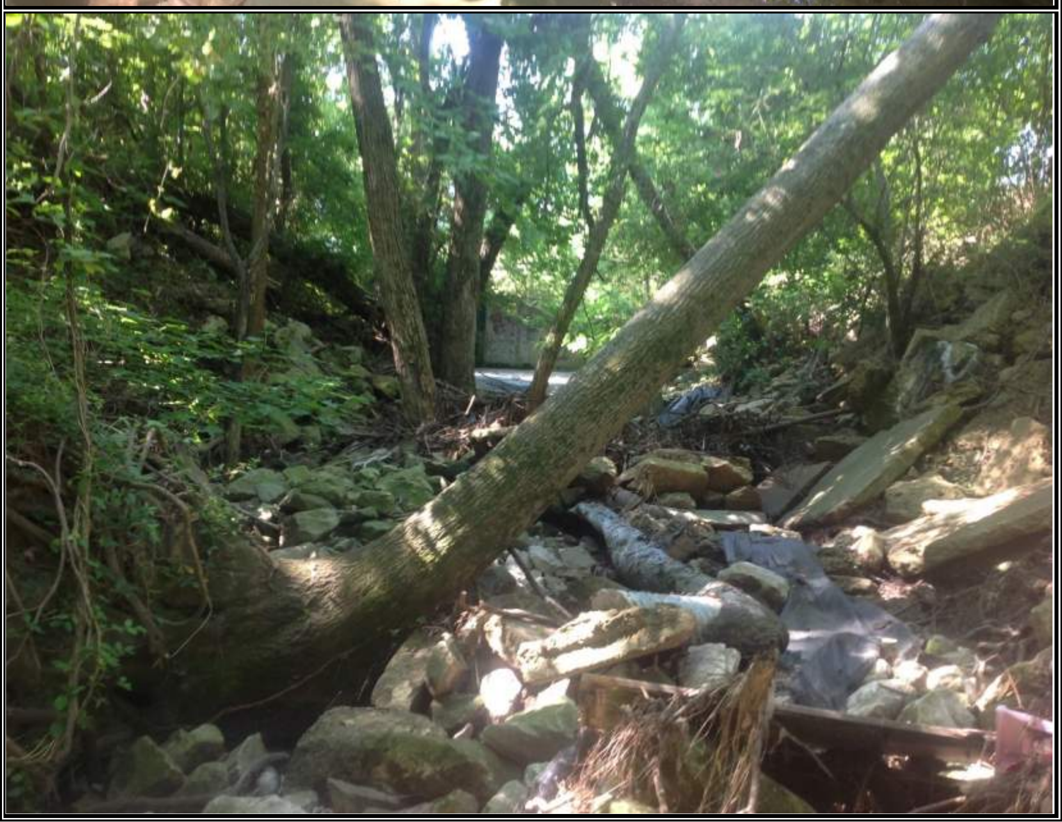


Photo: 80
By: G. Lynch
Date: 14 July 2017
Lat/Long: 35.3318, -89.8969
Feature: STR-4

Upstream view of STR-4 from the rip-rap and concrete pad where the channel flows under Paul Barrett Highway.

Photo: 81
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3382, -89.8922
Feature: STR-5

View of STR-5 looking down from the right-top-of-bank.

Photo: 82
By: A. Fowler
Date: 20 July 2017
Lat/Long: 35.3323, -89.8892
Feature: STR-6

Downstream view of STR-6.

Photo: 83
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3299, -89.8907
Feature: STR-7

Downstream view of STR-7 from the culvert outlet under Jones Boyd Blvd.

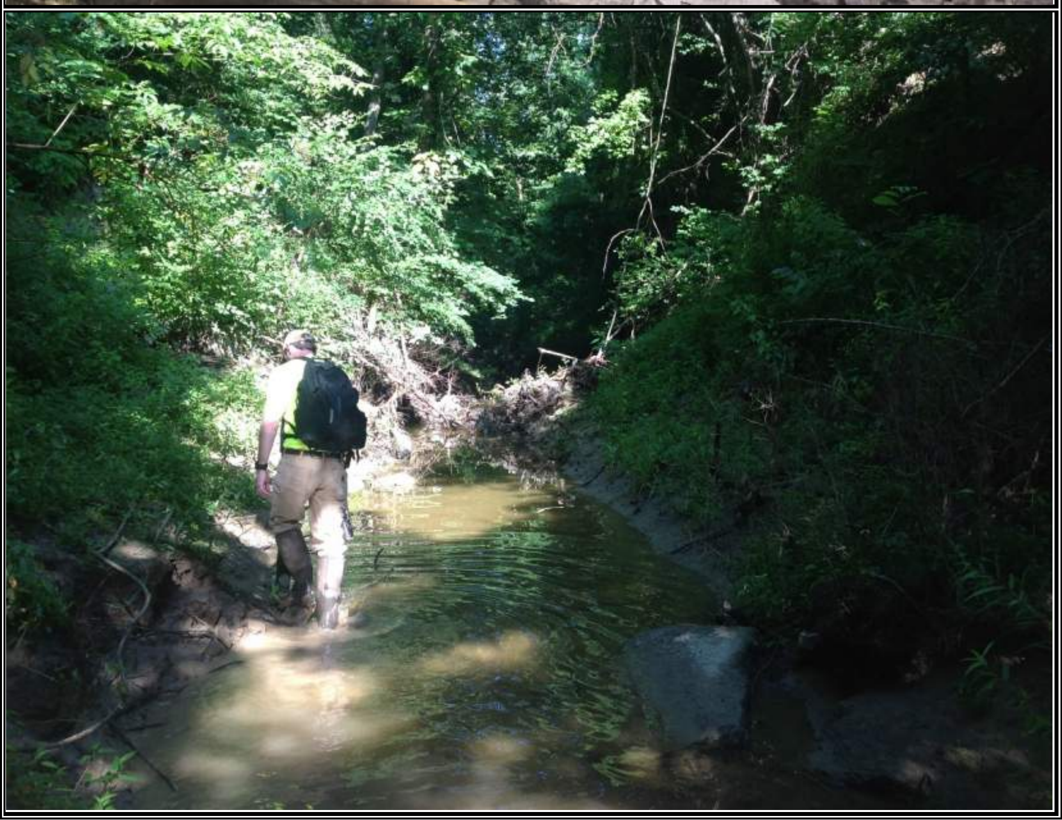


Photo: 84
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3316, -89.8845
Feature: STR-8

Downstream view of STR-8.

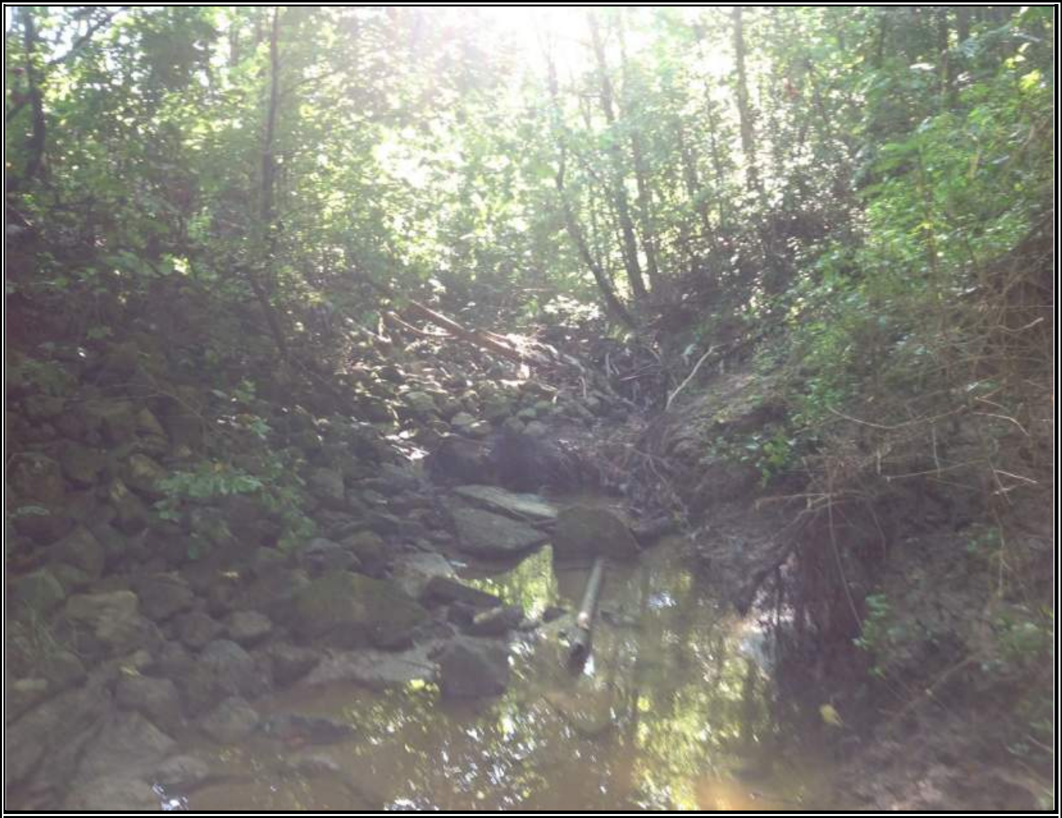


Photo: 85
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3316, -89.8845
Feature: STR-8

Upstream view of STR-8.

Photo: 86
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3318, -89.8969
Feature: STR-9

Downstream view of STR-9.

Photo: 87
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3309, -89.8799
Feature: STR-9

Upstream view of STR-9.

Photo: 88
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3269, -89.8851
Feature: STR-10

Downstream view of STR-10.

Photo: 89
By: G. Lynch
Date: 14 July 2017
Lat/Long: 35.3269, -89.8851
Feature: STR-11

Downstream view of STR-11.

Photo: 90
By: G. Lynch
Date: 14 July 2017
Lat/Long: 35.3290, -89.8849
Feature: STR-11

Upstream view of STR-11.

Photo: 91
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3289, -89.8840
Feature: STR-12

Downstream view of STR-12 near its confluence with Big Creek.

Photo: 92
By: G. Lynch
Date: 19 July 2017
Lat/Long: 35.3286, -89.8833
Feature: STR-12

Upstream view of STR-12.

Photo: 93
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3224, -89.8763
Feature: STR-13

Downstream view of STR-13.

Photo: 94
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3224, -89.8763
Feature: STR-13

Upstream view of STR-13.

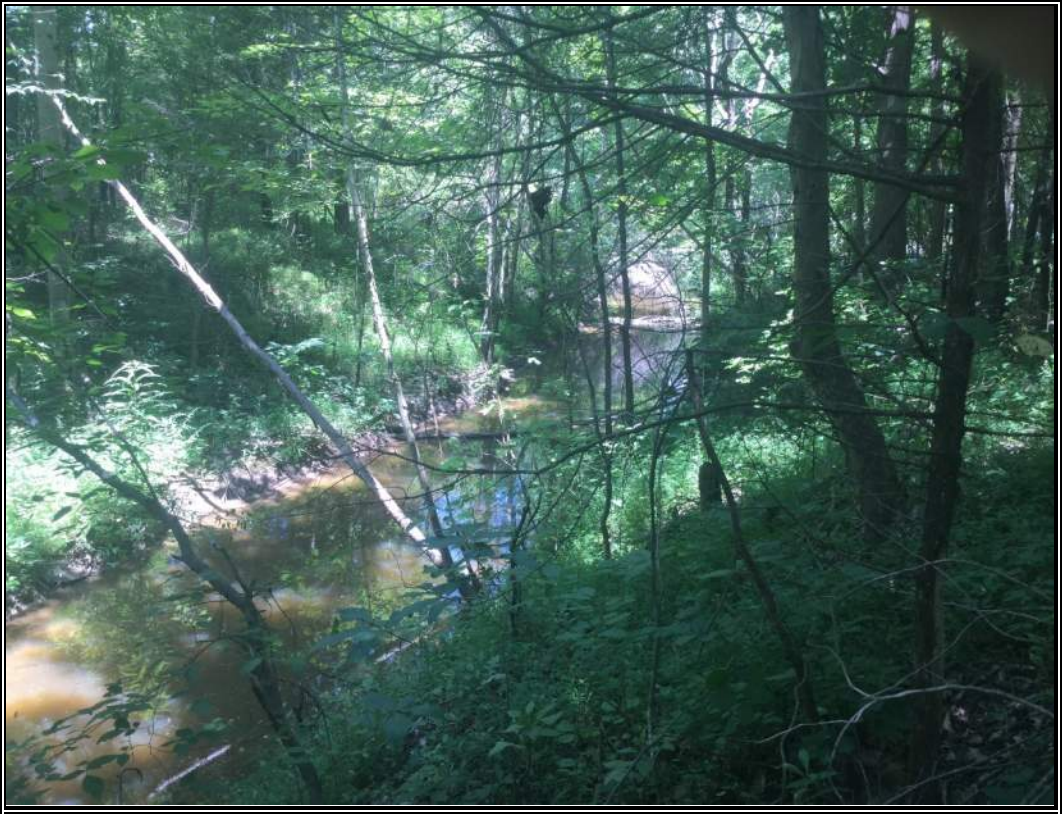


Photo: 95
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3223, -89.8700
Feature: STR-15

Downstream view of STR-15.

Photo: 96
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3223, -89.8700
Feature: STR-15

Upstream view of STR-15.

Photo: 97
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3213, -89.8611
Feature: STR-16

Downstream view of STR-16 near its confluence with Big Creek.

Photo: 98
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3213, -89.8611
Feature: STR-16

Upstream view of STR-16.

Photo: 99
By: A. Fowler
Date: 27 July 2017
Lat/Long: 35.3195, -89.8484
Feature: STR-17

Upstream view of STR-17.

Photo: 100
By: A. Fowler
Date: 27 July 2017
Lat/Long: 35.3195, -89.8484
Feature: STR-17

Downstream view of STR-17.

Photo: 101
By: G. Lynch
Date: 27 July 2017
Lat/Long: 35.3146, -89.8411
Feature: STR-18

Upstream view of STR-18.

Photo: 102
By: G. Lynch
Date: 27 July 2017
Lat/Long: 35.3146, -89.8411
Feature: STR-18

Downstream view of STR-18.

Photo: 103
By: A. Fowler
Date: 27 July 2017
Lat/Long: 35.3189, -89.8459
Feature: STR-19

Upstream view of STR-19.

Photo: 104
By: A. Fowler
Date: 27 July 2017
Lat/Long: 35.3213, -89.8611
Feature: STR-19

Upstream view of STR-19.

Photo: 105
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3345, -89.9172
Feature: Big Creek

Upstream view of Big Creek facing east from Hwy 3.

Photo: 106
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3337, -89.9103
Feature: Big Creek

Downstream view of Big Creek from the confluence of STR-2.

Photo: 107
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3337, -89.9103
Feature: Big Creek

Downstream view of Big Creek facing west from Raleigh Millington Rd.

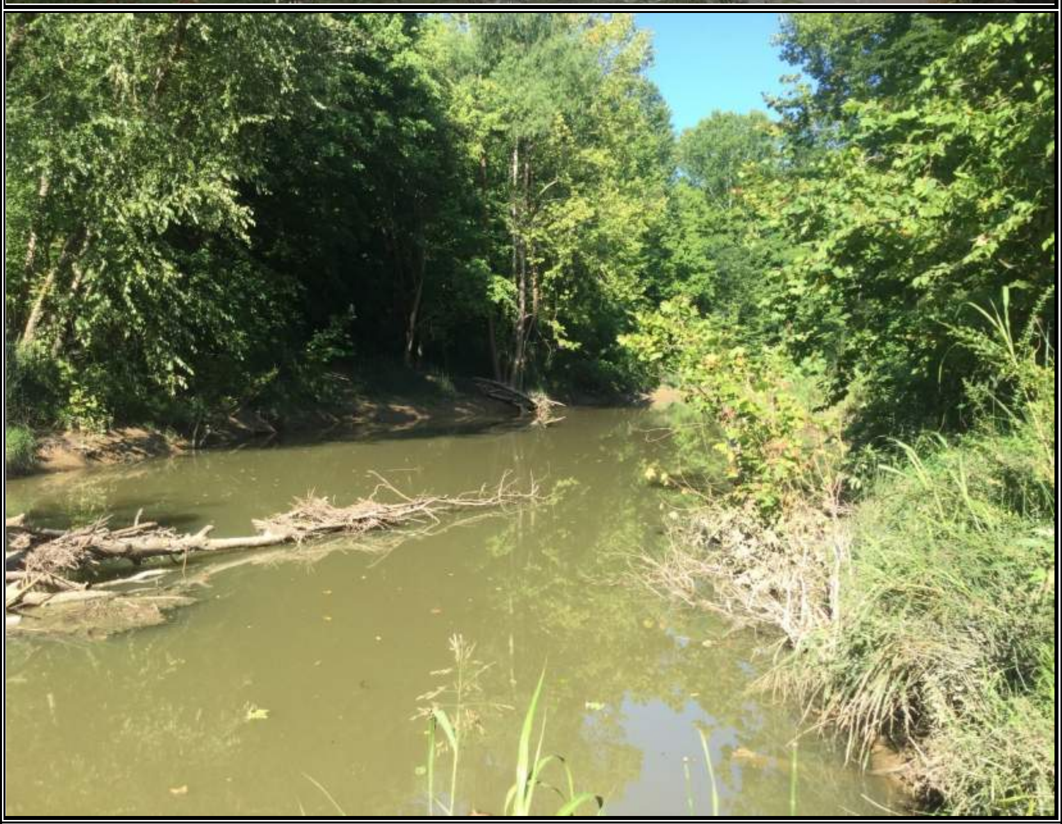


Photo: 108
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3212, -89.8612
Feature: Big Creek

Downstream view of Big Creek from the confluence of STR-16.

Photo: 109
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3359, -89.9269
Feature: STR-21

Upstream view of STR-21.

Photo: 110
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3359, -89.9269
Feature: STR-21

Downstream view of STR-21.

Photo: 111
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.3397, -89.9547
Feature: STR-22

Downstream view of STR-22.

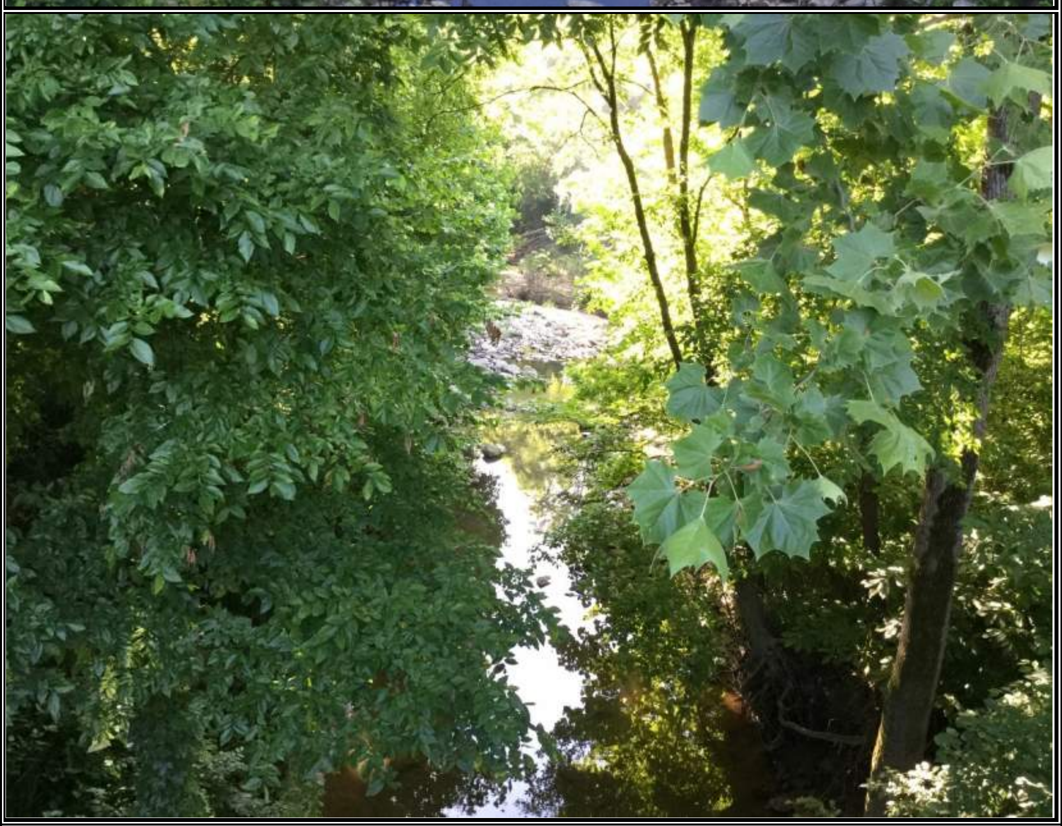


Photo: 112
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.3397, -89.9547
Feature: STR-22

Downstream view of STR-22.

Photo: 113
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.3417, -89.9510
Feature: STR-23

Upstream view of the STR-23 river valley. The bottom of the channel is hard to distinguish due to extreme channel incision.

Photo: 114
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2851, -89.9191
Feature: STR-24

Upstream view of STR-24 to point where it transitions from WWC-30/EPH-30.

Photo: 115
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2847, -89.9195
Feature: STR-24

Upstream view of STR-24 near mid-reach.

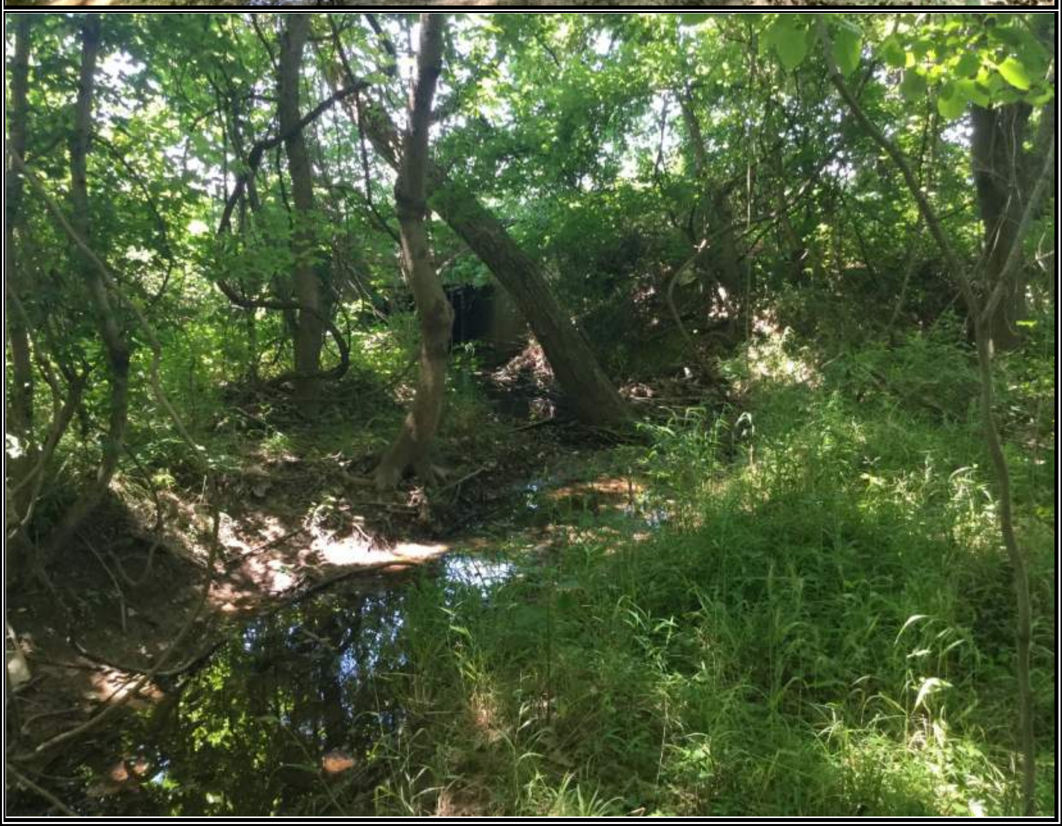


Photo: 116
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9225
Feature: STR-25

Downstream view of STR-25 toward Duncan Road culvert.

Photo: 117
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9225
Feature: STR-25

Downstream view of STR-25 near mid-reach.

Photo: 118
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3326, -89.9117
Feature: WTL-1

Representative photo of WTL-1.

Photo: 119
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3321, -89.9082
Feature: WTL-2

Representative photo of WTL-2 facing north of the southern edge of the wetland.

Photo: 120
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3320, -89.8977
Feature: WTL-3

View to the east of WTL-3.

Photo: 121
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3320, -89.8977
Feature: WTL-4

View to the west of the inundated section of WTL-4.

Photo: 122
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3315, -89.8963
Feature: WTL-4

View to the north of the non-inundated section of WTL-4 to the south.

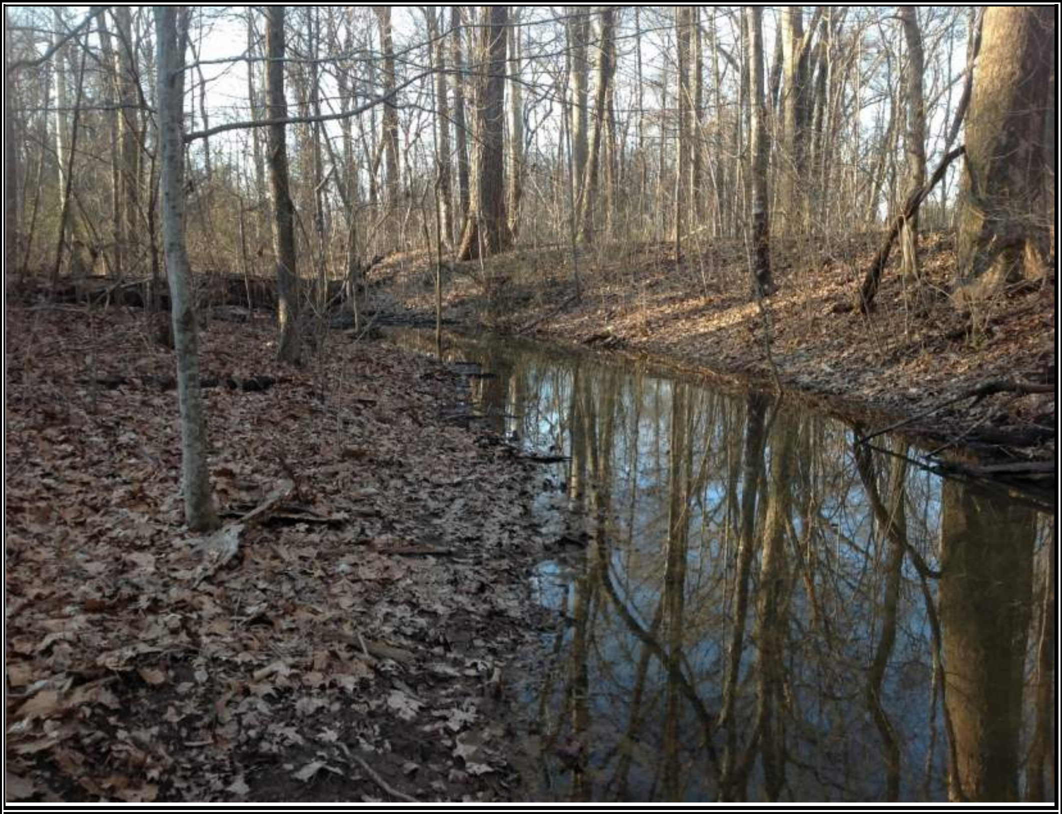


Photo: 123
By: A. Fowler
Date: 13 February 2018
Lat/Long: 35.3330, -89.8888
Feature: WTL-5

Representative photo of WTL-5.

Photo: 124
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3325, -89.8866
Feature: WTL-6

View to the north of the emergent vegetation in WTL-6.

Photo: 125
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3288, -89.8806
Feature: WTL-7

Representative photo of wetland conditions encountered in the federally protected wetland area.

Photo: 126
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3281, -89.8861
Feature: WTL-8

View from inside the forested section of WTL-8.

Photo: 127
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3278, -89.8830
Feature: WTL-8

View of the open, emergent portion on WTL-8.

Photo: 128
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3234, -89.8780
Feature: WTL-11

Representative photo of wetland and open water conditions found around wetlands 9, 10, and 11.

Photo: 129
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3224, -89.8737
Feature: WTL-12

View to the north at WTL-12.

Photo: 130
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3235, -89.8683
Feature: WTL-15

View to the west at WTL-15.

Photo: 131
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3206, -89.8706
Feature: WTL-17

Representative photos of various wetland areas located east of Singleton Ave and north of Hwy 385.

Photo: 132
By: J. Morrison
Date: 20 July 2017
Lat/Long: 35.3107, -89.8381
Feature: WTL-27

Representative photo of the wetland areas located in the southeastern portion of the project area.

Photo: 133
By: J. Morrison
Date: 18 July 2017
Lat/Long: 35.3228, -89.8364
Feature: WTL-28

View to the west of the linear wetland located in the northeastern portion of the project area.

Photo: 134
By: J. Morrison
Date: 18 July 2017
Lat/Long: 35.3201, -89.8377
Feature: WTL-29

Representative photo of the wetland areas located in the eastern portion of the project area.

Photo: 135
By: A. Fowler
Date: 19 April 2018
Lat/Long: 35.3350, -89.8884
Feature: WTL-30

View to the west of WTL-30 located in the emergent wetland area north of the tree line.

Photo: 136
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3366, -89.9309
Feature: WTL-31

View to the west of WTL-31.

Photo: 137
By: A. Fowler
Date: 18 April 2018
Lat/Long: 35.3369, -89.9304
Feature: WTL-32

View to the northwest of the emergent section of WTL-32 located north of the tree line.

Photo: 138
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3370, -89.9280
Feature: WTL-34

Representative photo of various wetland pockets in Area 6 with standing water and sparse vegetation.

Photo: 139
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3405, -89.9527
Feature: WTL-36

View of representative conditions within WTL-36.

Photo: 140
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3407, -89.9526
Feature: WTL-36

View of water line on trees within WTL-36.

Photo: 141
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3418, -89.9530
Feature: WTL-37

View of water-stained leaves within WTL-37.

Photo: 142
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3421, -89.9519
Feature: WTL-38

Representative view of conditions within WTL-38, WTL-39, and WTL-40.

Photo: 143
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3399, -89.9470
Feature: WTL-41

Representative view of WTL-41 near the western edge.

Photo: 144
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3398, -89.9471
Feature: WTL-41

Representative view of WTL-41 near the northern edge.

Photo: 145
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3318, -89.8969
Feature: WTL-42

Representative view of WTL-42 near the northern edge.

Photo: 146
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3376, -89.9405
Feature: WTL-44

View from southeastern edge of WTL-44 toward emergent center.

Photo: 147
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3380, -89.9407
Feature: WTL-44

View of bald cypress located on the fringes of WTL-44

Photo: 148
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3383, -89.9392
Feature: WTL-45

Representative view of young growth within WTL-45.

Photo: 149
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3374, -89.9395
Feature: WTL-46

View from southern border of WTL-46 toward the center and representative conditions.

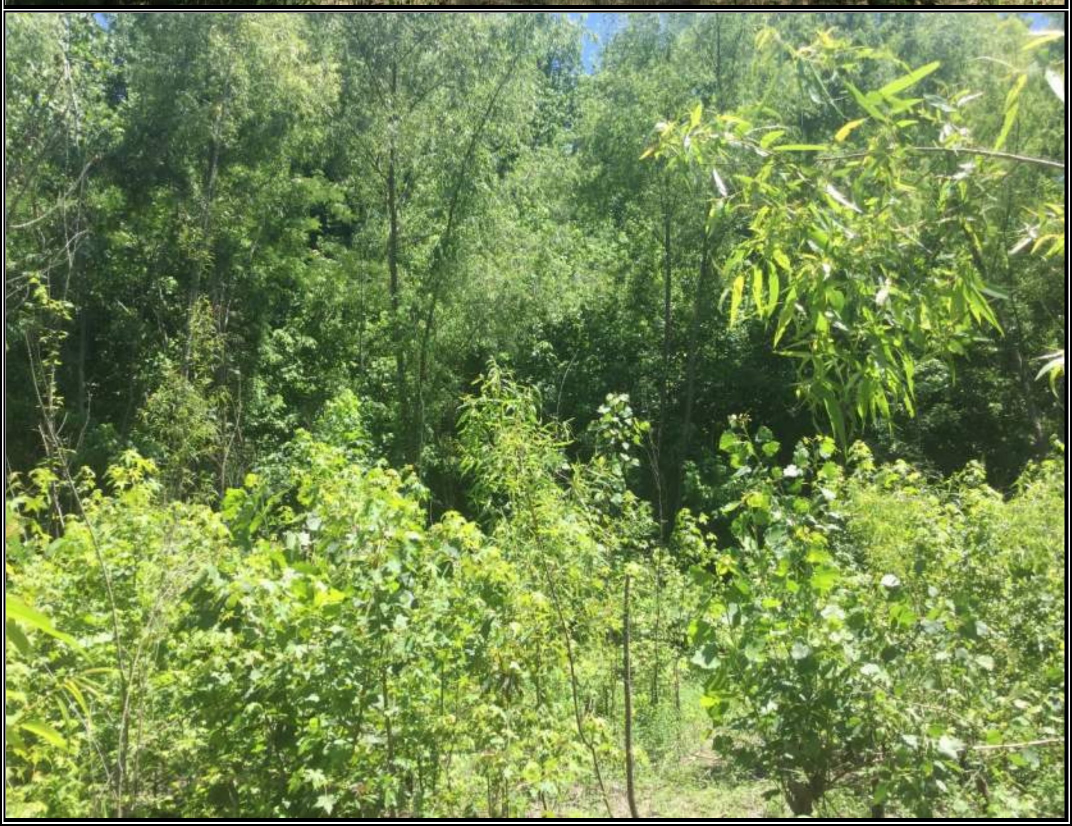


Photo: 150
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3375, -89.9394
Feature: WTL-46

View of black willow and sweetgum sapling presence within WTL-46.

Photo: 151
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2889, -89.9201
Feature: WTL-47

View of WTL-47 western fringe from the north.

Photo: 152
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2885, -89.9201
Feature: WTL-47

View from the southern boundary of WTL-47 toward the center of the feature.

Photo: 153
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2871, -89.9191
Feature: WTL-50

Representative view of WTL-50.

Photo: 154
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2860, -89.9185
Feature: WTL-51

View of western edge of WTL-51 where it becomes WWC-30.

Photo: 155
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2862, -89.9182
Feature: WTL-51

View of buried culvert at northeastern edge of WTL-51.

Photo: 156
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2857 -89.9190
Feature: WTL-52

View of representative conditions within WTL-52.

Photo: 157
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2861, -89.9191
Feature: WTL-52

View of standing water within WTL-52.

Photo: 158
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2844, -89.9175
Feature: WTL-53

View from the north toward the southern boundary of WTL-53.

Photo: 159
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2843, -89.9201
Feature: WTL-54

View of standing water within WTL-54

Photo: 160
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2842, -89.9203
Feature: WTL-54

Representative view of WTL-54 near the fringe.

Photo: 161
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2834, -89.92200
Feature: WTL-55

View of southern edge of WTL-55 near construction silt fencing.

Photo: 162
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2836, -89.9217
Feature: WTL-55

View of northern portion of WTL-55 and the representative conditions.

Photo: 163
By: A. Fowler
Date: 19 April 2018
Lat/Long: 35.2831, -89.9234
Feature: WTL-56

View to the east at WTL-56 in the area south of the cemetery construction.

Shelby County Government
Office of Resilience

Big Creek National Disaster Resilience Design Project

Appendix D

Preliminary Jurisdictional Determination

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT CORPS OF ENGINEERS
167 NORTH MAIN STREET B-202
MEMPHIS, TENNESSEE 38103-1894

October 19, 2018

Nick Carmean
Barge Design Solutions, Inc.
615 3rd Avenue South
Nashville, Tennessee 37210

Dear Mr. Carmean:

This is in response to your correspondence in which you requested concurrence with your delineation of the Big Creek Natural Disaster Resilience Design Project in Millington, Shelby County, Tennessee, as shown on the enclosed map. Based on the information submitted to our office, we concur with your delineation. Attached is the preliminary jurisdictional determination (PJD) verifying the presence of 56 wetlands, 59 streams and 4 other waterbodies (ponds) which may be considered waters of the United States. If you wish to provide additional information, you may request an approved jurisdictional determination.

The PJD is included for concurrence. If you agree with this PJD please sign the form and return it to the address listed above. If the PJD is not returned within 30 days of the date of this letter we will assume your concurrence. A PJD cannot be appealed. If you object to this PJD, please see Section I.E. of the attached Notification of Administrative Appeal Options and the Process and Request for Appeal Form, on how to proceed or call the Memphis District Regulatory Branch for assistance at the number listed below.

The Memphis District Regulatory Branch is committed to providing quality and timely service to our customers. In an effort to improve customer service, we invite you to complete a Customer Service Survey found on our web site at http://corpsmapu.usace .army.mil/cm_apex/f?p=regulatory_survey. Your comments, positive or negative, will not affect any current or future dealing with the Corps of Engineers.

If you have questions, please contact Mitch Elcan at (901) 544-0737 and refer to File No. MVM-2016-078.

Sincerely,

Roger S. Allan
Supervisor
Regulatory Branch

Enclosures

Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD: October 19, 2018

B. NAME AND ADDRESS OF PERSON REQUESTING PJD: Barge Design, Attn: Mr. Nick Carmen, 615 3rd Street, Nashville, TN 37210

C. DISTRICT OFFICE, FILE NAME, AND NUMBER: MVM-2016-078

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: TN County/parish/borough: Shelby City: Millington

Center coordinates of site (lat/long in degree decimal format):

Lat.: 35.3177 Long.: -89.862

Universal Transverse Mercator: 16

Name of nearest waterbody: Big Creek

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- [x] Office (Desk) Determination. Date: October 15, 2018
- [ ] Field Determination. Date(s):

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
*					
*					
*					
*					
*					
*					

* See attached sheets

1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

- [x] Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
  Map: submitted by Barge Design.
- [x] Data sheets prepared/submitted by or on behalf of the PJD requestor.
  - [x] Office concurs with data sheets/delineation report.
  - [ ] Office does not concur with data sheets/delineation report. Rationale: ________.
- [ ] Data sheets prepared by the Corps: ________.
- [ ] Corps navigable waters' study: ________.
- [ ] U.S. Geological Survey Hydrologic Atlas: ________.
  - [ ] USGS NHD data.
  - [ ] USGS 8 and 12 digit HUC maps.
- [x] U.S. Geological Survey map(s). Cite scale & quad name: Brunswick, TN 7.5' quadrangle.
- [x] Natural Resources Conservation Service Soil Survey. Citation: Shelby.
- [x] National wetlands inventory map(s). Cite name: FWS ORM2 digitized.
- [ ] State/local wetland inventory map(s): ________.
- [ ] FEMA/FIRM maps: ________.
- [ ] 100-year Floodplain Elevation is: ________.(National Geodetic Vertical Datum of 1929)
- [x] Photographs: [x] Aerial (Name & Date): provided in PJD concurrence request August 31, 2018.
  or [x] Other (Name & Date): provided in PJD concurrence request August 31, 2018.
- [ ] Previous determination(s). File no. and date of response letter: ________.
- [ ] Other information (please specify): ________.

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

ELCAN.JAMES.M.II.1106137150 Digitally signed by ELCAN.JAMES.M.II.1106137150 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ELCAN.JAMES.M.II.1106137150 Date: 2018.10.15 13:09:32 -05'00'

Signature and date of Regulatory staff member completing PJD

____

Signature and date of person requesting PJD (REQUIRED, unless obtaining the signature is impracticable)[1]

[1] Districts may establish timeframes for requestor to return signed PJD forms. If the requestor does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

RGL 16-01: TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION						
Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section	Cowardin Classification
STR-1	35.3311	-89.9152	1428 LF	Intermittent Stream	Section 404	Riverine
STR-2	35.3307	-89.9101	1136 LF	Intermittent Stream	Section 404	Riverine
STR-3	35.3349	-89.9078	476 LF	Perennial Stream	Section 404	Riverine
STR-4	35.3314	-89.8969	545 LF	Intermittent Stream	Section 404	Riverine
STR-5	35.3375	-89.8923	669 LF	Perennial Stream	Section 404	Riverine
STR-6	35.3324	-89.8896	356 LF	Intermittent Stream	Section 404	Riverine
STR-7	35.3299	-89.8907	816 LF	Intermittent Stream	Section 404	Riverine
STR-8	35.331	-89.8786	3386 LF	Perennial Stream	Section 404	Riverine
STR-9	35.3304	-89.8788	450 LF	Intermittent Stream	Section 404	Riverine
STR-10	35.3267	-89.8852	276 LF	Intermittent Stream	Section 404	Riverine
STR-11	35.329	-89.885	316 LF	Intermittent Stream	Section 404	Riverine
STR-12	35.328	-89.8835	618 LF	Intermittent Stream	Section 404	Riverine
STR-13	35.3217	-89.8763	3400 LF	Intermittent Stream	Section 404	Riverine
STR-14	35.3267	-89.8743	1181 LF	Intermittent Stream	Section 404	Riverine
STR-15	35.3201	-89.8713	1169 LF	Intermittent Stream	Section 404	Riverine
STR-16	35.3358	-89.8561	6737 LF	Perennial Stream	Section 404	Riverine
STR-17	35.3203	-89.8477	2665 LF	Intermittent Stream	Section 404	Riverine
STR-18	35.3133	-89.8396	5652 LF	Intermittent Stream	Section 404	Riverine
STR-19	35.3186	-89.8471	552 LF	Intermittent Stream	Section 404	Riverine
STR-20	35.3254	-89.8473	792 LF	Perennial Stream	Section 404	Riverine
STR-21	35.3372	-89.9267	732 LF	Intermittent Stream	Section 404	Riverine
STR-22	35.3259	-89.8306	168 LF	Perennial Stream	Section 404	Riverine
STR-23	35.3429	-89.9507	1987 LF	Perennial Stream	Section 404	Riverine
STR-24	35.2851	-89.9191	412 LF	Intermittent Stream	Section 404	Riverine
STR-25	35.2851	-89.9173	1563 LF	Intermittent Stream	Section 404	Riverine
EPH-1	35.333	-89.9187	1712 LF	Ephemeral Stream	Section 404	Riverine
EPH-2	35.331	-89.9119	360 LF	Ephemeral Stream	Section 404	Riverine
EPH-3	35.3334	-89.9116	478 LF	Ephemeral Stream	Section 404	Riverine

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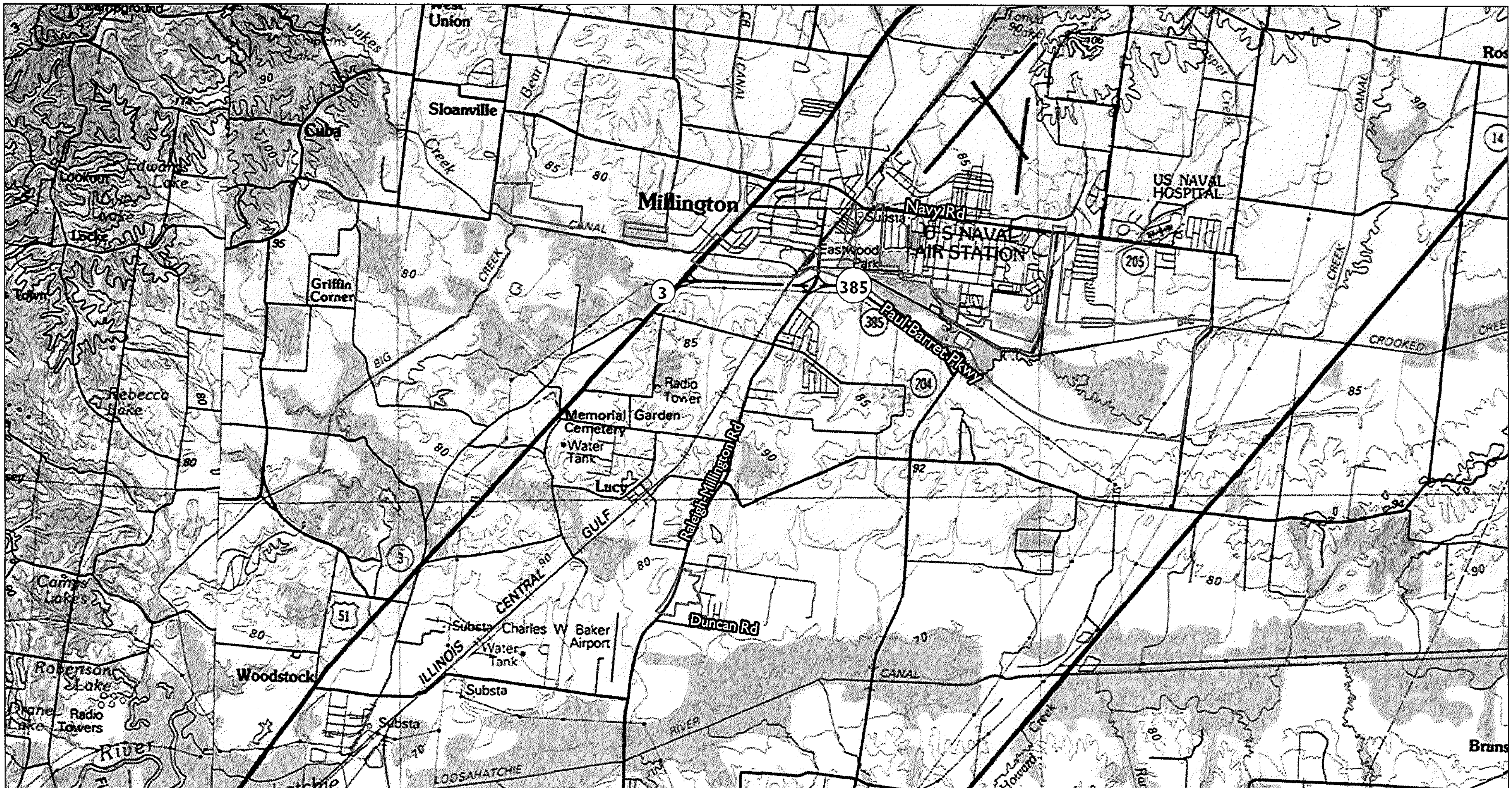
Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section	Cowardin Classification
EPH-4	35.3363	-89.9069	588 LF	Ephemeral Stream	Section 404	Riverine
EPH-5	35.3331	-89.9068	1589 LF	Ephemeral Stream	Section 404	Riverine
EPH-6	35.3316	-89.9003	518 LF	Ephemeral Stream	Section 404	Riverine
EPH-7	35.3401	-89.8873	1819 LF	Ephemeral Stream	Section 404	Riverine
EPH-8	35.3325	-89.8847	397 LF	Ephemeral Stream	Section 404	Riverine
EPH-9	35.3216	-89.8756	216 LF	Ephemeral Stream	Section 404	Riverine
EPH-10	35.3235	-89.8751	363 LF	Ephemeral Stream	Section 404	Riverine
EPH-11	35.3234	-89.8751	380 LF	Ephemeral Stream	Section 404	Riverine
EPH-12	35.3226	-89.8697	196 LF	Ephemeral Stream	Section 404	Riverine
EPH-13	35.3212	-89.8703	840 LF	Ephemeral Stream	Section 404	Riverine
EPH-14	35.3255	-89.8574	563 LF	Ephemeral Stream	Section 404	Riverine
EPH-15	35.3253	-89.8538	1172 LF	Ephemeral Stream	Section 404	Riverine
EPH-16	35.3241	-89.8555	1316 LF	Ephemeral Stream	Section 404	Riverine
EPH-17	35.3274	-89.8576	1098 LF	Ephemeral Stream	Section 404	Riverine
EPH-18	35.3368	-89.9306	573 LF	Ephemeral Stream	Section 404	Riverine
EPH-19	35.3367	-89.9289	482 LF	Ephemeral Stream	Section 404	Riverine
EPH-20	35.3421	-89.9516	232 LF	Ephemeral Stream	Section 404	Riverine
EPH-21	35.3421	-89.9513	342 LF	Ephemeral Stream	Section 404	Riverine
EPH-22	35.339	-89.9495	419 LF	Ephemeral Stream	Section 404	Riverine
EPH-23	35.339	-89.949	77 LF	Ephemeral Stream	Section 404	Riverine
EPH-24	35.3391	-89.9468	567 LF	Ephemeral Stream	Section 404	Riverine
EPH-25	35.3402	-89.9432	1185 LF	Ephemeral Stream	Section 404	Riverine
EPH-26	35.3379	-89.9423	434 LF	Ephemeral Stream	Section 404	Riverine
EPH-27	35.3378	-89.9418	439 LF	Ephemeral Stream	Section 404	Riverine
EPH-28	35.2882	-89.9191	1005 LF	Ephemeral Stream	Section 404	Riverine
EPH-29	35.2871	-89.9197	202 LF	Ephemeral Stream	Section 404	Riverine
EPH-30	35.2877	-89.9175	1192 LF	Ephemeral Stream	Section 404	Riverine
EPH-31	35.2867	-89.9188	250 LF	Ephemeral Stream	Section 404	Riverine

RGL 16-01: TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION						
Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section	Cowardin Classification
EPH-32	35.2856	-89.9202	381 LF	Ephemeral Stream	Section 404	Riverine
EPH-33	35.283	-89.9224	100 LF	Ephemeral Stream	Section 404	Riverine
EPH-34	35.2827	-89.9232	205 LF	Ephemeral Stream	Section 404	Riverine
WTL-1	35.3319	-89.9115	1.78 acres	Wetland	Section 404	PFO
WTL-2	35.3322	-89.9088	35.33 acres	Wetland	Section 404	PFO
WTL-3	35.332	-89.8977	0.07 acres	Wetland	Section 404	PEM
WTL-4	35.3314	-89.8956	5.37 acres	Wetland	Section 404	PFO
WTL-5	35.3343	-89.8877	1.23 acres	Wetland	Section 404	PFO
WTL-6	35.3325	-89.8865	0.21 acres	Wetland	Section 404	PFO
WTL-7	35.3288	-89.8808	0.67 acres	Wetland	Section 404	PSS
WTL-8	35.3284	-89.8864	0.14 acres	Wetland	Section 404	PSS/PEM
WTL-9	35.3255	-89.8792	1.13 acres	Wetland	Section 404	PFO/PSS
WTL-10	35.3245	-89.8782	0.16 acres	Wetland	Section 404	PFO/PSS
WTL-11	35.3234	-89.8782	1.41 acres	Wetland	Section 404	PFO/PSS
WTL-12	35.3233	-89.8733	10.08 acres	Wetland	Section 404	PFO/PSS
WTL-13	35.3227	-89.872	2.92 acres	Wetland	Section 404	PSO/PSS
WTL-14	35.32135	-89.8732	0.15 acres	Wetland	Section 404	PSO/PSS
WTL-15	35.3236	-89.8683	0.05 acres	Wetland	Section 404	PEM
WTL-16	35.3222	-89.87	0.14 acres	Wetland	Section 404	PFO/PEM
WTL-17	35.3203	-89.8704	0.83 acres	Wetland	Section 404	PFO/PEM
WTL-18	35.3187	-89.8688	4.37 acres	Wetland	Section 404	PFO/PEM
WTL-19	35.3214	-89.8679	0.86 acres	Wetland	Section 404	PFO/PEM
WTL-20	35.3204	-89.8672	2.54 acres	Wetland	Section 404	PFO/PEM
WTL-21	35.321	-89.866	0.61 acres	Wetland	Section 404	PFO/PEM
WTL-22	35.3207	-89.863	1.37 acres	Wetland	Section 404	PFO/PEM
WTL-23	35.3209	-89.8565	0.22 acres	Wetland	Section 404	PFO
WTL-24	35.3211	-89.8554	0.34 acres	Wetland	Section 404	PFO
WTL-25	35.3215	-89.8535	0.56 acres	Wetland	Section 404	PFO

RGL 16-01: TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION						
Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section	Cowardin Classification
WTL-26	35.3209	-89.8527	0.44 acres	Wetland	Section 404	PFO
WTL-27	35.3155	-89.8445	130.88 acres	Wetland	Section 404	PFO
WTL-28	35.3229	-89.8372	3.8 acres	Wetland	Section 404	PFO
WTL-29	35.3184	-89.84438	70.85 acres	Wetland	Section 404	PFO
WTL-30	35.3349	-89.8882	1.38 acres	Wetland	Section 404	PEM
WTL-31	35.3366	-89.9309	0.01 acres	Wetland	Section 404	PFO
WTL-32	35.3368	-89.9306	0.79 acres	Wetland	Section 404	PFO/PEM
WTL-33	35.3363	-89.9303	0.03 acres	Wetland	Section 404	PFO
WTL-34	35.3367	-89.9287	0.34 acres	Wetland	Section 404	PFO
WTL-35	35.3369	-89.928	0.04 acres	Wetland	Section 404	PFO
WTL-36	35.3404	-89.9526	0.69 acres	Wetland	Section 404	PFO
WTL-37	35.3413	-89.9524	0.95 acres	Wetland	Section 404	PFO
WTL-38	35.3416	-89.952	0.36 acres	Wetland	Section 404	PFO
WTL-39	35.3412	-89.9516	0.05 acres	Wetland	Section 404	PFO
WTL-40	35.3415	-89.9515	0.02 acres	Wetland	Section 404	PFO
WTL-41	35.3398	-89.947	0.08 acres	Wetland	Section 404	PFO
WTL-42	35.3383	-89.9458	0.05 acres	Wetland	Section 404	PFO
WTL-43	35.3383	-89.9444	0.08 acres	Wetland	Section 404	PFO
WTL-44	35.3377	-89.9411	1.25 acres	Wetland	Section 404	PFO
WTL-45	35.3383	-89.9393	0.19 acres	Wetland	Section 404	PEM
WTL-46	35.3376	-89.9394	0.32 acres	Wetland	Section 404	PEM
WTL-47	35.2886	-89.9201	0.38 acres	Wetland	Section 404	PFO
WTL-48	35.2888	-89.9196	0.31 acres	Wetland	Section 404	PFO
WTL-49	35.2878	-89.9175	0.04 acres	Wetland	Section 404	PFO
WTL-50	35.2871	-89.9191	0.09 acres	Wetland	Section 404	PFO
WTL-51	35.2862	-89.9183	0.05 acres	Wetland	Section 404	PFO
WTL-52	35.2855	-89.9193	0.63 acres	Wetland	Section 404	PFO
WTL-53	35.2842	-89.9175	0.003 acres	Wetland	Section 404	PFO

RGL 16-01: TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION						
Site number	**Latitude (decimal degrees)**	**Longitude (decimal degrees)**	**Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)**	**Type of aquatic resource (i.e., wetland vs. non-wetland waters)**	**Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section**	**Cowardin Classification**
WTL-54	35.2841	-89.9206	0.43 acres	Wetland	Section 404	PFO
WTL-55	35.2836	-89.9218	0.16 acres	Wetland	Section 404	PFO
WTL-56	35.2832	-89.9227	0.84 acres	Wetland	Section 404	PFO
P-1	35.33001	-89.88876	14.53 acres	Pond	Section 404	PUB
P-2	35.3239	-89.8781	10.8 acres	Pond	Section ~~405~~ 404 JME	PUB
P-3	35.3336	-89.8578	1.02 acres	Pond	Section ~~406~~ 404 JME	PUB
P-4	35.3412	-89.9537	7.88 acres	Pond	Section ~~407~~ 404 JME	PUB



N

5,000 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE

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Project Topographic Map

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

USGS Quadrangles: Millington and Brunswick

Figure 2

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 2_Project Topo.mxd

Date: 30 August 2018

Approximate Waters Map - Area 1

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Figure 6a

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6a_Approximate Waters_Area 1.mxd

Date: 30 August 2018

N

650 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

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ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 2

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
Pond
Contains Wetlands - Federally Protected Area
Streams
WWC
Culvert

Figure 6b

File Path: \\corp.bwsc.net\data\Projects\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6b_Approximate Waters_Area 2.mxd

Date: 25 September 2018

N

800 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

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Approximate Waters Map - Area 3

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
TDOT Mitigation Area
Streams
WWC
Culvert

Figure 6c

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6c_Approximate Waters_Area 3.mxd

Date: 30 August 2018

N

425 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE

Tioga

Approximate Waters Map - Area 4

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
Streams
WWC
Culvert

Figure 6d

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6d_Approximate Waters_Area 4.mxd

Date: 30 August 2018

N

650 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE

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ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 5

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
Pond
Streams
WWC
Culvert

Figure 6e

File Path: \\corp.bwsc.net\data\Projects\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6e_Approximate Waters_Area 5.mxd

Date: 25 September 2018

N

200 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE

Tioga

Approximate Waters Map - Area 6

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
Stream
WWC

Figure 6f

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6f_Approximate Waters Area 6.mxd

Date: 30 August 2018

N

350 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE

Tioga

Approximate Waters Map - Area 7

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
Pond
Stream
WWC

Figure 6g

File Path: \\corp.bwsc.net\data\Projects\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6g_Approximate Waters Area 7.mxd

Date: 25 September 2018

N

380 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE

Tioga

Approximate Waters Map - Area 8

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
Pond
Stream
WWC

Figure 6h

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6h_Approximate Waters Area 8.mxd

Date: 30 August 2018

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Barge Design		File Number: MVM-2016-078	Date: 10/19/2018
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
	APPROVED JURISDICTIONAL DETERMINATION		D
X	PRELIMINARY JURISDICTIONAL DETERMINATION		E

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

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

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

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

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

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

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

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

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

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

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

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

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: Gregg Williams USACE – Memphis District Regulatory Branch 167 North Main Street B-202 Memphis, Tennessee 38103-1894 (901) 544-0736	If you only have questions regarding the appeal process you may also contact: Administrative Appeals Review Officer USACE – Mississippi Valley Division P.O. Box 80 Vicksburg, MS 39181-0080 (601) 634-5820

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

Signature of appellant or agent.	Date:	Telephone number:

August 31, 2018

Mr. Mitch Elcan (James.M.Elcan@usace.army.mil)
USACE Regulatory Branch
Memphis District
167 N. Main Street
Room B-202
Memphis, Tennessee 38103

RE: Preliminary Jurisdictional Determination Request Package, Big Creek Natural Disaster Resilience Design Project, Millington, Shelby County, Tennessee
Barge #3508507

Dear Mr. Elcan,

Barge Design Solutions, Inc. (Barge) was retained by Shelby County, Tennessee to perform an ecology survey on approximately 2,600 acres of existing property to identify the extent of potential jurisdictional wetlands and other waterbodies that may be impacted during proposed activities.

1.0 PURPOSE

The purpose of the environmental assessment was to determine the extent of potential on-site jurisdictional wetlands and waterbodies pursuant to the federal Clean Water Act (Sections 401 and 404), and the Tennessee Water Quality Control Act. The information provided in the attached Preliminary Jurisdictional Determination Packages characterizes the existing wetlands, streams, and other waterbodies that may be affected by the proposed activities.

1.1 Study Area

The Project study area consists of four parcels of property located near the town of Millington, Shelby County, Tennessee. The parcels are approximately 2,600 total acres. The largest of the four parcels is located on the north side of Hwy 385 (Paul Barret Pkwy) between Hwy 3 and Sledge Rd in Millington, Tennessee (Attachment A, Figure 1). The second parcel is located east of Russel Bond Drive and south southwest of Epperson Mill Drive and the Millington Waste Water Treatment Facility on the west side of Millington, Tennessee. The third parcel is located south of the central area of Millington, situated on the northeast corner of Raleigh-Millington Road and Duncan Road. The final parcel is located at the southwest corner of Hickory Meadows Road and Quito Road in Millington Tennessee. These areas are located within the Mississippi Valley Loess Plains (74) ecoregion of Tennessee, and are further categorized into the Loess Plains (74b) physiographic region of Tennessee. The west side of the larger parcel is within the Millington topographic quadrangle, and the east side is within the Brunswick topographic quadrangle. The three smaller parcels are located within the Millington topographic quadrangle as well (Attachment A, Figure 2). The project area lies within the Big Creek Middle (080102090302), Big Creek Lower (080102090303), and Loosahatchie River-Outlet (080102090406) 12-digit HUCs (Attachment A, Figure 3).

2.0 ENVIRONMENTAL REVIEW

Prior to visiting the project area, a resource review of available background site information was conducted using the U.S. Fish and Wildlife National Wetland Inventory (NWI) database to determine if wetlands should be expected within the area. Topographic maps and the USGS National Hydrography Dataset (NHD) were also evaluated for potential jurisdictional waters. Major landscapes and vegetation units were identified before encountering the study area through aerial imagery, and again in the field before beginning field work. This provided information as to the potential conditions that may be encountered within the study area.

2.1 Field Investigations

Wetland Boundary Identification

During the months of July 2017, April 2018, and June 2018, Barge, Tioga Environmental Consultants, and Brophy-Heineke & Associates biologists performed a field survey within and directly adjacent to the limits of investigation to determine the presence or absence of jurisdictional waters. Wetland determinations were conducted by Barge, Tioga Environmental Consultants, and Brophy-Heineke & Associates biologists through observing hydrophytic vegetation, hydric soils, and wetland hydrology according the U.S. Army *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region, Version 2.0*. The methodologies as set forth in the manual were employed to determine presence or absence of vegetation, hydrology, and hydric soil field indicators. Sample points were chosen based upon representative portions of the study area to confirm visual estimates of field indicators. The Atlantic and Gulf Coastal Plain Data Forms were completed at wetland and upland sample points according to the Manual to confirm boundaries of each ecosystem (see Attachment C-1 for data forms). The boundaries of the wetland were then marked in the field with pink flagging and coordinates were obtained with a GPS unit.

Waterbody Identification

Perennial, intermittent, and ephemeral streams were field verified as waters of the U.S. based on the existence of biology, geomorphology (i.e. defined bed and bank, ordinary high water mark (OHWM)) and hydrology. Streams that were identified by the NHD and/or topographic maps were targeted for confirmation. Potential streams that were encountered and not identified by the NHD or topographic maps were also noted. For the purpose of this report, all ephemeral streams were characterized by the presence of two (2) or more OHWM indicators using the *2005 USACE Regulatory Guidance Letter 05-05* and proximity to other adjoining jurisdictional features (i.e. wetlands and/or intermittent or perennial streams). Streams located within the project area were flagged with blue and white flagging, and the coordinates of the centerline were obtained with a GPS unit.

3.0 RESULTS

3.1 Non-wetland Waters

All encountered non-wetland waterbodies are summarized in Table 1 (Attachment B) and displayed in Figures 6a – 6h (Attachment A). Thirty-four (34) ephemeral streams were identified within the project limits (EPH-1 – EPH-34). Additionally, twenty-five (25) streams (STR-1 – STR-25) are also located within the limits of investigation.

3.2 Wetlands

There are fifty-six (56) wetlands (“WTL-1 – WTL-56”) on the site as indicated on Figures 6a – 6h and summarized in Table 2 (Attachment B).

4.0 SUMMARY

Fifty-six wetlands, twenty-five streams, and thirty-four ephemeral streams were identified during the field investigation (Figure 6). Please find the attached preliminary jurisdictional application package which includes site maps/figures, wetland field data sheets, and a photo summary. Barge respectfully requests a review and confirmation of our determinations for the above listed waterbodies and request that all appropriate features be verified as waters of the U.S.

If you have any questions or comments, please do not hesitate to contact me at 615-252-4306 (Nick.Carmean@bargedesign.com) or Grant Lynch at 615-252-4246 (Grant.Lynch@bargedesign.com).

Sincerely,

Nick Carmean, TN-QHP
Project Biologist

Attachments: Preliminary Jurisdictional Application Package

Big Creek National Disaster Resiliency Design Project
Millington, Tennessee
Preliminary Jurisdictional Determination Request Package

List of Contents

Attachment A

Preliminary Jurisdictional Determination Form

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

District Office: Memphis District | File/ORM #: | PJD Date:

State: TN | City/County: Millington/Shelby

Nearest Waterbody: Big Creek

Location: TRS, LatLong or UTM: 35.331928, -89.900322

Name/ Address of Person Requesting PJD:
Nick Carmean
615 3rd Ave South, Suite 700
Nashville, TN 37210

Identify (Estimate) Amount of Waters in the Review Area:

Non-Wetland Waters: linear ft width acres | Stream Flow: N/A

See Attachment B for summary

Wetlands: acre(s) | Cowardin Class: N/A

Name of Any Water Bodies on the Site Identified as Section 10 Waters: Tidal: | Non-Tidal:

☑ Office (Desk) Determination
☑ Field Determination: Date of Field Trip: July 2017, April 2018, and June 2018

SUPPORTING DATA: Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- ☑ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: Barge
- ☑ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps
- ☐ Corps navigable waters' study:
- ☑ U.S. Geological Survey Hydrologic Atlas:
  - ☑ USGS NHD data.
  - ☑ USGS 8 and 12 digit HUC maps.
- ☑ U.S. Geological Survey map(s). Cite quad name: Millington and Brunswick
- ☑ USDA Natural Resources Conservation Service Soil Survey. Citation: Web Soil Survey
- ☑ National wetlands inventory map(s). Cite name:
- ☐ State/Local wetland inventory map(s):
- ☐ FEMA/FIRM maps:
- ☐ 100-year Floodplain Elevation is:
- ☑ Photographs: ☐ Aerial (Name & Date):
  - ☑ Other (Name & Date): Ground Photographs- 2017 and 2018
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Signature and Date of Regulatory Project Manager
(REQUIRED)

Signature and Date of Person Requesting Preliminary JD
(REQUIRED, unless obtaining the signature is impracticable)

EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "preconstruction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

Appendix A - Sites

District Office: Memphis District

File/ORM #:

PJD Date:

State: TN

City/County: Millington, Shelby

Person Requestinq PJD: Nick Carmean

See Attachment B for Table

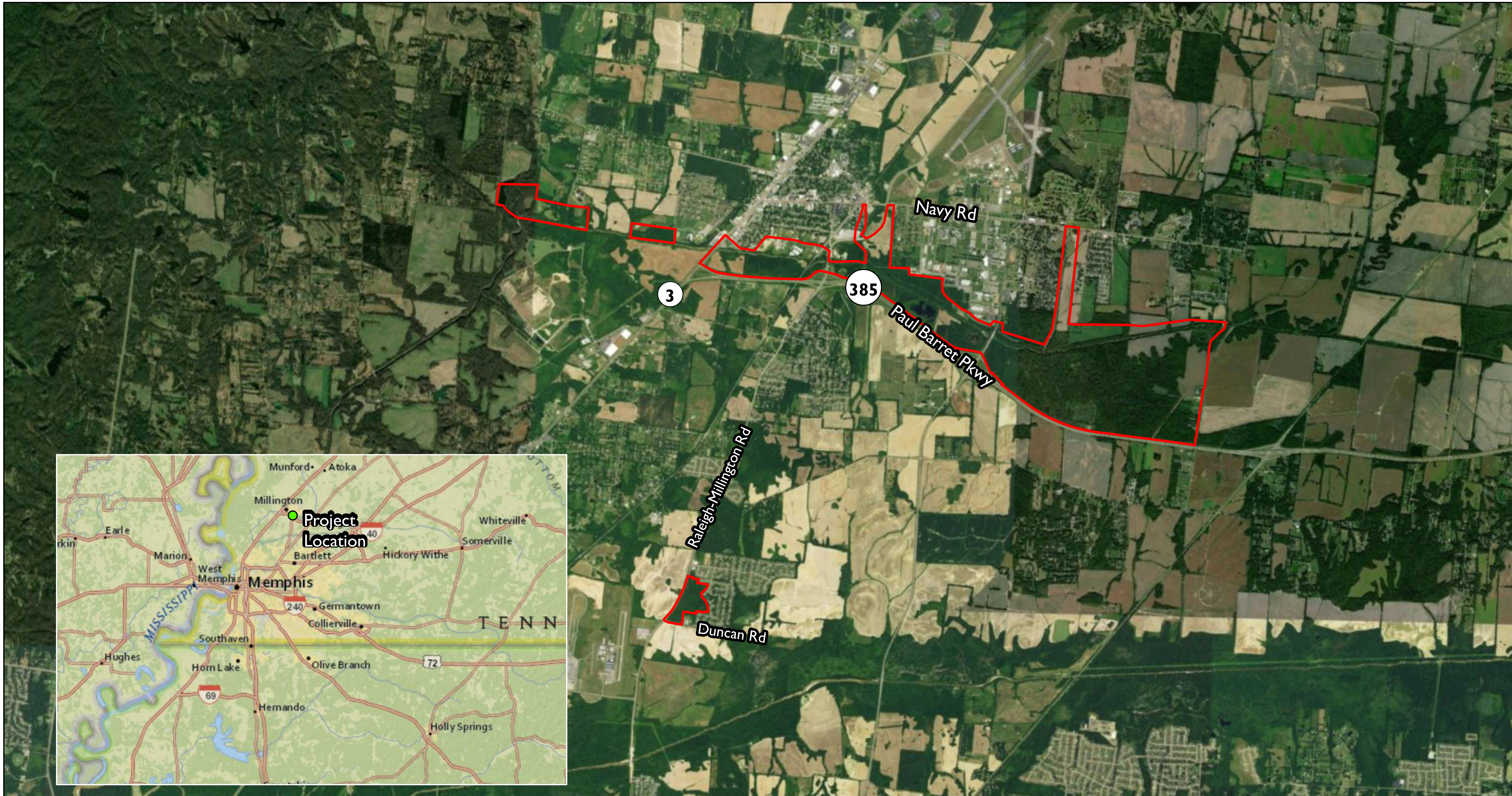
Site Number	Latitude	Longitude	Cowardin Class	Est. Amount of Aquatic Resource in Review Area	Class of Aquatic Resource
			n/a		Non-Section 10 non-wetlanc
			n/a		Non-Section 10 wetland
			n/a		Non-Section 10 non-wetlanc
			n/a		Non-Section 10 non-wetlanc
			n/a		Non-Section 10 non-wetlanc

Notes:

Attachment B provides waterbody summary

Attachment B

Figures



N

5,000 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Project Location Map

Big Creek National Disaster Resilience Design Project

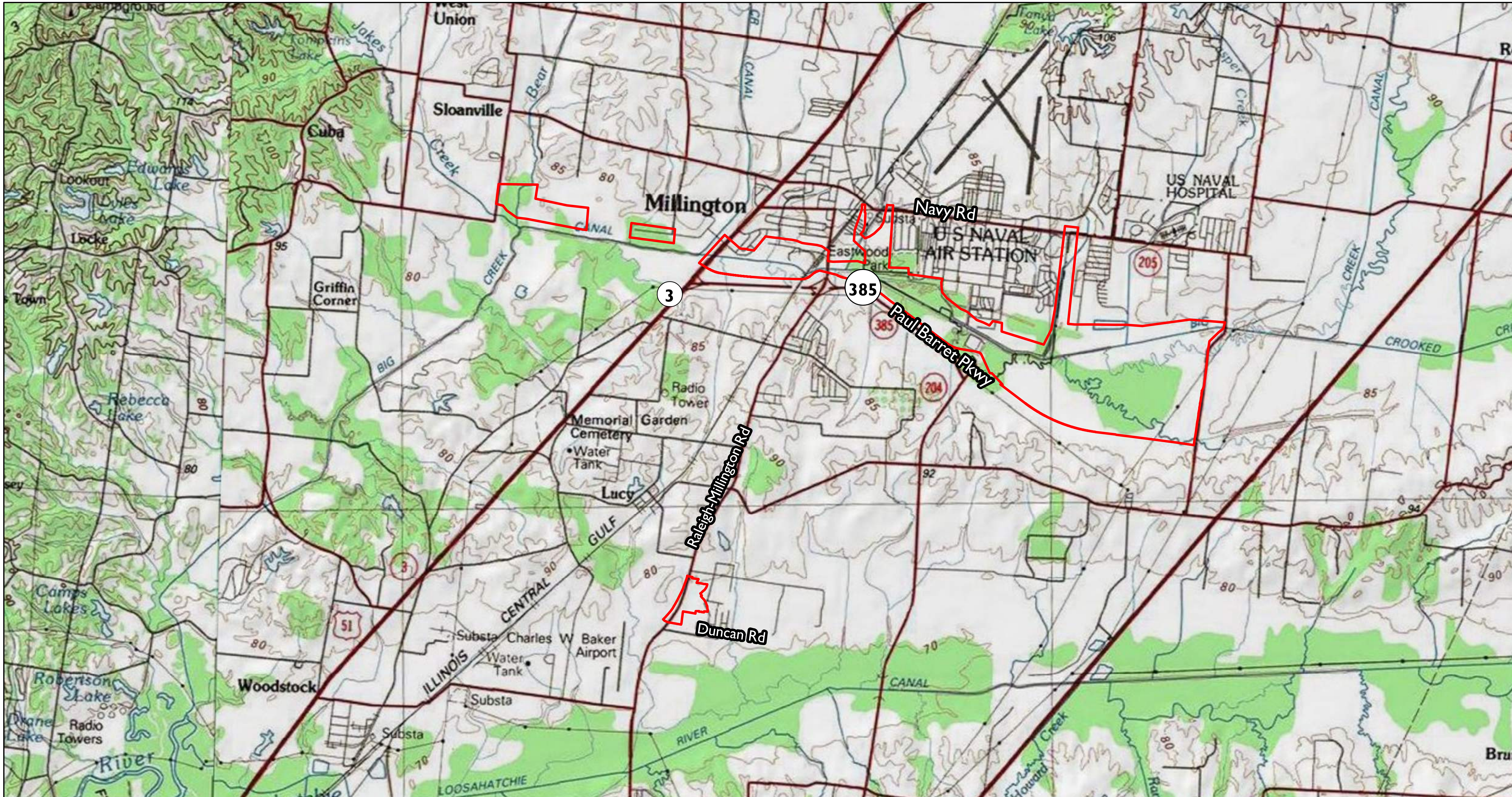
Millington, Shelby County, Tennessee

Project Limits

Figure 1

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 1_Project Location.mxd

Date: 29 August 2018



N

5,000 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Project Topographic Map

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

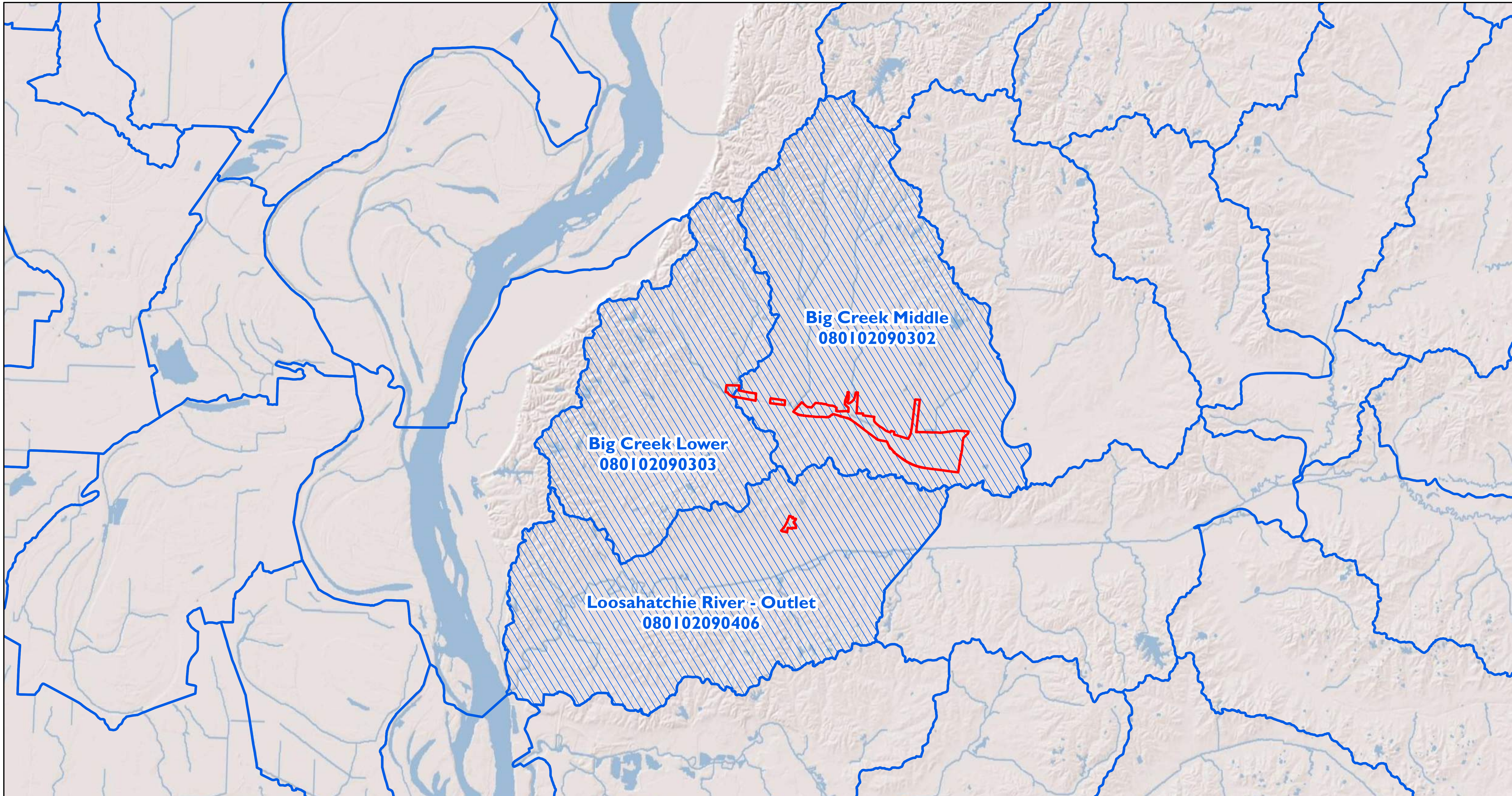
Project Limits

USGS Quadrangles: Millington and Brunswick

Figure 2

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 2_Project Topo.mxd

Date: 30 August 2018



N

15,000 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

HUC 12 Project Watershed Map

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

Project Watershed

HUC 12 Watershed

Figure 3

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 3_HUC 12 Watershed Map.mxd

Date: 30 August 2018

N

400 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE
DESIGN SOLUTIONS

Tioga
ENVIRONMENTAL CONSULTANTS

Soil Units Map - Area 1

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

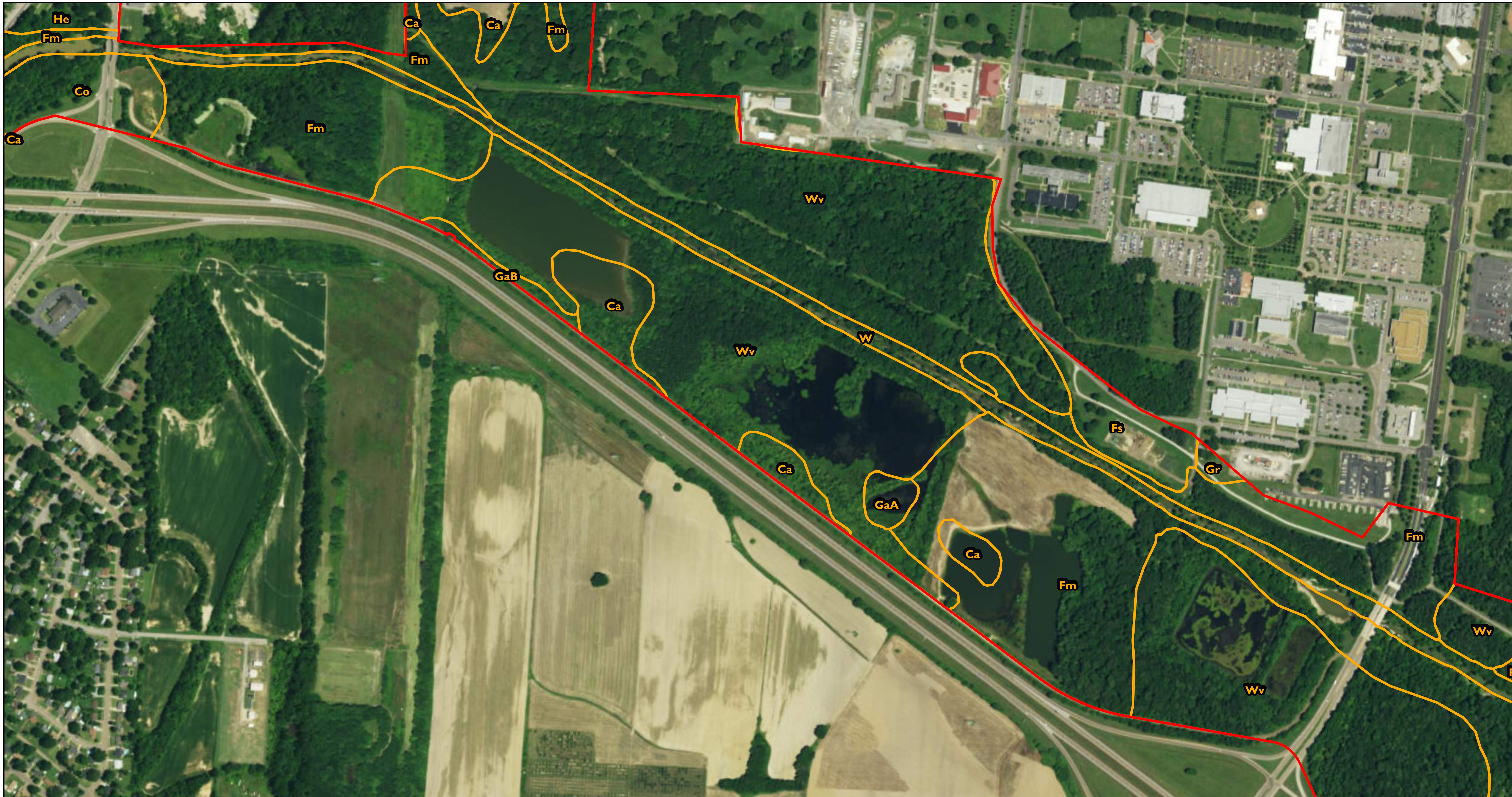
Project Limits

Soil Units

Figure 4a

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4a_Soil Units Area 1.mxd

Date: 30 August 2018



N

650 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Soil Units Map - Area 2

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

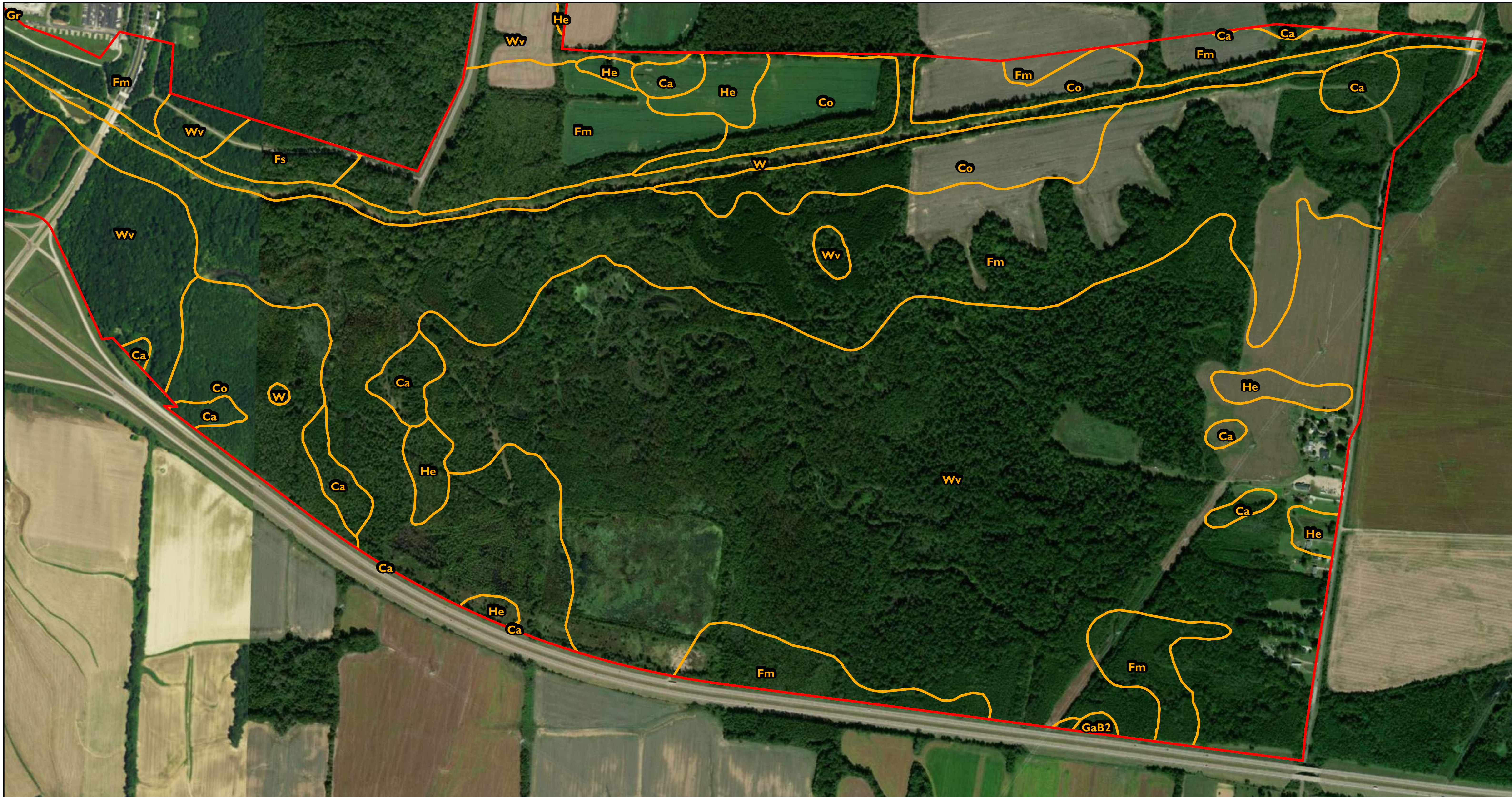
Project Limits

Soil Units

Figure 4b

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4b_Soil Units Area 2.mxd

Date: 30 August 2018



N
850 Feet
Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS
Tioga ENVIRONMENTAL CONSULTANTS

Soil Units Map - Area 3

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Soil Units

Figure 4c

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4c_Soil Units Area 3.mxd

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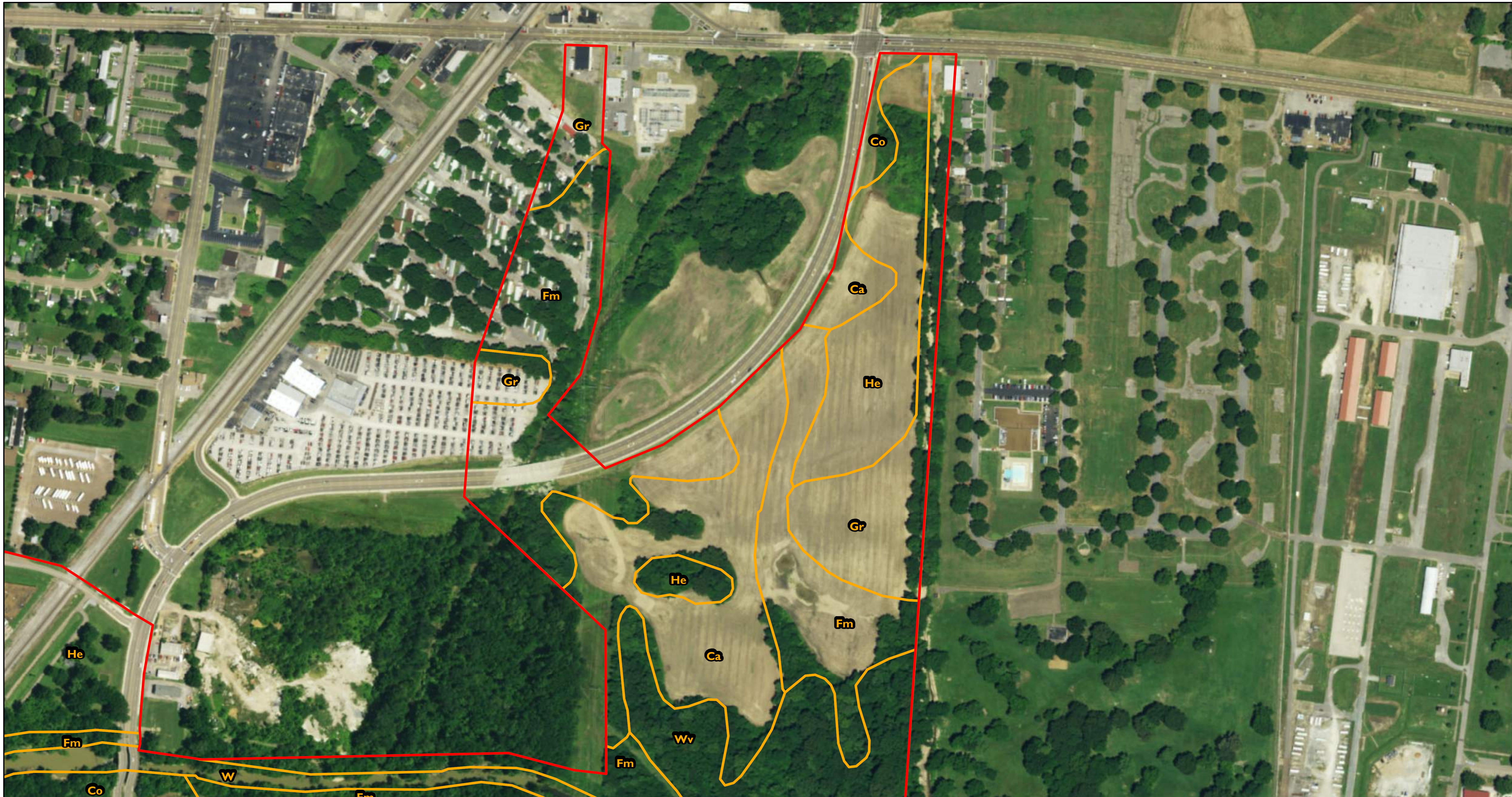

N

400 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

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Soil Units Map - Area 4

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

Soil Units

Figure 4d

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4d_Soil Units Map Area 4.mxd

Date: 30 August 2018

N

650 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

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Soil Units Map - Area 5

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

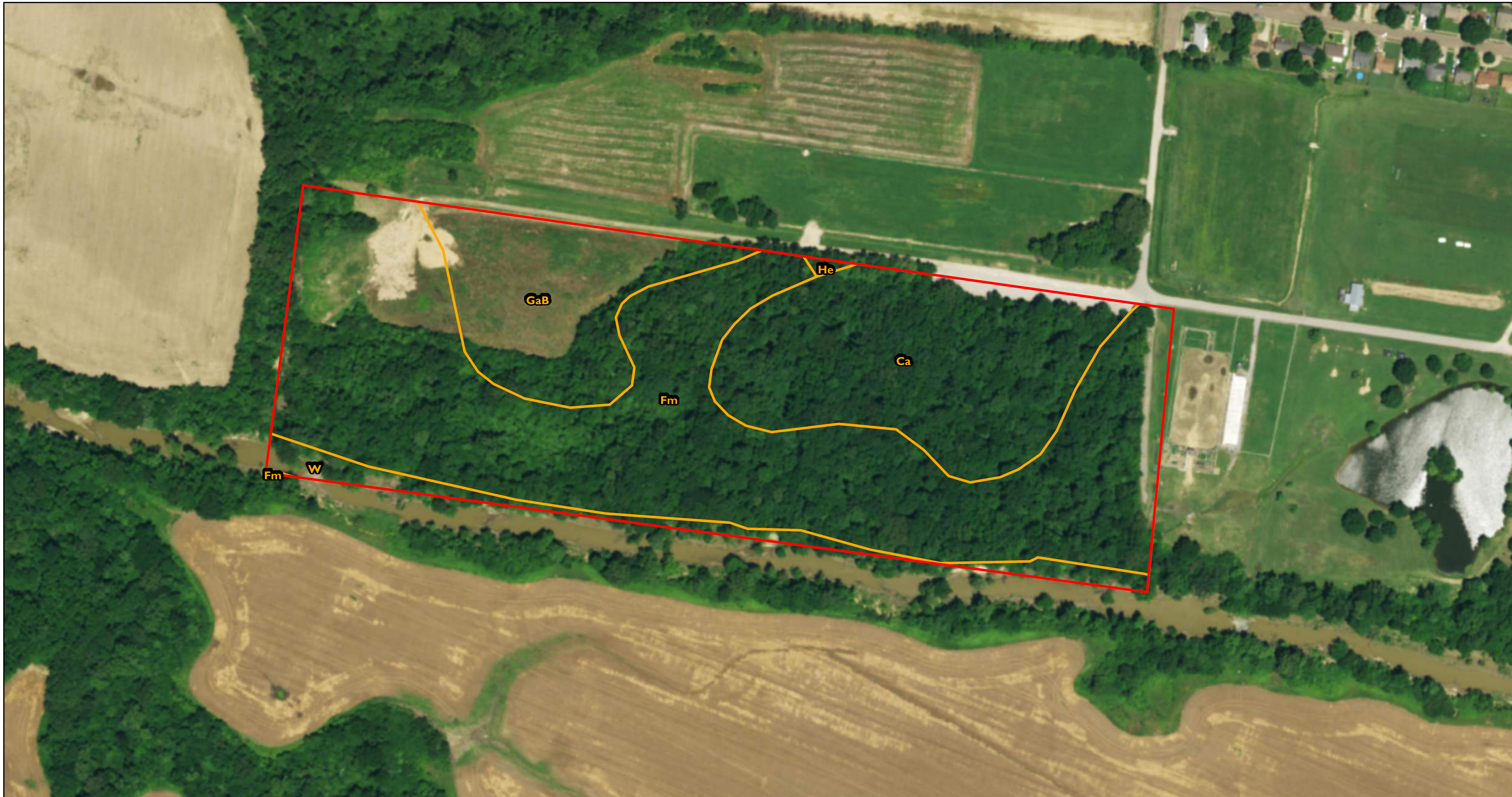
Project Limits

Soil Units

Figure 4e

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4e_Soil Units Area 5.mxd

Date: 30 August 2018



N

250 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

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Soil Units Map - Area 6

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

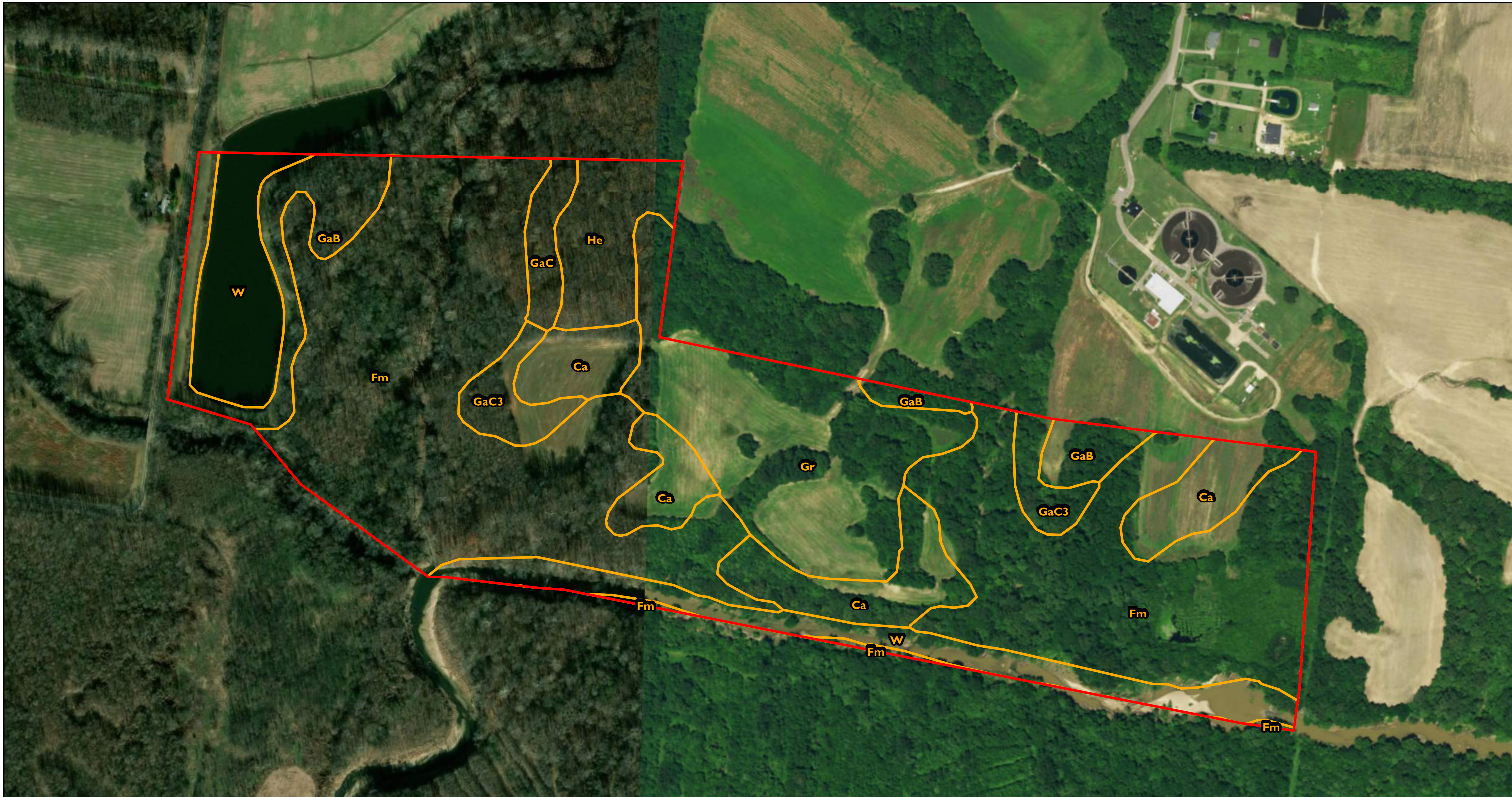
Project Limits

Soil Units

Figure 4f

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4f_Soil Units Area 6.mxd

Date: 30 August 2018



N
400 Feet
Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE
Tioga ENVIRONMENTAL CONSULTANTS

Soil Units Map - Area 7

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Soil Units

Figure 4g

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4g_Soil Units Area 7.mxd

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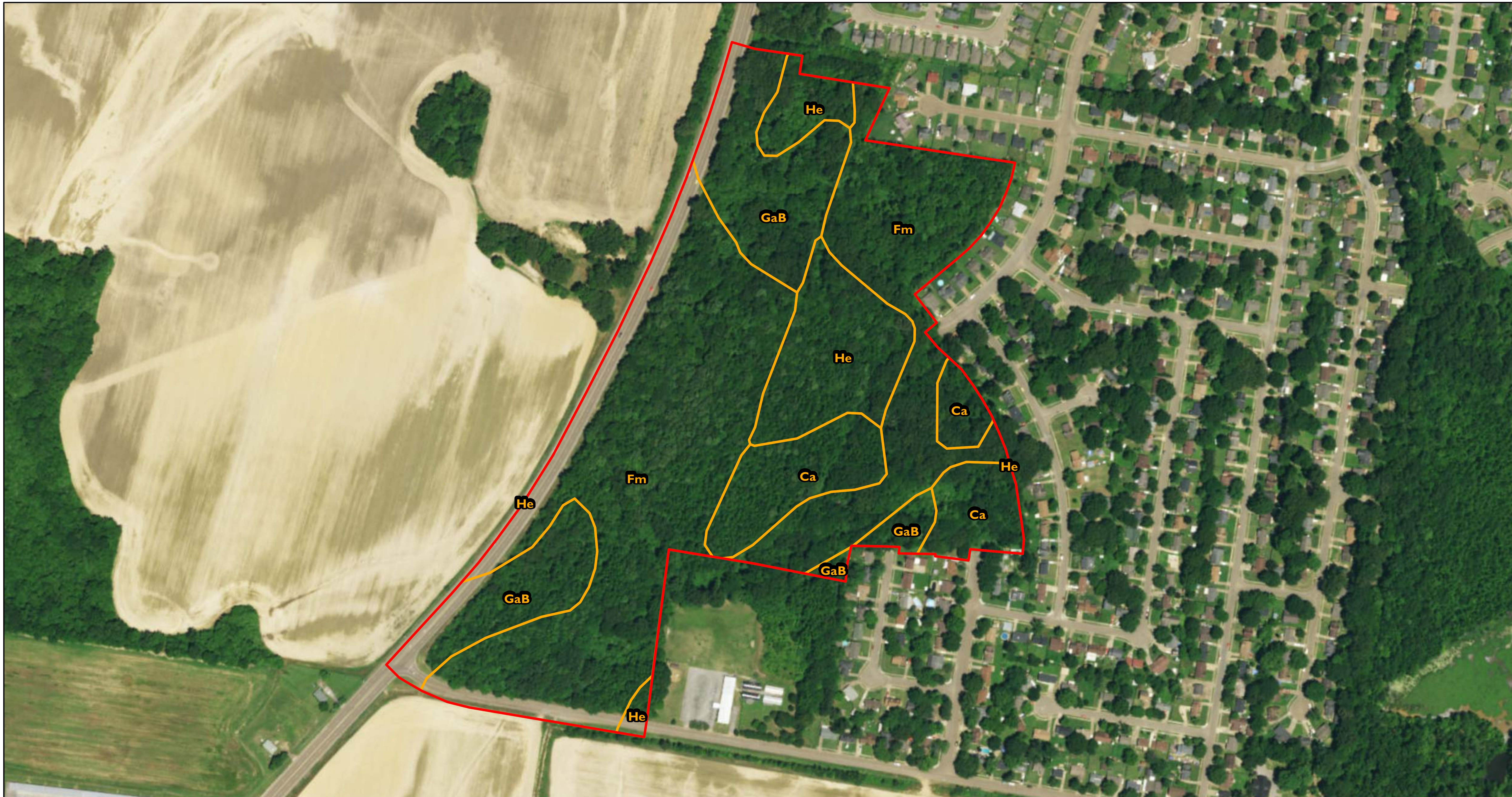


Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE
Tioga

Soil Units Map - Area 8

Big Creek National Disaster Resilience Design Project

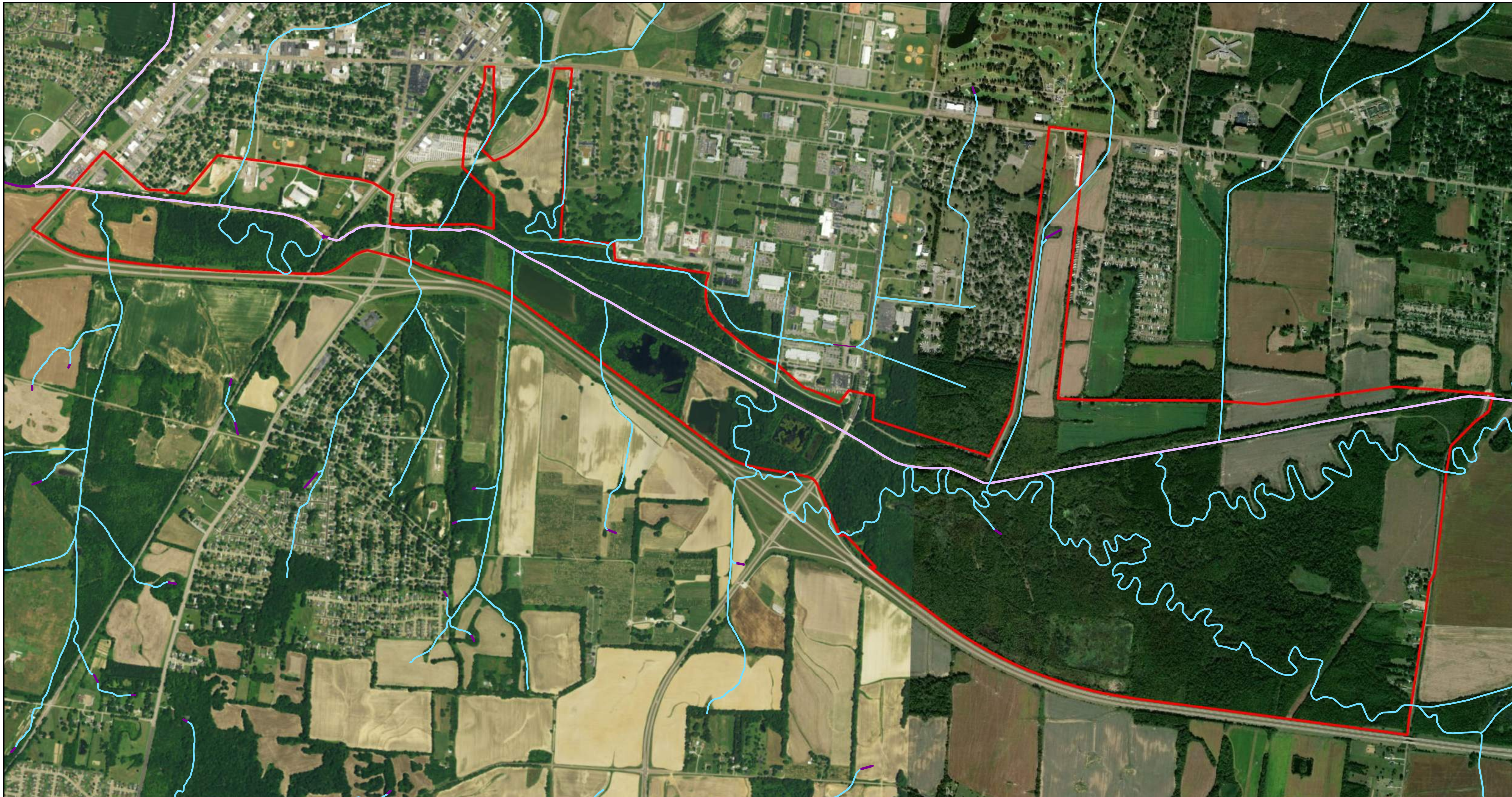
Millington, Shelby County, Tennessee

Project Limits
Soil Units

Figure 4h

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 4h_Soil Units Area 8.mxd

Date: 30 August 2018



N

1,800 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

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National Hydrography Dataset and National Wetlands Inventory Map - Areas 1 to 5

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

TN NHD Flowlines

FType

ArtificialPath

CanalDitch

StreamRiver

NWI Data

NWI Wetlands

Figure 5a

N

700 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

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National Hydrography Dataset and National Wetlands Inventory Map - Areas 6 and 7

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

TN NHD Flowlines

FType

ArtificialPath

CanalDitch

StreamRiver

NWI Data

NWI Wetlands

Figure 5b

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 5b_NWI and NHD.mxd

Date: 29 August 2018

N

400 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

National Hydrography Dataset and National Wetlands Inventory Map - Area 8

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

TN NHD Flowlines

FType

ArtificialPath

CanalDitch

StreamRiver

NWI Data

NWI Wetlands

Figure 5c

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\Figure 5c_NWI and NHD.mxd

Date: 29 August 2018

N

400 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 1

Big Creek National Disaster Resilience Design Project

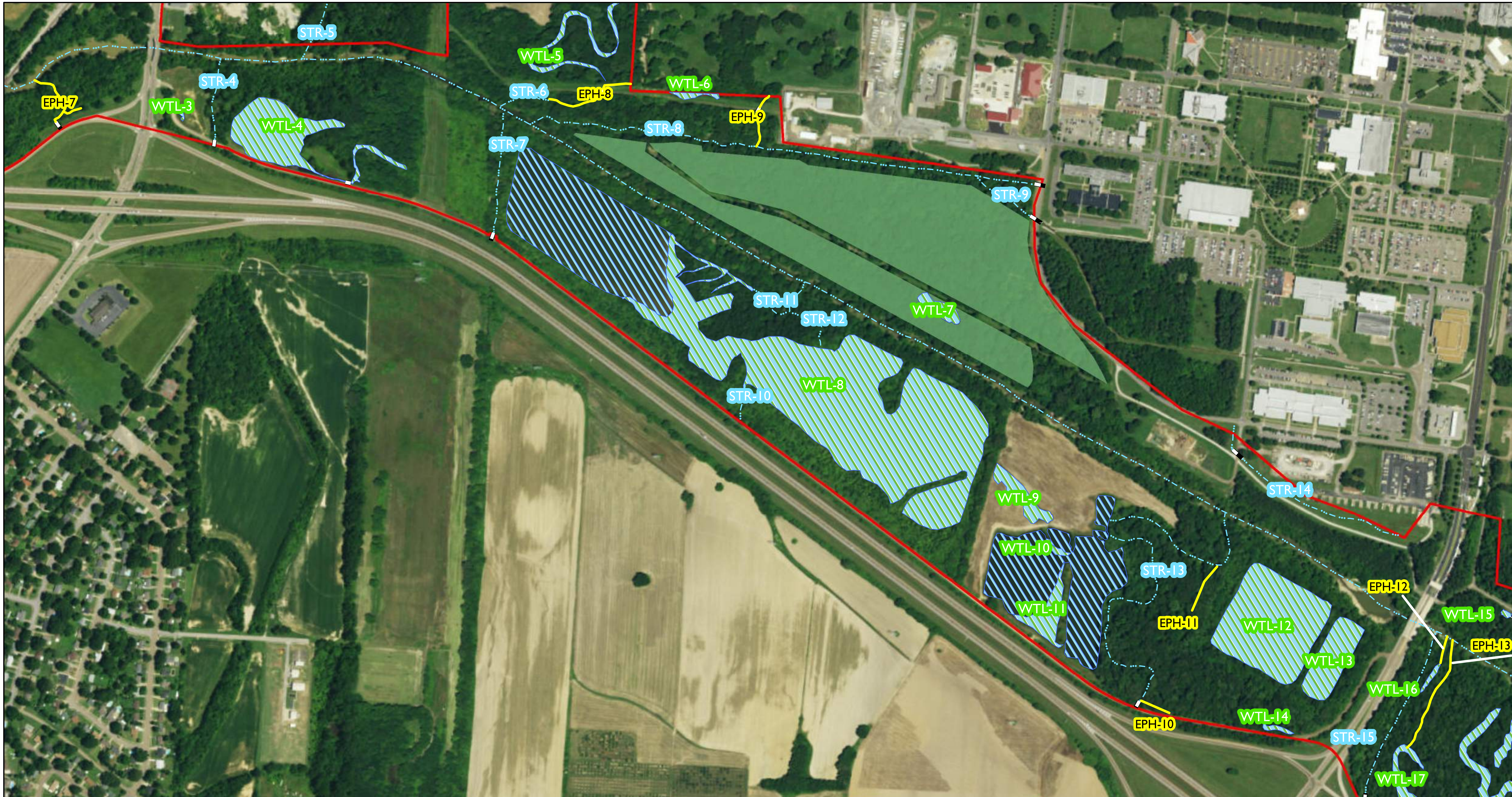
Millington, Shelby County, Tennessee

Project Limits
Wetland
Streams
WWC
Culvert

Figure 6a

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6a_Approximate Waters_Area 1.mxd

Date: 30 August 2018



Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 2

Big Creek National Disaster Resilience Design Project

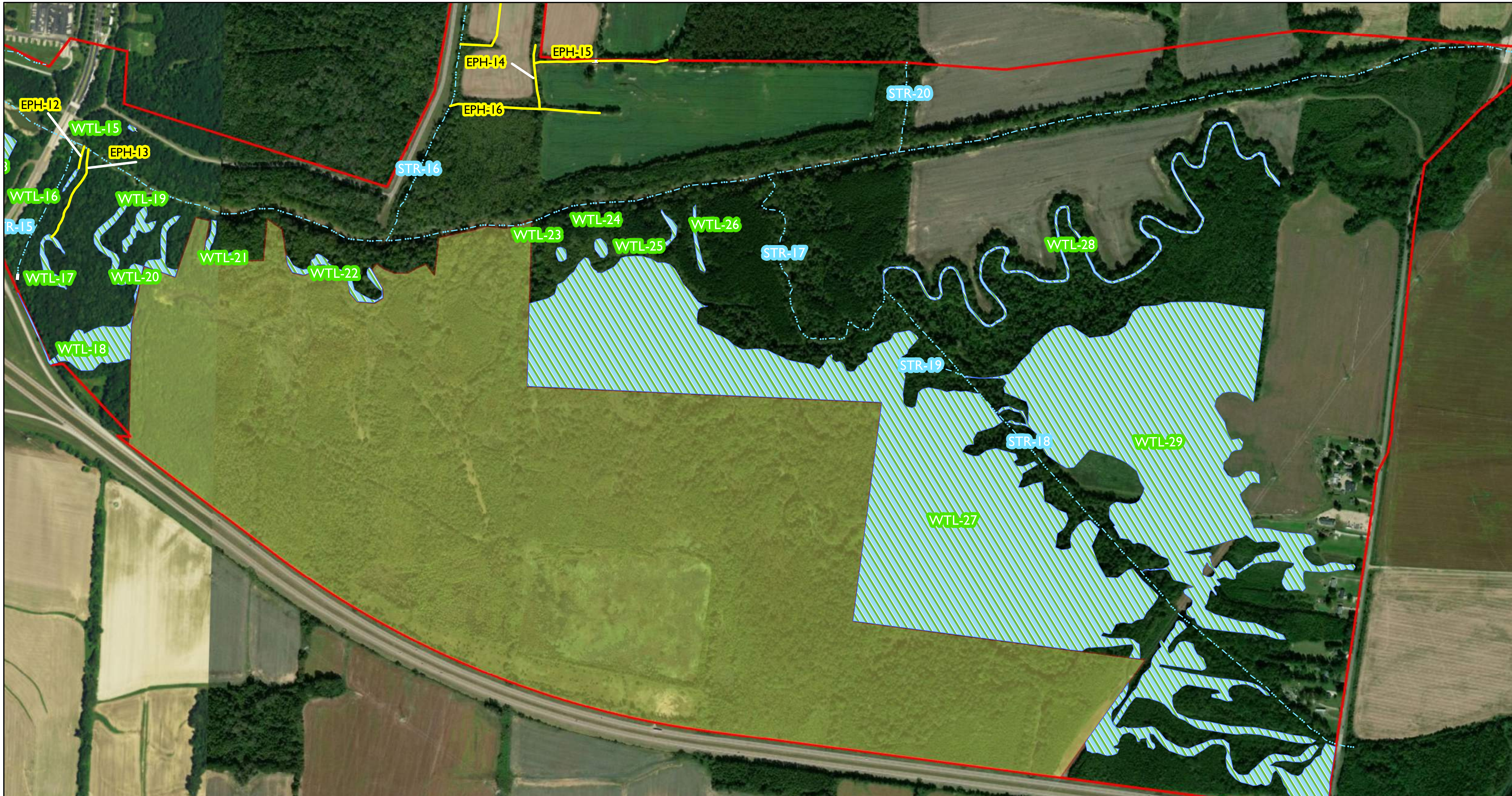
Millington, Shelby County, Tennessee

Project Limits
Wetland
Pond
Contains Wetlands - Federally Protected Area
Streams
WWC
Culvert

Figure 6b

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6b_Approximate Waters_Area 2.mxd

Date: 30 August 2018



N

800 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 3

Big Creek National Disaster Resilience Design Project

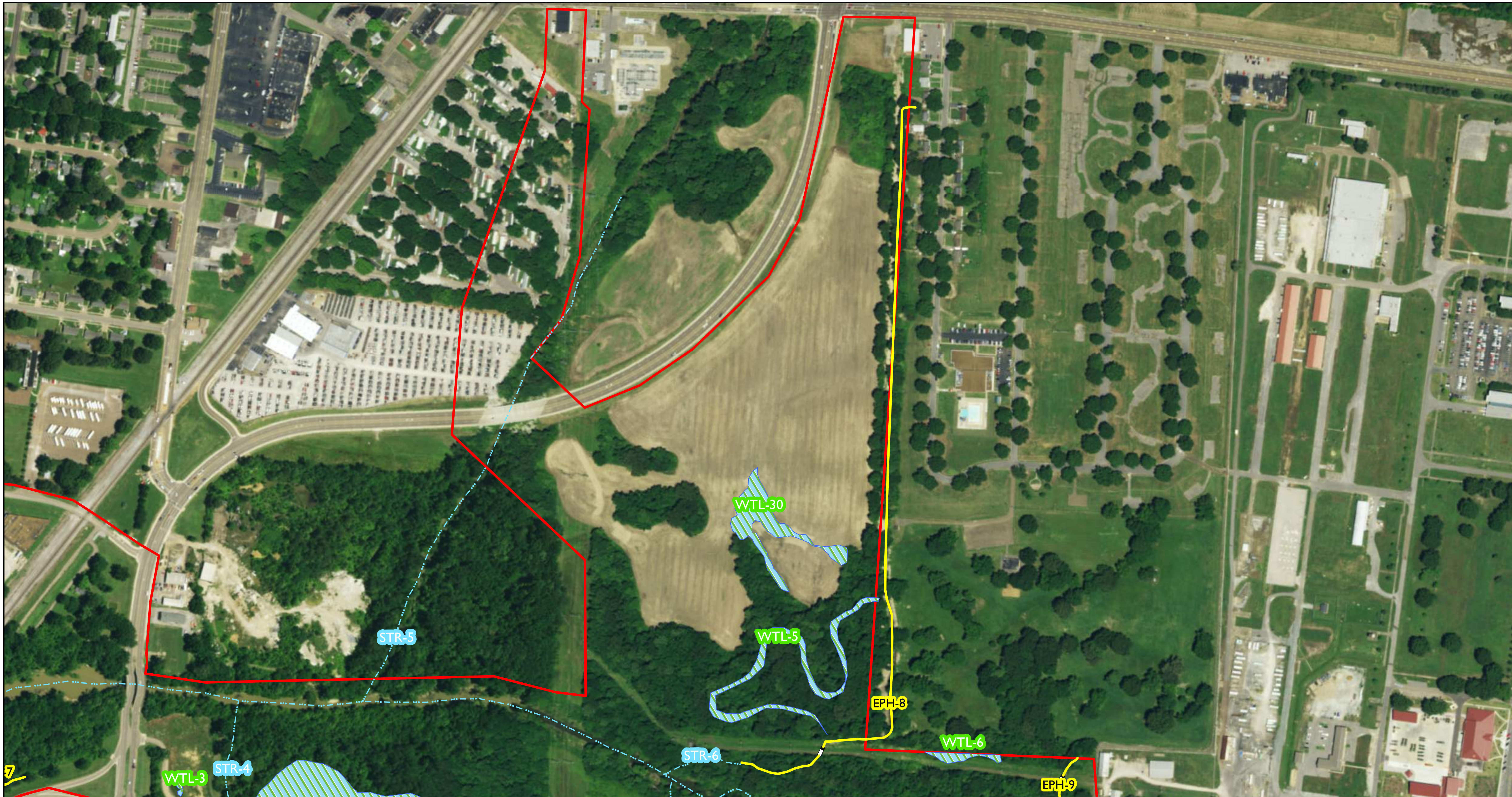
Millington, Shelby County, Tennessee

Project Limits
Wetland
TDOT Mitigation Area
Streams
WWC
Culvert

Figure 6c

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6c_Approximate Waters_Area 3.mxd

Date: 30 August 2018



N

425 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 4

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits
Wetland
Streams
WWC
Culvert

Figure 6d

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6d_Approximate Waters_Area 4.mxd

Date: 30 August 2018

N

650 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 5

Big Creek National Disaster Resilience Design Project

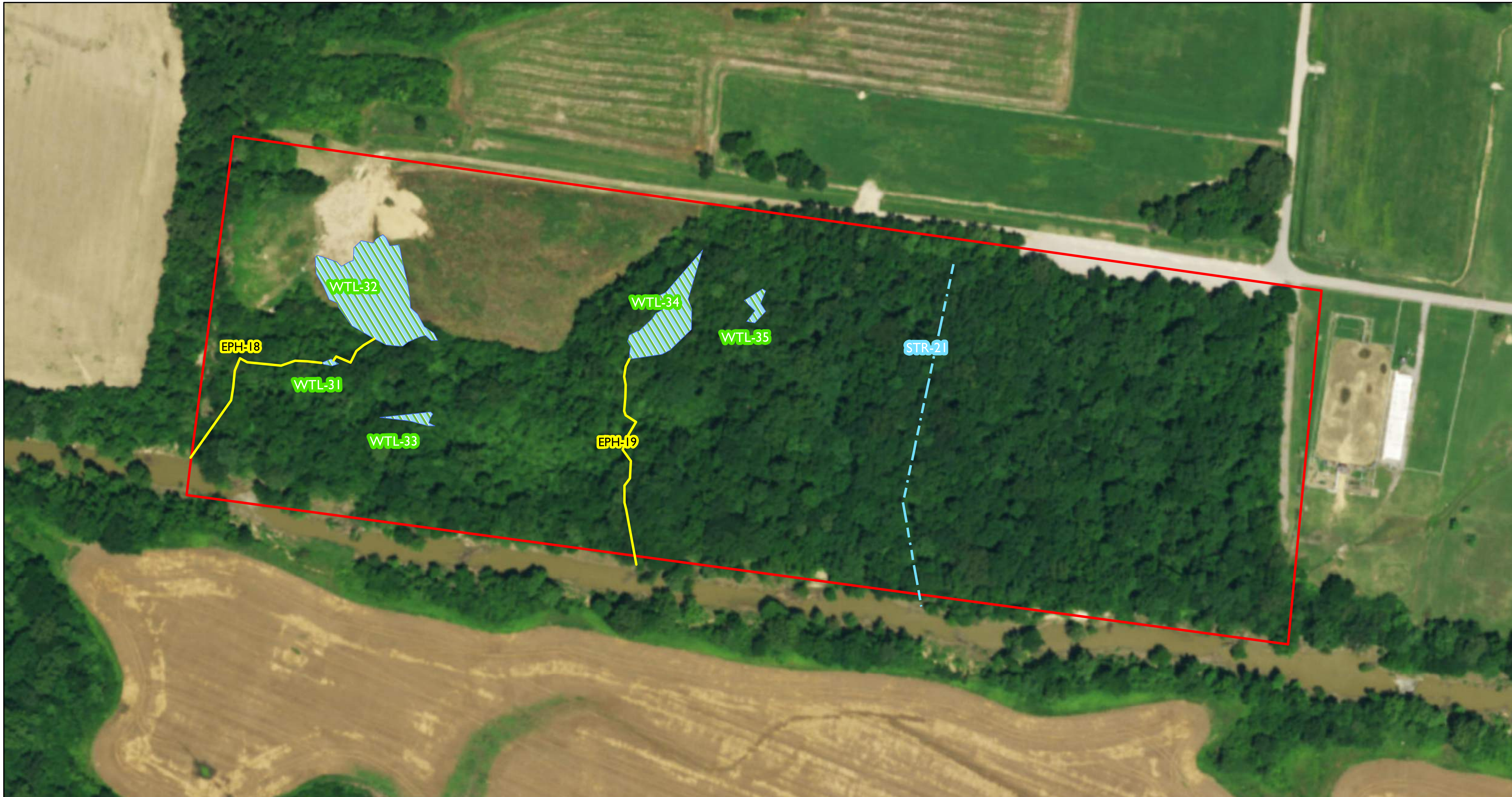
Millington, Shelby County, Tennessee

- Project Limits
- Wetland
- Pond
- Streams
- WWC
- Culvert

Figure 6e

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6e_Approximate Waters_Area 5.mxd

Date: 30 August 2018



N

200 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 6

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Project Limits

Wetland

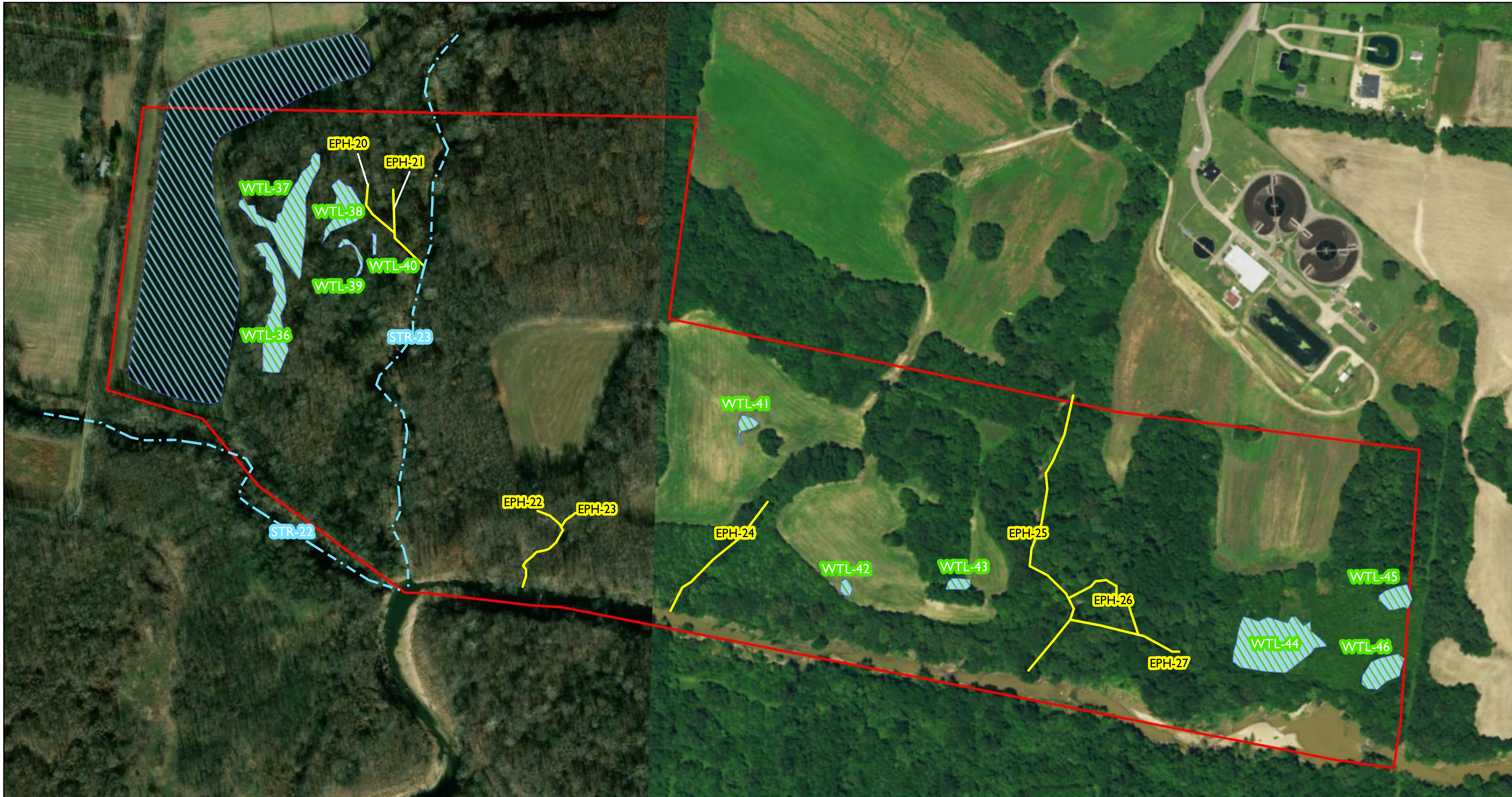
Stream

WWC

Figure 6f

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6f_Approximate Waters Area 6.mxd

Date: 30 August 2018



N

350 Feet

Tennessee State Plane (feet) 4100fips
North American Datum 1983

BARGE DESIGN SOLUTIONS

Tioga ENVIRONMENTAL CONSULTANTS

Approximate Waters Map - Area 7

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

	Project Limits
	Wetland
	Pond
	Stream
	WWC

Figure 6g

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6g_Approximate Waters Area 7.mxd

Date: 30 August 2018

Approximate Waters Map - Area 8

Big Creek National Disaster Resilience Design Project

Millington, Shelby County, Tennessee

Figure 6h

File Path: F:\35\35085\3508507\03_PROJECT_EXECUTION\EWR\Technical Studies\Ecology\GIS\Figures\For PJD\Figure 6h_Approximate Waters Area 8.mxd

Date: 30 August 2018

Attachment C

Tables

Summary of Non-Wetland Waterbodies Big Creek National Disaster Resilience Design Project					
Waterbody I.D.	**Description**	**Lat/Long Start**	**Lat/Long End**	**Estimated Amount Located in Limits of Investigation (LF)**	**Comments**
STR-1	Intermittent	35.3311/ -89.9152	35.3343/ -89.9158	1,428	Feature originates south of project area via culvert under Hwy 385
STR-2	Intermittent	35.3307/ -89.9101	35.3339/ -89.9103	1,136	
STR-3	Perennial	35.3349/ -89.9078	35.3338/ -89.9083	476	Stream appears to have GW connection at base of storm water structure.
STR-4	Intermittent	35.3314/ -89.8969	35.3329/ -89.8968	545	
STR-5	Perennial	35.3375/ -89.8923	35.3330/ -89.8951	669	North Fork Creek. Stream enters and exits project area at several points.
STR-6	Intermittent	35.3324/ -89.8896	35.3302/ -89.8907	356	
STR-7	Intermittent	35.3299/ -89.8907	35.3322/ -89.8906	816	Feature originates south of project area via culvert under Hwy 385
STR-8	Perennial	35.3310/ -89.8786	35.3319/ -89.8900	3,386	
STR-9	Intermittent	35.3304/ -89.8788	35.3311/ -89.8801	450	
STR-10	Intermittent	35.3267/ -89.8852	35.3272/ -89.8851	276	
STR-11	Intermittent	35.3290/ -89.8850	35.3286/ -89.8842	316	Drains the west side of WTL-8 to STR-12
STR-12	Intermittent	35.3280/ -89.8835	35.3292/ -89.8839	618	Drains the east side of WTL-8
STR-13	Intermittent	35.3217/ -89.8763	35.3252/ -89.8744	3,400	Channel is temporarily interrupted by open-water pond

STR-14	Intermittent	35.3267/ -89.8743	35.3249/ -89.8706	1,181	Possible headwater channel to STR-9
STR-15	Intermittent	35.3201/ -89.8713	35.3231/ -89.8697	1,169	Channel originates south of project area via culvert under Hwy 385
STR-16	Perennial	35.3358/ -89.8561	35.3211/ -89.8613	6,737	
STR-17	Intermittent	35.3203/ -89.8477	35.3228/ -89.8509	2,665	
STR-18	Intermittent	35.3133/ -89.8396	35.3203/ -89.8477	5,652	Extensive channelization
STR-19	Intermittent	35.3186/ -89.8471	35.3185/ -89.8456	552	Tributary to STR-18
STR-20	Perennial	35.3254/ -89.8473	35.3234/ -89.8474	792	Casper Creek
STR-21	Intermittent	35.3372/ -89.9267	35.3354/ -89.9269	732	
STR-22	Perennial	35.3259/ -89.8306	35.3382/ -89.9506	168	Jakes Creek. Most of resource is outside, but adjacent to, project area.
STR-23	Perennial	35.3429/ -89.9507	35.3384/ -89.9510	1,987	Bear Creek
STR-24	Intermittent	35.2851/ -89.9191	35.2842/ -89.9192	412	
STR-25	Intermittent	35.2851/ -89.9173	35.2824/ -89.9226	1,563	
WWC/EPH-1	Wet Weather Conveyance/ Ephemeral Channel	35.3330/ -89.9187	35.3312/ -89.9153	1,712	
WWC/EPH-2	Wet Weather Conveyance/ Ephemeral Channel	35.3310/ -89.9119	35.3318/ -89.9116	360	
WWC/EPH -3	Wet Weather Conveyance/ Ephemeral Channel	35.3334/ -89.9116	35.3335/ -89.9103	478	

WWC/EPH -4	Wet Weather Conveyance/ Ephemeral Channel	35.3363/ -89.9069	35.3350/ -89.9078	588	
WWC/EPH -5	Wet Weather Conveyance/ Ephemeral Channel	35.3331/ -89.9068	35.3335/ -89.9102	1,589	
WWC/EPH -6	Wet Weather Conveyance/ Ephemeral Channel	35.3316/ -89.9003	35.3325/ -89.9009	518	
WWC/EPH -7	Wet Weather Conveyance/ Ephemeral Channel	35.3401/ -89.8873	35.3324/ -89.8896	1,819	
WWC/EPH -8	Wet Weather Conveyance/ Ephemeral Channel	35.3325/ -89.8847	35.3316/ -89.8850	397	
WWC/EPH -9	Wet Weather Conveyance/ Ephemeral Channel	35.3216/ -89.8756	35.3218/ -89.8762	216	
WWC/EPH -10	Wet Weather Conveyance/ Ephemeral Channel	35.3235/ -89.8751	35.3242/ -89.8746	363	
WWC/EPH -11	Wet Weather Conveyance/ Ephemeral Channel	35.3234/ -89.8751	35.3243/ -89.8746	380	
WWC/EPH -12	Wet Weather Conveyance/ Ephemeral Channel	35.3226/ -89.8697	35.3231/ -89.8695	196	
WWC/EPH -13	Wet Weather Conveyance/ Ephemeral Channel	35.3212/ -89.8703	35.3230/ -89.8694	840	
WWC/EPH -14	Wet Weather Conveyance/ Ephemeral Channel	35.3255/ -89.8574	35.3242/ -89.8572	563	

WWC/EPH -15	Wet Weather Conveyance/ Ephemeral Channel	35.3253/ -89.8538	35.3252/ -89.8574	1,172	
WWC/EPH -16	Wet Weather Conveyance/ Ephemeral Channel	35.3241/ -89.8555	35.3242/ -89.8596	1,316	
WWC/EPH -17	Wet Weather Conveyance/ Ephemeral Channel	35.3274/ -89.8576	35.3256/ -89.8594	1,098	
WWC/EPH -18	Wet Weather Conveyance/ Ephemeral Channel	35.3368/ -89.9306	35.3361/ -89.9318	573	
WWC/EPH -19	Wet Weather Conveyance/ Ephemeral Channel	35.3367/ -89.9289	35.3356/ -89.9288	482	
WWC/EPH -20	Wet Weather Conveyance/ Ephemeral Channel	35.3421/ -89.9516	35.3416/ -89.9513	232	
WWC/EPH-21	Wet Weather Conveyance/ Ephemeral Channel	35.3421/ -89.9513	35.3413/ -89.9509	342	
WWC/EPH -22	Wet Weather Conveyance/ Ephemeral Channel	35.3390/ -89.9495	35.3382/ -89.9496	419	
WWC/EPH -23	Wet Weather Conveyance/ Ephemeral Channel	35.3390/ -89.9490	35.3388/ -89.9492	77	
WWC/EPH -24	Wet Weather Conveyance/ Ephemeral Channel	35.3391/ -89.9468	35.3380/ -89.9479	567	
WWC/EPH -25	Wet Weather Conveyance/ Ephemeral Channel	35.3402/ -89.9432	35.3375/ -89.9436	1,185	

WWC/EPH -26	Wet Weather Conveyance/ Ephemeral Channel	35.3379/ -89.9423	35.3382/ -89.9431	434	
WWC/EPH -27	Wet Weather Conveyance/ Ephemeral Channel	35.3378/ -89.9418	35.3380/ -89.9431	439	
WWC/EPH -28	Wet Weather Conveyance/ Ephemeral Channel	35.2882/ -89.9191	35.2851/ -89.9191	1,005	
WWC/EPH -29	Wet Weather Conveyance/ Ephemeral Channel	35.2871/ -89.9197	35.2868/ -89.9192	202	
WWC/EPH -30	Wet Weather Conveyance/ Ephemeral Channel	35.2877/ -89.9175	35.2851/ -89.9191	1,192	
WWC/EPH -31	Wet Weather Conveyance/ Ephemeral Channel	35.2867/ -89.9188	35.2861/ -89.9186	250	
WWC/EPH -32	Wet Weather Conveyance/ Ephemeral Channel	35.2856/ -89.9202	35.2847/ -89.9198	381	
WWC/EPH -33	Wet Weather Conveyance/ Ephemeral Channel	35.2830/ -89.9224	35.2828/ -89.9223	100	
WWC/EPH -34	Wet Weather Conveyance/ Ephemeral Channel	35.2827/ -89.9232	35.2826/ -89.9225	205	

-Table 2- Summary of Wetlands in Limits of Investigation Weakley County Pipeline Project				
Waterbody I.D.	**Description**	**Lat/Long Start**	**Area (Acre)**	**Comments**
WTL-1	Forested Floodplain Wetland	35.3319, -89.9115	1.78	
WTL-2	Forested Floodplain Wetland	35.3322. -89.9088	35.33	
WTL-3	Emergent Wetland	35.3320, -89.8977	0.07	
WTL-4	Forested Floodplain Wetland	35.3314, -89.8956	5.37	
WTL-5	Forested Floodplain Wetland	35.3343, -89.8877	1.23	
WTL-6	Forested Floodplain Wetland	35.3325, -89.8865	0.21	
WTL-7	Shrub/Scrub Wetland	35.3288, -89.8808	0.67	
WTL-8	Forested Floodplain, Shrub/Scrub and Emergent Wetland Complex	35.3284, -89.8864	0.14	
WTL-9	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3255, -89.8792	1.13	
WTL-10	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3245, -89.8782	0.16	
WTL-11	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3234, -89.8782	1.41	

WTL-12	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3233, -89.8733	10.08	
WTL-13	Forested Floodplain and Shrub/Scrub Wetland Complex	35.3227, -89.8720	2.92	
WTL-14	Forested Floodplain and Shrub/Scrub Wetland Complex	35.32135, -89.8732	0.15	
WTL-15	Emergent Wetland	35.3236, -89.8683	0.05	
WTL-16	Forested Floodplain and Emergent Wetland Complex	35.3222, -89.8700	0.14	
WTL-17	Forested Floodplain and Emergent Wetland Complex	35.3203, -89.8704	0.83	
WTL-18	Forested Floodplain and Emergent Wetland Complex	35.3187, -89.8688	4.37	
WTL-19	Forested Floodplain and Emergent Wetland Complex	35.3214, -89.8679	0.86	
WTL-20	Forested Floodplain and Emergent Wetland Complex	35.3204, -89.8672	2.54	
WTL-21	Forested Floodplain and Emergent Wetland Complex	35.3210, -89.8660	0.61	
WTL-22	Forested Floodplain and Emergent Wetland Complex	35.3207, -89.8630	1.37	
WTL-23	Forested Floodplain Wetland	35.3209, -89.8565	0.22	

WTL-24	Forested Floodplain Wetland	35.3211, -89.8554	0.34	
WTL-25	Forested Floodplain Wetland	35.3215, -89.8535	0.56	
WTL-26	Forested Floodplain Wetland	35.3209, -89.8527	0.44	
WTL-27	Forested Floodplain Wetland	35.3155, -89.8445	130.88	
WTL-28	Forested Floodplain Wetland	35.3229, -89.8372	3.80	
WTL-29	Forested Floodplain Wetland	35.3184, -89.84438	70.85	
WTL-30	Emergent Wetland	35.3349, -89.8882	1.38	
WTL-31	Forested Wetland/ Temporarily Flooded	35.3366, -89.9309	0.01	
WTL-32	Emergent/Forested Wetland	35.3368, -89.9306	0.79	
WTL-33	Forested Wetland/ Temporarily Flooded	35.3363, -89.9303	0.03	
WTL-34	Forested Wetland/ Temporarily Flooded	35.3367, -89.9287	0.34	
WTL-35	Forested Wetland/ Temporarily Flooded	35.3369, -89.9280	0.04	
WTL-36	Forested Wetland/ Temporarily Flooded	35.3404, -89.9526	0.69	
WTL-37	Forested Wetland/ Temporarily Flooded	35.3413, -89.9524	0.95	

WTL-38	Forested Wetland/ Temporarily Flooded	35.3416, -89.9520	0.36	
WTL-39	Forested Wetland/ Temporarily Flooded	35.3412, -89.9516	0.05	
WTL-40	Forested Wetland/ Temporarily Flooded	35.3415, -89.9515	0.02	
WTL-41	Forested Wetland/ Temporarily Flooded	35.3398, -89.9470	0.08	
WTL-42	Forested Wetland/ Temporarily Flooded	35.3383, -89.9458	0.05	
WTL-43	Forested Wetland/ Temporarily Flooded	35.3383, -89.9444	0.08	
WTL-44	Forested Wetland/ Temporarily Flooded	35.3377, -89.9411	1.25	
WTL-45	Emergent/ Forested Wetland	35.3383, -899393	0.19	
WTL-46	Emergent/ Forested Wetland	35.3376, -89.9394	0.32	
WTL-47	Forested Wetland/ Temporarily Flooded	35.2886, -89.9201	0.38	
WTL-48	Forested Floodplain Wetland	35.2888, -89.9196	0.31	Located outside of project area.
WTL-49	Forested Floodplain Wetland	35.2878, -89.9175	0.04	
WTL-50	Forested Floodplain Wetland	35.2871, -89.9191	0.09	

WTL-51	Forested Floodplain Wetland	35.2862, -89.9183	0.05	
WTL-52	Forested Floodplain Wetland	35.2855, -89.9193	0.63	
WTL-53	Forested Floodplain Wetland	35.2842, -89.9175	0.003	
WTL-54	Forested Floodplain Wetland	35.2841, -89.9206	0.43	
WTL-55	Forested Floodplain Wetland	36.3060, -88.7073	0.16	
WTL-56	Forested Floodplain Wetland	36.3054, -88.7075	0.84	

Attachment D

Data Forms

Attachment D-1

Wetland Data Forms

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/12/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-1, 2

Investigator(s): Fowler, Lynch, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain depression Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3322 Long: -89.9108 Datum: NAD87

Soil Map Unit Name: Co—Collins silt loam; Ca—Calloway silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes ___ No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

Wetlands 1 and 2 are in similar geographic positions with almost identical wetland indicator characteristics. Both feed into STR-2 via a number of ephemeral channels.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [x] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [x] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 2"

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Approximately 4 days without rain accounts for lack of surface water/saturation.

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

Sampling Point: WTL-1, 2

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	30	X	FAC
2. Ulmus americana	30	X	FAC
3. Populus Deltoides	20	X	FAC
4. Celtis occidentalis	20	X	FACU
5.			
6.			
7.			
8.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		
Sapling/Shrub Stratum (Plot size: ______)			
1. Ulmus americana	20	X	FAC
2. Acer negundo	20	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	40 = Total Cover		
50% of total cover: 20	20% of total cover: 8		
Herb Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size: ______)			
1. Toxicodendron radicans	10	X	FAC
2.			
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-1,2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-12	10YR 5/1	50	10YR 5/6	10	C	M	SiL	
	10YR 5/2	40						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.
[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5)
- [ ] Organic Bodies (A6) **(LRR P, T, U)**
- [ ] 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- [ ] Muck Presence (A8) **(LRR U)**
- [ ] 1 cm Muck (A9) **(LRR P, T)**
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Coast Prairie Redox (A16) **(MLRA 150A)**
- [ ] Sandy Mucky Mineral (S1) **(LRR O, S)**
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Dark Surface (S7) **(LRR P, S, T, U)**
- [ ] Polyvalue Below Surface (S8) **(LRR S, T, U)**
- [ ] Thin Dark Surface (S9) **(LRR S, T, U)**
- [ ] Loamy Mucky Mineral (F1) **(LRR O)**
- [ ] Loamy Gleyed Matrix (F2)
- [x] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Marl (F10) **(LRR U)**
- [ ] Depleted Ochric (F11) **(MLRA 151)**
- [ ] Iron-Manganese Masses (F12) **(LRR O, P, T)**
- [ ] Umbric Surface (F13) **(LRR P, T, U)**
- [ ] Delta Ochric (F17) **(MLRA 151)**
- [ ] Reduced Vertic (F18) **(MLRA 150A, 150B)**
- [ ] Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- [ ] Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- [ ] 1 cm Muck (A9) **(LRR O)**
- [ ] 2 cm Muck (A10) **(LRR S)**
- [ ] Reduced Vertic (F18) **(outside MLRA 150A,B)**
- [ ] Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- [ ] Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- [ ] Red Parent Material (TF2)
- [ ] Very Shallow Dark Surface (TF12)
- [ ] Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/26/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-3

Investigator(s): Fowler, Lynch, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain depression Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3319 Long: -89.8977 Datum: NAD87

Soil Map Unit Name: Co—Collins silt loam, 0 to 2 percent slopes, occasionally flooded, brief duration NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-3

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	10	X	OBL
2. Populus deltoides	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Scirpus sp.	60	X	OBL
2. Ludwigia palustris	20		OBL
3. Iva annua	20		FAC
4. Typha latifolia	15		OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	115 = Total Cover		
50% of total cover: 57.5	20% of total cover: 23		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3	10YR 6/1	90	10YR 5/6	10	C	M	SiCL	
3+	10YR 7/1	90	10YR 6/8	10	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks: Some areas of problematic soil were encountered close to road due to fill.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek Resiliency Study City/County: Millington / Shelby Sampling Date: 7/14/2017

Applicant/Owner: Shelby County State: TN Sampling Point: WTL-4

Investigator(s): Jennifer Morrison and Angel Fowler Section, Township, Range: NA

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): <1%

Subregion (LRR or MLRA): LRR P Lat: 35.33089 Long: -89.89386 Datum: NAD83

Soil Map Unit Name: Falaya silt loam (Fm) NWI classification: PFO1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ___ (If no, explain in Remarks.)

Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ___

Are Vegetation No , Soil No , or Hydrology No 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 ___
Hydric Soil Present?	Yes ✔	No ___
Wetland Hydrology Present?	Yes ✔	No ___

Is the Sampled Area within a Wetland? **Yes** ✔ **No** ___

Remarks:

This wetland plot is located north of Jones Boyd Road, west of the power lines, and south of Big Creek.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✔ Saturation (A3)
- ✔ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ✔ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✔ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✔ Sparsely Vegetated Concave Surface (B8)
- ✔ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✔ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No ✔	Depth (inches): ___
Water Table Present?	Yes ___	No ✔	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ✔	No ___	Depth (inches): variable

Wetland Hydrology Present? **Yes** ✔ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-4

Tree Stratum (Plot size: 30' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Celtis laevigata	20	✔	FACW
2. Fraxinus pennsylvanica	15	✔	FACW
3. Platanus occidentalis	15	✔	FACW
4. Asimina triloba	10		FAC
5.			
6.			
	60 = Total Cover		

50% of total cover: 30 20% of total cover: 12

Sapling Stratum (Plot size: 20' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Asimina triloba	10	✔	FACW
2. Acer negundo	10	✔	FAC
3.			
4.			
5.			
6.			
	20 = Total Cover		

50% of total cover: 10 20% of total cover: 4

Shrub Stratum (Plot size: 20' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus americana	5	✔	FAC
2.			
3.			
4.			
5.			
6.			
	5 = Total Cover		

50% of total cover: 2.5 20% of total cover: 1

Herb Stratum (Plot size: 10' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Saururus cernuus	5	✔	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	5 = Total Cover		

50% of total cover: 2.5 20% of total cover: 1

Woody Vine Stratum (Plot size: 10' radius)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Campsis radicans	2	✔	FAC
2.			
3.			
4.			
5.			
	2 = Total Cover		

50% of total cover: 1 20% of total cover: 0.4

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✔ **No** ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR5/2	50%	10YR5/6	20%	C	M	silt loam	
	10YR5/1	30%						
5-10	10YR5/2	60%	10YR5/6	10%	C	M	silt loam	
	10YR5/1	30%						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5)
- [ ] Organic Bodies (A6) **(LRR P, T, U)**
- [ ] 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- [ ] Muck Presence (A8) **(LRR U)**
- [ ] 1 cm Muck (A9) **(LRR P, T)**
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Coast Prairie Redox (A16) **(MLRA 150A)**
- [ ] Sandy Mucky Mineral (S1) **(LRR O, S)**
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Dark Surface (S7) **(LRR P, S, T, U)**
- [ ] Polyvalue Below Surface (S8) **(LRR S, T, U)**
- [ ] Thin Dark Surface (S9) **(LRR S, T, U)**
- [ ] Loamy Mucky Mineral (F1) **(LRR O)**
- [ ] Loamy Gleyed Matrix (F2)
- [x] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Marl (F10) **(LRR U)**
- [ ] Depleted Ochric (F11) **(MLRA 151)**
- [ ] Iron-Manganese Masses (F12) **(LRR O, P, T)**
- [ ] Umbric Surface (F13) **(LRR P, T, U)**
- [ ] Delta Ochric (F17) **(MLRA 151)**
- [ ] Reduced Vertic (F18) **(MLRA 150A, 150B)**
- [ ] Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- [ ] Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- [ ] 1 cm Muck (A9) **(LRR O)**
- [ ] 2 cm Muck (A10) **(LRR S)**
- [ ] Reduced Vertic (F18) **(outside MLRA 150A,B)**
- [ ] Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- [ ] Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- [ ] Red Parent Material (TF2)
- [ ] Very Shallow Dark Surface (TF12)
- [ ] Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✔ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 2-13-2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-5

Investigator(s): Fowler, Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Oxbow Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3337 Long: -89.8893 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, 0 to 2 percent slopes, occasionally flooded, long duration NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:

Initial field investigation was conducted in Feb. 2018 after flood condition rain events. Area was re-investigated in April 2018 under normal weather conditions and confirmed wetland indicators.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [x] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 4"
Water Table Present?	Yes X	No ___	Depth (inches): at surface
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-5

Tree Stratum (Plot size: ____)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deltoides	30	X	FAC
2. Platanus occidentalis	20	X	FACW
3. Salix nigra	15		OBL
4. Acer rubrum	15		FAC
5.			
6.			
7.			
8.			
	80 = Total Cover		

50% of total cover: 40 20% of total cover: 16

Sapling/Shrub Stratum (Plot size: ____)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Ligustrum sinense	15	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	15 = Total Cover		

50% of total cover: 7.5 20% of total cover: 3

Herb Stratum (Plot size: ____)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	____ = Total Cover		

50% of total cover: ____ 20% of total cover: ____

Woody Vine Stratum (Plot size: ____)

	Absolute % Cover	Dominant Species?	Indicator Status
1. Toxicodendron radicans	5	X	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		

50% of total cover: 2.5 20% of total cover: 1

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

Main body of wetland sparely vegetated due to flooding. However, area is forested and completely covered by canopy. Most vegetation growing on fringe.

SOIL

Sampling Point: WTL-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	92	10YR 4/6	8	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/26/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-6

Investigator(s): Fowler, Lynch, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3324 Long: -89.8866 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, 0 to 2 percent slopes, occasionally flooded, long duration NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes x No ___		
Wetland Hydrology Present?	Yes x No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X No ___	Depth (inches): 2" where present	
Water Table Present?	Yes x No ___	Depth (inches): at surface	
Saturation Present? (includes capillary fringe)	Yes x No ___	Depth (inches): at surface	**Wetland Hydrology Present? Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-6

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	35	X	FAC
2. Populus deltoides	20	X	FAC
3. Ulmus americana	20	X	FACW
4. Platanus occidentalis	15		FACW
5. Fraxinus pennsylvanica	10		FACW
6.			
7.			
8.			
	100	= Total Cover	
50% of total cover: 50		20% of total cover: 20	

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Microstegium vimineum	60	X	FAC
2. Ludwigia palustrus	30	X	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90	= Total Cover	
50% of total cover: 40		20% of total cover: 18	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 4/2	95	7.5YR 4/6	5	C	M	SiL	
1-12	10YR 5/2	80	7/5YR 4/6	15	C	M	SiL	
			7/5YR 2.5/1	5				Mn masses

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/13/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-7

Investigator(s): Fowler, Lynch, Morrison, Gray Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3322 Long: -89.9114 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, 0 to 2 percent slopes, occasionally flooded, long duration NWI classification: PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:

Located south of easement in protected area

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [x] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 4"
Water Table Present?	Yes X	No ___	Depth (inches): at surface
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-7

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	50	X	OBL
2. Acer negundo	15	X	FAC
3. Populus deltoides	10		FAC
4.			
5.			
6.			
7.			
8.			
	75 = Total Cover		
50% of total cover: 37.5	20% of total cover: 15		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deloides	10	X	FAC
2. Platanus occidentalis	10	X	FACW
3. Asimina triloba	10	X	FAC
4.			
5.			
6.			
7.			
8.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover: 6		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Saururus cernuus	50	X	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	______ = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	______ = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 5/2	47	7.5YR 4/6	30	C	M	SiL	Mn masses make up remaining 3%
	10YR 4/2	20						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/19/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-8

Investigator(s): Fowler, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3276 Long: -89.8857 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, Ca—Calloway silt loam, GaA—Grenada silt loam NWI classification: PEM, PSS, PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? **Yes** X **No** ____

Remarks:

Large wetland complex with some forested/shrub areas and other open water herbaceous areas

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☑ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): at surface
Water Table Present?	Yes X	No ____	Depth (inches): at surface
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-8

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deltoides (cotton)	50	X	FAC
2. Fraxinus pennsylvanica (green)	40	X	FACW
3. Acer negundo (box)	30		FAC
4. Salix nigra	25		OBL
5. Quercus nigra (water oak)	20		FAC
6.			
7.			
8.			
	165	= Total Cover	
50% of total cover: 82.5	20% of total cover: 33		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Cephalanthus occidentalis	25	X	OBL
2. Salix nigra	15	X	OBL
3. Mimulus alatus	15	X	OBL
4.			
5.			
6.			
7.			
8.			
	55	= Total Cover	
50% of total cover: 27.5	20% of total cover: 11		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Leersia oryzoides	10	X	OBL
2. Rumex crispus	5	X	FAC
3. Juncus effusus	5	X	FACW
4. Carex sp.	5	X	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25	= Total Cover	
50% of total cover: 12.5	20% of total cover: 5		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Apios americana	35	X	FACW
2.			
3.			
4.			
5.			
	35	= Total Cover	
50% of total cover: 17.5	20% of total cover: 7		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 10 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 5/3	70	7.5YR 6/6	30	C	M	Si	
5-14	10YR 5/2	80	7.5YR 5/6	20	C	M	Si	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____

Depth (inches): ____

Hydric Soil Present? **Yes** X **No** ____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/19/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-9 - 14

Investigator(s): Fowler, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3250 Long: -89.8787 Datum: NAD87

Soil Map Unit Name: Fm—Falaya silt loam; Ca—Calloway silt loam NWI classification: PSS/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

these areas are part of a wetland complex that is hydrologically connected by water courses and open water ponds and contain similar indicator characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [x] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 1" where present

Water Table Present? Yes X No ___ Depth (inches): 5"

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetlands surrounded by open water ponds

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-9 - 14

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	20	X	OBL
2. Populus deltoides	5		FAC
3. Diospyros virginiana	5		FAC
4.			
5.			
6.			
7.			
8.			
	30	= Total Cover	
50% of total cover: 15		20% of total cover: 6	

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Echinochloa crus-galli	60	X	FACW
2. Carex frankii	15		OBL
3. Juncus effusus	10		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85	= Total Cover	
50% of total cover: 42.5		20% of total cover: 17	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	70	x 2 =	140
FAC species	10	x 3 =	30
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	115 (A)		205 (B)

Prevalence Index = B/A = 1.78

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-9 - 14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 5/1	75	7.5YR 4/6	25	C	M	SiL	
5-14	10YR 4/2	70	7.5YR 4/6	30	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/13/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-15

Investigator(s): Fowler, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3235 Long: -89.8682 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, 0 to 2 percent slopes, occasionally flooded, long duration NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [x] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 2"

Water Table Present? Yes X No ___ Depth (inches): at surface

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-15

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	______ = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Echinochloa crus-galli	80	X	FACW
2. Diodia virginiana	40	X	FACW
3. Ludwigia palustris	10		OBL
4. Rumex crispus	10		FAC
5. Commelina virginica	10		FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	150 = Total Cover		
50% of total cover: 75	20% of total cover: 30		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	______ = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 4/2	90	10YR 5/8	10	C	M	SiL	
1-4	10YR 4/2	75	10YR 5/8	25	C	M	SiL	
4+	10YR 5/1	35	10YR 5/6	30	C	M	SiL	
	10YR 5/2	35						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/14/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-16 - 22

Investigator(s): Fowler, Lynch, Morrison, Gray Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3201 Long: -89.8702 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, Co—Collins silt loam, Fm—Falaya silt loam NWI classification: PFO/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

Small pockets of wetland saturation/inundation in close proximity with similar indicator characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [x] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [x] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X No ___	Depth (inches): 2-4" where present	
Water Table Present?	Yes X No ___	Depth (inches): at surface	
Saturation Present? (includes capillary fringe)	Yes X No ___	Depth (inches): at surface	**Wetland Hydrology Present? Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-16 - 22

Tree Stratum (Plot size: ________)

	Species	Absolute % Cover	Dominant Species?	Indicator Status
1.	Ulmus americana	40	X	FAC
2.	Acer rubrum	40	X	FAC
3.	Liquidamber styraciflua	10		FAC
4.	Quercus lyrata	5		OBL
5.	Gleditsia triacanthos	5		FAC
6.				
7.				
8.				
		100 = Total Cover		

50% of total cover: 50 20% of total cover: 20

Sapling/Shrub Stratum (Plot size: ________)

	Species	Absolute % Cover	Dominant Species?	Indicator Status
1.	Ulmus americana	40	X	FAC
2.	Asimina triloba	20	X	FAC
3.	Lindera benzoin	5		FACW
4.				
5.				
6.				
7.				
8.				
		65 = Total Cover		

50% of total cover: 32.5 20% of total cover: 13

Herb Stratum (Plot size: ________)

	Species	Absolute % Cover	Dominant Species?	Indicator Status
1.	Boehmeria cylindrica	65	X	FACW
2.	Saururus cernuus	40	X	OBL
3.	Campsis radicans	15		FAC
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
		120 = Total Cover		

50% of total cover: 60 20% of total cover: 24

Woody Vine Stratum (Plot size: ________)

	Species	Absolute % Cover	Dominant Species?	Indicator Status
1.				
2.				
3.				
4.				
5.				
		= Total Cover		

50% of total cover: ________ 20% of total cover: ________

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-16 - 22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100						O Horizon
1-2	10YR 2/1	100					SiL	
2-8	10YR 6/1	90	10YR 6/6	10	C	M	SiL	
8+	10YR 6/1	85	10YR 6/4	15	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 7/27/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-23 - 27 east

Investigator(s): Fowler, Lynch, Morrison Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3322 Long: -89.9114 Datum: NAD87

Soil Map Unit Name: Wv—Waverly silt loam, Fm—Falaya silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** ___ **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:

WTL-27 is a very large wetland area with WTL-23 - 26 being nearby pockets of saturation/inundation with similar indicator characteristics

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☑ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 1-4"
Water Table Present?	Yes X	No ___	Depth (inches): at surface
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-23 - 27 east

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus americana	20	X	FAC
2. Salix nigra	20	X	OBL
3. Fraxinus pennsylvanica	5		FACW
4. Platanus occidentalis	5		FACW
5.			
6.			
7.			
8.			
	50 = Total Cover		

50% of total cover: 25 20% of total cover: 10

Sapling/Shrub Stratum (Plot size:)			
1. Fraxinus pennsylvanica	5	X	FACW
2. Platanus occidentalis	5	X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		

50% of total cover: 5 20% of total cover: 5

Herb Stratum (Plot size:)			
1. Saururus cernuus	100	X	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

50% of total cover: 20% of total cover:

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-23 - 27 east

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-12	10YR 5/2	75	7.5YR 4/6	20	C	M	SiL	
			7.5YR 4/4	5	C	PL	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek Resiliency Study City/County: Millington / Shelby Sampling Date: 7/18/2017

Applicant/Owner: Shelby County State: TN Sampling Point: WTL-28, 29

Investigator(s): Jennifer Morrison and Margaret Lee Section, Township, Range: NA

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): concave Slope (%): <1%

Subregion (LRR or MLRA): LRR P Lat: 35.32001 Long: -89.83880 Datum: NAD83

Soil Map Unit Name: Waverly silt loam (Wv) NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No ___ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No ___

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	✔	
Hydric Soil Present?	✔	
Wetland Hydrology Present?	✔	
Is the Sampled Area within a Wetland?	✔	

Remarks:

This wetland plot is located within the easternmost portion of the project, to the west of Sledge Road.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ✔ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✔ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✔ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		✔	
Water Table Present?		✔	
Saturation Present? (includes capillary fringe)		✔	

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Shallow buttressing of trees observed within this area.

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

Sampling Point: WTL-28, 29

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar stryaciflua	85	✔	FAC
2. Carya ovata	30	✔	FACU
3. Ulmus americana	8		FAC
4. Quercus pagoda	6		FACW
5. Platanus occidentalis	5		FACW
6. Fraxinus pennsylvanica	4		FACW
	138 = Total Cover		

50% of total cover: 69 20% of total cover: 27.6

Sapling Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar stryaciflua	6	✔	FAC
2. Carya ovata	4	✔	FACU
3. Cretagus viridis	2		FACW
4.			
5.			
6.			
	12 = Total Cover		

50% of total cover: 6 20% of total cover: 2.4

Shrub Stratum (Plot size: 15' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus americana	3	✔	FAC
2. Lindera benzoin	2	✔	FACW
3.			
4.			
5.			
6.			
	5 = Total Cover		

50% of total cover: 2.5 20% of total cover: 1

Herb Stratum (Plot size: 10' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Carex festucacea	30	✔	FACW
2. Onoclea sensibilis	27	✔	OBL
3. Carex frankii	15		OBL
4. Leersia oryzoides	10		OBL
5. Boehmeria cylindrica	7		FACW
6. Persicaria hydropiperoides	2		OBL
7. Symphotrichum lanceolatum	1		FACW
8.			
9.			
10.			
11.			
	92 = Total Cover		

50% of total cover: 46 20% of total cover: 18.4

Woody Vine Stratum (Plot size: 10' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. Parthenocissus quinquefolia	10	✔	FACU
2. Toxicodendron radicans	5	✔	FAC
3. Smilax rotundifolia	2		FAC
4. Bignonia capreolata	1		FAC
5.			
	18 = Total Cover		

50% of total cover: 9 20% of total cover: 3.6

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 70% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✔ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL Sampling Point: WTL-28, 29

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR4/1	35%	7.5YR4/6	15%	C	M	silt loam	
	10YR4/2	50%						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ✔ **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 4/19/2017

Applicant/Owner: ______ State: TN Sampling Point: WTL-30

Investigator(s): Fowler, Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3354 Long: -89.8895 Datum: NAD87

Soil Map Unit Name: Fm—Falaya silt loam NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [x] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 1 - 6 inches
Water Table Present?	Yes X	No ___	Depth (inches): at surface
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

First site visit was in February 2018, but was reassessed under normal weather conditions due to flood conditions in February.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-30

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Gratiola neglecta	70	X	OBL
2. Ludwigia palustris	20	X	OBL
3. Carex sp.	5		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100	= Total Cover	
50% of total cover: 50		20% of total cover: 20	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-30

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/1	100						
2-12	10YR 5/1	75	7.5YR 5/8	25	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 4/18/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-31 - 35

Investigator(s): G. Lynch; A. Fowler Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3366 Long: -89.9309 Datum: NAD87

Soil Map Unit Name: Fm—Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

Flooded, oxbow-like depression (WTL-35) and small saturated pockets (WTL-34, 36). The five areas are close in proximity and have similar indicator characteristics.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] 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)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X No ___	Depth (inches): Surface	
Water Table Present?	Yes X No ___	Depth (inches): 6 inches	
Saturation Present? (includes capillary fringe)	Yes X No ___	Depth (inches): Surface	**Wetland Hydrology Present? Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-31 - 35

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	60	X	FAC
2. Acer negundo	30	X	FAC
3. Platanus occidentalis	5	X	FACW
4.			
5.			
6.			
7.			
8.			
	95	= Total Cover	
50% of total cover: 47.5		20% of total cover: 19	

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	10	X	FAC
2. Asimina triloba	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20	= Total Cover	
50% of total cover: 10		20% of total cover: 4	

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Rumex crispus	20	X	FAC
2. Ranunculus abortivus	20	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20	= Total Cover	
50% of total cover: 10		20% of total cover: 4	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	355 (B)

Prevalence Index = B/A = 2.73

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

Herbaceous vegetation generally contained to open field portion of WTL-33

SOIL

Sampling Point: WTL-31 - 35

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/2	90	10YR 5/6	10	C	M	SiLo	
2-12	10YR 5/1	85	7.5YR 4/4	15	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-36

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3404 Long: -89.9527 Datum: NAD87

Soil Map Unit Name: Fm-Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-36

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	35	X	FAC
2. Liquidambar styraciflua	30	X	FAC
3. Platanus occidentalis	15		FACW
4. Populus deltoides	10		FAC
5.			
6.			
7.			
8.			
	90	= Total Cover	
50% of total cover: 45	20% of total cover: 18		

Sapling/Shrub Stratum (Plot size:)			
1. Liquidambar styraciflua	10	X	FAC
2. Ulmus rubra	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size:)			
1. Toxicodendron radicans	15	X	FAC
2. Ampelopsis arborea	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Woody Vine Stratum (Plot size:)			
1. n/a			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	15	x 2 = 30
FAC species	115	x 3 = 345
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	130 (A)	375 (B)

Prevalence Index = B/A = 2.88

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-36

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/2	70	5YR 4/4	30	C	M	SiLo	
6-12	10YR 5/2	90	5YR 4/4	10	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ____

Hydric Soil Present? Yes X **No** ____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-37

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3418 Long: -89.9524 Datum: NAD87

Soil Map Unit Name: GaB - Grenada silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [x] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): Surface
Water Table Present?	Yes X	No ___	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-37

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	25	X	FAC
2. Liquidambar styraciflua	25	X	FAC
3. Platanus occidentalis	20	X	FACW
4. Populus deltoides	20	X	FAC
5.			
6.			
7.			
8.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	15	X	FAC
2. Ulmus rubra	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Toxicodendron radicans	15	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	20	x 2 = 40
FAC species	105	x 3 = 315
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	125 (A)	345 (B)

Prevalence Index = B/A = 2.76

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-37

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 5/1	90	7.5YR 3/4	10	C	M	SiLo	
6-12	10YR 5/1	75	7.5YR 4/4	25	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-38

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3419 Long: -89.9518 Datum: NAD87

Soil Map Unit Name: GaB - Grenada silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes X No ____		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [x] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [x] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): Surface

Water Table Present? Yes X No ____ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-38

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	30	X	FAC
2. Ulmus rubra	25	X	FAC
3. Platanus occidentalis	20	X	FACW
4. Populus deltoides	20	X	FAC
5.			
6.			
7.			
8.			
	95 = Total Cover		
50% of total cover: 47.5	20% of total cover: 19		

Sapling/Shrub Stratum (Plot size:)			
1. Liquidambar styraciflua	5	X	FAC
2. Ulmus rubra	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Herb Stratum (Plot size:)			
1. Toxicodendron radicans	10	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10 = Total Cover		
50% of total cover:	20% of total cover:		

Woody Vine Stratum (Plot size:)			
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	20	x 2 = 40
FAC species	95	x 3 = 285
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	115 (A)	325 (B)

Prevalence Index = B/A = 2.83

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-38

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/1	100					SiLo	
2-8	10YR 5/1	90	7.5YR 3/4	10	C	M	SiLo	
8-12	10YR 5/1	75	7.5YR 3/4	25	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-39

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3413 Long: -89.9517 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ______	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ______
Hydric Soil Present?	Yes X No ______		
Wetland Hydrology Present?	Yes X No ______		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ______	No X	Depth (inches): ______	
Water Table Present?	Yes ______	No X	Depth (inches): ______	
Saturation Present? (includes capillary fringe)	Yes X	No ______	Depth (inches): 2	**Wetland Hydrology Present? Yes** X **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-39

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	35	X	FAC
2. Acer negundo	25	X	FAC
3. Platanus occidentalis	10		FACW
4. Ulmus rubra	10		FAC
5.			
6.			
7.			
8.			
	80 = Total Cover		

50% of total cover: 40 20% of total cover: 16

Sapling/Shrub Stratum (Plot size:)			
1. Acer rubrum	20	X	FAC
2. Acer negundo	15	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	35 = Total Cover		

50% of total cover: 17.5 20% of total cover: 7

Herb Stratum (Plot size:)			
1. Sagittaria latifolia	15	X	OBL
2. Microstegium vimineum	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25 = Total Cover		

50% of total cover: 12.5 20% of total cover: 5

Woody Vine Stratum (Plot size:)			
1. Parthenocissus quinquefolia	10	X	FACU
2.			
3.			
4.			
5.			
	10 = Total Cover		

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.7 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	15	x 1 = 15
FACW species	10	x 2 = 20
FAC species	115	x 3 = 345
FACU species	10	x 4 = 40
UPL species		x 5 =
Column Totals:	150 (A)	420 (B)

Prevalence Index = B/A = 2.80

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-39

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/1	100					SiLo	
3-7	10YR 4/1	90	7.5YR 4/4	10	C	M	SiLo	
7-12	10YR 5/1	80	7.5YR 3/4	20	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-40

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3415 Long: -89.9515 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes** X **No** ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___	
Water Table Present?	Yes ___	No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 2	**Wetland Hydrology Present? Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-40

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	35	X	FAC
2. Ulmus rubra	25	X	FAC
3. Platanus occidentalis	15		FACW
4. Populus deltoides	15		FAC
5.			
6.			
7.			
8.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ligustrum sinense	15	X	FAC
2. Ulmus rubra	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Microstegium vimineum	10	X	FAC
2. Toxicodendron radicans	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	______ = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	15	x 2 = 30
FAC species	115	x 3 = 345
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	130 (A)	375 (B)

Prevalence Index = B/A = 2.88

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-40

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2	10YR 4/1	100					SiLo	
2-8	10YR 4/1	90	7.5YR 4/4	10	C	M	SiLo	
8-12	10YR 5/1	75	7.5YR 3/4	25	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5)
- [ ] Organic Bodies (A6) **(LRR P, T, U)**
- [ ] 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- [ ] Muck Presence (A8) **(LRR U)**
- [ ] 1 cm Muck (A9) **(LRR P, T)**
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Coast Prairie Redox (A16) **(MLRA 150A)**
- [ ] Sandy Mucky Mineral (S1) **(LRR O, S)**
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Dark Surface (S7) **(LRR P, S, T, U)**
- [ ] Polyvalue Below Surface (S8) **(LRR S, T, U)**
- [ ] Thin Dark Surface (S9) **(LRR S, T, U)**
- [ ] Loamy Mucky Mineral (F1) **(LRR O)**
- [ ] Loamy Gleyed Matrix (F2)
- [x] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Marl (F10) **(LRR U)**
- [ ] Depleted Ochric (F11) **(MLRA 151)**
- [ ] Iron-Manganese Masses (F12) **(LRR O, P, T)**
- [ ] Umbric Surface (F13) **(LRR P, T, U)**
- [ ] Delta Ochric (F17) **(MLRA 151)**
- [ ] Reduced Vertic (F18) **(MLRA 150A, 150B)**
- [ ] Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- [ ] Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- [ ] 1 cm Muck (A9) **(LRR O)**
- [ ] 2 cm Muck (A10) **(LRR S)**
- [ ] Reduced Vertic (F18) **(outside MLRA 150A,B)**
- [ ] Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- [ ] Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- [ ] Red Parent Material (TF2)
- [ ] Very Shallow Dark Surface (TF12)
- [ ] Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-41

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3399 Long: -89.9470 Datum: NAD87

Soil Map Unit Name: Ca - Calloway silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No X

Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes ___	No ___	
Wetland Hydrology Present?	Yes x	No ___	

Remarks:

Located in cleared ag field which caused problematic soils. Soils were compacted and we were not able to get a sample. Clear hydrology and hydrophytic vegetation were present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☑ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-41

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Eleocharis tenuis	15	X	FACW
2. Carex intumescens	15	X	FACW
3. Ludwigia palustris	5		OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35 = Total Cover		
50% of total cover: 17.5	20% of total cover: 7		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species	30	x 2 = 60
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	35 (A)	65 (B)

Prevalence Index = B/A = 1.85

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-41

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No ______

Remarks:

Agricultural field that has been tilled and compacted multiple times. No clear distinction in soils. Hydrology and vegetation were present though.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-42

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3383 Long: -89.9458 Datum: NAD87

Soil Map Unit Name: Gr - Graded land, silty materials NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No X

Are Vegetation ___, Soil X, 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 ___
Hydric Soil Present?	Yes ___	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:

Located in cleared ag field which caused problematic soils. Soils were compacted and we were not able to get a sample. Clear hydrology and hydrophytic vegetation were present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [x] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [x] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [x] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-42

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Eleocharis tenuis	15	X	FACW
2. Carex intumescens	15	X	FACW
3. Ludwigia palustris	5		OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35 = Total Cover		
50% of total cover: 17.5		20% of total cover: 7	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species	30	x 2 = 60
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	35 (A)	65 (B)

Prevalence Index = B/A = 1.85

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-42

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No ______

Remarks:

Agricultural field that has been tilled and compacted multiple times. No clear distinction in soils. Hydrology and vegetation were present though.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-43

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3384 Long: -89.9445 Datum: NAD87

Soil Map Unit Name: Ca - Calloway silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☑ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 3

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-43

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	40	X	OBL
2. Populus deltoides	20	X	FAC
3. Liquidambar styraciflua	10		FAC
4.			
5.			
6.			
7.			
8.			
	70	= Total Cover	
50% of total cover: 35	20% of total cover: 14		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	15	X	OBL
2. Liquidambar styraciflua	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	25	= Total Cover	
50% of total cover: 12.5	20% of total cover: 5		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Eleocharis tenuis	15	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15	= Total Cover	
50% of total cover: ______	20% of total cover: ______		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	______	= Total Cover	
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	55	x 1 =	55
FACW species	15	x 2 =	30
FAC species	40	x 3 =	120
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	110 (A)		205 (B)

Prevalence Index = B/A = 1.86

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-43

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	90	7.5YR 6/6	10	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.   [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-44

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Cypress depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3380 Long: -89.9407 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ______
Hydric Soil Present?	Yes X	No ______
Wetland Hydrology Present?	Yes X	No ______

Is the Sampled Area within a Wetland? **Yes** X **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☑ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ______	Depth (inches): Surface
Water Table Present?	Yes X	No ______	Depth (inches): Surface
Saturation Present? (includes capillary fringe)	Yes X	No ______	Depth (inches): Surface

Wetland Hydrology Present? **Yes** X **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-44

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Taxodium distichum	65	X	OBL
2. Acer negundo	15		FAC
3. Ulmus rubra	15		FAC
4.			
5.			
6.			
7.			
8.			
	95 = Total Cover		
50% of total cover: 47.5	20% of total cover: 19		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	65	x 1 = 65
FACW species		x 2 =
FAC species	30	x 3 = 90
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	95 (A)	155 (B)

Prevalence Index = B/A = 1.63

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-44

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 5/1	75	10YR 6/6	25	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-45

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3384 Long: -89.9392 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? **Yes X No ___**
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [x] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [x] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 2

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-45

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deltoides	85	X	FAC
2. Salix nigra	5		OBL
3.			
4.			
5.			
6.			
7.			
8.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		

Sapling/Shrub Stratum (Plot size: ______)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Herb Stratum (Plot size: ______)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Woody Vine Stratum (Plot size: ______)			
1. n/a			
2.			
3.			
4.			
5.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	5	x 1 = 5
FACW species		x 2 =
FAC species	85	x 3 = 255
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	90 (A)	260 (B)

Prevalence Index = B/A = 2.89

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-45

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 6/2	70	7.5YR 5/6	30	C	M	SiLo	
4-12	10YR 4/1	70	7.5YR 5/6	30	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/6/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-46

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Cypress depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.3375 Long: -89.9394 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☑ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☑ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): 2

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-46

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	30	X	FAC
2. Ulmus rubra	15	X	FAC
3. Platanus occidentalis	10		FACW
4. Salix nigra	5		OBL
5.			
6.			
7.			
8.			
	60 = Total Cover		
50% of total cover: 30	20% of total cover: 12		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	10	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
50% of total cover:	20% of total cover:		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Eleocharis tenuis	10	X	FACW
2. Lemna sp.	10	X	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	15	x 1 = 15
FACW species	30	x 2 = 60
FAC species	45	x 3 = 135
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	90 (A)	210 (B)

Prevalence Index = B/A = 2.33

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-46

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 5/2	50	7.5YR 5/4	20	C	M	SiLo	
			Gley1 5/10Y	30	D	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☑ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: hardpan clay

Depth (inches): 4

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-47

Investigator(s): Carmean Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2887 Long: -89.9201 Datum: NAD87

Soil Map Unit Name: He- Henry silt loam and GaB - Grenada silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): Surface
Water Table Present?	Yes X	No ___	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Standing water in located in very center of wetland.

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

Sampling Point: WTL-47

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	30	X	FACW
2. Liquidambar styraciflua	30	X	FAC
3. Ulmus americana	20	X	FAC
4. Acer negundo	10		FAC
5.			
6.			
7.			
8.			
	90	= Total Cover	
50% of total cover: 45	20% of total cover: 18		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	10	X	FAC
2. Ulmus americana	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ampelopsis arborea	10	X	FAC
2. Carex sp.	5	X	FACW
3. Toxicodendron radicans	5	X	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:
OBL species		x 1 =
FACW species	35	x 2 = 70
FAC species	95	x 3 = 285
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	130 (A)	355 (B)

Prevalence Index = B/A = 2.73

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-47

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 4/2	100					SiLo	
2-12	10YR 4/1	85	7.5YR 5/6	15	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-49

Investigator(s): Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Channel Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2877 Long: -89.9174 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation X, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No 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 ___	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** X **No** ___

Remarks:
Feature collects stormwater runoff and debris in low point of an ephemeral channel.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): ~4"
Water Table Present?	Yes X	No ___	Depth (inches): at surface
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upper end of channel relatively low point in channel downstream of culvert outlet. Area full of organic material and woody debris with no obvious slope. No vegetation within the channel.

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

Sampling Point: WTL-49

Tree Stratum (Plot size: ________)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Sapling/Shrub Stratum (Plot size: ________)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Herb Stratum (Plot size: ________)			
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Woody Vine Stratum (Plot size: ________)			
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ________ (A)

Total Number of Dominant Species Across All Strata: ________ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ________ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** ____

Remarks: (If observed, list morphological adaptations below).

Vegetation not present within channel. Area covered in saturated organic material and woody debris deposits.

SOIL

Sampling Point: WTL-49

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	Gley1 7/N	100					SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☑ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:
Soil sample was difficult of obtain due to inundation.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-50

Investigator(s): G. Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2872 Long: -89.9191 Datum: NAD87

Soil Map Unit Name: Fm—Falaya silt loam NWI classification: PFO/PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] 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)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): Surface
Water Table Present?	Yes X	No ___	Depth (inches): 6 inches
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-50

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	20	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	50	X	FAC
2. Acer negundo	15		FAC
3. Ligustrum sinense	15		FAC
4.			
5.			
6.			
7.			
8.			
	80 = Total Cover		
50% of total cover: 40	20% of total cover: 16		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Impatiens capensis	50%	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50 = Total Cover		
50% of total cover: 25	20% of total cover: 10		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-50

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	85	5YR 3/4	15	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-51

Investigator(s): Carmean Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Channel Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2862 Long: -89.9184 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam NWI classification: PSS

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ___	Is the Sampled Area within a Wetland?	Yes X No ___
Hydric Soil Present?	Yes X No ___		
Wetland Hydrology Present?	Yes X No ___		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☑ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes X	No ___	Depth (inches): 2 inches
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): at surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Upper end of channel adjacent to blocked culvert. Area full of organic material with no obvious slope. No vegetation within the channel.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WTL-51

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	______ = Total Cover		
50% of total cover: ______		20% of total cover: ______	

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	______ = Total Cover		
50% of total cover: ______		20% of total cover: ______	

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	______ = Total Cover		
50% of total cover: ______		20% of total cover: ______	

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	______ = Total Cover		
50% of total cover: ______		20% of total cover: ______	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

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]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** ______

Remarks: (If observed, list morphological adaptations below).

Vegetation not present within channel. Area covered in saturated organic material.

SOIL

Sampling Point: WTL-51

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5	Gley1 7/N	100					SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☑ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ____ State: TN Sampling Point: WTL-52

Investigator(s): Carmean Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2858 Long: -89.9191 Datum: NAD87

Soil Map Unit Name: He- Henry silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] 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)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [x] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): Surface
Water Table Present?	Yes X	No ____	Depth (inches): 3
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Standing water in located in very center of wetland.

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

Sampling Point: WTL-52

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	35	X	FAC
2. Platanus occidentalis	30	X	FACW
3. Ulmus americana	20	X	FAC
4. Acer negundo	5		FAC
5.			
6.			
7.			
8.			
	85 = Total Cover		
50% of total cover: 42.5	20% of total cover: 17		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	15	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	15 = Total Cover		
50% of total cover:	20% of total cover:		

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Impatiens capensis	10	X	FACW
2. Carex sp.	10	X	FACW
3. Toxicodendron radicans	10	X	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover: 6		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	50	x 2 = 100
FAC species	85	x 3 = 255
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	135 (A)	355 (B)

Prevalence Index = B/A = 2.63

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-52

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-12	10YR 5/1	75	5YR 3/4	25	C	M	SiLo	FeMn present @ 8"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.
[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☑ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-53

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2842 Long: -89.9175 Datum: NAD87

Soil Map Unit Name: Ca - Calloway silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☑ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____ No X	Depth (inches): ____	
Water Table Present?	Yes X No ____	Depth (inches): 2	
Saturation Present? (includes capillary fringe)	Yes X No ____	Depth (inches): Surface	**Wetland Hydrology Present? Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-53

Tree Stratum (Plot size: ______)

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: ______ 20% of total cover: ______

Sapling/Shrub Stratum (Plot size: ______)

Sapling/Shrub Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: ______ 20% of total cover: ______

Herb Stratum (Plot size: ______)

Herb Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Carex sp.	10	X	FACW
2. Ranunculus parviflorus	5	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15 = Total Cover		

50% of total cover: 7.5 20% of total cover: 3

Woody Vine Stratum (Plot size: ______)

Woody Vine Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	10	x 2 =	20
FAC species	5	x 3 =	15
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	15 (A)		35 (B)

Prevalence Index = B/A = 2.33

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: (If observed, list morphological adaptations below).

Sparsely vegetated concave surface.

SOIL

Sampling Point: WTL-53

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	100					SiLo	
3-12	10YR 4/1	90	7.5YR 5/6	10	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-54

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2842 Long: -89.9202 Datum: NAD87

Soil Map Unit Name: Ca- Calloway silt loam and Fm-Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] 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)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [x] Sparsely Vegetated Concave Surface (B8)
- [x] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [x] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): Surface
Water Table Present?	Yes X	No ___	Depth (inches): 3
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Standing water in pockets. Primarily near the middle of the wetland. Saturation to the surface throughout.

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

Sampling Point: WTL-54

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	30	X	FAC
2. Ulmus americana	30	X	FAC
3. Platanus occidentalis	25	X	FACW
4.			
5.			
6.			
7.			
8.			
	85	= Total Cover	
50% of total cover: 42.5	20% of total cover: 17		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	10	X	FAC
2. Ulmus americana	10	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Impatiens capensis	15	X	FACW
2. Panicum sp.	10	X	FACW
3. Toxicodendron radicans	5		FAC
4. Carex sp.	5		FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35	= Total Cover	
50% of total cover: 17.5	20% of total cover: 7		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	55	x 2 = 110
FAC species	85	x 3 = 255
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	140 (A)	365 (B)

Prevalence Index = B/A = 2.61

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-54

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/1	90	7.5YR 4/4	10	C	M	SiLo	
2-5	10YR 4/2	40	10YR 5/2	40	D	M	SiLo	
			7.5YR 4/3	20	C	M	SiLo	
5-12	10YR 5/2	70	10YR 5/4	30	C	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 6/5/2018

Applicant/Owner: ______ State: TN Sampling Point: WTL-55

Investigator(s): Carmean and Lynch Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Wooded depression Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2835 Long: -89.9220 Datum: NAD87

Soil Map Unit Name: Fm-Falaya silt loam NWI classification: n/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes x	No ___	
Wetland Hydrology Present?	Yes x	No ___	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ______
Water Table Present?	Yes ___	No X	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Sampling Point: WTL-55

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	30	X	FACW
2. Ulmus americana	25	X	FAC
3. Liquidambar styraciflua	25	X	FAC
4.			
5.			
6.			
7.			
8.			
	80 = Total Cover		
50% of total cover: 40	20% of total cover: 16		
Sapling/Shrub Stratum (Plot size: ______)			
1. Liquidambar styraciflua	10	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
50% of total cover: ____	20% of total cover: ____		
Herb Stratum (Plot size: ______)			
1. Impatiens capensis	30	X	FACW
2. Microstegium vimineum	20	X	FAC
3. Toxicodendron radicans	15		FAC
4. Juncus sp.	10		FACW
5. Carex sp.	10		FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85 = Total Cover		
50% of total cover: 42.5	20% of total cover: 17		
Woody Vine Stratum (Plot size: ______)			
1. n/a			
2.			
3.			
4.			
5.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species	80	x 2 = 160
FAC species	95	x 3 = 285
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	175 (A)	445 (B)

Prevalence Index = B/A = 2.54

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WTL-55

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/1	100					SiLo	
2-8	10YR 4/3	90	10YR 5/1	10	D	M	SiLo	
8-12	7.5YR 3/2	90	10YR 7/1	10	D	M	SiLo	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ____

Hydric Soil Present? **Yes** X **No** ____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Big Creek National Disaster Resilience Design Project City/County: Millington/Shelby Sampling Date: 4/18/2018

Applicant/Owner: ____ State: TN Sampling Point: WTL-56

Investigator(s): Fowler and Lynch Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Channel Local relief (concave, convex, none): Concave Slope (%): 0-2%

Subregion (LRR or MLRA): LRR-P (Inner Coastal Plain) Lat: 35.2833 Long: -89.9228 Datum: NAD87

Soil Map Unit Name: Fm - Falaya silt loam and GaB—Grenada silt loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes x No ____	
Wetland Hydrology Present?	Yes x No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☑ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No x Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): Surface

Wetland Hydrology Present? Yes X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Little water present other than saturation. Some hydrology may have been cut off by road and/or blocked culvert.

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

Sampling Point: WTL-56

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	75	X	FAC
2. Ulmus rubra	20		FAC
3. Acer rubrum	10		FAC
4.			
5.			
6.			
7.			
8.			
	105	= Total Cover	
50% of total cover: 52.5	20% of total cover: 21		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus rubra	30	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	30	= Total Cover	
50% of total cover: 15	20% of total cover: 6		

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Impatiens capensis	50	X	FACW
2. Carex sp.	15	X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65	= Total Cover	
50% of total cover: 32.5	20% of total cover: 13		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. n/a			
2.			
3.			
4.			
5.			
		= Total Cover	
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

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]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ______

Remarks: (If observed, list morphological adaptations below).

Vegetation not present within channel. Area covered in saturated organic material.

SOIL

Sampling Point: WTL-56

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 3/1	100					SiL	
1-3	10YR 4/1	95	7.5YR 4/4	5	C	M	SiL	
3-12	10YR 5/1	75	7.5YR 5/6	25	C	M	SiL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: n/a

Depth (inches): ______

Hydric Soil Present? **Yes** X **No** ______

Remarks:

Attachment D-2

Hydrologic Determination Data Forms

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-1/EPH-1	Date/Time: 7/26/2017 / 18:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3321 / -89.9190
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐very wet ☐wet ☐average ☑dry ☐drought ☐unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~9 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam; Ca—Calloway silt loam		Source: WSS
Surrounding Land Use : Agriculture field and highway		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑Severe ☐Moderate ☐Slight ☐Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 14.5

Justification / Notes :

Feature is a concrete-lined roadside ditch that becomes completely covered by sediment downstream. Drains into STR-1.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **8.5**)	**Absent**	**Weak**	**Moderate**	**Strong**
1. Continuous bed and bank	0 ☐	1 ☐	2 ☐	3 ✔
2. Sinuous channel 0.5	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 controls	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**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 = 14.5

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

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-2	Date/Time: 7/12/2017 / 14:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3311, -89.9119
Previous Rainfall (7-days) : 1.36 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~3 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Ca—Calloway silt loam		Source: WSS
Surrounding Land Use : Deciduous forest		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 15

Justification / Notes :

Drainage feature resulting from roadside runoff.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **9**)	**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 controls	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**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2 ✔	1	0
21. Rooted 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 Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-3	Date/Time: 7/12/2017 / 15:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3333 / -89.9105
Previous Rainfall (7-days) : 1.36 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~4.4 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Co—Collins silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☐ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 15

Justification / Notes :

Drainage path between WTL-1 and STR-2.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 10)	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 controls	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 = 4)	Absent		Weak		Moderate		Strong	
14. Subsurface flow/discharge into channel	0	✔	1	☐	2	☐	3	☐
15. Water in channel and >48 hours since sig. rain	0	✔	1	☐	2	☐	3	☐
16. Leaf litter in channel (January – September)	1.5	☐	1	✔	0.5	☐	0	☐
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)	Absent		Weak		Moderate		Strong	
20. Fibrous roots in channel [1]	3	☐	2	☐	1	✔	0	☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-4	Date/Time: 7/12/2017 / 18:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3360 / -89.9071
Previous Rainfall (7-days) : 1.36 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~268 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fs—Filled land		Source: WSS
Surrounding Land Use : Urban		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 13

Justification / Notes :

Feature is a large, concrete stormwater drainage feature that is nearly 1 mile long, which accounts for the large drainage area.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	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 controls	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)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ✔	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ✔	1 ☐	0.5 ☐	0 ☐
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 = 6)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ✔	2 ☐	1 ☐	0 ☐
21. Rooted 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 :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-5	Date/Time: 7/12/2017 / 15:45
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3332 / -89.9087
Previous Rainfall (7-days) : 1.36 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~32 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Co—Collins silt loam		Source: WSS
Surrounding Land Use : Deciduous Forest		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 14

Justification / Notes :

Feature appears to be historically channelized to drain nearby wetland. Channel is overgrown and poorly defined in several reaches.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7)	**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 controls	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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ✔	0.5 ☐	0 ☐
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 = 3)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 = 14

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

Notes :

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-6	Date/Time: 7/12/2017 / 16:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3323 / -89.9083
Previous Rainfall (7-days) : 1.32 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~11 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Co—Collins silt loam		Source: WSS
Surrounding Land Use : Deciduous Forest		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 14

Justification / Notes :

Feature appears to be historically channelized to drain nearby wetland. Channel is overgrown and poorly defined in several reaches.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7)	**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 controls	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 = 4)	**Absent**		**Weak**		**Moderate**		**Strong**	
14. Subsurface flow/discharge into channel	0	✔	1		2		3	
15. Water in channel and >48 hours since sig. rain	0	✔	1		2		3	
16. Leaf litter in channel (January – September)	1.5		1	✔	0.5		0	
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 = 3)	**Absent**		**Weak**		**Moderate**		**Strong**	
20. Fibrous roots in channel [1]	3		2	✔	1		0	
21. Rooted 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 = 14

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

Notes :

Ground Ivy (Glechoma hederacea - FACU) in channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-7	Date/Time: 7/26/2017 / 16:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3320 / -89.9002
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~3 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Co—Collins silt loam		Source: WSS
Surrounding Land Use : Highway at beginning of channel and forested to Big Creek		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17

Justification / Notes :

Hydrology originates in concrete stormwater drainage feature from highway. Channel was observed multiple times due to the need for multiple site visits. Water was only observed in channel in Feb. 2018 under flood conditions.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **12**)	**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 controls	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**)	**Absent**		**Weak**		**Moderate**		**Strong**	
14. Subsurface flow/discharge into channel	0	✔	1	☐	2	☐	3	☐
15. Water in channel and >48 hours since sig. rain	0	✔	1	☐	2	☐	3	☐
16. Leaf litter in channel (January – September)	1.5	☐	1	☐	0.5	✔	0	☐
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 = **3**)	**Absent**		**Weak**		**Moderate**		**Strong**	
20. Fibrous roots in channel [1]	3	☐	2	☐	1	✔	0	☐
21. Rooted 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

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

Notes :

Flow is concentrated by impermeable surfaces leading into a culvert at the beginning of the channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-8	Date/Time: 7/20/2017 / 13:30
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3322, -89.8890
Previous Rainfall (7-days) : Trace amounts		
Precipitation this Season vs. Normal : ☐very wet ☐wet ☐average ☑dry ☐drought ☐unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~40 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐Severe ☑Moderate ☐Slight ☐Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 15

Justification / Notes :

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 8)	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 controls	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)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ✔	2	1	0
21. Rooted 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 Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-9/EPH-9	Date/Time: 7/26/2017 / 14:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3322 / -89.8849
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~7 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam and Fs—Filled land		Source: WSS
Surrounding Land Use : Public Park and Military Base		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12.5

Justification / Notes :

Channel is historically altered for stormwater drainage. Channel is more defined below culvert where flow is concentrated, but poorly defined and in risk of becoming overgrown above.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **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 controls	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 = **3.5**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ✔	0.5 ☐	0 ☐
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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 = 12.5

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

Notes :

Channel is partially incised but not diversity of bed material. Few false nettle observed (FACW).

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-10/EPH-10	Date/Time: 7/26/2017 / 14:30
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3217 / -89.8761
Previous Rainfall (7-days) : 0.11"		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~1 acre	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam		Source: WSS
Surrounding Land Use : Forested, nearby road		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17

Justification / Notes :

Channelized drainageway near road.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **8**)	**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 controls	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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ✔	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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

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

Notes :

15. Some saturation but no standing water.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-1/EPH-1	Date/Time: 7/26/2017 / 18:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3321 / -89.9190
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~9 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology :		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) =

Justification / Notes :

Feature is a concrete-lined roadside ditch that becomes completely covered by sediment downstream. Drains into STR-1.

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 controls	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 =)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ☐	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ☐	0 ☐
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 =)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ☐	0 ☐
21. Rooted 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 = _____________

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

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-12/EPH-12	Date/Time: 7/14/2017 / 16:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3320 / -89.8698
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~1 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam		Source: WSS
Surrounding Land Use : Forested, historically cleared for ag/logging		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 14.5

Justification / Notes :

Channel is full of leaf litter and debris.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = **5.5**)	**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 controls	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 = **4**)	**Absent**		**Weak**		**Moderate**		**Strong**	
14. Subsurface flow/discharge into channel	0	✔	1		2		3	
15. Water in channel and >48 hours since sig. rain N/A	0		1		2		3	
16. Leaf litter in channel (January – September)	1.5		1		0.5		0	✔
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**)	**Absent**		**Weak**		**Moderate**		**Strong**	
20. Fibrous roots in channel [1]	3	✔	2		1		0	
21. Rooted 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 = 14.5

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

Notes :

One large headcut. Some VA creeper in channel but not prevalent.

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-13/EPH-13	Date/Time: 7/14/2017 / 18:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3320 / -89.8698
Previous Rainfall (7-days) : 0.11 in.		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~4 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam		Source: WSS
Surrounding Land Use : Forested, historically cleared for ag/logging		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 15

Justification / Notes :

Channel is full of leaf litter and debris.

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 controls	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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain N/A	0	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5	0 ✔
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**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ✔	2	1	0
21. Rooted 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 Indicator Score < 19 points

Notes :

One large headcut. Some VA creeper in channel but not prevalent.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-14/EPH-14	Date/Time: 7/19/2017 / 17:00
Assessors/Affiliation: A. Fowler; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3244 / -89.8572
Previous Rainfall (7-days) : Trace amounts		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~8 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 14

Justification / Notes :

Likely man-made features for farmland drainage. Historic channelization.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 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 controls	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 = **5**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ☐	2 ✔	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 = 14

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

Notes :

Some water present in standing pools around partially blocked culvert

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-15/EPH-15	Date/Time: 7/19/2017 / 17:00
Assessors/Affiliation: A. Fowler; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3252 / -89.8561
Previous Rainfall (7-days) : Trace amounts		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~6 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 11

Justification / Notes :

Historic channelization. Farmland drainage.

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 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 controls	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 = **3**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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 = **3**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1 ✔	0
21. Rooted 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

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

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-16/EPH-16	Date/Time: 7/19/2017 / 16:30
Assessors/Affiliation: A. Fowler; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3242 / -89.8583
Previous Rainfall (7-days) : Trace amounts		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~4 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17.5

Justification / Notes :

Debris and fibrous roots in channel. Historic channelization. Farmland drainage.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 8)	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 controls	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 = 5.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1	2 ✔	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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 = 4)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3	2	1 ✔	0
21. Rooted 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 Indicator Score < 19 points

Notes :

Few standing pools. Water mostly present as soil saturation.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-17	Date/Time: 4/19/2018 / 10:00
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3260 / -89.8584
Previous Rainfall (7-days) : 2.2"		
Precipitation this Season vs. Normal : ☐ very wet ☑ wet ☐ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~5 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Wv—Waverly silt loam		Source: WSS
Surrounding Land Use : Agriculture field		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17

Justification / Notes :

Small erosion rill from farm field. Upstream sections of the channel have been disrupted by passage of heavy equipment.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7.5)	**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 controls	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 = 6)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ☑	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ☐	2 ☑	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☑	0.5 ☐	0 ☐
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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ☑	0 ☐
21. Rooted 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

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

Notes :

Wrack lines in forested, downstream reach.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-18/EPH-18	Date/Time: 4/18/2017 / 15:30
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3366 / -89.9313
Previous Rainfall (7-days) : 2.2"		
Precipitation this Season vs. Normal : ☐ very wet ☑ wet ☐ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~2 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm—Falaya silt loam		Source: WSS
Surrounding Land Use : Forested with surrounding development		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 17

Justification / Notes :

Small drainage channel with heavy leaf litter and woody debris.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 9)	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 controls	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 = 4)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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

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

Notes :

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: WWC-19/EPH-19	Date/Time: 4/18/2017 / 15:30
Assessors/Affiliation: A. Fowler, G. Lynch; Barge Design Solutions, Inc.		Project ID : 3508507
Site Name/Description: Big Creek National Disaster Resilience Design Project		
Site Location: North of Paul Barret Pkwy between Hwy 3 and Sledge Rd		
USGS quad: Millington	HUC (12 digit): 080102090302	Lat/Long: 35.3359 / -89.9289
Previous Rainfall (7-days) : 2.2"		
Precipitation this Season vs. Normal : ☐ very wet ☑ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : Noaa.gov		
Watershed Size : ~2 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Source: WSS		
Surrounding Land Use : Forested with surrounding development		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☑ Severe ☐ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 12

Justification / Notes :

Historic channelization. Area may have been logged in the past. Channel is heavy with leaf litter and other debris

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	**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 controls	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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1 ✔	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5	0 ✔
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 = **4**)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2 ✔	1	0
21. Rooted 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 :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1030
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: STR 24		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.285145, -89.919119
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data :		
Watershed Size : 0.22 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** Stream

**Secondary Indicator Score (if applicable) = ** 22.5

Justification / Notes :

Surrounding area has been topographically/vegetatively altered, especially in the residential area and the newly cleared field to the west.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 10.5)	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 controls	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 = 6)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1 ✔	2 ✔	3
16. Leaf litter in channel (January – September)	1.5 ✔	1	0.5	0
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 = 6)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ✔	2 ✔	1	0
21. Rooted 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 = 22.5

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

Notes :

Soils: 10YR 5/1 ~ 80%, 7.5 YR 4/6 ~10%. Water present through approximately 25% of the channel during site visit. No leaf litter, weak matrix of fibrous roots, no vegetation within channel. 1 frogs observed, others heard. No other aquatic life observed. Wrack lines present throughout reach along bank, near OHWM. Bed and bank fully developed. 2 grade controls observed in reach, on the verge of becoming headcuts. Benches observed throughout and potential for bars in areas observed minimally. Pool areas observed, and few riffles likely if flow was present. Channel meanders slightly through the property.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1030
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: STR 25		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.282698, -89.922520
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data :		
Watershed Size : 0.22 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 25

Justification / Notes :

Surrounding area has been topographically/vegetatively altered.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 11.5)	**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 controls	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 = 6.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ☐	2 ✔	3 ☐
16. Leaf litter in channel (January – September)	1.5 ✔	1 ☐	0.5 ☐	0 ☐
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 = 7)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ✔	2 ☐	1 ☐	0 ☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Soils: 10YR 5/1 ~ 80%, 7.5 YR 4/6 ~20%. Water present through approximately 75% of the channel during site visit. No leaf litter, no fibrous roots, no vegetation within channel. 2 frogs observed, others heard. Few crayfish were observed within the channel as well. Wrack lines present throughout reach along bank, near OHWM. Bed and bank fully developed. 1 medium headcut observed near the top of the reach. Benches observed throughout and potential for bars in areas observed minimally. Pool areas observed, and riffles likely if flow was present. Channel meanders through the property.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Bear Creek	Date/Time: 6-6-18/1030
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 20		
Site Location: Millington, TN, property northeast of Russell Bond Road and Jakes Creek/Big Creek confluence		
USGS quad: Millington, TN	HUC (12 digit): 080102090403	Lat/Long: 35.342097, -89.951585
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam Source: WSS		
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☐ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 9.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	**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 controls	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 = 1.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Waterway is a trib to adjacent WWC. No hydric soil within channel. Leaf litter was abundant. No plant life within channel, but Smilax sp. present on/near bank in abundance. Fibrous roots easily detected within soil sample. Some sign of flow in channel, but bed and bank was primarily absent/under-formed. Grade controls present in the form of roots crossing the channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Bear Creek	Date/Time: 6-6-18/1100
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 21		
Site Location: Millington, TN, property northeast of Russell Bond Road and Jakes Creek/Big Creek confluence		
USGS quad: Millington, TN	HUC (12 digit): 080102090403	Lat/Long: 35.341800, -89.951285
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☐ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 16

Justification / Notes :

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7.5)	**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 controls	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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1 ✔	0.5	0
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)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2 ✔	1	0
21. Rooted 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 = 16

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

Notes :

Waterway is a trib to adjacent Bear Creek. Soil: 10YR 4/2 ~95%, 7.5YR 4/6 ~5%. Leaf litter was abundant near top, but sparse near confluence with Bear Creek. No plant life within channel. Fibrous roots detected within soil sample, but minimal. Sign of flow in channel, bed and bank fully formed. Grade controls present in the form of roots crossing the channel. Head cuts present near confluence due to drastic change in topography to Bear Creek stream bed. No water observed and no aquatic fauna.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Big Creek	Date/Time: 6-6-18/1745
Assessors/Affiliation: Carmean and Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 22		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.338923, -89.949073
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown		
Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 13.5

Justification / Notes :

Field near this watercourse is routinely tilled.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7.5)	**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 controls	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)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ✔	0.5 ☐	0 ☐
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 = 13.5

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

Notes :

Trib to Big Creek. Watercourse begins at a large headcut, followed by several grade controls and head cuts. Leaf litter ~15% of stream bed. No vegetation observed in the channel. Fibrous roots detected within soil sample, relatively sparse matrix throughout bed. Bed and bank present in ~95%. Grade controls present in the form of roots crossing the channel. Headcuts present near upper reach and also near Big Creek confluence No water observed and no aquatic fauna. Wrack lines present behind roots. Channel takes several relatively sharp cuts.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-6-18/1745
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 23		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.338923, -89.949073
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 10

Justification / Notes :

Field near this watercourse is routinely tilled.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	**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 controls	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 = 1.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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

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

Notes :

Trib to nearby unnamed watercourse. Watercourse begins at a large headcut near the field opening to the north. Leaf litter ~60% of stream bed. No vegetation observed in the channel. Fibrous roots detected within soil sample, relatively dense matrix throughout bed. Bed and bank present in ~90%. Grade controls present in the form of roots crossing the channel. Headcuts present near confluence with nearby WWC. No water observed and no aquatic fauna. Wrack lines present behind roots. Very straight channel.

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Bear Creek	Date/Time: 6-6-18/1730
Assessors/Affiliation: Carmean and Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 24		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.338762, -89.947034
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam	Source: WSS	
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 8.5

Justification / Notes :

Field surrounding this watercourse is routinely tilled.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	**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 controls	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 = 1.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 3)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 = 8.5

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

Notes :

Trib to Bear Creek. Watercourse is low drainage area between two fields. Leaf litter <70% of stream bed. Virginia creeper, Smilax sp. and poison ivy present within channel, especially in the upper reach. Fibrous roots detected within soil sample, relatively dense matrix throughout bed. Bed and bank present in ~25%, upper reaches very poor. Grade controls present in the form of roots crossing the channel. Headcuts present near confluence due to drastic change in topography to trib. No water observed and no aquatic fauna. Wrack lines present behind roots. Slight meander and cuts of channel within reach.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: UT to Big Creek	Date/Time: 6-6-18/1530
Assessors/Affiliation: Carmean and Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 25		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.340091, -89.943194
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : 0.46 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** n/a

Justification / Notes :

Strong flow observed near confluence with Big Creek. Follow channel up stream to find that nearby WWTP is discharging into channel. No flow/very little water observed above outfall. Deeply incised channel below the outfall.

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 controls	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 =)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5	0
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 =)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1	0
21. Rooted 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 = ____________

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

Notes :

Hydrologic Determination Field Data Sheet
Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-6-18/1530
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 26		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.338340, -89.942864
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam Source: WSS		
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 11

Justification / Notes :

It is possible with the addition of logging roads and culverts in this wooded area these drainage patterns were created. However, there is no conclusive evidence of this.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	**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 controls	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)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ✔	0.5 ☐	0 ☐
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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

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

Notes :

Trib to stream from Millington WWTP effluent. Leaf litter <25% of stream bed. No plant life within channel. Smilax sp. abundant on banks. Fibrous roots detected within soil sample, scattered throughout bed. Bed and bank present in >75%, upper reaches weak. Grade controls present in the form of roots crossing the channel. Headcuts present near confluence due to drastic change in topography to trib. No water observed and no aquatic fauna. Wrack lines present behind roots within the channel. Obvious meander from top to bottom.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-6-18/1500
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 27		
Site Location: Millington, TN, property approximately 1-mile south of Shelby Road and Epperson Mill Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090402	Lat/Long: 35.337813, -89.942032
Previous Rainfall (7-days) : 1.11-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.1 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential, agricultural and wooded		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☐ Slight ☑ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 9

Justification / Notes :

It is possible with the addition of logging roads and culverts in this wooded area these drainage patterns were created. However, there is no conclusive evidence of this.

Secondary Field Indicator Evaluation

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 controls	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 = 1.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1 ✔	0
21. Rooted 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 :

Trib to stream from Millington WWTP effluent. Leaf litter was abundant near top, but sparse near confluence. Posion ivy and jewelweed identified within channel, primarily in upper reaches. Fibrous roots detected within soil sample, abundant. No bed and bank in upper 3/4 of waterway. Transforms into more of a gully near confluence. Grade controls present in the form of roots crossing the channel. Headcuts present near confluence due to drastic change in topography to trib. No water observed and no aquatic fauna. Wrack lines present behind roots and trees near the channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1500
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 28		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.286394, -89.918679
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 13.5

Justification / Notes :

Drainageway to WTL-51. Channel starts with strong bed and bank which becomes less defined down-channel. Heavy trash accumulation before confluence with WTL-51.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 5.5)	**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 controls	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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4.5)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 = 13.5

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

Notes :

Some microstegium in channel in pockets but not prevalent.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1500
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 29 Down from Wetland		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.285374, -89.919192
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐very wet ☐wet ☑average ☐dry ☐drought ☐unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : He - Henry silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐Severe ☐Moderate ☑Slight ☐Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12.5

Justification / Notes :

Surrounding area has been topographically/vegetatively altered due to construction activities. In addition nearby impervious surfaces may be affecting this area.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 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 controls	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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	0.5 ✔	0
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 = 4)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1 ✔	0
21. Rooted 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 = 12.5

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

Notes :

Soils: 10YR 5/1 ~ 90%, 7.5 YR 4/6 ~10%. Leaf litter present, in abundance, near the top of this waterway, near the start of the nearby wetland boundary. Wrack lines noted behind sweetgum roots acting as multiple grade controls. Fibrous roots noted in channel during determination. Bed and bank nearly present in last 1/4 of channel. Channel has no sorting and no depositional areas. Sinuosity evident in reach, but slight. No standing water, saturation, or vegetation in channel. No aquatic fauna observed during determination. Waterway leads into stream from nearby delineated wetland to the west.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/15:00
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 29 Up from Wetland		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.286877, -89.919259
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 16

Justification / Notes :

Channel is a headwater drainageway. Strong bed and bank but otherwise weak geomorphology.

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 7)	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 controls	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 = 4)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ☐	1 ✔	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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 = 16

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

Notes :

Hydric soils observed but recorded colors were lost.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1700
Assessors/Affiliation: Carmean Barge Design		Project ID : 3508507
Site Name/Description: WWC 30 Down from Wetland		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.285875, -89.918769
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : 0.13 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : He - Henry silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 17

Justification / Notes :

Residential/impervious surfaces nearby.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 7.5)	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 controls	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 = 4.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ✔	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ✔	0.5 ☐	0 ☐
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)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ☐	2 ✔	1 ☐	0 ☐
21. Rooted 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

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

Notes :

Soils: 10YR 6/1 ~ 90%, 7.5 YR 5/4~10%. Waterway is connected to delineated linear wetland upstream and a stream downstream. Channel has very little sinuosity, slightly meanders. Bed and bank are defined throughout. No aquatic fauna was observed within the reach. No vegetation was located within the channel, upland or wetland. Fibrous roots were present in channel, but were not abundant. Very little leaf litter located within the channel. Wrack lines noted along the sides of the channel. Water in small pockets along the reach. Saturation through 90% of reach. No headcuts or grade controls within reach. This WWC transitions into a stream at a large headcut, which is included in that particular reach.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1600
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 30 Up from Wetland		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.286065, -89.918548
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : He - Henry silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12.5

Justification / Notes :

Residential/impervious surfaces nearby likely cause flashes of current through channel.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	**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 controls	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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1 ✔	0.5	0
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)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2 ✔	1	0
21. Rooted 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 = 12.5

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

Notes :

Soils: 10YR 6/2 ~ 95%, 7.5 YR 5/4~5%. Channel is a relatively short with very little sinuosity. Bed and bank are well defined and the channel appears to carry significant flashy flow. Deeper U shaped channel. No aquatic fauna was observed within the reach. No vegetation was located within the channel, upland or wetland. Fibrous roots were present in channel but not in abundance. Very little leaf litter was present in the channel, but sedimentation was noted on some of it, as well as the small woody debris within the waterway. Wrack lines noted along the sides of the channel, mainly in overhanging roots.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1600
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 31		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.286394, -89.918679
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 10.5

Justification / Notes :

Residential/impervious surfaces nearby.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4)	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 controls	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)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 Indicator Score < 19 points

Notes :

Soils: 10YR 6/2 ~ 95%, 7.5 YR 5/4~5%. Channel has noticeable sinuosity, but not significant. Bed and bank are defined in ~70% of the waterway. This channel may carry heavy flow during rain events. No aquatic fauna was observed within the reach. No vegetation was located within the channel, upland or wetland. Fibrous roots were present in channel at a noticeable amount. Leaf litter observed throughout reach. Wrack lines noted along the sides of the channel.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1345
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 32		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.285051, -89.919982
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Ca - Calloway silt loam and He - Henry silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

**Overall Hydrologic Determination = ** WWC

**Secondary Indicator Score (if applicable) = ** 11

Justification / Notes :

Surrounding area has been topographically/vegetatively altered due to construction activities.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	**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 controls	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 = 3)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1	2	3
15. Water in channel and >48 hours since sig. rain	0 ✔	1	2	3
16. Leaf litter in channel (January – September)	1.5	1 ✔	0.5 ✔	0
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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3	2	1 ✔	0 ✔
21. Rooted 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

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

Notes :

Soils: 10YR 4/1 ~ 80%, 7.5 YR 4/5 ~20%. Leaf litter present, but interspersed, long stretches of the waterway free from litter. Wrack lines noted near roots acting as grade controls. Roots within channel present, in abundance, when examining soil. Bed and bank nearly absent throughout, observed in ~10% of waterway. Channel has no sorting and no depositional areas. Sinuosity evident in reach, but slight. No standing water, saturation, or vegetation in channel. No aquatic fauna observed during determination. Waterway leads into nearby delineated wetland. It appears that this is a connector between two wetland complexes, one in the wooded area and one in the recently cleared field to the west.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1100
Assessors/Affiliation: Carmean, Barge Design		Project ID : 3508507
Site Name/Description: WWC 33		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.283006, -89.922257
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data : CoCoRaHS		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☐ Moderate ☑ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12

Justification / Notes :

Surrounding area has been topographically/vegetatively altered by clearing and construction activities.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 4.5)	**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 controls	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 = 3)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 4.5)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ✔	0 ☐
21. Rooted 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 :

Soils: 10YR 4/1 ~ 85%, 7.5 YR 4/5 ~15%. Leaf litter present, but not throughout, various areas are free of debris. Wrack lines present near bottom of channel. Carex sp. observed in channel, not in abundance. Roots within channel present when examining soil. Upland plants absent from channel. Bed and bank weak overall, present in bottom half of waterway, but lost in upper portion. Channel, overall, has very little sorting and no depositional areas. Sinuosity evident in reach, but slight. No standing water in channel, saturation present near confluence with stream. No aquatic fauna observed during determination.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Shelby	Named Waterbody: Unnamed	Date/Time: 6-5-18/1100
Assessors/Affiliation: Lynch, Barge Design		Project ID : 3508507
Site Name/Description: WWC 34		
Site Location: Millington, TN, Lot on northeast corner of Duncan Road and Raleigh Millington Road		
USGS quad: Millington, TN	HUC (12 digit): 080102090206	Lat/Long: 35.282696, -89.922734
Previous Rainfall (7-days) : 1.25-inch		
Precipitation this Season vs. Normal : ☐ very wet ☐ wet ☑ average ☐ dry ☐ drought ☐ unknown Source of recent & seasonal precip data :		
Watershed Size : <0.01 sq mi	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Fm - Falaya silt loam		Source: WSS
Surrounding Land Use : Residential and agricultural		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : ☐ Severe ☑ Moderate ☐ Slight ☐ Absent		

Primary Field Indicators Observed

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

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12

Justification / Notes :

Culverted recently by a construction entrance road. Surrounding area has been topographically/vegetatively altered recently as well.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 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 controls	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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
14. Subsurface flow/discharge into channel	0 ✔	1 ☐	2 ☐	3 ☐
15. Water in channel and >48 hours since sig. rain	0 ✔	1 ☐	2 ☐	3 ☐
16. Leaf litter in channel (January – September)	1.5 ☐	1 ☐	0.5 ✔	0 ☐
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 = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
20. Fibrous roots in channel [1]	3 ☐	2 ☐	1 ☐	0 ✔
21. Rooted 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 :

Soils: 10YR 5/1 ~ 90%, 7.5 YR 4/6 ~10%. Large amounts of leaf litter and small woody debris in the waterway. Few Carex sp. observed in channel, but sparse. Roots within channel very strong. Upland plants completely absent from channel. Bed and bank poor overall, slightly present near confluence with nearby stream. Channel, overall, has very little sorting and no depositional areas. Sinuosity of weak throughout. No water or saturation in channel and no aquatic fauna observed during determination.

Attachment E

Photo Summary

Photo: 1
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.331617, -89.917922
Feature: WWC-1/EPH-1

Upstream view of WWC-1/EPH-1.

Photo: 2
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.331639, -89.917939
Feature: WWC-1/EPH-1

Downstream view of WWC-1/EPH-1.

Photo: 3
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3310, -89.9119
Feature: WWC-2/EPH-2

Upstream view of WWC-2/EPH-2.

Photo: 4
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3310, -89.9119
Feature: WWC-2/EPH-2

Downstream view of WWC-2/EPH-2.

Photo: 5
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3335, -89.9103
Feature: WWC-3/EPH-3

Upstream view of WWC-3/EPH-3 from the lower reach of the channel.

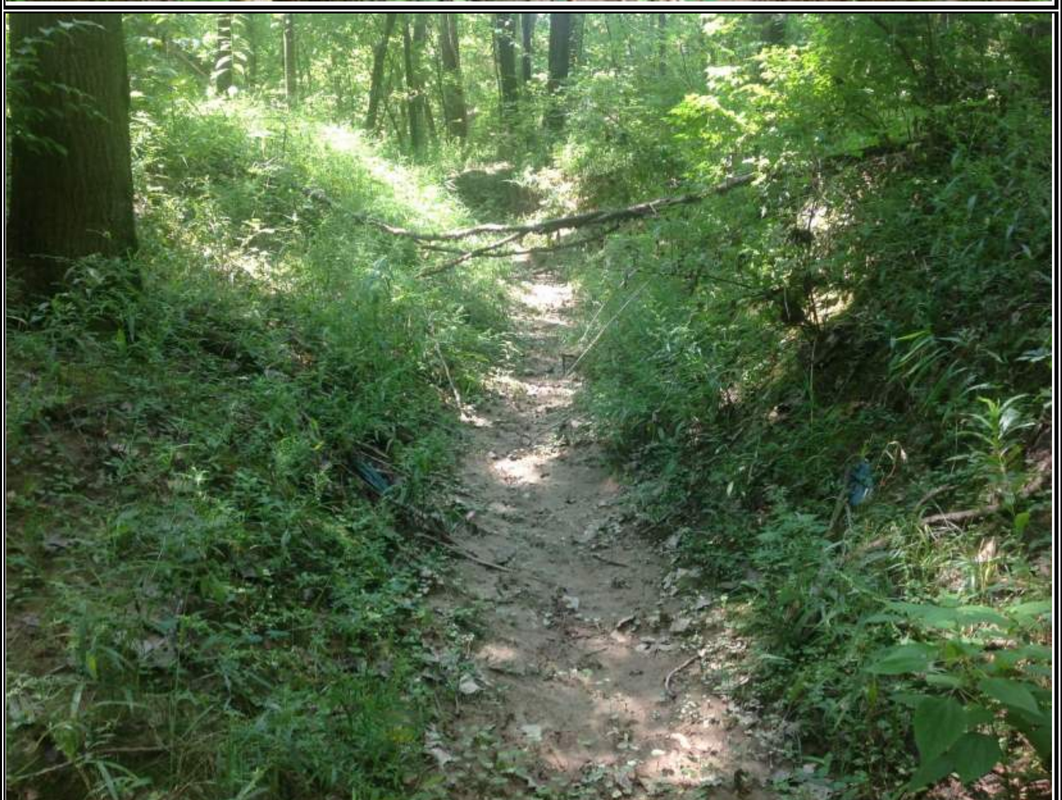


Photo: 6
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3332, -89.9108
Feature: WWC-3/EPH-3

Downstream view of WWC-3/EPH-3 from the upper reach of the channel.

Photo: 7
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3349, -89.9079
Feature: WWC-4/EPH-4

Downstream view of WWC-4/EPH-4 from the northern boundary of the project area.

Photo: 8
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3348, -89.9079
Feature: WWC-4/EPH-4

Upstream view of WWC-4/EPH-4 from the end of the feature where it drains into the tributary to Big Creek (STR-3).

Photo: 9
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3334, -89.9101
Feature: WWC-5/EPH-5

Downstream view of WWC-5/EPH-5 near its confluence with the tributary to Big Creek.

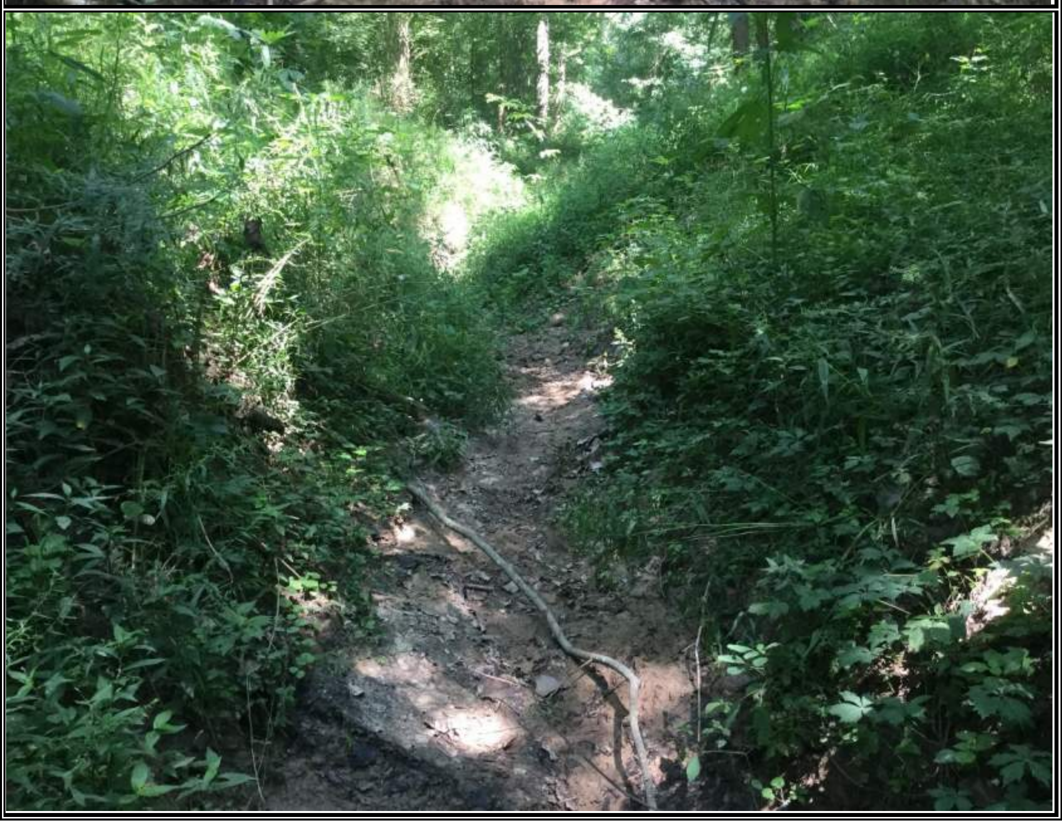


Photo: 10
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3334, -89.9101
Feature: WWC-5/EPH-5

Upstream view of WWC-5/EPH-5.

Photo: 11
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3321, -89.9003
Feature: WWC-6/EPH-6

Downstream view of WWC-6/EPH-6.

Photo: 12
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3322, -89.9003
Feature: WWC-6/EPH-6

Upstream view of WWC-6/EPH-6.

Photo: 13
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3322, -89.9004
Feature: WWC-7/EPH-7

Downstream view of the lower reach of WWC-7/EPH-7.

Photo: 14
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3322, -89.9004
Feature: WWC-7/EPH-7

Upstream view of WWC-7/EPH-7.

Photo: 15
By: A. Fowler
Date: 20 July 2017
Lat/Long: 35.3327, -89.8876
Feature: WWC-8/EPH-8

Downstream view of the upper reach WWC-8/EPH-8.

Photo: 16
By: A. Fowler
Date: 20 July 2017
Lat/Long: 35.3323, -89.8888
Feature: WWC-8/EPH-8

Downstream view of the lower reach of WWC-8/EPH-8.

Photo: 17
By: A. Fowler
Date: 20 July 2017
Lat/Long: 35.3322, -89.9003
Feature: WWC-8/EPH-8

Upstream view of the lower reach of WWC-8/EPH-8.

Photo: 18
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3322, -89.8849
Feature: WWC-9/EPH-9

Upstream view of WWC-9/EPH-9.

Photo: 19
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3322, -89.8849
Feature: WWC-9/EPH-9

Downstream view of WWC-9/EPH-9.

Photo: 20
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3217, -89.8761
Feature: WWC-10/EPH-10

Downstream view of WWC-10/EPH-10.

Photo: 21
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3219, -89.8762
Feature: WWC-10/EPH-10

Upstream view of WWC-10/EPH-10.

Photo: 22
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3226, -89.8697
Feature: WWC-12/EPH-12

Downstream view of WWC-12/EPH-12.

[Note – A photo of WWC-11/EPH-11 was not obtained]

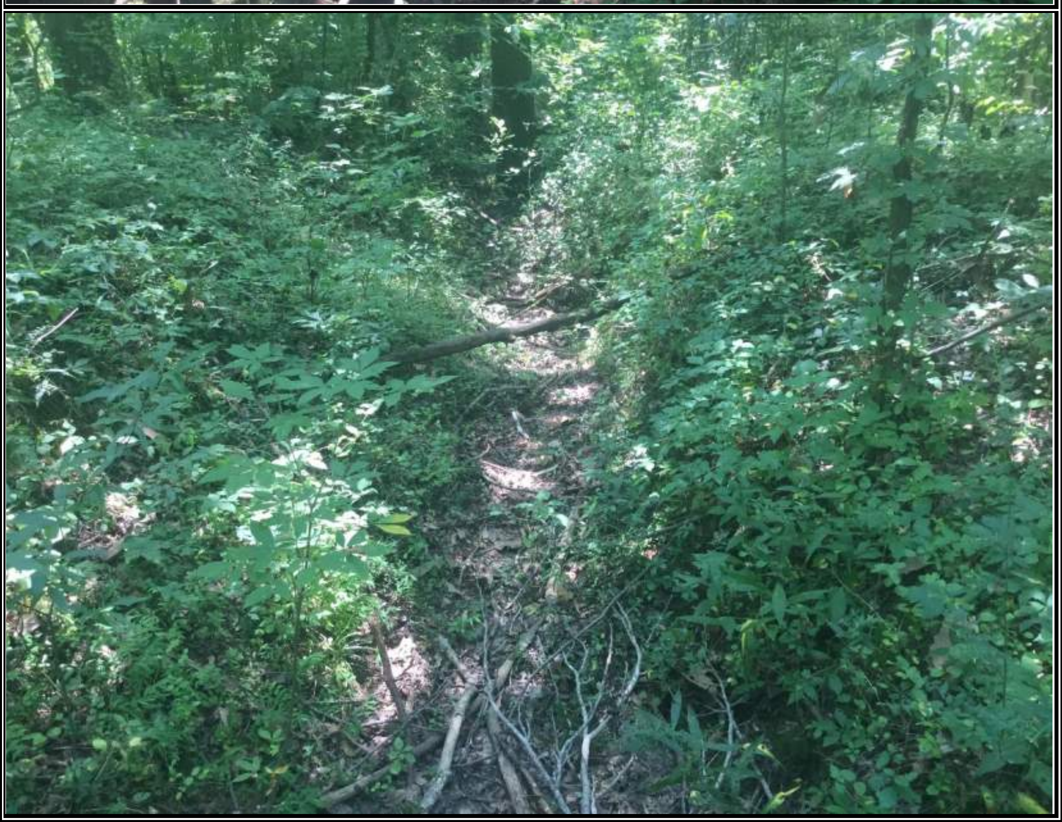
	**Photo:** 23 **By:** A. Fowler **Date:** 14 July 2017 **Lat/Long:** 35.3226, -89.8694 **Feature:** WWC-13/EPH-13 Downstream view of WWC-13/EPH-13.
	**Photo:** 24 **By:** A. Fowler **Date:** 14 July 2017 **Lat/Long:** 35.3226, -89.8694 **Feature:** WWC-13/EPH-13 Upstream view of WWC-13/EPH-13.

Photo: 25
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3249, -89.8573
Feature: WWC-14/EPH-14

Upstream view of WWC-14/EPH-14.

Photo: 26
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3249, -89.8573
Feature: WWC-14/EPH-14

Downstream view of WWC-14/EPH-14.

Photo: 27
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3252, -89.8555
Feature: WWC-15/EPH-15

Upstream view of WWC-15/EPH-15.

Photo: 28
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3252, -89.8555
Feature: WWC-15/EPH-15

Downstream view of WWC-15/EPH-15.

Photo: 29
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3241, -89.8572
Feature: WWC-16/EPH-16

Downstream view of WWC-16/EPH-16.

Photo: 30
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3241, -89.8572
Feature: WWC-16/EPH-16

Uptream view of WWC-16/EPH-16.

Photo: 31
By: A. Fowler
Date: 19 April 2018
Lat/Long: 35.3264, -89.8583
Feature: WWC-17/EPH-17

Downstream view of WWC-17/EPH-17.

Photo: 32
By: A. Fowler
Date: 19 April 2018
Lat/Long: 35.3264, -89.8583
Feature: WWC-17/EPH-17

Uptream view of WWC-17/EPH-17 showing the areas of channel disruption.

Photo: 33
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3366, -89.9313
Feature: WWC-18/EPH-18

Uptream view of WWC-18/EPH-18.

Photo: 34
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3366, -89.9309
Feature: WWC-18/EPH-18

Downstream view of WWC-18/EPH-18 where the channel exits WTL-31.

Photo: 35
By: A. Fowler
Date: 18 April 2018
Lat/Long: 35.3362, -89.9289
Feature: WWC-19/EPH-19

Uptream view of WWC-19/EPH-19.

Photo: 36
By: A. Fowler
Date: 18 April 2018
Lat/Long: 35.3366, -89.9289
Feature: WWC-19/EPH-19

Downstream view of WWC-19/EPH-19.

Photo: 37
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3421, -89.9516
Feature: WWC-20/EPH-20

Upstream view of WWC-20/EPH-20 from top of reach.

Photo: 38
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3421, -89.9516
Feature: WWC-20/EPH-20

Downstream view of WWC-20/EPH-20 from top of reach.

Photo: 39
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3415, -89.9511
Feature: WWC-21/EPH-21

Downstream view of WWC-21/EPH-21 near bottom of reach.

Photo: 40
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3420, -89.9513
Feature: WWC-21/EPH-21

Upstream view of WWC-21/EPH-21 near top of reach.

Photo: 41
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3389, -89.9493
Feature: WWC-22/EPH-22

Upstream view of WWC-22/EPH-22 toward grade control start.

Photo: 42
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3390, -89.9495
Feature: WWC-22/EPH-22

Upstream view of WWC-22/EPH-22 near upper reach.

Photo: 43
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3390, -89.9490
Feature: WWC-23/EPH-23

Downstream view of WWC-23/EPH-23 near headcut at top of reach.

Photo: 44
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3389, -89.9491
Feature: WWC-23/EPH-23

View downstream toward confluence of WWC-23/EPH-23 and WWC-22/EPH-22.

Photo: 45
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3391, -89.9468
Feature: WWC-24/EPH-24

Downstream view of WWC-24/EPH-24 near upper reach.

Photo: 46
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3391, -89.9468
Feature: WWC-24/EPH-24

Upstream view of WWC-24/EPH-24 near upper reach.

Photo: 47
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3418, -89.9424
Feature: WWC-25/EPH-25

Upstream view of WWC-25/EPH-25 at WWTP outfall, upstream has no surface water.

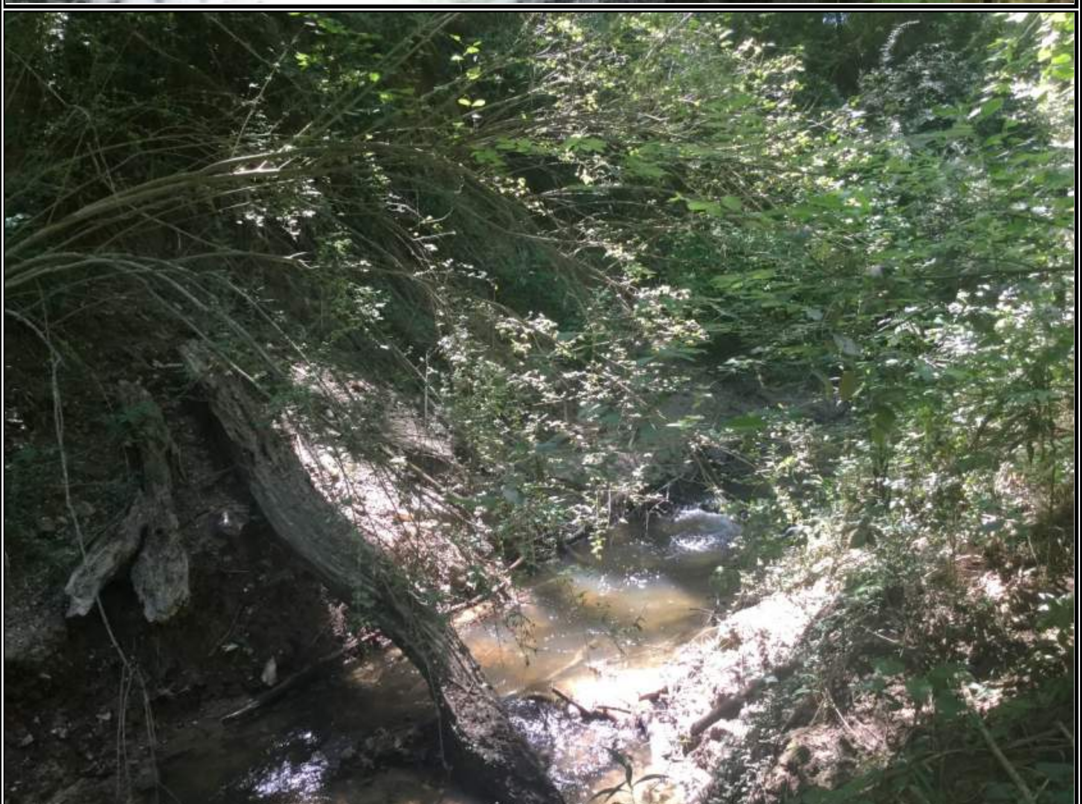


Photo: 48
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3383, -89.9431
Feature: WWC-25/EPH-25

Upstream view of WWC-25/EPH-25 near bottom of reach, above confluence with Big Creek.

Photo: 49
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3383, -89.9430
Feature: WWC-26/EPH-26

Downstream view of WWC-26/EPH-26 near bottom of reach.

Photo: 50
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3382, -89.9424
Feature: WWC-26/EPH-26

Upstream view of WWC-26/EPH-26 toward culvert at top of reach.

Photo: 51
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3378, -89.9418
Feature: WWC-27/EPH-27

Downstream view of WWC-27/EPH-27 near upper reach.

Photo: 52
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3379, -89.9422
Feature: WWC-27/EPH-27

Upstream view of WWC-27/EPH-27 near bottom of reach.

Photo: 53
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2875, -89.9195
Feature: WWC-28/EPH-28

Upstream view of WWC-28/EPH-28 near mid-reach.

Photo: 54
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2873, -89.9194
Feature: WWC-28/EPH-28

Downstream view of WWC-28/EPH-28 near northwestern edge of WTL-51.

Photo: 55
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2871, -89.9197
Feature: WWC-29/EPH-29

Downstream view of the upper reach of WWC-29/EPH-29.

Photo: 56
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2871, -89.9197
Feature: WWC-29/EPH-29

Upstream view of WWC-29/EPH-29 within upper reach.

Photo: 57
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2852, -89.9192
Feature: WWC-29/EPH-29

Upstream view of WWC-29/EPH-29from the confluence with STR-2.

Photo: 58
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2855, -89.9192
Feature: WWC-29/EPH-29

Downstream view of WWC-29/EPH-29from the boundary of WTL-53.

Photo: 59
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2860, -89.9185
Feature: WWC-30/EPH-30

Downstream view of WWC-30/EPH-30 from WTL-52.

Photo: 60
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2851, -89.9191
Feature: WWC-30/EPH-30

Upstream view of WWC-30/EPH-30 near start of STR-24.

Photo: 61
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2861, -89.9185
Feature: WWC-30/EPH-30

Upstream view of WWC-30/EPH-30 as it branches north away from WTL-52.

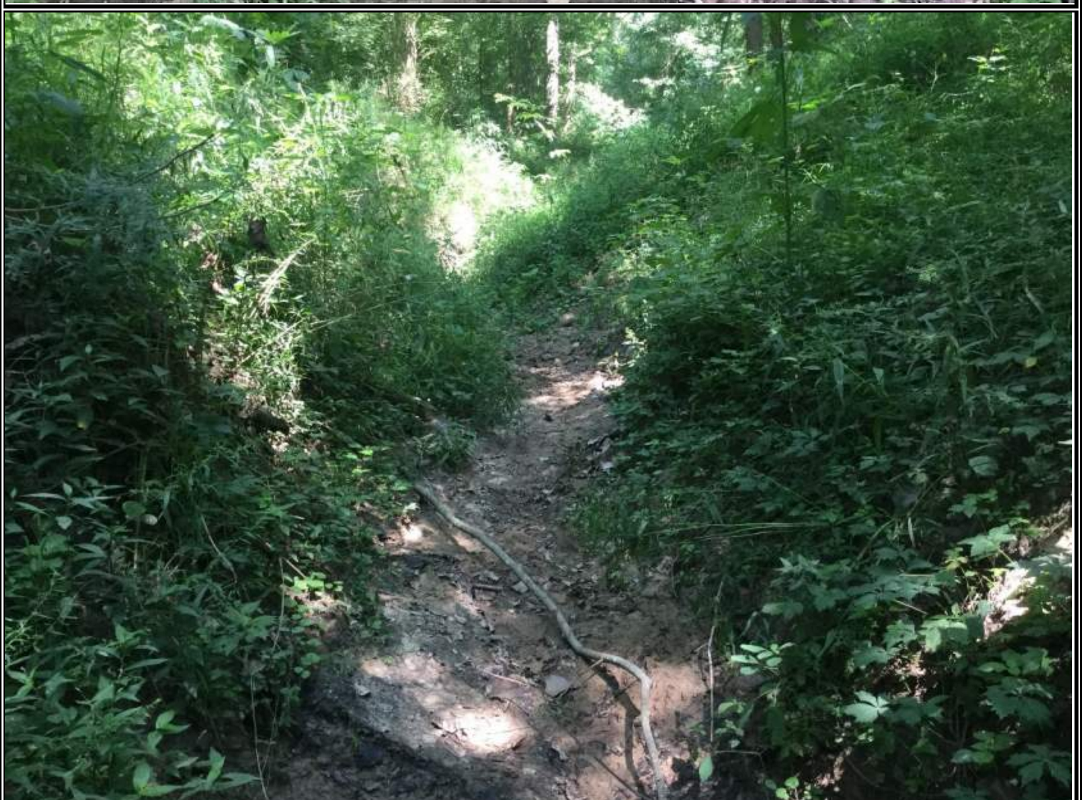


Photo: 62
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2863, -89.9184
Feature: WWC-30/EPH-30

Downstream mid-reach view of WWC-30/EPH-30.

Photo: 63
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2867, -89.9188
Feature: WWC-31/EPH-31

Downstream view of WWC-31/EPH-31.

Photo: 64
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2867, -89.9188
Feature: WWC-31/EPH-31

Upstream view of WWC-31/EPH-31.

Photo: 65
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2856 -89.9202
Feature: WWC-32/EPH-32

Downstream view of WWC-32/EPH-32 from the near top of waterway.

Photo: 66
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2848, -89.9199
Feature: WWC-32/EPH-32

Upstream view of WWC-32/EPH-32 from the lower reach of the channel.

Photo: 67
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2829, -89.9223
Feature: WWC-33/EPH-33

Upstream view of WWC-33/EPH-33.

Photo: 68
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2830, -89.9226
Feature: WWC-33/EPH-33

Downstream view of WWC-33/EPH-33.

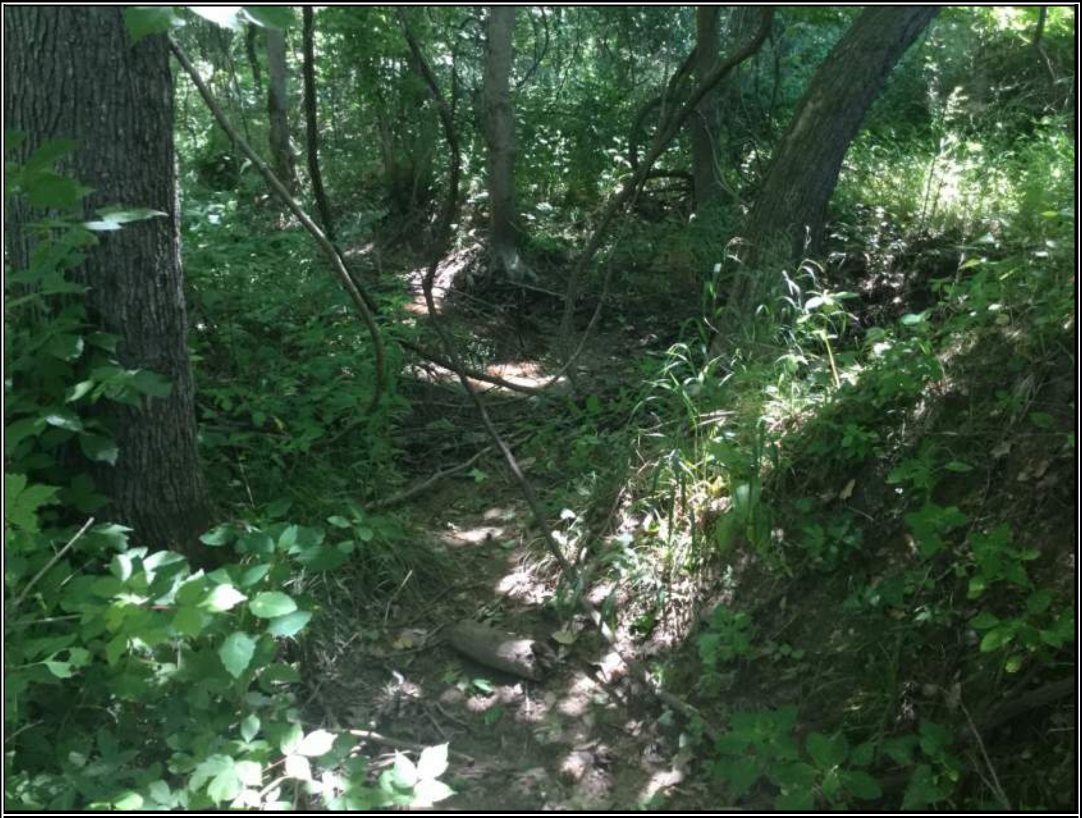


Photo: 69
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9230
Feature: WWC-34/EPH-34

Downstream view of WWC-34/EPH-34 from the upper reach.

Photo: 70
By: A. Fowler
Date: 5 June 2018
Lat/Long: 35.2827, -89.9226
Feature: WWC-34/EPH-34

Downstream view of WWC-34/EPH-34 at confluence with STR-25.

Photo: 71
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9225
Feature: STR-25

Downstream view of STR-25 toward Duncan Road culvert.

Photo: 72
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9225
Feature: STR-25

Downstream view of STR-25 near mid-reach.

Photo: 73
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2851, -89.9191
Feature: STR-24

Upstream view of STR-24 to point where it transitions from WWC-30/EPH-30.

Photo: 74
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2847, -89.9195
Feature: STR-24

Upstream view of STR-24 near mid-reach.

Photo: 75
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3321, -89.9101
Feature: STR-2

Downstream view of STR-2

Photo: 76
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3321, -89.9101
Feature: STR-2

Uptream view of STR-2.

Photo: 77
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3347, -89.9080
Feature: STR-3

Downstream view of STR-3.

Photo: 78
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3347, -89.9080
Feature: STR-3

Uptream view of STR-3.

Photo: 79
By: G. Lynch
Date: 14 July 2017
Lat/Long: 35.3318, -89.8969
Feature: STR-4

Downstream view of STR-4.

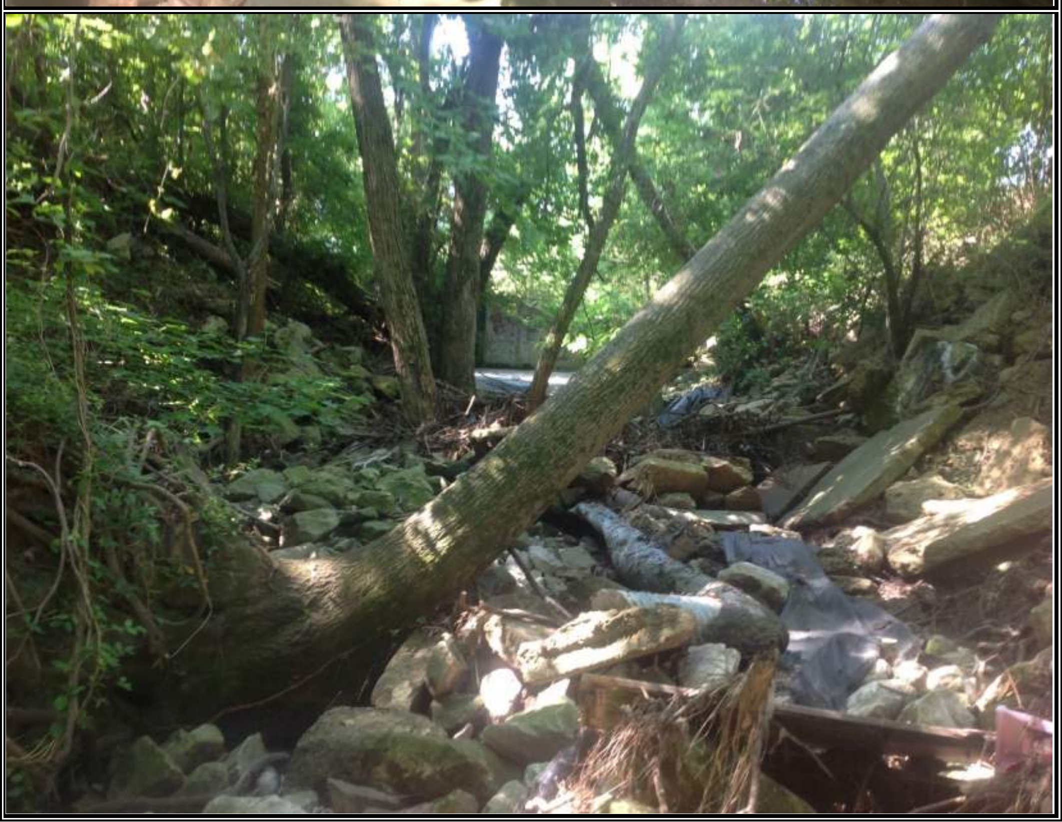


Photo: 80
By: G. Lynch
Date: 14 July 2017
Lat/Long: 35.3318, -89.8969
Feature: STR-4

Upstream view of STR-4 from the rip-rap and concrete pad where the channel flows under Paul Barrett Highway.

Photo: 81
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3382, -89.8922
Feature: STR-5

View of STR-5 looking down from the right-top-of-bank.

Photo: 82
By: A. Fowler
Date: 20 July 2017
Lat/Long: 35.3323, -89.8892
Feature: STR-6

Downstream view of STR-6.

Photo: 83
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3299, -89.8907
Feature: STR-7

Downstream view of STR-7 from the culvert outlet under Jones Boyd Blvd.

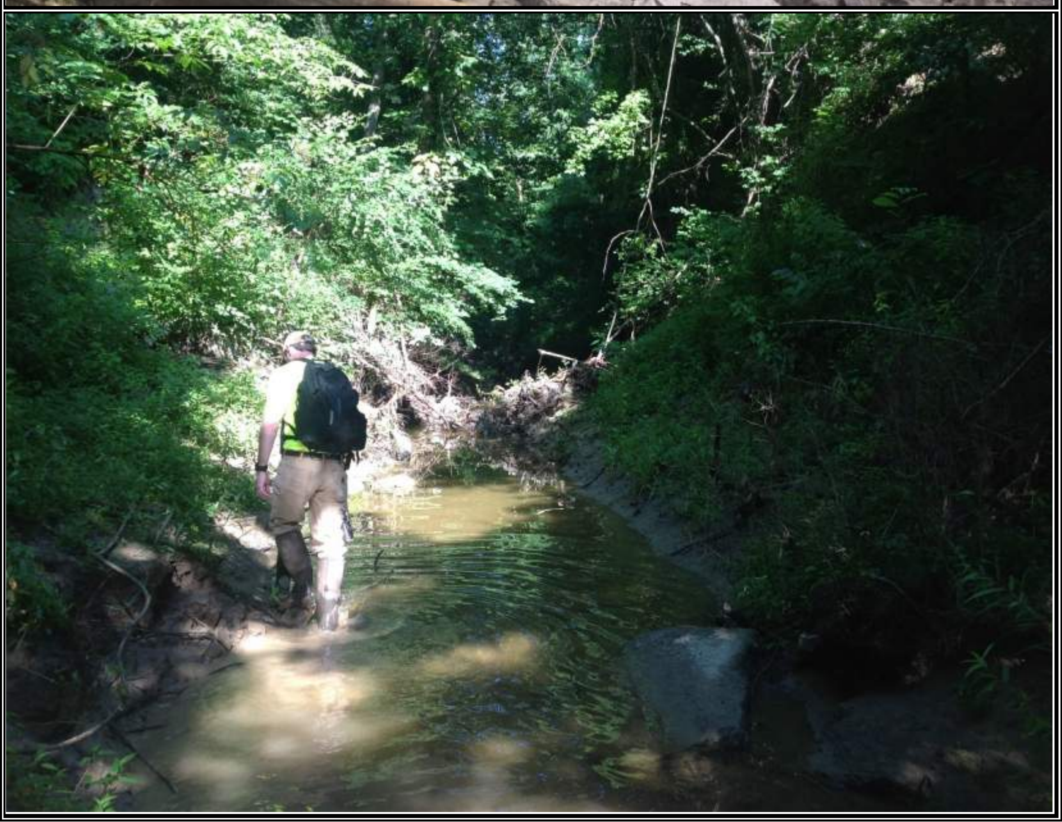


Photo: 84
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3316, -89.8845
Feature: STR-8

Downstream view of STR-8.

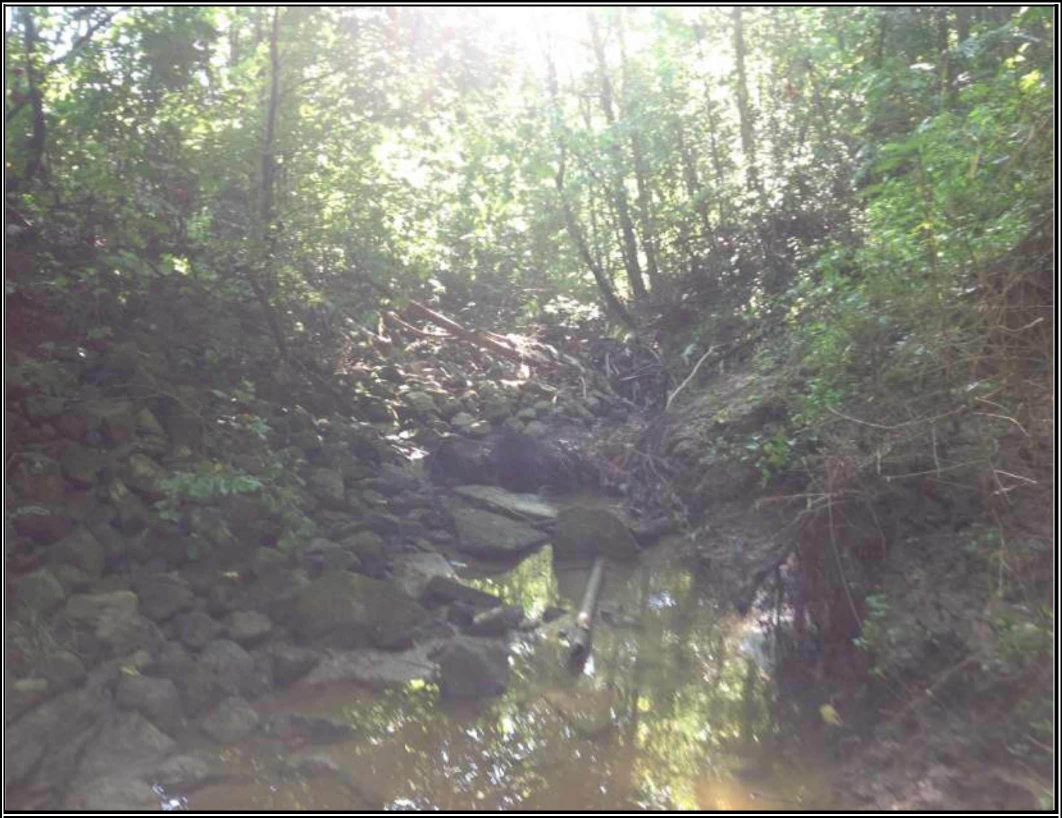


Photo: 85
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3316, -89.8845
Feature: STR-8

Upstream view of STR-8.

Photo: 86
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3318, -89.8969
Feature: STR-9

Downstream view of STR-9.

Photo: 87
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3309, -89.8799
Feature: STR-9

Upstream view of STR-9.

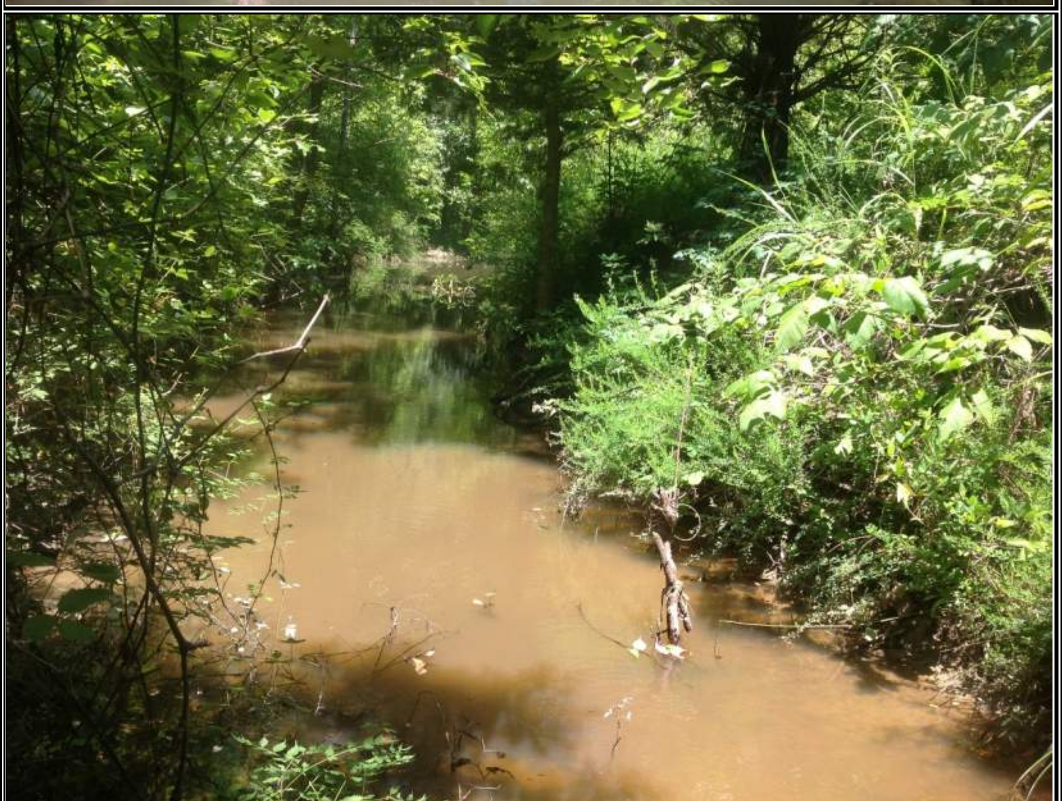


Photo: 88
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3269, -89.8851
Feature: STR-10

Downstream view of STR-10.

Photo: 89
By: G. Lynch
Date: 14 July 2017
Lat/Long: 35.3269, -89.8851
Feature: STR-11

Downstream view of STR-11.

Photo: 90
By: G. Lynch
Date: 14 July 2017
Lat/Long: 35.3290, -89.8849
Feature: STR-11

Upstream view of STR-11.

Photo: 91
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3289, -89.8840
Feature: STR-12

Downstream view of STR-12 near its confluence with Big Creek.

Photo: 92
By: G. Lynch
Date: 19 July 2017
Lat/Long: 35.3286, -89.8833
Feature: STR-12

Upstream view of STR-12.

Photo: 93
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3224, -89.8763
Feature: STR-13

Downstream view of STR-13.

Photo: 94
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3224, -89.8763
Feature: STR-13

Upstream view of STR-13.

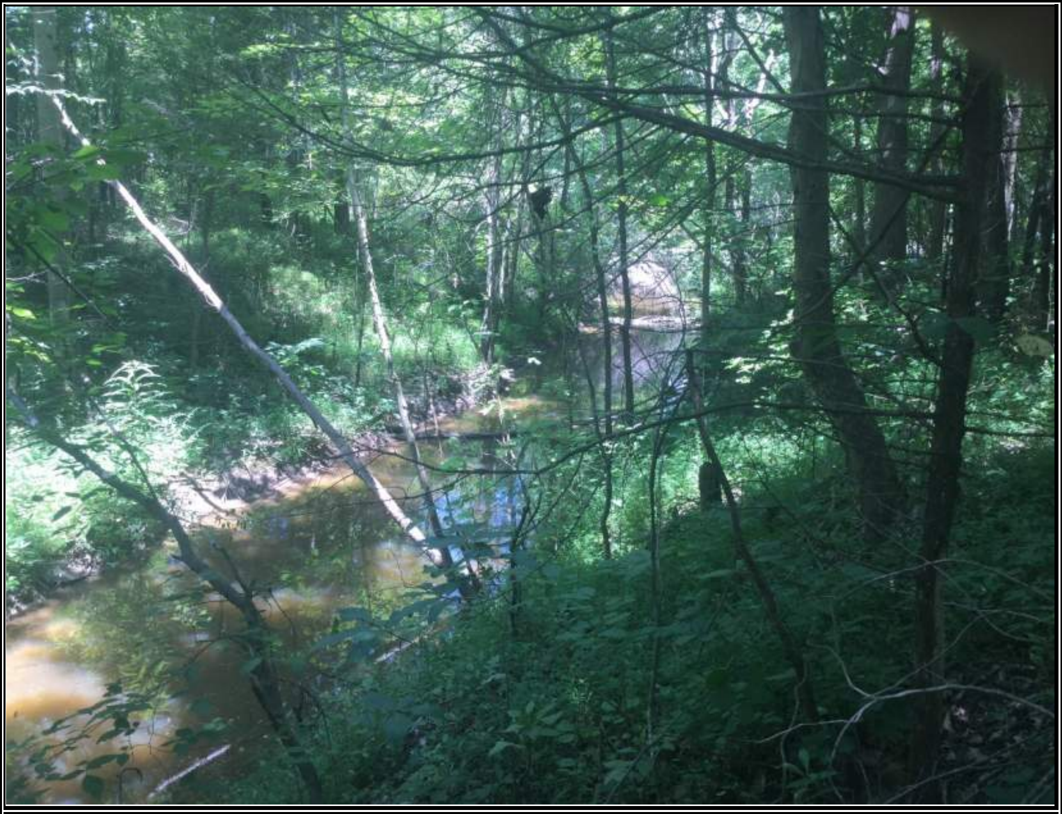


Photo: 95
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3223, -89.8700
Feature: STR-15

Downstream view of STR-15.

Photo: 96
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3223, -89.8700
Feature: STR-15

Upstream view of STR-15.

Photo: 97
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3213, -89.8611
Feature: STR-16

Downstream view of STR-16 near its confluence with Big Creek.

Photo: 98
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3213, -89.8611
Feature: STR-16

Upstream view of STR-16.

Photo: 99
By: A. Fowler
Date: 27 July 2017
Lat/Long: 35.3195, -89.8484
Feature: STR-17

Upstream view of STR-17.

Photo: 100
By: A. Fowler
Date: 27 July 2017
Lat/Long: 35.3195, -89.8484
Feature: STR-17

Downstream view of STR-17.

Photo: 101
By: G. Lynch
Date: 27 July 2017
Lat/Long: 35.3146, -89.8411
Feature: STR-18

Upstream view of STR-18.

Photo: 102
By: G. Lynch
Date: 27 July 2017
Lat/Long: 35.3146, -89.8411
Feature: STR-18

Downstream view of STR-18.

Photo: 103
By: A. Fowler
Date: 27 July 2017
Lat/Long: 35.3189, -89.8459
Feature: STR-19

Upstream view of STR-19.

Photo: 104
By: A. Fowler
Date: 27 July 2017
Lat/Long: 35.3213, -89.8611
Feature: STR-19

Upstream view of STR-19.

Photo: 105
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3345, -89.9172
Feature: Big Creek

Upstream view of Big Creek facing east from Hwy 3.

Photo: 106
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3337, -89.9103
Feature: Big Creek

Downstream view of Big Creek from the confluence of STR-2.

Photo: 107
By: G. Lynch
Date: 13 July 2017
Lat/Long: 35.3337, -89.9103
Feature: Big Creek

Downstream view of Big Creek facing west from Raleigh Millington Rd.

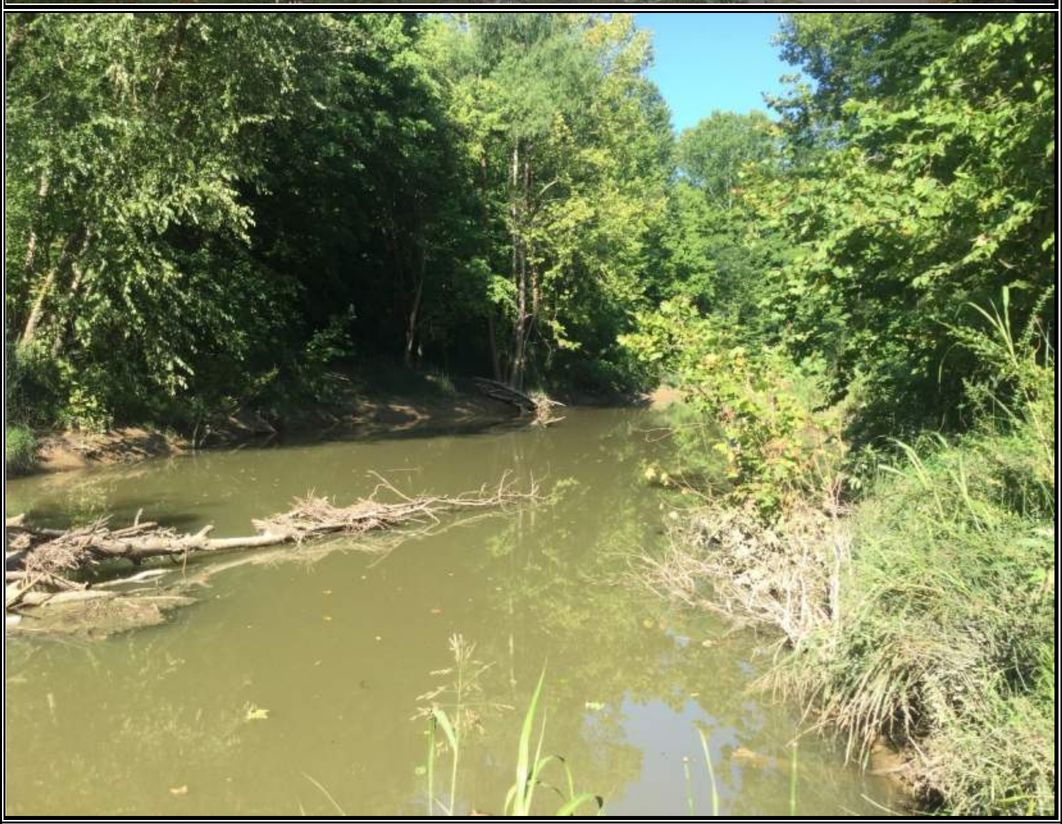


Photo: 108
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3212, -89.8612
Feature: Big Creek

Downstream view of Big Creek from the confluence of STR-16.

Photo: 109
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3359, -89.9269
Feature: STR-21

Upstream view of STR-21.

Photo: 110
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3359, -89.9269
Feature: STR-21

Downstream view of STR-21.

Photo: 111
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.3397, -89.9547
Feature: STR-22

Downstream view of STR-22.

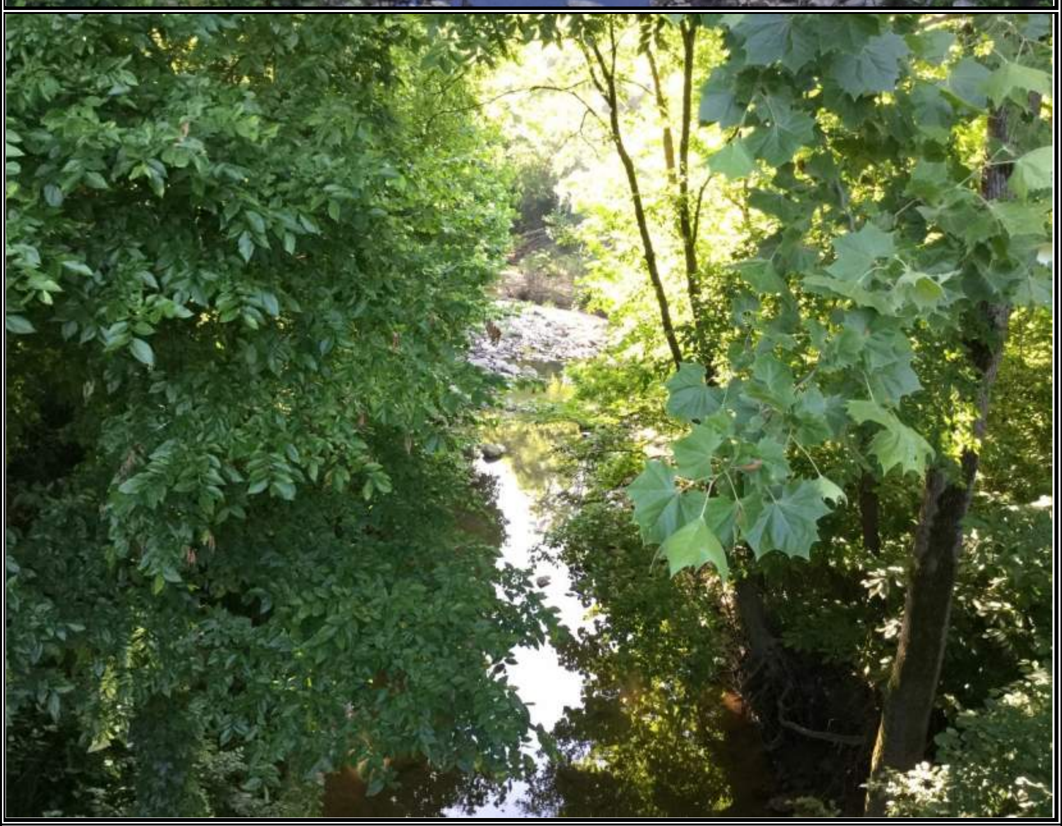


Photo: 112
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.3397, -89.9547
Feature: STR-22

Downstream view of STR-22.

Photo: 113
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.3417, -89.9510
Feature: STR-23

Upstream view of the STR-23 river valley. The bottom of the channel is hard to distinguish due to extreme channel incision.

Photo: 114
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2851, -89.9191
Feature: STR-24

Upstream view of STR-24 to point where it transitions from WWC-30/EPH-30.

Photo: 115
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2847, -89.9195
Feature: STR-24

Upstream view of STR-24 near mid-reach.

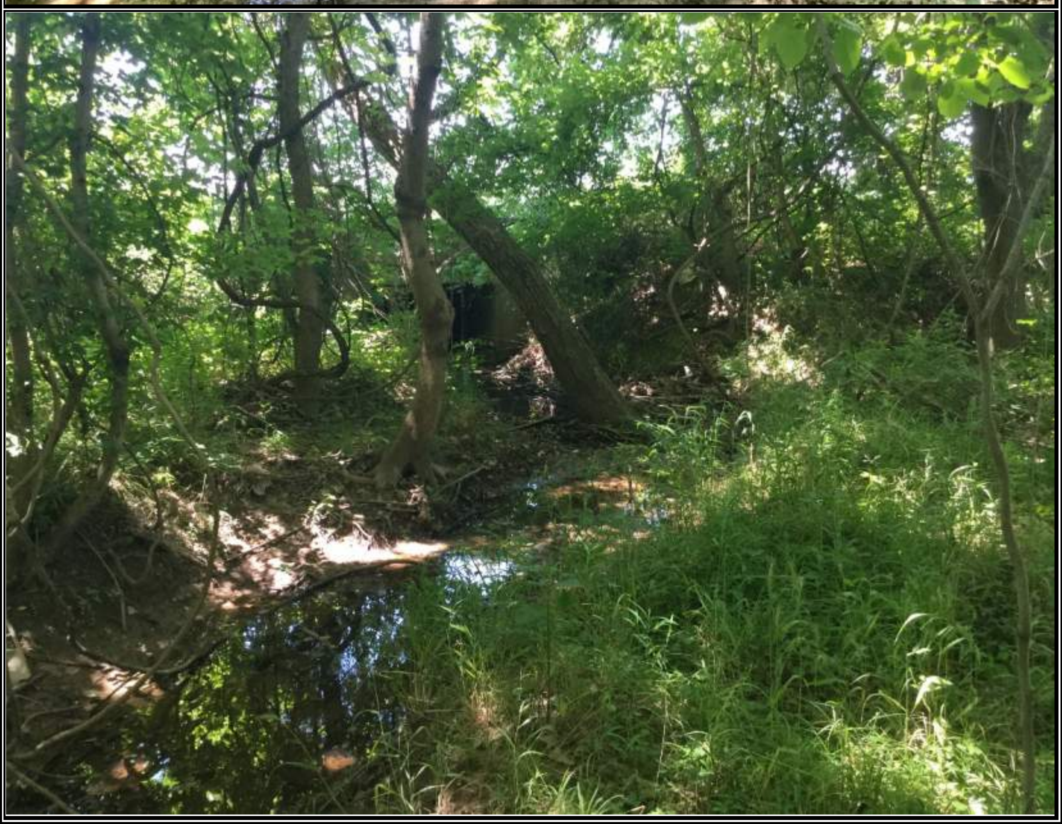


Photo: 116
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9225
Feature: STR-25

Downstream view of STR-25 toward Duncan Road culvert.

Photo: 117
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2827, -89.9225
Feature: STR-25

Downstream view of STR-25 near mid-reach.

Photo: 118
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3326, -89.9117
Feature: WTL-1

Representative photo of WTL-1.

Photo: 119
By: G. Lynch
Date: 12 July 2017
Lat/Long: 35.3321, -89.9082
Feature: WTL-2

Representative photo of WTL-2 facing north of the southern edge of the wetland.

Photo: 120
By: G. Lynch
Date: 26 July 2017
Lat/Long: 35.3320, -89.8977
Feature: WTL-3

View to the east of WTL-3.

Photo: 121
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3320, -89.8977
Feature: WTL-4

View to the west of the inundated section of WTL-4.

Photo: 122
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3315, -89.8963
Feature: WTL-4

View to the north of the non-inundated section of WTL-4 to the south.

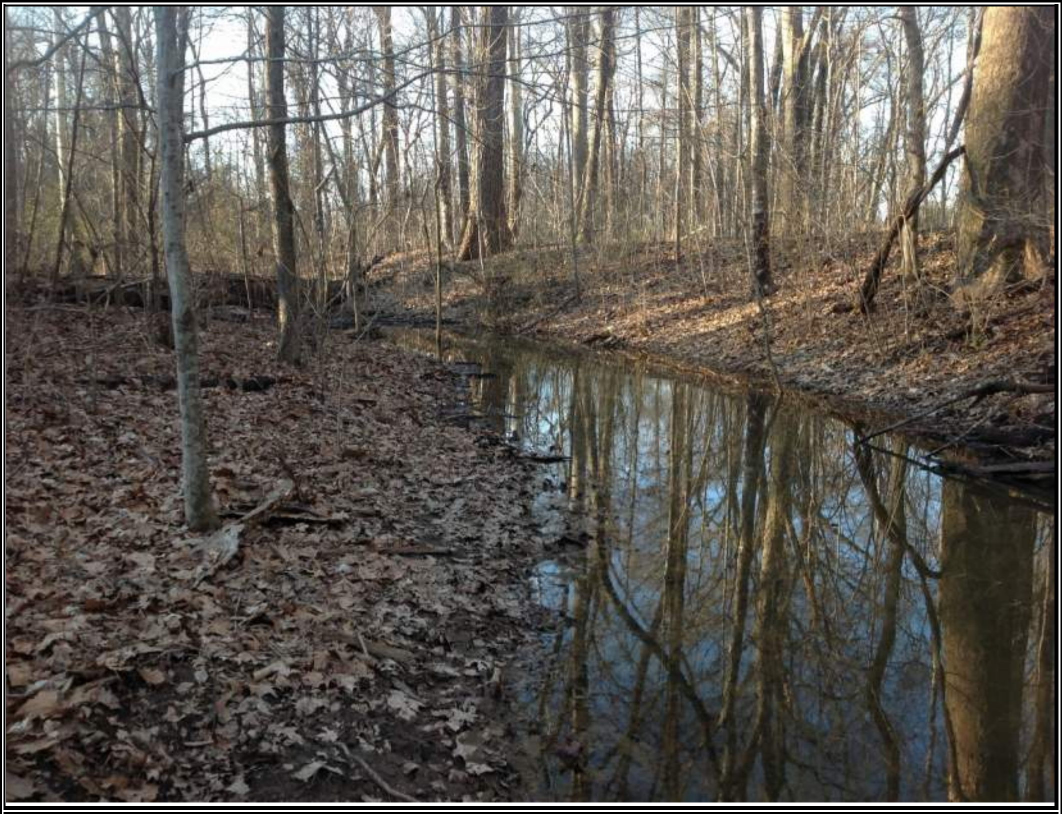


Photo: 123
By: A. Fowler
Date: 13 February 2018
Lat/Long: 35.3330, -89.8888
Feature: WTL-5

Representative photo of WTL-5.

Photo: 124
By: A. Fowler
Date: 26 July 2017
Lat/Long: 35.3325, -89.8866
Feature: WTL-6

View to the north of the emergent vegetation in WTL-6.

Photo: 125
By: A. Fowler
Date: 13 July 2017
Lat/Long: 35.3288, -89.8806
Feature: WTL-7

Representative photo of wetland conditions encountered in the federally protected wetland area.

Photo: 126
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3281, -89.8861
Feature: WTL-8

View from inside the forested section of WTL-8.

Photo: 127
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3278, -89.8830
Feature: WTL-8

View of the open, emergent portion on WTL-8.

Photo: 128
By: A. Fowler
Date: 12 July 2017
Lat/Long: 35.3234, -89.8780
Feature: WTL-11

Representative photo of wetland and open water conditions found around wetlands 9, 10, and 11.

Photo: 129
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3224, -89.8737
Feature: WTL-12

View to the north at WTL-12.

Photo: 130
By: A. Fowler
Date: 19 July 2017
Lat/Long: 35.3235, -89.8683
Feature: WTL-15

View to the west at WTL-15.

Photo: 131
By: A. Fowler
Date: 14 July 2017
Lat/Long: 35.3206, -89.8706
Feature: WTL-17

Representative photos of various wetland areas located east of Singleton Ave and north of Hwy 385.

Photo: 132
By: J. Morrison
Date: 20 July 2017
Lat/Long: 35.3107, -89.8381
Feature: WTL-27

Representative photo of the wetland areas located in the southeastern portion of the project area.

Photo: 133
By: J. Morrison
Date: 18 July 2017
Lat/Long: 35.3228, -89.8364
Feature: WTL-28

View to the west of the linear wetland located in the northeastern portion of the project area.

Photo: 134
By: J. Morrison
Date: 18 July 2017
Lat/Long: 35.3201, -89.8377
Feature: WTL-29

Representative photo of the wetland areas located in the eastern portion of the project area.

Photo: 135
By: A. Fowler
Date: 19 April 2018
Lat/Long: 35.3350, -89.8884
Feature: WTL-30

View to the west of WTL-30 located in the emergent wetland area north of the tree line.

Photo: 136
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3366, -89.9309
Feature: WTL-31

View to the west of WTL-31.

Photo: 137
By: A. Fowler
Date: 18 April 2018
Lat/Long: 35.3369, -89.9304
Feature: WTL-32

View to the northwest of the emergent section of WTL-32 located north of the tree line.

Photo: 138
By: G. Lynch
Date: 18 April 2018
Lat/Long: 35.3370, -89.9280
Feature: WTL-34

Representative photo of various wetland pockets in Area 6 with standing water and sparse vegetation.

Photo: 139
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3405, -89.9527
Feature: WTL-36

View of representative conditions within WTL-36.

Photo: 140
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3407, -89.9526
Feature: WTL-36

View of water line on trees within WTL-36.

Photo: 141
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3418, -89.9530
Feature: WTL-37

View of water-stained leaves within WTL-37.

Photo: 142
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3421, -89.9519
Feature: WTL-38

Representative view of conditions within WTL-38, WTL-39, and WTL-40.

Photo: 143
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3399, -89.9470
Feature: WTL-41

Representative view of WTL-41 near the western edge.

Photo: 144
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3398, -89.9471
Feature: WTL-41

Representative view of WTL-41 near the northern edge.

Photo: 145
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3318, -89.8969
Feature: WTL-42

Representative view of WTL-42 near the northern edge.

Photo: 146
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3376, -89.9405
Feature: WTL-44

View from southeastern edge of WTL-44 toward emergent center.

Photo: 147
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3380, -89.9407
Feature: WTL-44

View of bald cypress located on the fringes of WTL-44

Photo: 148
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3383, -89.9392
Feature: WTL-45

Representative view of young growth within WTL-45.

Photo: 149
By: N. Carmean
Date: 6 June 2018
Lat/Long: 35.3374, -89.9395
Feature: WTL-46

View from southern border of WTL-46 toward the center and representative conditions.

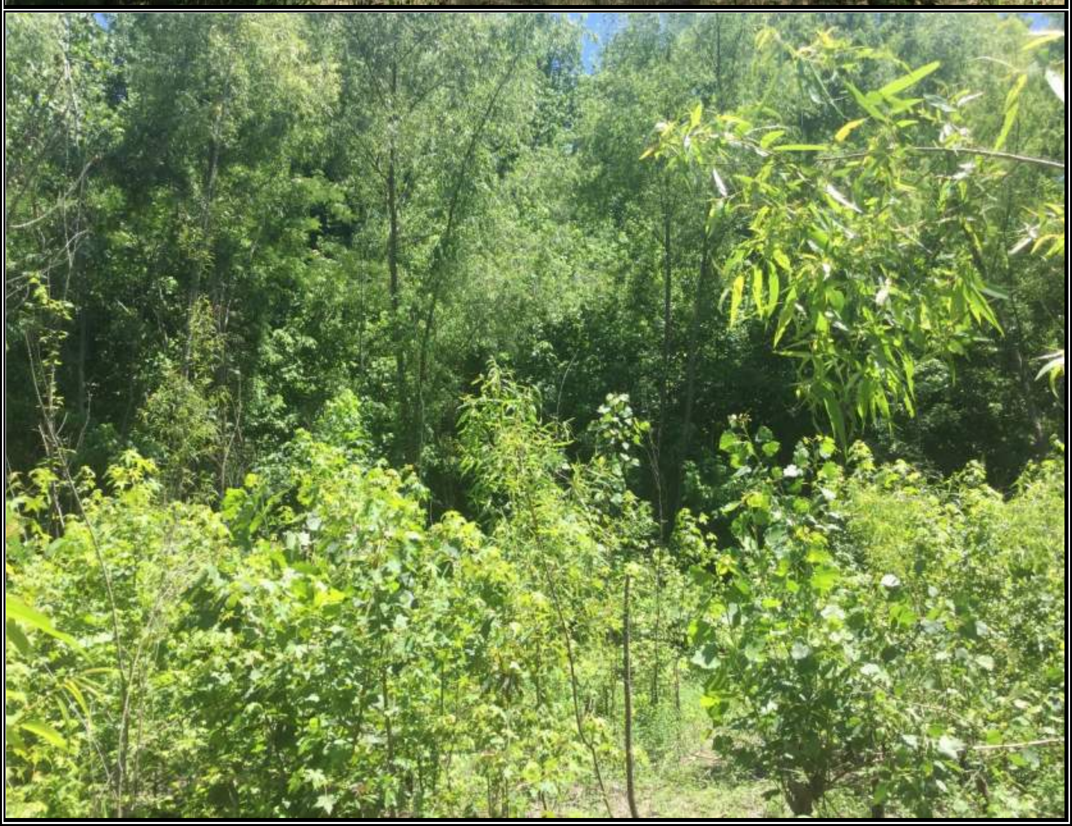


Photo: 150
By: G. Lynch
Date: 6 June 2018
Lat/Long: 35.3375, -89.9394
Feature: WTL-46

View of black willow and sweetgum sapling presence within WTL-46.

Photo: 151
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2889, -89.9201
Feature: WTL-47

View of WTL-47 western fringe from the north.

Photo: 152
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2885, -89.9201
Feature: WTL-47

View from the southern boundary of WTL-47 toward the center of the feature.

Photo: 153
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2871, -89.9191
Feature: WTL-50

Representative view of WTL-50.

Photo: 154
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2860, -89.9185
Feature: WTL-51

View of western edge of WTL-51 where it becomes WWC-30.

Photo: 155
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2862, -89.9182
Feature: WTL-51

View of buried culvert at northeastern edge of WTL-51.

Photo: 156
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2857 -89.9190
Feature: WTL-52

View of representative conditions within WTL-52.

Photo: 157
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2861, -89.9191
Feature: WTL-52

View of standing water within WTL-52.

Photo: 158
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2844, -89.9175
Feature: WTL-53

View from the north toward the southern boundary of WTL-53.

Photo: 159
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2843, -89.9201
Feature: WTL-54

View of standing water within WTL-54

Photo: 160
By: G. Lynch
Date: 5 June 2018
Lat/Long: 35.2842, -89.9203
Feature: WTL-54

Representative view of WTL-54 near the fringe.

Photo: 161
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2834, -89.92200
Feature: WTL-55

View of southern edge of WTL-55 near construction silt fencing.

Photo: 162
By: N. Carmean
Date: 5 June 2018
Lat/Long: 35.2836, -89.9217
Feature: WTL-55

View of northern portion of WTL-55 and the representative conditions.

Photo: 163
By: A. Fowler
Date: 19 April 2018
Lat/Long: 35.2831, -89.9234
Feature: WTL-56

View to the east at WTL-56 in the area south of the cemetery construction.

Shelby County Government
Office of Resilience

Big Creek National Disaster Resilience Design Project

Appendix E

Permitting Figures

1:2,000

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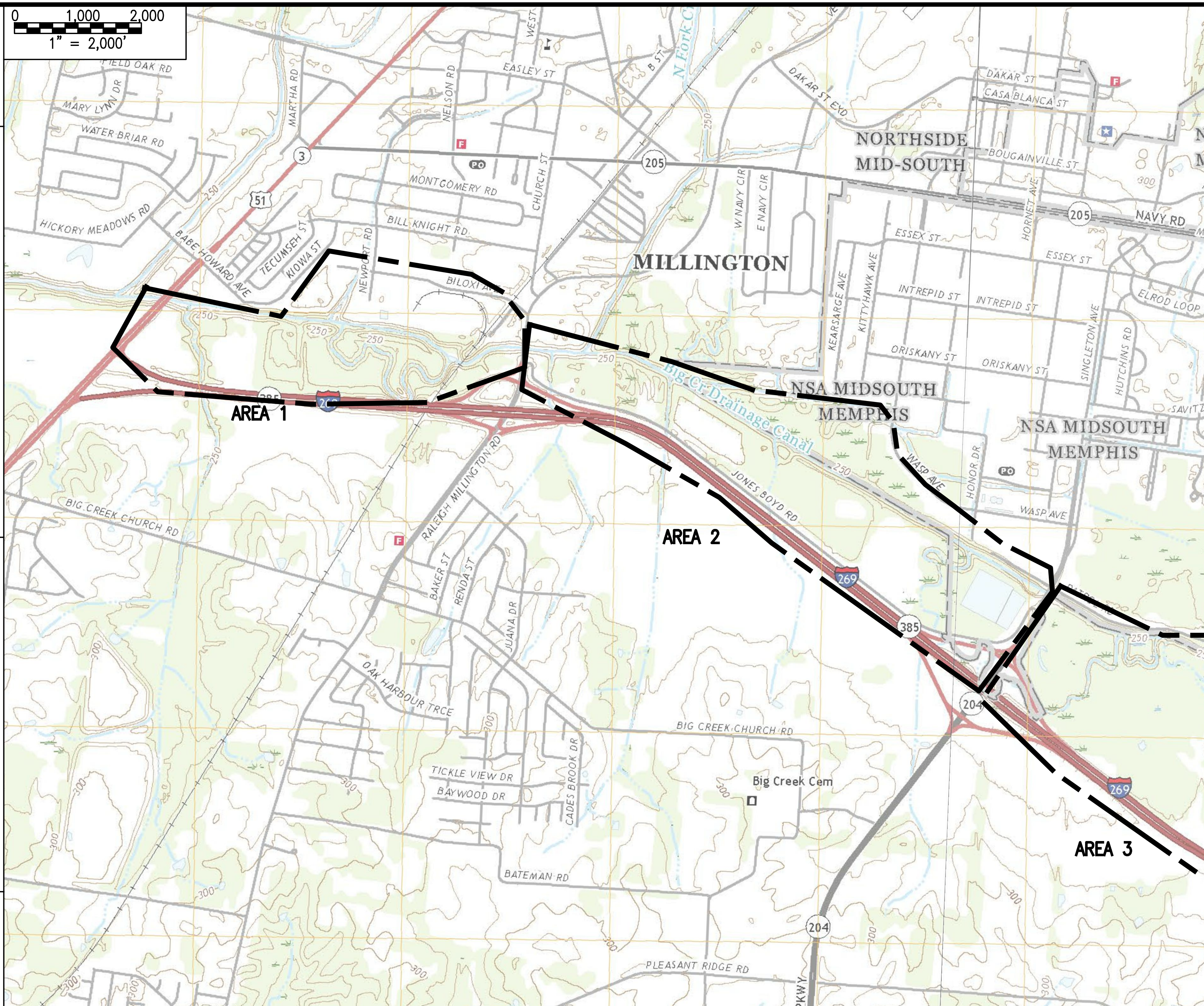


BIG CREEK WETLAND & RECREATION AREA JURISDICTIONAL WATERS PERMITTING

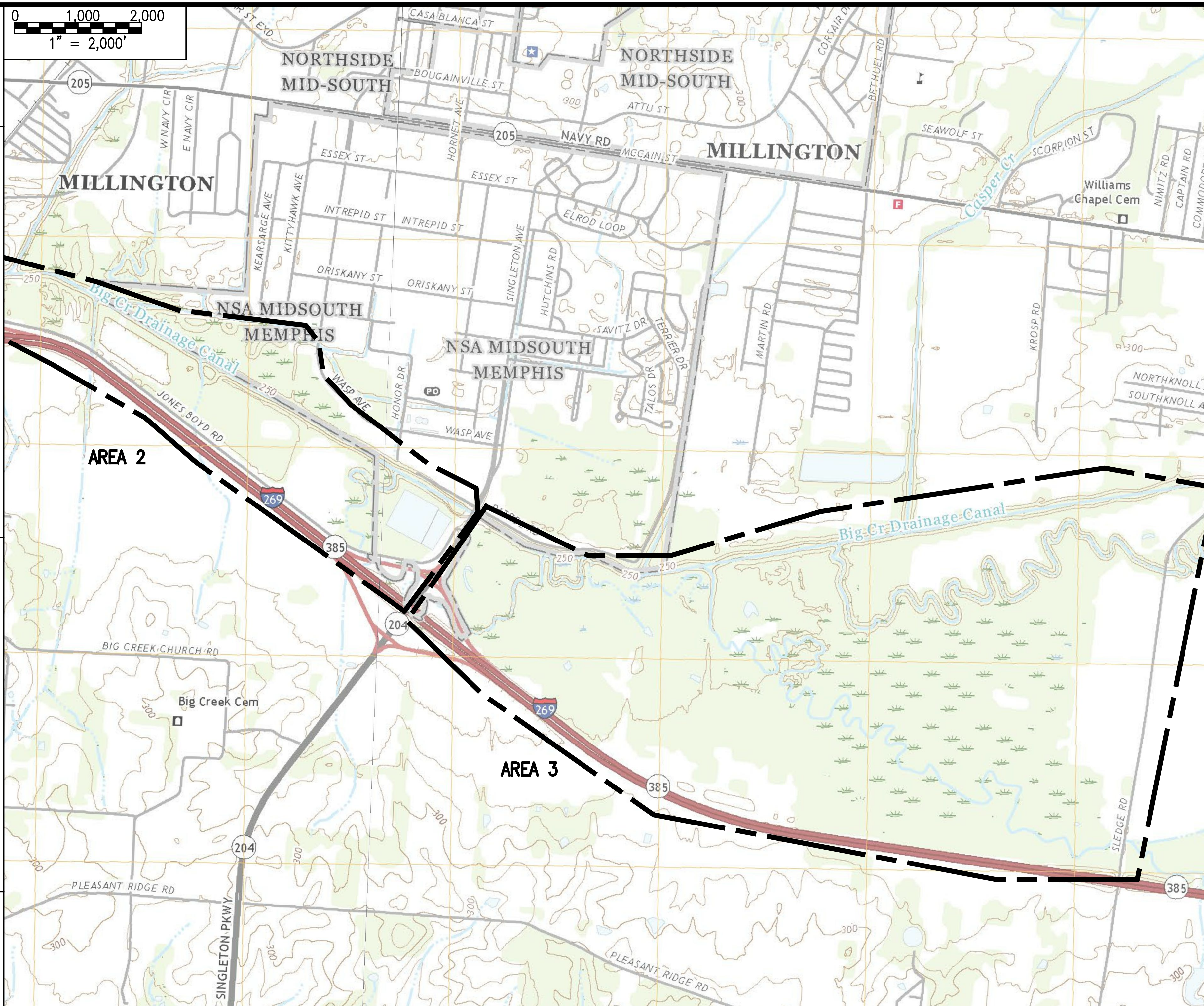
DESCRIPTION: TOPOGRAPHIC MAP - WEST

PROJECT #: 57802.00

LOCATION: MILLINGTON, TN

DATE: OCTOBER 2019

1



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ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION:
TOPOGRAPHIC MAP - EAST

PROJECT #:
57802.00

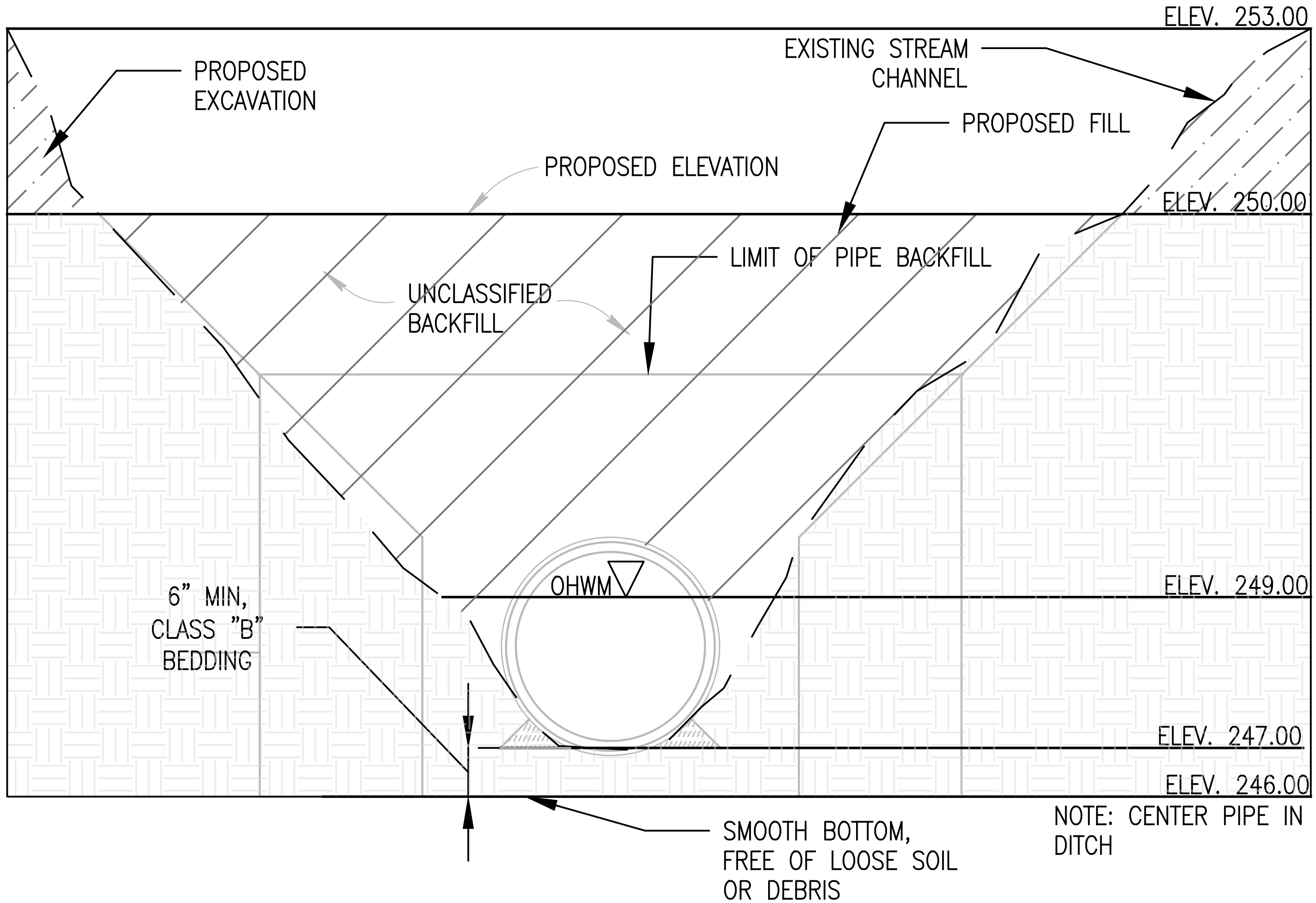
LOCATION:
MILLINGTON, TN

DATE:
OCTOBER 2019

2

NOT TO SCALE

Tioga
ENVIRONMENTAL CONSULTANTS



1 STREAM, PIPE IMPACT
(ELEVATION)

BIG CREEK DRG
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION: STREAM SECTION VIEW

LOCATION: MILLINGTON, TN

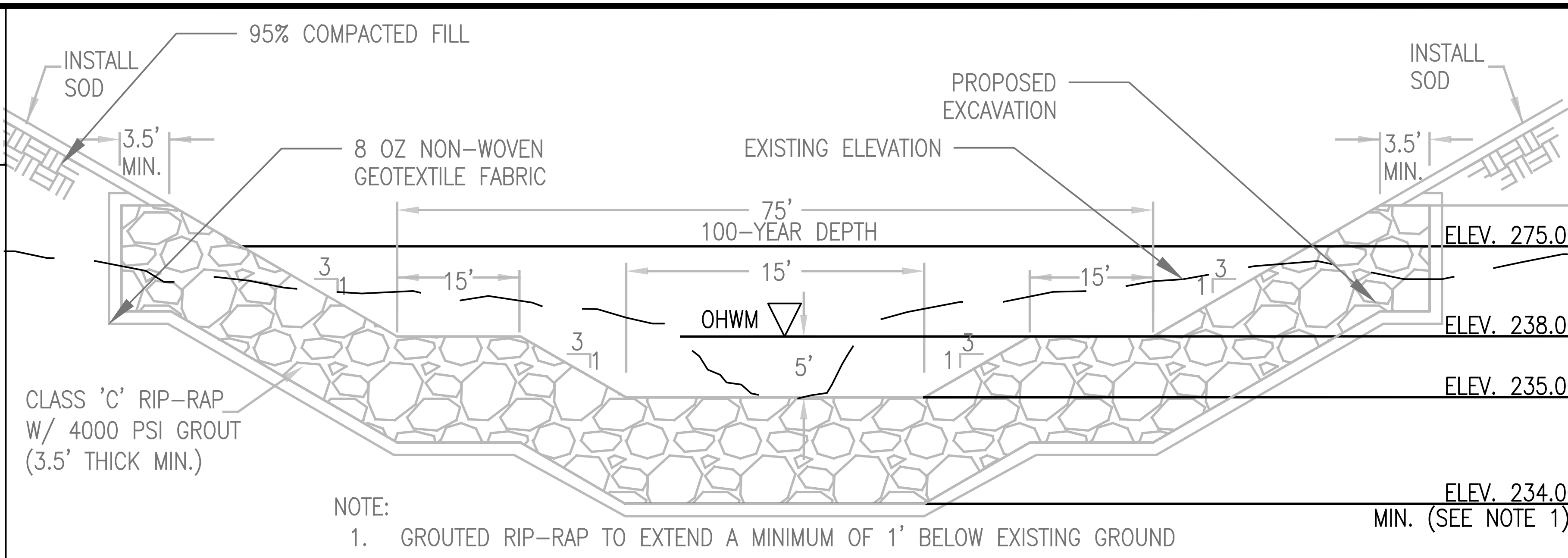
PROJECT #: 57802.00

DATE: MAY 2019

3

NOT TO SCALE

Tioga
ENVIRONMENTAL CONSULTANTS

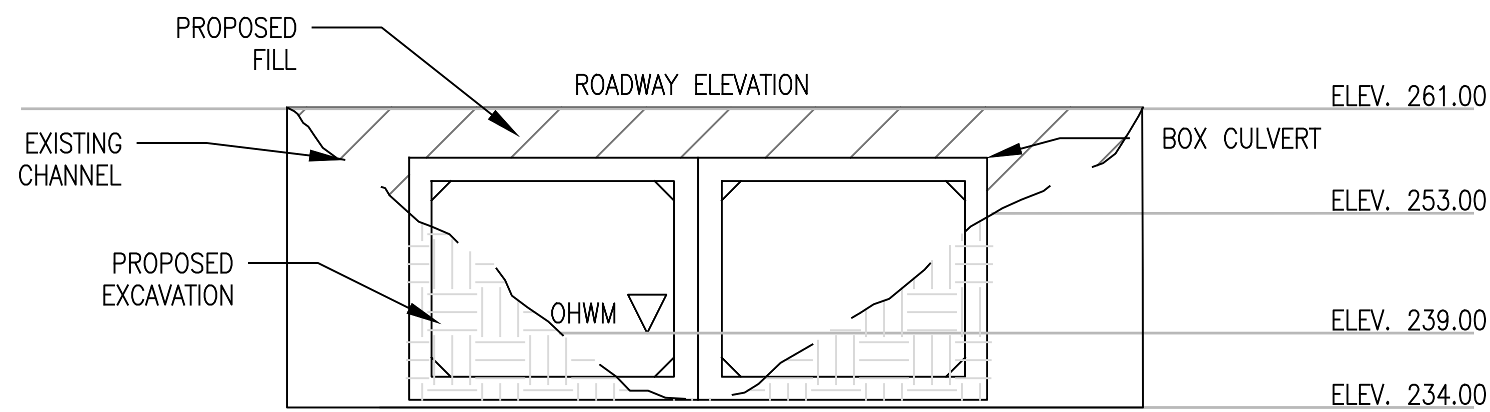


NOTE:

1. GROUTED RIP-RAP TO EXTEND A MINIMUM OF 1' BELOW EXISTING GROUND

② STREAM, GRADE CONTROL STRUCTURE

(ELEVATION)



③ STREAM, BOX CULVERT IMPACT

(ELEVATION)

BIG CREEK DRG
JURISDICTIONAL WATERS PERMITTING

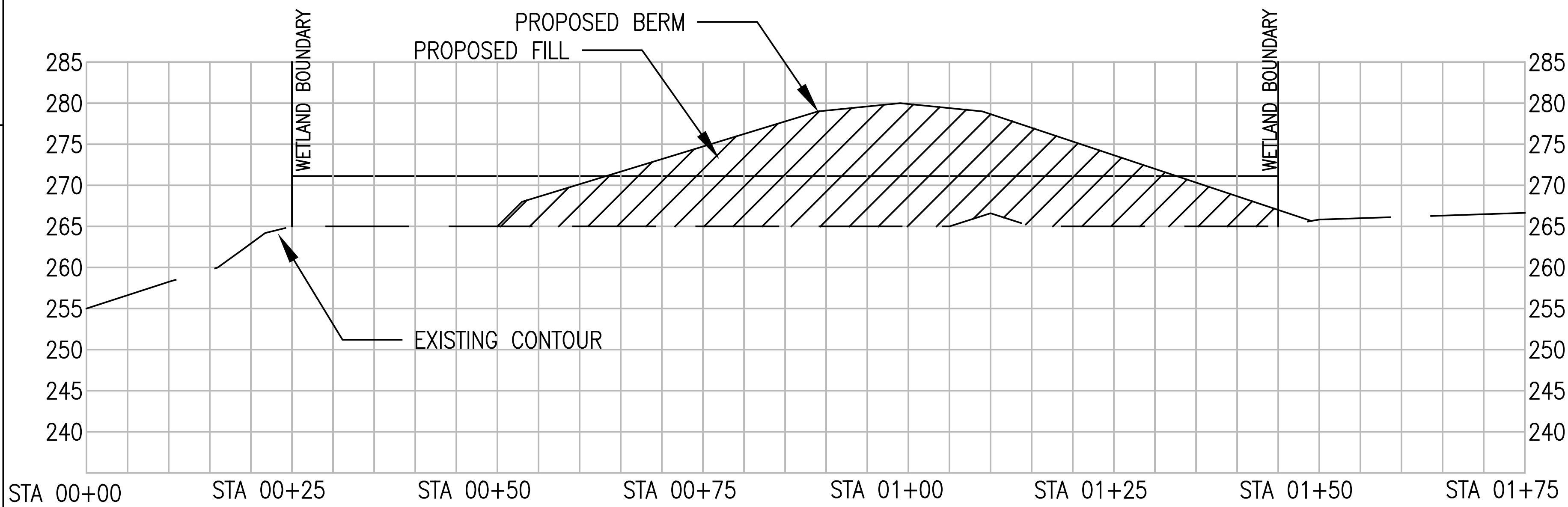
DESCRIPTION:
STREAM SECTION VIEW

LOCATION:
MILLINGTON, TN

PROJECT #:
57802.00

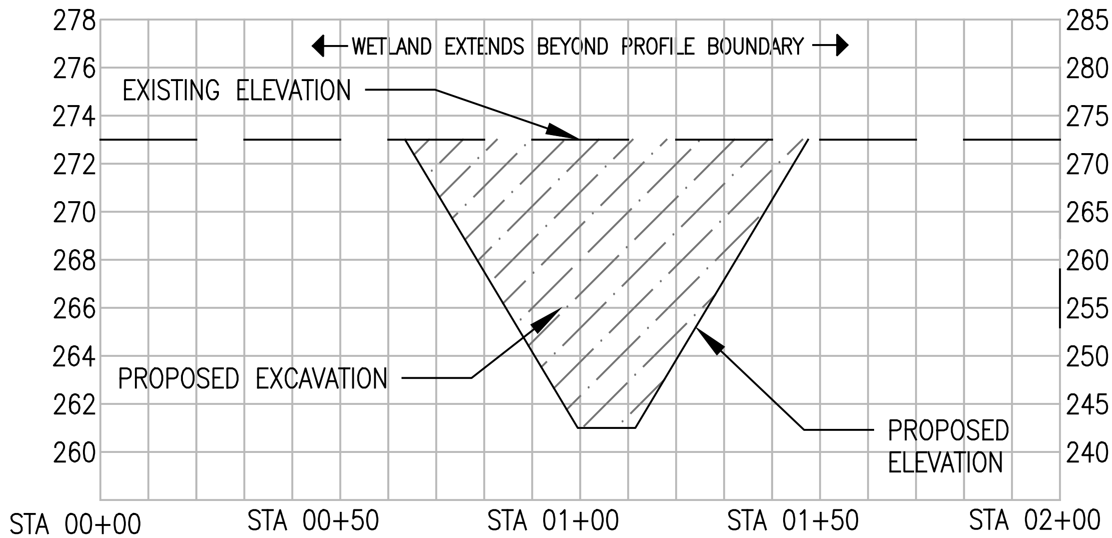
DATE:
MAY 2019

4



④ WETLAND FILL IMPACT
(ELEVATION)

1"=20' HOR
1"=20' VER



⑤ WETLAND EXCAVATION IMPACT
(ELEVATION)

1"=40' HOR
1"=8' VER

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BIG CREEK DRG
JURISDICTIONAL WATERS PERMITTING

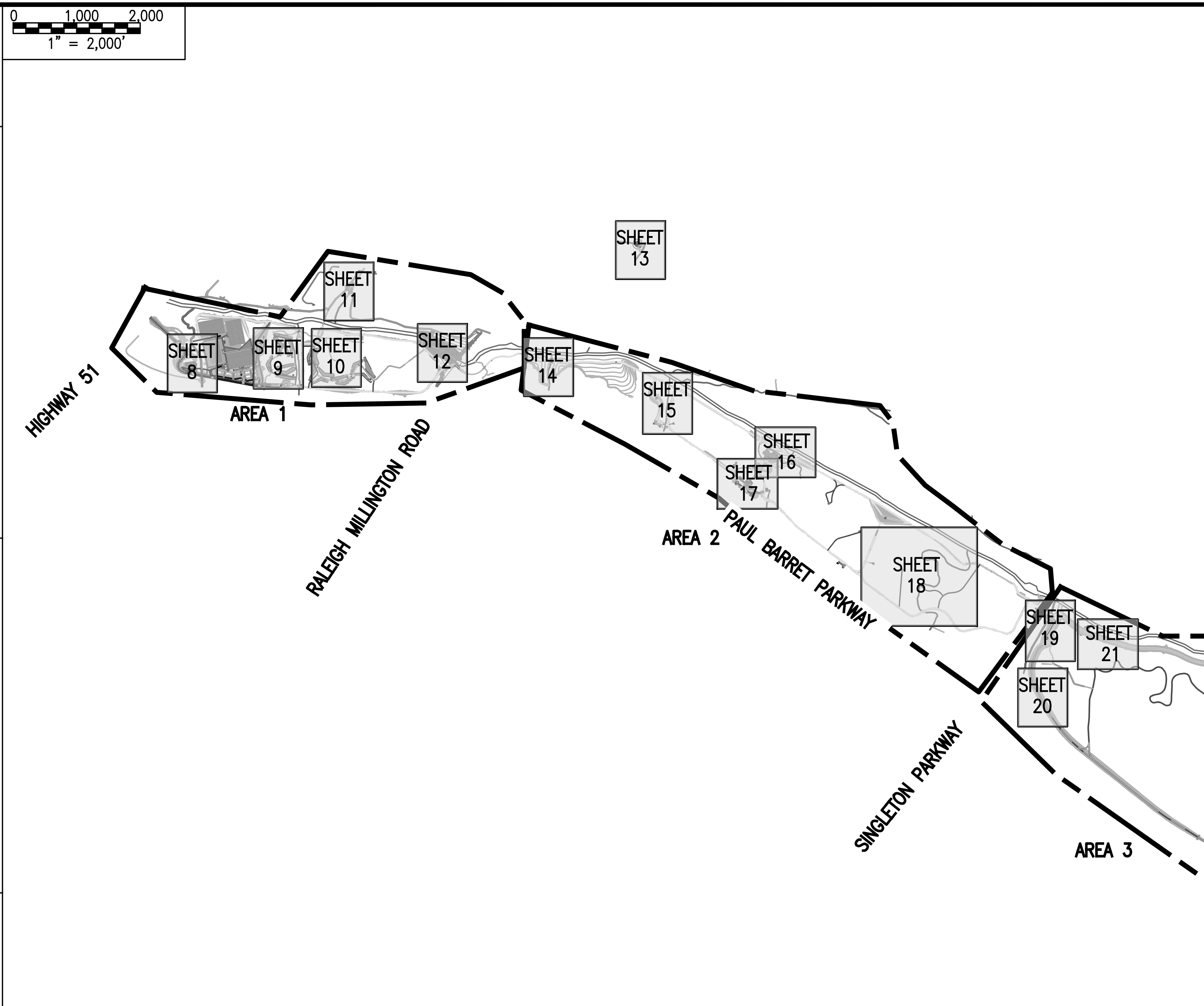
DESCRIPTION:
WETLAND PROFILE

LOCATION:
MILLINGTON, TN

PROJECT #:
57802.00

DATE:
MAY 2019

5



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ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

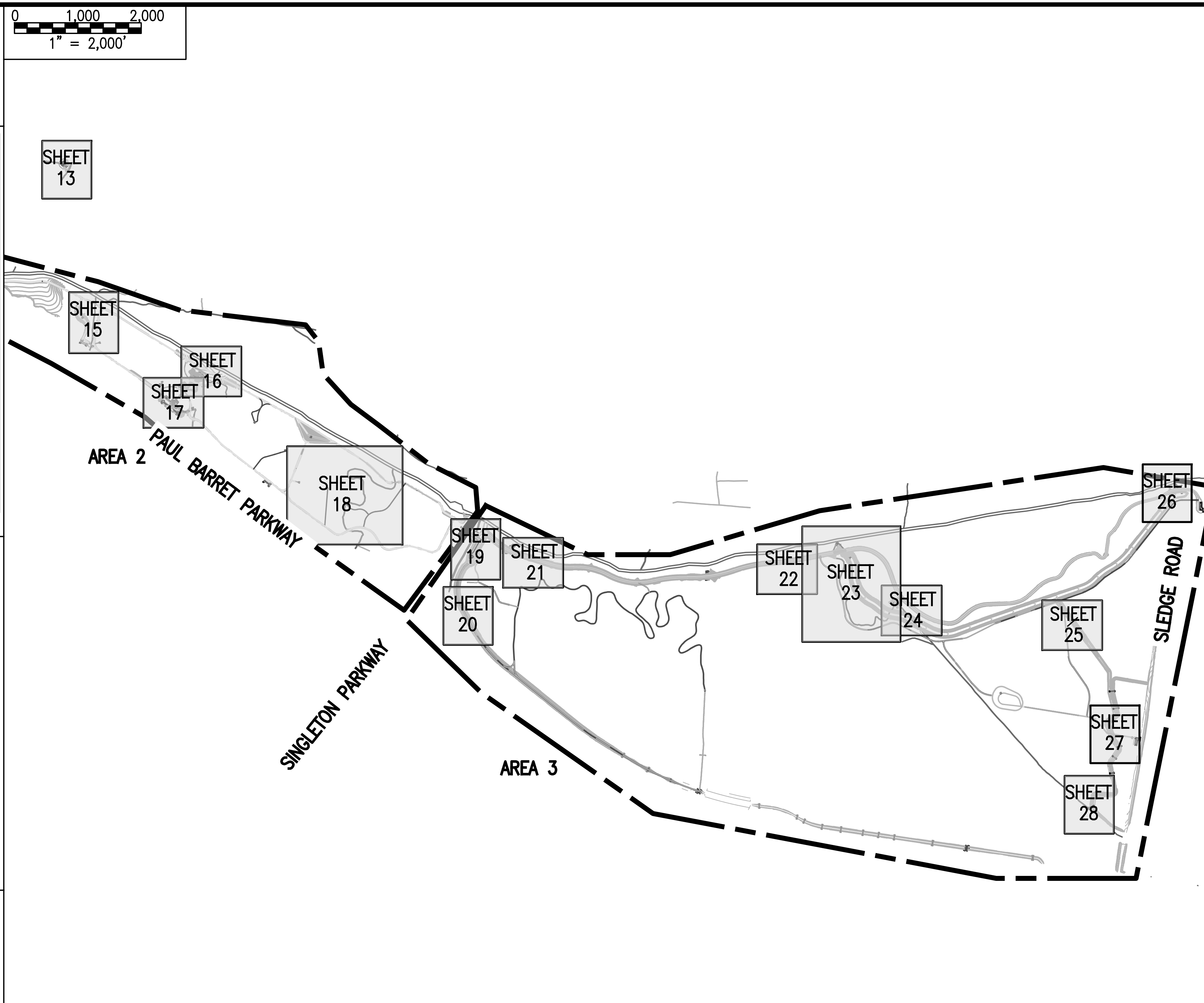
DESCRIPTION: MAP KEY - WEST

PROJECT #: 57802.00

LOCATION: MILLINGTON, TN

DATE: OCTOBER 2019

6



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ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

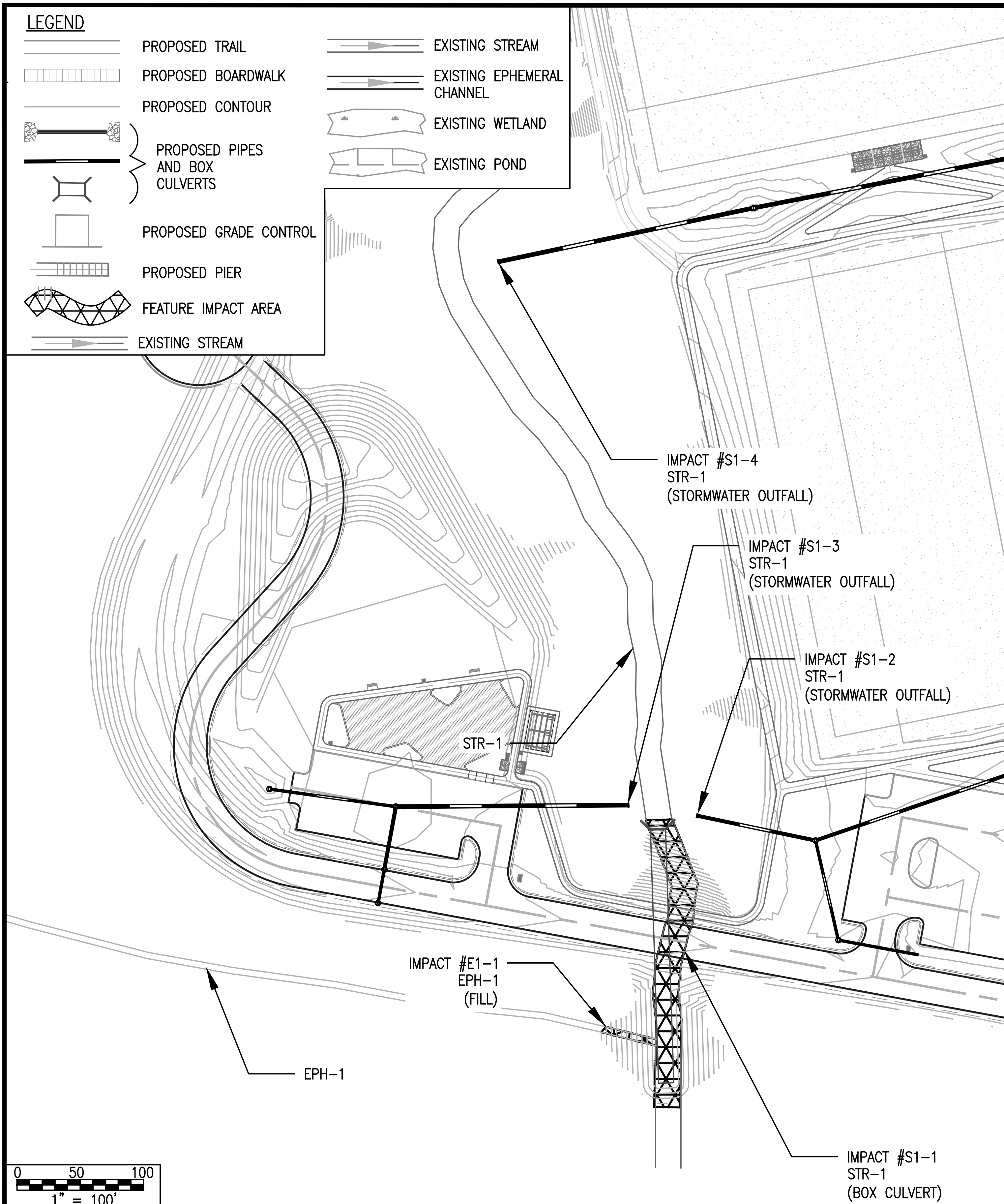
DESCRIPTION: MAP KEY - EAST

PROJECT #: 57802.00

LOCATION: MILLINGTON, TN

DATE: OCTOBER 2019

7



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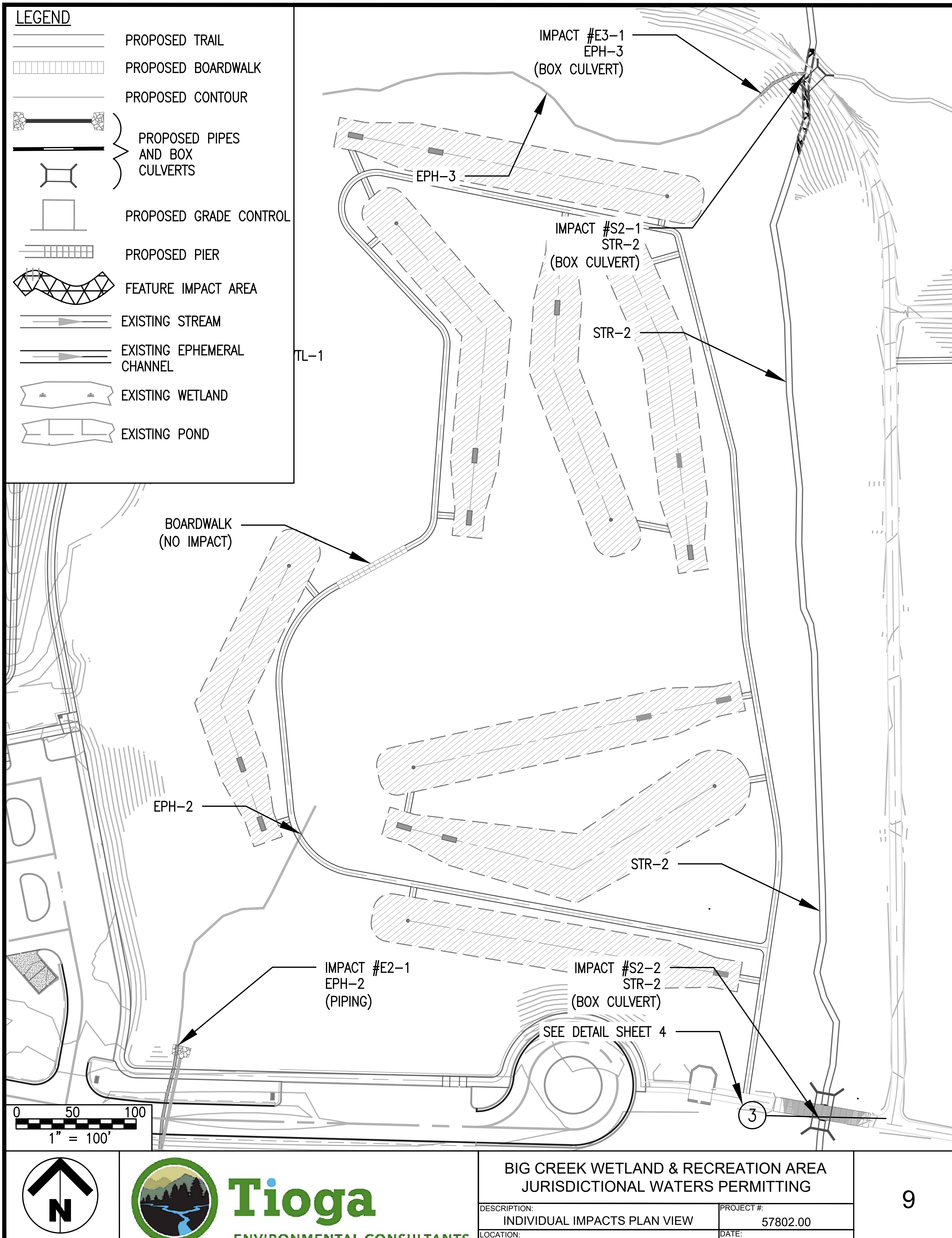
ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION: INDIVIDUAL IMPACTS PLAN VIEW	PROJECT #: 57802.00
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019



BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION: INDIVIDUAL IMPACTS PLAN VIEW	PROJECT #: 57802.00
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019

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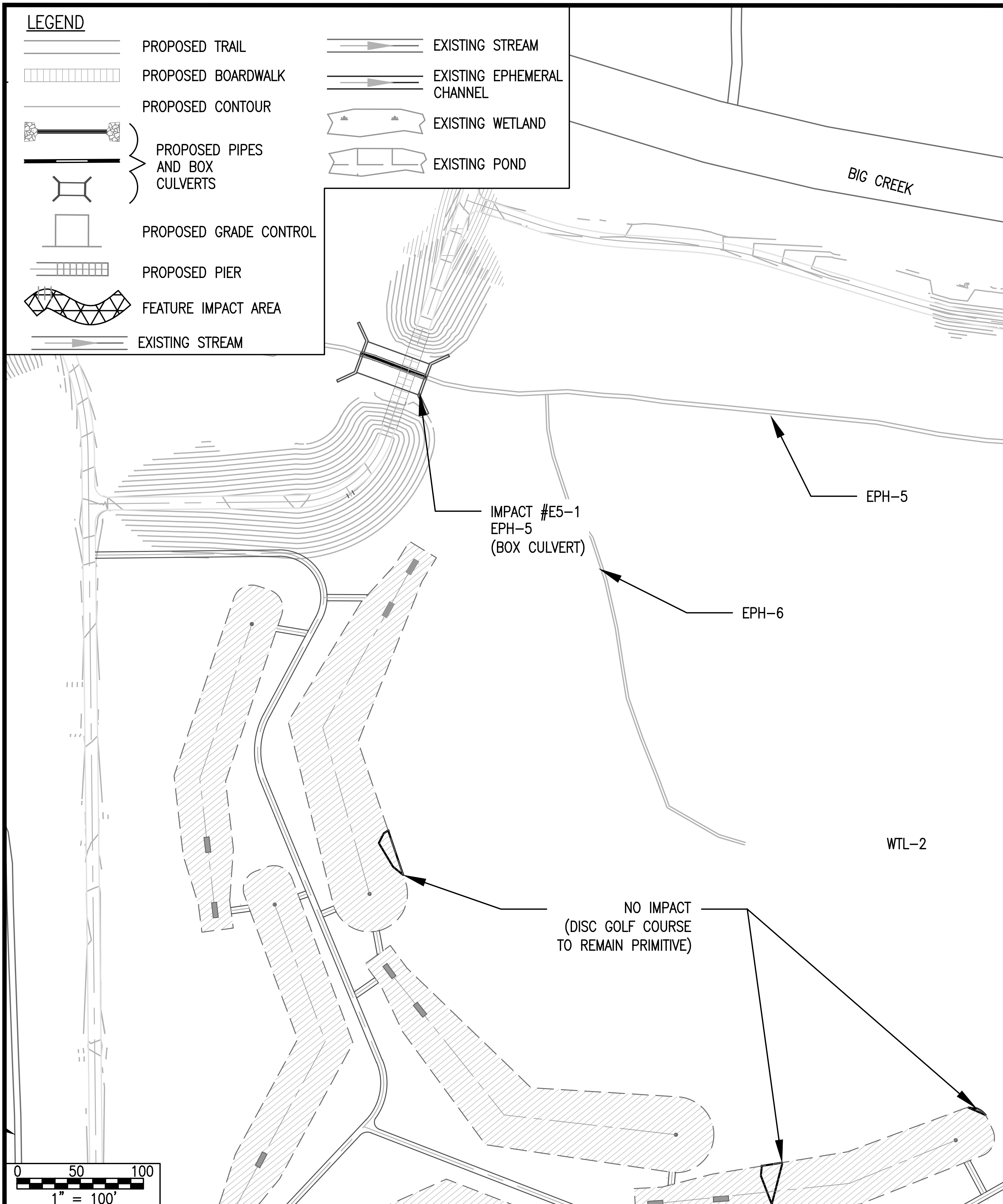
ENVIRONMENTAL CONSULTANTS



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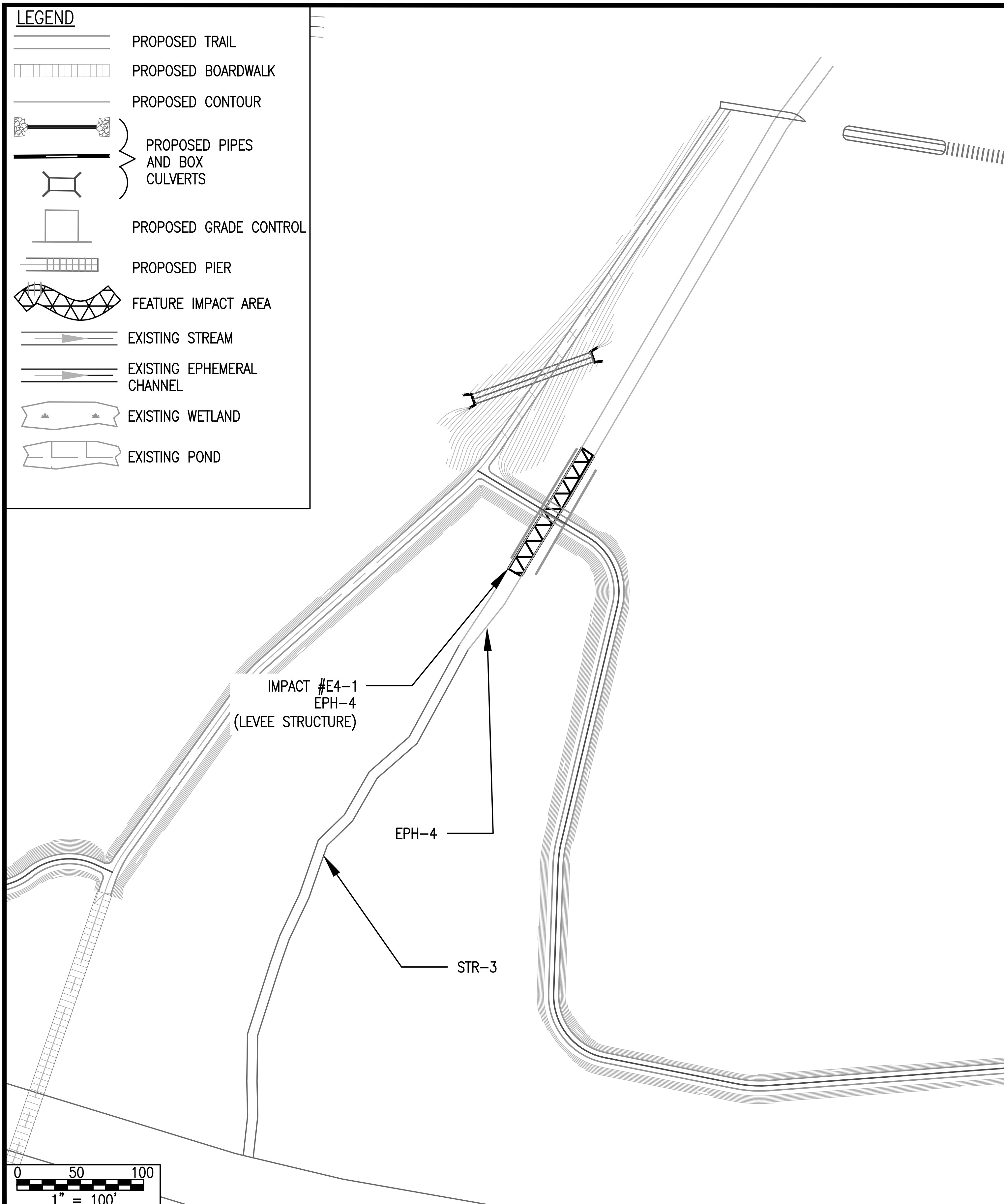
Tioga
ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION:	PROJECT #:
INDIVIDUAL IMPACTS PLAN VIEW	57802.00
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019

10

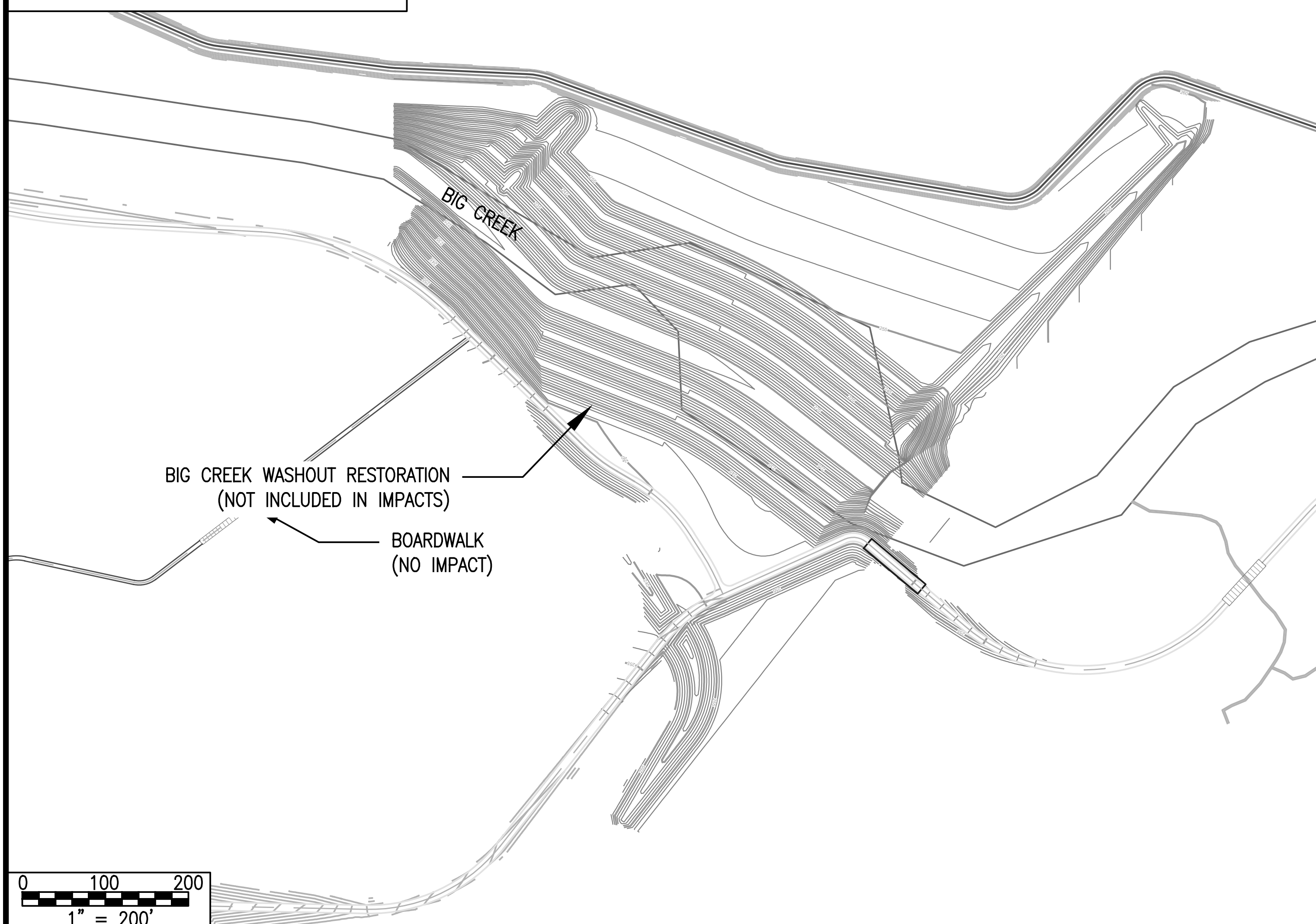


Tioga ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA JURISDICTIONAL WATERS PERMITTING		11
DESCRIPTION: INDIVIDUAL IMPACTS PLAN VIEW	PROJECT #: 57802.00	
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019	

LEGEND

- PROPOSED TRAIL
- PROPOSED BOARDWALK
- PROPOSED CONTOUR
- PROPOSED PIPES AND BOX CULVERTS
- PROPOSED GRADE CONTROL
- PROPOSED PIER
- FEATURE IMPACT AREA
- EXISTING STREAM
- EXISTING EPHEMERAL CHANNEL
- EXISTING WETLAND
- EXISTING POND



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ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION:	PROJECT #:
INDIVIDUAL IMPACTS PLAN VIEW	57802.00
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019

12

LEGEND

PROPOSED TRAIL

PROPOSED BOARDWALK

PROPOSED CONTOUR

PROPOSED PIPES AND BOX CULVERTS

PROPOSED GRADE CONTROL

PROPOSED PIER

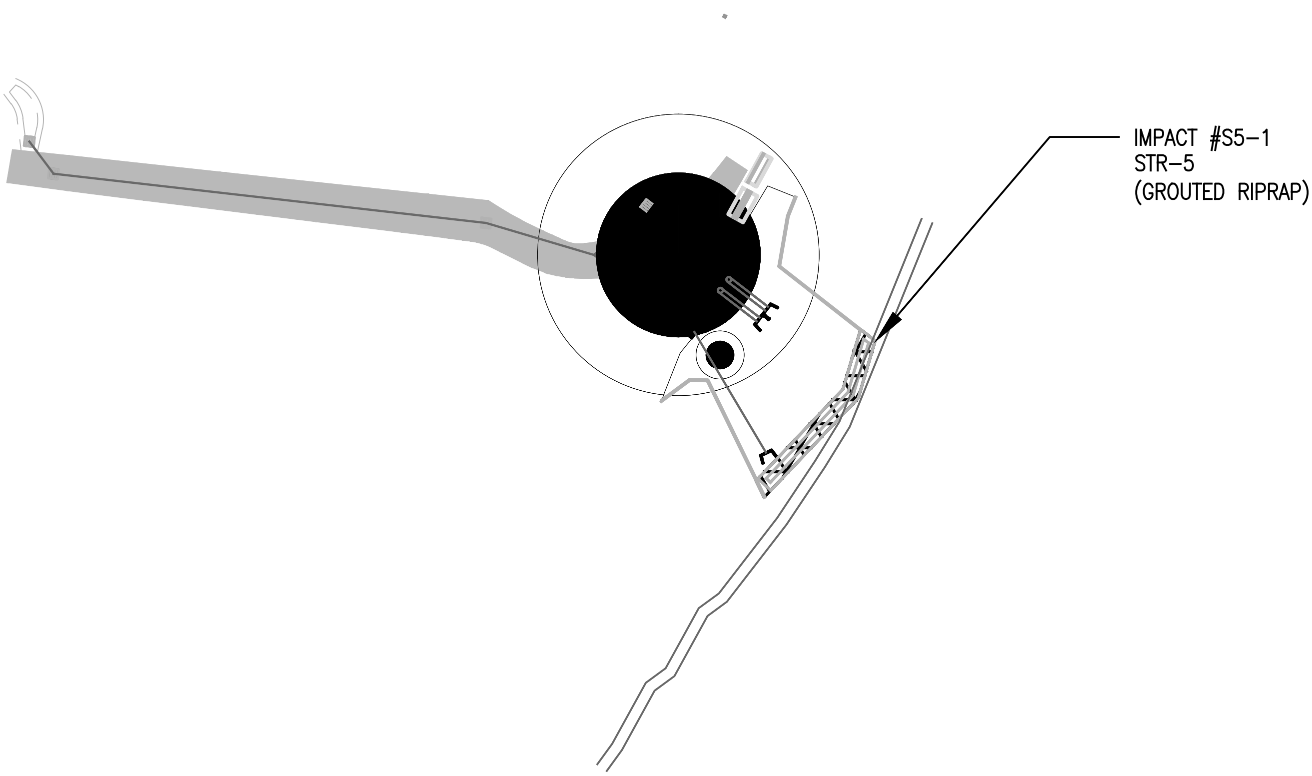
FEATURE IMPACT AREA

EXISTING STREAM

EXISTING EPHEMERAL CHANNEL

EXISTING WETLAND

EXISTING POND



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1" = 100'

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ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION: INDIVIDUAL IMPACTS PLAN VIEW	PROJECT #: 57802.00
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019

13

LEGEND

PROPOSED TRAIL

PROPOSED BOARDWALK

PROPOSED CONTOUR

PROPOSED PIPES AND BOX CULVERTS

PROPOSED GRADE CONTROL

PROPOSED PIER

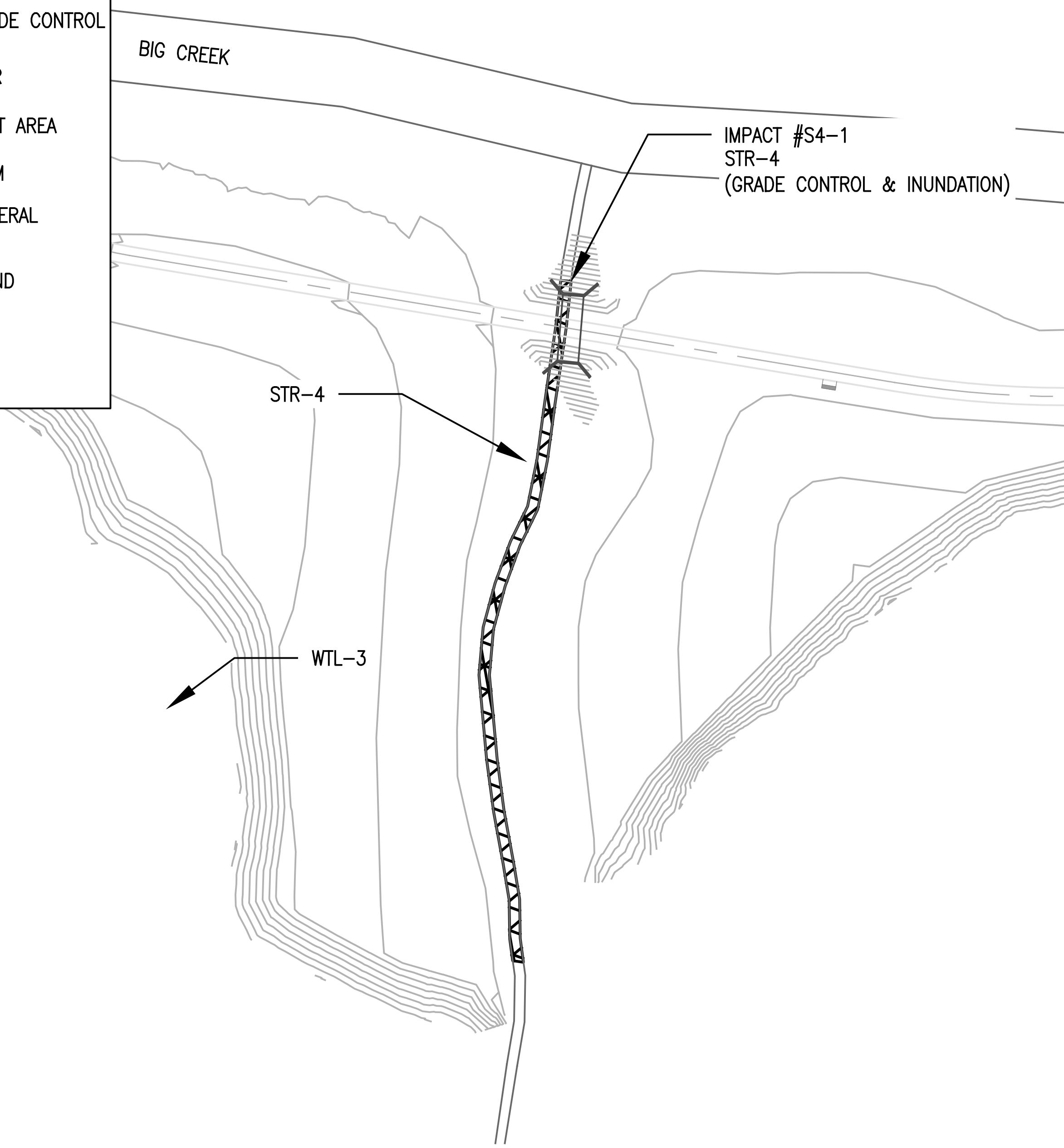
FEATURE IMPACT AREA

EXISTING STREAM

EXISTING EPHEMERAL CHANNEL

EXISTING WETLAND

EXISTING POND



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1" = 100'

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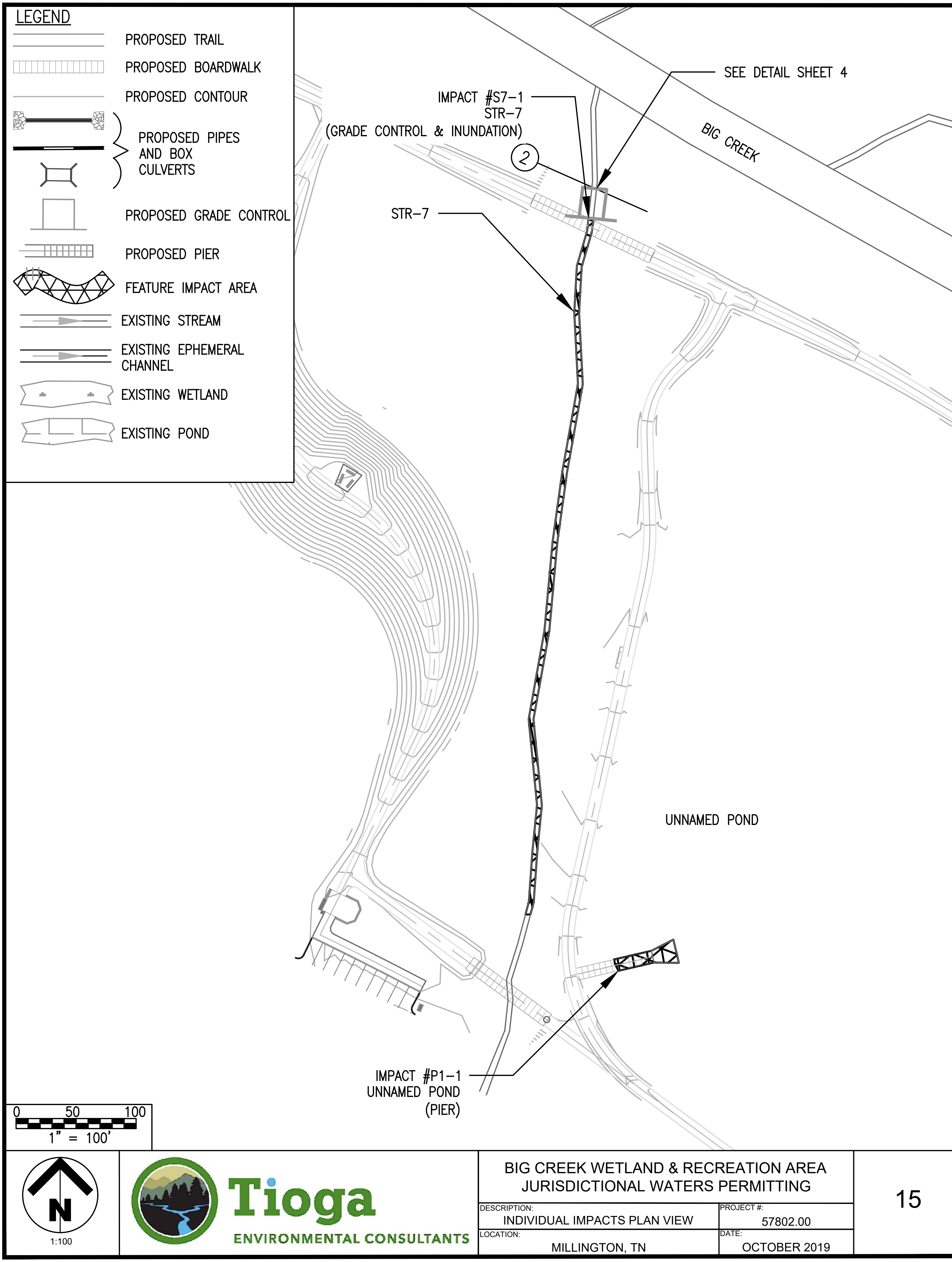
Tioga

ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA JURISDICTIONAL WATERS PERMITTING		14
DESCRIPTION: INDIVIDUAL IMPACTS PLAN VIEW	PROJECT #: 57802.00	
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019	



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BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION: INDIVIDUAL IMPACTS PLAN VIEW	PROJECT #: 57802.00
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019

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ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

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INDIVIDUAL IMPACTS PLAN VIEW

LOCATION:
MILLINGTON, TN

PROJECT #:
57802.00

DATE:
OCTOBER 2019

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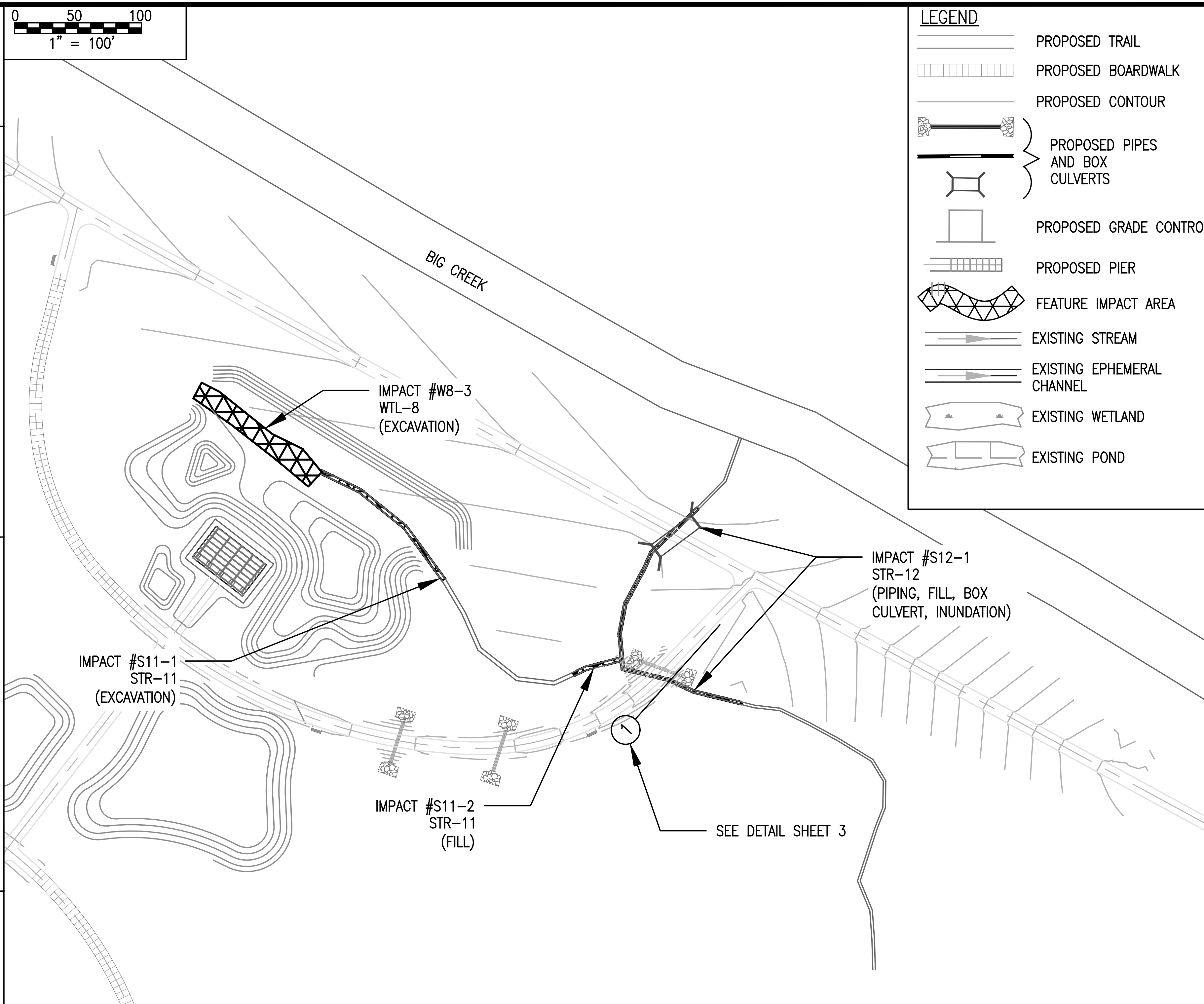

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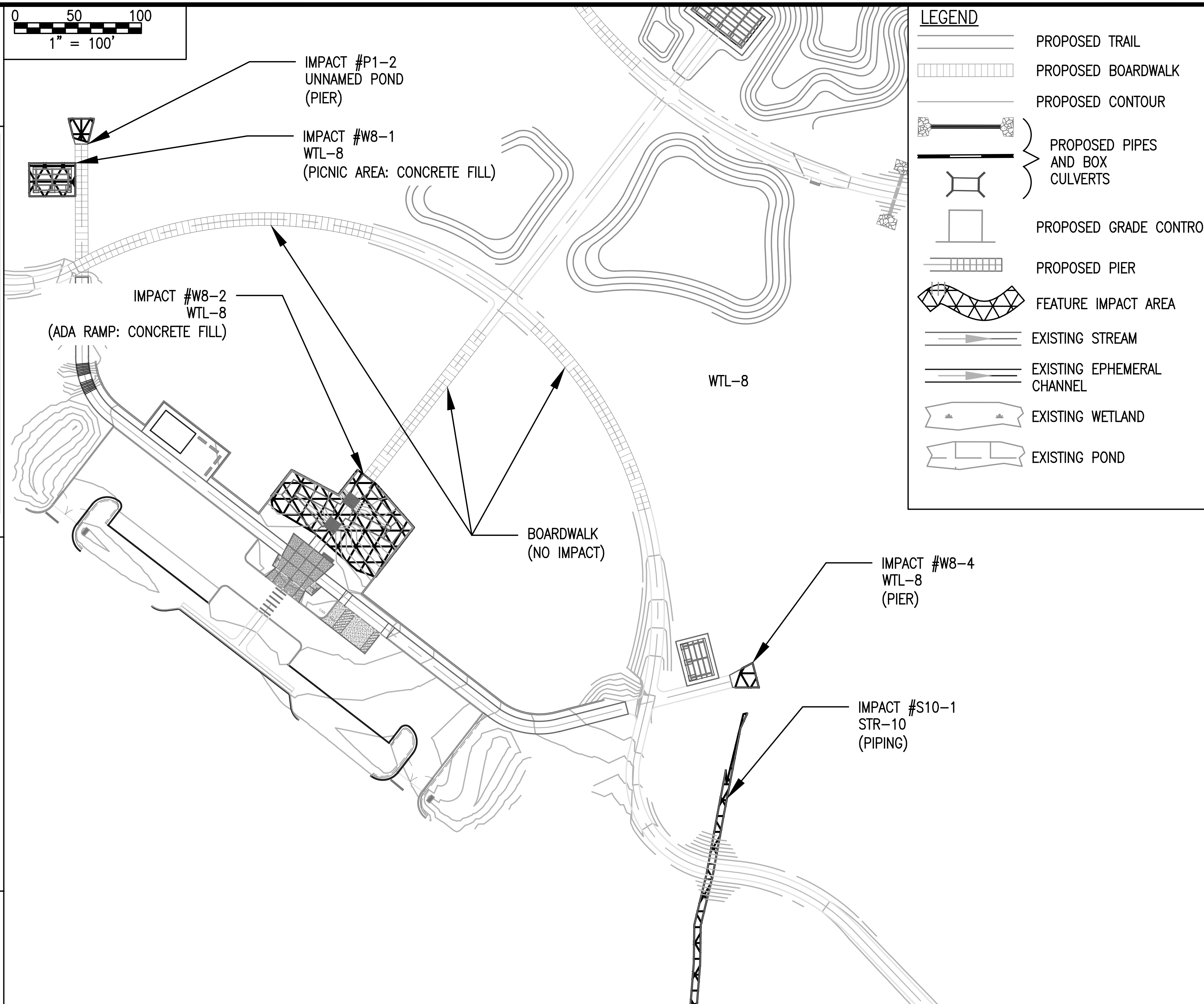
Tioga
ENVIRONMENTAL CONSULTANTS



BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

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INDIVIDUAL IMPACTS PLAN VIEW

LOCATION:
MILLINGTON, TN

PROJECT #:
57802.00

DATE:
OCTOBER 2019

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Tioga
ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

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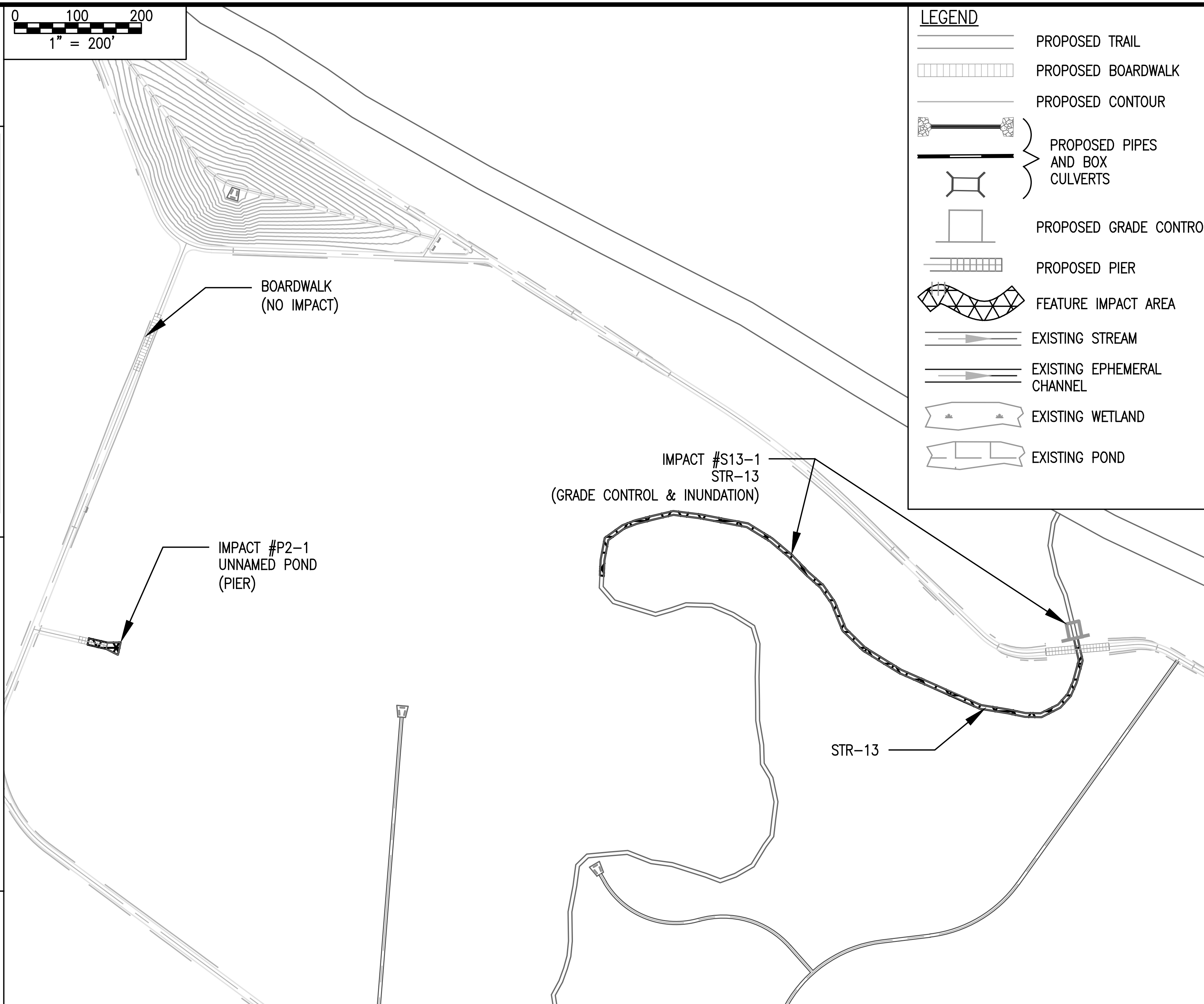
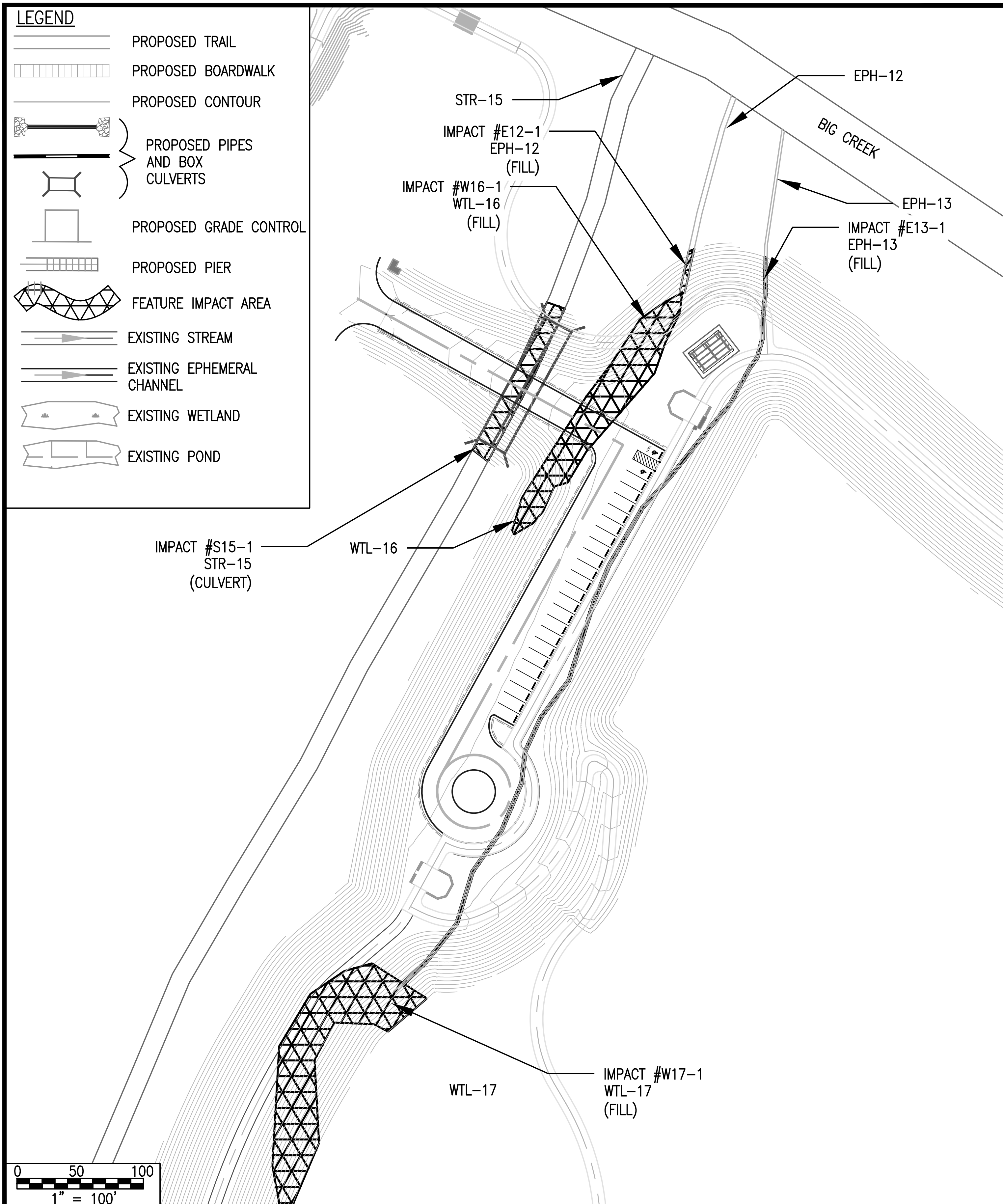
INDIVIDUAL IMPACTS PLAN VIEW

LOCATION:
MILLINGTON, TN

PROJECT #:
57802.00

DATE:
OCTOBER 2019





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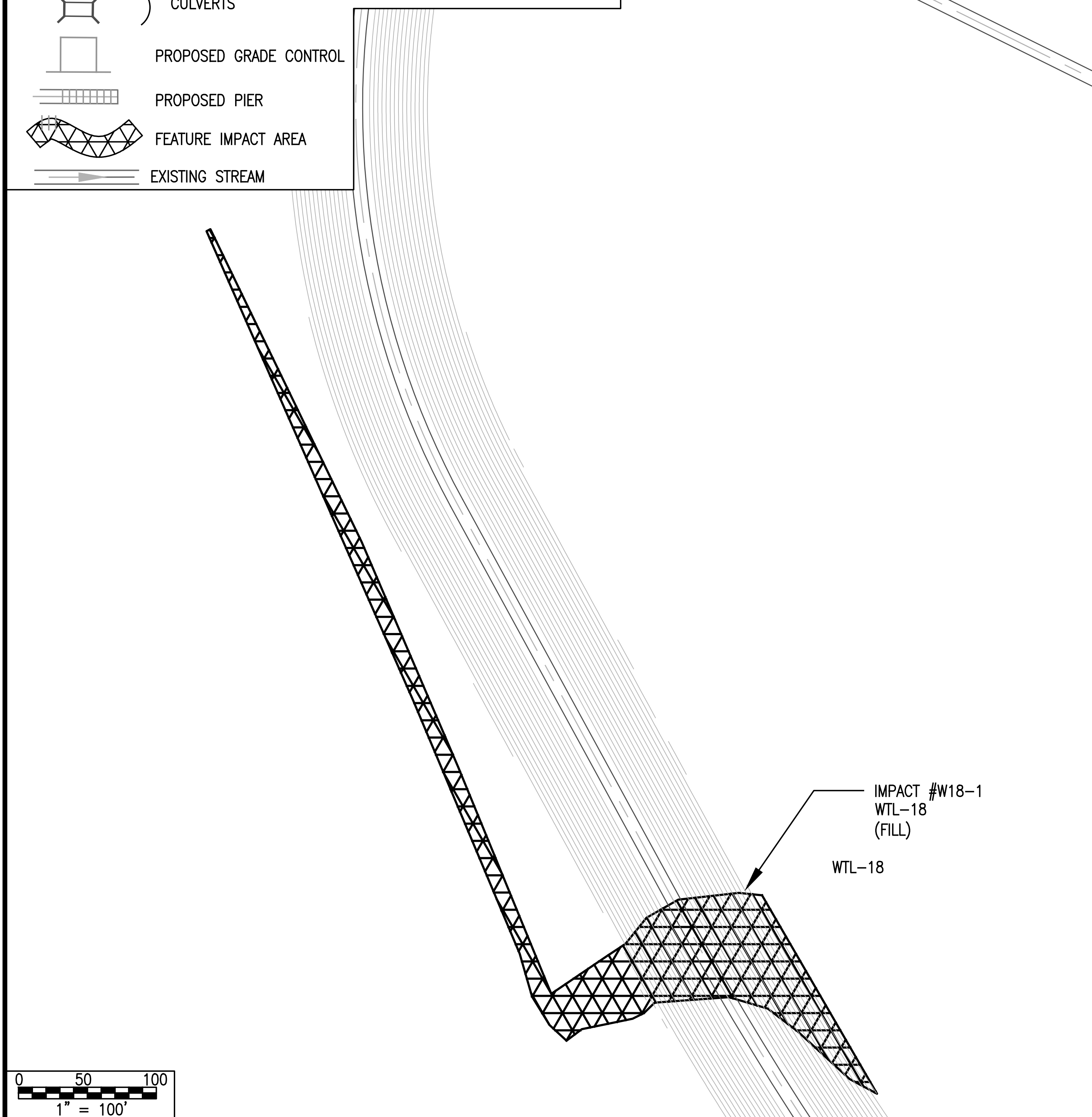
Tioga
ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION: INDIVIDUAL IMPACTS PLAN VIEW	PROJECT #: 57802.00
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019

LEGEND

- PROPOSED TRAIL
- PROPOSED BOARDWALK
- PROPOSED CONTOUR
- PROPOSED PIPES AND BOX CULVERTS
- PROPOSED GRADE CONTROL
- PROPOSED PIER
- FEATURE IMPACT AREA
- EXISTING STREAM
- EXISTING STREAM
- EXISTING EPHEMERAL CHANNEL
- EXISTING WETLAND
- EXISTING POND



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1" = 100'

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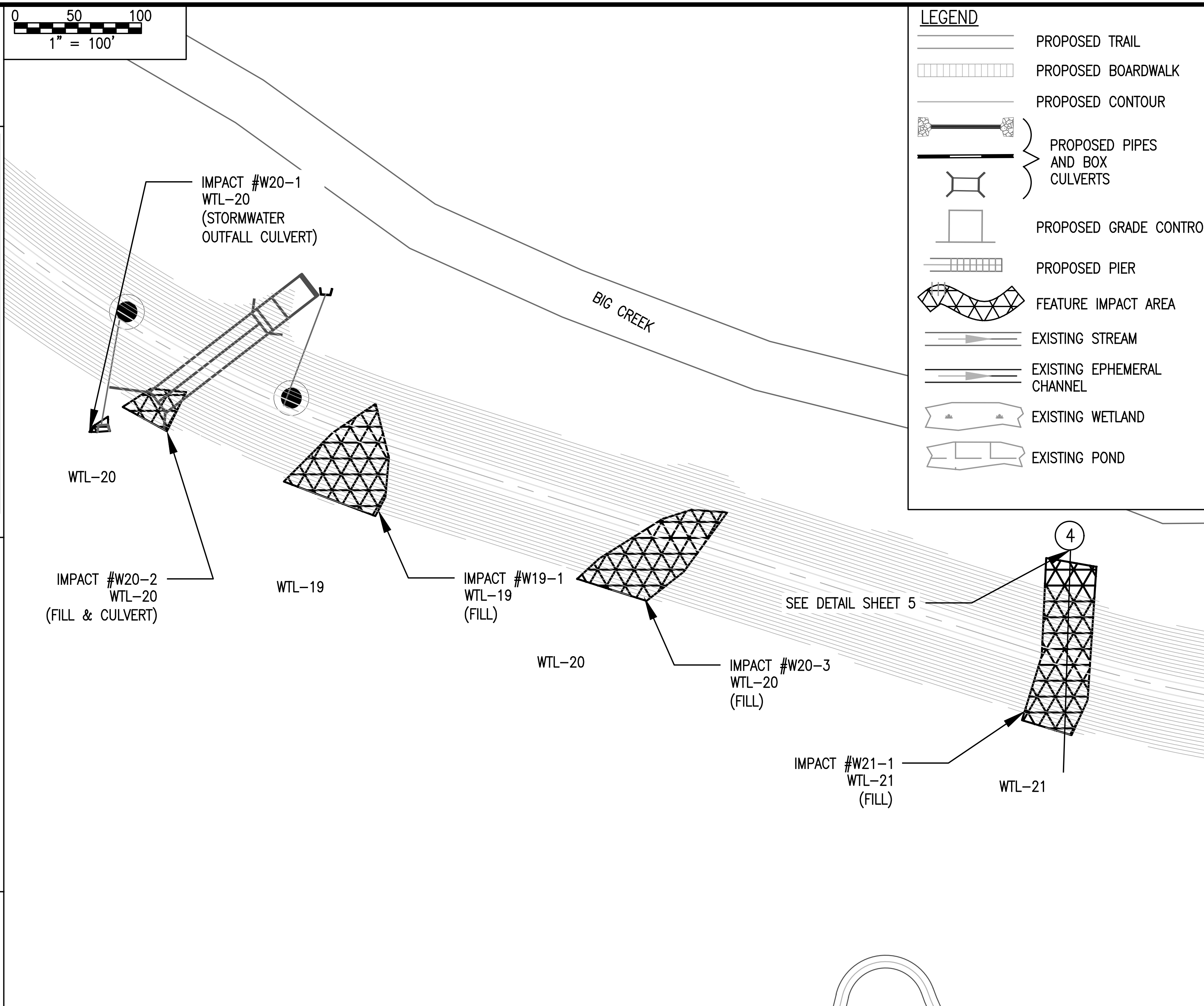
Tioga
ENVIRONMENTAL CONSULTANTS

BIG CREEK WETLAND & RECREATION AREA
JURISDICTIONAL WATERS PERMITTING

DESCRIPTION: INDIVIDUAL IMPACTS PLAN VIEW	PROJECT #: 57802.00
LOCATION: MILLINGTON, TN	DATE: OCTOBER 2019



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BIG CREEK WETLAND & RECREATION AREA
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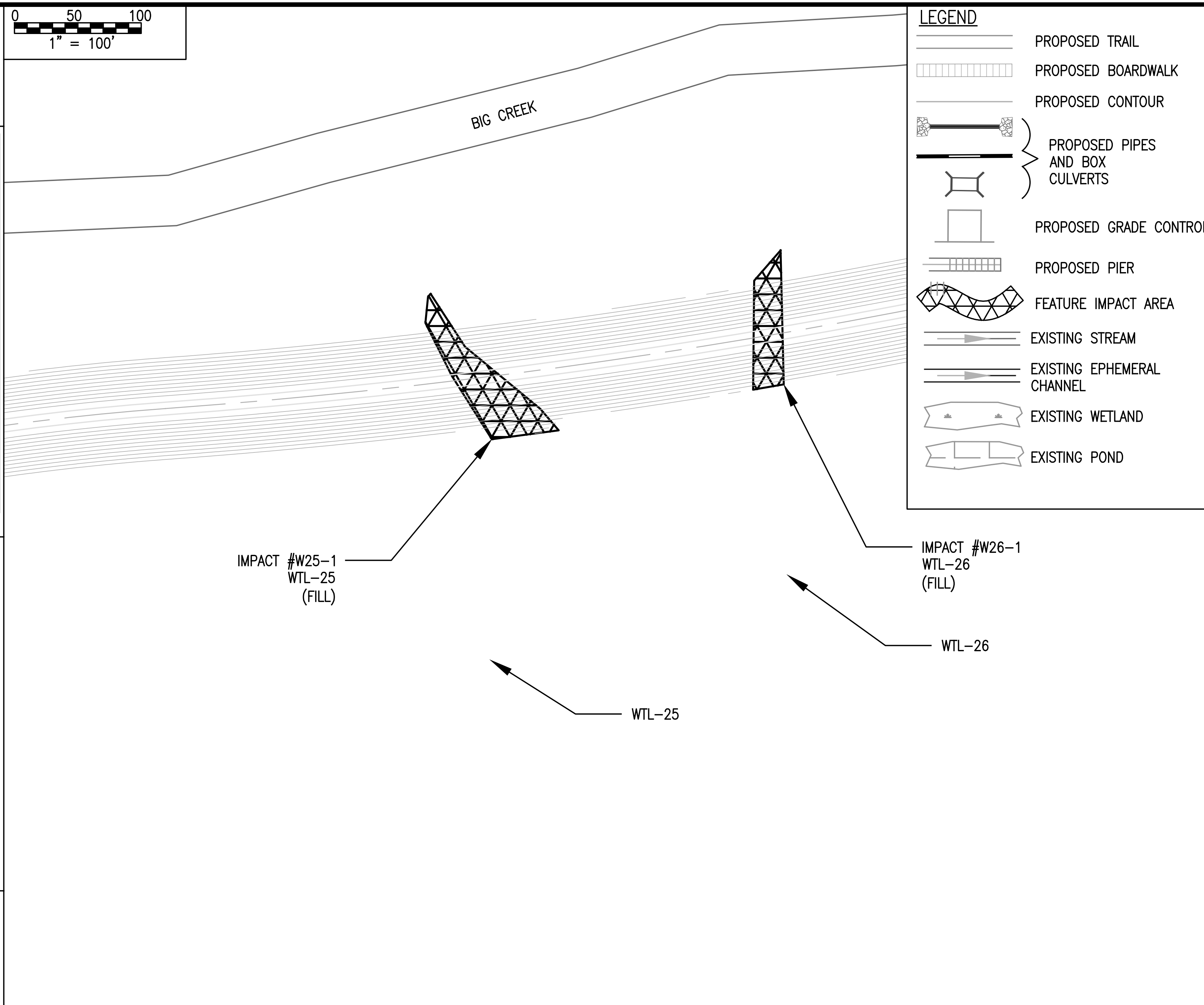
INDIVIDUAL IMPACTS PLAN VIEW

PROJECT #:
57802.00

LOCATION:
MILLINGTON, TN

DATE:
OCTOBER 2019



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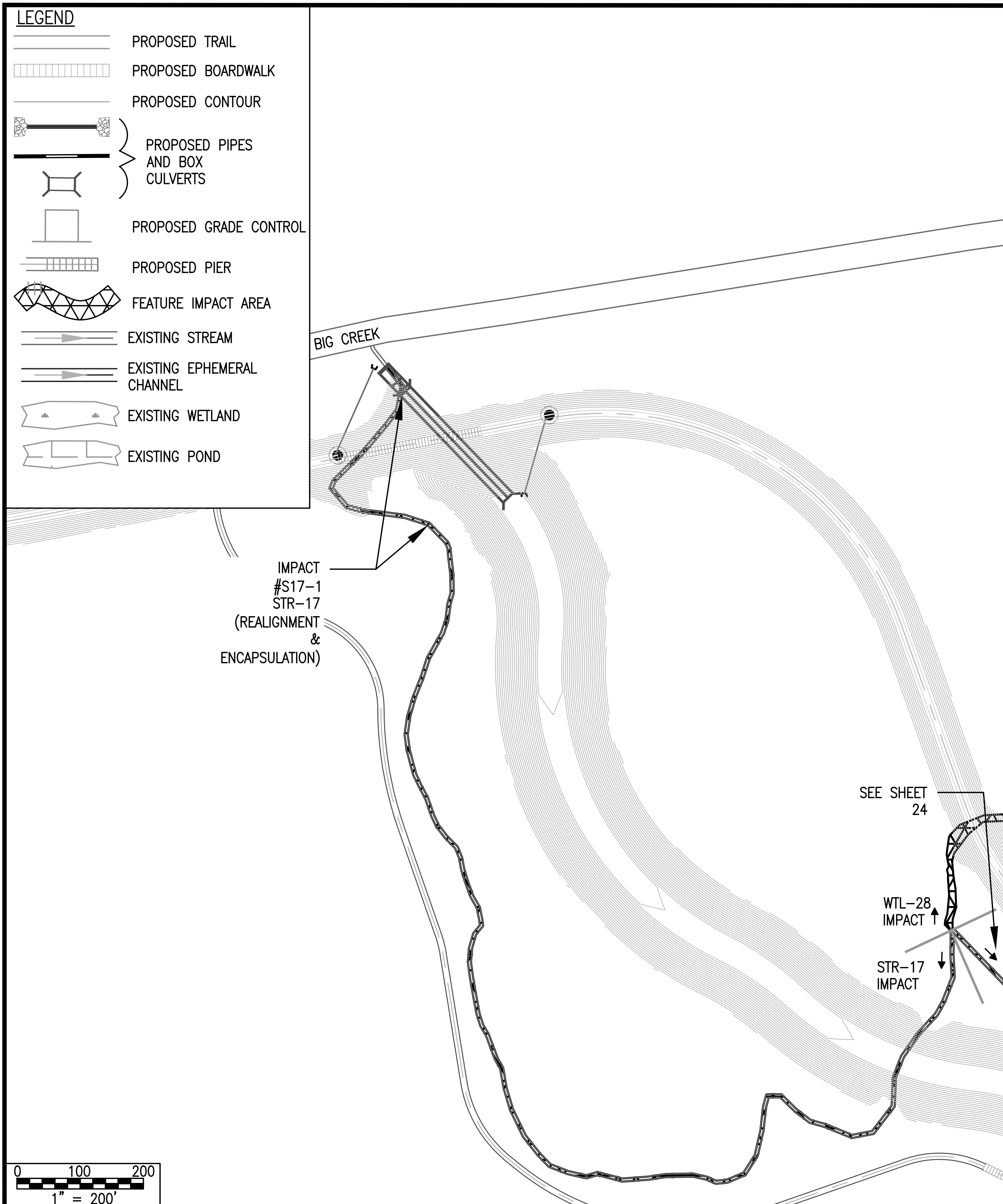

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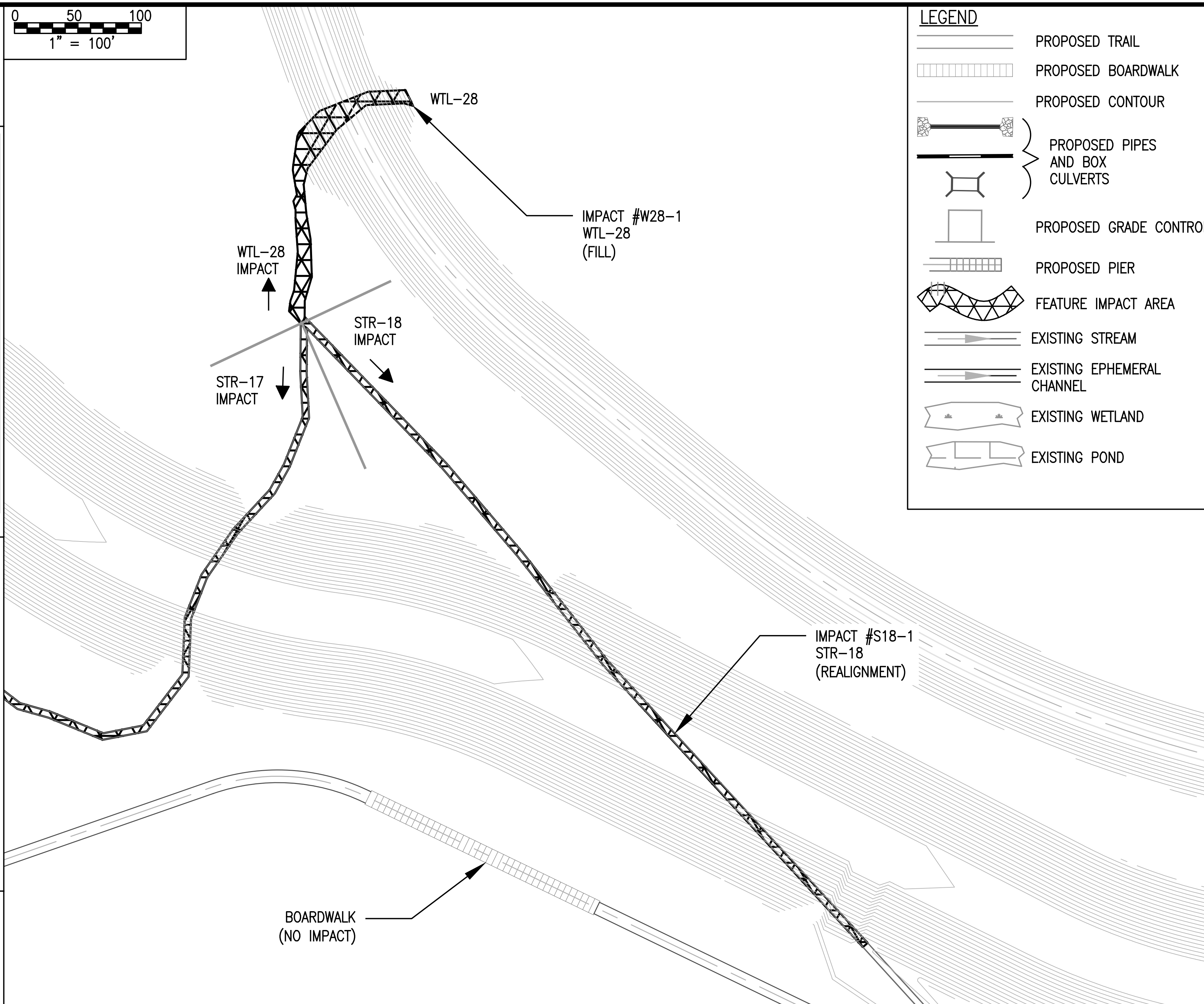

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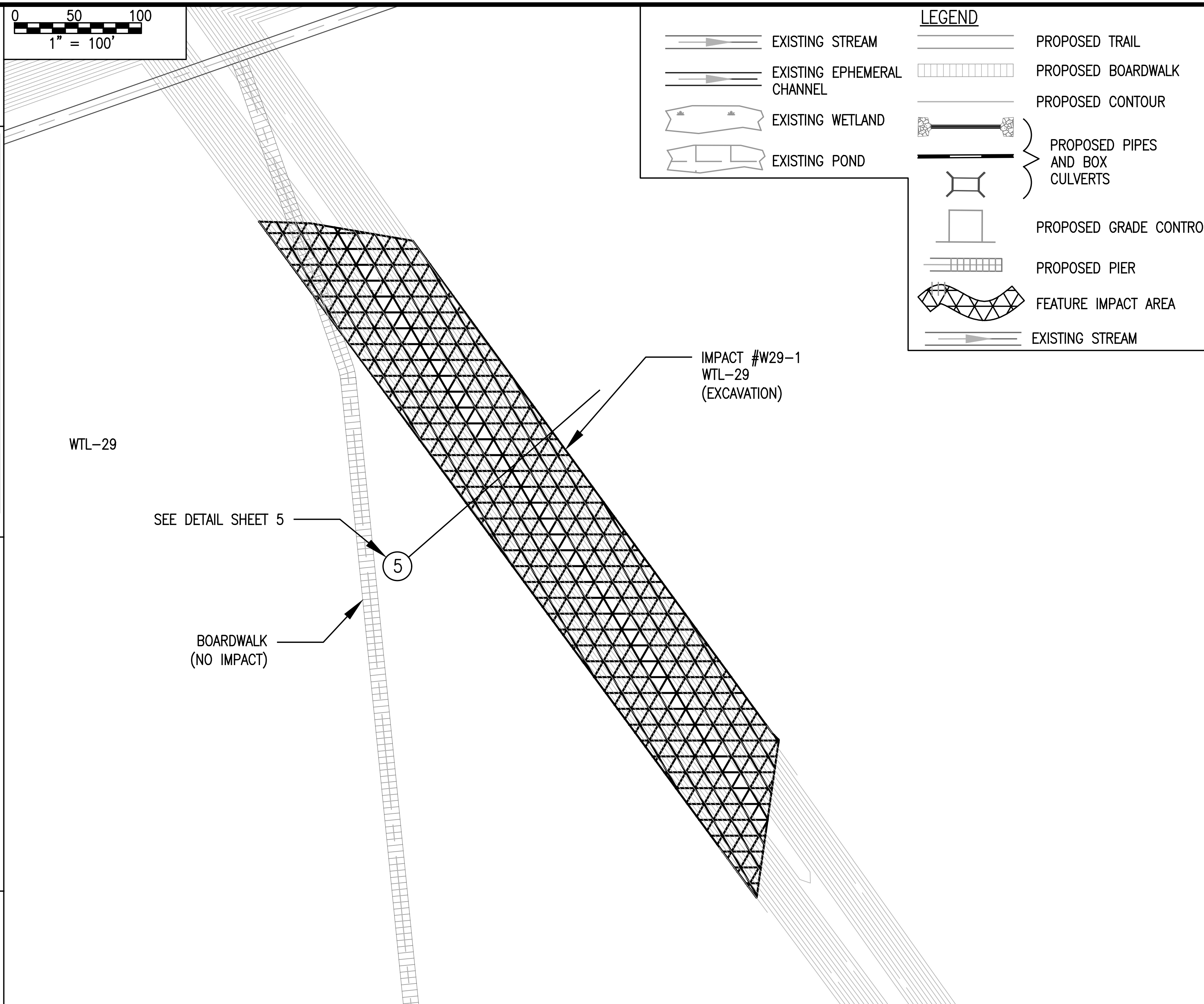

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PROJECT #:
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DATE:
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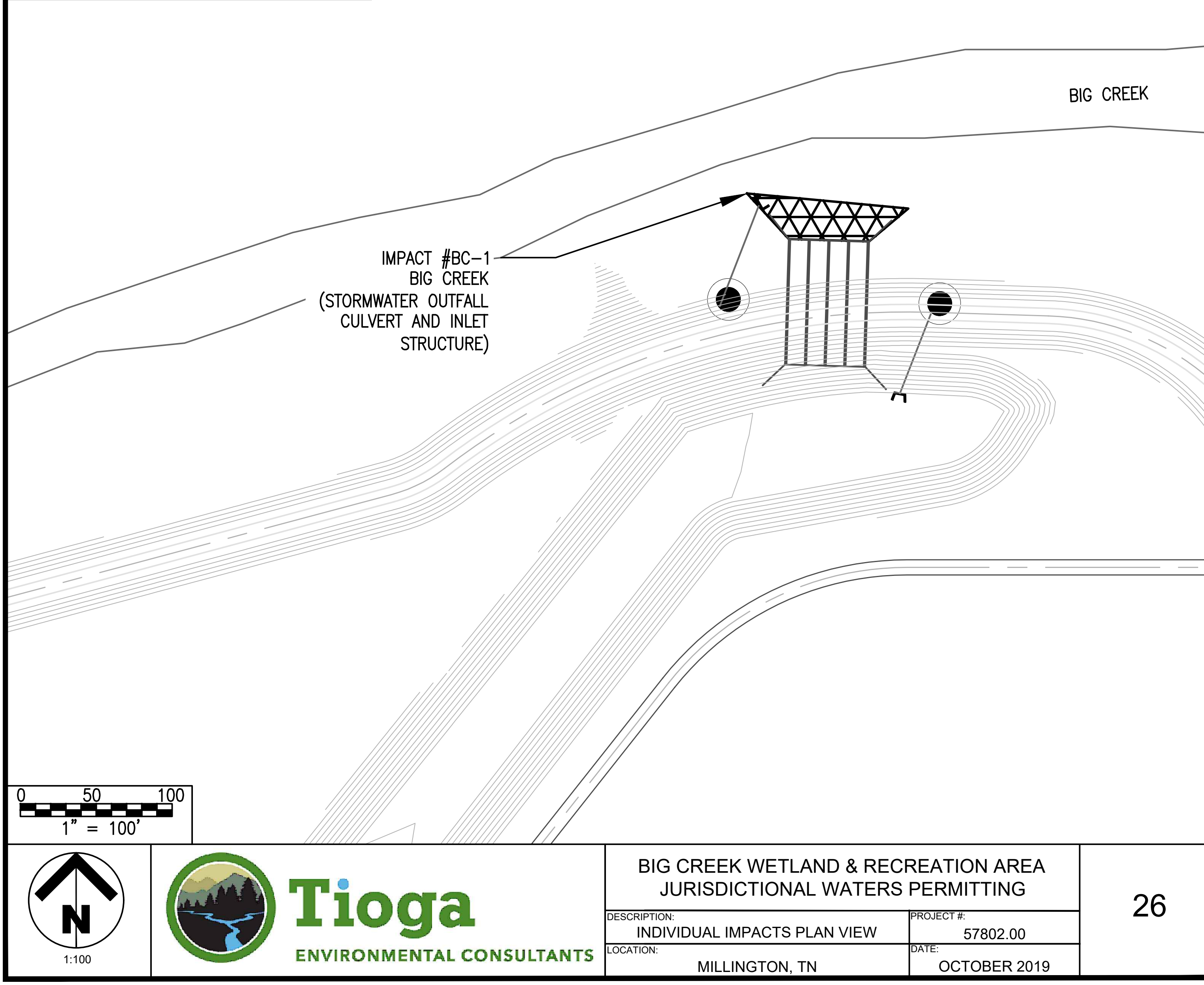
LEGEND

PROPOSED TRAIL
PROPOSED BOARDWALK
PROPOSED CONTOUR
PROPOSED PIPES AND BOX CULVERTS
PROPOSED GRADE CONTROL
PROPOSED PIER
FEATURE IMPACT AREA
EXISTING STREAM
EXISTING EPHEMERAL CHANNEL
EXISTING WETLAND
EXISTING POND



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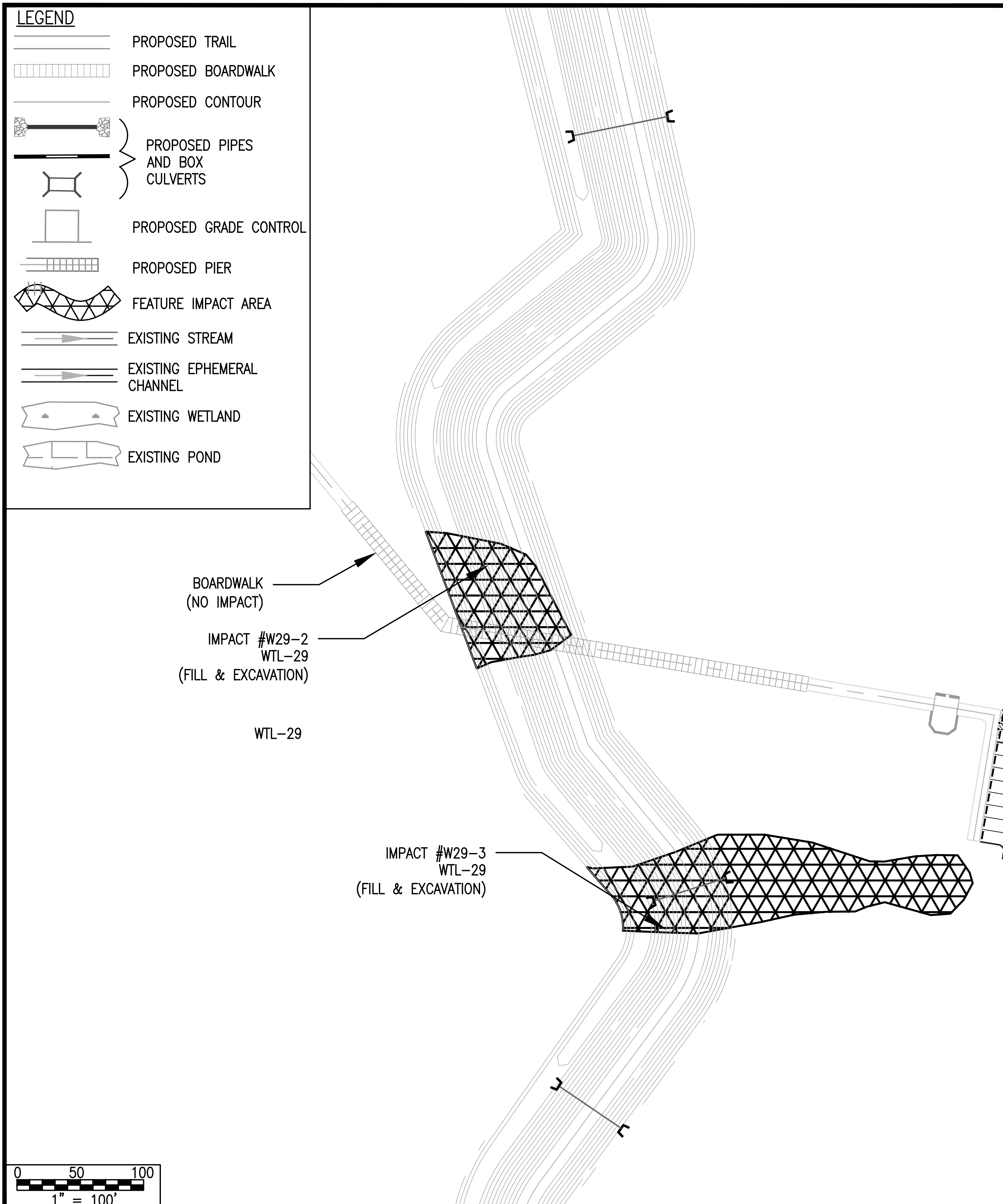

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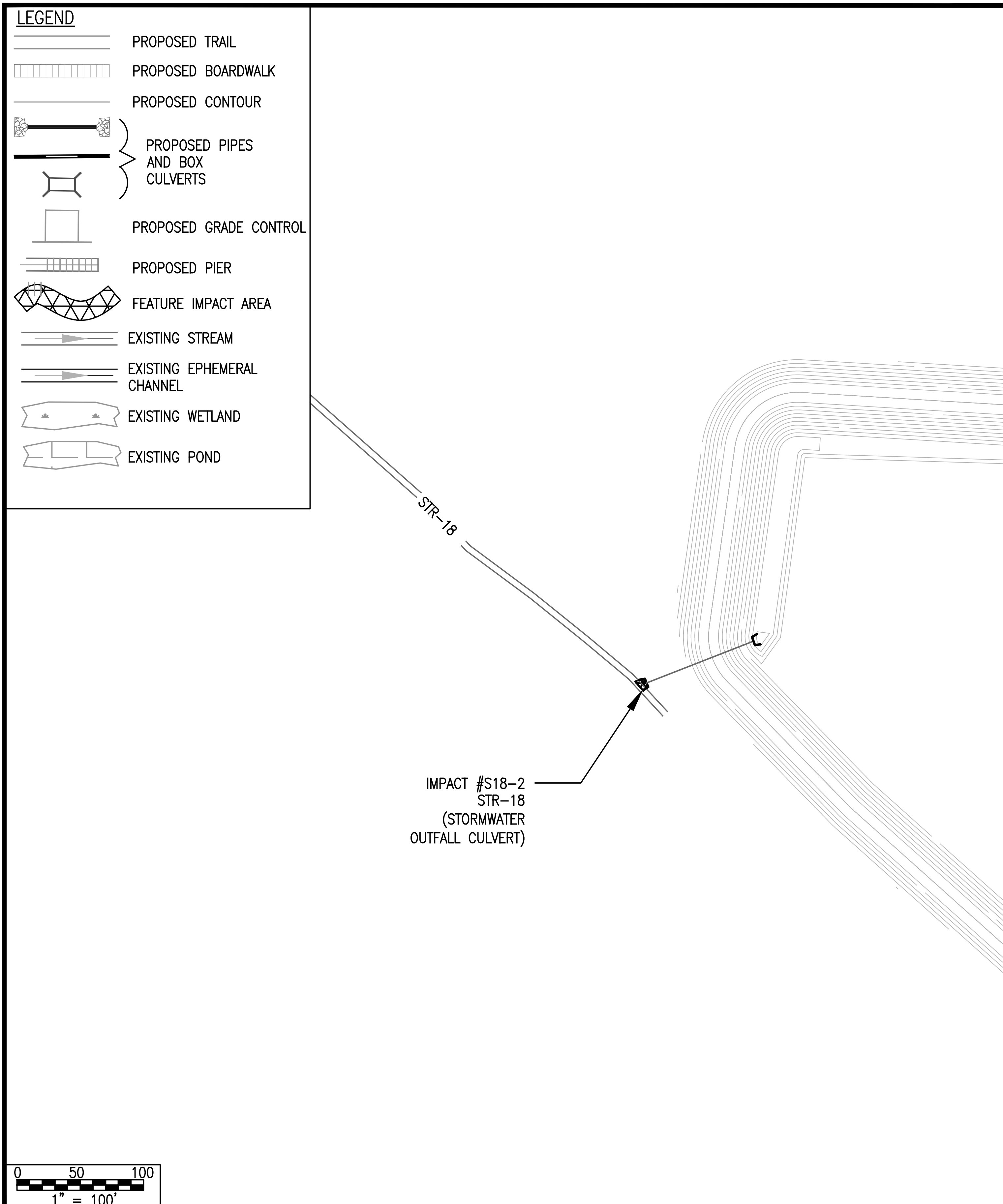

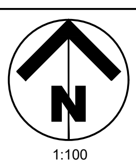

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Shelby County Government
Office of Resilience

Big Creek National Disaster Resilience Design Project

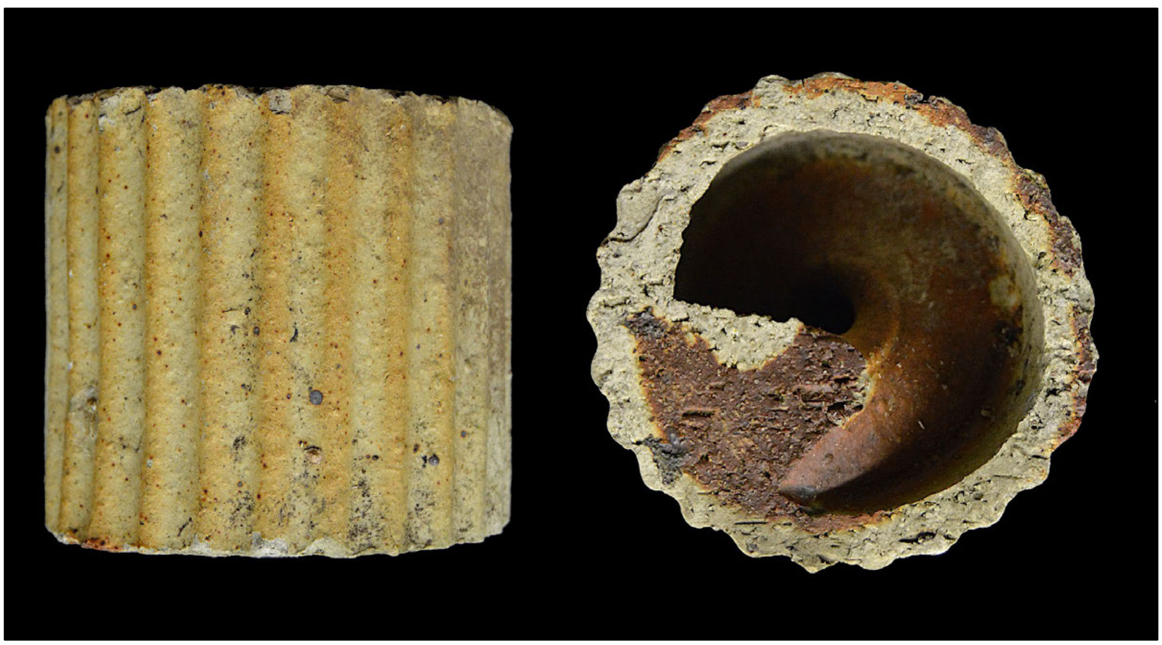
Appendix F

Cultural Resources Survey

PANAMERICAN REPORT NO. 38188

PANAMERICAN CONSULTANTS, INC.

PHASE I CULTURAL RESOURCES SURVEY FOR THE BIG CREEK NATIONAL DISASTER RESILIENCE IMPROVEMENTS PROJECT, SHELBY COUNTY, TENNESSEE



PREPARED FOR:

SHELBY COUNTY DIVISION OF PLANNING
125 NORTH MAIN, ROOM 468
MEMPHIS, TENNESSEE 38103

PREPARED BY:

PANAMERICAN CONSULTANTS, INC.
91 TILLMAN STREET
MEMPHIS, TENNESSEE 38111

FINAL REPORT ♦ MAY 2019

Cover Figure: Top and side views of a corrugated ceramic roller from Site 40SY664 Locus A.

FINAL REPORT

PHASE I CULTURAL RESOURCES SURVEY FOR THE BIG CREEK NATIONAL DISASTER RESILIENCE IMPROVEMENTS PROJECT, SHELBY COUNTY, TENNESSEE

Lead Agency:

U.S. Department of Housing and Urban Development

Prepared for:

Shelby County Division of Planning
125 North Main, Room 468
Memphis, Tennessee 38103
Purchase Order No. P032680

Tennessee Division of Archaeology Permit No. 001060

Prepared by:

C. Andrew Buchner, Andrew Saatkamp, and Karla Oesch

Panamerican Consultants, Inc.
91 Tillman Street
Memphis, Tennessee 38111
Panamerican Report No. 38188

C Andrew Buchner

C. Andrew Buchner, RPA
Principal Investigator

MAY 2019

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MANAGEMENT SUMMARY

Under contract with Shelby County Government, Panamerican Consultants, Inc. conducted a Phase I cultural resources survey for the Big Creek National Disaster Resilience Improvements Project in Shelby County, Tennessee. The archaeological APE is considered the 225 ac. within the 1,478 ac. primary project area that will be disturbed by the construction, and the 230.7 ac. associated with the three off site mitigation or borrow areas. In total, the APE is 455.7 ac. (0.7120 mi.^{2}). The six tracts of the APE can be identified on the Brunswick, TN [408 SE] and Millington, TN 7.5-min. quads [408 SW].

The setting is low-lying floodplains along the Big Creek Drainage Canal, with the exception of the possible Borrow Area; it is on the floodplain of the Loosahatchie River (of which Big Creek is a tributary). The current land use is variable, but much of the area is a wetland forest, indeed 683 ac., or 46 percent, of the primary project area consists of wetlands.

A standard cultural resources literature and records check was conducted using TDOA, THC and NRHP databases as primary sources, and this research revealed that there are three previously recorded archaeological sites within the APE, and no previously recorded THC above ground cultural resources or NRHP listed historic properties.

Prior to conducting the fieldwork a TDOA permit was obtained, because a portion of Area 3 contains a 409 ac. TDOT wetland mitigation tract. The majority of the cultural resources fieldwork was conducted from 10 January 2019 to 5 February 2019 by a crew ranging from two to four. Some follow up work was conducted at 40SY664 on 28 February 2019. The basic site detection method included shovel testing at 30-m intervals in areas with restricted surface visibility (< 50 percent) and surface inspection at 15 m intervals in areas with good surface visibility (>50 percent). Additionally all sites, both newly recorded and previously recorded, were shovel tested at 10 m or 15 m intervals.

The survey resulted in revisits to three previously recorded sites (40SY514, 40SY648 and 40SY664), and the documentation of two newly recorded Historic sites (40SY514, 40SY648) and two newly recorded Historic domestic loci not assigned trinomials by the TDOA (Locus 2 and Locus 3). Two of these sites are Prehistoric (40SY514 and 40SY648), three are Euro-American domestic occupations (40SY841, Locus 2 and Locus 3), one is a segment of an early twentieth century road (40SY842), one is several sets of concrete ruins associated with a World War II era powder plant (40SY664).

Panamerican recommends that 40SY664 be considered potentially eligible for the NRHP under Criterion D (Information Potential), as the site could contribute to the archaeological understanding of the World War II era Tennessee Powder Company and Chickasaw Ordnance Works. Avoidance of the loci of this site within the APE is the recommended management treatment plan, however if this is not possible then the site should be Phase II tested. Resources 40SY514, 40SY648, 40SY514, 40SY648, Locus 2 and Locus 3 are recommended ineligible for the NRHP.

ACKNOWLEDGEMENTS

Panamerican Consultants, Inc. appreciates the opportunity to have provided Shelby County Division of Planning with our services. Jim Vazquez and Chris Masin provided overall administration, and Sonja Worthy was the contracting officer. Trevor Cropp of Barge Design was the Project Manager, and assisted the crew with logistical issues during the fieldwork.

Panamerican Consultants, Inc. personnel who contributed to the project include the following individuals. Karla Oesch, RPA conducted the research at the Tennessee Division of Archaeology facility. Andrew Saatkamp, RPA directed the fieldwork. The field crew included Hannah Fite, Phillip Geary, Erin Delaney, Loren Clark and Rebecca Hart at various times. Karla Oesch, Lab Director, conducted the artifact analysis. Anna Hinnenkamp-Faulk edited the report. Kate Gilow provided administrative support during all phases of the project.

TABLE OF CONTENTS

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LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

Under contract with Shelby County Government, Panamerican Consultants, Inc. (Panamerican) conducted a Phase I cultural resources survey for the Big Creek National Disaster Resilience Improvements Project in Shelby County, Tennessee. The survey was designed to create an inventory of cultural resources within the area of potential effect (APE), and to make appropriate management recommendations for their treatment.

The project was conducted to assist Shelby County Government in complying with various Federal statutes, including Section 106 of the National Historic Preservation Act of 1966, as amended; Executive Order 11593; and the Advisory Council's "Protection of Historic Sites (36 CFR Part 800)," effective 17 June 1999. The investigations were designed to comply with the following professional standards and guidelines:

a. National Park Service (NPS) National Register Bulletin 15 "How to Apply the National Register Criteria for Evaluation," and Bulletin 36 "Guidelines for Evaluating and Registering Historical Archeological Sites and Districts
b. Secretary of Interior's "Standards and Guidelines for Archaeology and Historic Preservation" as published in the *Federal Register*, 29 September 1983
c. The Advisory Council on Historic Preservation (ACHP) guidelines set forth in 36 CFR 800, "Protection of Historic Properties"
d. The *Tennessee SHPO Standards and Guidelines for Archaeological Resource Management Studies* (October 2018).

PROJECT BACKGROUND

The Big Creek National Disaster Resilience Improvements Project involves grading, filling, and earth moving to lower land elevations and to provide additional floodwater conveyance and storage, as well as the construction of recreational facilities (see "Purpose and Need" section below). The primary project location is in Millington along Big Creek to the north of Paul Barrett Parkway (SR-385) (Figure 1-01). Additionally two mitigation sites are located west of US 51 (Figure 1-02), and a possible borrow site is located on Raleigh Millington Road (Figure 1-03).

Table 1-01. Big Creek National Disaster Resilience Improvements Project tracts.

Tract	Acres	Impacts
Primary Area 1	216.0	Most impacted area; construction of sports fields, parking lots and trails in the west half along US 51; floodplain lowered to create storage
Primary Area 2	211.0	Parking and trailhead on John Boyd Road, floodplain lowered to create storage, and future Audubon Nature Center.
Primary Area 3	1,051.0	Little modification; land kept in natural state with a primitive trail along and near Big Creek; existing levee will be raised 1 ft.
Primary subtotal:	*1,478.0*	
Off Site East Mitigation Tract	37.2	
Off Site West Mitigation Tract	134.3	
Off Site Borrow	59.2	
Off site subtotal:	*230.7*	
Total:	**1,708.7**	

The primary project area covers 1,478 ac., but only an approximately 225 ac. portion will be disturbed by the construction. The exact location of the construction areas are still being developed, but have been narrowed down to three locations and levee improvements (Figures 1-04, 1-05, 1-06 and 1-07). The archaeological APE is considered the 225 ac. within the primary project area that will be disturbed by the construction, and the 230.7 ac. associated with the off site areas. In total, the APE is 455.7 ac. (0.7120 mi.^{2}).

Project Location

The primary project area is partially located in the city of Millington and partially in unincorporated Shelby County, and is bounded by US 51 on the west, the Paul Barrett Parkway (SR-385) on the south, Sledge Road on the east, and residential areas and the Naval Support Activity Mid-South (formerly the Naval Air Station Memphis) to the north. The Raleigh-Millington Road separates primary project Area 1 from Area 2. The Singleton Parkway separates primary project Area 2 from Area 3. The primary project area tract can be identified on the Brunswick, TN [408 SE] and Millington, TN 7.5-min. quads [408 SW] (Figure 1-01).

The primary project area is a low-lying floodplain setting with elevations ranging from 250 ft. to 260 ft. along the Big Creek Drainage Canal. The current land use is variable, but much of the area is a wetland forest. Indeed, within the large Area 3 there is a 409 ac. Tennessee Department of Transportation (TDOT) wetland mitigation area (Figure 1-08). Approximately 683 ac., or 46 percent, of the primary project area consists of delineated or TDOT mitigation wetlands. Other significant land uses include agricultural fields and borrow pit ponds.

The two off site mitigation tracts are located west of US 51, and flank the north side of the Big Creek Drainage Canal. The East Mitigation tract is west of the USA Stadium Complex, and the West Mitigation tract is south and west of the Millington Wastewater Plant. Both mitigation tracts are low-lying floodplain settings with an elevation of about 250 ft. Additionally, the West Mitigation tract includes the lower reach of Bear Creek and an unnamed tributary of Big Creek. These tracts are currently a mixture of agricultural fields and forest. Both off site mitigation tracts can be identified on the Millington, TN 7.5-min. quad [408 SW] (Figure 1-02).

The off site borrow tract is located on the east side of Raleigh Millington Road, to the north of Duncan Road. It is approximately 5 km south of Big Creek, and is associated with the floodplain of the Loosahatchie River. The elevation here is between 240 and 250 ft. Shelby County Government is currently constructing a cemetery with a portion of this wooded tract. The off site borrow tract can be identified on the Millington, TN 7.5-min. quad [408 SW] (Figure 1-03).

Purpose and Need

The 2011 flood produced some of the worst flooding in recent years in Millington and the surrounding area. Storm water runoff caused streams and rivers to overflow their banks and caused major damage to infrastructure as well as residential, commercial, and industrial properties. The qualifying event resulted in damages of approximately $5,000,000. Most of the Millington area consists of more than 50 percent LMI households. The flood damage not only displaced the LMI population but also disrupted livelihoods stemming from displacement, loss of income, and recovery needs still unmet today. The effects are worsened by recent storm events in this area measuring well over the 1,000-year rainfall occurrence.

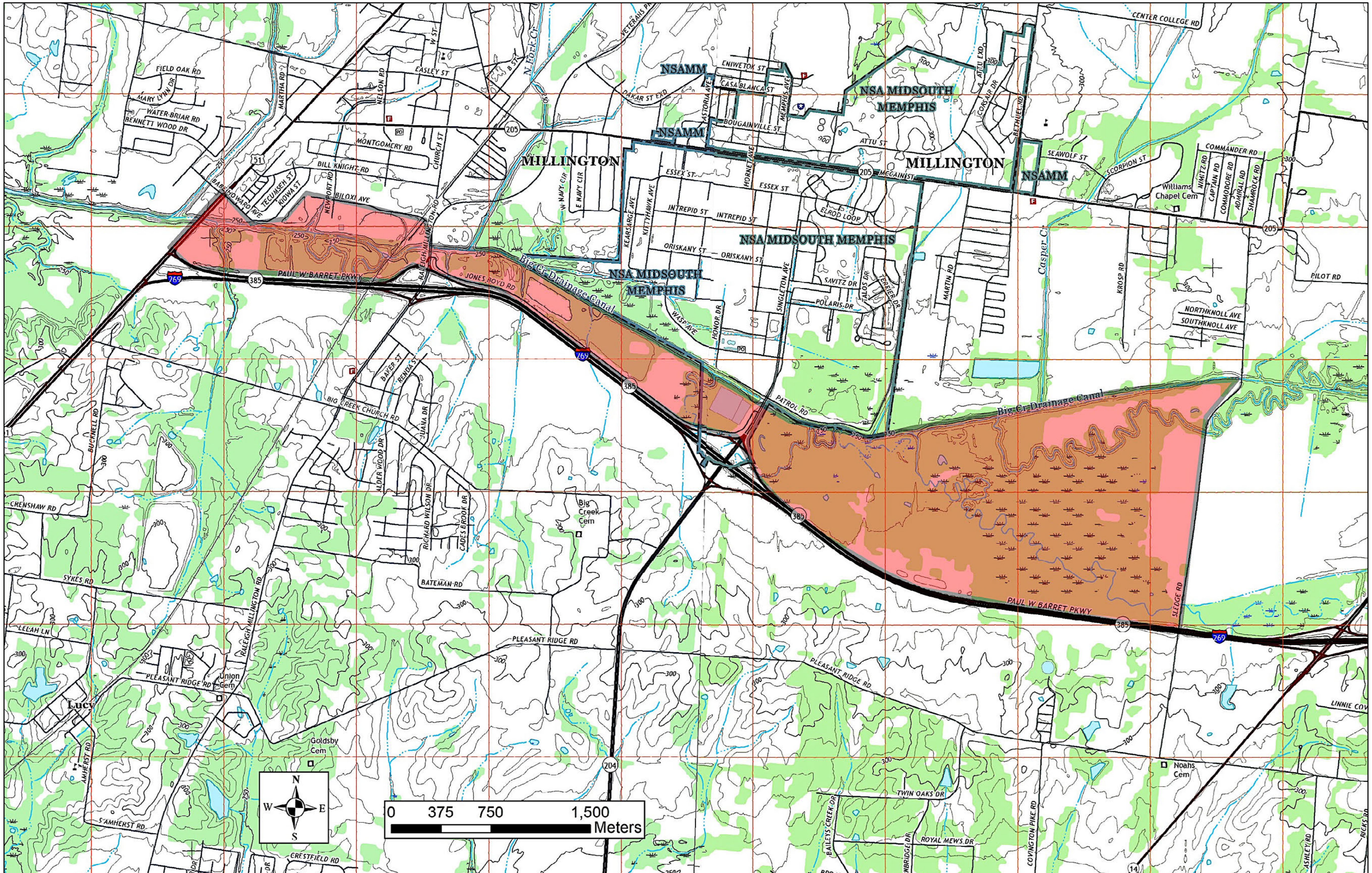

Figure 1-01. Primary project area shown on the 2016 Brunswick and Millington, TN 7.5-min. quads.

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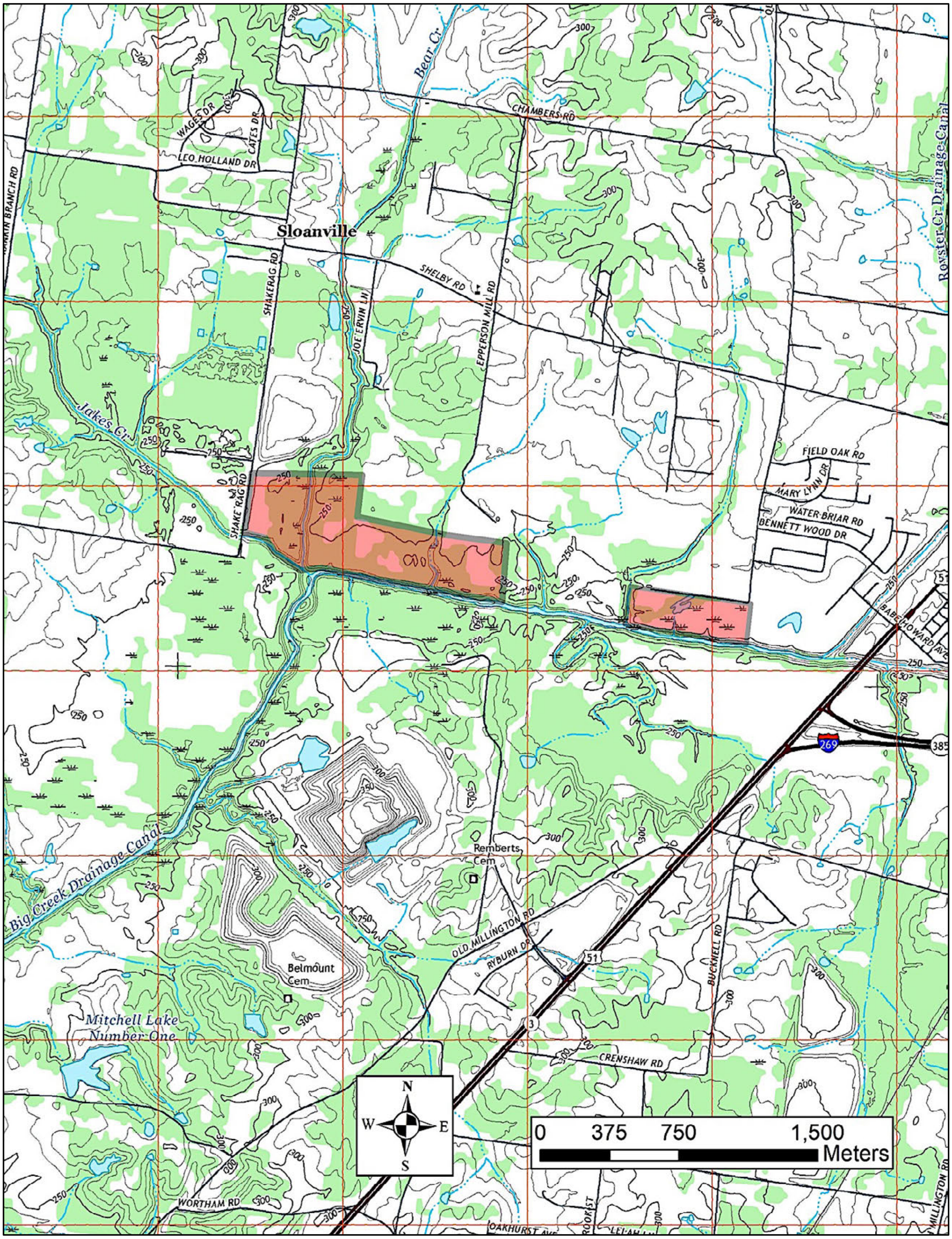

Figure 1-02. East and West Mitigation tracts shown on the 2016 Millington, TN 7.5-min. quad.

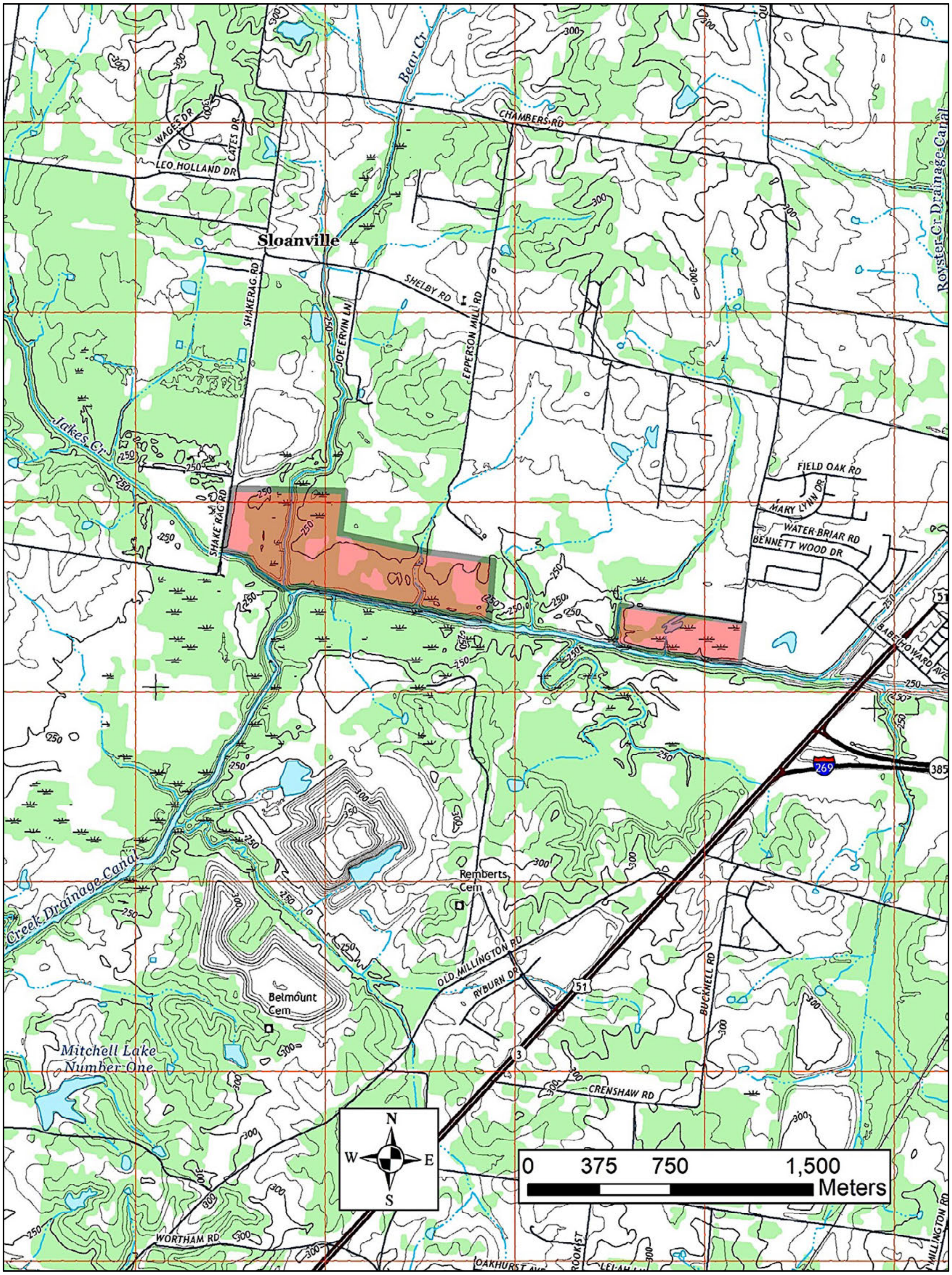

Figure 1-03. Borrow tract shown on the 2016 Millington, TN 7.5-min. quad.

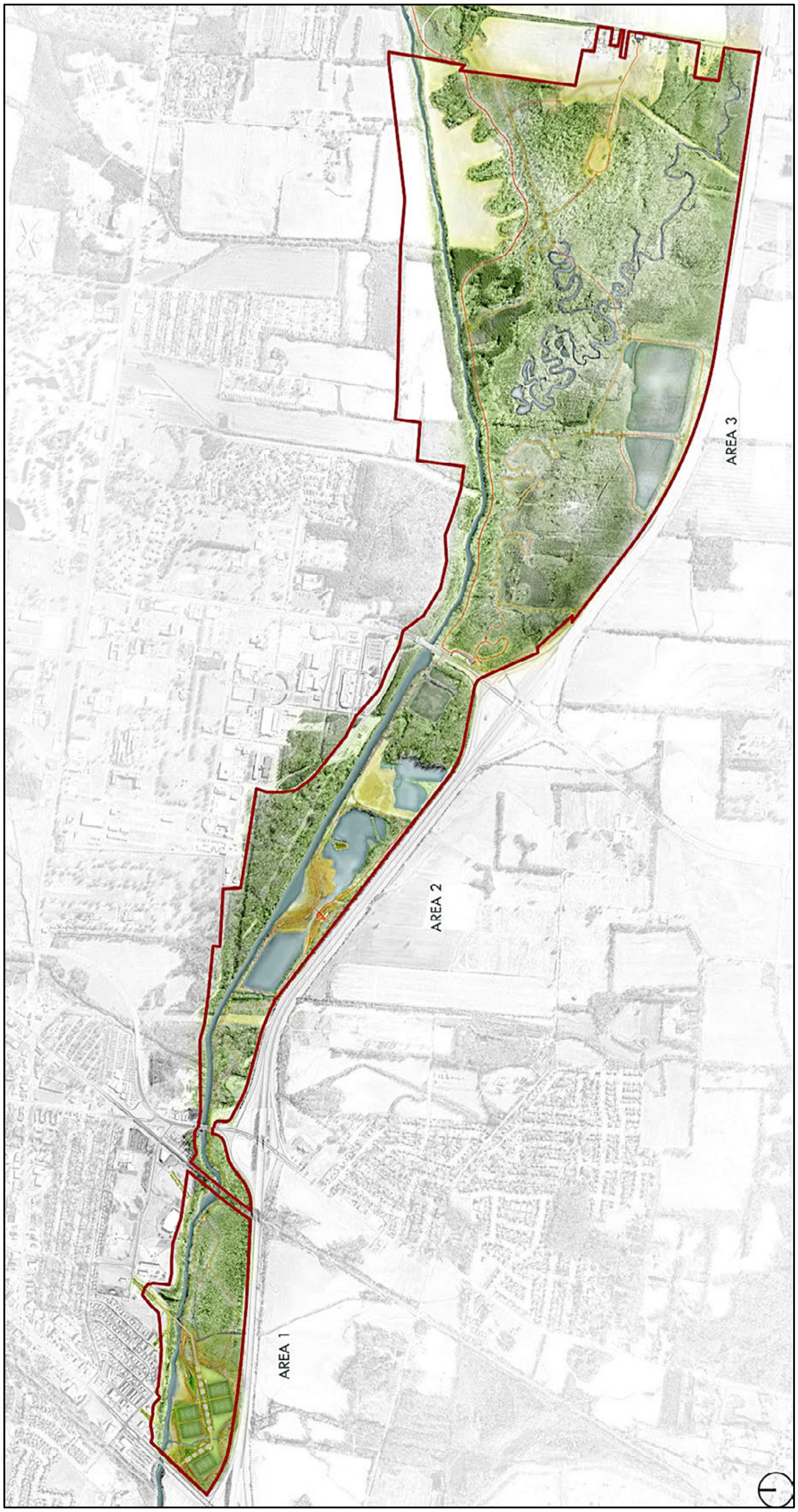

Figure 1-04. Master plan for the primary project area (Dalhoff Thomas Design Studio 2018:17).

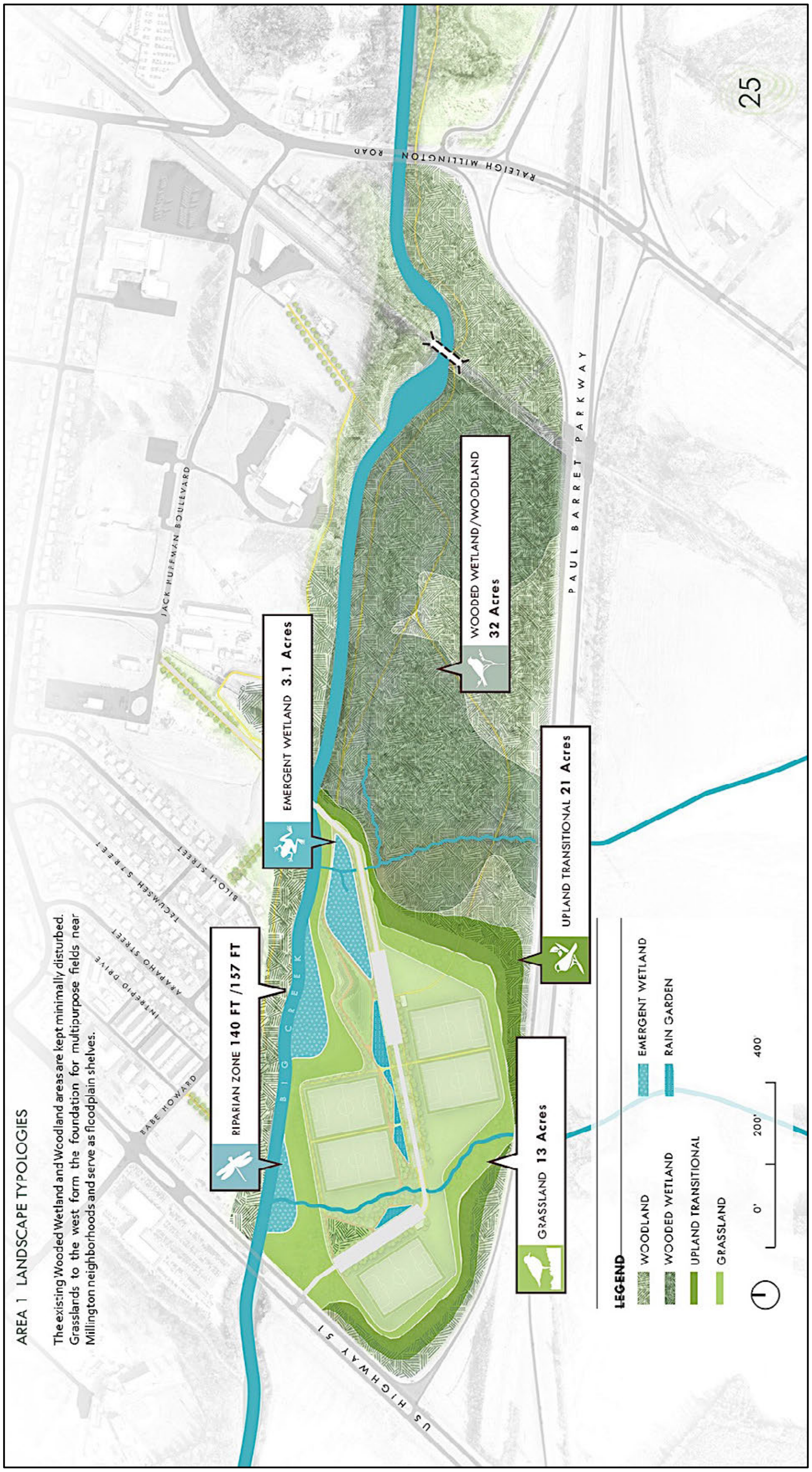

Figure 1-05. Primary project Area 1 proposed landscape typologies (Dalhoff Thomas Design Studio 2018:25).

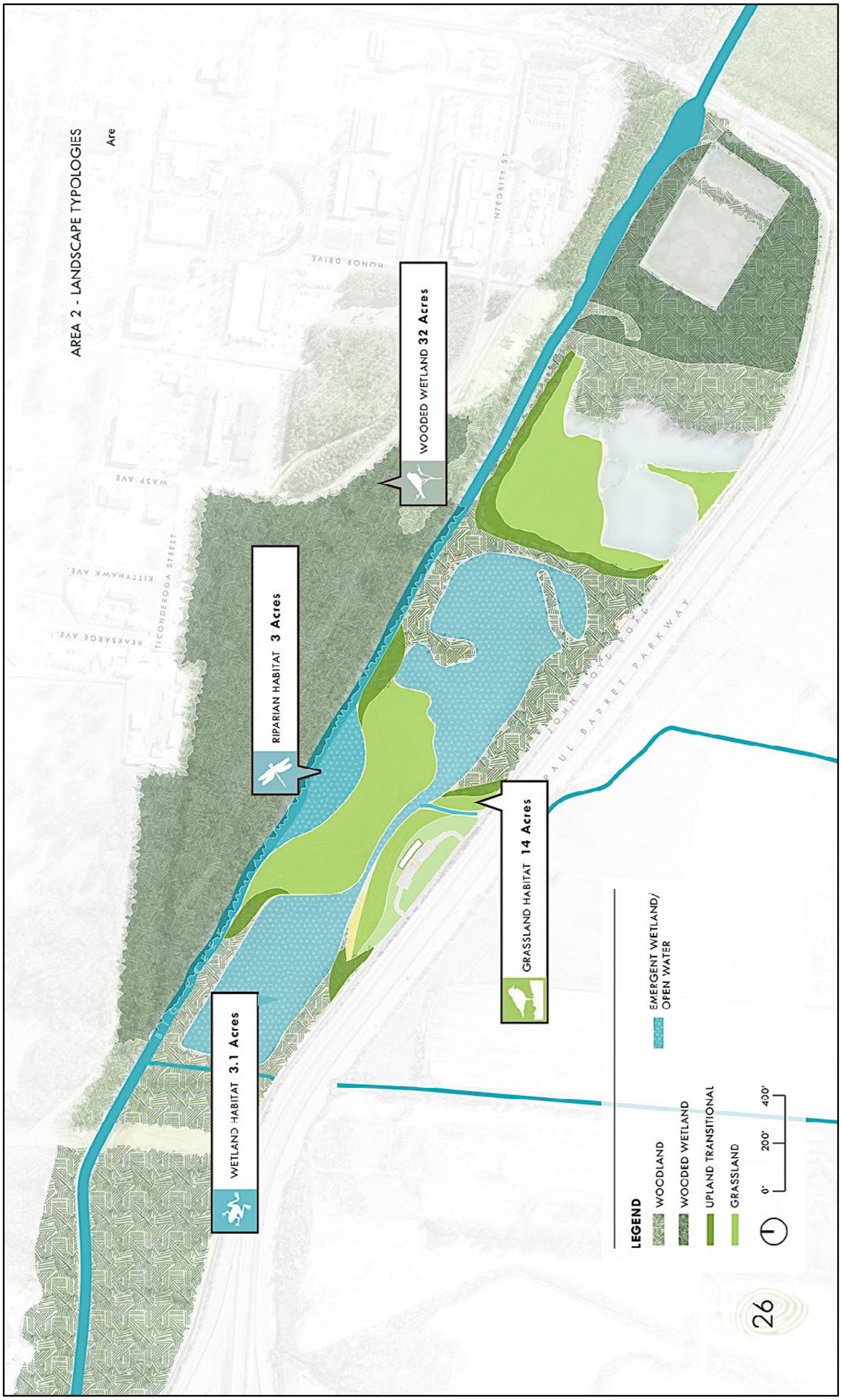

Figure 1-06. Primary project Area 2 proposed landscape typologies (Dalhoff Thomas Design Studio 2018:26).

Figure 1-07. Primary project Area 3 proposed landscape typologies (Dalhoff Thomas Design Studio 2018:27).

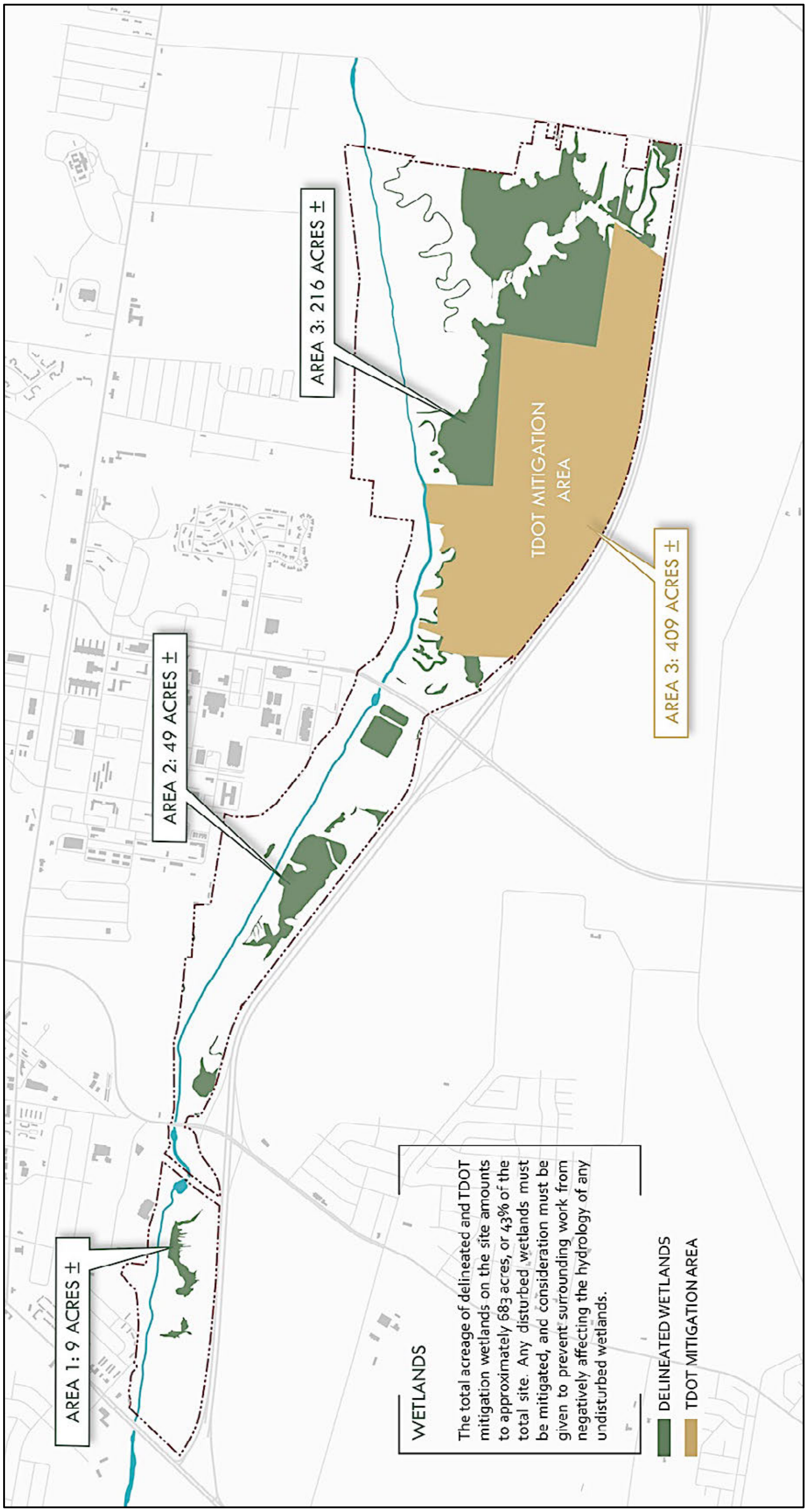

Figure 1-08. Delineated and TDOT wetlands within the primary project area (Dalhoff Thomas Design Studio 2018:27).

The Millington area has flooded multiple times when the level of the water in Big Creek exceeded the height of the protective levee. The resilient approach for this area includes the establishment of a large floodway between the existing levee on the north and the elevated highway to the south, which will provide area for the flood waters to bypass the community. This would allow floodwaters to bypass the community and provide flood protection for nearby neighborhoods and the Naval Support Activity Mid-South. The activity would create sustainable wildlife areas with native vegetation, wetlands, and other natural features. The area would also provide broader community benefits through connectivity of greenway trails, walking paths, athletic fields, and other recreational amenities.

TENNESSEE DIVISION OF ARCHAEOLOGY PERMIT

Because of the presence of the 409 ac. TDOT wetland mitigation tract within Area 3, a Tennessee Division of Archaeology (TDOA) Archaeological Permit was obtained. Archaeological Permit No. 001060 was issued on January 22, 2019 and expires on June 30, 2019.

REPORT OUTLINE

The technical report contained herein is organized in the following manner (see also *Table of Contents*). The most salient aspects of the local environmental setting are outlined in Chapter II. Prior archaeological investigations in the study area and a discussion of the local cultural sequence are provided in Chapter III. The results of the literature and records search are presented in Chapter IV. The methods and results of the archaeological assessment are found in Chapter V. Artifacts analysis methods and results are detailed in Chapter VI. A summary and the recommendations are presented in Chapter VII. The report closes with a references cited section and appendices.

II. ENVIRONMENTAL SETTING

GEOLOGY

The mitigation bank tract is located within the west Tennessee loess sheet. Stearns (1975) refers to the loess sheet as the West Tennessee Plain, and views it as a subregion of the Gulf Coastal Plain physiographic province (Fenneman 1938). A more recent ecoregion map refers to this area as the Loess Plains (74b), a Level IV ecoregion with the Mississippi Valley Loess Plains (a Level III ecoregion; Griffith et al. 2004; Figure 2-01). The Loess Plains cover 4,023 mi.^{2} in Tennessee, and the topography consists of level to gently rolling terrain that is the result of sequential deposition and erosion of Pleistocene (Late Wisconsin) loess. Wide, flat bottomlands and floodplains are present within the Loess Plains and they harbor low gradient silt and sand bottomed steams; most of which have been channelized.

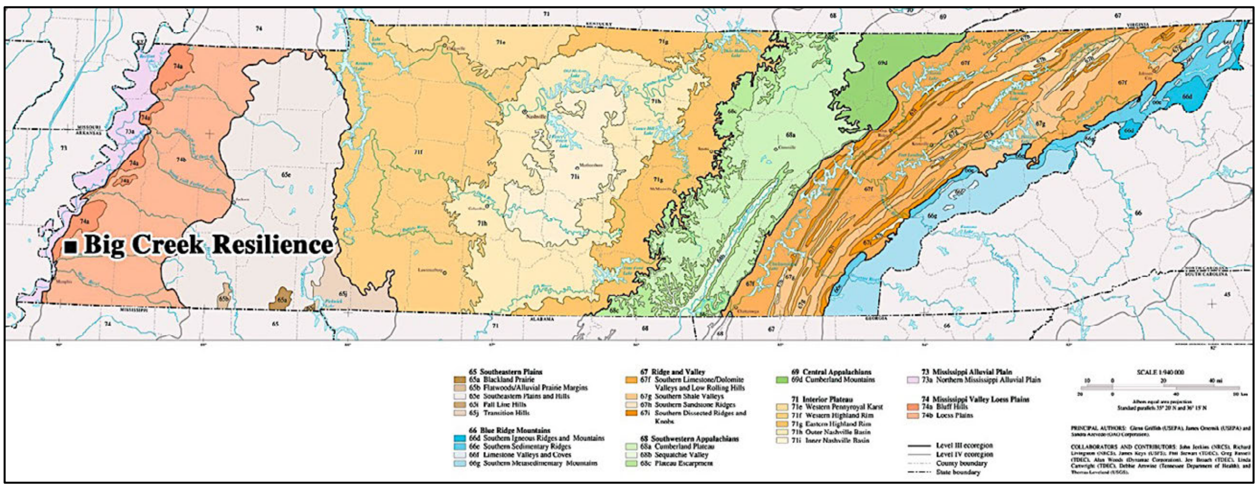

Figure 2-01. Big Creek Resilience project area shown on an ecoregions map of Tennessee (Griffith et al. 2004).

The loess deposit is thickest (24 m) along the Mississippi River—this is the reason for the various Chickasaw bluffs—and it thins to the east (Stearns 1975). Well logs from the Memphis Defense Depot reveal that the loess ranges 7.0–10.1 m thick in this area (Law Environmental 1990). Geologic studies of the loess sediments along Nonconnah Creek reveal that the loess is stratigraphically equivalent to the Late Wisconsin Peoria loess of the Upper Mississippi Valley (Cowell 1977). Remains of American mastodon and other now-extinct Late Pleistocene mega-fauna have been discovered deeply buried within Memphis's loess (Corgan and Breitburg 1996). Brister et al. (1981) date one such find on Nonconnah Creek to 17,000–23,000 years before present (YBP).

SOILS

At the county level, APE is associated with the Falaya-Waverly-Collins soil association (Unit 5; Sease et al. 1989:General Soil Map). The Falaya-Waverly-Collins soil association is described as "Level, poorly drained, to moderately well drained, silty soils on first bottoms" (Sease et al. 1989:7). This association forms about 20 percent of the county, and is characterized by long, wide, flat bottoms along streams that meander through the rolling uplands.

More specifically, six soil types have been identified within the APE (Sease et al. 1989). The most widespread soil types are Waverly soil loam and Falaya silt loam. The soils are associated with floodplains, and are poorly drained. They are occasionally flooded for long durations, and have a very high available water storage capacity. Falaya silt loam is a capability unit IIw-1 soil (Sease et al. 1989:16), while Waverly soil loam is a capability unit IIIw-1 soil (Sease et al. 1989:35-36).

Secondary soil types within the APE include Grenada silt loam, Calloway silt loam, Henry silt loam and Collins silt loam (Sease et al. 1989). Similar to Waverly soil loam and Falaya silt loam, these soils are capability unit II or III.

Because soils are indicators of past environments, soil types can be used to predict a given tract's potential for containing archaeological deposits. The Soil Conservation Service's "Capability Unit" classification is a measure of the limitations of each soil type that can restrict its use. These capability units are used by archeologists as indicators of the potential that a given soil type has for containing an archaeological deposit, because soils with few limitations are more likely to yield evidence of human occupation than soils with moderate or severe limitations.

From an archaeological standpoint, capability units are evaluated as followed:

- Class I soils have few limitations that restrict their use, and are considered to have a high probability of containing archaeological resources.
- Class II soils have moderate limitations, and are considered to have a moderate probability of containing archaeological resources.
- Class III and IV soils have severe limitations and are considered to have a low probability of containing archaeological resources.
- Class V and VI soils have very severe limitations, and are considered to have little probability of containing archaeological resources.

Based on soil types, the majority of the APE is considered to have a moderate to low probability of containing archaeological resources. The primary limitation of the soils within the APE is wetness and flooding.

DRAINAGE

The principal drainage of Shelby County is the Mississippi River. Major tributaries emptying into the Mississippi River in Shelby County include (from north to south) the Loosahatchie River, Wolf River, and Nonconnah Creek.

The primary project area and the two off site wetland mitigation tracts are located along the Big Creek Drainage Canal. Big Creek is a tributary of the Loosahatchie River. The off site borrow area is on the flood plain of the Loosahatchie River. Big Creek and the Loosahatchie River are alluvial streams that carry a high sediment load, and while typically sluggish they can become a torrent (Clay 1986:137).

The Loosahatchie River is 64-mi. long, and its watershed covers approximately 738 mi.^{2} and includes parts of Fayette, Hardeman, Haywood, Shelby, and Tipton counties (Tennessee Department of Environment and Conservation 2014). The Corps of Engineers has extensively modified the Big Creek and the lower Loosahatchie River, and the reaches in and near the APE has been channelized. A 1927/1932 maps reveals that these sections of Big Creek and the lower Loosahatchie River were already channelized by that time (see Chapter IV). The excavation of the Big Creek Drainage Canal resulted in the creation of several cut-off lakes and a lengthy section of abandoned channel in the primary project area (see Figure 1-01).

FLORA

Shelby County is part of the Mississippi Embayment Section of the Western Mesophytic Forest Region as described by Braun (1964:157), and the Tulip-Oak Forest as described by Shelford (1974:35). Oak and Oak-Hickory floral communities predominate in this region along stream and river terraces, with swamp forest species predominating along low-lying floodplain areas. However, much of the modern landscape is so modified that the flora is in no way reflective of a natural setting.

Floral species within the former Oak and Oak-Hickory communities include white oak (*Quercus alba*), southern red oak (*Quercus falcata*), hickory (*Carya* sp.), and tuliptree (*Liriodendron tulipifera*) at higher elevations, with beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and bald cypress (*Taxodium distichum*) occurring at only very low elevations such as those immediately abutting local drainages. Undergrowth in these communities is characteristically sparse, with dogwood (*Cornus florida*), winged elm (*Ulmus alata*), persimmon (*Diospyros virginiana*), sassafras (*Sassafras albidium*), mulberry (*Morus* sp.), white ash (*Fraxinus americana*), and holly (*Ilex* sp.) accounting for the majority of species (Braun 1964:157). In particular, mast-producing species such as the various oaks and hickories would have represented an important subsistence resource for humans occupying this region.

FAUNA

Faunal species occupying these communities include large mammals such as the white-tailed deer (*Odocoileus virginianus*) and black bear (*Ursus americanus*); smaller mammals such as opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), rabbit (*Syvilagus* sp.), beaver (*Casor canadensis*), otter (*Lutra canadensis*), and squirrel (*Sciurus* sp.); and large terrestrial birds including wild turkey (*Meleagris gallapavo*). Migratory waterfowl such as ducks (*Anas* sp.) and geese (*Branta* sp.) undoubtedly also frequented these communities on a seasonal basis. Riverine species within these communities would have included fish species such as bass (*Micropterus* sp.), catfish (*Ictalurus* sp.), sunfish (*Lepomis* sp.), drum (*Aplodinotus grunniens*), and gar (*Leisosteus* sp.). All the faunal species described immediately above would have offered important subsistence resources for humans occupying the area during prehistoric and historic times.

PALEOCLIMATE/VEGETATION

Paleoenvironmental conditions were substantially different in the late Pleistocene through the middle Holocene. Delcourt et al. (1999) have recently synthesized current data and mapped vegetation reconstructions for the Central Mississippi Valley. The discussion that follows is drawn from this summary. During the Late Wisconsin full-glacial interval (18,000 YBP) the central Mississippi River valley was covered by boreal forest communities and a Spruce-Willow Forest was on the valley train surfaces that were fed by glacial meltwater from the Ohio River. Post-glacial warming caused jack pine population to collapse about 14,000 YBP, but the area east of Crowley's Ridge remained a Spruce-Willow Forest. By 12,000 YBP warming temperatures lead to an expansion of Oak-Hickory Forest on abandoned braided steam terraces and the Spruce-Willow Forest became more restricted as the active channel of the Ohio River shifted east.

By 10,000 YBP, "the vegetation had become temperate to warm temperate in character" (Delcourt et al. 1999:25). Sweetgum-Elm Forest and Willow-Cane Forest developed along and near the now-meandering Mississippi River, while the Oak-Hickory Forest continued to expand on abandoned braided stream terraces.

At 8,000 YBP, the effects of a warm and dry interval referred to as the Hypsithermal begin to be seen in the pollen record. Drought-tolerant species expanded and the Oak-Hickory Forest that formerly covered the valley train to the west of the project area developed into an Oak-Hickory Savannah. However, along and near the Mississippi River, Sweetgum-Elm Forest and Willow-Cane Forest remained and Cypress-Tupelo Forest expanded in the backswamps.

Regionally, the Hypsithermal was most strongly felt around 6,000 YBP and the arid conditions continued until after 4,000 YBP (Delcourt et al. 1999). McNutt (1996) suggests that during 7,500–5,500 YBP the strongest cultural impacts of the Hypsithermal were felt. Willow-Cane Forest and Cypress-Tupelo Forest became "confined to the easternmost portion of the Eastern Lowlands along a relatively narrow meander belt" that would have included the Barnes Ridge area (Delcourt et al. 1999:26). Within the backswamps, mesic lowland forest probably expanded into Cypress-Tupelo Forests because of dropping water tables.

Modern floristic regions developed between 4,000 YBP and 3,000 YBP with a return to wetter conditions. The Sweetgum-Elm Forest re-expanded along drainages and Willow-Cane Forest "occupied a broadening and shifting Mississippi meander belt" (Delcourt et al. 1999:27). Changes in the locations of Willow-Cane, Sweetgum-Elm and Cypress-Tupelo Forests became dependant on shifts in channel morphology.

In discussing the 1,000 YBP environment, Delcourt et al. (1999) note that portions of the Eastern Lowlands would have been covered by Ragweed-Grass Old Field vegetation. This refers to "anthropogenically disturbed landscapes" (Delcourt et al. 1999:28), such as Native American (Mississippian period) corn fields with early secessional grassland and thickets for cover. Delcourt et al. (1999:28) state, the "paleoecological 'signature' of cultural impact is characterized by occurrence of pollen grains of cereals such as maize; weedy herbs including ragweed, chenopods, and grasses; and spores of old-field ferns, such as bracken."

MODERN CLIMATE

Shelby County's climate is typical of the central Mississippi River valley, with hot summers and mild winters and abundant rainfall. The average annual temperature in Memphis is 62˚ F, although extremes of 106˚ F and -11˚ F were recorded during the period spanning 1931–1960 (Sease et al. 1989:2). The growing season is long (238 days), extending from March 20–November 12 (Sease et al. 1989:3). July is the warmest month, with daily average maximum and minimum temperatures of 92.1˚ F and 71.5˚, and January is the coldest month, with daily average maximum and minimum temperatures of 50.6˚ F and 33.4˚ (Sease et al. 1989:Table 1).

Rainfall amounts vary throughout the county, with differences of up to two inches per annum recorded between the western and eastern portions (Sease et al. 1989:2). The average precipitation per annum is 49.73 inches (Sease et al. 1989:Table 1). Precipitation is normally heaviest during the winter and early spring months, with January on average having 6.07 in. (Sease et al. 1989:Table 1). Fall is the driest season and October, with an average of 2.72 in. of precipitation, is the driest month (Sease et al. 1989:Table 1).

III. CULTURAL BACKGROUND

This chapter provides background information relevant to the study area. A briefing on previous archaeological and historic studies conducted in West Tennessee is presented first, followed by a synopsis of fieldwork conducted in close proximity to the study area. Another section provides an overview of the archaeological and historical sequence of West Tennessee, as it is currently understood. These later discussions follow the standard period-by-period format.

PREVIOUS INVESTIGATIONS

ANTIQUARIAN INVESTIGATIONS

Archaeological investigations in this portion of West Tennessee were initially conducted by untrained but interested individuals and were focused on the monumental earthworks of the Pinson Mounds (40MD1) on the South Fork of the Forked Deer River. This large mound and earthwork complex was first described by the antiquarian historian Judge Haywood (1823:136–137) and later by the State Geologist Troost (1845:364–365). Schoolcraft (1854) produced one of the earliest summaries of Native Americans and archaeology at this time.

After the Civil War, antiquarian researchers, primarily working for museums, radiated across the Southeast in a quest for museum specimens. Mainfort's (1986:8–9) research indicates that in 1875, the Smithsonian Institution hired a local college president, E.H. Randle, to explore the mounds of West Tennessee, including Pinson. Dr. Joseph Jones (1984 [1876]) published a description of the Obion site (40HY14) on the North Fork of the Obion River and notes a stone figurine unearthed there in 1845 by a farmer, Mr. Hartsfield. At about this time (1879), the Bureau of American Ethnology (BAE), a branch of the Smithsonian, was founded.

In Cyrus Thomas's classic *Mound Explorations* (1985 [1894]), the Mound Builder myth was destroyed, and the origin of the mounds was demonstrated to be associated with Native Americans. Thomas (1985 [1894]:278–279) mentions mounds from only two West Tennessee counties, Lauderdale and Obion. He notes a number of small mounds, already disturbed by relic collectors, in Lauderdale County at Mr. Marley's farm, eight miles northwest of Ripley. The mounds in the Reelfoot Lake vicinity in Obion County and some of the artifacts the BAE excavators recovered are briefly described.

Other important antiquarian figures in Tennessee archaeology are Professor Putnam (1973 [1878]) and G.P. Thruston (1897). In the latter nineteenth and early twentieth centuries, the predominant archaeological research issue shifted away from the origin of the mounds to the antiquity of the human occupation of America.

EARLY TWENTIETH CENTURY

William E. Myer, a Tennessean and employee of the Smithsonian, was one of the most significant figures in early twentieth-century Tennessee archaeology. While much of Myer's work focused on Middle Tennessee, he is responsible for initiating a survey of Pinson Mounds by a professional engineer and providing a description of the complex. Myer's manuscript, *Stone Age Man in the Middle South*, was never published, but a microfilm transcript of this early synthesis of Tennessee archaeology is available and is commonly cited (Myer 1917). Myer (1971 [1928]) also compiled an *Archaeological Map of the State of Tennessee*.

C.W. Bishop of Harvard University's Peabody Museum made an archaeological reconnaissance in Henry County in 1911 and 1912. In the summer of 1913, Bishop and Bruce Merwin directed the major excavations of the mounds at the Obion site, or "Work Farm" (Garland 1992:7). Their results were never published, but a preliminary report was prepared by Merwin (1913), as was a manuscript, which was intended to be a chapter in Myer's *Stone Age Man* (Merwin 1923).

Another significant figure in early twentieth-century Southeastern archaeology is Clarence B. Moore. Using his steamship the *Gopher*, Moore (1915, 1916) conducted excavations along the lower Tennessee River, as well as along the Mississippi River.

During the period between 1910 and 1930, modern excavation techniques, such as the use of a grid and establishment of stratigraphic control, became standard procedure. The marriage of archaeology and anthropology was accomplished during this period, and by 1935 seven universities offered Ph.D. programs in anthropology. Professional archaeological organizations began to form during this period, with the Southeastern Archaeological Conference (SEAC) founded in 1932, and the Society for American Archaeology (SAA) founded in 1934.

The 1930s–1960s

No depression-relief Works Progress Administration (WPA) or later River Basin Survey (RBS) investigations were conducted along the interior drainages of West Tennessee. In 1940, the University of Tennessee revisited the Obion site and conducted additional excavations (Garland 1992:3), and initiated work at the Chucalissa site (40SY1) on the bluffs south of Memphis (Nash 1972). Practically no archaeological research was conducted in the United States during World War II (1941–1945).

Beginning in 1939, the Peabody Museum's Lower Mississippi Survey (LMS) compiled survey data and conducted test excavations at many of the large sites in the adjoining Mississippi alluvial valley (Phillips et al. 1951). The ceramic typology developed by the LMS is the basis for most archaeological phases in the lower valley (Phillips 1970).

The Memphis State University (now the University of Memphis) Department of Anthropology began as an element of the Department of Sociology in 1962, and was correlated with the annexation of the Chucalissa site by the University. Charles H. Nash initiated the anthropology program and established the museum and research facility at Chucalissa now named in his honor. Since the mid-1960s, the University of Memphis has played a significant role in West Tennessee archaeology, both in the form of cultural resource management (CRM) and research-oriented investigations, as well as training most of the active professional contract archaeologists in West Tennessee. The University of Memphis Anthropological Research Center initiated a series of Occasional Papers in 1965, and past subjects have covered a wide range of topics, including Mastodon excavations in Memphis (Brister et al. 1981); significant excavations of the stratified Spring Creek site (40PY207) on the Tennessee River (Peterson 1973); various excavations at the Chucalissa site (Lumb and McNutt 1988; Nash 1972); conference proceedings (McNutt 1991); as well as cultural anthropology studies.

Cultural Resource Management

The scope and intensity of archaeological investigations in West Tennessee, and indeed across the entire Southeast, increased dramatically with the onset of federally mandated CRM studies in the late 1960s. There is an abundance of CRM studies in west Tennessee, but most are small-scale projects with negative findings. Selected significant CRM-era projects in west Tennessee are discussed below.

The Loosahatchie and Wolf river drainages are one of the better-known areas in Shelby County, as a result of Peterson's (1979a, 1979b) systematic archaeological surveys. Peterson's data was derived from a five-percent random sample stratified by primary landform, supplemented by a one-percent intuitive sample. Survey results suggested a relatively high site density, especially along the terrace margins at the interface of floodplains and uplands, where sites such as Fulmer (40SY527) and 40SY540 are situated.

Recently, the construction of SR-385 (Paul Barrett Parkway) has generated a significant amount of survey data by both Panamerican Consultants, Inc. and Garrow & Associates (Collins et al. 1994; McNutt 1995; McNutt et al. 1994; Oliver et al. 1993), as well as testing of four prehistoric sites, including 40SY540 (Walling et al. 1996) and 40SY525–40SY527 (Weaver et al. 1996). Data recovery excavations were conducted at the Fulmer site, located on a terrace edge above the Loosahatchie bottoms (Weaver et al. 1999). The Fulmer site's shallow midden yielded significant data regarding Early Woodland (Tchula) period ceramic technology and intra-site patterning; see Woodland period below. Small, contemporary single-component sites in settings similar to Fulmer are frequent within the Holly Springs National Forest as well (Peacock 1996).

McNutt's (1995) survey of two proposed SR-385 corridor options from I-40 south, around Eads to Mt. Pleasant Road, is another more relevant survey conducted to date along the Shelby-Fayette county line. During this SR-385 survey ten previously unrecorded archaeological sites and one isolated find were documented. Two mid-nineteenth century sites (40SY549 and 40FY233) and one Woodland site (40FY236) were recommended as potentially eligible.

Another important eastern Shelby County archaeological project was funded by the Tennessee Department of Transportation (TDOT) as a result of the widening of US-64. TDOT archaeologist Zada Law conducted the initial corridor survey during 1989. The most significant result of this project was the excavation of the Carr House, or the Morning Sun Farmstead (40SY508) by Garrow & Associates (Weaver et al. 1990).

TENNESSEE DIVISION OF ARCHAEOLOGY

The Tennessee Division of Archaeology (TDOA) is a branch of the Tennessee Department of Conservation, established by the Tennessee Legislature in 1970 (Tennessee Archaeology Act, Tennessee Acts, 1970, Chapter 468; Tennessee Code Annotated 11-6-101). The TDOA was formed with a Director (State Archaeologist), three regional archaeologists, and an advisory council; the structure has since been revised. Amendments to these bills were passed in 1973 and 1984. The TDOA maintains the site files and has conducted an enormous amount of archaeological work in Tennessee. Although some of their investigations remain unpublished, manuscripts for most of these unpublished investigations are on file in Nashville. Selected prehistoric TDOA projects in West Tennessee are reviewed below and are followed by a review of historic projects.

The Pinson Mounds on the South Fork were an early focus of the TDOA's activity in West Tennessee. In 1974 the Pinson Mounds State Park was formed, and a two-year testing program was initiated (Broster and Schneider 1975). Subsequent research has clearly demonstrated that the Pinson Mounds represent a unique Middle Woodland ceremonial center (Mainfort 1986; Mainfort 1980; Mainfort et al. 1982). In a related study, Broster and Schneider (1977) conducted a site survey of the South Fork in the vicinity of the Pinson Mounds.

Broster (1975) conducted one of the earliest surveys in West Tennessee along a portion of the Middle Fork of the Obion River. Eight sites were located in Weakley and Henry counties; one of these, 40WK52, was suggested to be a significant Middle Woodland habitation.

In 1985, the TDOA surveyed selected localities within the Obion-Forked Deer Drainages under contract with the U.S. Army Corps of Engineers (USACE), Memphis District (Mainfort 1985). Two of these tracts were located on the Middle Fork and one on the North Fork.

From 1991 to 1993, a survey of 3,332 ac. of wetland mitigation lands associated with the USACE, Memphis District West Tennessee Tributaries Project was conducted by TDOA personnel (Mainfort 1994). The project covered numerous non-contiguous tracts located within the Obion-Forked Deer Basin, with a concentration of effort adjacent to the confluence of the Middle and South Forks of the Obion River. Relatively few sites were identified within the mitigation lands (11 newly recorded sites and 11 revisited sites; Mainfort 1994:73–90). Similar to Anderson et al.'s (1987) methods, survey work was continued outside the project area, resulting in the identification of an additional 12 sites (Mainfort 1994:91–95). Operating under a modified interpretation of the Memorandum of Agreement, test excavations or other activities were carried out at 40GB41, 40GB42, the Kenton Mound group (40OB4), the Chandler site (40CL64), the Barner site (40WK83), and the Oliver site (40OB161), all of which were located outside the project area. The most outstanding results of this project include: (1) the formulation of a well-defined ceramic typology for Tchula and Middle Woodland ceramics, which has general utility for the region (this typology supersedes an earlier attempt at such that has been heavily criticized as being non-replicable); and (2) the reporting of data regarding the Emergent Mississippian occupation of the upland in the Obion River drainage.

Historic archaeological studies conducted by the TDOA in West Tennessee have been largely focused on Civil War sites. Extensive excavations were conducted at Fort Pillow in Lauderdale County during the period from 1976 to 1978 (Mainfort 1980). These investigations resulted in the identification of structural features and a variety of domestic and military artifacts. In 1992–1993 a survey for Civil War period military sites in west Tennessee was conducted (Prouty and Barker 1996). This survey resulted in the documentation of 84 previously unrecorded Civil War military sites, and revisits of five previously recorded sites.

Fieldwork for a historic site survey of the state was conducted by the TDOA in 1979 (Stripling 1980). This study sampled various counties from the major physiographic regions of Tennessee, with Gibson County being representative of the Coastal Plain. The 1877 D.G. Beer's Map of Gibson County was extensively used to predict historic site locations.

S. Smith initiated a search for San Fernando in Memphis's Pinch District in 1980 (S. Smith 1980, 1982). Another TDOA contribution to historic archaeology to note is the publication of S. Smith's (1996:14) bibliography of historic archaeology.

PREHISTORIC SEQUENCE

Following is a summary of the prehistoric and historic cultural sequence of West Tennessee. Each of these periods is defined by characteristic artifact assemblages and patterns of subsistence and settlement. The prehistoric period in the southeastern United States is traditionally divided into four major periods: Paleoindian, Archaic, Woodland, and Mississippian.

PALEOINDIAN PERIOD

Paleoindian occupations represent the first well-accepted occurrence of humans in the Western Hemisphere. These populations are generally thought of as highly adaptive, mobile hunter-gatherers whose recent ancestors were Upper Paleolithic Siberians who migrated across the present Bering Strait during the Late Pleistocene, when sea levels were ca. 60 m lower. During the Late Glacial era, when initial human colonization of the Southeast is postulated (ca. 12,000–10,000 YBP), climatic changes followed the receding of the continental ice sheets, and there was a widespread extinction of megafauna. The environment at this time is usually interpreted to have been spruce and/or pine-dominated boreal forest (Saucier 1978). By 1,000 years prior to the fluted point occupations, the environment had changed to deciduous forest (Delcourt et al. 1980).

Recent research on Paleoindian diagnostics (Anderson et al. 1990) indicates that the period may be subdivided into Early (ca. 9,500–9,000 B.C.), Middle (ca. 9,000–8,500 B.C.), and Late (ca. 8,500–8,000 B.C.) stages, based on changes in hafted biface morphology. No radiocarbon dates are available to confirm independently the accuracy of the subdivision.

Aboriginal groups of the period were likely small, mobile bands dependent upon a hunting-and-gathering economy. Although they may have hunted some of the megafauna that became extinct at the end of the Pleistocene, such as mastodon (*Mammut americanum*), bison (*Bison bison antiquus*), and ground sloth (*Megalonyx* sp.), it is likely that the subsistence base was varied and included a number of plant and animal foods. One of the nearest firm associations of a fluted point with mastodon remains is well north of West Tennessee at the Kimmswick bone bed in Missouri (Graham et al. 1981), although a possible association at Mississippi River Island No. 35 to the south should be noted as well (Williams 1957). No artifacts are associated with the Nonconnah Creek Mastodon find (Brister et al. 1981).

DALTON PERIOD

The Dalton period is considered transitional between the Paleoindian and Archaic traditions. The key distinguishing feature of the material culture is the unfluted, serrated Dalton point, but the Dalton tool kit includes a number of other diagnostic special-function tools and a woodworking adz (Morse and Morse 1983, 1996). Dalton points recovered from a Forked Deer River context are noted by G. Smith (1996:101) as being long, thin forms with only a minimal amount of constriction in the hafting area. Goodyear (1982) suggests that Dalton represents a distinct temporal horizon dating to 8500–7900 B.C. While technologically similar to Paleoindian, Dalton assemblages suggest an adaptive pattern more akin to later Archaic cultures. One of the most important game species from this time to the contact era seems to have been the white-tailed deer (Morse and Morse 1983:71). During the Dalton period the Mississippi River meander system was established in the lower valley and was working northward, but a braided stream regime still existed.

Dalton components are better represented in northwestern Tennessee than are the preceding Early and Middle Paleoindian diagnostics, although much is yet to be learned about this temporal period. Mainfort (1996b:80) notes that the only two examples of Dalton components recovered from the Reelfoot Basin of extreme northwestern Tennessee were collected from predominantly Mississippian-component sites. Sites 40OB123 and 40OB127, approximately one mile apart, have yielded one Dalton artifact each. Mainfort further notes that a "fairly large Dalton site" has been reported by a local collector in the Reelfoot area, although the location of that site has yet to be determined. In Fayette County, G. Smith (1996:101) notes the presence of a Dalton component in a relatively shallow context at 40FY13.

In the 1960s the Ford-Redfield survey project identified a concentration of Dalton components in northeast Arkansas (Redfield 1971; Redfield and Moselage 1970). Important sites such as Brand (Goodyear 1974), Sloan (Morse 1975), and Lace (Morse and Morse 1983) produced evidence for some of the oldest cemeteries in the New World and revealed other features interpreted as living floors and shelter remains. The distribution of sites and site types along the major drainages has also led to the formulation of competing settlement-pattern models for band-level societies (Morse 1975, 1977; Price and Krakker 1975; Schiffer 1975), which have been succinctly commented upon by McNutt (1996:191–192).

ARCHAIC PERIOD

The Archaic is usually thought of in terms of three subperiods: Early (ca. 8000–5000 B.C.), Middle (5000–3000 B.C.), and Late (3000–1500 B.C.). Temporal divisions of the Archaic are primarily based on the occurrence of distinctive projectile points. Throughout Archaic times a hunter-gatherer lifeway appears to have continued, and it was focused on essentially the same flora and fauna as represented in the natural environment today. The Archaic is perceived as a time of regional "settling in," when an efficient utilization of the environment was keyed to highly cyclical, repetitive seasonal activities continued by indigenous groups over thousands of years (Caldwell 1958). Some seasonal movement to exploit econiches was probably required, but Archaic populations, compared to Paleoindian, are generally portrayed as being attached to localities, river valleys, or regions. A total of 31 sites with known or probable Archaic components have been recorded in the Reelfoot Basin of extreme northwestern Tennessee (Mainfort 1996b:80). Additionally, numerous other sites with Archaic components have been recorded in all the major river valleys in West Tennessee (Smith 1979). Relatively little is known about this temporal period in this area of the Southeast. In the Central Mississippi Valley, virtually no Archaic sites have been excavated, and indeed these components appear to have been overlooked by archaeologists more concerned with ceramic-period adaptations (McNutt 1996:194; Williams 1991).

Concerning the Early Archaic period, McNutt (1996:194) notes that "we can see several projectile points coming into the Valley from the west and north, probably in conjunction with the prairie expansion and dry econiches during the Hypsithermal." Point forms considered diagnostic for the Early Archaic include Big Sandy, Hardin, Plevna, and Lost Lake (G. Smith 1996:101). For northeast Arkansas, Morse and Morse (1983) proposed a series of horizon markers that grade from classic Early Archaic Corner Notched forms (ca. 7500–7000 B.C.) into Middle Archaic Basal Notched forms.

The Middle Archaic period was marked by a shift in subsistence modes. This was possibly due to environmental changes caused by a climatic episode called the Hypsithermal which is dated 7000–3000 B.C. (McNutt 1996) or 8000–4000 B.C. (Morse and Morse 1983). This change resulted in restricted deciduous forest occurrence, limiting the availability of certain floral and faunal resources. The cultural impact of this warming trend appears to have been most strongly felt from 5500–3500 B.C. Several settlement models regarding human adaptation during the climatic optimum have been posited. Morse and Morse (1983) propose that the western lowlands of northeastern Arkansas were largely abandoned for the uplands (Ozark Plateau and its escarpment). However, in the lower Tennessee/Cumberland region, populations appear to have congregated at a limited number of floodplain locations, producing deep middens (Nance 1987). Higgins (1990) proposed that the drying of the uplands forced people into the floodplain (American Bottom). Cypress Creek II, Eva, and perhaps some side-notched forms are noted as the diagnostic point forms from this temporal period (G. Smith 1996:101).

The Late Archaic began at the end of the Hypsithermal climatic episode (ca. 3000 B.C.) and the establishment of the modern climatic regime. The Mississippi River was by then a well-entrenched meander belt-type fluvial system, and adapting to this type of environment was critical for human occupation. There is evidence for more sedentary lifeways, and possibly limited horticulture was being employed, as sunflower, squash, and other cultivated native starchy seed annuals appear in the archaeobotanical record at this time in the other areas of the Southeast. Late Archaic settlement models typically have a seasonal round aspect, and there is evidence that the substantial "winter" villages, typically located on major streams, were actually occupied year round. Both earthen and shell mounds appear in the archaeological record in the Southeast at this time.

The Late Archaic is characterized by a substantial increase in the number of sites, cultural elaboration, and widespread trade. The period opened with the Benton culture, represented in the diagnostic material record by the Benton projectile point. G. Smith (1996:102) notes that two sites in West Tennessee yielded settlement-pattern information regarding Benton culture. Geographical positioning of these sites appears to represent a Benton trend toward the habitation of low stream terraces in West Tennessee. Excavations at 40FY13 and 40GB42 revealed a heavy dependence on mast-bearing species such as the hickory, and 40FY13 further revealed

Benton structural remains, interpreted as bent-pole rectilinear to ovate dwellings. Flexed burials at 40GB42 are at present tentatively tied to the Benton component at this site. Subsequent cultures of the Late Archaic in West Tennessee are very poorly understood. Such cultures may be represented by the Bartlett and MacIntire, *variety A* projectile points as described by Smith (1979), although little is known about the Late Archaic cultures that produced these lithic artifacts.

Poverty Point

Poverty Point, or Terminal Late Archaic, components are distinguished by the appearance of large mounds, earthworks, clay balls or "Poverty Point Objects," microlithics, lapidary work, raw material trade, and specialized manufacturing sites. The Poverty Point period (1500–500 B.C.) is considered one of three cultural "zeniths" in prehistoric Southeastern studies. In other portions of the Southeast, these components are referred to as Gulf Formational (Walthall 1990 [1980]) and include fiber-tempered ceramics as a diagnostic (Morse and Morse 1983:124). In West Tennessee, fiber-tempered ceramics occur only occasionally in the Nonconnah and Lambert complexes of the Terminal Late Archaic, and most likely represent trade items obtained from groups farther to the south (G. Smith 1996:104).

Midden mounds and gathering camps appear in the archaeological record at this time and reflect semi-sedentary populations (McNutt 1996; Morse and Morse 1983). G. Smith (1996:104) notes the presence of a Lambert complex component at 40FY13, possibly representing a Terminal Late Archaic mast-collection site. Site 40GB42 yielded similar components, although there they are attributable to the Kenton complex of the Terminal Late Archaic.

Clay balls are thought to have been a substitute for boiling stones and have considerable time depth, apparently extending into the early Middle Woodland; thus they cannot be used as exclusively Poverty Point component markers. A variety of stemmed projectile points are characteristic of the period, including Burkett-Etley-Gary forms, similar to Ledbetter-Pickwick-Mulberry Creek points, and the Weems-Wade-Dyroff-McIntire forms, which led into the Early Woodland.

Smith (1979, 1996; Smith and McNutt 1988) has repeatedly proposed a series of Poverty Point complexes for the interior drainages (loess region) of West Tennessee. The nine complexes he delineates are based primarily on pre-1975 fieldwork (see *Cultural Resource Management* above). His complexes are spatially discrete and distributed along the terraces of the smaller river bottoms that characterize the region. They are distinguished by variations in baked clay ball and preliminary projectile point types and varieties. The complexes are akin to phases and have been strongly criticized by Mainfort (1994) who remarks "While such a fine-scale typology may be useful, Smith does not demonstrate its value beyond documenting intra-regional variation and even that may be premature considering the fact that most of the data are derived from surface collections" (Johnson 1993:67).

Woodland Period

During the Woodland period, intensification in horticultural methods, construction of earthworks, elaboration of artistic expression, and burial rituals are all thought to be related to the reorganization of social structure. For at least part of the year, a sedentary group was needed to plant, tend, and harvest crops. Sedentism and communal labor efforts promoted territorial circumscription. This period was also characterized by increased variety and use of ceramics. Ceramic types and varieties thus are a primary consideration in interpreting settlement patterns and chronological progression of the Woodland period. Considerable archaeological attention has been focused on these ceramic cultures, and a number of phases and phase sequences have been proposed. However, the reader should be aware that these phase assignments are highly problematic and have received strong criticism in the recent past (Mainfort 1994).

The Early Woodland or Tchula period is viewed by G. Smith (1996:104–105) as a continued occupation by the distinct cultural complexes of the previous Poverty Point period. Tchula period diagnostic ceramics, including Tammany Punctated, Cormorant Cord Impressed, Twin Lakes Punctated, and Withers Fabric Impressed, are poorly represented in the archaeological assemblage from West Tennessee and Kentucky (Lewis 1996:51–53; Mainfort 1996a:81–82). According to Mainfort and Lewis, this poor representation is most likely attributable to the lack of temporally specific research projects aimed at the recovery of data regarding Tchula period occupations.

The most intensively investigated Early Woodland component in West Tennessee is the Fulmer site (40SY527), located on a finger ridge on the margin of the Loosahatchie floodplain near Arlington, Tennessee (Weaver et al. 1996). Approximately 62 percent of this small, essentially single-component open-habitation site was formally excavated, resulting in detailed data regarding Tchula period site structure. Activity and midden areas in the lee of the prevailing wind around a central hearth were suggested by artifact distributions. Numerous reconstructed vessel sections recovered here revealed that the conoidal bowl/beaker was overwhelmingly the most common vessel form (n=35), followed by medium jars (n=11), large flaring-rim bowls (n=5), and other bowl and jar forms. Fabric impression was the most common surface decoration, but slipped, punctated, and cord-impressed vessels were also manufactured, often with folded rims. Several ^{14}C samples were dated, but the resulting dates (A.D. 970, 980, 1060, 1520, 1750, and 1780; uncalibrated) were considered invalid (i.e., rejected). Most features at the site were heavily disturbed by tree roots, rodent burrowing, and other processes, including early-twentieth-century plowing, and the radiocarbon dates may date these post-depositional disturbances. Comparative review of the regional literature led the authors to suggest that Fulmer was affiliated with the Turkey Ridge phase of the Lake Cormorant Horizon, with a likely occupation ca. 400–100 B.C.

Another important late Tchula period component is a large site within the Reelfoot Basin, the MacDonald High site (40LK44). This site may have originally contained as many as 40 mounds; however, it has now been completely destroyed by agricultural activity (Mainfort 1996b:81–82).

The Middle Woodland period featured elaborate burial ceremonialism and artistic expression, and represents the second major cultural zenith in the prehistoric Southeast. In the Ohio Valley the Middle Woodland period is referred to in terms of Hopewell, while in the Lower Mississippi Valley this period is characterized as Marksville. Diagnostic ceramics from the Middle Woodland period include sand-tempered ceramics including Marksville Stamped and Marksville Incised (McNutt 1996:213). Two major Marksville sites are located within the Reelfoot Basin of southwestern Kentucky: the Amberg and Hickman Earthworks, 15FU37 and 15FU39–44 respectively.

The major Middle Woodland site of the region is Pinson Mounds (40MD1). Originally considered to be a Mississippian period site, subsequent archaeological investigations at Pinson (see Fischer and McNutt 1962; Mainfort 1980; Morse and Polhemus 1963) have provided ample radiocarbon dating evidence for a Middle Woodland temporal assignment. Site 40MD1 is interpreted as a large Middle Woodland ceremonial center utilized by "relatively small groups of semi-sedentary peoples" (Mainfort 1986) on a seasonal and/or infrequent basis. Middle Woodland settlement-pattern information has also been recovered (Broster and Schneider 1977) from 23 sites in the vicinity of Pinson.

The Late Woodland or Baytown period represents a period of change characterized by a population increase accompanied by decentralization and the continuing adaptation of agriculture to riverine environments (B. Smith 1986). Both characteristics of this temporal period may have represented a response to over-exploitation of local resources (McNutt 1996:217). Diagnostic Late Woodland ceramics consist entirely of clay-tempered types including Baytown Plain, Mulberry Creek Cord Marked, and Larto Red Filmed (Phillips 1970). Morse and Morse (1983) note that small, triangular projectile points such as the Hamilton and Madison types are diagnostic of the Late Woodland period and subsequent temporal periods as well. However, the general paucity of lithic artifacts from the Late Woodland may be related to the introduction of the bow and arrow ca. 700 A.D. (Blitz 1988), which may have reduced "the production of stone points to near zero" (Dunnell and Feathers 1991:26).

MISSISSIPPI PERIOD

Hallmarks of the Mississippi period include population increase, intensive floodplain settlement, greater emphasis on agricultural activity, earthwork construction on celestial alignments, inter-regional exchange of exotic items, shell-tempered ceramics, and possibly bow warfare. These factors and the development of a distinctive elite iconography are associated with the rise of conscripted, complex sociopolitical systems, which we now refer to as chiefdoms. A complex mosaic of competing chiefdoms dominated the late prehistoric Southeast political landscape. These chiefdoms were documented by the Spanish explorers at the close of the Mississippi period, which is the final zenith of Native American cultural development.

Early Mississippian cultures initiated a shift toward production of sparse shell-tempered ceramic vessels, construction of rectilinear domestic structures, and a heavy dependence upon maize-based agriculture for subsistence. The distribution of Early or "emergent" Mississippian occupations on the loess sheets of northwestern Tennessee is relatively poorly understood when compared to the remainder of the Central Mississippi Valley, with the exception of the Samburg (40OB1) and Foxhole (40LK10) sites in the Reelfoot Basin. Farther south, however, excavations at the Shelby Forest site (40SY489) revealed a Varney horizon occupation, the earliest cultural horizon in the Mississippi period, characterized by a prevalence of red-filmed ceramics (Varney Red) in the assemblage (McNutt 1988; McNutt and Fain 1990).

The Middle Mississippi period is characterized by the appearance of palisade-fortified villages, geographically expressed across the landscape in relation to an increasing adaptation to maize agriculture. Population density, house and storage pit size, vessel forms, and tool types visible in the archaeological assemblage further reflect an adaptation to and concentration upon agrarian subsistence (McNutt 1996:230). Middle Mississippian components in West Tennessee are, once again, poorly understood in comparison to surrounding areas. Two sites in the Reelfoot Basin, 40LK2 and 40LK3, offer the only Middle Mississippian occupational expressions in this portion of the state. Not until traveling much farther south does one encounter evidence of another Middle Mississippian occupation, the Chucalissa site (40SY1), located in extreme southwest Tennessee.

The Late Mississippi period represents the final prehistoric cultural climax in the southeastern United States and is predominantly characterized by a wide variety of elaborately decorated ceramic vessel types. A large number of Late Mississippian sites have been located and investigated in western Tennessee, although a surprising amount of information has yet to be published regarding these sites (Mainfort 1996a:172). G. Smith (1996:112–117) has defined three primary phases of the Late Mississippi period in West Tennessee. Smith's phases include (1) the Walls Phase, located in extreme southwest Tennessee and northern Mississippi; (2) the Tipton Phase, located in middle West Tennessee; and (3) the Jones Bayou Phase, located immediately north of the Tipton Phase, representing the closest of these three phases to the current project area. Mainfort (1996a) presents the most complete account of this temporal period for West Tennessee to date, although he notes that much work is needed before a complete understanding of the Late Mississippian cultures will be possible. Important Late Mississippian sites in West Tennessee include Sweat, Porter, Jones Bayou, Fullen, Graves Lake, Hatchie, Richardson's Landing, Wilder, Rast, Jeter, and Chucalissa. However, northwestern

Tennessee is relatively devoid of Late Mississippi period sites, a notion that has been addressed by Williams (1980, 1990) in his "Vacant Quarter Hypothesis."

PROTOHISTORIC PERIOD

This period is generally considered to have begun with the first appearance of European peoples in the Southeast. The de Soto expedition is thought to have crossed the Mississippi River near Walls, Mississippi, in June 1541, after following an upland trail from their 1540 winter camp with the proto-Chickasaw in northeast Mississippi (Dye 1993). Sites along the Mississippi River that were occupied after initial European contact have been termed Armorel phase components, and a number of horizon markers are proposed (Williams 1980).

Protohistoric sites in West Tennessee (A.D. 1541–1650) produce low frequencies of European trade goods (rarely Spanish, more typically French beads and brass) in association with Late Mississippian artifact types, including quantities of the ceramic type Campbell Appliqué (Mainfort 1996b:179). Protohistoric components are relatively infrequent in comparison to southeast Missouri and northeastern Arkansas, and are essentially absent from the interior drainages of the loess sheet. The key sites for this period in West Tennessee, Otto Sharpe and Graves Lake, are both located near the Mississippi River.

HISTORIC ABORIGINAL PERIOD

Terming seventeenth-century aboriginal occupations as "historic" versus "protohistoric" is a rather arbitrary division, as by this point Native American culture had irreversibly changed from pre-European contact lifeways. While West Tennessee is noteworthy for its general absence of historic aboriginal tribes, the region was claimed as a hunting ground by the Chickasaw as well as by the Cherokee (Satz 1979:11).

Middle Tennessee was occupied by the Shawnee in 1685 when the French established a trading post at a salt lick that later developed into the city of Nashville. At about the same time, in 1686, the French also established Arkansas Post near the Quapaw village of Osotouy. The Shawnee presence in the Cumberland River Valley brought them in persistent conflict with other groups from all sides (Cherokee, Chickasaws, and Iroquois), and early in the eighteenth century the Shawnee were driven from their Cumberland villages (Satz 1979:12). During their migration the Shawnee may have temporarily established villages in West Tennessee before settling on the Ohio River.

In 1700, a Frenchman, Father Gravier, encountered a canoe of Taogria (Yuchi) on the Mississippi River, somewhere below the mouth of the Ohio, who had been trading with the Akansea (Quapaw). In 1701, five Canadians apparently visited the Taogria Yuchi town, which was located on an island in the lower Tennessee River, near Muscle Shoals (Swanton 1922:297). These Yuchi likely moved up the Tennessee River in the first decade of the eighteenth century, and by 1712 the South Carolina Board of Indian Trade Affairs noted the presence of "Uche or Round Town people" among the Overhill Cherokee in East Tennessee (Swanton 1922:297).

HISTORIC ERA

COLONIAL PERIOD

In the waning sixteenth and seventeenth centuries, more or less continuous contact was established between European and aboriginal populations. Initial Spanish, French, and English settlements were all located on the coast. The English established Jamestown in 1607, and in 1609 King James I granted a charter to the London Company for a vast region that included present-day West Tennessee. The coastal Virginians armed the local Westo Indians, who proceeded to raid the Muscogee, or Creeks, who lacked firearms (Braund 1993:28). Such direct and indirect European-induced social disruptions, such as introduced disease (Ramenofsky 1987), would characterize the entire colonial period and lead to shifting allegiances as the European powers struggled for territory and profits in North America.

In 1665, all land south of 36° 30' was granted to the Lord Proprietors of Carolina by King Charles II. The English established Charlestown in 1670, and in 1685 Henry Woodward's packtrain traveled overland from Charlestown to the Lower Creek towns, an act that is generally regarded as the formal opening of the English deerskin trade.

In the early eighteenth century, the deer and slave trades continued to expand, as interior aboriginal populations became increasingly dependent on European goods such as flintlock muskets, metal tools, and textiles. Carolina companies "reaped huge benefits as hides and furs from interior tribes soon became the colony's major export" (Braund 1993:29). For example, in the period from 1699 to 1705, Charleston traders shipped an average of 45,000 deerskins annually to London. Above we noted that in 1701 a group of French Canadian traders ascended the Tennessee River.

While deerskins were the staple exchange, the sale of captive enemies was also profitable, fostering the breakdown of ancient traditions and a profound change in the nature of aboriginal warfare. Western groups such as the Choctaw and disrupted, weak coastal groups became targets for Creek-English slave raids.

During the 1740s tensions between the colonial powers mounted, and alliances with Indians were critical for seizing and holding both territory and deerskin-trading profits. The French launched raids on the Chickasaw during 1736–1740 in retaliation for Chickasaw raiding of their shipping (primarily Illinois wheat-laden barges) on the Mississippi. In 1739, Fort Assumption (now Memphis) was built by the French on the Chickasaw Bluffs in an attempt to curb the Chickasaw. Also at about this time the introduction of significant numbers of Negro slaves began along the coast, supplying the colonists with a more stable and controlled supply of labor.

In 1756, the French and Indian War (Seven Years' War) broke out, partly as a result of French efforts to fortify the Ohio Valley. France was defeated and signed the Treaty of Paris on February 10, 1763, ending the war. However, the English colonists were still forbidden to settle west of the Appalachians. English traders began infiltrating pro-French tribes in Louisiana in the 1770s; for example, in 1773 a Quapaw chief adopted an English trader, and they attended a conference at Pensacola together (Arnold 1991:109).

No significant activity took place in West Tennessee during the American Revolution. The nearest engagement was apparently the Englishman James Colbert's attack on Arkansas Post with a Chickasaw war party in April 1783 (Arnold 1991:111–112). This action took place well after Cornwallis surrendered at Yorktown (October 1781), essentially forcing the British to abandon the war effort and sign a preliminary peace treaty at Versailles in November 1782. The peace treaty that ended the American Revolution was formally ratified in Paris on September 3, 1783.

After the American Revolution, significant numbers of settlers from North Carolina and Virginia began to migrate over the Blue Ridge mountains into Tennessee and Kentucky. Tennessee at this time was part of North Carolina, as specified in the charter issued by the British Crown. In 1785, there were significant tensions between the settlers in the Cumberland and the legislators in North Carolina; a separate assembly was formed, resulting in the birth of the "Lost State" of Franklin (Gerson 1968:36). In 1790, George Washington established the Territory of the U. S. South of the River Ohio, which provided a formal federal separation. In 1796, Tennessee became a state.

ANTEBELLUM PERIOD

The early nineteenth century is better understood and represented in the archaeological record in Middle and East Tennessee, as this is where most settlements were located. In 1812 West Tennessee was rocked by a series of massive earthquakes known as the New Madrid earthquakes (Fuller 1912). The town of New Madrid, Missouri, was destroyed, Reelfoot Lake was formed, and the aftershocks continued for months. After the War of 1812 ended (in 1815) and the British-Creek Confederacy was defeated, immigration increased again.

In 1818 the Jackson Purchase Treaty resulted in the acquisition of West Tennessee from the Chickasaw Indians in Mississippi. Shelby County was created by the Tennessee General Assembly on November 24, 1819. The county is named for Issac Shelby, one of the Jackson Purchase Treaty commissioners. Neighboring Fayette County was established by the Tennessee Legislature on September 19, 1824, and was named for Marquis de Lafayette, the French general and statesman (Morton 1998). Settlement of the area along the Shelby-Fayette county line began as early as 1820. Memphis, the largest city in Shelby County was laid out in 1819 and incorporated in 1826.

Early settlements in east Shelby County include the following (Davies-Rodgers 1990; Magness 1994; Van West 1998). The log house that would later become Davies Manor in Brunswick was built in 1807. In 1825, Frances Wright founded the utopian plantation, Neshoba, on 2,000 ac. along the Wolf River. The plantation failed in 1829. The Memphis to Somerville Stage Road (now US-64) was authorized by the Shelby County Court in 1826. In 1830, the Morning Sun Post Office was established in the Wash Store, located at the intersection of Seed Tick and Old Stage Coach roads. Stephen Jones, Jr. moved his family from Halifax County, Virginia to Brunswick around 1835. A log house was built by Stephen's son, Russell, around 1860 that still stands today. In 1835, Thomas C. Crenshaw built Mt. Airy, a two-story plantation home southeast of Morning Sun. Other plantations, such as the Eklin family's Woodlawn, existed in east Shelby County in the 1830s. The Davies Plantation was not acquired by the Davies family until 1851, but the "manor" had been added to the log cabin by 1831.

Historically, the economy of northern and eastern Shelby County was based on agriculture, in particular cotton and corn production (Morton 1998:303). Large plantations and small farms existed throughout the county, and the adjacent sections of Fayette County. During the Antebellum era, the plantations were worked using slave labor, and the slave population of the county rose steadily during 1830-1860 (Table 3-01). During the early 1800s, the Shelby County population lagged behind that of the neighboring Fayette County. However, the rise of Memphis as an important river port eventually lead to Shelby County becoming one of the populated areas of the state. On the eve of the Civil War, black slaves formed 26 percent of the Shelby County population, while they formed more than 63 percent of Fayette County's total population. The eastern portions of Shelby County (i.e., rural areas outside of Memphis) were more akin to Fayette County.

Table 3-01. Antebellum census data for Shelby and Fayette counties.

Census	Shelby County Total Population	Shelby County Slave Population	Fayette County Total Population	Fayette County Slave Population
1830	5,648	2,049	8,652	3,178
1840	14,721	7,043	21,501	10,885
1850	31,157	14,360	26,719	15,264
1860	48,092	16,953	24,327	15,473

The Ames Plantation, located near LaGrange, has been the focus of historical archaeological research (Byrne and Moreland 2007; DuVall and Evans 1995). The Ames Plantation covers 18,600 ac. and 190 sites that promise to reveal new clues about the social and economic lives of enslaved people. During the first season of work a collaborative team surveyed and excavated at the Holcombe plantation (40FY446). This mid-sized plantation is well attested in the historical record, including published diary entries by a resident of the manor house from the 1830s.

Railroad development came in the 1850s. The Memphis to Charleston Railroad construction began in 1852 (Magness 1994:213). By 1853 the tracks reached Moscow. The line was completed in 1857, connecting Memphis directly with the Atlantic Coast for the first time. The Memphis and Ohio Railroad was established through Shelby Depot (Brunswick after 1880; Davies-Rodgers 1990:123). This became part of the Louisville and Nashville (L&N; now Seaboard) Railroad.

CIVIL WAR AND RECONSTRUCTION

Following Lincoln's election, the initial vote for secession failed, but after the war began Tennessee seceded. In 1861–1862, several skirmishes took place along the Mississippi during the Federal campaign to seize control of the river. New Madrid was captured by Confederate forces under General Pillow in 1861. Island No. 10 was fortified by the Confederates and was the scene of a battle in March 1862 (Daniel and Bock 1996).

Fort Pillow was originally constructed just above the mouth of the Hatchie River by Confederate forces in 1861, but was abandoned and seized by Union forces in June 1862. Also in June 1862 the Federal forces captured Memphis. In April 1864 the Confederate cavalry, under General Forrest, raided Fort Pillow and routed the Union troops. Archaeological investigations at Fort Pillow by the TDOA were mentioned above. Following the battle for Fort Pillow, sporadic guerrilla activity characterized combat of the latter war years.

During 1992–1993 TDOA conducted a thematic survey to identify Civil War period military sites in west Tennessee (Prouty and Barker 1996). As a result of this survey 89 sites were identified, and 19 types of archaeological sites were recognized (Prouty and Barker 1996:22). Thirteen Civil War era military sites were identified within Shelby County as a result of this study (40SY5, 40SY515–40SY524, and 40SY532–40SY533), and 18 were identified in Fayette County (40FY214–40FY231). A variety of military sites types are reported in Shelby County, but all are associated with the Union Army. The most common site type is "long term encampment" (n=11). The most significant Civil War period military site in western Shelby County is Fort Germantown (40SY533; Prouty and Barker 1996:27).

W.G. Brownlow was selected as the governor by the military occupation forces (Folmsbee et al. 1969:353). He took office in April 1865 and immediately disenfranchised all former Confederates. However, owing to Federal occupation of most of the significant populated areas of Tennessee (esp. Memphis, Nashville, and Knoxville) for most of the war, Reconstruction was a relatively short affair in Tennessee, ending in 1869.

During Reconstruction railroad construction began to open the interior portions of Western Tennessee. During the 1855–1950 communication and transportation became dominated by the railroads. The period is "foremost characterized by a drastic reorganization of non-farming settlement pattern keyed to extremely narrow corridors … " (Stewart-Abernathy and Watkins 1982:HA18-19). From an archaeological viewpoint the Railroad period is summarized as:

> … aside from the increased presence of consumer goods and increased general information level, the Railroad period is reflected by scores of nucleated settlements whose end or beginning date correspond to the coming of the railroad, and by some of the greatest landscape modifications made by people. These modifications take the form of embankments, cuttings, bridges, and

> support complexes, and exist on an intensive and extensive scale matched only by the construction after 1950 of highways and levees [Stewart-Abernathy and Watkins 1982:HA18-19].

Railroads were critical to the late nineteenth-century development of Memphis as a regional distribution center and transportation hub. Railroad construction boomed after the Civil War, and by 1900 there were 3,131 miles of track in Tennessee (Johnson 1998:771). By the 1890s, most of the railroads in Tennessee were consolidated into three major systems: the Southern Railway Security Company (Southern); the L&N; and the Illinois Central (IC).

TENANT PERIOD

The period 1870–1950 is known as the Tenant period (Stewart-Abernathy and Watkins 1982), and is named for the sharecropping or tenant farm labor system that was a significant characteristic of southern U.S. agriculture after the Civil War. This decentralization of the old plantation system developed during Reconstruction as a means of stabilizing labor relations between former slaves and landowners. Prunty (1955) has interpreted tenancy as a post-bellum modification of the plantation system.

Tennessee's farm tenancy percentage peaked during 1930–1935 at 46.2 percent, and was higher than the Southern average (Holley 2000:27). The importance of the Tenant period in the archaeological record is that it represents the maximum occupation of the study area prior to 1950 developments (see "Lakeland" section below). The dispersed settlement pattern of the tenant period contrasts sharply with the clustered settlement pattern prior to 1865 (Orser and Nekola 1985:68). The tenant settlement pattern can be observed on 1930s and 1940s aerial photographs, with alignments along roads and bayous at regular spacing. Sites dating to this period are numerous, and the issue of these sites' NRHP significance status has generated some commentary (Wilson 1990).

The Tenant period is defined as:

> …the phase within the history of commercial agriculture in which the rural landscapes dominated by mono-culture are composed of small farms of minimal size operated by white and black renter or sharecropper families. These small farms are tied to the plantation complex and represent a decentralized stage in this development. In this stage the use of capital for the production of a base crop is routed through an extra step consisting of the several families who are responsible for raising the crop. While the direction of capital use and power obviously flows from top to bottom in this stage, the extent to which the tenant family, in fact, exercises control over various of their affairs is problematical, with archaeological implications ranging from source of supply for table ceramics and architectural environment to responsibility for social and physical community patterning and maintenance of ethnic identity [Stewart-Abernathy and Watkins 1982:HA16-HA17].

Stewart-Abernathy (1999:240) has reviewed a number of "intriguing" investigations at tenant farmsteads in "delta" area around Memphis that were conducted by contract archaeologists (Buchner 1992; Buchner and Childress 1991; Buchner and Weaver 1990; Childress 1990; Weaver et al. 1996). Nearly all of this work was CRM investigations funded by the USACE, Memphis District. Examination of "delta" Tenant period archaeological site data has lead to the development of a distinctive "Tenant Period Artifact Pattern" (Buchner 1992), when assemblages are analyzed using South's (1977) functional groups. While some deviations can be observed in the frequency patterns identified based on surface collected assemblages versus excavated assemblages, in general the pattern is one where Kitchen Group artifacts dominate. Excavated assemblages tend to produce more nails, thus the proportional representation of the Architecture group increases at the expense of the Kitchen Group.

The ceramics are typically cheaper types, often from mismatched sets, and many of these types can be identified following Price (1979). Mean ceramic dates (MCDs) are often not calculated for these sites due to the long span of whiteware production, as well as problems relating to temporal lag. Garrow et al. (1989:60) note that "South's (1977) mean ceramic date formula tends to break down after ca. 1860…the primary reason is that neither manufacturing or popularity date ranges have been firmly established for the post-1860 period." Only trace frequencies of other artifact groups are found (Arms, Clothing, Personal, Furniture, Tobacco), and in small assemblages these minority group types are often not represented.

The cultural deposits at Tenant period sites are typically near surface, often plowzone only contexts, as a result of the buildings being frame structures elevated on brick, concrete, or cypress stump piers. If a house did not have a substantial chimney, it was more likely to be swept away during a flood. Occasionally tenant sites are multi-component (i.e. co-occur with prehistoric material); this is largely dependent on the natural setting of the site. Many Tenant period sites are located on silty clay backswamp soils that were not suitable for human habitation until after drainage improvements were made.

World War II

While World War II (WWII) was waged overseas, the war had both immediate and long-term influences on the home front. During WWII, multiple military and industrial facilities were constructed in Tennessee, and these facilities are part of the state's "Home Front Heritage" (Kelly 2004:40).

The TDOA conducted a survey for WWII military sites in Tennessee, and identified five sites in Shelby County: the Memphis General Services Depot (40SY700); Second Army HQ (40SY701); Memphis Naval Air Station (40SY702); the "Wagon Wheel" Airfield (40SY703); Charles W. Baker Field (40SY704); and Kennedy Veterans Hospital (40SY705) (Nance 2007:22). Additionally, Nance (2007:57) identified 16 companies in Shelby County that produced war materials, including the Chickasaw Ordnance Works (COW) in Millington. A portion of the APE is within the former Chickasaw Ordnance Works; a history of this facility is provided in Chapter IV.

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IV. LITERATURE AND RECORDS SEARCH

PREVIOUSLY RECORDED ARCHAEOLOGICAL SITES

Karla Oesch, Register of Professional Archaeologists (RPA) conducted a standard site files search at the Tennessee Division of Archaeology (TDOA) facility in Nashville for this project on December 12, 2018. Importantly, this research revealed that there are three previously recorded archaeological sites within the proposed Big Creek project APE: 40SY514 in the Primary Project Area 1 and 40SY648 and 40SY664 in the Western Mitigation tract.

40SY514

Site 40SY514 is a Dalton component located in an agricultural field within Primary Project Area 1 to the south of a borrow pit (Figure 4-02). Memphis State University archaeologist G.P. Smith recorded Site 40SY514 as field site A-90 during an April 1990 survey. The TDOA site form is the only record of the site, there is no associated report (although G.P. Smith mentions that property was being acquired by the Corps of Engineers for use as a borrow pit). Smith described 40SY514 was a 190 m long surface scatter with a concentration in the southern 50 m. Work conducted included the recovery of a small surface collection, the excavation of an unspecified number of shovel tests and a 1-x-1m unit. The latter revealed that the site does not exhibit a midden. The recovered assemblage is curated at C.H. Nash Museum/Chucalissa Indian Village, and includes a Dalton point, three flakes, two broken rocks, a core, a hammer stone, and a possible scraper.

40SY648

Site 40SY648 is a multi-component Prehistoric open habitation that is located within an agricultural field within the Western Mitigation tract (Figure 4-02). Weaver & Associates, LLC (W&A) initially identified the site during an I-69 corridor survey for TDOT (Carty et al. 2002). DuVall & Associates, Inc. (D&A) revisited the site during another Phase I survey for I-69 Alignment A-1, and subsequently D&A conducted a Phase II investigation of the site (Cochrane et al. 2006; McCorkle et al. 2005). Importantly, the Phase II investigation resulted in 40SY648 being determined not eligible for the NRHP (Cochrane et al. 2006).

Cochrane et al. (2006:36) characterize 40SY648 as 60-x-75 m plowzone deposit in on a rise overlooking the confluence of Jakes Creek with Bear Creek. Phase II work conducted at the site include the recovery of a surface collection, and the excavation of six 1-x-1 m test units and thirteen mechanized strips that exposed 825 m^2. Two small, truncated Prehistoric pit features were identified within the stripped area. In total the Phase II assemblage contained 421 Prehistoric lithics and ceramics, six Historic artifacts, and 543.7 g of fire-cracked rock (FCR), burnt clay, and burnt nutshell. Key diagnostic artifacts include a Ledbetter point, a Madison point, shell-, grog-, and sand-tempered ceramics, and weak Late Archaic, and strong Woodland and Mississippian occupations were suggested.

40SY664—CHICKASAW ORDNANCE WORKS

Site 40SY664 represents various surface features associated with the 1940-1942 Tennessee Powder Company and the 1942-1946 Chickasaw Ordnance Works (COW). This was a sprawling 6,000+ ac. WW II era explosives production facility, and a history of this facility is offered at the end of this section; here the focus is on the previously recorded archaeological features.

Archaeologists affiliated with PBSJ initially identified features associated with the COW during an I-69 corridor survey for TDOT (Sherman et al. 2002) (Figure 4-01). Within the Western

Mitigation tract, Sherman et al. (2002:Figure 22) identified four structures and a bridge, while south of the Big Creek Drainage Canal (outside the Big Creek Resilience project area) six ammunition igloos and another structure were identified. The Sherman et al.'s (2002) estimated site boundary for 40SY664, which they refer to as "Archaeology District 1," covers 180 ac. of their survey corridor (Figure 4-01).

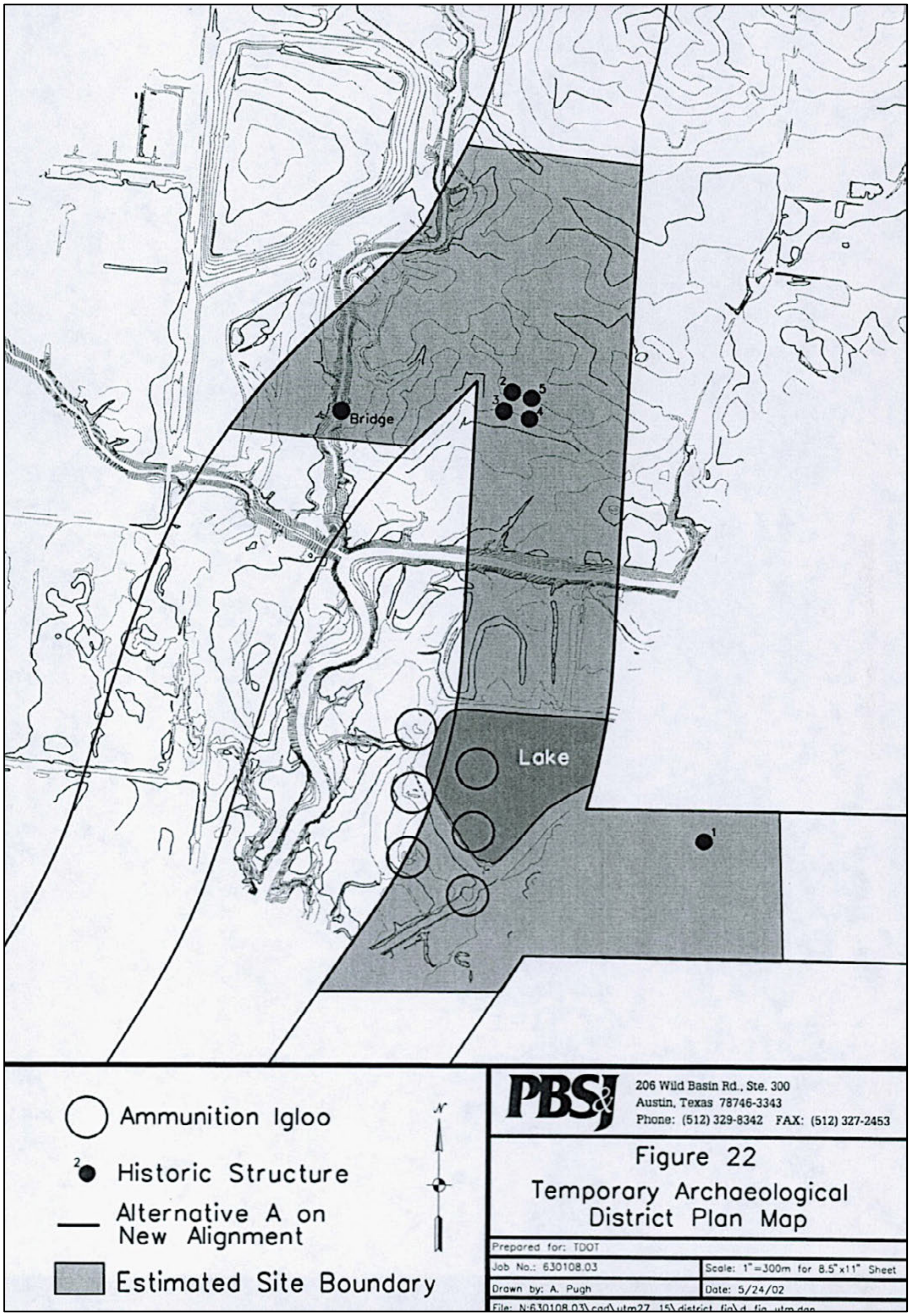

Figure 4-01. Site 40SY664 site plan (after Sherman et al. 2002:Figure 22).

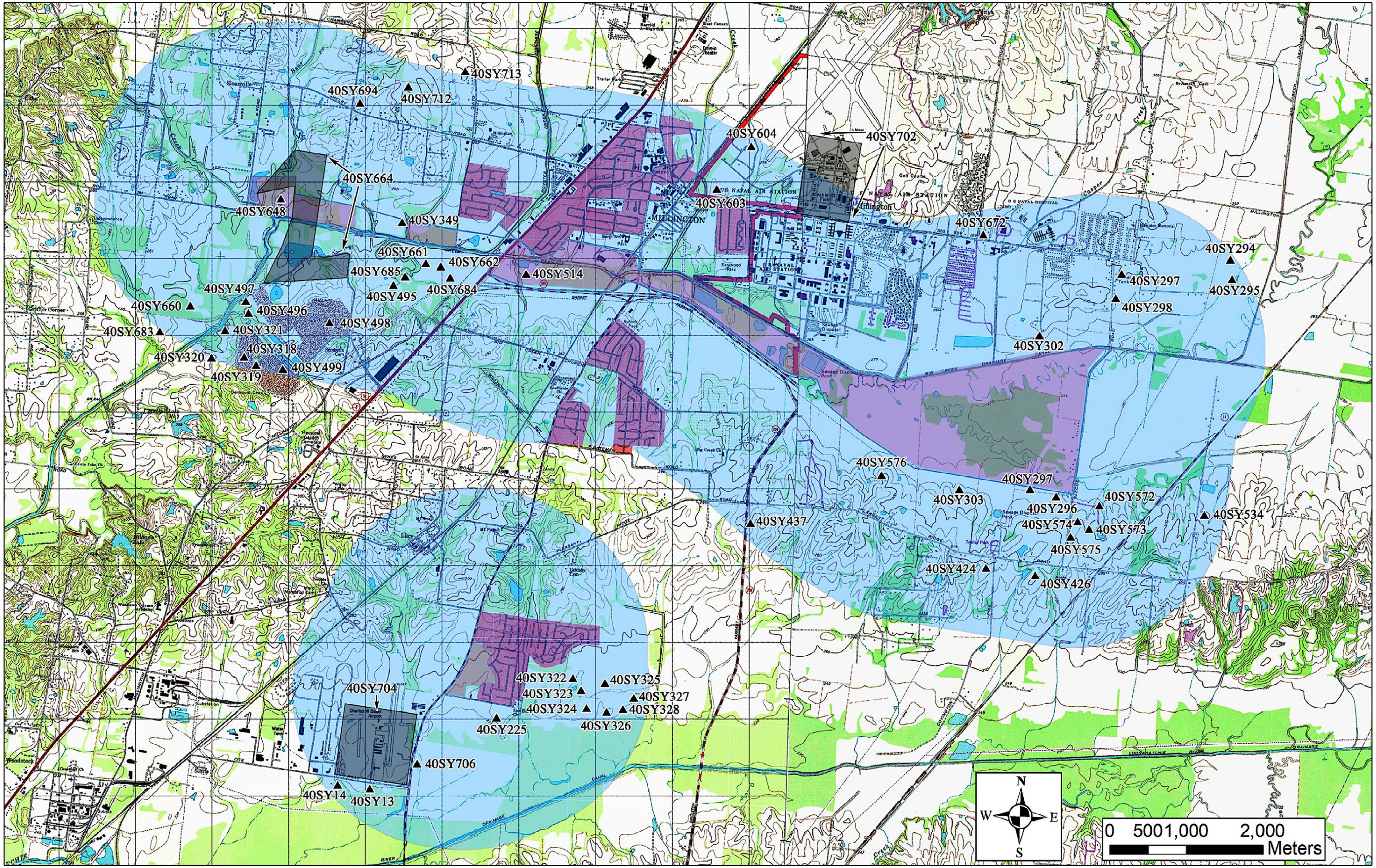

Figure 4-02. Distribution of previously recorded archaeological sites within 2 km of the Big Creek Resilience project areas (base maps: Brunswick and Millington, TN 7.5-min. quads).

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Sherman et al. (2002) identified Structures 2, 3, 4 and 5 within the Western Mitigation tract (Figure 4-03). The function of the structures was not determined. Structure 2 was concrete and contained three elements, including two box-like foundations and a rubble pile with cement pipes (Sherman et al. 2002:58). Structure 3 consisted of a pair of identical keyhole-like concrete features, separated by an area of rubble (Figure 4-04). Structure 4 was the concrete frame of a large building, roughly 20-x-20 m by 10 m tall. Structure 5 is a par of 1-x- 1m concrete cubes that are aligned with Structure 3. The bridge within the Western Mitigation tract was not described.

Sherman et al. (2002:64) recognized the significance of the COW, and concluded that 40SY664 "may be eligible for NRHP inclusion under Criterion A" for its association with early WW II mobilization efforts, and its economic and social impact on Millington. Additionally, Sherman et al. (2002:64) also suggested that 40SY664 might be eligible under Criterion C, as the remaining architectural elements potentially embody the distinctive characteristics of WW II period construction.

During 2005, D&A revisited 40SY664 as a part of the I-69 Alternate Alignment A-1 survey (McCorkle et al. 2005:84-86). They limited their investigation to a walkover of the portion of the COW within the corridor. Photos of three concrete ruins were provided (McCorkle et al. 2005:Figures 48, 49 and 50), but their locations and distribution are not discussed. Based on our field knowledge (see Chapter V), one of the structures photographed by McCorkle et al. (2005:Figure 49) is Sherman et al.'s (2002) Structure 4, while the other two structures they photographed (McCorkle et al. 2005:Figure 50 and 51) were not documented by Sherman et al. (2002).

Importantly, regarding 40ST664's NRHP eligibility, McCorkle et al. (2005:84) state the THC determined the COW <u>did not</u> meet NRHP criteria because the remaining structures do not contribute to an "overall sense of a manufacturing or industrial facility, and the site no longer retains integrity fro the World War II era" (McCorkle et al. 2005:Appendix B:B3).

In 2009, during another I-69 corridor survey for Alternative R, W&A relocated one of McCorkle et al.'s (2005) structures associated with the COW (Oster et al. 2009:274-277). This structure, also within the Big Creek Western Mitigation tract, is about 100 m to 300 m west of Sherman et al.'s (2002) cluster containing Structures 2, 3, 4 and 5. This structure is located on the edge of a terrace, adjacent to an unnamed tributary of Big Creek. It is a relatively large (30-x-15 m) concrete foundation with three rectangular sections; two of which were flooded and interpreted as basements (see W&A sketch map [Figure 4-05] and D&A photo [McCorkle et al. 2005:Figure 48]). One of the basement sections exhibited a recessed concrete stairway. Orser et al. (2009:275) suggested that the "overlying structure" had been dismantled and removed.

Orser et al. (2009:275) excavated 13 shovel tests near the structure, but all were sterile. Orser et al.'s (2009:277) conclusions and recommendations mirror those of Sherman et al. (2002:64): the structure was interpreted as a former element of the COW, and was potentially eligible for the NRHP under Criterion A and C.

OTHER SITES WITHIN 2 KM

Within a 2-km search radius of the APE there are 59 additional previously recorded archaeological sites (Table 4-01 and Figure 4-02).

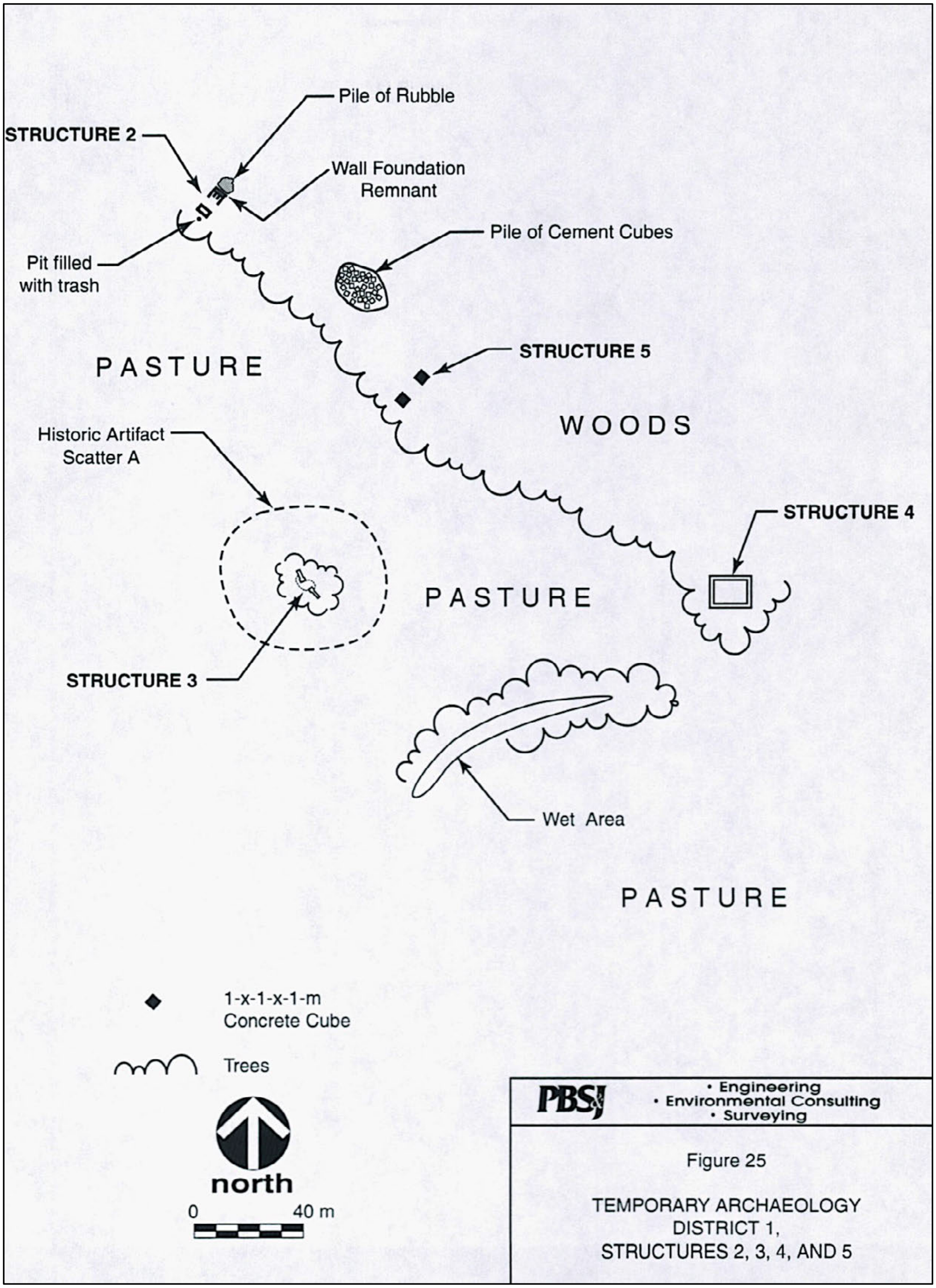

Figure 4-03. Sherman et al.'s (2002) sketch of 40SY664 Structures 2, 3, 4 and 5 within the Western Mitigation tract (after Sherman et al. 2002:Figure 25).

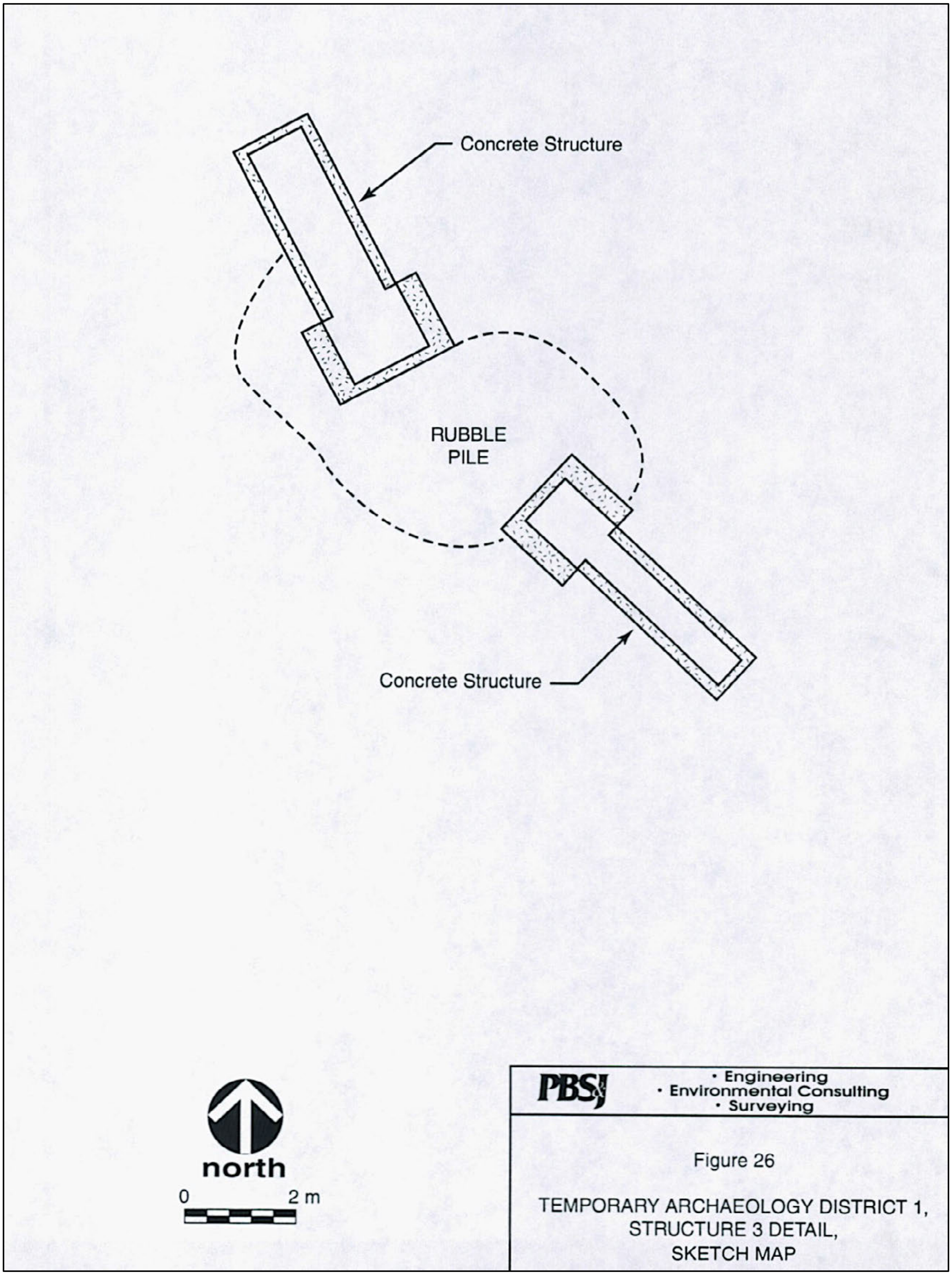

Figure 4-04. Sherman et al.'s (2002) Structure 3 detail (after Sherman et al. 2002:Figure 26).

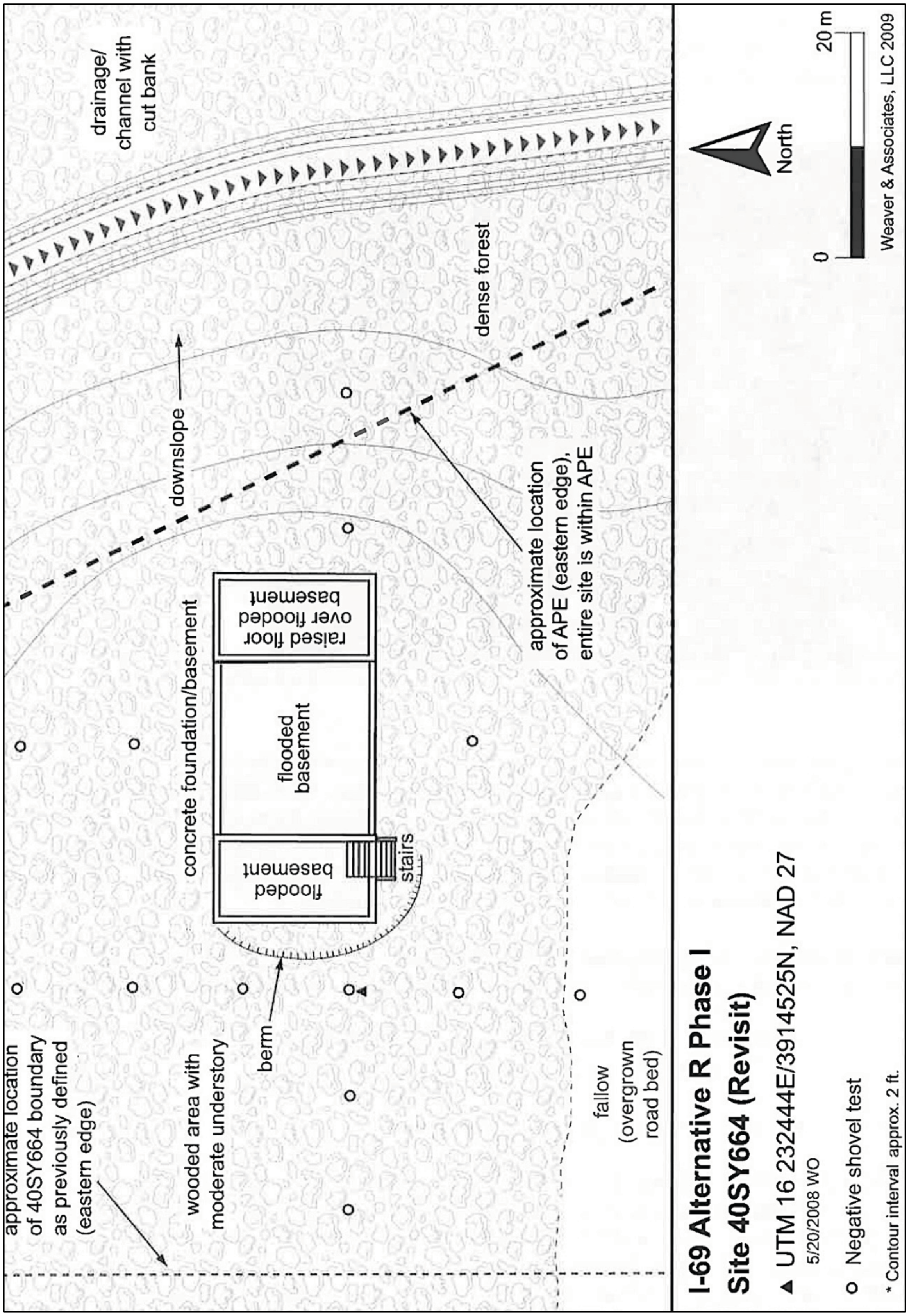

Figure 4-05. W&A's 40SY664 structure (after Oster et al. 2009:Figure 8.14).

Table 4-01. Previously recorded sites within 2 km of the APE.

Trinomial	Component	Site Type	NRHP Status	Reference
40SY13	Unknown prehistoric; unknown historic	Open habitation; Unknown	Potentially eligible	no report on file
40SY14	Possible Archaic	Village	Not eligible (destroyed)	Smith and Smith 2006
40SY225	Archaic, Woodland	camp	n/a	no report on file
40SY294	Unknown prehistoric	Open habitation	n/a	no report on file
40SY295	Unknown prehistoric	Open habitation	n/a	no report on file
40SY296	Late Archaic	Camp	n/a	no report on file
40SY297	Late Archaic, Woodland	Camp	n/a	no report on file
40SY298	Undifferentiated prehistoric	camp	n/a	no report on file
40SY299	Archaic, Woodland	Open habitation	n/a	no report on file
40SY300	Archaic, Woodland	Open habitation	n/a	no report on file
40SY302	Archaic	Open habitation	n/a	no report on file
40SY303	Unknown prehistoric; unknown historic	Unknown	n/a	no report on file
40SY317	Undifferentiated prehistoric	Open habitation	n/a	no report on file
40SY318	Undifferentiated prehistoric	Open habitation	n/a	Sherman et al. 2002 (Not on file at TDOA)
40SY319	Undifferentiated prehistoric	Open habitation	n/a	no report on file
40SY320	Undifferentiated prehistoric	Lithic scatter	Not eligible	Peterson 1979; Gilbert 1980
40SY321	Undifferentiated prehistoric	Lithic scatter	Not eligible	Peterson 1979; Gilbert 1980
40SY322	Archaic, Woodland; 20th century	Open habitation; House site	n/a	Peterson 1979; Gilbert 1980
40SY323	Undifferentiated prehistoric	Open habitation	Not eligible	Peterson 1979; Gilbert 1980
40SY325	Undifferentiated prehistoric	Lithic scatter	Not eligible	Peterson 1979; Gilbert 1980
40SY326	Undifferentiated prehistoric	Lithic scatter	Not eligible	Peterson 1979; Gilbert 1980
40SY327	Undifferentiated prehistoric	Lithic scatter	Not eligible	Peterson 1979; Gilbert 1980
40SY328	Undifferentiated prehistoric	Lithic scatter	Not eligible	Peterson 1979; Gilbert 1980
40SY347	Early 20t century	Tenant farm	n/a	no report on file
40SY349	Undifferentiated prehistoric	Lithic scatter	n/a	no report on file
40SY424	Unknown prehistoric; unknown historic	Unknown	n/a	no report on file
40SY426	Unknown prehistoric; unknown historic	Unknown	n/a	Peterson 1979
40SY495	Undifferentiated prehistoric	Lithic scatter	Not eligible	no report on file
40SY496	Undifferentiated prehistoric	Lithic scatter	Not eligible	no report on file
40SY497	Middle Archaic, Woodland, Mississippian	Open habitation	n/a	no report on file
40SY498	19th century historic	Rural domestic site	n/a	no report on file
40SY499	Late Archaic, Woodland	Open habitation	n/a	no report on file

Trinomial	Component	Site Type	NRHP Status	Reference
40SY534	Undifferentiated prehistoric; Early 20th century historic	Lithic scatter; House site	Not eligible	McNutt et al. 1994
40SY572	Late Archaic	Open habitation	Not eligible	Lauro 1995 (Not on file at TDOA)
40SY573	Undifferentiated prehistoric	Lithic scatter	Not eligible	Lauro 1995 (Not on file at TDOA
40SY574	Late Archaic	Camp	n/a	Lauro 1995 (Not on file at TDOA
40SY575	Early Archaic; unknown historic	Open habitation; Rural domestic site	Not eligible	Lauro 1995 (Not on file at TDOA
40SY576	Undifferentiated prehistoric; 20th century historic	Lithic scatter Rural domestic site	Not eligible	Lauro 1995 (Not on file at TDOA
40SY598	Undifferentiated prehistoric	Lithic scatter	Not eligible	Childress 1996
40SY599	mid 19th-early 20th c. historic	Rural domestic site	Not eligible	Childress 1996
40SY600	Woodland	Open habitation	unevaluated	Childress 1996
40SY603	Archaic-Woodland mid 19th-early 20th c. historic	Open habitation; Rural domestic site	unevaluated	Childress 1996
40SY604	Early 20th century historic	Possible house site	Not eligible	Childress 1996
40SY660	Unknown prehistoric; mid 19th-early 20th c. historic	Lithic scatter; House site	Not eligible	Sherman et al. 2002 (Not on file at TDOA); McCorkle et al. 2005
40SY661	Undifferentiated prehistoric	Lithic scatter	Not eligible	Sherman et al. 2002 (Not on file at TDOA); Oster et al. 2009
40SY662	Undifferentiated prehistoric	Lithic scatter	Not eligible	Sherman et al. 2002 (Not on file at TDOA); McCorkle et al. 2005; Oster et al. 2009
40SY672	mid 19th-early 20th century	House site	Not eligible	Anderson et al. 2004 (Not on file at TDOA)
40SY673	mid 19th-early 20th century	House site	Not eligible	Anderson et al. 2004 (Not on file at TDOA)
40SY683	Late Archaic, Early Woodland	Lithic scatter	Not eligible	McCorkle et al. 2005
40SY684	Late Woodland, Mississippian	Lithic scatter	Not eligible	McCorkle et al. 2005; Oster et al. 2009
40SY685	Undifferentiated prehistoric	Lithic scatter	Not eligible	McCorkle et al. 2005; Oster et al. 2009
40SY694	mid 19th-early 20th century	House site	Not eligible	McCorkle et al. 2005; Oster et al. 2009
40SY702	Early 20th-mid 20th century historic y	Millington Naval Air Station	?	Nance 2007; Barrett 2017
40SY704	Early 20th-mid 20th century historic	Charles Baker airfield	?	Nance 2007
40SY706	mid 19th-20th century	House site/farmstead	Not eligible	Stetzer 2007; Buchner et al 2014
40SY712	Undifferentiated prehistoric	Lithic scatter	Not eligible	Oster et al. 2009
40SY713	mid 19th-early 20th century	House site	Not eligible	Oster et al. 2009

Trinomial	Component	Site Type	NRHP Status	Reference
40SY772	mid 19th-early 20th century	House site	Not eligible	Rosenwinkel et al. 2017
40SY775	20th century historic	House site	Not eligible	Rosenwinkel et al. 2017

Note: sites in bold and italics are within one of the four APEs.

PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

Review of the TDOA project files indicate that the vast majority of the Big Creek project area has not been previously surveyed for cultural resources. At least twelve previous surveys are have been conducted near Big Creek project area, and they are reviewed below in chronological order.

SR 385 INVESTIGATIONS

During 1994, G&A conducted a survey the proposed SR 385 corridor from Ricks Road to Salem Road (McNutt et al. 1994). Approximately 146 acres were examined for TDOT. The APE was mainly investigated by pedestrian visual survey, but 51 shovel tests were excavated in areas of low surface visibility. Four sites (40SY534—537) and three isolated finds were documented. All those cultural resources were recommended as not eligible for listing in the NRHP.

WEST UNION ROAD EXTENSION

In 1996, G&A conducted a survey for proposed right-of-way extensions of West Union Road in Millington for TDOT (Childress 1996). The right-of-way was a four-lane divided highway 3.4 mi. long. During the course of the fieldwork, seven new sites were identified (40SY598—604). Three sites were recommended for additional work (40SY600, 40SY602 and 40SY603). One site was to be unaffected by the proposed work, but was recommended for additional investigation, if it was to be affected (40SY601). The remaining three sites were recommended as not eligible for listing in the NRHP.

I-69 RECONNAISSANCE

During 2002, PBSJ conducted a reconnaissance survey of the proposed I-69 route from Hernando, Mississippi to Millington, Tennessee (Sherman et al. 2002). During the course of the field work, six previously recorded sites and 63 newly identified sites were examined. Importantly, Site 40SY664, referred to as Archaeology District 1, was identified within the Big Creek off site Western Mitigation tract; see discussion above.

I-69 ALTERNATIVE A-1

In 2005, D&A conducted a survey of the proposed I-69 Corridor A, Alternative A-1 (McCorkle et al. 2005). The survey corridor extended from the intersection of I-40 and SR 51, north to Shelby Road in Millington, and 739 ac. was investigated. The APE was surveyed by pedestrian reconnaissance and shovel testing, with the tests dug from 10 to 30 m apart, depending on field conditions. As a result of the field work, 12 previously recorded sites were revisited and 21 newly identified archaeological sites were recorded. Sites 40SY648 and 40SY664, which are located within the Western Mitigation tract, was re-visited during this corridor survey. Three of the sites were recommended for additional testing (including 40SY648), the remaining 30 sites, including 40ST664, were recommended not eligible for listing in the NRHP.

PHASE II TESTING AT 40SY141, 40SY648, AND 40SY681

During 2005-2006, Cochrane et al. (2006) conducted phase II testing of the three sites recommended for additional work by McCorkle et al. (2005); see above. Importantly, Site

40SY648, located within the Western Mitigation tract, was determined not eligible for the NRHP as a result of this project; see 40SY648 discussion above.

Loosahatchie Force Main and Sewer Extension

In 2006, Cultural Resource Services conducted a survey in advance of the construction of a new force main and gravity sewer line extension (Smith and Smith 2006). The area had been previously surveyed in 1972 by students from the University of Memphis, and during which five sites were identified (40SY13, 40SY14, 40SY310, 40SY311 and 40SY312). During the 2006 investigations, the site locations were revisited. It was determined that four of the sites, while near the extension, would not be affected by the proposed work. The landform occupied by 40SY14 was reportedly gone, thus the site was considered destroyed. Sites 40SY13 and 40SY312 were recommended as potentially eligible for listing in the NRHP, but reportedly would not be impacted by the undertaking.

Memphis Stone and Gravel Cell Tower Site

In 2007, W&A conducted a survey of 100-x-100 ft. proposed cellular tower lot in Millington, overlooking an unnamed intermittent channel of the Loosahatchie River Drainage Canal (Stetzer 2007). Shovel testing revealed the presence of Site 40SY706, a mid-nineteenth-to late twentieth century rural domestic site. Site 40SY706 was recommended as not eligible for listing in the NRHP.

I-69 (Corridor 18) Alternates Surveys

In 2009, W&A conducted a survey of 68 mi. of new and existing alignments the proposed I-69 Corridor 18 Alternates (Oster et al. 2009). This resulted in the documentation 81 archaeological sites and six historic cemeteries. Importantly, another concrete foundation associated with COW was identified with the Western Mitigation tract; see 40SY664 discussion above.

Alternative Site 1 Survey

In 2011, Panamerican performed a Phase I cultural resources survey of an 18.7 ac. tract located south of Fite Road, southwest of the Charles W. Baker Airport (Saatkamp 2011). Surface visibility across the project area was poor to excellent, with approximately half of the field being amenable to visual inspection. The tract was shovel tested at 30 m intervals and a total of 99 shovel test locations was recorded. None of the excavated shovel tests were positive for cultural material. Two non-diagnostic lithic artifacts were observed in the southwestern corner of the project area, near the boundary. Both items were observed on the ground surface in an eroded spot with excellent surface visibility. The isolated find was a very sparse scatter confined to a surface context, perhaps related to 40SY314, located across a small ditch to the west-southwest. This isolated find was recommended to be not eligible for listing in the National Register of Historic Places.

405-Acre Mitigation Tract

In 2014, Panamerican surveyed a 405-ac. proposed wetland mitigation tract along the Loosahatchie River Drainage Canal (Buchner et al. 2014). The tract was investigated by visual survey in the agricultural fields, shovel testing at 30-m intervals in the non-flooded portion of the bottomland forest, and 10-m interval shovel testing at 40SY706, a previously recorded site in the tract. Aside from 40SY706, which was recommended not eligible for listing in the NRHP, no other cultural resources were identified.

Army Reserve Facilities Survey

In 2016 Brockington & Associates (2016) surveyed seven U.S. Army Reserve facilities in Tennessee, including the Millington Army Reserve Center. The Millington center contains six buildings in four locations, built between 1956 and 1985. Archaeological investigations consisted of the excavation of shovel tests within the four locations. The soils were disturbed, likely due to the construction of the center. Negative findings were reported.

SHELBY-DRUMMONDS TRANSMISSION LINE ACCESS ROADS

In 2017, Tennessee Valley Archaeological Research conducted a survey of nine proposed access roads totaling 1.69 km in length that were associated with a proposed TVA transmission line from Shelby to Drummonds. The roads were walked and visually inspected, and shovel testing was conducted at 30 m intervals. Two previously recorded sites were revisited (40SY772 and 40SY775) and one new site (40SY776) was identified and recorded. All three sites were recommended as not eligible for listing in the NRHP (Rosenwinkel et al. 2017).

ASTORIA AVENUE IMPROVEMENTS

In 2017, TRC conducted a survey for proposed improvements to a 0.5-mile section of Astoria Avenue. The APE was found to be heavily disturbed by previous construction and demolition activities (Barrett 2017). No new archaeological sites were identified within the APE, and a previously recorded site mapped within the APE (40SY702) was not relocated (Barrett 2017).

PREVIOUSLY RECORDED ARCHITECTURAL PROPERTIES

Importantly, review of the Tennessee Historic Commission online historic properties viewer Historic resources inventory architectural map reveals that there is no above ground cultural resource within the Big Creek Resilience project area. This is not surprising given the low-lying project setting and abundant wetlands.

Within a 1 mi. radius of the Big Creek Resilience project area there are 127 previously recorded properties (Table 4-02). The high density of properties is due to the proximity of City of Millington to the Big Creek project area. The properties range in age from 1864 (the Rembert Cemetery, SY-32933A) to 1951. Three of the properties are recommended as potentially eligible for listing in the NRHP.

Table 4-02. Historic structures within 1-mi. of the four APEs.

THC ID	Property Address	NRHP Status	Construction Date	Original Use Type
SY-31945A	RICKS RD	No	ca. 1930	Agriculture
SY-31947A	PLEASANT RIDGE 6915	Yes	ca. 1915	Residential structure
SY-31948A	PLEASANT RIDGE 6912	No	ca. 1930	Residential structure
SY-31949A	PLEASANT RIDGE 6912	No	ca. 1930	Other structure
SY-31950A	PLEASANT RIDGE 6791	No	ca. 1920	Other structure
SY-31951A	SLEDGE RD	No	ca. 1925	Residential structure
SY-31952A	PLEASANT RIDGE 6648	No	ca. 1945	Agriculture
SY-31953A	PLEASANT RIDGE 6540	No	ca. 1930	Residential structure
SY-31954A	PLEASANT RIDGE 6540	No	ca. 1930	Agriculture
SY-31955A	PLEASANT RIDGE	No	ca. 1925	Agriculture
SY-31956A	PLEASANT RIDGE 5686	No	ca. 1920	Residential structure
SY-31957A	PLEASANT RIDGE	No	ca. 1940	Residential structure
SY-32028A	PLEASANT RIDGE RD 6995	No	ca. 1930	Residential structure
SY-32029A	PLEASANT RIDGE 7019	No	ca. 1930	Residential structure
SY-32030A	PLEASANT RIDGE 6915	No	ca. 1915	Residential structure

THC ID	Property Address	NRHP Status	Construction Date	Original Use Type
SY-32031A	PLEASANT RIDGE 6912	No	ca. 1930	Agriculture
SY-32032A	PLEASANT RIDGE RD 6648	No	ca. 1930	Agriculture
SY-32033A	PLEASANT RIDGE RD 6648	No	ca. 1935	Agriculture
SY-32034A	PLEASANT RIDGE RD 6554	No	ca. 1930	Residential structure
SY-32035A	PLEASANT RIDGE	No	ca. 1935	Residential structure
SY-32036A	TWIN OAKS	No	ca. 1935	Residential structure
SY-32037A	TWIN OAKS	No	ca. 1935	
SY-32038A	PLEASANT RIDGE	No	ca. 1930	Residential structure
SY-32039A	PLEASANT RIDGE	No	ca. 1920	Residential structure
SY-32040A	PLEASANT RIDGE RD	No	ca. 1930	Residential structure
SY-32110A	SLEDGE RD	No	ca. 1925	Residential structure
SY-32530A	DOWER 6400	No	ca. 1935	Residential structure
SY-32531A	ILLINOIS CENTRAL 6365	No	ca. 1940	Residential structure
SY-32532A	ILLINOIS CENTRAL 6389	No	ca. 1942	Residential structure
SY-32534A	MAIN 6396	No	ca. 1940	Commercial building
SY-32540A	SHAKE RAG 8305	No	ca. 1940	Residential structure
SY-32583A	EASLEY 5038	No	ca. 1910	Commercial building
SY-32584A	EASLEY 5030	No	ca. 1925	Residential structure
SY-32585A	EASLEY 5021	No	ca. 1930	Residential structure
SY-32586A	EASLEY 5018	No	ca. 1920	Residential structure
SY-32587A	EASLEY 5004	No	ca. 1910	Residential structure
SY-32588A	EASLEY	No	ca. 1920	Residential structure
SY-32589A	CHURCH 7979	No	ca. 1920	Residential structure
SY-32590A	EASLEY 4854	No	ca. 1930	Residential structure
SY-32618A	SLEDGE 7521	No	ca. 1900	Other structure
SY-32619A	NAVY RD 6867	No	ca. 1930	Residential structure
SY-32623A	KROSP RD 7419	No	ca. 1915	Residential structure
SY-32624A	KROSP RD 7440	No	ca. 1935	Residential structure
SY-32662A	LUCY 4023	No	ca. 1945	Government building
SY-32663A	DOWER ST 6386	No	ca. 1945	Residential structure
SY-32664A	DOWER ST 6395	No	ca. 1940	Residential structure
SY-32665A	I.C. RD 6375	No	ca. 1880	Residential structure
SY-32666A	I.C. RD 6359	No	ca. 1920	Residential structure
SY-32668A	I.C. RD 6423	No	ca. 1880	Other structure
SY-32669A	PLEASANT RIDGE	No	ca. 1920	Residential structure
SY-32670A	SCHOOL RD	No	ca. 1935	Residential structure
SY-32671A	AMHERST 6144	No	ca. 1920	Residential structure
SY-32672A	AMHERST 6316	No	ca. 1915	Residential structure
SY-32673A	AMHERST 6366	No	ca. 1910	Residential structure
SY-32674A	PLEASANT RIDGE 4201	No	ca. 1915	Residential structure
SY-32676A	PLEASANT RIDGE	No	ca. 1900	Other structure
SY-32678A	RALEIGH MILLINGTON	No	ca. 1935	Residential structure
SY-32679A	PLEASANT RIDGE 4595	No	ca. 1940	Residential structure

THC ID	Property Address	NRHP Status	Construction Date	Original Use Type
SY-32680A	PLEASANT RIDGE 4703	No	ca. 1903	Residential structure
SY-32681A	PLEASANT RIDGE 4727	No	ca. 1905	Residential structure
SY-32686A	DUNCAN 4470	No	ca. 1949	Religious structure
SY-32687A	DUNCAN 4470	No	ca. 1870	Other structure
SY-32688A	RALEIGH MILLINGTON 5581	No	ca. 1910	Residential structure
SY-32696A	CHASE RD 6034	No	ca. 1920	Residential structure
SY-32697A	CHASE RD 5694	No	ca. 1900	Residential structure
SY-32698A	CHASE RD	No	ca. 1925	Residential structure
SY-32710A	SLEDGE	No	ca. 1930	Residential structure
SY-32711A	MAUY RD 6790	No	ca. 1890	Religious structure
SY-32712A	NAVY RD 7029	No	ca. 1920	Residential structure
SY-32715A	NAVY RD	No	ca. 1906	Other structure
SY-32716A	KROSP RD	No	ca. 1920	Residential structure
SY-32719A	MARTIN	No	ca. 1900	Residential structure
SY-32756A	I.C. 6345	No	ca. 1910	Residential structure
SY-32757A	LUCY 4005	No	ca. 1940	Religious structure
SY-32758A	LUCY 4059	No	ca. 1930	Residential structure
SY-32759A	ETTA RD 6448	No	ca. 1940	Residential structure
SY-32760A	MAIN ST	No	ca. 1920	Residential structure
SY-32761A	PLEASANT RIDGE 4090	No	ca. 1920	Residential structure
SY-32762A	SCHOOL RD 6269	No	ca. 1920	Educational facility
SY-32763A	AMHERST 6306	No	ca. 1930	Residential structure
SY-32764A	AMHERST C359	No	ca. 1935	Residential structure
SY-32765A	PLEASANT RIDGE 4393	No	ca. 1951	Religious structure
SY-32767A	RALEIGH MILLINGTON 6438	No	ca. 1930	Residential structure
SY-32768A	PLEASANT RIDGE RD 4585	No	ca. 1940	Residential structure
SY-32769A	PLEASANT RIDGE RD	No	ca. 1900	Other structure
SY-32773A	RALEIGH MILLINGTON 5440	No	ca. 1915	Residential structure
SY-32785A	CHASE RD 6008	No	ca. 1930	Residential structure
SY-32794A	BIG CREEK CHURCH RD 4551	No	ca. 1925	Residential structure
SY-32795A	BIG CRREK CHURCH 5128	No	ca. 1935	Residential structure
SY-32796A	BIG CREEK CHURCH RD	No	ca. 1942	Religious structure
SY-32797A	BIG CREEK CHURCH 6839	No	ca. 1930	Residential structure
SY-32798A	BIG CREEK CHURCH RD	No	ca. 1930	Residential structure
SY-32805A	BIG CREEK CHURCH	No	ca. 1920	Residential structure
SY-32807A	BIG CREEK CHURCH RD	No	ca. 1900	Other structure
SY-32808A	BIG CREEK CHURCH RD	No	ca. 1930	Residential structure
SY-32809A	BIG CREEK CHURCH	No	ca. 1945	Commercial building
SY-32818A	QUITO 8281	No	ca. 1925	Residential structure
SY-32819A	QUITO	No	ca. 1920	Residential structure
SY-32820	QUITO 8154	No	ca. 1930	Residential structure
SY-32847A	HWY 51 7384	No	ca. 1920	Residential structure
SY-32847A	HWY 51 7384	No	ca. 1920	Residential structure

THC ID	Property Address	NRHP Status	Construction Date	Original Use Type
SY-32849A	HWY 51 8086	No	ca. 1930	Residential structure
SY-32880A	EASLEY 5049	No	ca. 1910	Residential structure
SY-32881A	EASLEY 5041	No	ca. 1920	Residential structure
SY-32882A	EASLEY 5045	No	ca. 1920	Residential structure
SY-32883A	EASLEY 5022	No	ca. 1900	Residential structure
SY-32884A	EASLEY 5012	No	ca. 1910	Residential structure
SY-32885A	EASLEY 5005	No	ca. 1920	Residential structure
SY-32886A	EASLEY 5005	No	ca. 1920	Residential structure
SY-32887A	CHURCH 7967	No	ca. 1925	Residential structure
SY-32888A	EASLEY 4880	No	ca. 1930	Residential structure
SY-32908A	QUITO 8161	No	ca. 1910	Residential structure
SY-32909A	QUITO	No	ca. 1910	Residential structure
SY-32910	SHELBY 4238	No	ca. 1940	Residential structure
SY-32911	SHELBY 3964	No	ca. 1940	Residential structure
SY-32923	SHAKE RAG RD	No	ca. 1942	Chickasaw Ordnance Works Smoke Stacks
SY-32933A	OLD MILLINGTON	No	ca. 1864	Other structure
SY-32949A	HWY 51 7204	No	ca. 1935	Residential structure
SY-32952A	HWY 51	No	ca. 1935	Residential structure
SY-32953A	HWY 51 7385	No	ca. 1940	Residential structure
SY-33133A	PLEASANT RIDGE RD 4591	No	ca. 1940	Residential structure
SY-33134A	WILKINSVILLE 8038	Yes	ca. 1920	Residential structure
SY-33135A	WILKINSVILLE 8066	No	ca. 1920	Residential structure
SY-33136A	WILKINSVILLE 8088	Yes	ca. 1906	Residential structure
SY-33200A	WILKINSVILLE 8046	No	ca. 1920	Residential structure
SY-33201A	WILKINSVILLE 8057	No	ca. 1920	Educational facility
SY-33206A	WEST 811	No	ca. 1930	Residential structure

Among the structures listed in Table 4-02 are the two 250 ft. concrete smokestacks and nearby concrete foundations on Shake Rag Road (well outside the Big Creek Resilience project area) that are associated with the Chickasaw Ordnance Works power plant (SY-32923). PBSJ assessed these structures as not eligible for the NRHP (Tomberlin 2004), with the following reasoning:

> There is no overall sense of manufacturing, and it no longer retains integrity from World War II. The plant also does not have significant in military history to meet National Register eligibility. The plant was one of three munitions companies operated in Shelby County during World War II, and one of over fifty in operation by Du Pont alone across the country … While contributing to the war effort, the Chickasaw Ordnance Works has not been identified in any of the Du Pont histories as notable for its contributions in engineering or industry. The Chickasaw Ordnance Works was closed and dismantled following the war. Other Du Pont plants from this period such as Morgantown, West Virginia, and Salt Lake City, Utah were much larger and played a more significant role than the company's plants in Shelby County. Today, the twin smokestacks are the primary reminders of the legacy of this property [Tomberlin 2004:351].

NATIONAL REGISTER OF HISTORIC PLACES

Review of the NRHP database reveals that there are no listed properties within the Big Creek Resilience project area, and there are none in the City of Millington. There are currently 190 listed NRHP properties in Shelby County; the vast majority of which are located in Memphis. The nearest listed property is Goodwinslow, or the Chapman House (#79002482), which is located in Raleigh 7.5 km south of the off site Borrow Area. This property was built in 1875 and listed in 1979.

TENNESSEE POWDER COMPANY/CHICKASAW ORDNANCE WORKS HISTORY

The origin of the extensive Tennessee Powder Company (1940-1942) and subsequent Chickasaw Ordnance Works (1942-1946) industrial facility at Millington dates back to early 1939 when England and France sought a safe place to produce gunpowder in the U.S., as war with Germany was looming (Gotten 2005). The Anglo-French Purchasing Board began talking with the representatives of the E.I. du Pont Chemical Company about the construction and operation of a smokeless gunpowder plant. Negotiations regarding the proposed plants specifications and production capacity dragged on until June 10, 1940 when the contract between du Pont and the governments of England and France was signed for the construction of the plant under the name Tennessee Powder Company. However after the Fall of France—note that the Germans occupied Paris on June 14, 1940—only days after the contract was signed, Great Britain announced it would take on full responsibility of the operation of the plant (Frank 1998:151; Gotten 2005:12).

The size of the site selected for the facility north of Memphis is variably reported, but most typically 6,000 to 7,000 ac. is cited (Frank 1998:152; Gotten 2005:6; Lauderdale 2013a). A 1940 *Commercial Appeal* (1940) article shows the location of the proposed facility along US 51 southwest of Millington; note that the plant site is larger than Millington (Figure 4-06). Gotten (2005:5-6) reports that the construction site covered 5,600 ac., and that the plant site "soon became its own little city" with its own power plant, water supply, restaurants, police, transportation services, hospital, rail lines and yards, etc.

The site selection process was influenced by a number of factors. First, the Memphis Aquifer and the Big Creek Drainage Canal could supply the 22 million gallons water that a vast plant of this size would require on a daily basis. Secondly, the site met the plant's need for transportation, with US 51 and the Illinois Central Railroad nearby; although US 51 would have to be widened into four-lanes. Importantly, an ample labor force was locally available, as the Memphis population was 292,942 in 1940. Most of the properties purchased were farmland, and were readily acquired at $60-70 per ac., because this price was roughly double its agricultural value, coupled with cotton allotments restricting planting. And finally, the cotton plantations in the Memphis area provided for an ample supply of cotton lint used in the production process; see block quote below.

Construction of the plant began on June 17, 1940 (Gotten 2005:2). Bond and Sherman (2003:119) indicate the plant was built at a cost $25 million, and the "massive complex" had more than 100 buildings. By November 1940, when construction of the facility peaked, over 9,300 men were employed building the plant (Frank 1998:151; Gotten 2005:5). Gotten (2005:5) notes the monthly construction payroll was $300,000, and that this brought prosperity to Millington, as well as Memphis. The influx of workers into Millington created a "carnival-like atmosphere, "and various new businesses opened up to support the workers at the construction site. In 2013, William Burke, fire chief for the present-day DuPont plant near Woodstock (Memphis) discovered a series of photos in the DuPont archives in Delaware showing the Tennessee Powder Company facility under construction that show the vast scale of the project (Lauderdale 2013a, 2013b) (Figures 4-07—12).

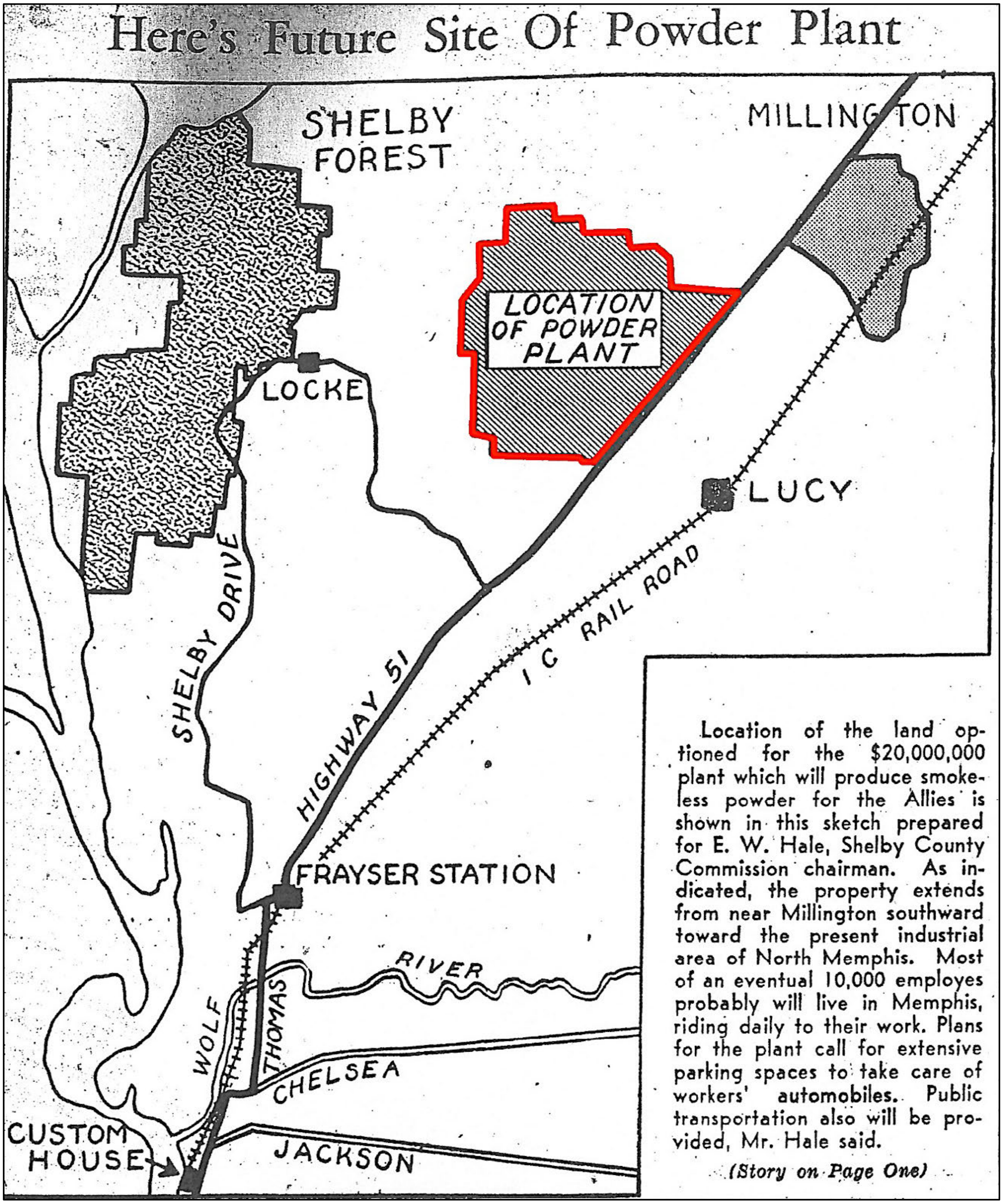

Figure 4-06. June 6, 1940 *Commercial Appeal* Powder Plant location map.

Figure 4-07. Tennessee Powder Company construction ca. 1940 (after Lauderdale 2013a).

Figure 4-08. Tennessee Powder Company construction ca. 1940 (after Lauderdale 2013b).

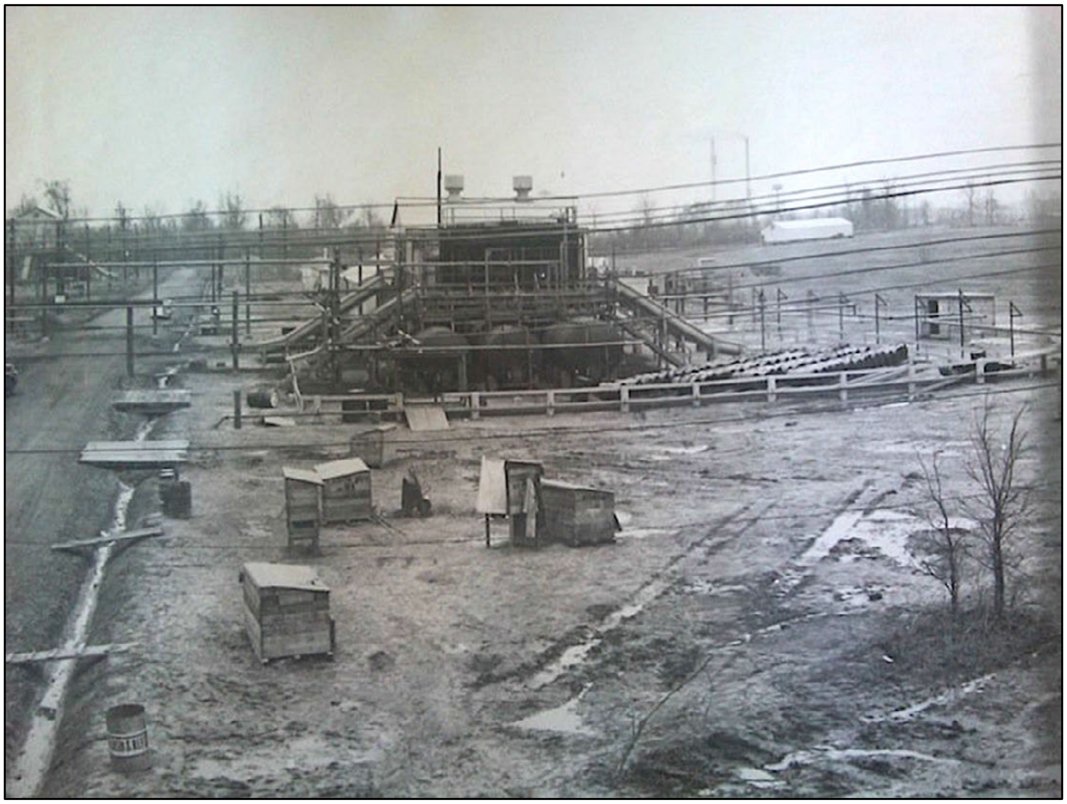

Figure 4-09. Tennessee Powder Company construction ca. 1940 (after Lauderdale 2013a).

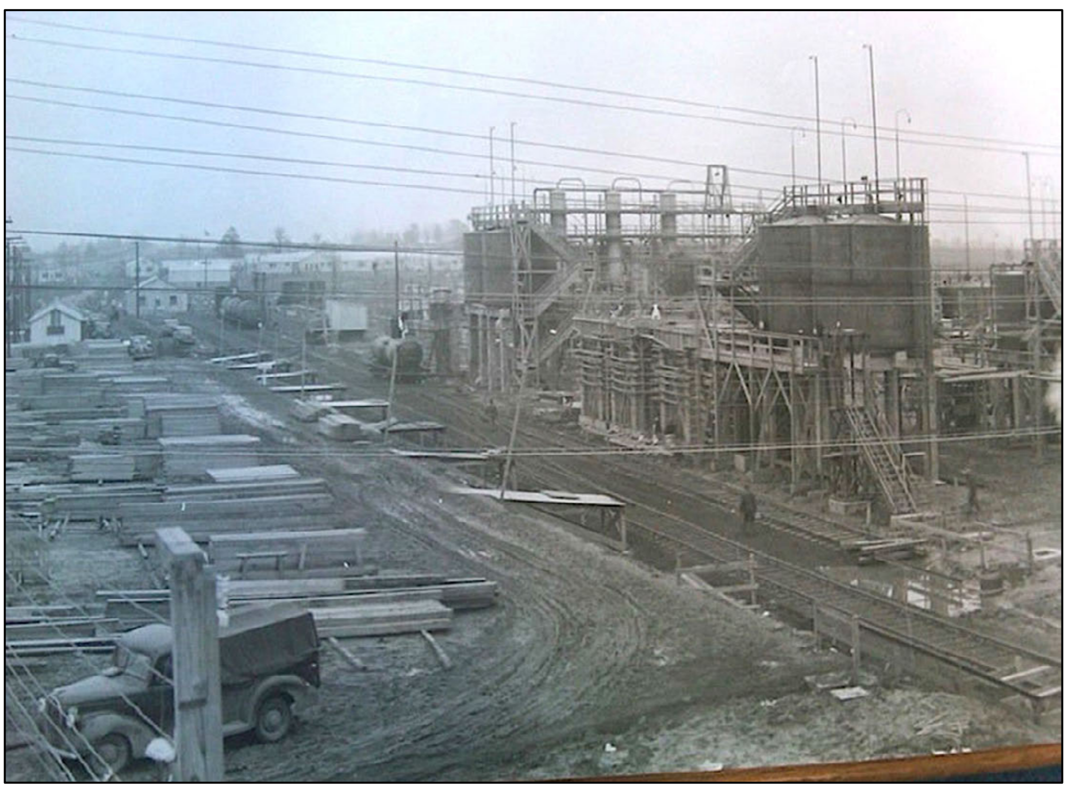

Figure 4-10. Tennessee Powder Company construction ca. 1940 (after Lauderdale 2013a).

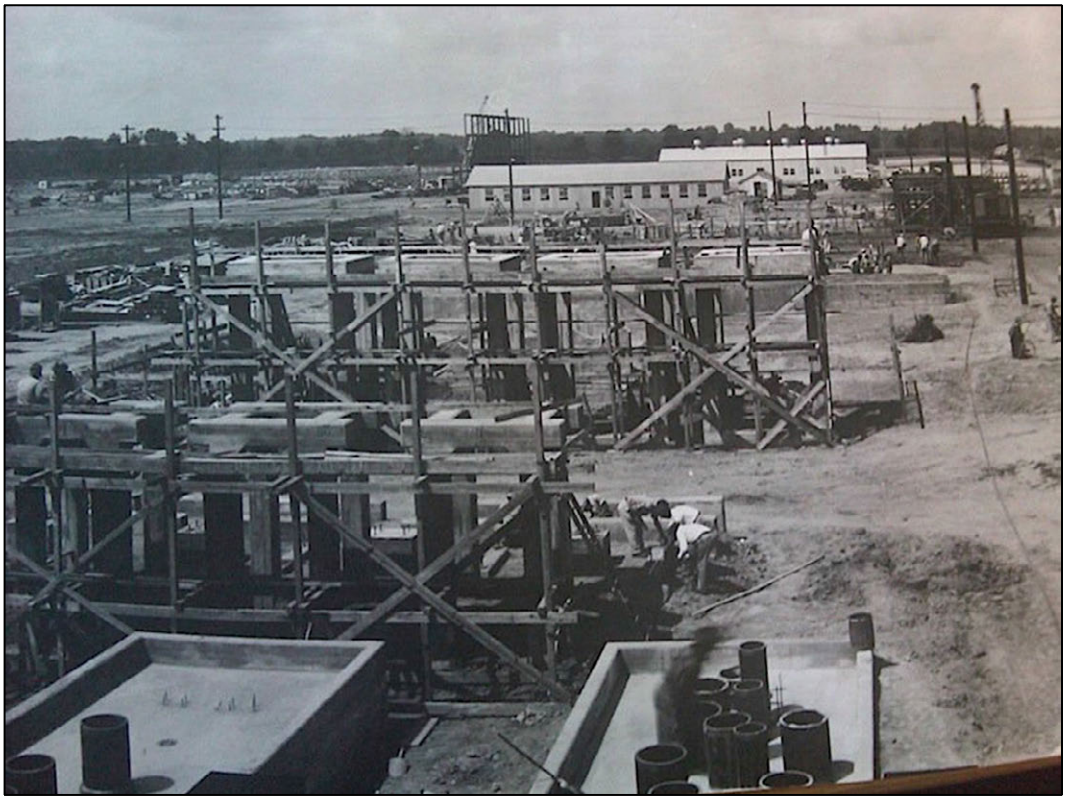

Figure 4-11. Tennessee Powder Company construction ca. 1940 (after Lauderdale 2013a).

Figure 4-12. Tennessee Powder Company construction ca. 1940 (after Lauderdale 2013a).

More generally, the du Pont Chemical Company was chosen to build and operate the Millington plant because they had extensive experience in building such works, and had historically developed a type of smokeless power ca. 1909 that was the most important type of smokeless power used by the Allies in the First World War (Gotten 2005:10). Per Gotten (2005:9) the Millington plant was designed to manufacture a propellant (i.e., smokeless powder) that burned with a minimum of smoke and with consistent gas pressures. The manufacturing process at Millington involved mixing nitric acid, sulphuric acid and lint cotton to produce nitrocellulose, a high-explosive also known as "guncotton" or "nitrocotton" (Frank 1998:151; Gotten 2005:11). Du Pont's propellant was made from a guncotton of relatively low nitrogen content, known as pyrocellulose, because this type is readily soluble in ether-alcohol. In 1940 however, sufficient quantities of nitric acid was not available on the open market, so nitric acid had to be manufactured on site. The guncotton production process at Millington is detailed below, as it is important for interpreting some of the artifacts discovered at the site:

> The nitric acid was then mixed with sulphuric acid, to which ordinary cotton was added and allowed to soak, over time, producing the nitrocellulose by the formula discussed. The water was then removed by mixing it with alcohol and ether, creating "cakes" of nitrocellulose. Rather than making flakes, however, these "cakes" were pressed like cheese and then forced through different sized dies for different sized armaments, the smaller ones producing "grain" for rifle powder and the larger ones for cannon powder [Gotten 2005:11-12].

Initially, there was some secrecy around the fact that the Tennessee Powder Company was an agent for the British Purchasing Commission. However, most locals supported aid to Britain and France, and the surveyors and engineers encountered few problems. As the plant near completion the threat of German sabotage became real, and the dates of first powder shipments were kept guarded.

During the construction phase of the Tennessee Powder Company facility, the contract was amended to call for the production of other types of propellant (Gotten 2005:4). For example in August 1940 the British requested that cannon powder facilities designed to produce 160,000 pounds daily, be converted to produced 136,000 pounds of cannon powder and 24,000 pounds of rifle powder daily. In September 1940, the contract was amended to add the production of 80,000 pounds of TNT and 16,000 pounds of DNT on a daily basis.

John W. Kitts was chosen by du Pont to be the initial Plant Manager. The facility became operational on December 13, 1940, and reached its production targets in February 1941. DNT production began in February 1941 and TNT production began in March 1941. Gotten (2005:8) indicates the plant was in full production by June 1941, and the work force was 3,550 men.

The passage of the Lend-Lease Act in March 1941 paved the way for the U.S. to take over the not only the Tennessee Powder Company, but similar privately owned manufacturing plants that were producing armaments in other part of the country (Thompson and Mayo 1960). Such plants then became known as government-owned, contractor-operated (GOCO) facilities.

Following Pearl Harbor and the U.S. declaration of war, in early 1942 the British indicated that they no longer had sufficient funds to continue operating the Tennessee Gunpowder Company plant (Gotten 2005:14). As a result, the U.S. Department of Ordnance and du Pont entered into a letter contract on January 22, 1942 to allow for "uninterrupted production" (Gotten 2005:14). At this time the name of the plant was officially changed to the Chickasaw Ordnance Works (COW) and the U.S. Government funded its operation. Du Pont continued to manage the COW. A local collector reports that the 303 ammo produced at the COW was head stamped CHK.

During the war, the COW is variously cited as employing 8,000 to 9,000 people, the large labor force was needed in part because the facility operated 24 hours a day (Frank 1998:151; Gotten

2005:5-6). With so many men in military service, the war created jobs in Memphis for women who had not worked before (Sigafoos 1979:206). As a result, most of du Pont's employees at the COW were women (Bond and Sherman 2003:119; Sigafoos 1979:207). Some of these women on the Production Drive Committee designed a humorous poster to address the problem of absenteeism (Figure 4-13).

Figure 4-13. Humorous poster produced by the COW workers (image courtesy: Library of Congress fsa8b04444 //hdl.loc.gov/loc.pnp/fsa.8b04444).

During WW II the COW was cited for its both its safety and production records. Both Frank (1998:151) and Gotten (2005:14) note the COW received the Army-Navy "E" award from the Under Secretaries of both branches for outstanding performance on war work for four successive six-month periods. For the period July 1, 1944 to June 30, 1945, the COW won 1st Place among all smokeless powder plants in the Army Ordnance Explosive contest sponsored by the National Safety Council and the Chief of Ordnance. Additionally, the COW set a world safety record by operating 2 million, and later 3.6 million, work hours without a major injury. A serious accident was avoided on April 8, 1944 when a B-24 Liberator taking off from the Millington NAS developed engine trouble and crashed just west of the COW (Lauderdale 2013b).

The COW was deactivated on June 17, 1946. Frank (1998:151-152) and Gotten (2005:15) both note that Memphis and Shelby County missed an economic opportunity to "entice" a large manufacturing company to take over the ready-made manufacturing facility. Instead, however the COW was deemed to dangerous for conversion to civilian use, and was turned over to the War Assets Administration for disposal. Gotten (2005:15) interviewed a local man who worked at the plant during the war, and during its disassembly, stated that multiple companies participated in the salvage. During this process the facilities' buildings were sold and moved, or razed, and the numerous storage tanks, rail lines, and abundant brass and stainless steel valves and piping were salvaged. The National Archives at Atlanta curates several boxes of records and maps associated the COW land disposal (National Archives Identifier 1256873).

After the plant was dismantled, the Government sold the land back to many of the original owners for roughly $25-$50 per ac. (Gotten 2005:15-16). There were some fears that the land was saturated with explosive materials and that it would not grow a crop. Gotten (2005:17) indicates that at some point portions of the former COW property were placed on the list of contaminated "Super Fund" sites by the Tennessee Department of Environment and Conservation.

CARTOGRAPHIC REVIEW

Various archival maps dating from 1888 to 1971 that are relevant to the Big Creek Resilience Improvements project area reviewed in this section. These maps were retrieved from the Memphis Benjamin L. Hooks Central Library Memphis Room (i.e., special collections) and/or various on-line sources. Unfortunately, a map of the Chickasaw Ordnance Works facility was not located.

1888 W.T. WILLIAMSON MAP OF SHELBY COUNTY

The 1888 W.T. Williamson map of Shelby County is an important archival resource because it shows landowners, and property boundaries and acreages. Key landscape features in the project vicinity at this time include the Ohio & South-Western Railroad (later the Illinois Central), along which Millington is located, as well as Big Creek and Bear Creek (Figure 4-14). The Raleigh Millington Road and US 51 are shown on this map, but are not labeled. The primary project area is extensively sub-divided by this date, and landowners associated with include, from west to east: Harriet M. Moon, M.T. Houze, L. Andrews, C.C. Crenshaw, S.L. Wynne, A. Anderson, Nancy R. Hill, M.L. Loller, F. Crenshaw, W.M. Sledge and Ida. P. Sledge. The Eastern Mitigation tract is associated with two parcels owned by R.L. Brown and J.N. Moon. The Western Mitigation tract is associated with four parcels owned by S.M. Brooks, S. Douglas, F.A. Houze and Porter Taylor and Co. The Borrow tract is wholly contained within a 149.10 ac. tract owned by B.P. Duncan.

1927 SHELBY COUNTY COMMISSIONER'S MAP

H.V. Patton Co. produced a "Map of Shelby County, Tenn." in 1927 for the Shelby County Commissioners. The copy on file at the Memphis room is a 1932 revised edition that shows the location of white schools in Memphis and Shelby County, and the school names are hand written on the map (Figure 4-15). Perhaps the most significant element of on the map relevant to this undertaking is the presence of the "Big Creek Drainage Canal," which indicates that the stream was channelized prior to 1927-32. The Raleigh Millington Road and US 51 are labeled on this source.

1939 HIGHWAY AND TRANSPORTATION MAP

The 1939 Tennessee State Highway Department "General highway and transportation map, Shelby County, Tennessee" is fairly detailed and shows the approximate location and type of structures within the Big Creek Resilience Improvements project area (Figure 4-16). This map also shows the undeveloped and open nature of the landscape in the vicinity of the Western Mitigation tract immediately prior to the construction of the Tennessee Powder Company facility in 1940. In 1939 the only structures located within the primary project area are adjacent to major roads including US 51, Raleigh Millington Road and Sledge Road.

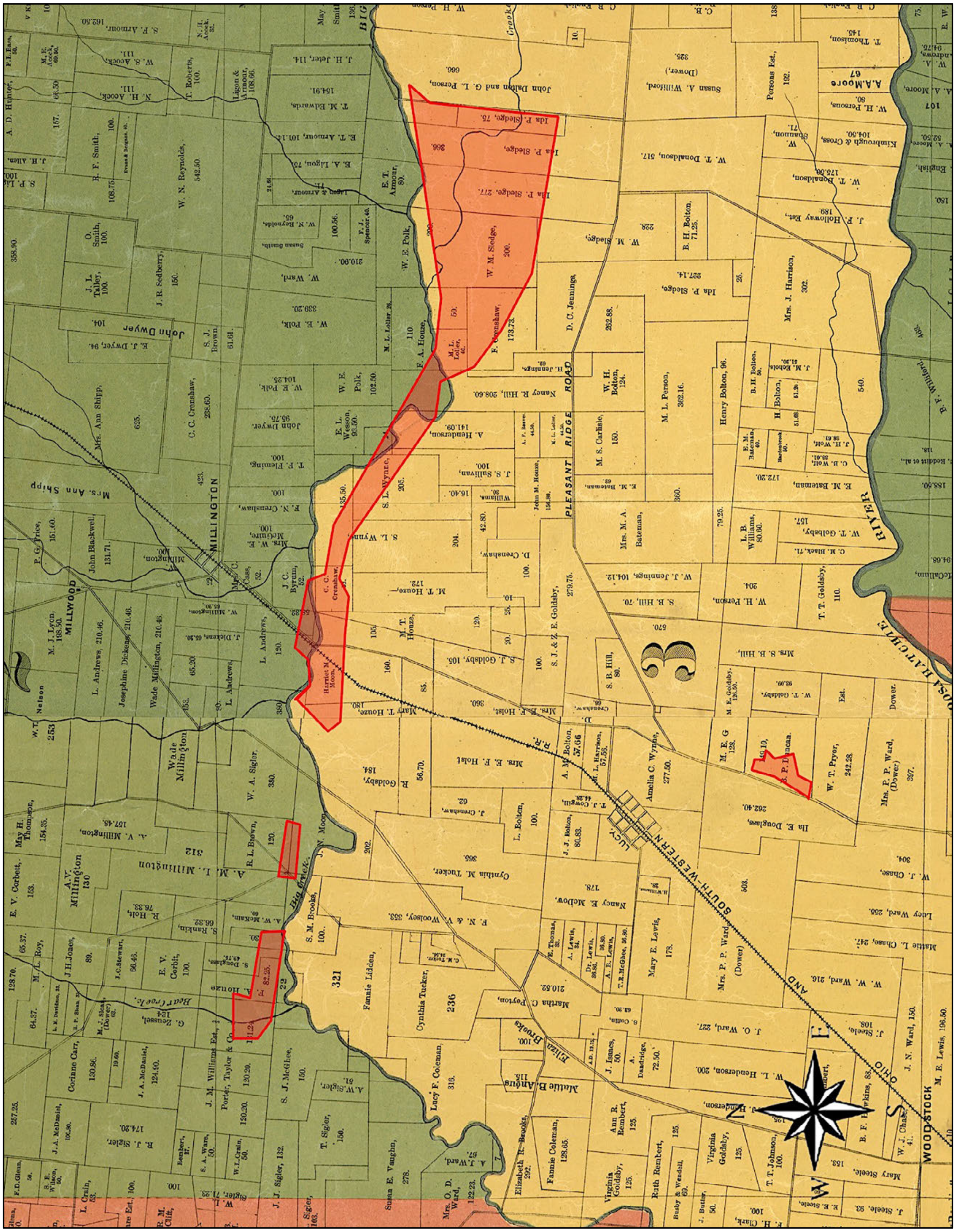

Figure 4-14. The entire Big Creek project area overlain on a portion of the M.T. Williamson 1888 Shelby County map (map courtesy: Memphis Room, Benjamin L. Hooks Central Library).

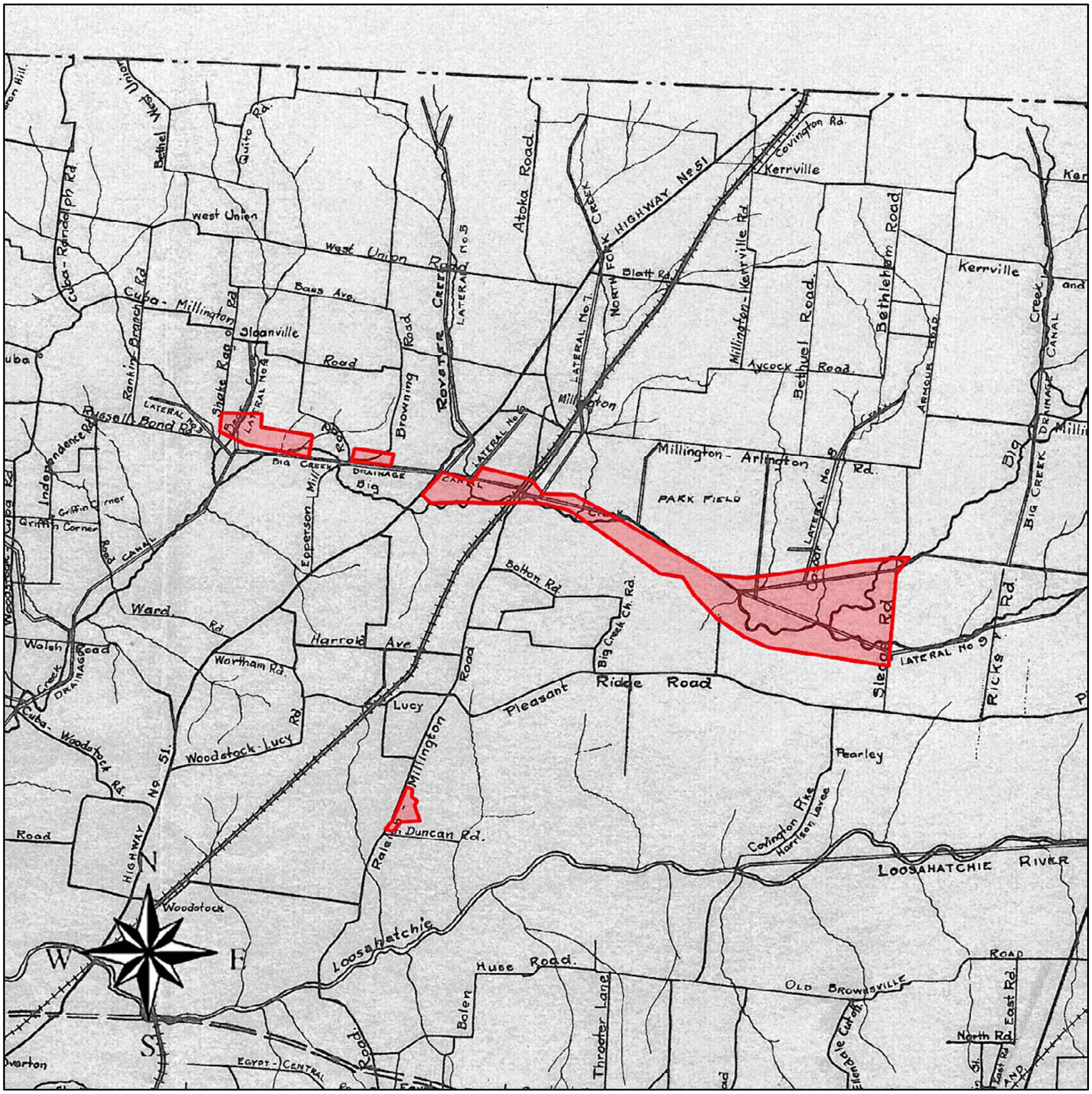

Figure 4-15. The entire Big Creek project area overlain on the 1927, revised 1932 "Map of Shelby County, Tenn." by the Shelby County Commissioner's and engraved by H.V. Patton Co. with Shelby Farms Park area overlaid (map courtesy: Memphis Room, Benjamin L. Hooks Central Library).

Figure 4-16. A portion of the 1939 "General highway and transportation map, Shelby County, Tennessee" prepared by the Tennessee State Highway Department with the entire Big Creek project area overlain overlaid (map courtesy: Memphis Room, Benjamin L. Hooks Central Library).

1942, 1960, AND 1971 QUADS

Primary Project Area

The 1942 Millington 15-min. quad shows no structures within the primary project area, except for four residences along Sledge Road on the eastern flank of Area 3 (Figure 4-17). Approximately half of the primary project area at this time is shaded green meaning it is wooded, and these areas correlated strongly with the delineated wetlands and TDOT wetlands of today (see Figure 1-08).

The 1960 Millington 15-min. quad shows a few post 1942 developments within the primary project area (Figure 4-18). Within Area 3 there are five structures at three locations on the south bank of the Big Creek Drainage Canal that are likely near the levee APE. Within Area 2 there is a radio tower on the east side of the Raleigh Millington Road. Within Area 1 there is a cluster of three structures north of Big Creek. Similar to 1942, approximately half of the primary project area in 1960 is wooded, and these areas correlated strongly with the delineated wetlands and TDOT wetlands of today (again see Figure 1-08).

East and West Mitigation Tracts

The 1942 Millington 15-min. quad does not show any of the Chickasaw Ordnance Works facilities, likely for security reasons (Figure 4-19). A improved road is indicated in the Eastern Mitigation tract, and a structure is shown in the Western Mitigation tract on Shake Rag Road, west of Bear Creek. Approximately a third of these tracts are wooded and associated with low-lying terrain. The remaining two-thirds is open land, and almost certainly agricultural fields.

The 1960 Millington 15-min. quad reveals no changes in the Eastern Mitigation tract since 1942, except that the road bisecting the tract is now unimproved and has likely been abandoned. In and near the Western Mitigation tract this edition of the quad reveals a few transportation features associated with the former Chickasaw Ordnance Works, including roads and an abandoned railroad spur. South of Big Creek, outside the project, a circular road network associated the COW igloo complex can be seen as well. Again, approximately a third of the mitigation tracts are wooded in 1960 and associated with low-lying terrain. The remaining two-third is open land, and almost certainly agricultural fields.

The 1971 Millington 7.5-min. quad reveals that the transportation features associated with the Chickasaw Ordnance Works, including roads and an abandoned railroad spur, shown on the 1960 quad, are now gone (Figure 4-21). Again, approximately a third of these tracts are wooded in 1971 and associated with low-lying terrain. The remaining two-third is open land, and almost certainly agricultural fields.

Borrow Tract

The 1942 Millington 15-min. quad shows one structure in the northern portion of the Borrow tract, and most of the tract is cleared and likely agricultural fields (Figure 4-22). The Zion Hill Church and Cemetery are found along Duncan Road the east of the tract.

The 1960 Millington 15-min. quad shows four structures in the northern part portion of the Borrow tract, in the area where the 1942 quad showed one structure (Figure 4-23). The Millington Municipal Air Park is indicate to the southwest.

Examination of the 1971 Millington 7.5-min. quad reveals that four structures within the tract were gone, indicating they were razed sometime after 1960. A subdivision has been built to the east, and is under construction to the northeast. The Millington Municipal Air Park has been renamed Charles W. Baker Airport, and appears somewhat reconfigured.

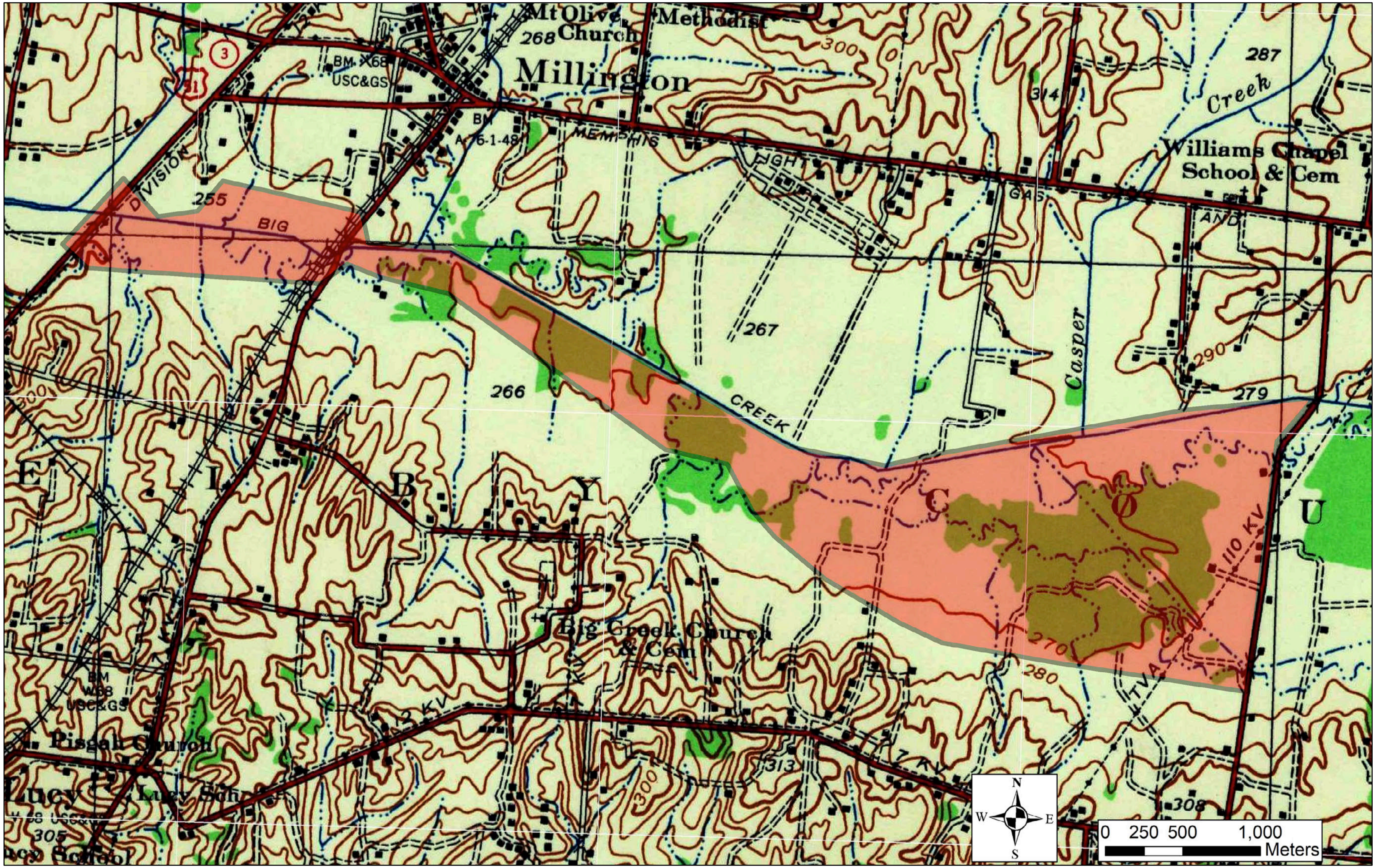

Figure 4-17. Primary Areas 1, 2 and 3 on 1942 Millington 15-min. quad.

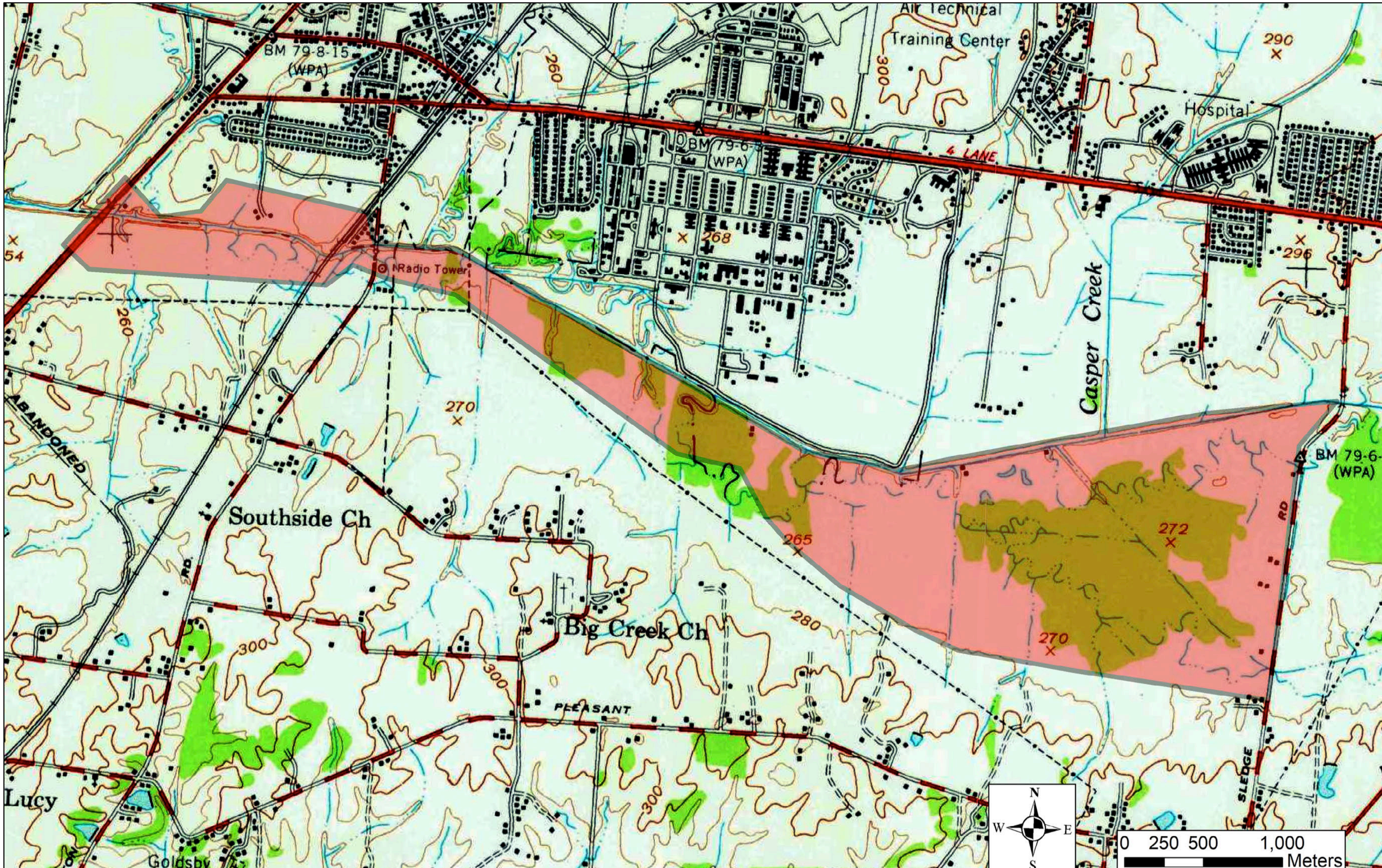

Figure 4-18. Primary Areas 1, 2 and 3 on 1960 Millington 15-min. quad.

Figure 4-19. East and West Mitigation tracts on 1942 Millington 15-min. quad.

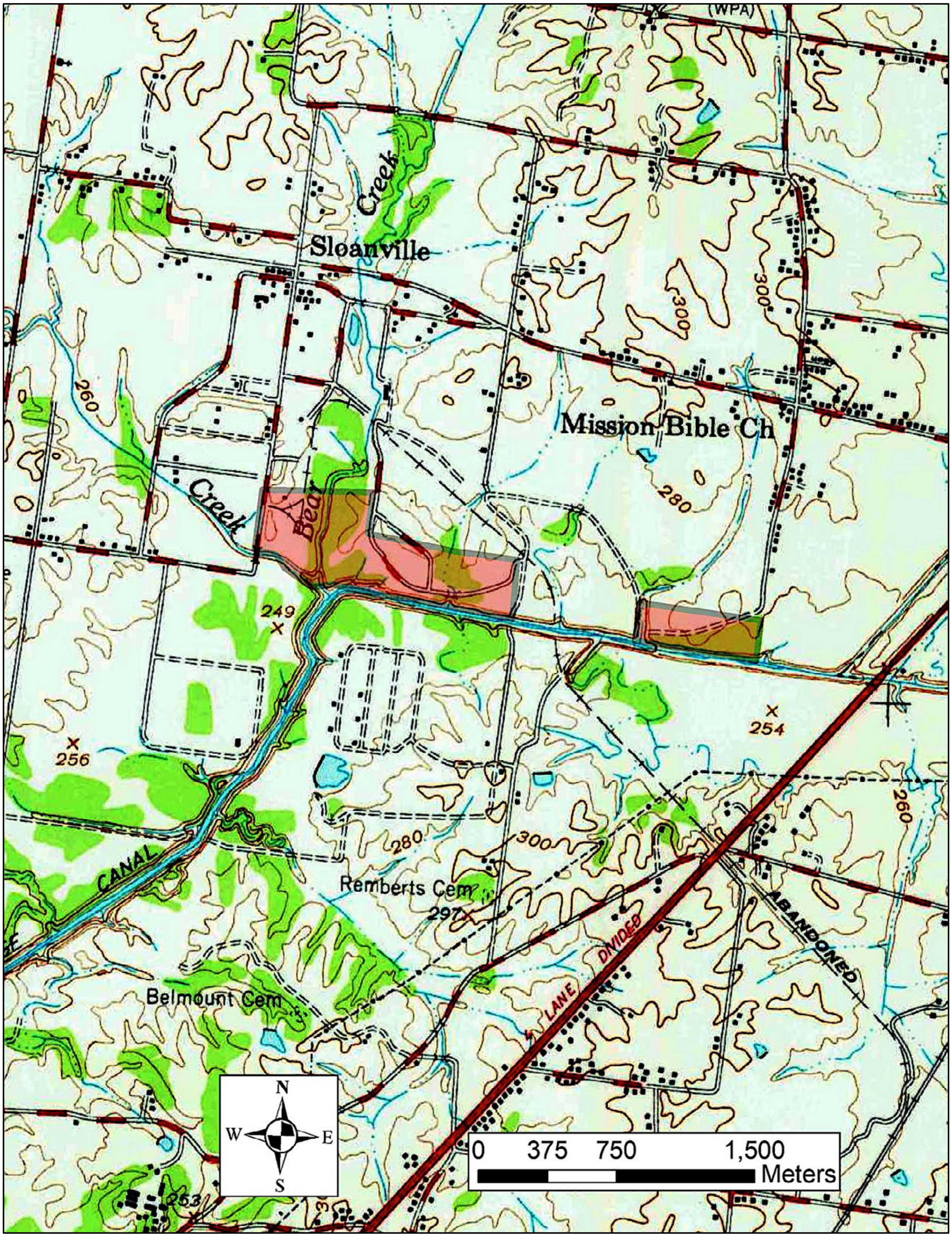

Figure 4-20. East and West Mitigation tracts on 1960 Millington 15-min. quad.

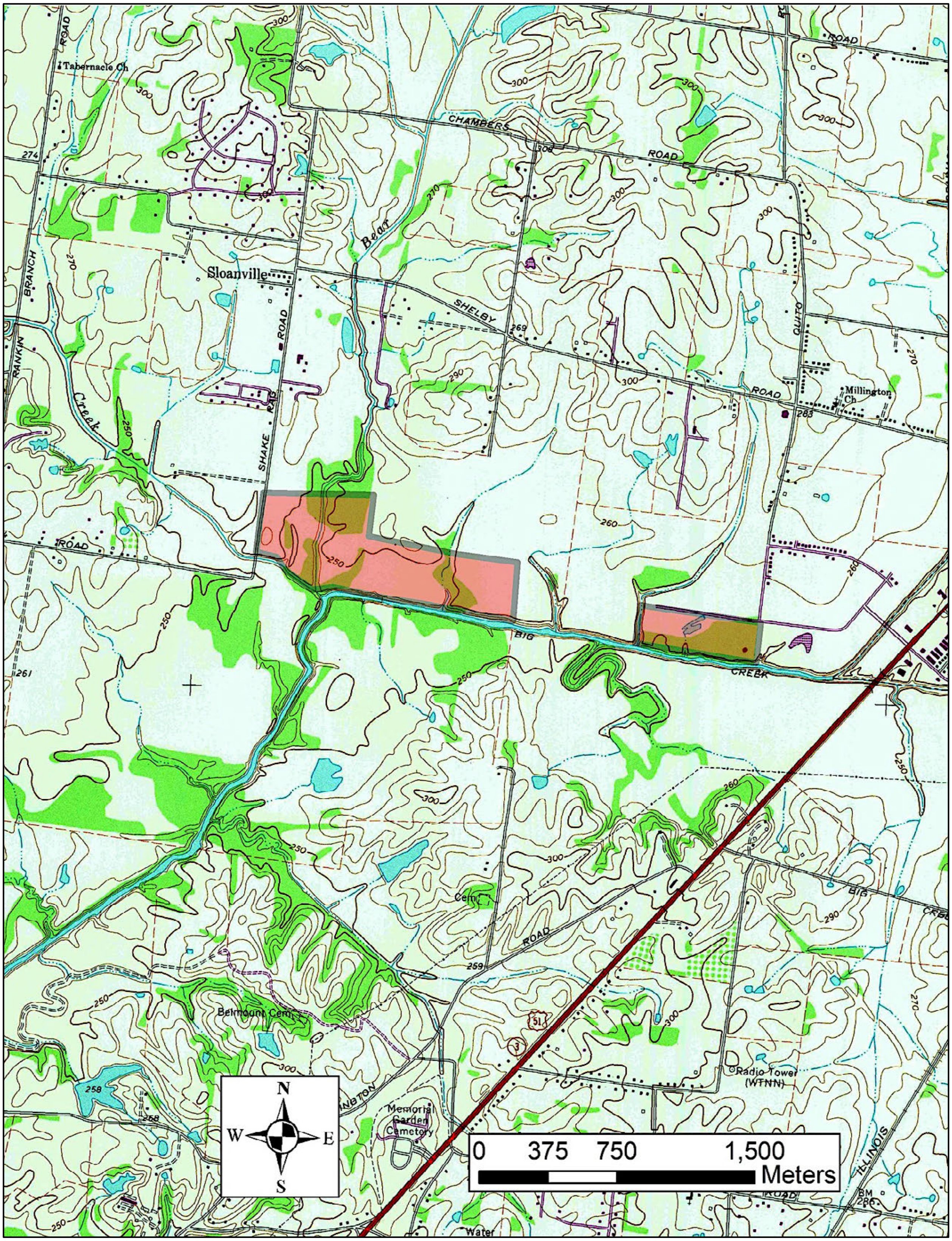

Figure 4-21. East and West Mitigation tracts on 1971 Millington 7.5-min. quad.

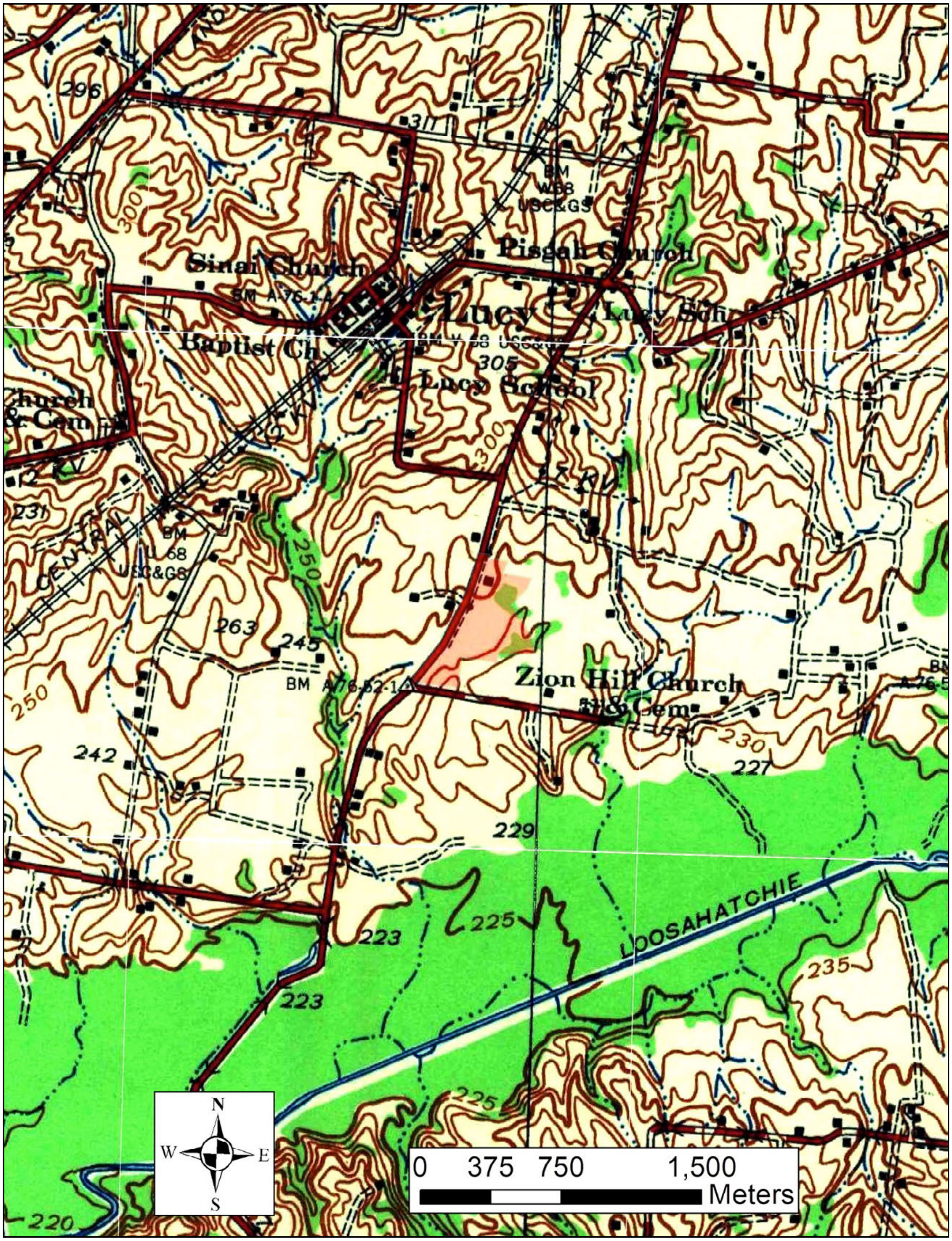

Figure 4-22. Borrow tract on 1942 Millington 15-min. quad.

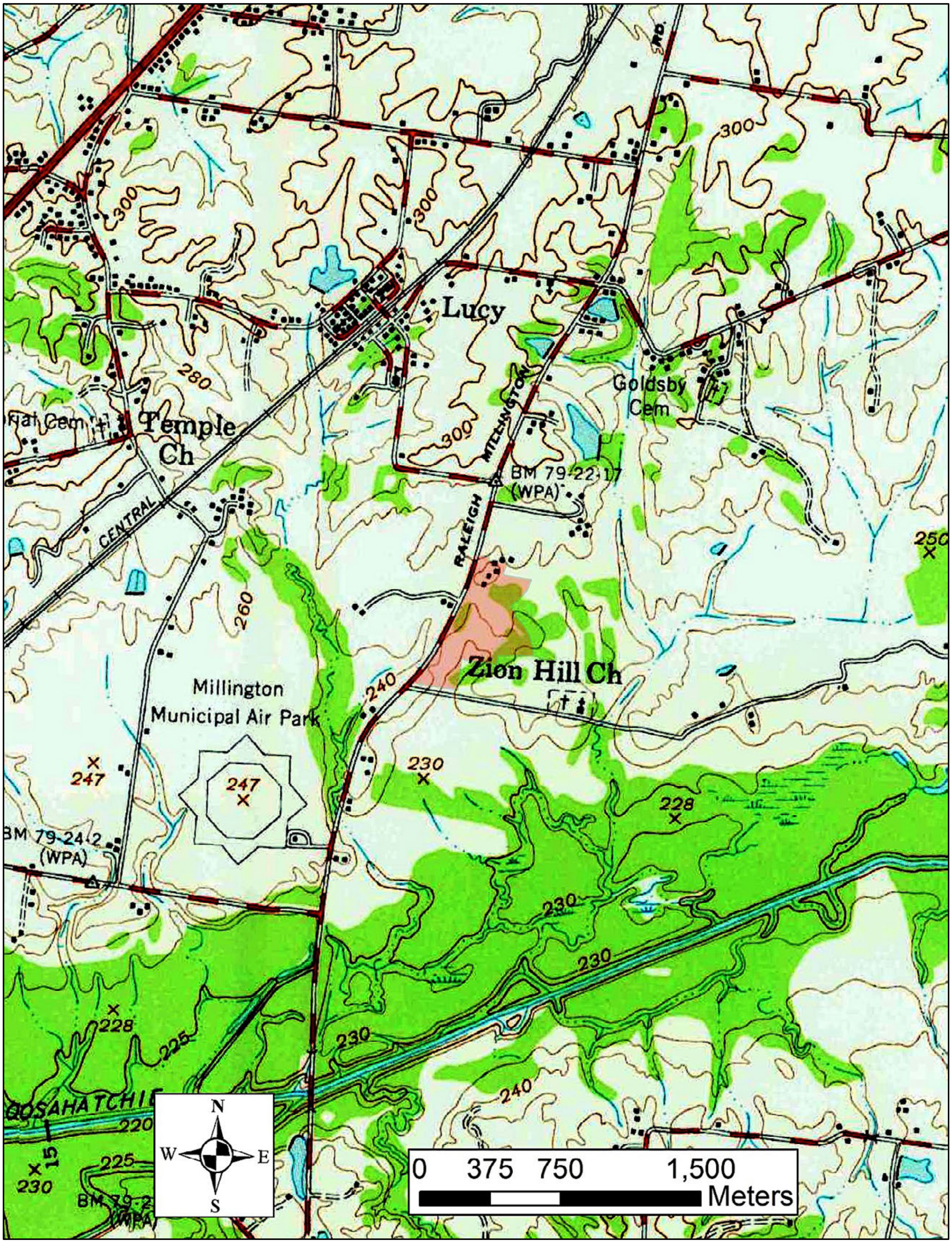

Figure 4-23. Borrow tract on 1960 Millington 15-min. quad.

SURVEY EXPECTATIONS

Given the above, the following survey expectations can be offered. There are three known sites within the APE that should be relocated; two are Prehistoric (40SY514 and 40SY648) and the other site consists of scattered ruins associated with the Chickasaw Ordnance Works (40SY664). Additional sites of these types are potentially present.

The review of various archival maps suggests some twentieth century domestic sites may be located within the APE, including:

- Three locations along the Big Creek Drainage Canal in Area 3.
- A structure on Shake Rag Road in the Western Mitigation Area.
- A cluster of four residences in the northern portion of the Borrow Area.

More generally, the environmental setting and soils across the majority of the APE led us to conclude that, overall, the APE has a moderate to low probability of containing archaeological resources. Indeed 683 ac. (46 percent) of the primary project area consists of delineated or TDOT wetlands. Recall too, that the Big Creek Resilience Improvements project is largely designed to reduce flooding similar to what occurred in 2011.

The expected archaeological site density for the APE can be inferred from Peterson's (1979a) sample survey of the Loosahatchie River Watershed. During this milestone investigation, the Loosahatchie River Watershed was stratified into three environmental zones (floodplain, terraces, and uplands), subdivided into 1-min. quadrants, and a three percent random sample of the quadrants was surveyed. Peterson's (1979a) results revealed that archaeological sites in the Loosahatchie River Watershed are concentrated on terraces, where 3.22 sites were identified per km^2. In contrast, uplands yielded only 0.49 sites per km^2 and floodplains even less at only 0.22 sites per km^2. Since the 455.7 ac. (1.84 km^2) APE is associated with the floodplain of Big Creek, a tributary of the Loosahatchie River, as well as the floodplain of the Loosahatchie River itself (i.e., the Borrow Area), the number of expected sites is 8.3 (1.84 km^2/0.22 sites per km^2).

V. FIELD INVESTIGATIONS

METHODS

The majority of the cultural resources fieldwork was conducted from 10 January 2019 to 5 February 2019 by a crew ranging from two to four. Some follow up work was conducted at 40SY664 on 28 February 2019. The basic site detection method included shovel testing at 30-m intervals in areas with restricted surface visibility (<50 percent) and surface inspection at 15 m intervals in areas with good surface visibility (>50 percent). Additionally all sites, both newly recorded and previously recorded, were shovel tested at 10 m or 15 m intervals.

The main objectives in conducting the intensive archaeological survey were as follows: (1) to obtain a complete inventory of all significant cultural resources present; and (2) to evaluate all identified resources relative to eligibility criteria of the NRHP (36 CFR 63). No data recovery beyond the constraints of an intensive (shovel test) survey and site boundary delineation was expected. The field work was conducted according to the standards set forth by the Tennessee State Historic Preservation Office (*Tennessee SHPO Standards and Guidelines for Archaeological Resource Management Studies*, October 2018).

SURVEY DOCUMENTATION

To ensure appropriate field data management, Panamerican employs a system the company developed for intensive surveys. This system has been successfully implemented for several years and, for example, it has been used successfully during various past projects within Tennessee. Throughout the course of the fieldwork, the crew used specialized forms to individually record the shovel test locations. The status of each shovel test was assessed as positive (■), negative (❑), or not excavated (Ø). In the case of the latter, which are referred to as "no-test" locations, the reason for not excavating a shovel test is provided on the forms. This allows for a complete inventory of shovel tests to be generated. Shovel test profiles, sediment characteristics, and depths of artifact recovery, if any, were recorded on the forms during the fieldwork. At the end of each field day, this information is collected by the field director and reviewed for content. The shovel test data was later entered into a Microsoft Excel spreadsheet by Panamerican laboratory staff, and a table presenting the information was produced (see *Appendix B: Shovel Test Inventory*). This table documents the intensity of the survey, and demonstrates the coverage of the non-site areas within survey tracts.

In addition to the individual shovel test results recorded by the archaeological technicians, the field documentation included, but was not limited to, the following: (1) the Field Director's field notes that outline daily activities and provides a general commentary on the project findings, it also includes any unique or significant findings; (2) the location of each identified cultural resource was recorded on a 7.5-min. quad map; (3) a scale sketch map of each artifact locus was prepared; (4) the survey area and all recorded sites were recorded using photography; and (5) a number of logs or lists were maintained, including ones for artifact bags and photo records.

SHOVEL TEST DEFINITION

A shovel test consisted of the excavation of a four-sided hole at least 30 cm to a side (0.09 m^2). Each shovel test was excavated to culturally sterile deposits, unless a disturbance or water seepage halted the excavation. To ensure consistent artifact recovery, all sediment was hand-screened through 0.25-in. mesh hardware cloth. All natural and cultural strata revealed in the individual shovel test profiles were recorded using metric depth measurements, and described in terms of textural class and color (using the Munsell Soil Color Chart). Additional strata descriptions were provided as needed, such as moisture, natural rock content, and number and size of roots. Panamerican employs a specialized shovel test form to insure consistent shovel test profile recording. Following recording a shovel test, artifact sample bags (if any) were labeled. All holes were subsequently backfilled as closely as possible to the original condition.

During the course of the field work, 1,129 shovel test locations were documented across the six tracts including 16 that were positive for cultural material, 702 that were negative for cultural material, and 401 planned tests that were not dug, mainly due to standing water (Table 5-01).

Table 5-01. Shovel test frequencies.

Area	Acres	Positive	Negative	No-test	Total
Primary Area 1	216.0	1	125	93	219
Primary Area 2	211.0	0	0	0	0
Primary Area 3	1,051.0	2	8	0	10
East Mitigation Tract	37.2	0	131	31	162
West Mitigation Tract	134.2	0	299	168	467
Borrow Tract	59.2	13	149	109	271
Totals:	*1,708.7*	*16*	*712*	*401*	*1,129*

Within Primary Area 1, where most of the impacts will take place, a total of 219 shovel test locations were recorded, and two relatively large cultivated fields visually inspected (Figure 5-01). Site 40SY514 was relocated in Primary Area 1; see Site Descriptions below.

Primary Area 2 consists mainly of borrow pits and these were full of water. The cultivated fields in Area 2 were visually inspected (Figure 5-01).

Due to winter rains much of Primary Area 3, which include extensive wetlands, was covered in water. The levee and/or the Big Creek Drainage Canal bank was visually inspected, and ten shovel tests were recorded at the two Historic sites (Locus 2 and Locus 3; see Site Descriptions below) that were identified along Big Creek within Area 3. Additionally a large field along the eastern boundary of Area 3 was visually inspected (Figure 5-01). Landowner access was denied to surface inspect the agricultural field in the northeastern corner of Area 3.

The cover at the East and West Mitigation tracts is a mixture of forest and agricultural fields. The forested areas were shovel tested and the agricultural fields were surface inspected, and the field with 40SY648 was shovel tested. There were areas of standing water, mainly near Big Creek (Figure 5-02). The shovel test density in the East Mitigation tract was 2.75 tests per acre, and the shovel tests density in the West Mitigation tract was 3.49 shovel tests per acre; however there were no positive tests in these tracts. Using visual survey, Sites 40SY648 and 40SY664 were revisited (relocated) in the West Mitigation Tract, and Site 40SY842 was newly recorded in the East Mitigation Tract.

The Borrow Tract was roughly half wooded and half cleared; the latter area is being developed by Shelby County as a cemetery (potters field) (Figure 5-03). Twenty-one transects were run over the Borrow tract, including over the cleared area, and 271 shovel test locations were recorded. There was standing water along the eastern and northern boundaries. Site 40SY841 was newly recorded in the northern portion of this tract, in a location where archival quads showed structures.

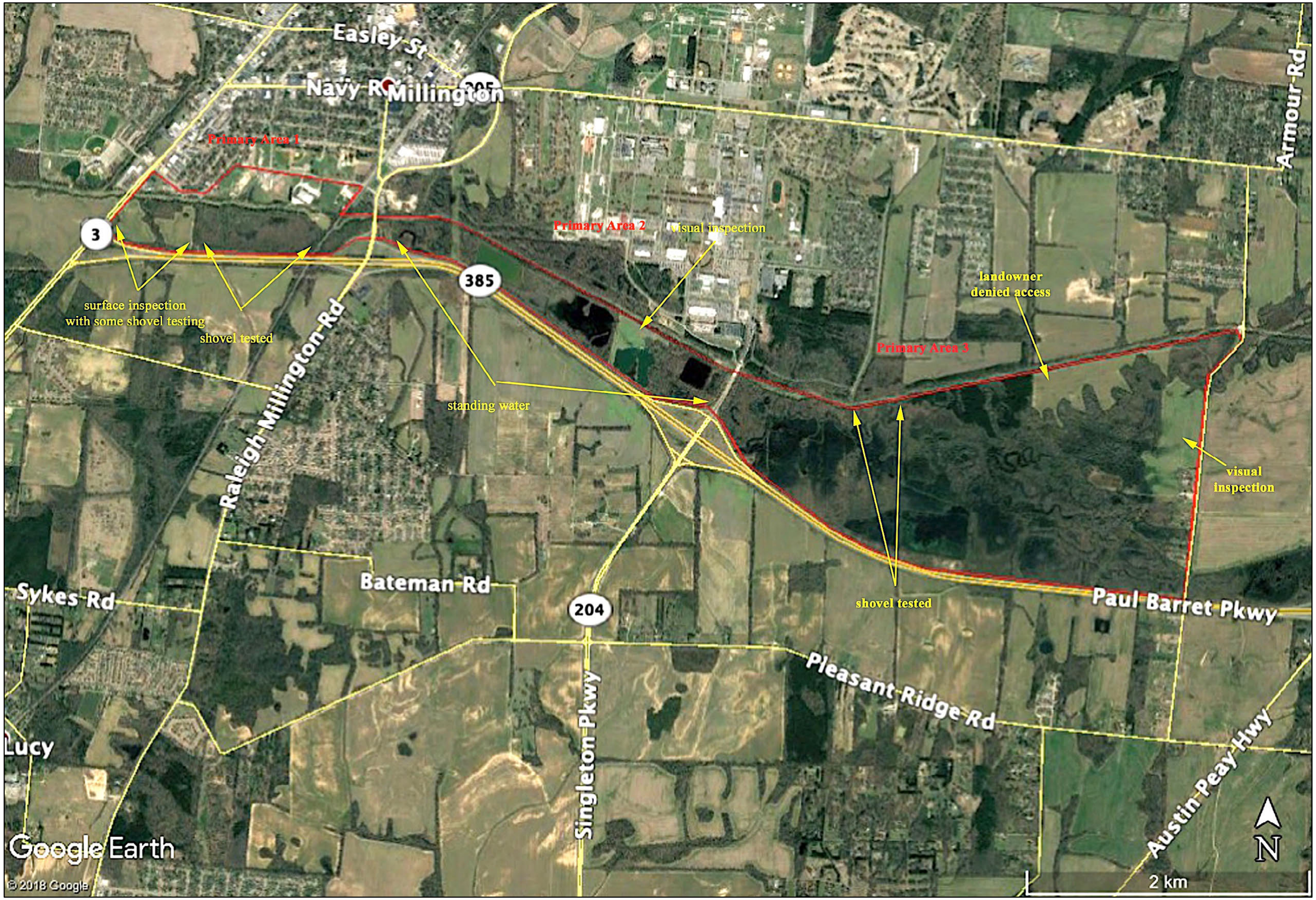

Figure 5-01. Aerial image of Primary Areas 1, 2, and 3 showing work conducted (base map: Google Earth).

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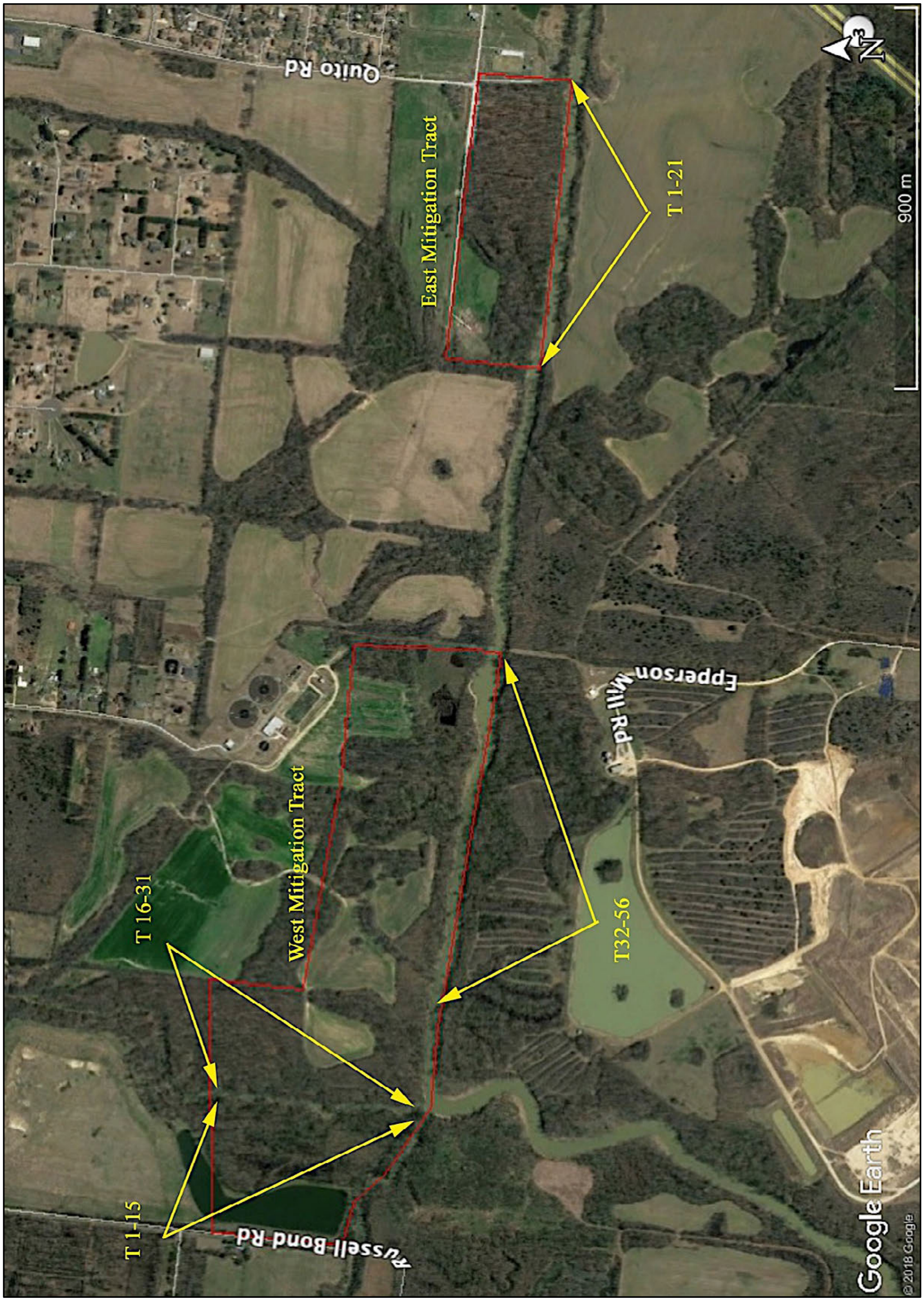

Figure 5-02. Aerial image of the East and West Mitigation Tracts showing work conducted (base map: Google Earth).

Figure 5-03. Aerial image of Borrow tract showing work conducted (base map: Google Earth).

RESULTS

During the course of the fieldwork three previously recorded sites were revisited (40SY514, 40SY648 and 40SY664), two sites were newly recorded (40SY841 and 40SY842) and two Historic domestic loci not assigned a trinomial by the TDOA were identified (Locus 2 and Locus 3); see Figures 5-04–5-06 for quad map locators for these resources that are described below.

SITE 40SY514

Cultural Affiliation .... late Poverty Point
Type .... Camp/open habitation
Size (observed) .... 25-x-25 m
Artifact Recovery Total 4
Recommended NRHP Status .... Ineligible

Location and Setting

Site 40SY514 is a previously recorded Prehistoric scatter on a small rise south of Big Creek, within the Project Area 1 boundary. This location is in northern Shelby County, south of Millington, east of US Highway 51. The location is on the left bank (descending) of the Big Creek Drainage Canal and in a cultivated field south of a borrow pit. At the time of investigation, the 40SY514 location was in harvested soybeans and there was fair surface visibility (Figures 5-07 and 5-08). Sease et al. (1989) map this location as Henry silt loam (He).

Figure 5-07. Photograph of Site 40SY514, view north from southern end of the site (DSCN1481).

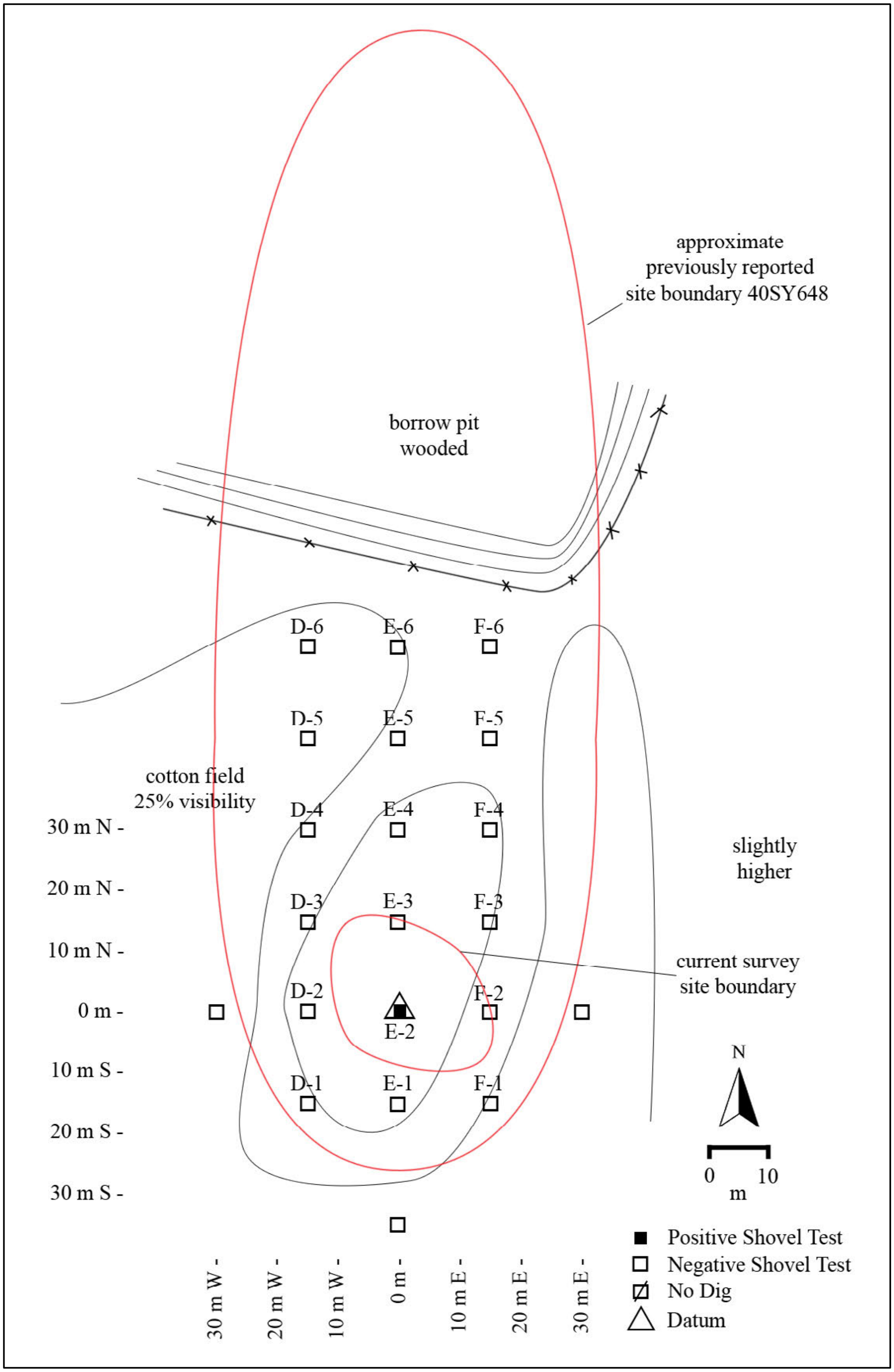

Figure 5-08. Sketch map of Site 40SY514.

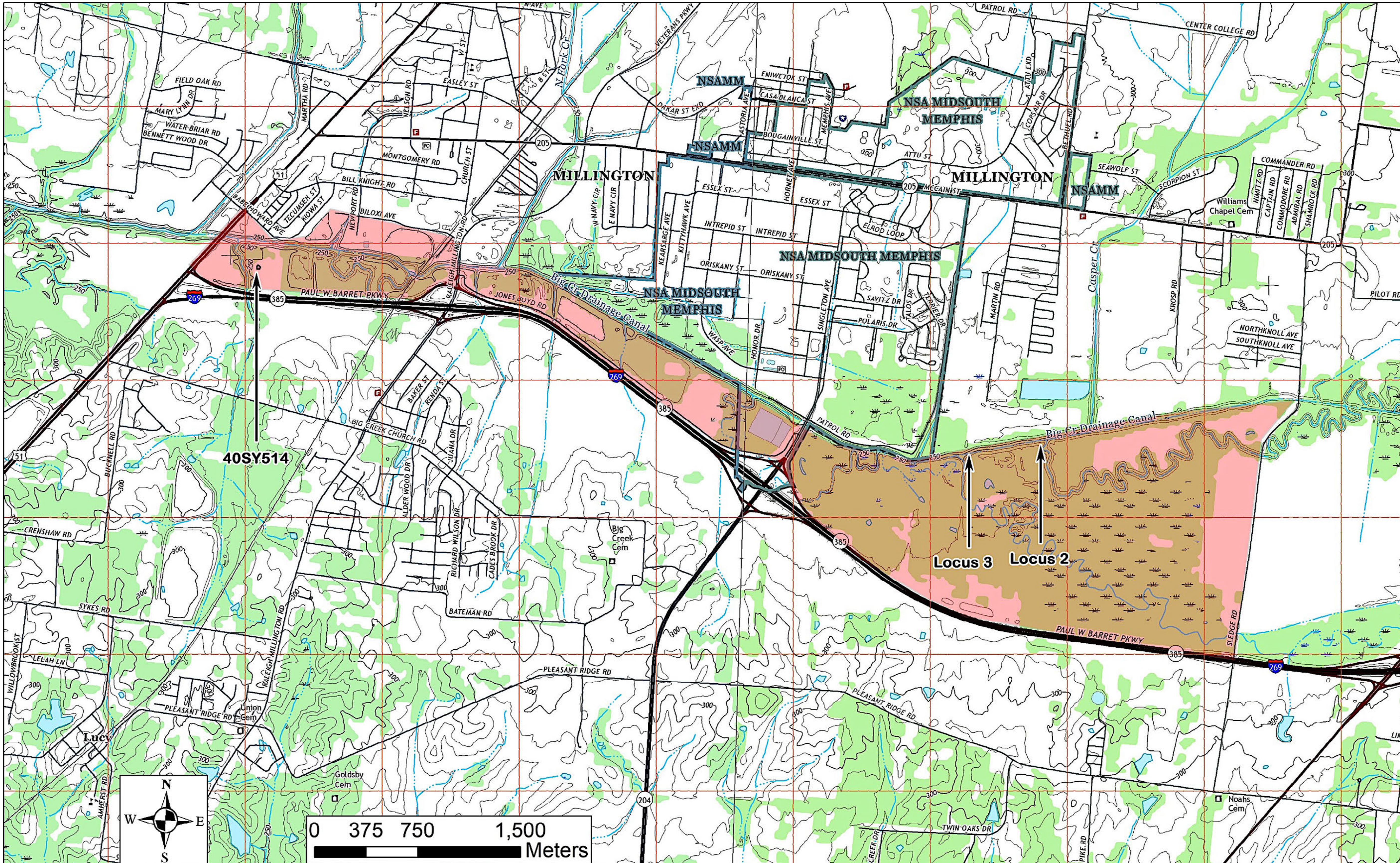

Figure 5-04. Quad map locator for 40SY514, Locus 2 and Locus 3 (base maps: 2016 Millington and Brunswick, TN 7.5-min. quads).

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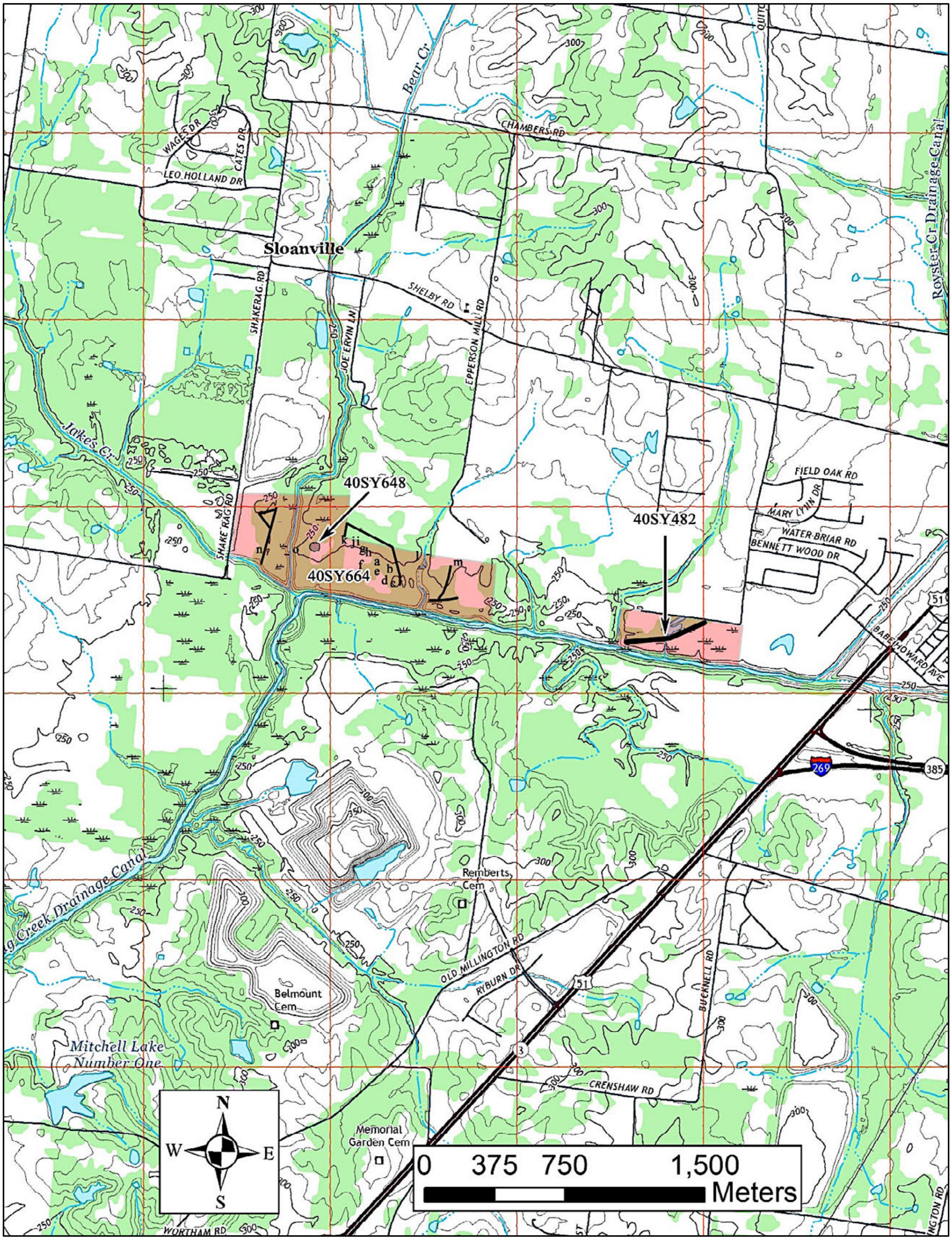

Figure 5-05. Quad map locator for 40SY648, 40SY664, and 40SY842 in the Eastern and Western Mitigation tracts (base map: 2016 Millington, TN 7.5-min. quad).

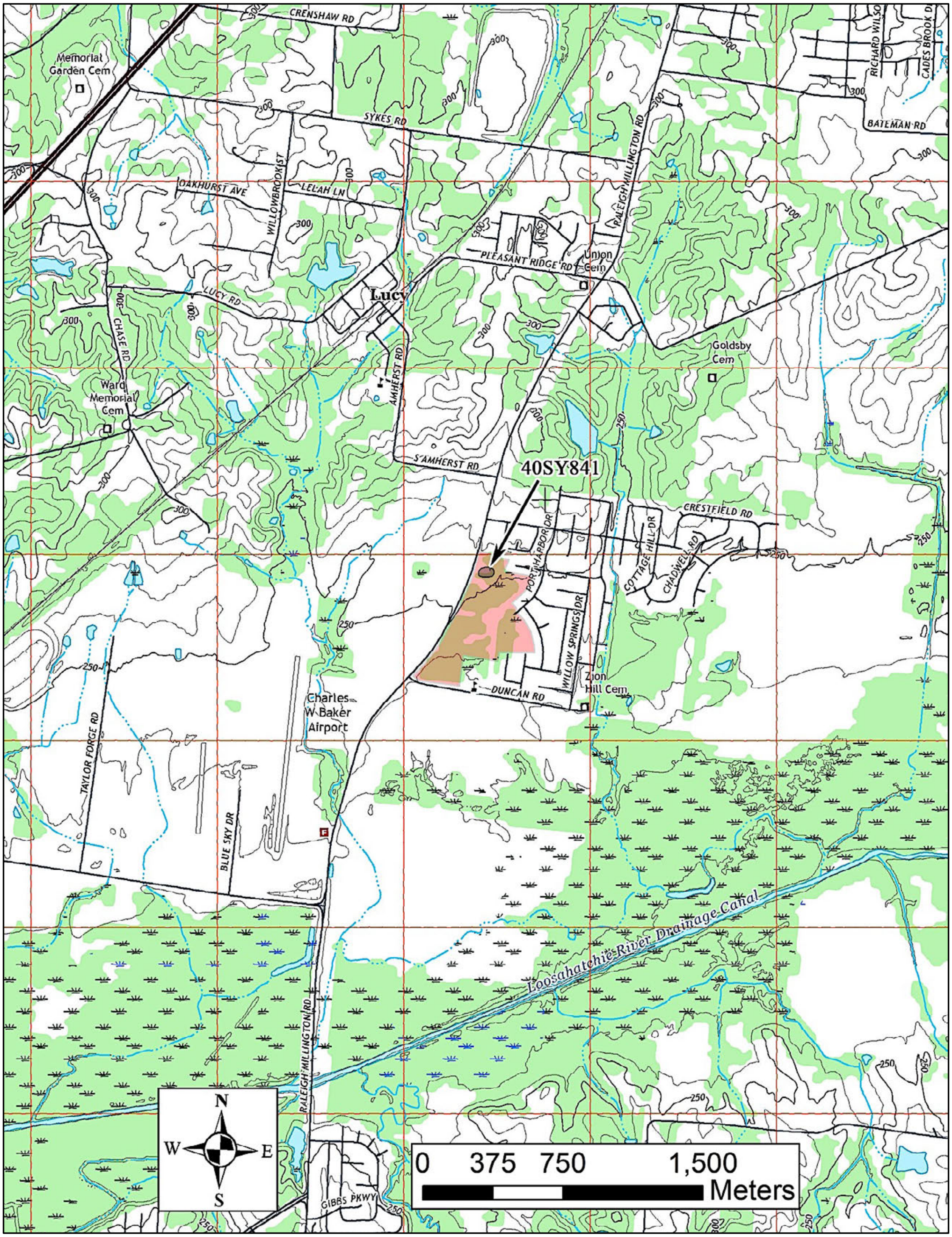

Figure 5-06. Quad map locator 40SY841 in the Borrow Area (base map: 2016 Millington, TN 7.5-min. quad).

Archaeology

As discussed in Chapter IV, in 1990 Memphis State University archaeologists recorded 40SY514 as a 190 m long low-density lithic scatter with a Dalton component. The TDOA site form is the only record of the site, there is no associated report; although G.P. Smith mentions that property was being acquired by the Corps of Engineers for use as a borrow pit. Work conducted in 1990 included the recovery of a small surface collection, the excavation of an unspecified number of shovel tests and a 1-x-1m unit. The latter revealed that the site does not contain a midden.

Panamerican observed a low rise in a harvested cotton field consistent within the southern portion of the previously described location of 40SY514. A 100 percent surface collection was taken, and this resulted in the recovery of three pieces of debitage from a 25-x-25 m area. The northern portion of the site is covered by a borrow pit pond, and this portion of it is considered destroyed.

Three shovel test transects (D, E, and F) were run across the landform at 15 m intervals from south to north, ending at the borrow pit pond. One transect shovel test one was positive (E2), the remainder were negative (see Figure 5-08). Three additional delineation tests were dug on a 15-m interval grid to the west, south and north of E2, but these were negative as well. In total, 21 shovel tests were excavated at 40SY514: one was positive and 20 were negative. The positive shovel test E2 profile at 40SY514 was recorded as: 0-6 cmbs 10YR 4/4 silty clay with a PP/K and from 6-44 cmbs sterile 10YR 5/6 silty clay (Figure 5-09).

Figure 5-09. Shovel test E2 at Site 40SY514.

To summarize, 40SY514 is considered a low-density plowzone deposit.

Artifacts

The small Panamerican 40SY514 lithic assemblage is summarized below (Table 5-02). Importantly, one diagnostic was recovered, an Arlington PP/K (see Figure 6-05). G.P. Smith (1979:98) considers Arlington points a "marker type for the late Poverty Point in western Tennessee."

Table 5-02. Site 40SY514 artifact recovery.

Shovel Test	Depth (cm)	Artifact Category	Comments	N	Mass (g)
E2	0-6	Arlington PP/K	See Figure 6-05	1	6.6
	surface	complete flake	Size grade;1 cortex grade 1	1	1.4
	surface	flake fragment		2	2.1
			Total:	4	

Additional Comments

40SY514 is interpreted as short term, briefly occupied hunting camp or chipping station. The lack of Poverty Point Objects also hints that this was a hunting camp. While low-density, site is somewhat intriguing in that two diagnostics, a Dalton point and an Arlington point, were recovered from it during 1990 and 2019 surveys.

Recommendation

Site 40SY514 is recommended ineligible for the NRHP. Test units in 1990 found no evidence for midden or features, and our investigation revealed the site is a low-density plowzone deposit. It has been impacted by agricultural practices and the excavation of a borrow pit over the northern portion of the site. Low-density lithic scatters are common in the loess area of west Tennessee, and beyond the component and location data that are already in hand the site is unlikely to yield additional significant archaeological information. The recommended management action is no further work.

SITE 40SY648

Cultural Affiliation ....Late Archaic, Woodland and Mississippian
Type .... Camp/open habitation
Size .... 75-x-60 m
Artifact Recovery Total 0
Recommended NRHP Status .... Ineligible

Location and Setting

Site 40SY648 is a previously recorded a multi-component Prehistoric open habitation site that is located within the Western Mitigation tract (see Figure 5-05). It associated with a low rise north of Big Creek overlooking the confluence of Jakes Creek with Bear Creek. During this investigation, the 40SY648 location was a harvested soybean field within fair surface visibility (25 to 50 percent) (Figure 5-10). Sease et al. (1989) map this location as Henry silt loam (He).

Archaeology

As discussed in Chapter IV, all past work at 40SY648 was associated with TDOT funded projects along various alignments of the proposed I-69. This site has been subjected to two Phase I investigations (Carty et al. 2002; McCorkle et al. 2005) and, most importantly, was

Phase II tested and determined ineligible for the NRHP (Cochrane et al. 2006). Testing revealed a plowzone deposit with two small truncated Prehistoric pit features in the subsoil, and the recovered assemblage of 421 artifacts suggested a weak Late Archaic and strong Woodland and Mississippian occupations.

Figure 5-10. Photograph of Site 40SY648, view north from the southwestern part of the site (DSCN1459).

Panamerican identified a rise in a harvested soybean field at the previously recorded location of 40SY648. Given the limited surface visibility, the rise was shovel tested at 30 m intervals. Transects 23 through 28 traversed the site area and the adjacent woods, from east to west. Shovel test 24-7 was excavated near the coordinates given on the site form (Figure 5-11). In total, 23 tests were excavated in and near site vicinity, and all of them were negative. A permanent datum shown on the site form sketch map was not relocated.

One prehistoric lithic item, a flake fragment, was observed on the ground surface along the western tree line, near test 25-4, but it was not collected because it was not diagnostic and the site has already been evaluated (tested).

Recommendation

Site 40SY648 is recommended ineligible for the NRHP. Cochrane et al. (2006) tested the site via the excavation of six 1-x-1 m test units and thirteen mechanized strips that exposed 825 m^2 and determined it is ineligible for the NRHP. Panamerican concurs with this evaluation. The work conducted during the current survey indicates that there is little left of the site, as none of the shovel tests was positive.

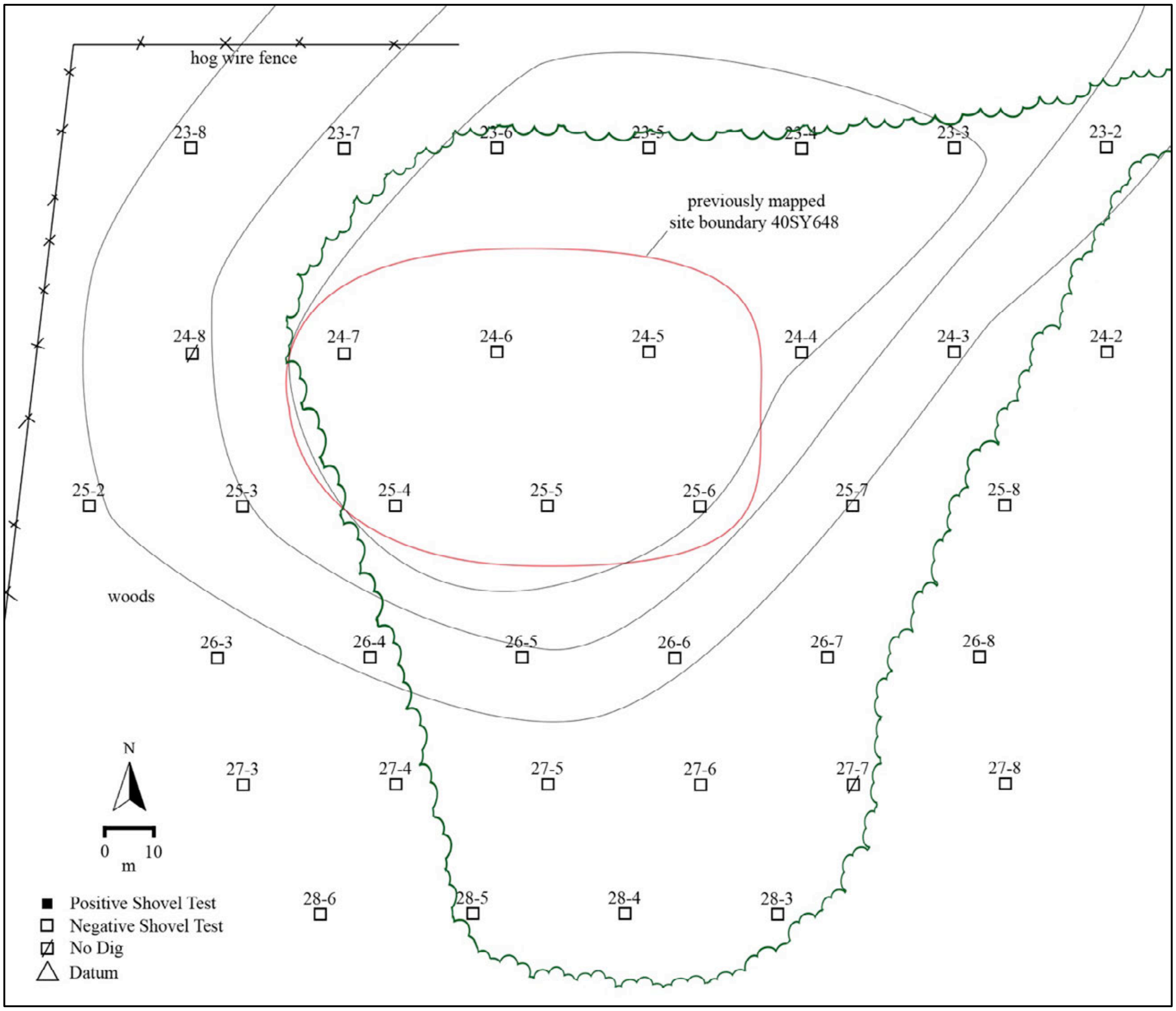

Figure 5-11. Sketch map of the shovel tests near Site 40SY648.

SITE 40SY664–TENNESSEE POWDER COMPANY/CHICKASAW ORDNANCE WORKS

Cultural Affiliation 1940-1946
Type .... Powder Plant/Ordnance Works
Size .... 5,000+ ac.
Artifact Recovery Total 5
Recommended NRHP Status .... Potentially eligible

Location and Setting

Site 40SY664 represents assorted surface features, including various types of concrete ruins, that are associated with the 1940-1942 Tennessee Powder Company and the 1942-1946 Chickasaw Ordnance Works. The entire 134 ac. Western Mitigation tract was formerly located within the 5,000+ ac. Powder Plant/Ordnance Works facility, and this tract was approximately 0.5 mi. south and southeast of the facility's coal powered power plant. Note, however, that the ruins features were only identified within forested portions of the Western Mitigation tract (see Figure 5-05);

no features were identified within the agricultural fields portion of the Western Mitigation tract. More generally the portion of 40SY664 within the APE is southwest of the Millington Wastewater Plant, at the south end of the Epperson Mill Road.

The terrain within the Western Mitigation tract (i.e., 40SY664) includes some elevated terrace edge topography >250 ft. in the north-central portion of the tract, but most of the tract is low-lying floodplains (240 ft.) along the Big Creek Drainage Canal, Bear Creek and an unnamed tributary of Big Creek. The ruins are distributed across a variety of soil types, including Calloway silt loam, 0 to 2 percent slopes, Falaya silt loam, Graded land, Granada silt loam, 2 to 5 percent slopes.

Archaeology

Previous investigations at 40SY664 are discussed in some detail in Chapter IV; briefly different elements of the site were identified during 2002, 2005 and 2009 as a part of three Phase I surveys associated with TDOT's proposed I-69 alignments (McCorkle et al. 2005; Oster et al. 2009; Sherman et al. 2002). W&A shovel tested the area around one of the structures, but PBSJ and D&A conducted no subsurface examination of the site. The specific functions of the identified ruins were considered unknown by all previous researchers.

During the Big Creek Resilience survey, Panamerican shovel tested the entire 134 ac. Western Mitigation tract that contains both 40SY664 (and Prehistoric 40SY648), and this effort included the excavation of 299 negative tests and the documentation of an additional 168 no-test locations where planned tests were not excavated, principally due to wetlands. This suggests that the archaeological signature of 40SY664 is limited to the surface features. It should also be noted that there are abundant other surface features/ruins associated with the COW to the northeast of the APE, most notably along Shake Rag Road—including the two 250 ft. smokestacks (see Figures 4-07 and 4-08)—that should be considered additional loci of 40SY664.

The surface features identified in and near the APE were each assigned a letter locus designation, and photographed and briefly described. Additionally, segments of abandoned railroad grades and roads associated with the facility were also identified. The UTMs of these features were recorded using hand held GPS equipment, and this allowed for the production of a map showing the distribution of the features to be produced in Google Earth (Figure 5-13).

Locus A contains two in situ rectangular concrete foundations, roughly 6-x-11 m in size, with "U" shaped concrete frames that no doubt supported cylindrical industrial tanks (Figure 5-14). Adjacent to these is a 30 m diameter pile of rubble that that contains concrete slabs, hollow concrete cylinders, 3 ft. diameter vitrified clay pipes and fragments, corrugated ceramic rollers (see "Artifacts" below), and metal pipe sections encased in concrete (Figure 5-15). While much of the material in the Locus A rubble pipe is in secondary context, an apparent in situ row of concrete "stumps" encased in vitrified clay pipe suggests that these features were once vertical (Figure 5-17 and 5-18). Two of the vitrified clay pipes were stamped BLACKMER & POST PIPE CO./ST LOUIS MO and two model numbers were noted "O 61539" and "O 62339" (Figure 5-16). Due to the presence of abundant corrugated ceramic rollers on the surface (see Figure 6-03 for an example), Locus A is interpreted as a location where the nitrocellulose, or guncotton, cakes were pressed (Figure 5-19).

Locus B is an in situ concrete frame structure measuring 11.6-x-6.2 m along a 315°-135° axis (Figure 5-20 and 5-21). The structure is 4 m tall and includes three pairs of 45-x-45 cm columns that are connected by cross beams at the top. There is an in situ support tank foundation similar to the ones observed at Locus A immediately to the southeast, and a road remnant is to the east and north. Locus B is interpreted as Sherman et al.'s (2002) Structure 4 (see Figure 4-03), and was photographed by McCorkle et al. (2005:Figure 49). Its function is unclear.

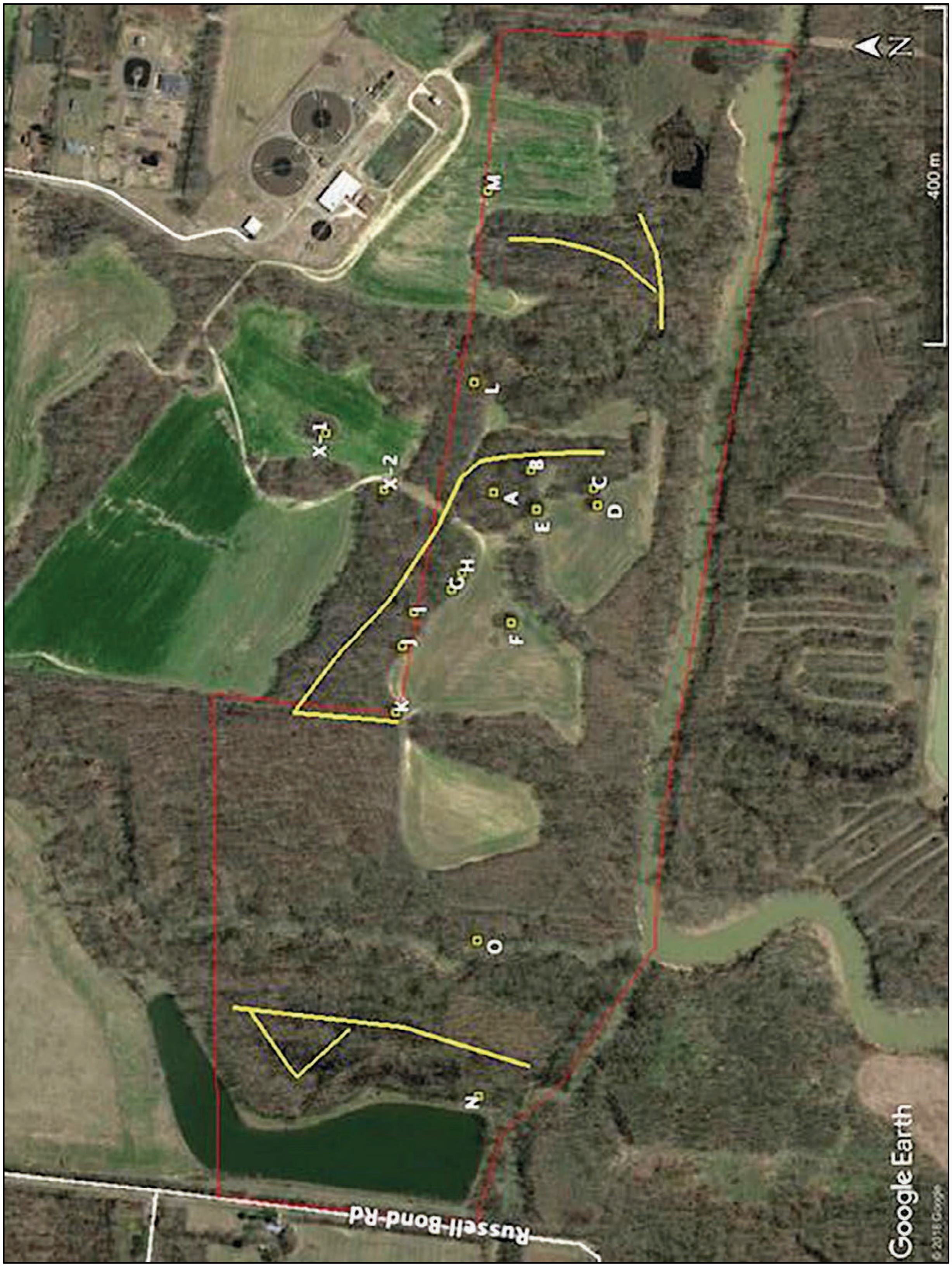

Figure 5-13. Aerial image of the portion of Site 40SY664 within the Western Mitigation tract (red boundary), with Loci labeled. The railroad grade is the linear feature on the west, and the road remnants are the linear features on the east.

Figure 5-14. Locus A foundation with industrial tank supports, view north (P2282417).

Figure 5-15. Locus A rubble pile, view southwest (P2282419).

Figure 5-16. Locus A vitrified clay pipe with BLACKMER & POST PIPE CO mark (P3062514).

Figure 5-17. Locus A in situ concrete and vitrified clay pipe column bases (P3062515).

Figure 5-18. Locus A concrete and vitrified clay pipe column cross section (P3062516).

Figure 5-19. Locus A unusual vitrified clay artifact and corrugated ceramic rollers (P3062517).

Figure 5-20. Locus B view southeast (P2282424).

Figure 5-21. Locus B view east (P2282428).

Locus C is a relatively intact concrete foundation measuring 7.5-x-5.0 on south side of an earthen mound roughly 2.5 m tall and 10 m in diameter (Figure 5-22). There are two “U” shaped concrete frames adjacent to the foundation that no doubt supported cylindrical industrial tanks.

Locus D is a concrete pediment about 1.45-x-2.2 m by 1.1 m tall (Figure 5-23). It is located in a clump of vegetation in an agricultural field to the west of Locus C.

Locus E contains two concrete ruins and located near a low swale north of Locus D. The primary structure is 5-x-8 m and is taller (3 m) on the northeast end (Figure 5-24). Inside this structure there are abundant corrugated (non-metal metal) roofing panels (Figure 5-25). The secondary structure is smaller and located to the north. Sherman et al. (2002) appear to have recorded the larger ruin as Structure 4 (see Figure 4-03).

Locus F is a pair of in situ twin concrete pediments measuring 3.7-x-1.15 by 1.6 m tall, with a pile of rubble between them (Figures 5-26 and 5-27). The rubble is composed of thick concrete slabs with metal tubing encased in them. This locus appears to correspond with Sherman et al.’s (2002) Structure 3 (see Figures 4-03 and 4-04). It is found within a clump of vegetation in a field to the west of Locus E.

Locus G consists of two in situ concrete boxes about 8 m apart on the edge of forest bordering the field containing Locus F. The southern box measures 2.25-x-1.65 m by 1.2 m tall (Figure 5-28). This locus appears to correspond to Sherman et al.’s (2002) Structure 5 (see Figure 4-03).

Locus H a brick sewer located near Locus G (Figure 5-29). Its metric attributes are as follows: 1.30 m exterior diameter; 0.75 interior diameter; 0.90 m deep. There is an outflow pipe bearing 130º. Nearby there is another pile of rubble, and an open pipe in the forest floor.

Locus I is pile of rubble in the forest adjacent to the field edge, and to the north (outside the APE) there is a relatively large rectangular foundation filled with water (Figure 5-30). This rubble pile contained vitrified clay pipe and corrugated ceramic rollers similar to those observed at Locus A, and thus is also interpreted as a location where the nitrocellulose, or guncotton, cakes were pressed. Locus I is possibly the feature Sherman et al. (2002) designated a “pile of cement cubes” (see Figure 4-03).

Locus J consists of two relatively intact concrete ruins and a pile of rubble located to the northwest of Locus I (Figures 5-31 and 5-32). The larger structure is three sided, measured 4.9-x-2.2 m by 3.0 m tall, and the interior contains “U” shaped supports for holding a cylindrical industrial tank (Figure 5-33). The other structure was 4.9-x-3.0 m and 1.2 m tall, and was full of water. The rubble pile was principally composed of hollow concrete cylinders similar to those observed at Locus A. As a result Locus J is thought to be related to Locus I, and is also interpreted as a location where the nitrocellulose, or guncotton, cakes were pressed. Sherman et al. (2002) recorded Locus J as Structure 2 (see Figure 4-03).

Locus K is pile of concrete rubble measuring about 5-x-5 m. It is located west of Locus J adjacent to relic road segment, and a deer stand has been built in tree here.

Locus L is large foundation located approximately 100 m northeast of Locus B, adjacent to an unnamed tributary to Big Creek. This structure measures roughly 25.0-x-12 m, and is composed of three parts; two water filled basements and an elevated section on the east side (Figures 5-34, 5-35, 5-36 and 5-37). The water in the basements is relatively deep (2.5 m). There is a recessed stairwell on the southwestern end of this ruin. McCorkle et al. (2005:Figure 48) provide a photograph of Locus L, and Orser et al. (2009) provide a sketch map of it (see Figure 4-05).

Figure 5-22. Locus C foundation with earthen mound in background, view north (P2282433).

Figure 5-23. Locus D view north (P2282435).

Figure 5-24. Locus E view northeast (P2282437).

Figure 5-25. Locus E interior of larger structure with corrugated roofing, view northeast (P2282438).

Figure 5-26. Locus F view east (P2282446).

Figure 5-27. Locus F southern portion, view east (P2282447).

Figure 5-28. Locus G view northeast (P2282451).

Figure 5-29. Locus H (P2282452).

Figure 5-30. Locus I view east from atop rubble pile (P2282457).

Figure 5-31. Locus J view north (P2282458).

Figure 5-32. Locus J view northwest (P2282459).

Figure 5-33. Locus J structure interior, view northeast (P2282460).

Figure 5-34. Locus L stairwell view north (P2282468).

Figure 5-35. Locus L view north from right of stairwell (P2282470).

Figure 5-36. Locus L view south toward stairwell (P2282471).

Figure 5-37. Locus L view southwest (P2282472).

Locus M includes two concrete features, an approximately 1 m high foundation and rectangular ground level feature (Figure 5-38). This is the eastern most feature associated with the COW, and is south of the Millington Wastewater Plant. An old road remnant was identified in the forest to the southwest of Locus M.

Locus N is a small rectangular concrete in ground foundation (Figure 5-39). It is west of Bear Creek and east of a borrow pit pond east on Shake Rag Road (see “Russell Bond Rd” on Figure 5-13). A relic rail grade was identified to the east of Locus N; this railroad grade is labeled “Abandoned” on the 1960 Millington quad, and has a unique triangular switching area to the north of Locus N (see Figure 4-20).

Locus O is asset of wooden bridge pilings on Bear Creek to the east of Locus N. There is no obvious road or rail grade at this location.

Locus X1 is outside the Big Creek APE, and was identified while accessing the project area (see Figure 5-13). It is a unique type of ruin that was photographed by McCorkle et al. (2005:Figure 50). Locus X1 consists of three identical concrete platforms within a shallow basin encircled by a low earth berm approximately 20 m in diameter (Figure 5-40). The platforms measure 3.45-x-3.45 m.

Locus X2 is outside the Big Creek APE, and was identified while accessing the project area (see Figure 5-13). It contains the foundations of two identical structures consisting of eight rows of concrete piers that are 7.3 m long by 30 cm wide, and spaced 1.3 apart (Figure 5-41).

Figure 5-38. Locus M view northwest.

Figure 5-39. Locus N view east (P2282494).

Figure 5-40. Locus X1 view east (P2282408).

Figure 5-41. Locus X2 view northwest (P2282410).

Artifacts

The only artifacts recovered from 40SY664 are five corrugated ceramic rollers from the Locus A surface; Figure 6-03 provides a top and side view of an example. There are dozens of these items on the surface at Locus A and Locus I (see Figure 5-19), and, as noted in Chapter VI, they are distinctive artifacts that are interpreted as rollers that were associated with pressing the nitrocellulose, or guncotton, cakes. We are unaware of any examples of these previously being recovered from a site in the Mid-South region, so their discovery is of some interest. As some of the vitrified clay pipes at Locus A are marked BLACKMER & POST PIPE CO./ST LOUIS MO, it is possible that the ceramic rollers were manufactured there as well. The Blackmer & Post Pipe Company was established in 1878 and incorporated in 1892 (Leonard 1906).

Recommendation

As discussed in Chapter IV, PBSJ and W&A considered 40SY664 potentially eligible for the NRHP under Criterion A and C (Orser et al. 2009; Sherman et al. 2002). In contrast, D&A state the THC determined the COW did not meet these NRHP criteria because the remaining structures do not contribute to an "overall sense of a manufacturing or industrial facility, and the site no longer retains integrity fro the World War II era (McCorkle et al. 2005:84).

Panamerican recommends that 40SY664 be considered potentially eligible for the NRHP under Criterion D (Information Potential), which is the criterion commonly used to nominate archaeological sites. The site is extremely large, and the Big Creek Resilience APE covers only a fraction of the site. The discovery of the ceramic rollers during this survey revealed that the site can produce additional significant archaeological data, and could produce more data in future. Future investigations should focus on obtaining a facility plan, and determining the functions of the various structures that one stood at the loci (ruins).

Avoidance is the recommended management treatment plan for the 40SY664 loci within the Big Creek APE, and if is avoidance is not possible then Phase II testing to make a formal determination of the each locus's NRHP status should be conducted.

SITE 40SY841

Cultural Affiliation ....Late nineteenth to mid-twentieth century
Type .... Rural domestic
Size .... 50-x-70 m
Artifact Recovery Total 110
Recommended NRHP Status .... Ineligible

Location and Setting

Site 40SY841 is a newly recorded historic rural domestic scatter in a wooded area in the Off Site Borrow tract on the east side of Raleigh-Millington Road. The location is south and west of a subdivision, south of Waverly Farms Road and north of Duncan Road. At the time of investigation, the site location was in woods with poor surface visibility (Figure 5-42). The site is on a slight rise and the surrounding area was very wet due to a great deal of rain. A man-made drainage ditch draining the neighborhood to the northeast is located east of the site. Sease et al. (1989) map this location as Grenada silt loam, 2 to 5 percent slopes (GaB).

Figure 5-42. Photograph of Site 40SY841, view north towards the datum (DSCN1442).

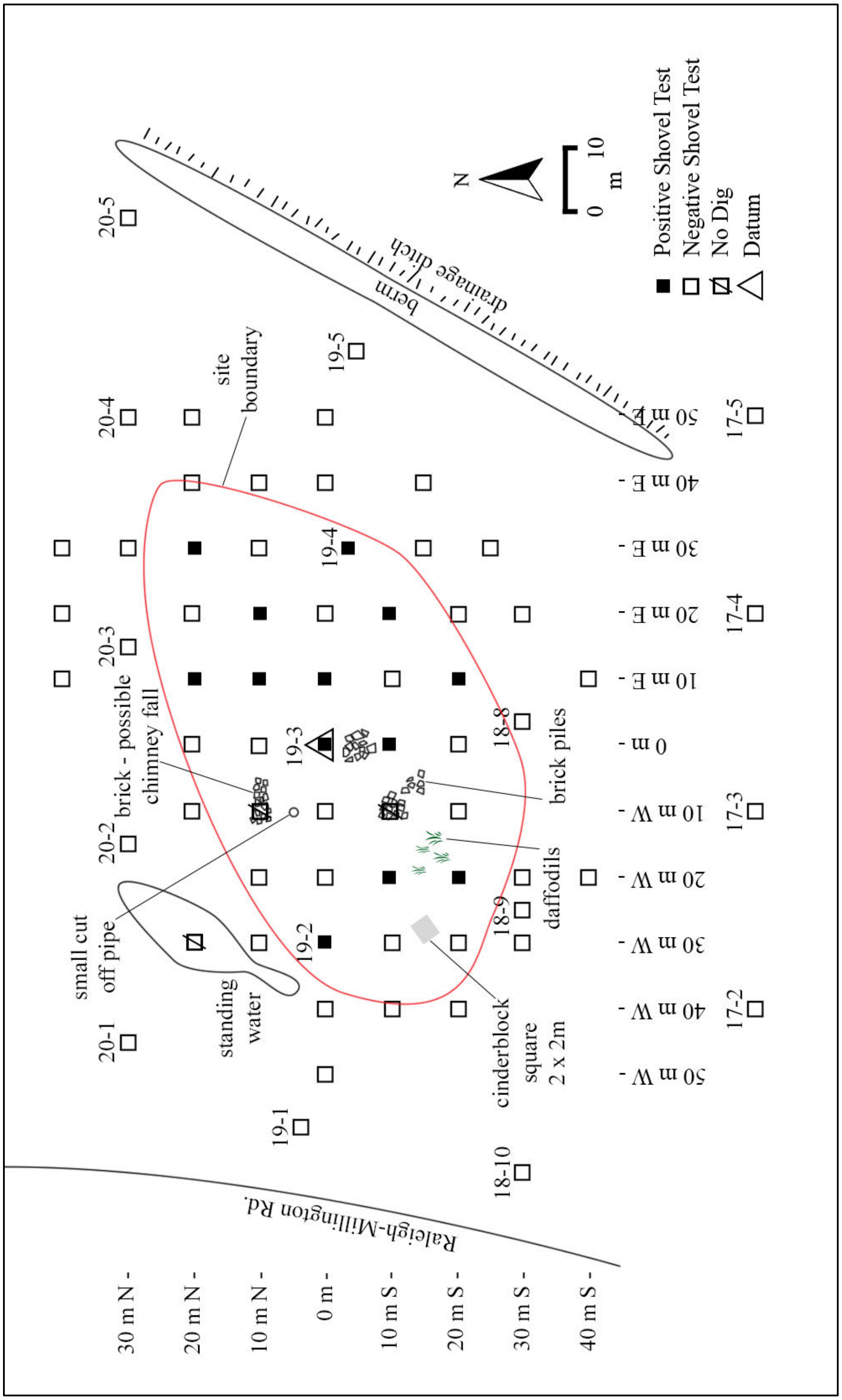

Figure 5-43. Sketch map of Site 40SY841.

Archaeology

Site 40SY841, recorded as Field Site 1 (FS1), was encountered along Transect 19 which was run east from Raleigh-Millington Road, and three shovel tests along the transect were positive. In addition to the positive shovel tests, there were several brick scatters. These may be chimney falls, but they look more like areas where brick was pushed (i.e., dozed). A small cinder block "foundation" about 2 m on a side, was observed in the western portion of the site. A section of metal pipe was sticking out of the ground and this may have been where water was obtained. While the vegetation was mainly secondary growth woods, and there were areas of daffodils.

The site was delineated on a 10-m interval grid, with shovel test 19-2 serving as the site grid origin. Thirteen shovel tests were positive for cultural material at Site 40SY841. The site boundary of 50-x-70 m is based on the extent of the positive shovel tests and the observed cultural remains. The soils were fairly wet and a typical shovel test at 40SY841 was: 0-6 cmbs, 10YR 4/4 silty clay; 6-44 cmbs, 10YR 5/6 silty clay (Figure 5-03).

Figure 5-44. Shovel test S20 E10 at Site 40SY841 (DSCN1444).

At 49SY841 all recovery was from shovel tests. Among the 13 positive shovel tests the recovery ranged from one to 37 artifacts, and the average was 8.4 artifacts per test. The highest yielding tests (S20 E10) is located on the southeastern margin of the site.

Artifacts

A total of 110 historic items was recovered from Site 40SY841 (Table 5-03). The artifact pattern conforms to that of a Tenant period (1875-1950) assemblage, and is dominated by Architectural Group (n=59, or 52.7 percent) and Kitchen Group (n=27, or 24.4 percent) items. Among the Architectural Group artifacts are brick (n=19), glass (n=13) cut nails (n=8) and wire nails (n=18).

Following Orser et al. (1987), the cut to wire nail ratio suggest the site likely post dates 1890. The Kitchen Group artifacts include glass (n=15), plain whiteware (n=10), Bristol glazed stoneware (n=1) and a metal can fragment (n=1). The majority of the Kitchen Group artifacts date to the twentieth century.

Miscellaneous Items rank third in the 40SY841 assemblage (n=19, or 17.3 percent), and include burned wood, coal, melted glass, shell, slag and unidentified ferrous objects.

The other functional groups are represented at low frequencies: Activity Group (n=4, or 3.6 percent); Clothing Group (n=1, or 0.9 percent) and Faunal (n=1; a shell fragment). The Clothing Group artifact is a brass U.S. Army Cavalry button recovered from shovel test S20 E10. This button measures 0.9 in. in diameter and features a "C" within a shield placed over an eagle. The U.S. Cavalry used this button type from ca. 1855 to 1902 (Tice 1997:133).

Table 5-03. Artifact inventory from Site 40SY841.

Shovel Test	Depth (cm)	Artifact Category	Comments	Count
19-2	0-18	bottle glass, clear		1
19-2	0-18	bottle glass, green		1
19-2	0-18	table glass, clear, rim		1
19-2	0-18	metal, wire		2
19-3	0-13	bottle glass, clear		1
19-3	0-13	flat glass, clear		10
19-3	0-13	flat glass, aqua		3
19-3	0-13	brick fragment		5
19-3	0-13	melted glass		2
19-3	0-13	metal, undifferentiated		3
19-4	0-18	brick fragment		1
S10 E20	0-30	bottle glass, amber		1
S10 E20	0-30	brick fragment		1
S10 W20	0-20	whiteware, plain		1
N10 E10	0-25	bottle glass, clear		1
N10 E10	0-25	whiteware, molded, footring		1
N10 E10	0-25	table glass, clear, rim		1
N20 E30	0-22	brick fragment		2
N20 E10	0-30	whiteware, plain		1
N20 E10	0-30	brick fragment		1
E10	0-24	stoneware, Bristol glazed exterior/ interior		1
N10 E20	18-30	bottle glass, amber		1
N10 E20	18-30	whiteware, plain, rim		1
S10	0-30	brick fragment		1
S10	0-30	insect nest		7
S10	0-30	melted glass		3
S20 W20	0-25	bottle glass, clear		2
S20 W20	0-25	bottle glass, amber		2
S20 W20	0-25	table glass, milkglass, rim, molded		1
S20 W20	0-25	battery core		1
S20 W20	0-25	brick fragment		4
S20 W20	0-25	nail, wire		6
S20 W20	0-25	nail fragment, wire		1
S20 W20	0-25	coal		2

Shovel Test	Depth (cm)	Artifact Category	Comments	Count
S20 E10	0-35	bottle glass, clear, embossed	"Property…/ …er Farm"	1
S20 E10	0-35	table glass, milkglass, rim, molded	red painted	1
S20 E10	0-35	whiteware, plain		4
S20 E10	0-35	whiteware, plain, maker's mark	too small to determine	1
S20 E10	0-35	whiteware, plain, rim		1
S20 E10	0-35	button, brass U.S. Cavalry; see Figure 6-02	Ca. 1855-1902	1
S20 E10	0-35	nail, cut		4
S20 E10	0-35	nail, wire		9
S20 E10	0-35	nail fragment, cut		4
S20 E10	0-35	nail fragment, wire		2
S20 E10	0-35	brick fragment		2
S20 E10	0-35	brick, half	T=2.4in; T=2.3, W=3.8in	2
S20 E10	0-35	metal, can fragment		1
S20 E10	0-35	metal, strap		1
S20 E10	0-35	shell		1
S20 E10	0-35	slag		1
S20 E10	0-35	coal		1
			Total	**110**

Additional Comments

Review of the 1939 Shelby County Highway Map shows one, possibly two, structures near the Site 40SY841 location. A structure appears on the 1942 Millington 15-min. quad at this location, and four structures are shown in this area on the 1960 Millington 15-min. quad. None of these structures is shown on the 1971 Millington 7.5-min quad, thus the structures were razed ca. 1961-1970.

Recommendation

The recommended NRHP status for 40SY841 is ineligible. It is the site of a post 1890 domicile that was razed ca. 1961-1970, and most of the assemblage dates to the twentieth century. Beyond the component and location data that are already in hand the site is unlikely to yield additional significant archaeological information. Similar Tenant period domestic sites are ubiquitous throughout west Tennessee, and this example does not meet enough of the criteria for NRHP eligibility as established by Wilson (1990) to be considered eligible. As such, the recommended management action is no further work.

SITE 40SY842

Cultural Affiliation .... Early to mid-twentieth century
Type .... Relic road
Size .... 650-x-5 m
Artifact Recovery Total 0
Recommended NRHP Status .... Not Eligible

Location and Setting

Site 40SY842 is a newly recorded historic road in a wooded area in the Eastern Mitigation Area. This location is in northern Shelby County, west of Millington, and west of the USA Baseball Stadium Complex. The site is north of Big Creek and east of an unnamed drainage in to that stream. At the time of investigation, the Site 40SY842 location was in woods with poor surface visibility (Figure 5-45). The area is fairly level, although there were areas of standing water.

Sease et al. (1989) map this location as Falaya silt loam (Fa) and Calloway silt loam, 0 to 2 percent slopes (Ca).

Figure 5-45. Photograph of Site 40SY842, view north-northeast from near the middle (DSCN1416). A "roadside" ditch can be seen to the left.

Archaeology

Site 40SY842, recorded as Field Site 4 (FS4), was encountered in the Eastern Mitigation tract. The road can be identified on the 1942 and 1960 editions of the Millington 15-min. quads, see Figures 4-19 and 4-20, and the faint remains of the road were observed in the woods. As the road spans the entire APE, all the transects run in the APE went over the road. No artifacts were encountered, however, during a walk along the length of the road, what appear to be bridge remains were encountered over a small drainage near the middle of the site (Figure 5-46). The site size is based on the extent of the road within the APE; archival maps show that it continued on to the north, outside the project area.

Additional Comments

A road is shown at this location on the 1939 Shelby County Highway Map (see Figure 4-16). The 1942 Millington 15-min. quad shows a road at this location and uses the symbol for "other surface improvements" (see Figure 4-19). The 1960 Millington 15-min. quad shows the road still in place, however uses the symbol for "unimproved dirt road" (see Figure 4-20), suggesting it was abandoned; likely as a result of the COW developing its own road network. The 1971 Millington 7.5-min. quad does not show the road.

Figure 5-46. Bridge remains at Site 40SY842, view southwest (DSCN1424). Note the small drainage just beyond the remains.

Recommendation

Site 40SY842 is recommended as ineligible for the NRHP. It is a road remnant dating from the early part of the twentieth century, and does not offer any significant future research potential. The recommended management treatment action is no further work.

LOCUS 2

Cultural Affiliation .... Mid-twentieth century
Type .... Domestic site; possible sportsman's camp
Size .... 20-x-20 m
Artifact Recovery Total 46
Recommended NRHP Status .... Ineligible

Location and Setting

Locus 2 is a newly recorded domestic site, possibly representing a sportsman's camp, within a wooded section of the Primary Project Area 3. The site on the Big Creek Drainage Canal about 1.5 km west of Sledge Road. Recorded as Field Site 2 (FS-2), the Locus 2 location was in woods with poor surface visibility (Figure 5-47). The site is on the left bank (descending) of Big Creek, with the mouth of deeply downcut drainage to the east. Sease et al. (1989) map this location as Falaya silt loam (Fa).

Figure 5-47. Photograph of Locus 1, view to north (DSCN1491).

Archaeology

An archaeological site was predicted at Locus 2 because the 1960 Millington 15-min. quad shows a structure here. Surface features at Locus 2 include concrete footers and a brick column section, and a scatter of metal roofing (Figure 5-48). The footers were distributed over a 6-x-4 m area.

Initially a centrally placed shovel test was excavated south of the footers, and it was positive. The site was then delineated on a 10-m interval grid from the datum test. None of the four additional tests were positive. Tests could not be dug to the north, east and south due to the steep drops into Big Creek and the unnamed drainage (Figure 5-58). The site boundary of 20-x-20 m is based on the extent of the surface material. The soils were fairly wet and a typical shovel test at Locus 1 was: Zone I from 0-12 cmbs, 10YR 4/3 silty clay loam; and Zone II from 12-51 cmbs, 10YR 6/4 silty clay (Figure 5-49).

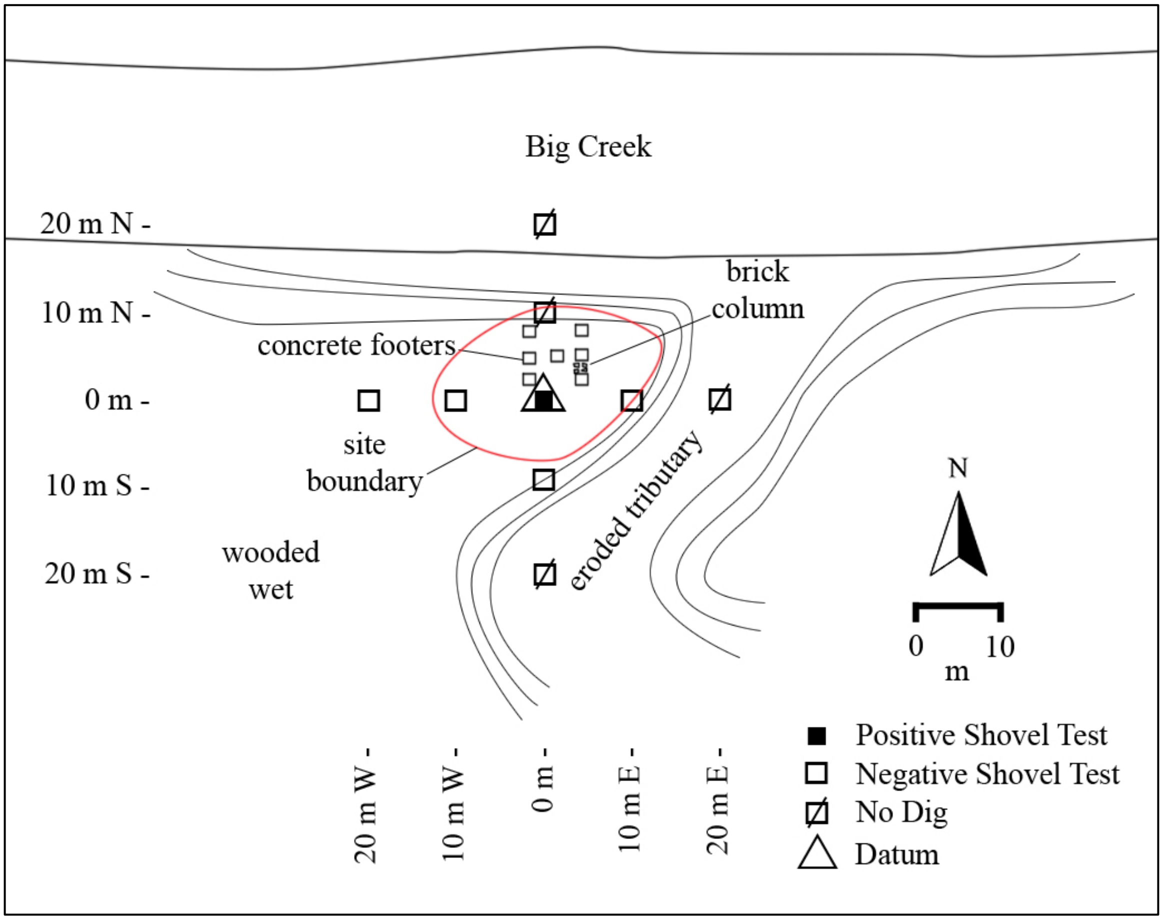

Figure 5-48. Sketch map of Locus 2.

Artifacts

All recovery at Locus 2 was from Zone I of the centrally located shovel test. This test produced 46 artifacts, including 45 pieces of corrugated metal (mass 307.7 g) and one piece of burned wood (0.1 g). The corrugated metal fragments are presumably from the former structure's roof.

Additional Comments

Neither the 1939 Shelby County Highway Map, nor the 1942 Millington 15-min. quad show a structure at this location (see Figures 4-16 and 4-17). The 1960 Millington 15-min. quad does indicate a structure at this location, but no road is shown leading to the area, possibly suggesting that access was via Big Creek. The structure is not shown on the 1971 Millington 7.5-min. quad. Given the archival data, the structure was constructed sometime during the period ca. 1943-1959 and was razed ca. 1961-1970, thus the occupation was relatively short term. Locus 2 most likely represents a sportsman's camp.

Figure 5-49. Datum shovel test profile at Locus 2 (DSCN1494).

Recommendation

Locus 2 is recommended ineligible for the NRHP. The TDOA was consulted and did not assign FS-2 a trinomial. This probable sportsman's camp dating to mid twentieth century offers little future research potential. The recommend management action is no further work.

Locus 3

Cultural Affiliation .... Mid-twentieth century
Type .... Domestic site; possible sportsman's camp
Size .... 20-x-10 m
Artifact Recovery Total 24
Recommended NRHP Status .... Ineligible

Location and Setting

Locus 3 is a newly recorded domestic site, possibly representing a sportsman's camp, within a wooded section of the Primary Project Area 3. This location is on the Big Creek Drainage Canal, about 420 m west of Martin Road. Recorded as Field Site 3 (FS-3), at the time of investigation, the Locus 3 location was in woods with poor surface visibility (Figure 5-51). The site is on the left bank (descending) of Big Creek, and with the mouth of deeply downcut drainage to the west. Sease et al. (1989) map this location as Falaya silt loam (Fa).

Archaeology

An archaeological site was predicted at Locus 3 because the 1960 Millington 15-min. quad shows a pair of structures here. Although no structural remains were observed on the surface, conjoining pieces of a hand painted white ware bowl were observed on the surface.

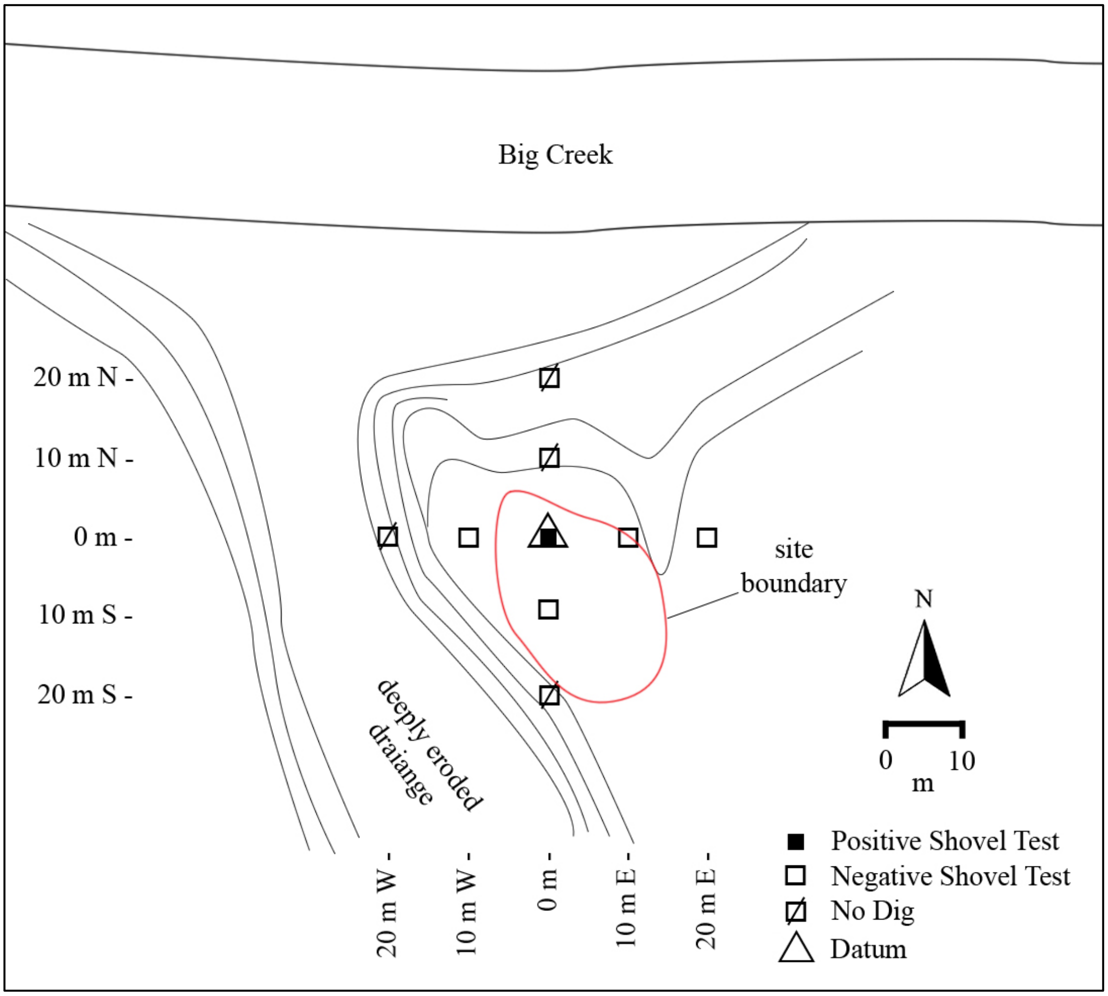

Figure 5-50. Sketch map of Locus 3.

Initially, a "datum" shovel test was excavated at the bowl surface find, and this test was positive. This positive test was then delineated on a 10-m interval grid, but none of the four additional tests were positive. Additional tests could not be dug to the north, west and south due to the steep drops into Big Creek and the unnamed drainage (Figure 5-50). The site boundary of 20-x-10 m is based on the assumed extent of the site.

The soils were fairly wet, and the profile from the positive shovel at Locus 2 recorded as: Zone I from 0-9 cmbs, 10YR 4/3 silty clay loam; Zone II 9-45 cmbs, 10YR 6/3 silty clay (Figure 5-52). Artifacts were recovered from 0-15 cm, which includes Zone I and the upper portion of Zone II.

The one positive shovel test at Locus 3 was fairly productive, and it yielded 23 artifacts. Being adjacent to the conjoining bowl sections, it can be inferred to that this location represents the dump or trash pile section of the camp.

Artifacts

A total of 24 historic items was recovered from Locus 3 (Table 5-04). The artifact pattern conforms to that of a Tenant period (1875-1950) assemblage, and is dominated by and Kitchen Group (n=13, or 54.1 percent) and Architectural Group (n=10, or 41.7 percent) items.

Figure 5-51. Photograph of Locus 3, view to west-northwest, towards the datum (DSCN1498).

Figure 5-52. Positive shovel test profile at Locus 3 (DSCN1495).

Table 5-04. Artifact inventory for Locus 3.

Shovel Test	Depth (cm)	Artifact Category	Comments	Count
datum	0-15	bottle glass, clear		5
datum	0-15	bottle glass, clear, bottleneck	external thread finish	2
datum	0-15	bottle glass, clear, canning jar fragment	external thread finish; refits	1
datum	0-15	bottle glass, clear, embossed	"One quart"	1
datum	0-15	bottle glass, clear, embossed	"D.E…"; refits	1
datum	0-15	bottle glass, amber, bottleneck	crown finish; refits	1
datum	0-15	whiteware, plain		1
datum	0-15	nail, wire		6
datum	0-15	nail fragment, wire		4
datum	0-15	melted glass		1
	surface	whiteware, hand painted, bowl fragment, maker's mark	polychrome; refits; Southern Potteries, Inc. (1917 to 1957)	1
			Locus 3 Total:	**24**

Among the Kitchen Group artifacts are 11 pieces of bottle glass (clear and amber colored), plain whiteware (n=1) and conjoining sections of a hand painted polychrome whiteware bowl. This bowl section, shown as Figure 6-01, exhibits a back mark that was identified as one used by Southern Potteries, Inc., a company that operated from 1917 to 1957 (Lehner 1988:433-434). The Architectural Group at Locus 3 consists entirely of wire nails. The lone miscellaneous item from Locus 3 is a piece of melted glass. Overall the assemblage is consistent with a twentieth century occupation, with occupation ending prior to widespread use of plastic containers.

Additional Comments

Neither the 1939 Shelby County Highway Map, nor the 1942 Millington 15-min. quad show a structure at this location (see Figures 4-16 and 4-17). The 1960 Millington 15-min. quad does indicate two structures at this location, but no road is shown leading to the area, possibly suggesting that access was via Big Creek. The structures are not shown on the 1971 Millington 7.5-min. quad. Given the archival data, the pair of structures was constructed sometime during the period ca. 1943-1959 and was razed ca. 1961-1970, thus the occupation was relatively short term. Locus 3 most likely represents a sportsman's camp.

Recommendation

Locus 3 is recommended ineligible for the NRHP. The TDOA was consulted and did not assign FS-3 a trinomial. Similar to Locus 2, this probable sportsman's camp in he Big Creek bottoms dating to mid twentieth century offers little future research potential. The recommend management action is no further work.

NEGATIVE FINDINGS

PRIMARY AREA 1

Of the three tracts that make up the primary project area, Area 1 was the most intensely investigated (see Table 5-01). The section along US 51 consisted of agricultural fields and these were visually inspected (Figure 5-53). Site 40SY514 was relocated in these fields. Closer to Raleigh-Millington Road the quad map showed an area of higher ground, but upon inspection of the area it was found to be lower than the surrounding terrain and in standing water (Figure 5-54).

PRIMARY AREA 2

Area 2 is almost entirely made up of borrow pits, presumably relating to the construction SR-385 (see Figure 5-01). There was an area of cultivated field near the middle of the tract (Figure 5-55), and this field was visually inspected. A structure is shown on the 1960 Millington 15-min quad just west of what will be Singleton Parkway, but this structure was razed and a wastewater plant lagoon was built and is depicted on the 1971 Millington 7.5-min. quad. This lagoon is now overgrown, although it does still contain some water (Figure 5-56).

PRIMARY AREA 3

The large Area 3 is principally wetlands on all the maps, but some structures are shown along the eastern along Sledge Road. This area was not considered part of the APE, but no improvements are slated there. The only agricultural field that was available for surface inspection was along Sledge Road, and this area was visually inspected.

The 1942 Millington 15-min. quad shows an improved road running through the southeastern part of the tract. The portion of the road crossing what is now SR 385 was observed and walked for a short distance, but it ended in an area of standing water. A powerline corridor runs through the eastern third of the tract, but this area was very wet (Figure 5-57). There was what appears to be some sort of construction debris dump just off SR 385 and north of it is a large area of water (Figure 5-58). From Singleton Parkway there is a narrow track that leads into the tract winding its way through the area. In many areas the water was all around the tract (Figure 5-59).

EAST MITIGATION TRACT

This tract was almost entirely wooded (Figure 5-60), with only a small section in the northwest being clear. This area has several piles of dirt and asphalt, the latter of which may be from roads torn up in the area or, possibly, from construction of the stadium complex. The entire tract was shovel tested (see Table 5-01), and Site 40SY842 was recorded in this area.

WEST MITIGATION TRACT

There is a large borrow pit pond covering the western portion of the Western Mitigaiton tract, along Shake Rag Road (Figure 5-61). With the exception of this pond, the entire tract was shovel tested. The entire tract was shovel tested (see Table 5-01), and Sites 40SY648 and 40SY664 were relocated.

BORROW PIT TRACT

This area was roughly half woods, and half a cleared plot that is being developed for a potter's field cemetery (Figure 5-62). The cleared tract was transected, but shovel tests were not dug due to the ground disturbances. The surrounding woods were generally of low elevation with some standing water. The entire tract was shovel tested (see Table 5-01), and Site 40SY841 was recorded in this tract.

Figure 5-53. Agricultural field within Primary Area 1, view east from US 51 (DSCN1470).

Figure 5-54. Area of standing water in Primary Area 1, view north (DSCN1479). The levee along the south bank of Big Creek is just visible in the distance.

Figure 5-55. Agricultural field within Primary Area 2, view northeast (DSCN1474).

Figure 5-56. Former wastewater lagoon west of Singleton Parkway, view north (DSCN1484).

Figure 5-57. Powerline corridor in Primary Area 3, view north (DSCN1522).

Figure 5-58. Standing water in Primary Area 3 north of a construction debris dump, view north (DSCN1488).

Figure 5-59. Standing water in Primary Area 3 near the middle of the tract, view east (DSCN1490).

Figure 5-60. Typical woods in the East Mitigation tract, view south from Quito Road (DSCN1415).

Figure 5-61. Dirt piles in the northwest corner of the East Mitigation tract, view southwest (DSCN1419).

Figure 5-62. Borrow pit pond in the southwest corner of the West Mitigation Tract, view northeast (DSCN1436).

Figure 5-63. The potter's field cemetery within the Borrow tract, view northeast from Raleigh-Millington Road (DSCN1404).

VI. ARTIFACT ANALYSIS

All artifacts recovered during the survey were transported to Panamerican's laboratory in Memphis for processing and analysis under the supervision of Laboratory Directors, Karla Oesch and Arabela Baer. Analysis proceeded by provenience (unit, level, feature, etc.). Standardized analysis forms and artifact categories were used and the data were keyed into a spreadsheet-type artifact inventory using Excel. All of the artifacts have been cataloged using a system compatible with the requirements of 36 CFR 79.

The recovered assemblage consists of 189 counted artifacts from three sites with trinomials and two loci not assigned trinomials (Table 6-01). The vast majority of the recovery is Historic and associated with mid-nineteenth to mid-twentieth century domestic occupations. However, five artifacts are industrial and associated with the WW II era Chickasaw Ordnance Works. The small Prehistoric assemblage from 40SY514 contains one diagnostic projectile. The artifact categories are discussed further below.

Table 6-01. Artifact recovery by site and group.

Group	40SY514	40SY664	40SY841	Locus 2	Locus 3	Totals
Architecture Group	0	0	58	0	10	68
Activity Group	0	0	4	45	0	49
Kitchen Group	0	0	27	0	13	40
Clothing Group	0	0	1	0	0	1
Industrial Group	0	5	0	0	0	5
Miscellaneous	0	0	20	1	1	22
Historic Subtotal:	*0*	*5*	*110*	*46*	*24*	*185*
Prehistoric Lithics	4	0	0	0	0	4
Totals:	***4***	***5***	***110***	***46***	***24***	***189***

HISTORIC ANALYSIS

The 185 historic artifacts were recovered from two sites with trinomials and two loci that were not assigned a trinomial. Historic artifact groups were formulated and presented following the functional group classification system originally developed by Stanley South (1977). Artifacts were analyzed within a general type-ware-materials-class-group system, with the most detailed analysis performed at the type level and the most generalized analysis at the group level. Each artifact was analyzed largely upon the differences in formal characteristics based on South's system. Five functional groups are recognized in the recovered assemblage: Architecture, Activity, Kitchen, Clothing and Industrial. Artifacts that could not be placed into a functional group are considered miscellaneous items.

ARCHITECTURE GROUP

Architecture Group artifacts form 36.8 percent of the Historic recovery (n=68). Artifacts in this group include nails (n=36), brick halves or fragments (n=19), and flat glass (n=13).

Nails

Nails were sorted into two types based on morphology: wire (n=28) and square or cut (n=8). Machine cut or square nails are cut from flat sheets of metal and feature two tapering edges and two parallel edges. Wire nails are round and are processed from metal cylinders.

During the early 1800s, when the Euro-American settlement of west Tennessee was in its infancy, machine cut nails became available in the Lower Mississippi Valley. Based on research at Millwood Plantation in South Carolina, Orser et al. (1987:549-558) suggest that the relative proportion of cut nails to wire nails can serve as an index to the age of a structure or a site. They propose that sites containing almost entirely cut nails will predate 1855. Sites featuring more cut nails than wire nails should date to the period from ca. 1855–1880. Sites featuring a relatively even mixture of wire and cut nails should date to the period from 1880–1890, and sites featuring more wire nails than cut nails postdate 1890.

40SY841 nail recovery includes wire nails and fragments (n=18), as well as eight cut nails and fragments. Following Orser et al. (1987) this site post dates 1890. In contrast, the recovery at Locus 3 consists entirely of wire nails and fragments (n=10), thus this site postdates 1890.

Brick

Brick recovery was moderate and all 19 pieces were from 40SY841. Within this category there are two classifications: fragments (n=17) and halves (n=2). The two brick halves are large enough to be classified as a common brick following Gurcke (1987). The brick haves exhibit a smoothed symmetrical exterior indicative of a machine made brick. In addition, exterior markings on the brick indicate stiff mud manufacture (Gurcke 1987:108-110).

Flat Glass

Architectural or window glass consists of thin, flat fragments (shards) of glass (n=23). No whole panes were recovered. The window glass fragments were sub-sorted by color/tint, and all those recovered were classified as aqua or clear.

Activity Group

The Activity Group artifacts are considered to be anything associated with human activities. This group is a leading minority group, making up 26.5 percent of the Historic recovery (49/185). This higher percentage is largely due to the recovery of ferrous metal at 40SY841 and Locus 2. The recovery at Locus 2 is almost entirely comprised of fragments of corrugated ferrous metal (n=45). Recovery from 40SY841 includes ferrous metal wire (n=2), ferrous metal strap (n=1), and a carbon battery core.

Kitchen Group

Kitchen Group artifacts represent only 21.6 percent of the Historic recovery (40/185). Kitchen Group items are those associated with food preparation and consumption, and are typically suggestive of domestic occupations. Kitchen Group artifacts were recovered from 40SY841 and Locus 3. The classes within the Kitchen Group include: glass (n=26), ceramics (n=13), and metal can fragment.

Bottle Glass

Bottle glass was the only type of glass noted in the Kitchen Group. Bottle glass color offers some chronological data, thus all bottle glass was sorted by color. Colors recovered include: clear (n=16), amber (n=5), and green (n=1). The majority of bottle glass recovered was identified based only on color. When possible, bottle glass was further classified based on defining attributes (i.e., bottle fragments, bases, bottleneck, etc.). These attributes will be discussed below.

The bottle glass in this assemblage is nearly all machine-made, with a minor representation of mold blown glass. No free blown glass was recovered. Within historic archaeological assemblages that post-date the Civil War, bottle glass is one of the more chronologically sensitive artifact categories. The importance of bottle glass in dating Historic period assemblages cannot be overemphasized, partly because the ceramics associated with post-bellum sites exhibit such broad production ranges. As a result, analysis of bottle glass often provides a more accurate and refined view of a site's chronology than reliance on ceramics.

During the 1860s and 1870s there was an increased demand for clear glass containers that "became readily apparent by 1880" (Fike 1987:17). Consumer pressure forced the growing food-preservation industry into using clear glass containers, in order that a bottle's contents could be viewed, without distortion, at the point of purchase. Clear is by far the most frequent bottle glass color recovered (n=16). Heavy recovery of clear bottle glass is a common trait of archaeological assemblages that post-date the 1880s.

Initially, adding soda lime to the glass formula made glass clear, which was an expensive process. After 1880, manganese oxide was used to produce clear glass, which continued until World War I interrupted the supply of manganese oxide from Germany (Jones and Sullivan 1989). Manganese reacts to UV rays in sunlight (i.e., solarizes), leaving the formerly clear glass a violet or purple shade known as amethyst glass. Lack of control over the amount of manganese introduced into the glass formula occurred when machine production began; thus, the bottles produced in 1893–1917 generally tend to show a deeper color change. No amethyst glass was recovered.

Amber, or brown, glass ranks second in the assemblage (n=4). This color is produced by adding carbon and/or nickel, and/or iron to molten glass (Fike 1987:17). Amber glass was used widely after 1860 and had a general application, including use for alcoholic beverages such as beer and whiskey, as well as for mineral water bottles and various other household compounds.

Green bottle glass ranks last in the assemblage (n=1). Green glass encompasses a wide variety of name and shade variations (Lindsey 2017). The colors noted here most closely resemble bright green known as 7-UP green.

Table Glass

The table glass genre includes both utilitarian and decorative household glass, such as drinking vessels, bowls, stemware, vases, pitchers, candy dishes, and plates. Table glass was a minority type in the glass assemblage (n=4). Colors recovered included clear (n=2) and milk (n=2).

Ceramics

The ceramics were sorted by ware group and surface treatment. A total of 13 sherds were sorted into three identifiable ware groups: whiteware (n=12) and stoneware (n=1).

Classification of eighteenth- and nineteenth-century refined ceramics into specific types has been problematic for historic archaeologists (Majewski and O'Brien 1987; Miller 1991; Noël Hume 1970; South 1977). Paste composition can be used a general chronological indicator because creamware was an eighteenth-century product from which pearlware evolved in the 1780s, followed by whiteware and ironstone. This evolution in wares resulted in a paste gradient that becomes evident as a problem in the reliable sorting of refined earthenwares into the common typological categories. Miller (1980:2) has remarked that differences between the types often "hinge on personal opinion." The gradient from whiteware to ironstone probably presents the most significant problem in identification.

Whiteware

Whiteware has a buff-colored or whitish paste and a clear or colorless lead glaze and lacks the bluish tint of pearlware. Whiteware began replacing pearlware ca. 1820 and continued production throughout the century (Noël Hume 1982:130-131).

Undecorated whiteware is relatively common on sites in west Tennessee. It is difficult to precisely date plain whiteware due to its long production span; thus the most chronologically sensitive attribute of plain whiteware is the back mark. Two back marks were noted; one is too small to accurately identify and the other will be discussed below. The majority of the whiteware recovery (11/12) is plain. Price (1979) suggests plain whiteware is most common after the Civil War. The plain whiteware in this assemblage is considered to date 1830-1950, and thus has a mean date of 1890.

One hand painted whiteware bowl section was recovered from Locus 3. The bowl consists of three pieces that refit, and has a polychrome hand painted floral design (Figure 6-01). The suggested date range for ceramics with hand painted decorations can date as early as ca. 1780 to 1870, depending on the particular ware group. However the Locus 3 bowl exhibits a back mark that was identified as one used by Southern Potteries, Inc., a company that operated from 1917 to 1957 (Lehner 1988:433-434).

Stoneware

One stoneware sherd was recovered. Stoneware was generally made for utilitarian purposes and was manufactured locally throughout the U.S. The specimens in this assemblage appear to be domestic. Per Greer (1981) it exhibits a Bristol glazed exterior and interior. Bristol glaze was the last type of glaze to become popular in the U.S. It is prepared from chemical compounds purchased from a supply company and was designed to result in a smooth, white stoneware glaze (Greer 1981:210). The increasing popularity of the Bristol glaze was tied to an increasing social focus on cleanliness during the Victorian era. This glaze was favored by almost all industrialized potteries in the U.S. after 1884. During ca. 1880–1920, Bristol glaze was often used in combination with Albany slip.

CLOTHING GROUP

The single Clothing Group artifact is a brass U.S. Army Cavalry button recovered from 40SY841. It measures 0.9 in. in diameter and features a C within a shield placed over an eagle (Figure 6-02). Tice (1997:133) suggests U.S. Cavalry officers wore buttons of this type from ca. 1855 to 1902.

INDUSTRIAL GROUP

At 40SY664 Loci A and J numerous examples of corrugated ceramic rollers were observed on the surface. These are distinctive artifacts that we have not encountered before, and appear to be unique items associated with WW II ordnance production. A sample of five of these objects, which are essentially identical, mass-produced items was recovered from Locus A. Their diameters are 3.25 in. on the exterior and 3.00 in. on the interior, and their lengths are 3.0625 in. Masses are typically about 493 g. The corrugated, cog-like grooves on the exterior are abraded. The interiors exhibit a corkscrew-like ceramic flange that makes one revolution. The raw material is coarse vitrified clay.

The items are interpreted as rollers that were associated with pressing the nitrocellulose, or guncotton, “cakes” and then forcing it through dies (variably sized as desired) to produce rifle power or cannon powder (Gotten 2005:11-12). The use of adjustable rollers to granulate propellant dates back to ca. 1780 in black powder manufacturing (Howard 1975:19).

MISCELLANEOUS ITEMS

The remaining artifacts were all classified as Miscellaneous Items and included burned wood, coal, melted glass, shell, slag and unidentified ferrous objects.

Figure 6-01. A ca. 1917 to 1957 hand painted whiteware bowl fragment from Locus 3.

Figure 6-02. A ca. 1855-1902 U.S. Army Cavalry Button from 40SY841.

Figure 6-03. Top and side views of a corrugated ceramic roller from 40SY664 Locus A.

LITHIC SORTING METHODS

The chipped-stone analysis is based on the sorting scheme of Sullivan and Rozen (1985; Rozen and Sullivan 1989a, 1989b; Figure 6-04). The proposed Sullivan and Rozen (1985) sorting method offers greater replicability over traditional stage typologies and was formulated specifically for the constraints (time and money) of contract archaeology. Additional commentary regarding the value of interpretative results derived from this scheme has been presented (Amick and Mauldin 1989; Ensor and Roemer 1989; Rozen and Sullivan 1989a, 1989b). While originally based on Arizona CRM samples, the descriptive merits of the system have proven to have general utility for characterizing and comparing lithic site assemblages in the Midsouth.

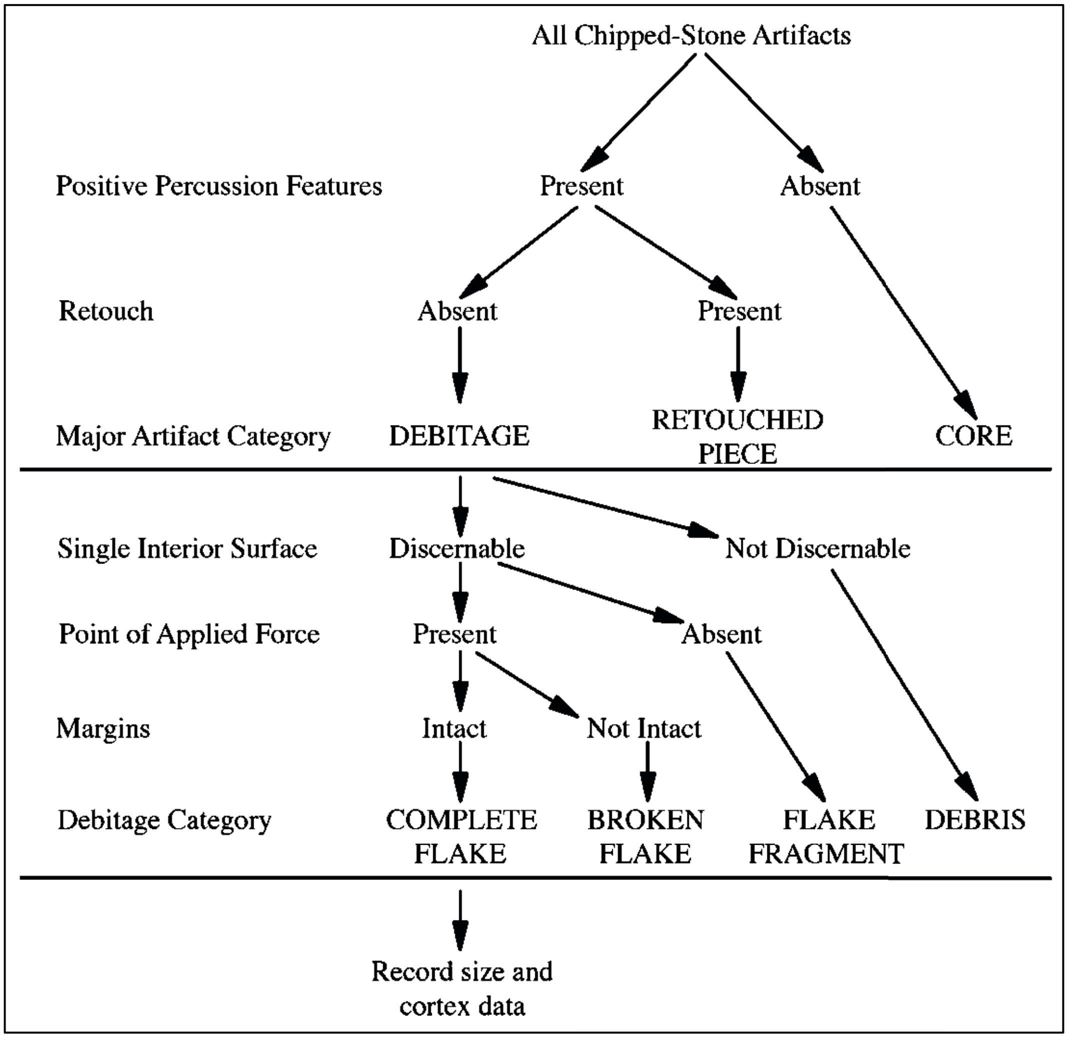

Figure 6-04. Technological attribute key used to identify major chipped-stone and debitage categories (after Sullivan and Rozen 1985).

All lithic items were organized into two initial sorting categories according to the presence or absence of positive percussion features. Chipped-stone artifacts without positive percussion features were considered under the broad term "cores," while chipped-stone artifacts with positive percussion features were considered debitage. All cores, or items that exhibited flake scars, were then subdivided into more traditional subcategories: PP/Ks; bifaces; and other (traditional) cores. The presence or absence of retouch initially subdivided the remaining debitage. Like cores, retouched debitage may be further subdivided into more traditionally assumed functional or morphological categories. The identification and classification of retouched pieces can be problematic, given the gradation from formal to expedient "use wear" type retouch. In general, the Sullivan and Rozen (1985) typology initially defines three chipped-stone tool categories: cores; retouched pieces; and debitage.

The classification of debitage is where the scheme varies the most from traditional approaches. Pieces without observable interior faces were considered "debris," which is similar to "chipping shatter" of traditional approaches. Pieces of debitage with observable interior faces but lacking bulbs of percussion were considered "flake fragments." Fragments with both observable interior faces and bulbs of percussion were considered either "complete flakes," if the margins were intact, or "broken flakes," if the lateral margins were not intact. Complete flakes are typically subjected to further analysis, but no complete flakes were noted from any of the loci.

LITHIC ANALYSIS RESULTS

Prehistoric lithic artifacts represent a minority (2.1 percent) of the overall Big Creek Resilience project recovery, and all such material was from 40SY514. Recovery includes two flake fragments, one complete flake, and one complete projectile point (PP/K) (Figure 6-05). The PP/K is a medium sized (40-x-20 mm) dart, with a straight to slightly contracted stem, weakly barbed shoulders, incurvate and excurvate blades and an apiculate distal. The knapping is moderately crude. The raw material appears to be thermally altered cherty gravel that is locally available (Citronelle).

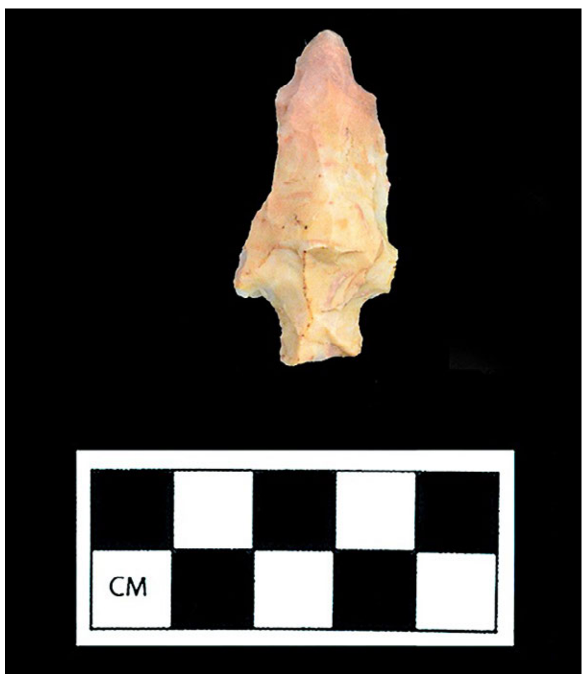

Figure 6-05. Arlington point from Site 40SY514.

Smith (1979:98) classifies similar specimens as Arlington points (or Provisional Form 64), and considers them a "marker type for the late Poverty Point in western Tennessee." Smith (1979) reports Form 64 PP/Ks from at least three multicomponent sites in the South Fork Forked Deer River basin (40HD20, 40HD24 and 40MD34).

CURATION

The artifact assemblage is the property of Shelby County, and is temporarily stored at Panamerican's lab in Memphis.

VI. SUMMARY AND RECOMMENDATIONS

SUMMARY

Under contract with Shelby County Government, Panamerican Consultants, Inc. (Panamerican) conducted a Phase I cultural resources survey for the Big Creek National Disaster Resilience Improvements Project in Shelby County, Tennessee. The survey was designed to create an inventory of cultural resources within the area of potential effect (APE), and to make appropriate management recommendations for their treatment. The funding for the Big Creek National Disaster Resilience Improvements Project is from the U.S. Department of Housing and Urban Development.

The Big Creek National Disaster Resilience Improvements Project involves grading, filling, and earth moving to lower land elevations and to provide additional floodwater conveyance and storage, as well as the construction of recreational facilities (see "Purpose and Need" section in Chapter I). The primary project location is in Millington along Big Creek to the north of Paul Barrett Parkway (SR-385) (see Figure 1-01 and Table 1-01). Additionally two mitigation sites are located west of US 51 (see Figure 1-02), and a possible borrow site is located on Raleigh Millington Road (see Figure 1-03). The primary project area covers 1,478 ac., but only an approximately 225 ac. portion will be disturbed by the construction. The exact location of the construction areas are still being developed, but have been narrowed down to three locations and levee improvements (Figures 1-04, 1-05, 1-06 and 1-07). The archaeological APE is considered the 225 ac. within the primary project area that will be disturbed by the construction, and the 230.7 ac. associated with the off site areas. In total, the APE is 455.7 ac. (0.7120 mi.^{2}).

The setting is low-lying floodplains along the Big Creek Drainage Canal, with the exception of the possible Borrow Area; it is on the floodplain of the Loosahatchie River (of which Big Creek is a tributary). The current land use is variable, but much of the area is a wetland forest, indeed 683 ac., or 46 percent, of the primary project area consists of wetlands. Other significant land uses include agricultural fields and borrow pit ponds.

A standard cultural resources literature and records check was conducted using TDOA, THC and NRHP databases as primary sources. Importantly, this research revealed that there are three previously recorded archaeological sites within the proposed Big Creek project APE: 40SY514 in the Primary Project Area 1 and 40SY648 and 40SY664 in the Western Mitigation tract. Because one of the previously recorded sites (40SY664) within the APE is associated with the Tennessee Powder Company (1940-1942) and subsequent Chickasaw Ordnance Works (1942-1946), a detailed review of the history of this extensive facility is provided in Chapter IV. There are no previously recorded THC above ground cultural resources or NRHP listed historic properties within the Big Creek Resilience project area.

Based on Peterson's (1979a) sample survey of the Loosahatchie River Watershed the Big Creek APE was expected to exhibit low site density, and the number of expected sites was 8.3 (1.84 km^2/0.22 sites per km^2). Expected site types included Prehistoric open habitations, Historic domestic sites, and ruins associated with the Chickasaw Ordnance Works. Standing structures were not expected within the low-lying, floodplain setting.

Prior to conducting the fieldwork a TDOA permit was obtained, because a portion of Area 3 contains a 409 ac. TDOT wetland mitigation tract.

The majority of the cultural resources fieldwork was conducted from 10 January 2019 to 5 February 2019 by a crew ranging from two to four. Some follow up work was conducted at 40SY664 on 28 February 2019. The basic site detection method included shovel testing at 30-m intervals in areas with restricted surface visibility (< 50 percent) and surface inspection at 15 m intervals in areas with good surface visibility (>50 percent). Additionally all sites, both newly recorded and previously recorded, were shovel tested at 10 m or 15 m intervals.

During the course of the field work, 1,129 shovel test locations were documented across the six discrete tracts, including 16 that were positive for cultural material, 702 that were negative for cultural material, and 401 planned tests that were not dug, mainly due to standing water (see Table 5-01). Four areas are considered completed surveyed: Area 1, the East Mitigation tract, the West Mitigation tract, and the Borrow area. The survey within Area 2 and 3 was limited to the APE, and was constrained by the extent of wetlands and borrow pit ponds within these tracts.

The survey resulted in revisits to three previously recorded sites (40SY514, 40SY648 and 40SY664), and the documentation of two newly recorded Historic sites (40SY841 and 40SY842) and two newly recorded Historic domestic loci not assigned trinomials by the TDOA (Locus 2 and Locus 3) (Table 7-01). The observed overall resource density conformed fairly closely to the expected (7 versus 8.3).

Table 7-01. Recorded resources summary.

Site	Area	Description	Positive Shovel Tests	Artifact Recovery	NRHP Rec.	Management Action
40SY514	1	Low-density Dalton and late Poverty Point lithic scatter	1	4	I	No further work
40SY648	West Mit.	Weak Late Archaic and strong Woodland/Mississippian camp	0	0	I	No further work
40SY664	West Mit.	Scattered sets of ruins (i.e., concrete features) associated with the Chickasaw Ordnance Works	0	5	PE	Avoid; or Phase II
40SY841	Borrow	Late 19th to mid 20th Century domestic	13	110	I	No further work
40SY842	East Mit.	Relic early 20th road segment	0	0	I	No further work
Locus 2	3	Mid 20th Century domestic; possible sportsman camp	1	46	I	No further work
Locus 3	3	Mid 20th Century domestic; possible sportsman camp	1	24	I	No further work

Key: Mit. = Mitigation; Rec.=Recommendation; I-Ineligible; PE=Potentially Eligible.

Both of the identified Prehistoric components were previously recorded. At 40SY514, it was discovered that the northern portion of the site has been destroyed by the excavation of a borrow pit since being recorded in 1990. Shoveling testing of the remaining portion of the site produced only four artifacts. Site 40SY648 was previously subjected to an extensive Phase II investigation as a part of the TDOT I-69 studies, and importantly was determined not eligible (Cochrane et al. 2006). Panamerican shovel tested the site, but failed to recovery any additional artifacts, although one piece of debitage was observed on the surface.

Three types of Historic Euro-American sites were identified. Late Historic domestic is the most common Historic site type, but only one of the three sites of this type that were identified was assigned a official trinomial by the TDOA (40SY841). The two that were not assigned trinomials (Loci 2 and 3) date to the mid twentieth century, and were predicted based on a review of archival maps. A 650 m long segment of an early twentieth road represents the second Historic site type (40SY842).

The most interesting site identified was 40SY664 in the Western Mitigation tract, which represents dis-contiguous sets surface features, essentially various types of concrete ruins, which are associated with the 1940-1942 Tennessee Powder Company and the 1942-1946 Chickasaw Ordnance Works. Different portions of 40SY664 were identified during three Phase I surveys associated with TDOT's proposed I-69 alignments (McCorkle et al. 2005; Oster et al. 2009; Sherman et al. 2002). Panamerican identified 15 ruins designated Loci A-O within the wooded portions of the APE in the Western Mitigation tract. Outside of the APE there are abundant additional ruins associated with the plant, including Loci X1 and X2 (see Figure 5-13), as well multiple concrete structures along Shake Rag Road, most impressively the 250 ft. tall twin smokestacks for the facility's power plant. Another result of this investigation of 40SY664 was that a previously unrecognized artifact type in the Memphis area was identified: corrugated ceramic rollers that were used press the nitrocellulose, or guncotton, "cakes" into rifle power or cannon powder (see Figure 6-03).

RECOMMENDATIONS

Panamerican recommends that 40SY664 be considered potentially eligible for the NRHP under Criterion D (Information Potential), which is the criterion commonly used to nominate archaeological sites to the NRHP. The site is extremely large, and the Big Creek Resilience APE covers only a fraction of the site. The discovery of the ceramic rollers during associated with the production process is considered significant archaeological find, and this find suggests that site could yield more data in future. Future investigations, if any, should focus on obtaining a facility plan, and determining the functions of the various structures that one stood at the loci (ruins).

Avoidance is the recommended management treatment plan for the 40SY664 loci within the Big Creek APE, and if is avoidance is not possible then Phase II testing to make a formal determination of the each locus's NRHP status should be conducted. Note that since all the features (Loci A-O) associated with 40SY664 are located within wooded sections of the Western Mitigation tract, planned mitigation activities within the agricultural fields would not constitute an impact to the site.

The other six resources identified with the Big Creek National Disaster Resilience Improvements Project APE are recommended ineligible for the NRHP (see Table 7-01). Note that Site 40SY648 was previously Phase II tested and determined ineligible (Cochrane et al. 2006).

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APPENDIX A: TENNESSEE DIVISION OF ARCHAEOLOGY PERMIT

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STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF ARCHAEOLOGY
Cole Building #3, 1216 Foster Avenue
NASHVILLE, TN 37243
(615) 741-1588 FAX (615) 741-7329

ARCHAEOLOGICAL PERMIT

NO. 001060

IN ACCORDANCE WITH THE PROVISIONS OF TENNESSEE CODE ANNOTATED SECTION 11-6-101 ET SEQ. PERMISSION IS HEREBY GRANTED TO:

C. ANDREW BUCHNER

REPRESENTING:

PANAMERICAN CONSULTANTS, INC.

FOR ARCHAEOLOGICAL INVESTIGATION ON THE FOLLOWING DESIGNATED STATE-OWNED OR CONTROLLED LANDS

PHASE I ARCHAEOLOGICAL SURVEY OF A PORTION OF BIG CREEK NATIONAL DISASTER RESILIENCE IMPROVEMENTS PROJECT, SHELBY COUNTY

IN ACCORDANCE WITH THE APPLICATION FILED JANUARY 17, 2019 IN THE OFFICE OF THE DIVISION OF ARCHAEOLOGY AND IN CONFORMITY WITH THE DATA SUBMITTED THEREIN WHICH IS CONSIDERED AS A PART OF THIS PERMIT.

ISSUED THIS 22ND DAY OF JANUARY 2019

TO EXPIRE THE 30TH DAY OF JUNE 2019

ADDITIONAL TERMS TO PERMIT APPLICATION: ARTIFACTUAL REMAINS AND THE ORIGINAL PROJECT RECORDS WILL BE CURATED WITH THE TENNESSEE DIVISION OF ARCHAEOLOGY. THIS PERMIT IS SUBJECT TO PERIODIC REVIEW AND/OR CANCELLATION BY THE DIVISION OF ARCHAEOLOGY SHOULD CONDITIONS WARRANT SAME.

Michael C Moore
DIRECTOR/STATE ARCHAEOLOGIST

C Andrew Buchner
APPLICANT

CN-0939

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APPENDIX B: SHOVEL TESTS DATA

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Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	1	1	❑	33	0-10 cmbs, 10YR 4/3 silty loam; 10-33 cmbs, mottled 10YR 6/2 and 10YR 4/6 silty clay	
1	1	2	Ø			slope
1	1	3	Ø			wetland; inundated soils; standing water
1	1	4	Ø			wetland; standing water
1	1	5	❑	33	0-14 cmbs, 10YR 5/2 silty clay loam; 14-33 cmbs, 10YR 7/2 silty clay	
1	1	6	❑	36	0-15 cmbs, 10YR 5/2 silty clay loam; 15-36 cmbs, 7.5YR 5/3 silty clay	
1	1	7	❑	35	0-17 cmbs, 10YR 5/2 silty clay loam; 17-35 cmbs, 7.5YR 5/3 silty clay	
1	1	8	Ø			slope
1	1	9	❑	33	0-10 cmbs, 10YR 5/2 silty clay loam; 10-33 cmbs, mottled 10YR 7/1 and 10YR 4/6 silty clay	
1	2	1	❑	31	0-19 cmbs, 10YR 5/3 silty clay loam; 19-31 cmbs, mottled 10YR 7/2 and 10YR 6/6 compact silty clay	
1	2	2	❑	34	0-16 cmbs, 10YR 4/3 silty loam; 16-34 cmbs, 10YR 5/6 silty clay	
1	2	3	❑	32	0-13 cmbs, 10YR 4/3 silty loam; 13-32 cmbs, 10YR 5/6 silty clay	
1	2	4	❑	34	0-15 cmbs, 10YR 4/3 silty loam; 15-34 cmbs, 10YR 5/6 silty clay	
1	2	5	❑	33	0-16 cmbs, 10YR 4/3 silty loam; 16-33 cmbs, 10YR 5/6 silty clay	
1	2	6	Ø			wetland; standing water
1	2	7	Ø			wetland; standing water
1	2	8	Ø			drainage
1	2	9	❑	31	0-12 cmbs, 10YR 5/2 silty clay loam; 12-31 cmbs, 10YR 5/8 clay	
1	3	1	❑	30	0-9 cmbs, 10YR 3/4 silty clay loam; 9-30 cmbs, 10YR 5/6 silty clay	
1	3	2	Ø			slope; drainage
1	3	3	❑	27	0-9 cmbs, 10YR 3/4 silty clay loam; 9-27 cmbs, mottled 10YR 5/6 and 10YR 7/1 silty clay to clay	ground water at 27 cmbs
1	3	4	Ø			saturated ground; standing water
1	3	5	Ø			saturated ground; standing water

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	3	6	❑	30	0-7 cmbs, 10YR 3/4 silty clay loam; 7-20 cmbs, 10YR 4/4 silty clay; 20-30 cmbs, mottled 10YR 5/6 and 10YR 7/1 silty clay to clay	
1	3	7	❑	30	0-5 cmbs, 10YR 3/4 silty clay loam; 5-30 cmbs, mottled 10YR 5/6 and 10YR 7/1 clay	
1	3	8	❑	29	0-3 cmbs, 10YR 3/4 silty clay loam; 3-15 cmbs, 10YR 4/4 silty clay; 15-29 cmbs, mottled 10YR 5/6 and 10YR 7/1 silty clay to clay	ground water at 29 cmbs
1	3	9	❑	30	0-4 cmbs, 10YR 3/4 silty clay loam; 4-16 cmbs, 10YR 4/4 silty clay; 16-30 cmbs, mottled 10YR 5/6 and 10YR 7/1 silty clay to clay	
1	3	10	❑	30	0-8 cmbs, 10YR 3/4 silty clay loam; 8-18 cmbs, 10YR 5/4 silty clay; 18-30 cmbs, 10YR 7/1 clay	
1	4	1	❑	30	0-8 cmbs, 10YR 3/4 silty clay loam; 8-30 cmbs, 10YR 5/6 silty clay	
1	4	2	Ø			standing water; saturated
1	4	3	Ø			standing water; saturated
1	4	4	Ø			standing water; saturated
1	4	5	❑	30	0-4 cmbs, 10YR 3/4 silty clay loam; 4-30 cmbs, 10YR 5/6 silty clay	
1	4	6	❑	30	0-4 cmbs, 10YR 3/4 silty clay loam; 4-30 cmbs, 10YR 5/6 silty clay	ground water at 30 cmbs
1	4	7	❑	30	0-7 cmbs, 10YR 3/4 silty clay loam; 7-20 cmbs, 10YR 4/4 silty clay; 20-30 cmbs, mottled 10YR 5/6 and 10YR 7/1 silty clay to clay	
1	4	8	Ø			slope; drainage
1	4	9	❑	30	0-7 cmbs, 10YR 3/4 silty clay loam; 7-30 cmbs, 10YR 5/6 silty clay	
1	5	1	❑	40	0-5 cmbs, 10YR 3/2 silty loam; 5-25 cmbs, 10YR 5/4 silty clay; 25-40 cmbs, mottled 10YR 5/4 and 10YR 5/8 clay	saturated
1	5	2	Ø			sloped drainage
1	5	3	❑	40	0-30 cmbs, 10YR 5/4 silty clay; 30-40 cmbs, mottled 10YR 5/4 and 10YR 5/8 clay	saturated
1	5	4	❑	45	0-35 cmbs, 10YR 6/6 silty clay; 35-45 cmbs, 10YR 5/8 clay	saturated
1	5	5	❑	40	0-10 cmbs, 10YR 4/4 silty clay; 10-30 cmbs, mottled 10YR 5/4 and 10YR 6/6 clay; 30-40 cmbs, 10YR 5/8 clay	saturated
1	5	6	❑	35	0-25 cmbs, 10YR 7/6 silty clay; 25-35 cmbs, mottled 10YR 5/4 and 10YR 5/8 clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	5	7	❑	35	0-20 cmbs, 10YR 4/3 silty clay; 20-35 cmbs, mottled 10YR 5/8 and 10YR 6/6 clay	saturated
1	5	8	Ø			frozen standing water; wetland
1	5	9	Ø			frozen standing water; wetland
1	6	1	Ø			frozen standing water; wetland
1	6	2	Ø			frozen standing water; wetland
1	6	3	❑	40	0-5 cmbs, 10YR 4/2 silty clay loam; 5-30 cmbs, 10YR 5/2 silty clay; 30-40 cmbs, mottled 10YR 5/2 and 10YR 5/8 clay	saturated
1	6	4	Ø			disturbed drainage
1	6	5	❑	40	0-30 cmbs, 10YR 5/3 silty clay; 30-40 cmbs, mottled 10YR 5/2 and 10YR 5/8 clay	saturated
1	6	6	❑	30	0-15 cmbs, 10YR 4/3 silty clay; 15-30 cmbs, mottled 10YR 5/2 and 10YR 6/6 clay	saturated
1	6	7	❑	40	0-20 cmbs, 10YR 4/4 silty clay; 20-24 cmbs, 10YR 5/8 silty clay; 24-40 cmbs, mottled 10YR 5/2 and 10YR 5/8 clay	saturated
1	6	8	❑	45	0-35 cmbs, 10YR 5/4 silty loam; 35-45 cmbs, mottled 10YR 5/2 and 10YR 6/6 clay	saturated
1	6	9	Ø			disturbed drainage
1	7	1	❑	30	0-30 cmbs, mottled 10YR 7/4 and 10YR 6/6 clay	wet
1	7	2	❑	28	0-28 cmbs, 10YR 6/4 clay	
1	7	3	❑	34	0-34 cmbs, 10YR 4/6 clay	
1	7	4	❑	40	0-40 cmbs, 10YR 4/6 clay	
1	7	5	Ø			standing water
1	7	6	❑	34	0-6 cmbs, 10YR 3/3 clay loam; 6-34 cmbs, 10YR 6/4 clay	
1	7	7	❑	40	0-8 cmbs, 10YR 4/3 clay loam; 8-40 cmbs, 10YR 6/4 clay	
1	7	8	Ø			standing water
1	7	9	Ø			standing water
1	8	1	Ø			standing water
1	8	2	Ø			standing water
1	8	3	Ø			standing water
1	8	4	❑	26	0-26 cmbs, 10YR 6/4 clay	very wet
1	8	5	❑	24	0-24 cmbs, 10YR 6/4 clay	
1	8	6	❑	31	0-31 cmbs, 10YR 6/4 clay	
1	8	7	❑	34	0-34 cmbs, 10YR 6/4 clay	
1	8	8	❑	30	0-30 cmbs, 10YR 6/4 clay	
1	8	9	❑	28	0-28 cmbs, 10YR 6/4 clay	wet

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	9	1	❑	35	0-5 cmbs, 10YR 4/2 silty clay loam; 5-20 cmbs, 10YR 5/4 silty clay; 20-35 cmbs, mottled 10YR 5/2 and 10YR 5/8 clay	
1	9	2	Ø			slope
1	9	3	❑	30	0-24 cmbs, 10YR 5/4 silty clay; 24-30 cmbs, mottled 10YR 5/2 and 10YR 6/6 silty clay to clay	saturated
1	9	4	❑	45	0-30 cmbs, 10YR 5/4 silty clay; 30-45 cmbs, mottled 10YR 5/4 and 10YR 5/8 clay	saturated
1	9	5	❑	45	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 5/4 silty clay; 30-45 cmbs, mottled 10YR 5/4 and 10YR 6/6 clay	saturated
1	9	6	❑	35	0-15 cmbs, 10YR 5/3 silty clay; 15-35 cmbs, mottled 10YR 5/2 and 10YR 5/8 clay	
1	9	7	❑	20	0-20 cmbs, 10YR 5/3 silty clay	test filled with water at 20 cmbs
1	9	8	Ø			frozen standing water; wetland
1	9	9	Ø			frozen standing water; wetland
1	10	1	Ø			frozen standing water; wetland
1	10	2	Ø			frozen standing water; wetland
1	10	3	❑	15	0-15 cmbs, 10YR 5/3 silty clay	test filled with water at 15 cmbs
1	10	4	❑	30	0-15 cmbs, 10YR 5/3 silty clay; 15-30 cmbs, mottled 10YR 5/2 and 10YR 4/6 clay	saturated
1	10	5	❑	35	0-20 cmbs, 10YR 4/4 silty clay; 20-35 cmbs, mottled 10YR 5/4 and 10YR 5/8 clay	saturated
1	10	6	❑	40	0-25 cmbs, 10YR 4/4 silty clay; 25-35 cmbs, 10YR 6/6 silty clay; 35-40 cmbs, mottled 10YR 6/6 and 10YR 5/8 clay	saturated
1	10	7	❑	30	0-15 cmbs, 10YR 4/4 silty clay; 15-30 cmbs, mottled 10YR 5/4 and 10YR 5/8 clay	saturated
1	10	8	Ø			slope
1	10	9	❑	45	0-5 cmbs, 10YR 4/2 silty clay loam; 5-35 cmbs, 10YR 5/2 silty clay; 35-45 cmbs, mottled 10YR 5/2 and 10YR 5/6 clay	
1	11	1	❑	32	0-10 cmbs, 10YR 4/3 silty loam; 10-32 cmbs, 10YR 5/6 silty clay	
1	11	2	Ø			drainage
1	11	3	❑	30	0-13 cmbs, 10YR 4/3 silty clay loam; 13-30 cmbs, mottled 10YR 5/6 and 10YR 7/1 clay	
1	11	4	❑	32	0-15 cmbs, 10YR 4/3 silty clay loam; 15-32 cmbs, 7.5YR 5/1 clay	
1	11	5	❑	30	0-11 cmbs, 10YR 4/3 silty clay loam; 11-30 cmbs, 7.5YR 5/1 clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	11	6	❑	32	0-10 cmbs, 10YR 4/3 silty clay loam; 10-32 cmbs, 10YR 5/8 silty clay	
1	11	7	Ø			wetland; standing water
1	11	8	Ø			wetland; standing water
1	11	9	Ø			wetland; standing water
1	12	1	Ø			wetland; standing water
1	12	2	Ø			wetland; standing water
1	12	3	Ø			wetland; standing water
1	12	4	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 5/8 clay	
1	12	5	❑	40	0-23 cmbs, 10YR 4/3 silty clay loam; 23-40 cmbs, 7.5YR 5/1 clay	
1	12	6	❑	30	0-20 cmbs, 10YR 4/3 silty clay loam; 20-30 cmbs, 7.5YR 5/1 clay	
1	12	7	❑	30	0-13 cmbs, 10YR 4/3 silty clay loam; 13-30 cmbs, mottled 7.5YR 5/8 and 7.5YR 5/1 clay	
1	12	8	Ø			drainage
1	12	9	❑	35	0-12 cmbs, 10YR 4/2 silty clay loam; 12-35 cmbs, 10YR 5/8 clay	
1	13	1	❑	30	0-10 cmbs, 10YR 3/4 silty clay loam; 11-30 cmbs, 10YR 5/6 silty clay	
1	13	2	Ø			slope; drainage
1	13	3	Ø			standing water; saturated
1	13	4	❑	25	0-4 cmbs, 10YR 3/4 silty clay loam; 4-25 cmbs, 10YR 5/6 silty clay	ground water at 25 cmbs
1	13	5	❑	30	0-6 cmbs, 10YR 5/8 silty clay loam; 6-30 cmbs, 10YR 5/4 silty clay	
1	13	6	❑	24	0-6 cmbs, 10YR 3/4 silty clay loam; 6-24 cmbs, 10YR 5/4 silty clay	ground water at 24 cmbs
1	13	7	Ø			saturated; surface water
1	13	8	Ø			saturated
1	13	9	❑	30	0-10 cmbs, 10YR 3/4 silty clay loam; 10-30 cmbs, 10YR 5/4 silty clay	
1	13	10	Ø			slope; drainage
1	14	1	❑	30	0-7 cmbs, 10YR 3/4 silty clay loam; 7-17 cmbs, 10YR 4/4 silty clay; 17-30 cmbs, 10YR 5/6 silty clay	
1	14	2	Ø			slope; drainage
1	14	3	❑	30	0-2 cmbs, 10YR 3/4 silty clay loam; 2-30 cmbs, 10YR 5/6 silty clay	ground water at 30 cmbs
1	14	4	Ø			saturated

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	14	5	Ø			surface water
1	14	6	Ø			surface water
1	14	7	Ø			saturated; surface water
1	14	8	Ø			saturated
1	14	9	Ø			slope; drainage
1	14	10	Ø			ravine
1	15	1	❑	24	0-24 cmbs, 10YR 6/4 clay	wet
1	15	2	Ø			slope
1	15	3	❑	30	0-30 cmbs, 10YR 6/4 clay	wet
1	15	4	❑	30	0-30 cmbs, 10YR 6/4 clay	wet
1	15	5	Ø			standing water
1	15	6	Ø			standing water
1	15	7	Ø			standing water
1	15	8	Ø			standing water
1	15	9	Ø			standing water
1	16	1	Ø			standing water
1	16	2	Ø			standing water
1	16	3	Ø			standing water
1	16	4	Ø			standing water
1	16	5	Ø			standing water
1	16	6	❑	24	0-24 cmbs, 10YR 6/4 clay	
1	16	7	❑	31	0-31 cmbs, 10YR 6/4 clay	
1	16	8	Ø			slope
1	16	9	❑	30	0-4 cmbs, 10YR 4/3 clay loam; 4-30 cmbs, 10YR 6/4 clay	
1	17	1	❑	45	0-30 cmbs, 10YR 5/4 silty clay; 30-45 cmbs, mottled 10YR 5/4 and 10YR 5/6 clay	
1	17	2	Ø			slope
1	17	3	❑	15	0-10 cmbs, 10YR 6/2 silty clay; 10-15 cmbs, 10YR 5/6 clay	test filled with water at 15 cmbs
1	17	4	Ø			frozen standing water; wetland
1	17	5	Ø			frozen standing water; wetland
1	17	6	Ø			frozen standing water; wetland
1	17	7	Ø			frozen standing water; wetland
1	17	8	Ø			frozen standing water; wetland
1	17	9	❑	35	0-15 cmbs, 10YR 5/4 silty clay; 15-35 cmbs, mottled 10YR 6/4 and 10YR 5/8 clay	saturated
1	17	10	❑	30	0-20 cmbs, 10YR 5/4 silty clay; 20-30 cmbs, mottled 10YR 5/4 and 10YR 6/6 clay	saturated
1	18	1	❑	30	0-15 cmbs, 10YR 4/4 silty clay loam; 15-20 cmbs, 10YR 6/6 clay; 20-30 cmbs, mottled 10YR 5/2 and 10YR 6/6 clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	18	2	Ø			disturbed drainage
1	18	3	Ø			disturbed drainage
1	18	4	❏	40	0-10 cmbs, 10YR 4/3 silty clay; 10-30 cmbs, mottled 10YR 5/4 and 10YR 5/2 clay; 30-40 cmbs, mottled 10YR 5/2 and 10YR 6/6 clay	
1	18	5	Ø			frozen standing water; wetland
1	18	6	❏	30	0-15 cmbs, 10YR 5/4 silty clay; 15-30 cmbs, mottled 10YR 5/6 and 10YR 6/6 silty clay	
1	18	7	❏	40	0-10 cmbs, 10YR 4/3 silty clay; 10-30 cmbs, 10YR 5/4 clay; 30-40 cmbs, mottled 10YR 5/6 and 10YR 6/6 clay	
1	18	8	Ø			disturbed drainage
1	18	9	Ø			slope
1	18	10	❏	30	0-5 cmbs, 10YR 4/3 silty clay; 5-30 cmbs, 10YR 5/6 clay	
1	19	1	❏	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 7.5YR 5/8 clay	
1	19	2	Ø			drainage
1	19	3	❏	30	0-13 cmbs, 10YR 4/3 silty clay loam; 13-30 cmbs, 10YR 5/8 clay	
1	19	4	❏	35	0-15 cmbs, 10YR 4/3 silty clay loam; 15-35 cmbs, 10YR 5/8 clay	
1	19	5	Ø			wetland; standing water
1	19	6	Ø			wetland; standing water
1	19	7	Ø			wetland; standing water
1	19	8	Ø			wetland; standing water
1	19	9	Ø			wetland; standing water
1	20	1	Ø			wetland; standing water
1	20	2	Ø			wetland; standing water
1	20	3	Ø			wetland; standing water
1	20	4	Ø			wetland; standing water
1	20	5	❏	31	0-13 cmbs, 10YR 4/3 clay loam; 13-31 cmbs, 10YR 5/8 clay	saturated
1	20	6	❏	35	0-15 cmbs, 10YR 4/2 silty clay loam; 15-35 cmbs, 10YR 5/8 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	20	7	❑	34	0-16 cmbs, 10YR 4/2 silty clay loam; 16-34 cmbs, 10YR 5/8 silty clay	
1	20	8	Ø			drainage
1	20	9	❑	31	0-10 cmbs, 10YR 4/2 silty clay loam; 10-31 cmbs, 10YR 5/8 clay	
1	40SY514	E30	❑	38	0-10 cmbs, 10YR 4/4 silty clay; 10-38 cmbs, 10YR 6/3 silty clay	
1	40SY514	S15	❑	30	0-10 cmbs, 10YR 4/4 silty clay; 10-30 cmbs, 10YR 5/6 and 8/1 silty clay	
1	40SY514	W30	❑	50	0-15 cmbs, 10YR 5/6 silty clay loam; 15-30 cmbs, 10YR 5/4 silty clay; 30-50 cmbs, 10YR 5/4 and 6/1 clay	
1	A	1	Ø			ditch by railroad grade
1	A	2	❑	26	0-2 cmbs, 10YR 4/3 silty clay loam; 2-26 cmbs, 10YR 4/6 clay	
1	A	3	❑	29	0-4 cmbs, 10YR 4/3 silty clay loam; 4-29 cmbs, 10YR 4/6 silty clay	
1	A	4	❑	31	0-8 cmbs, 10YR 4/6 clay; 8-31 cmbs, 10YR 6/4 clay	
1	A	5	❑	30	0-6 cmbs, 10YR 4/6 clay; 6-30 cmbs, 10YR 6/4 clay	
1	A	6	❑	24	0-24 cmbs, 10YR 4/6 clay	
1	A	7	Ø			frozen standing water
1	A	8	Ø			levee along Big Creek
1	B	1	❑	24	0-24 cmbs, 10YR 6/4 clay	
1	B	2	❑	30	0-30 cmbs, 10YR 4/6 clay	
1	B	3	Ø			steep slope; levee; rail siding
1	B	4	❑	26	0-4 cmbs, 10YR 4/4 clay; 4-26 cmbs, 10YR 4/6 clay	
1	B	5	Ø			debris from railroad
1	D	1	❑	50	0-3 cmbs, 10YR 4/4 silty loam; 3-35 cmbs, 10YR 5/6 silty clay; 35-50 cmbs, 10YR 5/8 ad 8/1 clay	light gravel
1	D	2	❑	50	0-2 cmbs, 10YR 4/4 silty loam; 2-40 cmbs, 10YR 5/6 silty clay; 40-50 cmbs, 10YR 5/8 ad 8/1 clay	
1	D	3	❑	45	0-30 cmbs, 10YR 5/6 silty clay; 30-45 cmbs, 10YR 5/6 and 6/3 clay	
1	D	4	❑	46	0-25 cmbs, 10YR 5/6 silty clay; 25-46 cmbs, 10YR 5/6 and 6/3 clay	
1	D	5	❑	45	0-30 cmbs, 10YR 5/6 silty loam; 30-45 cmbs, 10YR 7/6 clay	
1	D	6	❑	48	0-26 cmbs, 10YR 5/6 silty clay loam; 26-48 cmbs, 10YR 7/6 clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
1	E	1	❑	34	0-34 cmbs, 10YR 5/6 silty clay	
1	E	2	■	44	0-6 cmbs, 10YR 6/4 silty clay; 6-44 cmbs, 10YR 5/6 silty clay	40SY514
1	E	3	❑	32	0-11 cmbs, 10YR 6/4 silty clay; 11-32 cmbs, 10YR 5/6 silty clay	
1	E	4	❑	33	0-9 cmbs, 10YR 6/4 silty clay; 9-33 cmbs, 10YR 5/6 silty clay	
1	E	5	❑	34	0-12 cmbs, 10YR 6/4 silty clay; 12-34 cmbs, 10YR 5/6 silty clay	
1	E	6	❑	34	0-16 cmbs, 10YR 6/4 silty clay; 16-34 cmbs, 10YR 5/6 silty clay	
1	F	1	❑	40	0-13 cmbs, 10YR 4/4 silty clay; 13-40 cmbs, 10YR 6/3 silty clay	
1	F	2	❑	40	0-14 cmbs, 10YR 4/4 silty clay; 14-40 cmbs, 10YR 6/3 silty clay	
1	F	3	❑	45	0-15 cmbs, 10YR 4/4 silty clay; 15-45 cmbs, 10YR 6/3 silty clay	
1	F	4	❑	46	0-20 cmbs, 10YR 4/4 silty clay; 20-46 cmbs, 10YR 6/3 silty clay	
1	F	5	❑	42	0-12 cmbs, 10YR 4/4 silty clay; 12-42 cmbs, 10YR 7/2 silty clay	
1	F	6	❑	40	0-16 cmbs, 10YR 4/4 silty clay; 12-40 cmbs, 10YR 7/2 silty clay	
3	Locus 2	datum	■	51	0-12 cmbs, 10YR 4/3 silty clay loam; 12-51 cmbs, 10YR 6/4 silty clay	
3	Locus 2	E10	❑	36	0-13 cmbs, 10YR 3/3 silty clay loam; 13-36 cmbs, 10YR 5/3 silty clay	
3	Locus 2	S10	❑	34	0-11 cmbs, 10YR 3/3 silty clay loam; 11-34 cmbs, 10YR 5/3 silty clay	
3	Locus 2	W10	❑	35	0-12 cmbs, 10YR 3/3 silty clay loam; 12-35 cmbs, 10YR 5/3 silty clay	
3	Locus 2	W20	❑	33	0-15 cmbs, 10YR 3/3 silty clay loam; 15-33 cmbs, 10YR 5/3 silty clay	
3	Locus 3	datum	■	45	0-9 cmbs, 10YR 4/3 silty clay loam; 9-45 cmbs, 10YR 6/3 silty clay	
3	Locus 3	E10	❑	35	0-12 cmbs, 10YR 4/3 silty clay loam; 12-35 cmbs, 10YR 6/4 silty clay	
3	Locus 3	E20	❑	32	0-10 cmbs, 10YR 4/3 silty clay loam; 10-32 cmbs, 10YR 6/4 silty clay	
3	Locus 3	S10	❑	36	0-15 cmbs, 10YR 4/3 silty clay loam; 15-36 cmbs, 10YR 6/4 silty clay	
3	Locus 3	W10	❑	35	0-14 cmbs, 10YR 4/3 silty clay loam; 14-35 cmbs, 10YR 6/4 silty clay	
Borrow	1	1	❑	28	0-8 cmbs, 10YR 4/4 sandy clay loam; 8-28 cmbs, 10YR 5/6 silty clay	
Borrow	1	2	❑	33	0-21 cmbs, 10YR 3/4 sandy clay loam; 22-33 cmbs, 10YR 4/3 silty clay	
Borrow	1	3	❑	20	0-10 cmbs, 10YR 4/3 sandy clay loam; 10-20 cmbs, 10YR 4/4 silty clay	water at 20 cmbs

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
Borrow	1	4	❑	20	0-20 cmbs, 10YR 5/4 silty clay	standing water
Borrow	1	5	❑	0	0-20 cmbs, 10YR 5/4 silty clay	standing water
Borrow	1	6	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
Borrow	1	7	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
Borrow	1	8	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
Borrow	2	1	❑	30	0-10 cmbs, 10YR 3/4 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
Borrow	2	2	❑	20	0-20 cmbs, 10YR 5/4 silty clay	standing water
Borrow	2	3	❑	20	0-20 cmbs, 10YR 5/4 silty clay	standing water
Borrow	2	4	❑	20	0-20 cmbs, 10YR 5/4 silty clay	standing water
Borrow	2	5	❑	30	0-9 cmbs, 10YR 3/3 silty clay loam; 9-30 cmbs, 10YR 5/4 silty clay	
Borrow	2	6	❑	29	0-10 cmbs, 10YR 4/3 silty clay loam; 10-29 cmbs, 10YR 5/6 silty clay	
Borrow	3	1	❑	30	0-10 cmbs, 10YR 3/4 silty clay loam; 10-30 cmbs, 10YR 6/6 clay	
Borrow	3	2	❑	30	0-10 cmbs, 10YR 3/4 clay loam; 10-30 cmbs, 10YR 5/2 and 4/6 clay	
Borrow	3	3	❑	36	0-11 cmbs, 10YR 3/4 clay loam; 11-36 cmbs, 10YR 4/4 silty clay	
Borrow	3	4	Ø	0		standing water
Borrow	3	5	Ø	0		disturbed, road grade
Borrow	3	6	Ø	0		standing water
Borrow	3	7	❑	38	0-10 cmbs, 10YR 3/4 silty clay loam; 10-38 cmbs, 10YR 5/3 and 4/6 silty clay	
Borrow	3	8	❑	34	0-8 cmbs, 10YR 3/4 silty clay loam; 8-34 cmbs, 10YR 5/3 and 4/6 silty clay	
Borrow	3	9	❑	35	0-12 cmbs, 10YR 3/4 silty clay loam; 12-35 cmbs, 10YR 5/3 and 4/6 silty clay	
Borrow	3	10	Ø	0		creek
Borrow	3	11	❑	36	0-12 cmbs, 10YR 4/4 silty clay loam; 12-36 cmbs, 10YR 5/6 silty clay	
Borrow	4	1	❑	50	0-10 cmbs, 10YR 3/4 silty clay loam; 10-50 cmbs, 10YR 5/8 silty clay	
Borrow	4	2	Ø	0		standing water
Borrow	4	3	Ø	0		standing water
Borrow	4	4	Ø	0		standing water
Borrow	4	5	Ø	0		standing water
Borrow	4	6	❑	38	0-10 cmbs, 10YR 3/4 silty clay loam; 10-38 cmbs, 10YR 5/6 silty clay	
Borrow	4	7	Ø	0		standing water
Borrow	4	8	❑	36	0-13 cmbs, 10YR 3/4 silty clay loam; 13-36 cmbs, 10YR 5/6 silty clay	
Borrow	4	9	❑	35	0-11 cmbs, 10YR 3/4 silty clay loam; 11-35 cmbs, 10YR 5/6 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
Borrow	4	10	❑	30	0-12 cmbs, 10YR 3/4 silty clay loam; 12-30 cmbs, 10YR 5/6 silty clay	
Borrow	4	11	❑	40	0-1150 cmbs, 10YR 3/4 silty clay loam; 15-40 cmbs, 10YR 5/6 silty clay	
Borrow	5	1	Ø	0		graded area near road
Borrow	5	2	❑	15	0-5 cmbs, 10YR 4/3 sandy loam; 5-15 cmbs, 10YR 5/8 sandy clay	
Borrow	5	3	Ø	0		graded area
Borrow	5	4	Ø	0		graded area
Borrow	5	5	Ø	0		graded area
Borrow	5	6	❑	14	0-4 cmbs, 10YR 4/4 clay loam; 4-14 cmbs, 10YR 7/6 and 6/3 clay	
Borrow	5	7	Ø	0		standing water
Borrow	5	8	❑	13	0-3 cmbs, 10YR 4/4 clay loam; 3-13 cmbs, 10YR 5/8 and 6/3 clay	
Borrow	5	9	Ø	0		standing water
Borrow	5	10	❑	20	0-10 cmbs, 10YR 4/4 clay loam; 10-20 cmbs, 10YR 5/8 silty clay	
Borrow	5	11	❑	15	0-5 cmbs, 10YR 4/4 clay loam; 5-15 cmbs, 10YR 5/8 and 6/3 clay	
Borrow	6	1	Ø	0		creek
Borrow	6	2	Ø	0		drainage
Borrow	6	3	Ø	0		drainage
Borrow	6	4	Ø	0		standing water
Borrow	6	5	❑	13	0-3 cmbs, 10YR 4/4 clay loam; 3-13 cmbs, 10YR 5/8 and 6/3 clay	
Borrow	6	6	❑	13	0-3 cmbs, 10YR 4/4 clay loam; 3-13 cmbs, 10YR 5/8 and 6/3 clay	
Borrow	6	7	Ø	0		graded area
Borrow	6	8	Ø	0		graded area
Borrow	6	9	Ø	0		graded area
Borrow	6	10	Ø	0		graded area
Borrow	6	11	Ø	0		graded area
Borrow	7	1	Ø	0		graded area
Borrow	7	2	Ø	0		graded area
Borrow	7	3	Ø	0		graded area
Borrow	7	4	Ø	0		graded area
Borrow	7	5	Ø	0		graded area
Borrow	7	6	❑	1	0-6 cmbs, 10YR 4/4 clay loam; 6-16 cmbs, 10YR 5/8 and 6/3 clay	
Borrow	7	7	❑	13	0-3 cmbs, 10YR 4/4 clay loam; 3-13 cmbs, 10YR 5/8 and 6/3 clay	
Borrow	7	8	❑	13	0-3 cmbs, 10YR 4/4 clay loam; 3-13 cmbs, 10YR 5/8 and 6/3 clay	
Borrow	7	9	Ø	0		drainage
Borrow	7	10	Ø	0		creek
Borrow	7	11	❑	15	0-5 cmbs, 10YR 4/4 clay loam; 5-15 cmbs, 10YR 5/8 and 6/3 clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
Borrow	7	12	Ø	0		creek
Borrow	7	13	❑	15	0-5 cmbs, 10YR 4/3 silty clay loam; 5-15 cmbs, 10YR 5/8 and 6/3 silt clay	
Borrow	7	14	❑	13	0-3 cmbs, 10YR 4/3 silty clay loam; 3-13 cmbs, 10YR 5/8 and 6/2 silty clay	
Borrow	7	15	Ø	0		standing water
Borrow	8	1	❑	15	0-5 cmbs, 10YR 4/3 silty clay loam; 5-15 cmbs, 7.5YR 5/6and 5/8 silt clay	
Borrow	8	2	Ø	0		drainage
Borrow	8	3	❑	12	0-2 cmbs, 10YR 4/3 silty clay loam; 2-12 cmbs, 10YR 5/8 silty clay	
Borrow	8	4	Ø	0		drainage
Borrow	8	5	❑	13	0-3 cmbs, 10YR 4/3 silty clay loam; 3-13 cmbs, 10YR 5/8 and 6/2 silty clay	
Borrow	8	6	❑	13	0-3 cmbs, 10YR 4/3 silty clay loam; 3-13 cmbs, 10YR 5/8 and 6/2 silty clay	
Borrow	8	7	Ø	0		standing water
Borrow	8	8	Ø	0		standing water
Borrow	8	9	Ø	0		standing water
Borrow	8	10	❑	15	0-5 cmbs, 10YR 4/3 silty clay loam; 5-15 cmbs, 10YR 5/8 silty clay	
Borrow	8	11	❑	15	0-5 cmbs, 10YR 4/3 silty clay loam; 5-15 cmbs, 10YR 5/8 silty clay	
Borrow	8	12	Ø	0		graded area
Borrow	8	13	Ø	0		graded area
Borrow	8	14	Ø	0		graded area
Borrow	8	15	Ø	0		graded area
Borrow	9	1	Ø	0		slope drainage
Borrow	9	2	Ø	0		graded, standing water
Borrow	9	3	Ø	0		graded, standing water
Borrow	9	4	Ø	0		graded, standing water
Borrow	9	5	Ø	0		graded, standing water
Borrow	9	6	❑	13	0-3 cmbs, 10YR 4/4 silty clay loam; 3-13 cmbs, 10YR 5/8 and 6/2 silty clay	
Borrow	9	7	❑	20	0-20 cmbs, 10YR 5/6 and 6/3 silty clay	water at 20 cmbs
Borrow	9	8	❑	30	0-10 cmbs, 10YR 4/4 silty clay loam; 10-30 cmbs, 10YR 5/8 and 6/3 silty clay	
Borrow	9	9	❑	18	0-3 cmbs, 10YR 4/4 silty clay loam; 3-18 cmbs, 10YR 5/8 and 6/3 silty clay	
Borrow	9	10	❑	30	0-10 cmbs, 10YR 4/4 silty clay loam; 10-30 cmbs, 10YR 5/8 and 6/3 silty clay	
Borrow	9	11	❑	15	0-5 cmbs, 10YR 4/3 silty clay loam; 5-15 cmbs, 10YR 5/8 silty clay	
Borrow	9	12	❑	36	0-10 cmbs, 10YR 4/4 silty clay loam; 10-36 cmbs, 10YR 5/8 and 6/3 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
Borrow	9	13	❑	30	0-10 cmbs, 10YR 4/4 silty clay loam; 10-30 cmbs, 10YR 5/8 and 6/3 silty clay	
Borrow	9	14	❑	30	0-10 cmbs, 10YR 4/4 silty clay loam; 10-30 cmbs, 10YR 5/8 and 6/3 silty clay	
Borrow	10	1	❑	25	0-12 cmbs, 10YR 4/3 silty clay loam; 12-25 cmbs, 10YR 5/4 and 6/2 silty clay	
Borrow	10	2	❑	25	0-9 cmbs, 10YR 4/3 silty clay loam; 9-25 cmbs, 10YR 5/4 and 6/2 silty clay	
Borrow	10	3	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 5/8 and 6/2 silty clay	
Borrow	10	4	❑	20	0-10 cmbs, 10YR 4/3 silty clay loam; 10-20 cmbs, 10YR 5/8 and 6/2 silty clay	water at 20 cmbs
Borrow	10	5	❑	20	0-10 cmbs, 10YR 4/3 silty clay loam; 10-20 cmbs, 10YR 5/8 and 6/2 silty clay	water at 20 cmbs
Borrow	10	6	❑	10	0-5 cmbs, 10YR 4/3 silty clay loam; 5-10 cmbs, 10YR 6/3 and 7/2 silty clay loam	water at 10 cmbs
Borrow	10	7	❑	25	0-7 cmbs, 10YR 4/3 silty clay loam; 7-25 cmbs, 10YR 6/3 and 7/2 silty clay loam	
Borrow	10	8	❑	20	0-3 cmbs, 10YR 4/3 silty clay loam; 3-20 cmbs, 10YR 6/3 and 7/2 silty clay loam	
Borrow	10	9	❑	20	0-5 cmbs, 10YR 4/3 silty clay loam; 5-20 cmbs, 10YR 6/3 and 7/2 silty clay loam	
Borrow	10	10	Ø	0		standing water
Borrow	10	11	Ø	0		standing water
Borrow	10	12	Ø	0		standing water
Borrow	10	13	Ø	0		standing water
Borrow	10	14	Ø	0		standing water
Borrow	11	1	Ø	0		graded area
Borrow	11	2	Ø	0		graded area
Borrow	11	3	Ø	0		graded area
Borrow	11	4	Ø	0		graded area
Borrow	11	5	Ø	0		standing water
Borrow	11	6	❑	20	0-20 cmbs, 10YR 4/4 and 6/4 silty clay	very wet
Borrow	11	7	❑	31	0-8 cmbs, 10YR 4/3 silty clay; 8-30 cmbs, 10YR 6/4 and 6/8 silty clay	
Borrow	11	8	❑	29	0-10 cmbs, 10YR 4/3 silty clay; 10-29 cmbs, 10YR 6/4 and 6/8 silty clay	
Borrow	11	9	Ø	0		standing water
Borrow	11	10	❑	30	0-30 cmbs, 10YR 4/3 silty clay	
Borrow	11	11	❑	28	0-28 cmbs, 10YR 4/3 silty clay	
Borrow	11	12	❑	29	0-10 cmbs, 10YR 4/3 silty clay; 10-29 cmbs, 10YR 7/3 and 6/6 silty clay	
Borrow	11	13	❑	29	0-8 cmbs, 10YR 4/3 silty clay; 8-29 cmbs, 10YR 7/3 and 6/6 silty clay	
Borrow	12	1	❑	30	0-6 cmbs, 10YR 4/4 silty clay; 6-30 cmbs, 10YR 5/8 silty clay	
Borrow	12	2	❑	34	0-11 cmbs, 10YR 4/4 silty clay; 11-34 cmbs, 10YR 5/8 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
Borrow	12	3	Ø	0		berm along drainage
Borrow	12	4	Ø	0		standing water
Borrow	12	5	❑	16	0-16 cmbs, 10YR 4/4 and 6/4 silty clay	very wet
Borrow	12	6	Ø	0		standing water
Borrow	12	7	❑	29	0-10 cmbs, 10YR 4/3 silty clay; 10-29 cmbs, 10YR 5/6 silty clay	
Borrow	12	8	Ø	0		graded area
Borrow	12	9	Ø	0		graded area
Borrow	12	10	Ø	0		graded area
Borrow	12	11	Ø	0		graded area
Borrow	12	12	Ø	0		graded area
Borrow	12	13	Ø	0		graded area
Borrow	13	1	Ø	0		graded area
Borrow	13	2	Ø	0		graded area
Borrow	13	3	Ø	0		graded area
Borrow	13	4	Ø	0		graded area
Borrow	13	5	Ø	0		graded area
Borrow	13	6	❑	18	0-5 cmbs, 10YR 4/3 silty clay loam; 5-18 cmbs, 10YR 5/8 and 6/2 silty clay	
Borrow	13	7	❑	13	0-3 cmbs, 10YR 4/3 silty clay loam; 3-13 cmbs, 10YR 6/2and 7.5YR 5/6 silty clay	very wet
Borrow	13	8	Ø	0		standing water
Borrow	13	9	Ø	0		standing water
Borrow	13	10	❑	12	0-2 cmbs, 10YR 3/2 silty clay loam; 2-12 cmbs, 10YR 6/2 and 6/6 silty clay	
Borrow	13	11	❑	30	0-4 cmbs, 10YR 4/3 silty clay loam; 4-17 cmbs, 10YR 5/8 silty clay; 17-30 cmbs, 10YR 5/8, 6/2 and 7/5YR 5/6 silty clay	
Borrow	14	1	❑	20	0-10 cmbs, 10YR 4/4 silty clay loam; 10-20 cmbs, 10YR 4/6 and 6/2 silty clay	
Borrow	14	2	Ø	0		standing water
Borrow	14	3	❑	20	0-10 cmbs, 10YR 6/3 silty clay loam; 10-20 cmbs, 7.5YR 5/8 silty clay	
Borrow	14	4	❑	20	0-10 cmbs, 10YR 6/3 silty clay loam; 10-20 cmbs, 7.5YR 5/8 silty clay	
Borrow	14	5	Ø	0		graded area
Borrow	14	6	Ø	0		graded area
Borrow	14	7	Ø	0		graded area
Borrow	14	8	Ø	0		graded area
Borrow	14	9	Ø	0		graded area
Borrow	14	10	Ø	0		graded area
Borrow	15	1	Ø	0		graded area
Borrow	15	2	Ø	0		graded area
Borrow	15	3	Ø	0		graded area
Borrow	15	4	Ø	0		graded area
Borrow	15	5	Ø	0		graded area
Borrow	15	6	Ø	0		graded area

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
Borrow	15	7	❑	30	0-5 cmbs, 10YR 3/3 silty clay loam; 5-30 cmbs, 10YR 4/4 silty clay	
Borrow	15	8	❑	30	0-5 cmbs, 10YR 3/3 silty clay loam; 5-30 cmbs, 10YR 4/4 silty clay	
Borrow	15	9	❑	30	0-5 cmbs, 10YR 3/3 silty clay loam; 5-30 cmbs, 10YR 4/4 silty clay	
Borrow	15	10	❑	30	0-5 cmbs, 10YR 3/3 silty clay loam; 5-30 cmbs, 10YR 4/4 silty clay	
Borrow	16	1	❑	30	0-75 cmbs, 10YR 3/3 silty clay loam; 7-30 cmbs, 10YR 4/4 silty clay	
Borrow	16	2	❑	30	0-5 cmbs, 10YR 3/3 silty clay loam; 5-30 cmbs, 10YR 4/4 silty clay	
Borrow	16	3	❑	30	0-5 cmbs, 10YR 3/3 silty clay loam; 5-30 cmbs, 10YR 4/4 silty clay	
Borrow	16	4	❑	30	0-2 cmbs, 10YR 3/3 silty clay loam; 2-30 cmbs, 10YR 4/4 silty clay	
Borrow	16	5	Ø	0		standing water
Borrow	16	6	Ø	0		standing water
Borrow	16	7	Ø	0		standing water
Borrow	16	8	Ø	0		standing water
Borrow	16	9	Ø	0		standing water
Borrow	16	10	Ø	0		standing water
Borrow	17	1	❑	29	0-16 cmbs, 10YR 3/3 silty loam; 16-29 cmbs, 10YR 5/4 silty clay	
Borrow	17	2	❑	30	0-15 cmbs, 10YR 3/3 silty loam; 15-30 cmbs, 10YR 5/4 silty clay	
Borrow	17	3	❑	30	0-17 cmbs, 10YR 3/3 silty loam; 17-30 cmbs, 10YR 5/4 silty clay	
Borrow	17	4	❑	30	0-18 cmbs, 10YR 3/3 silty loam; 18-30 cmbs, 10YR 5/1 and 4/6 silty clay	
Borrow	17	5	Ø	0		standing water
Borrow	17	6	Ø	0		standing water
Borrow	17	7	Ø	0		standing water
Borrow	17	8	Ø	0		standing water
Borrow	17	9	❑	10	0-3 cmbs, 10YR 3/2 silty clay loam; 3-10 cmbs, 10YR 5/1 and 4/6 silty clay	water at 10 cmbs
Borrow	17	10	Ø	0		creek
Borrow	18	1	Ø	0		creek
Borrow	18	2	❑	15	0-5 cmbs, 10YR 3/2 silty clay loam; 5-15 cmbs, 10YR 5/1 and 4/6 silty clay	water at 15 cmbs
Borrow	18	3	Ø	0		standing water
Borrow	18	4	Ø	0		standing water
Borrow	18	5	Ø	0		standing water
Borrow	18	6	Ø	0		standing water
Borrow	18	7	❑	23	0-10 cmbs, 10YR 3/4 silty clay loam; 10-23 cmbs, 10YR 5/6 silty clay	
Borrow	18	8	❑	26	0-12 cmbs, 10YR 3/4 silty clay loam; 12-26 cmbs, 10YR 5/6 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
Borrow	18	9	❑	20	0-5 cmbs, 10YR 3/2 silty clay loam; 5-20 cmbs, 10YR 4/6 silty clay	
Borrow	18	10	❑	30	0-10 cmbs, 10YR 3/3 silty clay loam; 10-30 cmbs, 10YR 6/6 silty clay	
Borrow	19	1	❑	26	0-10 cmbs, 10YR 4/3 loam; 10-16 cmbs, 10YR 5/8 silty clay loam; 16-26 cmbs, 10YR 5/8 silty clay	
Borrow	19	2	■	30	0-10 cmbs, 10YR 3/2 silty clay loam; 10-18 cmbs, 10YR 4/4 silty clay loam; 18-30 cmbs. 10YR 5/8 silty clay	40SY841
Borrow	19	3	■	30	0-13 cmbs, 10YR 3/2 silty clay loam; 13-30 cmbs. 10YR 5/8 silty clay	40SY841
Borrow	19	4	■	30	0-10 cmbs, 10YR 3/2 silty clay loam; 10-18 cmbs, 10YR 3/4 silty clay; 18-30 cmbs. 10YR 5/6 silty clay	40SY841
Borrow	19	5	❑	11	0-1 cmbs, 10YR 4/3 silty clay loam; 1-11 cmbs, 10YR 5/8 silty clay	
Borrow	19	6	❑	15	0-3 cmbs, 10YR 4/3 silty clay loam; 3-15 cmbs, 10YR 4/6 and 6/3 silty clay	
Borrow	19	7	❑	10	0-10 cmbs, 7.5YR /8 and 10YR 6/2 silty clay	
Borrow	19	8	❑	18	0-8 cmbs, 10YR 4/3 silty clay loam; 8-18 cmbs, 10YR 5/8 silty clay	
Borrow	19	9	Ø	0		standing water
Borrow	19	10	Ø	0		standing water
Borrow	20	1	❑	15	0-3 cmbs, 10YR 3/3 loam; 3-15 cmbs, 7.5YR 5/8 clay	with gravel
Borrow	20	2	❑	30	0-13 cmbs, 10YR 3/4 silty loam; 13-30 cmbs, 10YR 4/4 silty clay	
Borrow	20	3	❑	24	0-12 cmbs, 10YR 3/3 silty loam; 12-24 cmbs, 10YR 5/8 silty clay	
Borrow	20	4	❑	30	0-12 cmbs, 10YR 3/3 silty loam; 12-24 cmbs, 10YR 5/8 silty clay	
Borrow	20	5	❑	32	0-5 cmbs, 10YR 3/3 silty loam; 5-32 cmbs, 10YR 5/6 silty clay	
Borrow	21	1	❑	40	0-12 cmbs, 10YR 3/3 silty clay loam; 12-40 cmbs, 10YR 6/4 silty clay	
Borrow	21	2	Ø	0		standing water
Borrow	21	3	❑	34	0-10 cmbs, 10YR 3/3 silty clay loam; 10-34 cmbs, 10YR 6/4 silty clay	
Borrow	21	4	❑	10	0-3 cmbs, 10YR 3/3 silty clay loam; 3-6 cmbs, 10YR 4/6 silty clay; 6-10 cmbs, 10YR 6/8 silty clay	
Borrow	40SY841	E10	■	50	0-24 cmbs, 10YR 4/2 silty clay loam; 24-50 cmbs, 10YR 5/6 silty clay	
Borrow	40SY841	E20	❑	50	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 10YR 5/6 silty clay; 30-50 cmbs, 10YR 6/8 clay	
Borrow	40SY841	E40	❑	40	0-19 cmbs, 10YR 4/2 silty clay loam; 19-40 cmbs, 10YR 5/6 silty clay	very wet

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
Borrow	40SY841	E50	❏	25	0-15 cmbs, 10YR 4/2 silty clay loam; 15-25 cmbs, 10YR 5/6 silty clay	very wet, water in test at 25 cmbs
Borrow	40SY841	N10	❏	30	0-13 cmbs, 10YR 4/3 silty clay loam; 13-30 cmbs, 10YR 4/6 silty clay	
Borrow	40SY841	N10 E10	■	50	0-25 cmbs, 10YR 4/2 silty clay loam; 25-50 cmbs, 7.5YR 5/6 silty clay	
Borrow	40SY841	N10 E30	❏	43	0-17 cmbs, 10YR 4/2 silty clay loam; 17-43 cmbs, 10YR 5/6 silty clay	
Borrow	40SY841	N10 E40	❏	48	0-23 cmbs, 10YR 4/2 silty clay loam; 23-48 cmbs, 7.5YR 5/6 silty clay	
Borrow	40SY841	N10 W10	Ø	0		brick scatter
Borrow	40SY841	N10 W20	■	30	0-12 cmbs, 10YR 4/3 silty clay loam; 12-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	N10 W20	❏	45	0-19 cmbs, 10YR 2/1 silty clay loam; 19-45 cmbs, 7.5YR 6/6 silty clay	very wet, roots
Borrow	40SY841	N10 W30	❏	47	0-34 cmbs, 10YR 3/2 silty clay loam; 34-47 cmbs, 7.5YR 5/8 clay	very wet
Borrow	40SY841	N20	❏	30	0-9 cmbs, 10YR 4/3 silty clay loam; 9-30 cmbs, 10YR 4/6 silty clay	
Borrow	40SY841	N20 E10	■	30	0-12 cmbs, 10YR 4/3 silty clay loam; 12-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	N20 E20	❏	30	0-8 cmbs, 10YR 4/2 silty clay loam; 8-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	N20 E30	■	45	0-22 cmbs, 10YR 4/2 silty clay loam; 22-45 cmbs, 7.5YR 5/6 silty clay	
Borrow	40SY841	N20 E40	❏	30	0-11 cmbs, 10YR 4/3 silty clay loam; 11-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	N20 W10	❏	30	0-12 cmbs, 10YR 4/3 silty clay loam; 12-30 cmbs, 10YR 4/6 silty clay	
Borrow	40SY841	N20 W30	Ø	0		standing water
Borrow	40SY841	N30 E30	❏	48	0-25 cmbs, 10YR 4/2 silty clay loam; 25-48 cmbs, 7.5YR 5/6 silty clay	
Borrow	40SY841	N40	❏	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 5/6 silty clay	
Borrow	40SY841	N40 E10	❏	50	0-22 cmbs, 10YR 4/2 silty clay loam; 22-50 cmbs, 10YR 6/6 silty clay	
Borrow	40SY841	N40 E20	❏	30	0-12 cmbs, 10YR 4/3 silty clay loam; 12-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	N40 E30	❏	47	0-25 cmbs, 10YR 4/2 silty clay loam; 25-47 cmbs, 7.5YR 5/6 silty clay	
Borrow	40SY841	S10	■	30	0-13 cmbs, 10YR 3/2 silty clay loam; 13-30 cmbs, 10YR 4/3 silty clay	
Borrow	40SY841	S10 E10	❏	30	0-13 cmbs, 10YR 3/2 silty clay loam; 13-30 cmbs, 10YR 4/3 silty clay	
Borrow	40SY841	S10 E20	■	30	0-12 cmbs, 10YR 3/2 silty clay loam; 12-16 cmbs, 10YR 4/3 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
Borrow	40SY841	S10 E20	❑	40	0-10 cmbs, 10YR 4/2 silty clay loam; 10-40 cmbs, 10YR 5/6 silty clay	
Borrow	40SY841	S10 E40	❑	40	0-15 cmbs, 10YR 4/2 silty clay loam; 15-40 cmbs, 10YR 5/8 silty clay	
Borrow	40SY841	S10 W10	Ø	0		brick scatter
Borrow	40SY841	S10 W20	■	37	0-20 cmbs, 10YR 3/2 silty clay loam; 20-37 cmbs, 7.5YR 4/6 clay	tree root
Borrow	40SY841	S10 W30	❑	30	0-14 cmbs, 10YR 4/2 silty clay loam; 14-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	S10 W40	❑	30	0-13 cmbs, 10YR 4/3 silty clay loam; 13-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	S20	❑	30	0-15 cmbs, 10YR 3/2 silty clay loam; 15-30 cmbs, 10YR 4/3 silty clay	
Borrow	40SY841	S20 E10	■	65	0-35 cmbs, 10YR 3/2 silt loam; 35-65 cmbs, 7.5YR 5/8 clay	
Borrow	40SY841	S20 E20	❑	30	0-16 cmbs, 10YR 3/2 silty clay loam; 16-30 cmbs, 10YR 4/3 silty clay	
Borrow	40SY841	S20 E30	❑	45	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 5/2 and 7/3 silty clay; 30-45 cmbs, 10YR 5/8 clay	
Borrow	40SY841	S20 W10	❑	30	0-16 cmbs, 10YR 4/2 silty clay loam; 16-30 cmbs, 10YR 4/3 silty clay	near brick pile
Borrow	40SY841	S20 W20	■	25	0-25 cmbs, 10YR 2/1 silty loam	root
Borrow	40SY841	S20 W30	❑	30	0-16 cmbs, 10YR 4/3 silty clay loam; 16-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	S20 W40	❑	48	0-26 cmbs, 10YR 4/2 silty clay loam; 26-48 cmbs, 10YR 5/6 silty clay	
Borrow	40SY841	S30 E20	❑	30	0-13 cmbs, 10YR 4/2 silty clay loam; 13-30 cmbs, 10YR 4/3 silty clay	
Borrow	40SY841	S30 W20	❑	30	0-16 cmbs, 10YR 3/3 silty clay loam; 16-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	S30 W30	❑	30	0-16 cmbs, 10YR 4/3 silty clay loam; 16-30 cmbs, 10YR 4/4 silty clay	
Borrow	40SY841	S40 E20	❑	35	0-9 cmbs, 10YR 3/2 silty clay loam; 9-15 cmbs, 10YR 4/3 silty clay loam; 15-30 cmbs silty clay	
Borrow	40SY841	S40 W20	❑	38	0-18 cmbs, 10YR 4/2 silty clay loam; 18-38 cmbs, 7.5YR 6/6 silty clay	
Borrow	40SY841	W10	❑	49	0-26 cmbs, 10YR 4/2 silty clay loam; 26-49 cmbs, 7.5YR 5/8 silty clay	
Borrow	40SY841	W20	❑	40	0-16 cmbs, 10YR 2/1 silty clay loam; 16-40 cmbs, 7.5YR 6/6 silty clay	very wet
Borrow	40SY841	W50	❑	30	0-16 cmbs, 10YR 4/3 silty clay loam; 16-30 cmbs, 10YR 5/6 silty clay	
East Mit.	1	1	❑	30	0-10 cmbs, 10YR 3/3 silty loam; 10-30 cmbs, 10YR 4/4 silty clay loam	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
East Mit.	1	2	❑	30	0-9 cmbs, 10YR 3/3 silty loam; 9-30 cmbs, 10YR 4/3 silty clay loam	
East Mit.	1	3	❑	30	0-10 cmbs, 10YR 3/3 silty loam; 10-30 cmbs, 10YR 4/4 silty clay loam	
East Mit.	1	4	❑	30	0-6 cmbs, 10YR 3/3 silty loam; 6-30 cmbs, 10YR 4/4 silty clay loam	
East Mit.	1	5	❑	30	0-10 cmbs, 10YR 3/3 silty loam; 10-30 cmbs, 10YR 4/4 silty clay loam	
East Mit.	1	6	❑	30	0-8 cmbs, 10YR 3/3 silty loam; 8-30 cmbs, 10YR 3/4 silty clay loam	
East Mit.	1	7	❑	30	0-10 cmbs, 10YR 3/3 silty loam; 10-30 cmbs, 10YR 3/4 silty clay loam	
East Mit.	2	1	❑	30	0-5 cmbs, 10YR 3/3 silty loam; 5-14 cmbs, 10YR 4/3 silty clay loam; 14-30 cmbs, 10YR 4/4 silty clay	
East Mit.	2	2	❑	30	0-2 cmbs, 10YR 4/3 silty loam; 2-30 cmbs, 10YR 4/4 silty clay	
East Mit.	2	3	❑	30	0-5 cmbs, 10YR 3/3 silty loam; 5-15 cmbs, 10YR 4/3 silty clay loam; 15-30 cmbs, 10YR 4/4 silty clay	
East Mit.	2	4	❑	30	0-5 cmbs, 10YR 3/3 silty loam; 5-14 cmbs, 10YR 4/3 silty clay loam; 14-30 cmbs, 10YR 4/4 silty clay	
East Mit.	2	5	❑	30	0-2 cmbs, 10YR 4/3 silty loam; 2-30 cmbs, 10YR 4/4 silty clay loam	
East Mit.	2	6	❑	30	0-5 cmbs, 10YR 4/3 silty loam; 5-30 cmbs, 10YR 4/4 silty clay loam	
East Mit.	2	7	❑	30	0-5 cmbs, 10YR 4/3 silty loam; 5-30 cmbs, 10YR 4/4 silty clay loam	
East Mit.	3	1	❑	30	0-17 cmbs, 10YR 4/2 silty loam; 17-30 cmbs, 10YR 6/4 silty clay	
East Mit.	3	2	❑	36	0-20 cmbs, 10YR 4/2 silty clay loam; 20-36 cmbs, 10YR 6/6 silty clay	
East Mit.	3	3	❑	32	0-17 cmbs, 10YR 4/2 silty clay loam; 17-32 cmbs, 10YR 6/6 silty clay	
East Mit.	3	4	❑	37	0-20 cmbs, 10YR 4/2 silty clay loam; 20-37 cmbs, 10YR 6/6 silty clay	
East Mit.	3	5	❑	30	0-16 cmbs, 10YR 4/2 silty clay loam; 16-30 cmbs, 10YR 6/6 silty clay	
East Mit.	3	6	❑	30	0-12 cmbs, 10YR 4/2 silty clay loam; 12-30 cmbs, mottled 10YR 5/3 and 10YR 6/1 silty clay	
East Mit.	3	7	❑	30	0-15 cmbs, 10YR 4/2 silty clay loam; 15-30 cmbs, mottled 10YR 5/3 and 10YR 6/1 silty clay	
East Mit.	4	1	❑	33	0-15 cmbs, 10YR 4/2 silty clay loam; 15-33 cmbs, mottled 10YR 5/3 and 10YR 6/1 silty clay	
East Mit.	4	2	❑	35	0-12 cmbs, 10YR 4/2 silty clay loam; 12-35 cmbs, 10YR 7/4 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
East Mit.	4	3	❑	31	0-13 cmbs, 10YR 4/2 silty clay loam; 13-31 cmbs, 10YR 6/6 silty clay	
East Mit.	4	4	❑	34	0-12 cmbs, 10YR 4/2 silty clay loam; 12-34 cmbs, 10YR 6/6 silty clay	
East Mit.	4	5	❑	30	0-14 cmbs, 10YR 4/2 silty clay loam; 14-30 cmbs, 10YR 6/6 silty clay	
East Mit.	4	6	❑	30	0-11 cmbs, 10YR 4/2 silty clay loam; 11-30 cmbs, mottled 10YR 5/3 and 10YR 6/1 silty clay	
East Mit.	4	7	❑	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 10YR 7/6 silty clay	
East Mit.	5	1	❑	34	0-4 cmbs, 10YR 4/4 silty clay loam; 4-34 cmbs, mottled 10YR 6/4 and 10YR 5/4 clay	wet
East Mit.	5	2	❑	44	0-6 cmbs, 10YR 4/3 silty clay loam; 6-36 cmbs, 10YR 7/4 silty clay; 36-44 cmbs, mottled 10YR 7/4 and 10YR 8/4 clay	
East Mit.	5	3	❑	26	0-10 cmbs, 10YR 4/3 silty clay loam; 10-26 cmbs, 10YR 7/4 silty clay	large root at 26 cmbs
East Mit.	5	4	❑	38	0-10 cmbs, 10YR 4/3 silty clay loam; 10-38 cmbs, 10YR 6/6 silty clay	
East Mit.	5	5	❑	38	0-11 cmbs, 10YR 4/3 silty clay loam; 11-24 cmbs, 10YR 5/6 silty clay; 24-38 cmbs, 10YR 6/6 silty clay	
East Mit.	5	6	❑	36	0-8 cmbs, 10YR 4/3 silty clay loam; 8-22 cmbs, 10YR 5/6 silty clay; 22-36 cmbs, 10YR 6/6 silty clay	
East Mit.	5	7	❑	34	0-6 cmbs, 10YR 4/4 silty clay loam; 6-34 cmbs, 10YR 7/4 silty clay	
East Mit.	6	1	Ø			levee/berm along Big Creek
East Mit.	6	2	❑	31	0-6 cmbs, 10YR 4/3 silty clay loam; 6-31 cmbs, mottled 10YR 8/2 and 10YR 7/6 silty clay	
East Mit.	6	3	❑	38	0-14 cmbs, 10YR 4/4 silty clay loam; 14-38 cmbs, 10YR 7/4 silty clay	
East Mit.	6	4	❑	40	0-16 cmbs, 10YR 4/4 silty clay loam; 16-40 cmbs, 10YR 6/6 silty clay	
East Mit.	6	5	❑	32	0-14 cmbs, 10YR 4/4 silty clay loam; 14-32 cmbs, 10YR 6/6 silty clay	
East Mit.	6	6	❑	41	0-12 cmbs, 10YR 4/3 silty clay loam; 12-41 cmbs, 10YR 7/4 silty clay	
East Mit.	6	7	Ø			standing water
East Mit.	6	8	Ø			push pile
East Mit.	7	1	❑	20	0-5 cmbs, 10YR 4/4 silty clay loam; 5-20 cmbs, 10YR 6/6 saturated silty clay	
East Mit.	7	2	❑	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 10YR 6/4 saturated silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
East Mit.	7	3	❑	20	0-5 cmbs, 10YR 4/2 silty clay loam; 5-20 cmbs, 10YR 6/3 saturated silty clay	ground water at 20 cmbs
East Mit.	7	4	❑	36	0-18 cmbs, 10YR 4/2 silty clay loam; 18-36 cmbs, 10YR 7/4 saturated silty clay	
East Mit.	7	5	❑	32	0-15 cmbs, 10YR 4/2 silty clay loam; 15-32 cmbs, 10YR 7/6 silty clay	
East Mit.	7	6	❑	30	0-12 cmbs, 10YR 4/2 silty clay loam; 12-30 cmbs, 10YR 7/6 silty clay	
East Mit.	7	7	❑	30	0-10 cmbs, 10YR 4/2 silty loam; 10-30 cmbs, 10YR 6/1 silty clay	
East Mit.	7	8	Ø			slope
East Mit.	8	1	Ø			side of slope into eroded drainage into Big Creek
East Mit.	8	2	Ø			slope into drainage
East Mit.	8	3	Ø			drainage
East Mit.	8	4	❑	30	0-9 cmbs, 10YR 3/2 silty clay loam; 9-30 cmbs, mottled 10YR 5/4 and 10YR 6/1 silty clay	
East Mit.	8	5	❑	32	0-12 cmbs, 10YR 3/2 silty clay loam; 12-32 cmbs, mottled 10YR 6/3 and 10YR 6/1 silty clay	
East Mit.	8	6	❑	37	0-20 cmbs, 10YR 4/4 silty clay loam; 20-37 cmbs, mottled 10YR 6/1 and 10YR 5/4 silty clay	
East Mit.	8	7	❑	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, mottled 10YR 6/1 and 10YR 5/4 silty clay	
East Mit.	8	8	❑	33	0-10 cmbs, 10YR 4/2 silty clay loam; 10-33 cmbs, 10YR 5/4 saturated silty clay	
East Mit.	9	1	❑	30	0-4 cmbs, 10YR 3/3 silty loam; 4-20 cmbs, 10YR 4/3 silty clay loam; 20-30 cmbs, 10YR 4/4 silty clay	
East Mit.	9	2	❑	30	0-3 cmbs, 10YR 3/3 silty loam; 3-18 cmbs, 10YR 4/3 silty clay loam; 18-30 cmbs, 10YR 4/4 silty clay	
East Mit.	9	3	❑	30	0-3 cmbs, 10YR 3/3 silty loam; 3-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
East Mit.	9	4	❑	30	0-2 cmbs, 10YR 3/3 silty loam; 3-18 cmbs, 10YR 4/3 silty clay loam; 18-30 cmbs, 10YR 4/4 silty clay	
East Mit.	9	5	❑	30	0-3 cmbs, 10YR 3/3 silty loam; 3-19 cmbs, 10YR 4/3 silty clay loam; 19-30 cmbs, 10YR 4/4 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
East Mit.	9	6	❑	30	0-2 cmbs, 10YR 3/3 silty loam; 3-13 cmbs, 10YR 4/3 silty clay loam; 13-30 cmbs, 10YR 4/4 silty clay	
East Mit.	9	7	❑	30	0-2 cmbs, 10YR 3/3 silty loam; 2-17 cmbs, 10YR 4/3 silty clay loam; 17-30 cmbs, 10YR 4/4 silty clay	
East Mit.	10	1	❑	30	0-5 cmbs, 10YR 3/3 silty loam; 5-20 cmbs, 10YR 4/3 silty clay loam; 20-30 cmbs, 10YR 4/4 silty clay	
East Mit.	10	2	❑	30	0-2 cmbs, 10YR 3/3 silty loam; 2-18 cmbs, 10YR 4/3 silty clay loam; 18-30 cmbs, 10YR 4/4 silty clay	
East Mit.	10	3	❑	30	0-1 cmbs, 10YR 3/3 silty loam; 1-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
East Mit.	10	4	❑	30	0-8 cmbs, 10YR 4/3 silty clay loam; 8-30 cmbs, 10YR 4/4 silty clay	
East Mit.	10	5	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
East Mit.	10	6	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
East Mit.	10	7	❑	30	0-5 cmbs, 10YR 4/3 silty clay loam; 5-30 cmbs, 10YR 4/4 silty clay	
East Mit.	10	8	❑	30	0-2 cmbs, 10YR 4/3 silty clay loam; 2-30 cmbs, 10YR 4/4 silty clay	
East Mit.	10	9	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
East Mit.	11	1	❑	40	0-4 cmbs, 10YR 4/6 silty clay; 4-40 cmbs, 10YR 7/4 silty clay	
East Mit.	11	2	❑	26	0-26 cmbs, mottled 10YR 5/4 and 10YR 7/3 clay	
East Mit.	11	3	❑	34	0-8 cmbs, 10YR 4/4 silty clay loam; 8-34 cmbs, 10YR 7/4 silty clay	
East Mit.	11	4	❑	38	0-10 cmbs, 10YR 4/4 silty clay loam; 10-38 cmbs, 10YR 7/4 silty clay	
East Mit.	11	5	❑	36	0-10 cmbs, 10YR 4/4 silty clay loam; 10-36 cmbs, 10YR 7/4 silty clay	
East Mit.	11	6	❑	32	0-12 cmbs, 10YR 4/3 silty clay loam; 12-32 cmbs, 10YR 7/6 silty clay	
East Mit.	11	7	❑	34	0-8 cmbs, 10YR 4/3 silty clay loam; 8-34 cmbs, 10YR 7/4 silty clay	
East Mit.	12	1	❑	34	0-8 cmbs, 10YR 4/4 silty clay loam; 8-34 cmbs, 10YR 7/4 silty clay	
East Mit.	12	2	❑	40	0-10 cmbs, 10YR 4/4 silty clay loam; 10-40 cmbs, 10YR 7/4 silty clay	
East Mit.	12	3	❑	32	0-8 cmbs, 10YR 4/4 silty clay loam; 8-32 cmbs, 10YR 7/4 silty clay	
East Mit.	12	4	❑	6	0-6 cmbs, mottled 10YR 6/8 and 10YR 7/6 clay	gravel just below surface; old road

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
East Mit.	12	5	❑	18	0-18 cmbs, mottled 10YR 7/2 and 10YR 6/4 clay	
East Mit.	12	6	Ø			standing water
East Mit.	12	7	Ø			edge of gravel road
East Mit.	13	1	❑	30	0-11 cmbs, 10YR 4/4 silty clay loam; 11-30 cmbs, mottled 10YR 6/1 and 10YR 5/4 silty clay	
East Mit.	13	2	❑	30	0-10 cmbs, 10YR 4/4 silty clay loam; 10-30 cmbs, 10YR 5/6 clay	
East Mit.	13	3	❑	33	0-13 cmbs, 10YR 4/3 silty clay loam; 13-33 cmbs, mottled 10YR 7/3 and 10YR 5/3 silty clay	
East Mit.	13	4	❑	25	0-7 cmbs, 10YR 4/2 silty clay loam; 7-25 cmbs, mottled 10YR 7/1 and 7.5YR 4/6 clay	ground water at 25 cmbs
East Mit.	13	5	❑	33	0-9 cmbs, 10YR 4/2 silty clay loam; 9-33 cmbs, mottled 10YR 7/3 and 7.5YR 4/6 silty clay	
East Mit.	13	6	❑	34	0-11 cmbs, 10YR 4/2 silty clay loam; 11-34 cmbs, 10YR 5/6 silty clay	
East Mit.	13	7	❑	30	0-12 cmbs, 10YR 4/2 silty clay loam; 12-30 cmbs, 10YR 6/3 silty clay	
East Mit.	13	8	❑	34	0-13 cmbs, 10YR 3/2 silty clay loam; 13-34 cmbs, 10YR 5/8 clay	
East Mit.	14	1	Ø			slope into drainage
East Mit.	14	2	Ø			slope/drainage
East Mit.	14	3	Ø			slope/drainage
East Mit.	14	4	Ø			drainage
East Mit.	14	5	❑	35	0-15 cmbs, 10YR 4/1 silty clay loam; 15-35 cmbs, 10YR 5/8 clay	
East Mit.	14	6	❑	32	0-15 cmbs, 10YR 5/3 silty clay loam; 15-32 cmbs, mottled 10YR 7/3 and 10YR 4/6 silty clay	
East Mit.	14	7	❑	30	0-12 cmbs, 10YR 5/3 silty clay loam; 12-30 cmbs, mottled 10YR 7/3 and 10YR 4/6 silty clay	
East Mit.	14	8	Ø			heavy saturated soil
East Mit.	15	1	❑	30	0-9 cmbs, 10YR 4/4 silty clay loam; 9-30 cmbs, 10YR 4/3 silty clay	
East Mit.	15	2	❑	30	0-4 cmbs, 10YR 4/4 silty clay loam; 4-30 cmbs, 10YR 4/3 silty clay	
East Mit.	15	3	❑	30	0-2 cmbs, 10YR 4/4 silty clay loam; 2-30 cmbs, 10YR 4/3 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
East Mit.	15	4	❑	30	0-2 cmbs, 10YR 4/4 silty clay loam; 2-30 cmbs, 10YR 4/3 silty clay	
East Mit.	15	5	❑	30	0-3 cmbs, 10YR 4/4 silty clay loam; 3-30 cmbs, 10YR 4/3 silty clay	
East Mit.	15	6	❑	30	0-5 cmbs, 10YR 4/4 silty clay loam; 5-30 cmbs, 10YR 4/3 silty clay	
East Mit.	15	7	❑	30	0-2 cmbs, 10YR 4/4 silty clay loam; 2-30 cmbs, 10YR 4/3 silty clay	
East Mit.	15	8	❑	30	0-4 cmbs, 10YR 4/4 silty clay loam; 4-30 cmbs, 10YR 4/3 silty clay	
East Mit.	15	9	❑	30	0-2 cmbs, 10YR 4/4 silty clay loam; 2-30 cmbs, 10YR 4/3 silty clay	
East Mit.	16	1	❑	30	0-3 cmbs, 10YR 4/4 silty clay loam; 3-30 cmbs, 10YR 4/3 silty clay	
East Mit.	16	2	❑	30	0-10 cmbs, 10YR 4/4 silty clay loam; 10-30 cmbs, 10YR 4/3 silty clay	
East Mit.	16	3	❑	30	0-8 cmbs, 10YR 4/4 silty clay loam; 8-30 cmbs, 10YR 4/3 silty clay	
East Mit.	16	4	❑	30	0-10 cmbs, 10YR 4/4 silty clay loam; 10-30 cmbs, 10YR 4/3 silty clay	
East Mit.	16	5	❑	30	0-5 cmbs, 10YR 4/4 silty clay loam; 5-30 cmbs, 10YR 4/3 silty clay	
East Mit.	16	6	❑	30	0-3 cmbs, 10YR 4/4 silty clay loam; 3-30 cmbs, 10YR 4/3 silty clay	
East Mit.	16	7	❑	30	0-3 cmbs, 10YR 4/4 silty clay loam; 3-30 cmbs, 10YR 4/3 silty clay	
East Mit.	16	8	❑	30	0-6 cmbs, 10YR 4/4 silty clay loam; 6-30 cmbs, 10YR 4/3 silty clay	
East Mit.	16	9	❑	30	0-3 cmbs, 10YR 4/4 silty clay loam; 3-30 cmbs, 10YR 4/3 silty clay	
East Mit.	17	1	Ø			good surface visibility
East Mit.	17	2	❑	38	0-14 cmbs, 10YR 4/4 silty clay loam; 14-38 cmbs, 10YR 6/8 silty clay	
East Mit.	17	3	❑	36	0-12 cmbs, 10YR 4/4 silty clay loam; 12-36 cmbs, 10YR 6/8 silty clay	
East Mit.	17	4	❑	36	0-10 cmbs, 10YR 3/3 silty clay loam; 10-36 cmbs, 10YR 6/8 silty clay	old road 5 m south
East Mit.	17	5	❑	38	0-16 cmbs, 10YR 4/4 silty clay loam; 16-38 cmbs, 10YR 6/6 silty clay	
East Mit.	17	6	❑	40	0-21 cmbs, 10YR 4/4 silty clay loam; 21-32 cmbs, 10YR 6/4 silty clay loam; 32-40 cmbs, 10YR 6/6 silty clay	
East Mit.	17	7	Ø			berm along creek
East Mit.	18	1	❑	40	0-18 cmbs, 10YR 4/4 silty clay loam; 18-40 cmbs, 10YR 6/6 silty clay	
East Mit.	18	2	❑	31	0-16 cmbs, 10YR 4/4 silty clay loam; 16-31 cmbs, 10YR 6/6 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
East Mit.	18	3	Ø			wet; old road 10 m north
East Mit.	18	4	❏	24	0-8 cmbs, 10YR 4/3 silty clay loam; 8-24 cmbs, 10YR 6/8 silty clay	
East Mit.	18	5	Ø			standing water
East Mit.	18	6	❏	38	0-14 cmbs, 10YR 4/4 silty clay loam; 14-38 cmbs, 10YR 6/8 silty clay	
East Mit.	18	7	Ø			piles of asphalt and dirt
East Mit.	19	1	Ø			disturbed; debris; water
East Mit.	19	2	Ø			disturbed; debris; water
East Mit.	19	3	Ø			water
East Mit.	19	4	Ø			water
East Mit.	19	5	Ø			water
East Mit.	19	6	Ø			saturated
East Mit.	19	7	❏	30	0-16 cmbs, 10YR 4/3 silty clay loam; 16-30 cmbs, 10YR 4/4 silty clay	
East Mit.	19	8	❏	30	0-8 cmbs, 10YR 4/3 silty clay loam; 8-30 cmbs, 10YR 4/4 silty clay	
East Mit.	19	9	Ø			slope into creek
East Mit.	20	1	❏	10	0-2 cmbs, 10YR 4/2 silty clay loam; 2-10 cmbs, 10YR 5/8 gravel fill clay	
East Mit.	20	2	Ø			disturbed; road debris
East Mit.	20	3	Ø			disturbed; road debris
East Mit.	20	4	❏	34	0-34 cmbs, 10YR 6/3 silty clay	
East Mit.	20	5	❏	40	0-14 cmbs, 10YR 4/2 silty clay loam; 14-40 cmbs, 10YR 5/6 silty clay	
East Mit.	20	6	❏	31	0-10 cmbs, 10YR 3/2 silty clay loam; 10-31 cmbs, 10YR 5/6 silty clay	
East Mit.	20	7	❏	40	0-16 cmbs, 10YR 3/2 silty clay loam; 16-40 cmbs, 10YR 5/8 silty clay	
East Mit.	20	8	Ø			slope into Big Creek
East Mit.	21	1	Ø			slope into Big Creek
East Mit.	21	2	❏	34	0-19 cmbs, 10YR 3/2 silty clay loam; 19-34 cmbs, 10YR 4/4 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
East Mit.	21	3	❑	10	0-3 cmbs, 10YR 3/1 silty clay loam; 3-10 cmbs, 7.5YR 5/8 gravel fill clay	
East Mit.	21	4	❑	30	0-13 cmbs, 10YR 3/2 silty clay loam; 13-30 cmbs, 10YR 4/4 silty clay	
East Mit.	21	5	❑	40	0-13 cmbs, 10YR 4/2 silty clay loam with asphalt; 13-40 cmbs, mottled 10YR 7/2 and 10YR 5/4 silty clay	
East Mit.	21	6	❑	33	0-12 cmbs, 10YR 3/2 silty clay loam; 12-33 cmbs, mottled 10YR 5/2, 10YR 6/8, and 10YR 7/1 silty clay	
East Mit.	21	7	Ø			disturbed; asphalt and brick push pile
East Mit.	21	8	❑	10	0-10 cmbs, mottled 10YR 5/2, 10YR 6/8, and 10YR 7/1 gravel fill clay	
West Mit.	1	1	❑	30	0-15 cmbs, 10YR 4/3 silty clay loam; 15-30 cmbs, mottled 10YR 5/3 and 10YR 7/2 silty clay	
West Mit.	1	2	❑	35	0-13 cmbs, 10YR 3/2 silty clay loam; 13-35 cmbs, 10YR 4/3 silty clay	
West Mit.	1	3	❑	36	0-18 cmbs, 10YR 5/3 silty clay loam; 18-36 cmbs, 10YR 6/2 silty clay	
West Mit.	1	4	❑	35	0-12 cmbs, 10YR 4/3 silty clay loam; 12-35 cmbs, 10YR 5/4 silty clay	
West Mit.	1	5	❑	33	0-12 cmbs, 10YR 4/2 silty clay loam; 12-33 cmbs, 10YR 5/6 silty clay	
West Mit.	1	6	❑	33	0-15 cmbs, 10YR 4/2 silty clay loam; 15-35 cmbs, 10YR 5/6 silty clay	
West Mit.	1	7	Ø			creek
West Mit.	2	1	❑	30	0-4 cmbs, 10YR 4/3 silty clay loam; 4-30 cmbs, 10YR 4/4 silty clay	
West Mit.	2	2	❑	30	0-6 cmbs, 10YR 4/3 silty clay loam; 6-30 cmbs, 10YR 4/4 silty clay	
West Mit.	2	3	❑	30	0-4 cmbs, 10YR 4/3 silty clay loam; 4-30 cmbs, 10YR 4/4 silty clay	
West Mit.	2	4	❑	30	0-7 cmbs, 10YR 4/3 silty clay loam; 7-30 cmbs, 10YR 4/4 silty clay	
West Mit.	2	5	❑	30	0-9 cmbs, 10YR 4/3 silty clay loam; 9-30 cmbs, 10YR 4/4 silty clay	
West Mit.	2	6	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
West Mit.	3	1	❑	32	0-6 cmbs, 10YR 4/3 silty clay loam; 6-21 cmbs, 10YR 6/6 silty clay; 21-32 cmbs, mottled 10YR 6/6 and 10YR 7/4 clay	
West Mit.	3	2	❑	24	0-24 cmbs, mottled 10YR 6/8 and 10YR 7/4 clay	delineated wetland
West Mit.	3	3	❑	5	0-5 cmbs, mottled 10YR 2/3 and 10YR 7/1 gravel, slag, and loam	possible degraded road east of rail

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	3	4	❑	40	0-8 cmbs, 10YR 4/3 silty clay loam; 8-34 cmbs, 10YR 5/4 silty clay loam; 34-40 cmbs, 10YR 6/6 silty clay	
West Mit.	3	5	❑	37	0-18 cmbs, 10YR 4/3 silty clay loam; 18-37 cmbs, 10YR 5/6 silty clay	
West Mit.	4	1	❑	30	0-8 cmbs, 10YR 4/3 silty clay loam; 8-30 cmbs, 10YR 4/4 silty clay	
West Mit.	4	2	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
West Mit.	4	3	❑	30	0-7 cmbs, 10YR 4/3 silty clay loam; 7-15 cmbs, 10YR 4/4 silty clay; 15-30 cmbs, 10YR 4/4 silty clay	layer 2 has hard, orange possible dump of slag
West Mit.	4	4	❑	30	0-11 cmbs, 10YR 3/3 silty clay loam; 11-30 cmbs, 10YR 5/6 silty clay	
West Mit.	4	5	❑	30	0-9 cmbs, 10YR 3/3 silty clay loam; 9-30 cmbs, 10YR 5/6 silty clay	
West Mit.	5	1	❑	42	0-16 cmbs, 10YR 4/4 silty loam; 16-42 cmbs, 10YR 5/4 silty clay loam	
West Mit.	5	2	❑	40	0-18 cmbs, 10YR 4/4 silty loam; 18-40 cmbs, 10YR 5/4 silty clay loam	
West Mit.	5	3	❑	38	0-6 cmbs, 10YR 3/3 silty loam; 6-24 cmbs, 10YR 5/4 silty clay loam; 24-38 cmbs, mottled 10YR 7/3 and 10YR 6/8 silty clay	
West Mit.	5	4	Ø			gravel at surface; old rail
West Mit.	6	1	❑	35	0-13 cmbs, 10YR 4/2 silty clay loam; 13-35 cmbs, 10YR 5/6 silty clay	
West Mit.	6	2	❑	34	0-12 cmbs, 10YR 3/2 silty clay loam; 12-34 cmbs, 10YR 5/6 silty clay	
West Mit.	6	3	❑	33	0-11 cmbs, 10YR 3/2 silty clay loam; 11-33 cmbs, 10YR 5/6 silty clay	
West Mit.	6	4	❑	31	0-10 cmbs, 10YR 3/2 silty clay loam; 10-31 cmbs, 10YR 5/6 silty clay	
West Mit.	6	5	❑	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 7.5YR 5/8 clay with gravel	
West Mit.	6	6	❑	30	0-12 cmbs, 10YR 4/2 silty clay loam; 12-30 cmbs, mottled 7.5YR 5/8 and 10YR 7/2 clay with gravel	
West Mit.	7	1	❑	34	0-6 cmbs, 10YR 4/3 silty clay loam; 6-34 cmbs, 10YR 5/4 silty clay	
West Mit.	7	2	Ø			old rail grade
West Mit.	7	3	Ø			old rail grade
West Mit.	7	4	❑	32	0-8 cmbs, 10YR 4/3 silty clay loam; 8-32 cmbs, mottled 10YR 5/4 and 10YR 7/4 silty clay	
West Mit.	7	5	❑	35	0-10 cmbs, 10YR 4/3 silty clay loam; 10-35 cmbs, mottled 10YR 7/4 and 10YR 5/6 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	7	6	❑	38	0-8 cmbs, 10YR 4/3 silty clay loam; 8-38 cmbs, mottled 10YR 5/4 and 10YR 7/4 silty clay	
West Mit.	7	7	❑	34	0-8 cmbs, 10YR 4/3 silty clay loam; 8-34 cmbs, mottled 10YR 5/4 and 10YR 7/3 silty clay	
West Mit.	8	1	❑	39	0-16 cmbs, 10YR 4/3 silty clay loam; 16-39 cmbs, mottled 10YR 5/3 and 10YR 7/4 silty clay	
West Mit.	8	2	Ø			standing water; delineated wetland
West Mit.	8	3	❑	30	0-4 cmbs, 10YR 4/4 silty clay loam; 4-30 cmbs, 10YR 5/4 silty clay	somewhat wet
West Mit.	8	4	Ø			old rail grade
West Mit.	8	5	❑	35	0-10 cmbs, 10YR 4/3 silty clay loam; 10-35 cmbs, mottled 10YR 5/4 and 10YR 7/4 silty clay	
West Mit.	8	6	❑	28	0-4 cmbs, 10YR 4/4 silty clay loam; 4-28 cmbs, 10YR 6/6 clay	
West Mit.	8	7	❑	29	0-6 cmbs, 10YR 4/4 silty clay loam; 6-29 cmbs, 10YR 6/6 clay	
West Mit.	9	1	❑	32	0-14 cmbs, 10YR 3/2 silty clay loam; 14-32 cmbs, mottled 10YR 5/8 and 10YR 6/4 clay	
West Mit.	9	2	❑	30	0-11 cmbs, 10YR 4/2 silty clay loam; 11-30 cmbs, 10YR 5/4 silty clay	
West Mit.	9	3	Ø			wetland; standing water
West Mit.	9	4	❑	25	0-20 cmbs, 10YR 2/1 gravel; 20-25 cmbs, 7.5YR 6/8 compact fill clay	old road or railroad
West Mit.	9	5	Ø			wetland; standing water
West Mit.	9	6	❑	30	0-7 cmbs, 10YR 4/2 silty clay loam; 7-30 cmbs, 10YR 5/4 silty clay	
West Mit.	9	7	❑	33	0-10 cmbs, 10YR 4/2 silty clay loam; 10-33 cmbs, 10YR 4/4 silty clay	
West Mit.	10	1	❑	30	0-12 cmbs, 10YR 4/2 silty clay loam; 12-30 cmbs, 10YR 4/4 silty clay	
West Mit.	10	2	❑	30	0-6 cmbs, 10YR 4/2 silty clay loam; 6-30 cmbs, 10YR 5/3 silty clay	
West Mit.	10	3	❑	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 10YR 5/3 silty clay	
West Mit.	10	4	❑	15	0-5 cmbs, 10YR 2/1 silty clay loam; 5-15 cmbs, mottled 10YR 5/2 and 10YR 7/3 clay	
West Mit.	10	5	❑	20	0-10 cmbs, 10YR 2/1 silty clay loam; 10-20 cmbs, mottled 10YR 5/1 and 10YR 7/1 clay	
West Mit.	10	6	❑	15	0-5 cmbs, 10YR 5/1 silty clay; 5-15 cmbs, 7.5YR 5/8 clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	10	7	❑	15	0-3 cmbs, 10YR 4/2 silty clay loam; 3-15 cmbs, 7.5YR 5/8 clay	
West Mit.	11	1	❑	31	0-6 cmbs, 10YR 4/4 silty clay loam; 6-31 cmbs, mottled 10YR 6/6 and 10YR 7/4 clay	
West Mit.	11	2	❑	30	0-8 cmbs, 10YR 4/4 silty clay loam; 8-30 cmbs, mottled 10YR 6/6 and 10YR 7/4 clay	
West Mit.	11	3	❑	21	0-4 cmbs, 10YR 3/3 clay loam; 4-21 cmbs, 10YR 6/6 clay	
West Mit.	11	4	Ø			old rail grade
West Mit.	11	5	Ø			standing water
West Mit.	11	6	❑	34	0-11 cmbs, 10YR 4/3 silty clay loam; 11-34 cmbs, mottled 10YR 5/4 and 10YR 7/4 silty clay	
West Mit.	11	7	❑	36	0-14 cmbs, 10YR 3/3 silty clay loam; 14-36 cmbs, 10YR 5/4 silty clay	
West Mit.	12	1	❑	15	0-5 cmbs, 10YR 4/2 silty clay loam; 5-15 cmbs, 7.5YR 5/8 clay	
West Mit.	12	2	❑	20	0-10 cmbs, 10YR 2/1 gravel loam; 10-20 cmbs, 7.5YR 5/6 clay fill	
West Mit.	12	3	Ø			wetland; standing water
West Mit.	12	4	❑	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 10YR 5/3 silty clay	
West Mit.	12	5	❑	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 10YR 5/3 silty clay	
West Mit.	13	1	❑	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 10YR 5/3 silty clay	
West Mit.	13	2	❑	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 10YR 5/3 silty clay	
West Mit.	14	1	Ø			numerous roots
West Mit.	14	2	❑	29	0-6 cmbs, 10YR 4/6 silty clay loam; 6-29 cmbs, 10YR 5/4 silty clay	
West Mit.	14	3	❑	34	0-8 cmbs, 10YR 4/6 silty clay loam; 8-34 cmbs, 10YR 5/4 silty clay	
West Mit.	14	4	❑	40	0-8 cmbs, 10YR 4/4 silty clay loam; 8-40 cmbs, 10YR 5/4 silty clay	
West Mit.	15	1	❑	33	0-10 cmbs, 10YR 4/2 silty clay loam; 10-33 cmbs, 10YR 5/3 silty clay	
West Mit.	15	2	❑	35	0-10 cmbs, 10YR 4/2 silty clay loam; 10-35 cmbs, 10YR 5/3 silty clay	
West Mit.	15	3	Ø			drainage
West Mit.	15	4	❑	34	0-12 cmbs, 10YR 4/2 silty clay loam; 12-34 cmbs, 10YR 5/8 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	16	1	❏	20	0-20 cmbs, mottled 10YR 6/1 and 7.5YR 5/4 silty clay	saturated; ground water at 20 cmbs
West Mit.	16	2	Ø			wetland; standing water
West Mit.	16	3	❏	32	0-13 cmbs, 10YR 4/2 silty clay loam; 13-32 cmbs, 10YR 5/6 silty clay	saturated; ground water at 32 cmbs
West Mit.	16	4	❏	38	0-17 cmbs, 10YR 4/2 silty clay loam; 17-38 cmbs, 10YR 5/4 silty clay	
West Mit.	16	5	❏	40	0-20 cmbs, 10YR 3/3 loam; 20-40 cmbs, 10YR 6/6 saturated clay	
West Mit.	16	6	❏	33	0-14 cmbs, 10YR 3/3 loam; 14-33 cmbs, 10YR 5/4 saturated silty clay	
West Mit.	16	7	❏	44	0-20 cmbs, 10YR 4/1 silty loam; 20-44 cmbs, 10YR 5/4 silty clay	
West Mit.	16	8	❏	36	0-15 cmbs, 10YR 4/2 silty clay loam; 15-36 cmbs, 10YR 5/4 silty clay	
West Mit.	17	1	❏	30	0-16 cmbs, 10YR 4/2 silty clay loam; 16-30 cmbs, 10YR 5/8 compact silty clay	
West Mit.	17	2	Ø			slope; drainage
West Mit.	17	3	❏	33	0-15 cmbs, 10YR 4/2 silty clay loam; 15-33 cmbs, 10YR 5/6 silty clay	
West Mit.	17	4	❏	37	0-12 cmbs, 10YR 4/2 silty clay loam; 12-37 cmbs, 10YR 5/6 silty clay	
West Mit.	17	5	Ø			wetland; standing water
West Mit.	17	6	❏	33	0-15 cmbs, 10YR 5/1 silty clay loam; 15-33 cmbs, mottled 10YR 7/2 and 7.5YR 7/6 silty clay	
West Mit.	17	7	❏	34	0-17 cmbs, 10YR 3/2 silty loam; 17-34 cmbs, 10YR 7/8 saturated clay	
West Mit.	17	8	Ø			wetland; standing water
West Mit.	17	9	❏	20	0-20 cmbs, mottled 10YR 6/6 and 7.5YR 5/4 saturated silty clay	ground water at 20 cmbs
West Mit.	18	1	❏	30	0-11 cmbs, 10YR 3/3 silty loam; 11-30 cmbs, 10YR 3/3 silty loam and asphalt	some asphalt and gravel
West Mit.	18	2	❏	30	0-14 cmbs, 10YR 4/3 silty clay loam; 14-30 cmbs, 10YR 4/4 silty clay	possible iron slag at 18 cmbs
West Mit.	18	3	❏	30	0-11 cmbs, 10YR 3/3 silty clay loam; 11-30 cmbs, 10YR 5/4 silty clay	
West Mit.	18	4	❏	30	0-15 cmbs, 10YR 3/3 silty clay loam; 15-30 cmbs, 10YR 5/4 silty clay	
West Mit.	18	5	❏	30	0-15 cmbs, 10YR 3/3 silty clay loam; 15-30 cmbs, 10YR 5/4 silty clay	
West Mit.	18	6	❏	30	0-12 cmbs, 10YR 4/3 silty clay loam; 12-30 cmbs, 10YR 5/6 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	18	7	❑	30	0-15 cmbs, 10YR 3/3 silty clay loam; 15-30 cmbs, 10YR 4/4 silty clay	
West Mit.	18	8	❑	30	0-11 cmbs, 10YR 4/3 silty clay loam; 11-30 cmbs, 10YR 4/4 silty clay	
West Mit.	18	9	Ø			slope
West Mit.	18	10	Ø			slope
West Mit.	19	1	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
West Mit.	19	2	❑	30	0-9 cmbs, 10YR 4/3 silty loam; 9-30 cmbs, 10YR 4/4 silty clay	
West Mit.	19	3	❑	20	0-9 cmbs, 10YR 4/3 silty clay loam; 9-20 cmbs, 10YR 4/4 silty clay	saturated at 20 cmbs
West Mit.	19	4	❑	30	0-15 cmbs, 10YR 4/4 silty clay loam; 15-30 cmbs, 10YR 5/6 silty clay	
West Mit.	19	5	Ø			slope
West Mit.	19	6	Ø			slope
West Mit.	19	7	❑	30	0-12 cmbs, 10YR 4/3 silty clay loam; 12-30 cmbs, 10YR 4/4 silty clay	
West Mit.	19	8	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 4/4 silty clay	
West Mit.	19	9	❑	30	0-7 cmbs, 10YR 4/3 silty clay loam; 7-30 cmbs, 10YR 6/6 silty clay	
West Mit.	20	1	❑	31	0-6 cmbs, 10YR 4/4 silty clay loam; 6-31 cmbs, mottled 10YR 7/3 and 10YR 7/4 silty clay	
West Mit.	20	2	Ø			ditch/drainage
West Mit.	20	3	❑	34	0-18 cmbs, 10YR 4/3 silty clay loam; 18-34 cmbs, 10YR 6/4 silty clay	somewhat wet
West Mit.	20	4	❑	30	0-12 cmbs, 10YR 4/3 silty clay loam; 12-30 cmbs, 10YR 6/4 silty clay	
West Mit.	20	5	❑	34	0-14 cmbs, 10YR 4/3 silty clay loam; 14-34 cmbs, 10YR 6/4 silty clay	
West Mit.	20	6	Ø			drainage
West Mit.	20	7	❑	38	0-12 cmbs, 10YR 4/3 silty clay; 12-38 cmbs, 10YR 6/4 clay	
West Mit.	20	8	❑	29	0-29 cmbs, mottled 10YR 4/3 and 10YR 6/4 silty clay	somewhat wet
West Mit.	20	9	❑	34	0-34 cmbs, mottled 10YR 4/3 and 10YR 6/4 silty clay	somewhat wet
West Mit.	21	1	❑	32	0-10 cmbs, 10YR 4/4 silty clay loam; 10-32 cmbs, mottled 10YR 6/6 and 10YR 7/4 silty clay	very compact at 26 cmbs

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	21	2	❏	14	0-4 cmbs, 10YR 4/4 silty clay loam; 4-8 cmbs, 10YR 6/4 silty clay; 8-14 cmbs, 10YR 6/8 silty clay	ironstone rock at 12 cmbs
West Mit.	21	3	❏	39	0-6 cmbs, 10YR 3/3 silty clay loam; 6-28 cmbs, 10YR 6/4 silty clay; 28-39 cmbs, 10YR 7/3 clay	
West Mit.	21	4	Ø			drainage
West Mit.	21	5	❏	34	0-12 cmbs, 10YR 4/4 silty clay loam; 12-34 cmbs, 10YR 6/4 silty clay	
West Mit.	21	6	❏	31	0-31 cmbs, mottled 10YR 6/4 and 10YR 7/4 clay	
West Mit.	21	7	❏	3	0-30 cmbs, mottled 10YR 6/4 and 10YR 7/4 clay	
West Mit.	21	8	❏	29	0-8 cmbs, 10YR 4/4 silty clay loam; 8-29 cmbs, 10YR 6/4 silty clay	
West Mit.	21	9	❏	34	0-10 cmbs, 10YR 4/4 silty clay loam; 10-34 cmbs, 10YR 6/4 silty clay	
West Mit.	22	1	Ø			old road bed; standing water
West Mit.	22	2	❏	38	0-14 cmbs, 10YR 4/6 silty clay loam; 14-38 cmbs, 10YR 6/4 silty clay	
West Mit.	22	3	❏	24	0-6 cmbs, 10YR 4/4 silty clay loam; 6-14 cmbs, 10YR 6/4 silty clay	roots at 14 cmbs
West Mit.	22	4	❏	10	0-6 cmbs, 10YR 6/4 silty clay; 6-10 cmbs, 10YR 5/8 clay	very compact; some gravel
West Mit.	22	5	❏	18	0-6 cmbs, 10YR 4/4 silty clay loam; 6-18 cmbs, 10YR 6/6 silty clay	1970s trash pile to north
West Mit.	22	6	❏	16	0-8 cmbs, 10YR 4/4 silty clay loam; 8-16 cmbs, 10YR 6/6 silty clay	gravel at 16 cmbs
West Mit.	22	7	❏	17	0-4 cmbs, 10YR 4/4 silty clay loam; 4-17 cmbs, 10YR 6/6 silty clay	
West Mit.	22	8	❏	21	0-9 cmbs, 10YR 4/4 silty clay loam; 9-21 cmbs, 10YR 6/6 silty clay	
West Mit.	22	9	Ø			deeply eroded
West Mit.	23	1	Ø			standing water
West Mit.	23	2	❏	30	0-30 cmbs, 10YR 5/6 silty clay	
West Mit.	23	3	❏	30	0-10 cmbs, 10YR 5/6 silty clay; 10-30 cmbs, 10YR 5/8 silty clay	
West Mit.	23	4	❏	30	0-18 cmbs, 10YR 4/6 silty clay; 18-30 cmbs, 10YR 6/4 silty clay	
West Mit.	23	5	❏	30	0-16 cmbs, 10YR 4/6 silty clay; 16-30 cmbs, 10YR 6/4 silty clay	
West Mit.	23	6	Ø			disturbed ground

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	23	7	Ø			slope
West Mit.	23	8	❑	30	0-10 cmbs, 10YR 4/3 silty clay loam; 10-30 cmbs, 10YR 5/6 silty clay	
West Mit.	23	9	❑	30	0-11 cmbs, 10YR 4/3 silty clay loam; 11-30 cmbs, 10YR 4/4 silty clay	
West Mit.	23	10	❑	30	0-8 cmbs, 10YR 4/3 silty clay loam; 8-30 cmbs, 10YR 4/4 silty clay	
West Mit.	23	11	Ø			slope
West Mit.	24	1	❑	33	0-14 cmbs, 10YR 3/2 silty clay loam; 14-33 cmbs, 7.5YR 6/6 silty clay	
West Mit.	24	2	❑	36	0-15 cmbs, 10YR 4/2 silty clay loam; 15-36 cmbs, 10YR 5/4 silty clay	
West Mit.	24	3	❑	30	0-14 cmbs, 10YR 5/3 silty clay loam; 14-30 cmbs, 10YR 5/6 silty clay	
West Mit.	24	4	❑	29	0-16 cmbs, 10YR 5/4 silty clay loam; 16-29 cmbs, 10YR 5/8 compact silty clay	
West Mit.	24	5	❑	34	0-18 cmbs, 10YR 5/4 silty clay loam; 18-34 cmbs, 7.5YR 7/6 silty clay	
West Mit.	24	6	❑	31	0-15 cmbs, 10YR 5/4 silty clay loam; 15-31 cmbs, mottled 10YR 7/6 and 10YR 7/3 compact silty clay	
West Mit.	24	7	❑	32	0-15 cmbs, 10YR 5/4 silty clay loam; 15-32 cmbs, mottled 10YR 7/6 and 10YR 7/3 compact silty clay	
West Mit.	24	8	Ø			wetland; inundated soils
West Mit.	24	9	❑	32	0-12 cmbs, 10YR 3/2 silty loam; 12-32 cmbs, 7.5YR 5/8 clay	
West Mit.	25	1	❑	42	0-13 cmbs, 10YR 3/3 silty clay loam; 13-42 cmbs, 7.5YR 5/6 clay	
West Mit.	25	2	❑	30	0-11 cmbs, 10YR 7/6 silty clay loam; 11-30 cmbs, mottled 7.5YR 7/8 and 10YR 7/3 compact silty clay	
West Mit.	25	3	❑	28	0-6 cmbs, 10YR 3/2 silty clay loam; 6-28 cmbs, 10YR 7/6 clay	
West Mit.	25	4	❑	23	0-11 cmbs, 10YR 5/4 silty clay loam; 11-23 cmbs, 7.5YR 6/6 compact clay	
West Mit.	25	5	❑	35	0-17 cmbs, 10YR 5/4 silty clay loam; 17-35 cmbs, 7.5YR 6/6 compact clay	
West Mit.	25	6	❑	25	0-14 cmbs, 10YR 5/4 silty clay loam; 14-25 cmbs, 7.5YR 7/6 compact clay	
West Mit.	25	7	❑	26	0-12 cmbs, 10YR 5/4 silty clay loam; 12-26 cmbs, 7.5YR 7/6 compact clay	
West Mit.	25	8	❑	42	0-20 cmbs, 10YR 4/4 silty clay loam; 20-42 cmbs, 10YR 5/8 silty clay	
West Mit.	25	9	Ø			wetland; inundated soils

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	26	1	❑	30	0-8 cmbs, 10YR 4/3 silty clay loam; 8-30 cmbs, 10YR 4/4 silty clay	
West Mit.	26	2	❑	30	0-4 cmbs, 10YR 4/3 silty clay loam; 4-30 cmbs, 10YR 5/6 silty clay	
West Mit.	26	3	❑	30	0-3 cmbs, 10YR 4/3 silty clay loam; 3-30 cmbs, 10YR 5/6 silty clay	
West Mit.	26	4	❑	30	0-30 cmbs, 10YR 5/6 silty clay loam	
West Mit.	26	5	❑	30	0-30 cmbs, 10YR 4/6 silty clay loam	
West Mit.	26	6	❑	30	0-30 cmbs, 10YR 4/6 silty clay loam	
West Mit.	26	7	❑	30	0-4 cmbs, 10YR 4/3 silty clay loam; 4-30 cmbs, 10YR 5/6 silty clay	
West Mit.	26	8	❑	30	0-12 cmbs, 10YR 4/3 silty clay loam; 12-30 cmbs, 10YR 4/4 silty clay	
West Mit.	26	9	❑	30	0-15 cmbs, 10YR 4/4 silty clay loam; 15-30 cmbs, 10YR 5/6 silty clay	
West Mit.	27	1	❑	40	0-16 cmbs, 10YR 4/3 silty clay loam; 16-40 cmbs, 10YR 6/6 silty clay	
West Mit.	27	2	❑	24	0-24 cmbs, 10YR 6/8 clay	fairly wet soil
West Mit.	27	3	❑	26	0-26 cmbs, 10YR 6/4 silty clay	
West Mit.	27	4	Ø			standing water
West Mit.	27	5	❑	30	0-8 cmbs, 10YR 6/4 silty clay loam; 8-30 cmbs, 10YR 6/6 silty clay	
West Mit.	27	6	❑	36	0-21 cmbs, 10YR 4/6 silty clay; 21-36 cmbs, mottled 10YR 7/2 and 10YR 4/4 clay	
West Mit.	28	1	Ø			standing water
West Mit.	28	2	Ø			saturated
West Mit.	28	3	❑	30	0-30 cmbs, 10YR 5/6 silty clay	
West Mit.	28	4	❑	30	0-30 cmbs, 10YR 5/6 silty clay	
West Mit.	28	5	❑	30	0-30 cmbs, 10YR 5/6 silty clay	
West Mit.	28	6	Ø			saturated
West Mit.	28	7	Ø			standing water
West Mit.	28	8	Ø			saturated
West Mit.	28	9	❑	30	0-6 cmbs, 10YR 3/3 silty clay loam; 6-30 cmbs, 10YR 5/6 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	29	1	Ø			standing water
West Mit.	29	2	Ø			standing water
West Mit.	29	3	❏	37	0-13 cmbs, 10YR 5/1 silty clay loam; 13-37 cmbs, 10YR 6/6 silty clay	
West Mit.	29	4	❏	40	0-15 cmbs, 10YR 5/1 silty clay loam; 15-40 cmbs, 10YR 7/6 silty clay	
West Mit.	29	5	Ø			standing water
West Mit.	29	6	❏	15	0-10 cmbs, 10YR 5/1 silty clay loam; 10-15 cmbs, mottled 10YR 7/6 and 10YR 8/3 saturated silty clay	ground water at 15 cmbs
West Mit.	29	7	Ø			standing water
West Mit.	29	8	❏	33	0-12 cmbs, 10YR 4/2 silty clay loam; 12-33 cmbs, 10YR 5/6 silty clay	
West Mit.	30	1	❏	34	0-8 cmbs, 10YR 6/4 silty clay loam; 8-34 cmbs, 10YR 6/6 silty clay	
West Mit.	30	2	❏	26	0-26 cmbs, 10YR 4/6 silty clay	wet
West Mit.	30	3	❏	38	0-12 cmbs, 10YR 4/4 silty clay loam; 12-38 cmbs, 10YR 6/4 silty clay	
West Mit.	30	4	Ø			eroded gully
West Mit.	30	5	❏	30	0-16 cmbs, 10YR 4/6 silty clay loam; 16-30 cmbs, 10YR 6/4 silty clay	
West Mit.	30	6	❏	38	0-15 cmbs, 10YR 4/3 silty clay loam; 15-38 cmbs, 10YR 6/4 silty clay	
West Mit.	30	7	❏	34	0-16 cmbs, 10YR 4/3 silty clay loam; 16-34 cmbs, 10YR 6/4 silty clay	wet
West Mit.	30	8	Ø			standing water
West Mit.	30	9	Ø			standing water
West Mit.	31	1	❏	36	0-10 cmbs, 10YR 4/4 silty clay loam; 10-36 cmbs, 10YR 6/4 silty clay	
West Mit.	31	2	❏	31	0-14 cmbs, 10YR 4/3 silty clay loam; 14-31 cmbs, mottled 10YR 6/1, 10YR 5/3, and 10YR 4/3 silty clay	
West Mit.	31	3	Ø			drainage
West Mit.	31	4	❏	36	0-15 cmbs, 10YR 4/3 silty clay loam; 15-36 cmbs, 10YR 5/6 silty clay	
West Mit.	31	5	Ø			deep gully
West Mit.	31	6	❏	30	0-16 cmbs, 10YR 4/3 silty clay loam; 16-30 cmbs, 10YR 5/4 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	31	7	Ø			standing water
West Mit.	31	8	Ø			standing water
West Mit.	32	1	Ø			surface visibility
West Mit.	32	2	Ø			standing water
West Mit.	32	3	Ø			standing water
West Mit.	32	4	Ø			standing water
West Mit.	32	5	❑	30	0-30 cmbs, 10YR 5/6 silty clay	
West Mit.	32	6	Ø			standing water
West Mit.	32	7	❑	30	0-10 cmbs, 10YR 4/6 silty clay loam; 10-30 cmbs, 10YR 5/6 silty clay	
West Mit.	32	8	❑	30	0-3 cmbs, 10YR 4/6 silty clay loam; 3-30 cmbs, 10YR 5/6 silty clay	
West Mit.	32	9	❑	30	0-10 cmbs, 10YR 4/4 silty clay loam; 10-30 cmbs, 10YR 5/6 silty clay	
West Mit.	32	10	Ø			slope
West Mit.	33	1	❑	30	0-3 cmbs, 10YR 4/3 silty clay loam; 3-30 cmbs, 10YR 5/6 silty clay	
West Mit.	33	2	❑	30	0-2 cmbs, 10YR 4/3 silty clay loam; 2-30 cmbs, 10YR 5/6 silty clay	
West Mit.	33	3	❑	30	0-4 cmbs, 10YR 4/3 silty clay loam; 4-30 cmbs, 10YR 5/6 silty clay	
West Mit.	33	4	Ø			standing water
West Mit.	33	5	❑	30	0-30 cmbs, 10YR 5/6 silty clay	
West Mit.	33	6	❑	30	0-30 cmbs, 10YR 5/6 silty clay	
West Mit.	33	7	Ø			surface visibility
West Mit.	33	8	Ø			standing water
West Mit.	33	9	Ø			standing water
West Mit.	33	10	Ø			surface visibility
West Mit.	34	1	❑	25	0-15 cmbs, 10YR 4/3 silty clay loam; 15-25 cmbs, 10YR 6/6 saturated silty clay	ground water at 25 cmbs
West Mit.	34	2	Ø			standing water

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	34	3	Ø			standing water
West Mit.	34	4	Ø			standing water
West Mit.	34	5	❑	36	0-15 cmbs, 10YR 4/3 silty clay loam; 15-36 cmbs, 10YR 5/6 silty clay	
West Mit.	34	6	Ø			standing water
West Mit.	34	7	Ø			standing water
West Mit.	34	8	❑	33	0-16 cmbs, 10YR 4/2 silty clay loam; 16-33 cmbs, 10YR 5/8 silty clay	
West Mit.	34	9	❑	26	0-12 cmbs, 10YR 4/2 silty clay loam; 12-26 cmbs, 10YR 5/8 silty clay	ground water at 26 cmbs
West Mit.	35	1	❑	25	0-12 cmbs, 10YR 4/2 silty clay loam; 12-25 cmbs, 10YR 5/8 silty clay	ground water at 25 cmbs
West Mit.	35	2	Ø			inundated soils
West Mit.	35	3	❑	38	0-15 cmbs, 10YR 4/1 silty clay loam; 15-38 cmbs, mottled 10YR 5/4 and 10YR 8/3 silty clay	
West Mit.	35	4	Ø			standing water
West Mit.	35	5	Ø			drainage; standing water
West Mit.	35	6	Ø			standing water
West Mit.	35	7	Ø			standing water
West Mit.	35	8	Ø			standing water
West Mit.	35	9	❑	35	0-15 cmbs, 10YR 4/2 silty clay loam; 15-35 cmbs, 10YR 5/6 silty clay	
West Mit.	35	10	❑	10	0-10 cmbs, 10YR 4/4 silty clay loam	saturated; ground water at 10 cmbs
West Mit.	36	1	❑	18	0-3 cmbs, 10YR 4/3 silty clay loam; 3-18 cmbs, 10YR 6/6 clay	wet
West Mit.	36	2	Ø			visibility; standing water
West Mit.	36	3	Ø			visibility; standing water
West Mit.	36	4	Ø			standing water
West Mit.	36	5	Ø			standing water
West Mit.	36	6	❑	29	0-8 cmbs, 10YR 4/4 silty clay loam; 8-29 cmbs, mottled 10YR 7/2 and 10YR 3/6 silty clay	some small gravels

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	36	7	Ø			standing water
West Mit.	36	8	❏	16	0-16 cmbs, 10YR 6/6 clay	
West Mit.	36	9	❏	21	0-21 cmbs, mottled 10YR 6/6 and 10YR 7/3 clay	
West Mit.	36	10	Ø			very wet
West Mit.	37	1	Ø			ground very soft; standing water
West Mit.	37	2	❏	18	0-18 cmbs, 10YR 6/4 silty clay	
West Mit.	37	3	❏	15	0-15 cmbs, 10YR 6/6 clay	water filled test
West Mit.	37	4	❏	21	0-21 cmbs, 10YR 6/6 clay	wet
West Mit.	37	5	❏	20	0-20 cmbs, 10YR 6/6 clay	wet
West Mit.	37	6	Ø			drainage; standing water
West Mit.	37	7	Ø			standing water
West Mit.	37	8	❏	15	0-15 cmbs, 10YR 6/6 clay	wet
West Mit.	37	9	❏	41	0-6 cmbs, 10YR 4/4 silty loam; 6-34 cmbs, 10YR 6/4 silty clay loam; 34-41 cmbs, 10YR 6/6 clay	brick drain ~5 m north
West Mit.	38	1	❏	30	0-12 cmbs, 10YR 4/3 silty clay loam; 12-30 cmbs, 10YR 6/6 silty clay	piles of concrete to east; possible road debris
West Mit.	38	2	Ø			push pile
West Mit.	38	3	❏	24	0-24 cmbs, 10YR 6/4 silty clay	very wet
West Mit.	38	4	Ø			drainage; standing water
West Mit.	38	5	❏	20	0-20 cmbs, 10YR 6/4 clay	very wet
West Mit.	38	6	Ø			standing water
West Mit.	38	7	❏	18	0-18 cmbs, 10YR 6/6 clay	very wet
West Mit.	38	8	Ø			standing water
West Mit.	39	1	❏	30	0-5 cmbs, 10YR 4/3 silty clay loam; 5-30 cmbs, 10YR 5/6 silty clay	gravel
West Mit.	39	2	❏	30	0-3 cmbs, 10YR 4/3 silty clay loam; 3-30 cmbs, 10YR 5/6 silty clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	39	3	❑	30	0-4 cmbs, 10YR 3/3 silty clay loam; 4-30 cmbs, 10YR 5/6 silty clay	
West Mit.	39	4	Ø			saturated
West Mit.	39	5	Ø			underwater
West Mit.	39	6	❑	30	0-30 cmbs, 10YR 4/4 silty clay	
West Mit.	39	7	Ø			standing water
West Mit.	39	8	Ø			saturated
West Mit.	39	9	❑	30	0-11 cmbs, 10YR 3/3 silty clay loam; 11-30 cmbs, 10YR 4/6 silty clay	
West Mit.	39	10	Ø			underwater
West Mit.	39	11	❑	30	0-4 cmbs, 10YR 3/3 silty clay loam; 4-30 cmbs, 10YR 5/6 silty clay	
West Mit.	39	12	Ø			slope
West Mit.	40	1	❑	30	0-14 cmbs, 10YR 4/2 silty clay loam; 14-30 cmbs, 10YR 6/4 silty clay	saturated; ground water at 30 cmbs
West Mit.	40	2	❑	20	0-20 cmbs, 10YR 3/1 silty loam	
West Mit.	40	3	Ø			on historic feature
West Mit.	40	4	Ø			standing water
West Mit.	40	5	❑	35	0-12 cmbs, 10YR 4/2 silty clay loam; 12-35 cmbs, mottled 10YR 5/8 and 10YR 7/1 silty clay	
West Mit.	40	6	Ø			15-20 m to the east of historic feature/concrete frame structure; standing water
West Mit.	40	7	Ø			standing water
West Mit.	40	8	Ø			standing water
West Mit.	40	9	❑	35	0-13 cmbs, 10YR 4/2 silty clay loam; 13-35 cmbs, mottled 10YR 5/8 and 10YR 7/1 silty clay	saturated; ground water at 35 cmbs
West Mit.	41	1	❑	20	0-20 cmbs, 10YR 6/4 clay	very soft and wet
West Mit.	41	2	Ø			standing water

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	41	3	❏	30	0-15 cmbs, 10YR 4/2 silty clay loam; 15-30 cmbs, mottled 10YR 5/8 and 10YR 7/1 silty clay	saturated; very wet; water at 30 cmbs
West Mit.	41	4	❏	3	0-3 cmbs, 10YR 2/3 loam	old road bed; concrete thing 10 m to northeast
West Mit.	41	5	Ø			standing water
West Mit.	41	6	Ø			standing water
West Mit.	41	7	Ø			water; disturbed; concrete frame
West Mit.	41	8	Ø			disturbed; standing water
West Mit.	42	1	❏	30	0-12 cmbs, 10YR 5/4 silty clay; 12-30 cmbs, 10YR 5/6 silty clay	
West Mit.	42	2	❏	30	0-7 cmbs, 10YR 3/3 silty clay loam; 7-30 cmbs, 10YR 5/6 silty clay	
West Mit.	42	3	Ø			saturated
West Mit.	42	4	Ø			saturated
West Mit.	42	5	Ø			saturated
West Mit.	42	6	Ø			surface water
West Mit.	42	7	Ø			surface water
West Mit.	42	8	❏	30	0-5 cmbs, 10YR 5/8 silty clay; 5-30 cmbs, 10YR 5/6 silty clay	
West Mit.	42	9	❏	30	0-8 cmbs, 10YR 4/3 silty clay loam; 8-30 cmbs, 10YR 4/4 silty clay	
West Mit.	43	1	❏	30	0-2 cmbs, 10YR 4/3 silty clay loam; 2-30 cmbs, 10YR 4/4 silty clay	
West Mit.	43	2	Ø			inundated soils
West Mit.	43	3	Ø			standing water
West Mit.	43	4	❏	30	0-2 cmbs, 10YR 4/3 silty clay loam; 2-30 cmbs, 10YR 4/4 silty clay	
West Mit.	43	5	❏	32	0-10 cmbs, 10YR 4/2 silty clay loam; 10-32 cmbs, 10YR 4/6 clay	
West Mit.	43	6	Ø			low wetland; inundated soils
West Mit.	43	7	Ø			low wetland; standing water
West Mit.	43	8	❏	32	0-10 cmbs, 10YR 5/2 silty clay loam; 10-32 cmbs, mottled 10YR 5/8 and 10YR 7/1 clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	44	1	Ø			disturbed; concrete structure
West Mit.	44	2	❏	30	0-10 cmbs, 10YR 4/2 silty clay loam; 10-30 cmbs, 10YR 4/6 silty clay	
West Mit.	44	3	❏	33	0-15 cmbs, 10YR 4/2 silty loam; 15-33 cmbs, 10YR 4/6 silty clay	
West Mit.	44	4	❏	31	0-12 cmbs, 10YR 4/2 silty loam; 12-31 cmbs, 10YR 4/6 silty clay	
West Mit.	44	5	❏	30	0-15 cmbs, 10YR 4/2 silty loam; 15-30 cmbs, 10YR 4/6 silty clay	
West Mit.	44	6	❏	29	0-13 cmbs, 10YR 4/2 silty clay loam; 13-29 cmbs, 10YR 4/6 silty clay	
West Mit.	44	7	Ø			standing water
West Mit.	44	8	❏	30	0-12 cmbs, 10YR 4/2 silty clay loam; 12-30 cmbs, 10YR 4/6 silty clay	at creek
West Mit.	45	1	Ø			drainage; inundated soils
West Mit.	45	2	❏	30	0-6 cmbs, 10YR 4/6 silty clay; 6-30 cmbs, 10YR 5/8 clay	
West Mit.	45	3	Ø			drainage; slope
West Mit.	45	4	Ø			drainage; slope
West Mit.	45	5	❏	30	0-5 cmbs, 10YR 3/4 silty clay loam; 5-30 cmbs, 10YR 5/8 silty clay	
West Mit.	45	6	Ø			slope; drainage
West Mit.	45	7	Ø			inundated soils; standing water
West Mit.	45	8	Ø			standing water
West Mit.	45	9	Ø			drainage; slope; inundated soils
West Mit.	46	1	❏	30	0-5 cmbs, 10YR 4/3 silty clay loam; 5-30 cmbs, 10YR 4/6 silty clay	
West Mit.	46	2	Ø			slope; drainage
West Mit.	46	3	Ø			slope; drainage; inundated soils
West Mit.	46	4	❏	30	0-10 cmbs, 10YR 5/6 silty clay; 10-30 cmbs, 10YR 5/6 clay	reached ground water
West Mit.	46	5	Ø			surface water; inundated
West Mit.	46	6	❏	30	0-2 cmbs, 10YR 4/6 silty clay; 2-4 cmbs, 10YR 6/2 clay; 4-30 cmbs, 10YR 5/6 clay	
West Mit.	46	7	❏	30	0-2 cmbs, 10YR 4/3 silty clay loam; 2-30 cmbs, mottled 10YR 5/8 and 10YR 5/4 clay	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	47	1	Ø			standing water
West Mit.	47	2	Ø			standing water
West Mit.	47	3	❑	10	0-5 cmbs, 10YR 2/1 gravel fill material; 5-10 cmbs, 7.5YR 5/8 gravel fill clay	
West Mit.	47	4	❑	8	0-8 cmbs, 10YR 2/1 compact black tar asphalt and gravel	
West Mit.	47	5	❑	10	0-5 cmbs, 10YR 2/1 black tar asphalt and gravel; 5-10 cmbs, 10YR 6/8 compact gravel rocks and clay	
West Mit.	47	6	Ø			drainage
West Mit.	47	7	❑	8	0-5 cmbs, 10YR 2/1 gravel loam; 5-8 cmbs, 7.5YR 5/8 gravel rock clay fill	possible road
West Mit.	47	8	Ø			low wetland; inundated soils
West Mit.	47	9	❑	35	0-15 cmbs, 10YR 3/2 silty loam; 15-35 cmbs, 10YR 4/6 silty clay	
West Mit.	47	10	❑	30	0-10 cmbs, 10YR 3/2 silty loam; 10-30 cmbs, 10YR 4/6 silty clay	
West Mit.	47	11	Ø			slope
West Mit.	48	1	Ø			slope
West Mit.	48	2	❑	30	0-10 cmbs, 10YR 4/2 silty loam; 10-30 cmbs, 10YR 4/6 silty clay	
West Mit.	48	3	Ø			drainage
West Mit.	48	4	Ø			standing water
West Mit.	48	5	Ø			inundated soils
West Mit.	48	6	❑	15	0-5 cmbs, 10YR 4/2 silty clay loam; 5-15 cmbs, 10YR 4/6 silty clay	saturated; ground water at 15 cmbs
West Mit.	48	7	Ø			slope; disturbed road
West Mit.	48	8	❑	5	0-5 cmbs, 10YR 4/2 silty loam	large rock impasse at 5 cmbs
West Mit.	48	9	Ø			inundated soils; wetland
West Mit.	48	10	Ø			wetland; inundated soils; standing water
West Mit.	48	11	Ø			wetland; inundated soils; standing water

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	49	1	❑	20	0-3 cmbs, 10YR 5/4 silty clay loam; 3-20 cmbs, mottled 10YR 5/4 and 10YR 6/3 compact silty clay	
West Mit.	49	2	❑	38	0-26 cmbs, 10YR 4/3 silty clay loam; 26-38 cmbs, 10YR 5/4 heavily oxidized silty clay	
West Mit.	49	3	❑	35	0-28 cmbs, 10YR 4/4 silty clay loam; 28-35 cmbs, mottled 10YR 5/4 and 10YR 6/3 silty clay with some oxidation	
West Mit.	49	4	Ø			low drainage area; heavily disturbed; possible road 15 m to west; culvert present
West Mit.	49	5	❑	25	0-25 cmbs, mottled 10YR 6/3 and 10YR 5/4 silty clay	
West Mit.	49	6	❑	25	0-25 cmbs, mottled 10YR 6/3 and 10YR 5/4 silty clay	
West Mit.	49	7	Ø			standing water
West Mit.	49	8	Ø			standing water
West Mit.	49	9	Ø			standing water
West Mit.	49	10	Ø			standing water
West Mit.	49	11	Ø			Big Creek
West Mit.	50	1	Ø			standing water
West Mit.	50	2	Ø			standing water
West Mit.	50	3	Ø			standing water
West Mit.	50	4	Ø			standing water
West Mit.	50	5	Ø			standing water
West Mit.	50	6	❑	35	0-23 cmbs, 10YR 4/3 silty clay; 23-35 cmbs, mottled 10YR 4/3 and 10YR 6/3 silty clay with heavy oxidation	field saturated and flooded in areas
West Mit.	50	7	❑	25	0-25 cmbs, mottled 10YR 4/3 and 10YR 6/3 silty clay with heavy oxidation	
West Mit.	50	8	Ø			standing water
West Mit.	50	9	❑	25	0-25 cmbs, mottled 10YR 4/3 and 10YR 6/3 silty clay with heavy oxidation	
West Mit.	50	10	❑	30	0-3 cmbs, 10YR 4/3 silty clay loam; 3-30 cmbs, mottled 10YR 5/4 and 10YR 6/3 silty clay with heavy oxidation	

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	50	11	❑	30	0-5 cmbs, 10YR 4/3 silty clay loam; 5-30 cmbs, mottled 10YR 5/4 and 10YR 6/3 silty clay with heavy oxidation	
West Mit.	51	1	❑	30	0-15 cmbs, 10YR 4/4 silty clay loam; 15-20 cmbs, mottled 10YR 6/1 and 10YR 5/4 clay; 20-30 cmbs, mottled 10YR 5/4 and 10YR 5/8 clay	light gravel
West Mit.	51	2	❑	35	0-20 cmbs, 10YR 4/4 silty clay; 20-25 cmbs, mottled 10YR 6/1 and 10YR 5/4 clay; 25-35 cmbs, mottled 10YR 5/4 and 10YR 5/8 clay	moderate large gravel
West Mit.	51	3	❑	45	0-35 cmbs, 10YR 5/4 sandy clay loam; 35-45 cmbs, 7.5YR 5/6 clay	
West Mit.	51	4	❑	40	0-30 cmbs, 10YR 5/4 silty loam; 30-40 cmbs, 10YR 4/6 clay	organic flecking in Strat II
West Mit.	51	5	Ø			standing water
West Mit.	51	6	❑	50	0-40 cmbs, 10YR 5/3 sandy clay loam; 40-50 cmbs, 10YR 5/8 sandy clay	light gravel; saturated
West Mit.	51	7	Ø			disturbed drainage
West Mit.	51	8	Ø			flooded; standing water
West Mit.	51	9	Ø			flooded; standing water
West Mit.	51	10	Ø			flooded; standing water
West Mit.	52	1	Ø			flooded; standing water
West Mit.	52	2	Ø			flooded; standing water
West Mit.	52	3	Ø			flooded; standing water
West Mit.	52	4	Ø			flooded; standing water
West Mit.	52	5	Ø			flooded; standing water
West Mit.	52	6	❑	40	0-30 cmbs, 10YR 5/3 sandy clay loam; 30-40 cmbs, 10YR 5/8 clay	light gravel; saturated
West Mit.	52	7	❑	40	0-25 cmbs, 10YR 5/3 sandy clay loam; 25-40 cmbs, 10YR 5/8 clay	
West Mit.	52	8	❑	40	0-25 cmbs, 10YR 4/4 silty clay loam; 25-30 cmbs, mottled 10YR 6/1 and 10YR 4/4 clay; 30-40 cmbs, mottled 10YR 5/2 and 10YR 5/8 clay	
West Mit.	52	9	❑	40	0-30 cmbs, 10YR 5/4 silty clay; 30-40 cmbs, 10YR 5/8 clay	moderate small gravel
West Mit.	52	10	❑	45	0-35 cmbs, mottled 10YR 5/4 and 10YR 4/3 silty clay; 35-45 cmbs, mottled 10YR 5/8 and 10YR 6/1 clay	moderate gravel

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	53	1	❏	30	0-2 cmbs, 10YR 4/4 silty loam; 2-30 cmbs, 10YR 5/3 silty clay	
West Mit.	53	2	❏	30	0-2 cmbs, 10YR 3/3 silty loam; 2-12 cmbs, 10YR 4/4 silty clay loam; 12-30 cmbs, mottled 10YR 5/3 and 10YR 8/1 silty clay	
West Mit.	53	3	❏	30	0-1 cmbs, 10YR 3/3 silty loam; 1-14 cmbs, 10YR 4/3 silty clay loam; 14-30 cmbs, 10YR 5/6 silty clay	
West Mit.	53	4	❏	30	0-3 cmbs, 10YR 3/3 silty loam; 3-15 cmbs, 10YR 4/3 silty clay loam; 15-30 cmbs, 10YR 5/6 silty clay	
West Mit.	53	5	❏	30	0-2 cmbs, 10YR 3/3 silty loam; 2-17 cmbs, 10YR 4/3 silty clay loam; 17-30 cmbs, 10YR 5/6 silty clay	
West Mit.	53	6	❏	30	0-2 cmbs, 10YR 3/3 silty loam; 2-18 cmbs, 10YR 4/3 silty clay loam; 18-30 cmbs, 10YR 5/6 silty clay	
West Mit.	53	7	❏	30	0-3 cmbs, 10YR 3/3 silty loam; 3-22 cmbs, 10YR 4/3 silty clay loam; 22-30 cmbs, 10YR 5/6 silty clay	
West Mit.	53	8	❏	30	0-2 cmbs, 10YR 3/3 silty loam; 2-7 cmbs, 10YR 4/4 silty clay; 7-30 cmbs, 10YR 5/6 clay	
West Mit.	53	9	❏	30	0-3 cmbs, 10YR 3/3 silty loam; 3-24 cmbs, 10YR 4/4 silty clay; 24-30 cmbs, 10YR 5/6 clay	
West Mit.	53	10	❏	30	0-5 cmbs, 10YR 3/3 silty loam; 5-18 cmbs, 10YR 4/4 silty clay; 18-30 cmbs, 10YR 5/6 clay	
West Mit.	54	1	❏	30	0-7 cmbs, 10YR 3/3 silty loam; 7-24 cmbs, 10YR 4/4 silty clay; 24-30 cmbs, 10YR 5/6 clay	
West Mit.	54	2	❏	30	0-3 cmbs, 10YR 3/3 silty loam; 3-22 cmbs, 10YR 4/1 silty clay; 22-30 cmbs, mottled 10YR 5/6 and 10YR 7/1 clay	
West Mit.	54	3	❏	30	0-4 cmbs, 10YR 3/3 silty loam; 4-16 cmbs, 10YR 4/4 silty clay; 16-30 cmbs, 10YR 5/6 silty clay	
West Mit.	54	4	❏	30	0-7 cmbs, 10YR 3/3 silty loam; 7-18 cmbs, 10YR 4/4 silty clay loam; 18-30 cmbs, 10YR 5/6 silty clay	
West Mit.	54	5	❏	30	0-4 cmbs, 10YR 3/3 silty loam; 4-16 cmbs, 10YR 4/4 silty clay loam; 16-30 cmbs, 10YR 5/6 silty clay	
West Mit.	54	6	❏	30	0-18 cmbs, 10YR 3/3 silty loam; 18-30 cmbs, 10YR 5/6 clay	
West Mit.	54	7	Ø			slope
West Mit.	54	8	Ø			slope

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	54	9	Ø			slope; drainage
West Mit.	54	10	❏	30	0-2 cmbs, 10YR 3/3 silty loam; 2-14 cmbs, 10YR 4/4 silty clay loam; 14-30 cmbs, 10YR 5/6 silty clay	
West Mit.	54	11	❏	30	0-3 cmbs, 10YR 3/3 silty loam; 3-20 cmbs, 10YR 4/4 silty clay loam; 20-30 cmbs, 10YR 5/6 silty clay	
West Mit.	55	1	❏	36	0-12 cmbs, 10YR 3/3 silty clay loam; 12-36 cmbs, 10YR 5/8 silty clay with gravel	
West Mit.	55	2	❏	35	0-14 cmbs, 10YR 3/1 silty clay loam; 14-35 cmbs, mottled 10YR 5/8 and 10YR 7/1 silty clay with gravel	
West Mit.	55	3	❏	35	0-13 cmbs, 10YR 3/1 silty loam; 13-35 cmbs, mottled 10YR 5/8 and 10YR 7/1 silty clay with gravel	
West Mit.	55	4	❏	32	0-15 cmbs, 10YR 3/1 silty loam; 15-32 cmbs, mottled 10YR 5/8 and 10YR 7/1 silty clay with gravel	
West Mit.	55	5	❏	30	0-12 cmbs, 10YR 3/1 silty loam; 12-30 cmbs, mottled 10YR 5/8 and 10YR 7/1 silty clay with gravel	
West Mit.	55	6	❏	40	0-12 cmbs, 10YR 4/6 silty clay loam; 12-40 cmbs, 10YR 6/3 silty clay	
West Mit.	55	7	❏	30	0-16 cmbs, 10YR 6/4 silty clay loam; 16-30 cmbs, 7.5YR 4/6 compact silty clay	
West Mit.	55	8	❏	34	0-15 cmbs, 10YR 6/4 silty clay loam; 15-34 cmbs, 7.5YR 4/6 compact silty clay	
West Mit.	55	9	Ø			wetland; standing water
West Mit.	55	10	❏	22	0-10 cmbs, 10YR 3/1 silty loam; 10-22 cmbs, 7.5YR 5/8 compact silty clay with gravel	
West Mit.	55	11	Ø			slope; creek
West Mit.	56	1	Ø			slope; creek
West Mit.	56	2	❏	33	0-12 cmbs, 10YR 5/4 silty clay loam; 12-33 cmbs, mottled 10YR 6/2 and 10YR 4/3 silty clay	
West Mit.	56	3	❏	35	0-15 cmbs, 10YR 5/4 silty clay loam; 15-35 cmbs, mottled 10YR 6/2 and 10YR 4/3 silty clay	
West Mit.	56	4	❏	10	0-5 cmbs, 10YR 5/4 silty clay loam with gravel; 5-10 cmbs, 7.5YR 6/8 compact gravel clay fill	
West Mit.	56	5	❏	31	0-15 cmbs, 10YR 5/4 silty clay loam; 15-31 cmbs, 10YR 4/3 compact silty clay	
West Mit.	56	6	Ø			wetland; standing water

Area	T	ST	R	Max Depth (cmbs)	Soil Description	Notes
West Mit.	56	7	Ø			wetland; standing water
West Mit.	56	8	Ø			wetland; standing water
West Mit.	56	9	Ø			wetland; standing water
West Mit.	56	10	Ø			wetland; standing water
West Mit.	56	11	Ø			wetland; standing water

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APPENDIX C: ARTIFACT INVENTORY

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Site	ST	Depth (cmbs)	Artifact Category	Comments	n=	Mass (g)
40SY514	E2	0-6	Arlington PP/K		1	6.6
40SY514		surface	complete flake	SG1 CG1	1	1.4
40SY514		surface	flake fragment		2	2.1
40SY644		surface	Corrugated ceramic roller	Locus A	5	2,465.0
40SY841	19-2	0-18	metal, wire		2	2.1
40SY841	19-2	0-18	bottle glass, clear		1	0.7
40SY841	19-2	0-18	bottle glass, green		1	3.9
40SY841	19-2	0-18	table glass, clear, rim		1	4.3
40SY841	19-3	0-13	brick fragment		5	13.3
40SY841	19-3	0-13	flat glass, aqua		3	14.2
40SY841	19-3	0-13	flat glass, clear		10	15.3
40SY841	19-3	0-13	bottle glass, clear		1	0.5
40SY841	19-3	0-13	melted glass		2	1.4
40SY841	19-3	0-13	metal, undifferentiated		3	3.9
40SY841	19-4	0-18	brick fragment		1	62.7
40SY841	E10	0-24	stoneware, Bristol glazed exterior/ interior		1	9.2
40SY841	N10 E10	0-25	bottle glass, clear		1	3.7
40SY841	N10 E10	0-25	table glass, clear, rim		1	3.2
40SY841	N10 E10	0-25	whiteware, molded, footring		1	4.7
40SY841	N10 E20	18-30	bottle glass, amber		1	4.9
40SY841	N10 E20	18-30	whiteware, plain, rim		1	3.0
40SY841	N20 E10	0-30	brick fragment		1	2.6
40SY841	N20 E10	0-30	whiteware, plain		1	0.9
40SY841	N20 E30	0-22	brick fragment		2	2.5
40SY841	S10	0-30	brick fragment		1	9.1
40SY841	S10	0-30	insect nest		7	26.2
40SY841	S10	0-30	melted glass		3	88.4
40SY841	S10 E20	0-30	brick fragment		1	11.0
40SY841	S10 E20	0-30	bottle glass, amber		1	15.2
40SY841	S10 W20	0-20	whiteware, plain		1	1.7
40SY841	S20 E10	0-35	metal, strap		1	125.9
40SY841	S20 E10	0-35	brick fragment		2	13.9
40SY841	S20 E10	0-35	brick, half	T=2.4in; T=2.3, W=3.8in	2	820.7
40SY841	S20 E10	0-35	nail fragment, cut		4	13.6
40SY841	S20 E10	0-35	nail fragment, wire		2	5.2
40SY841	S20 E10	0-35	nail, cut		4	36.6
40SY841	S20 E10	0-35	nail, wire		9	32.2
40SY841	S20 E10	0-35	button, brass U.S. Cavalry	1855-1870	1	4.0
40SY841	S20 E10	0-35	shell		1	1.3
40SY841	S20 E10	0-35	bottle glass, clear, embossed	"Property…/ …er Farm"	1	12.0
40SY841	S20 E10	0-35	metal, can fragment		1	51.5
40SY841	S20 E10	0-35	table glass, milkglass, rim, molded	red painted	1	4.0
40SY841	S20 E10	0-35	whiteware, plain		4	7.8
40SY841	S20 E10	0-35	whiteware, plain, maker's mark	too small to determine	1	6.0
40SY841	S20 E10	0-35	whiteware, plain, rim		1	1.2
40SY841	S20 E10	0-35	coal		1	1.8

Site	ST	Depth (cmbs)	Artifact Category	Comments	n=	Mass (g)
40SY841	S20 E10	0-35	slag		1	0.7
40SY841	S20 W20	0-25	battery core		1	4.9
40SY841	S20 W20	0-25	brick fragment		4	41.3
40SY841	S20 W20	0-25	nail fragment, wire		1	1.0
40SY841	S20 W20	0-25	nail, wire		6	30.3
40SY841	S20 W20	0-25	bottle glass, amber		2	9.9
40SY841	S20 W20	0-25	bottle glass, clear		2	4.1
40SY841	S20 W20	0-25	table glass, milkglass, rim, molded		1	5.0
40SY841	S20 W20	0-25	coal		2	3.5
Locus 2	datum	0-12	metal, corrugated		45	307.7
Locus 2	datum	0-12	burned wood		1	0.1
Locus 3	datum	0-15	nail fragment, wire		4	41.7
Locus 3	datum	0-15	nail, wire		6	76.5
Locus 3	datum	0-15	bottle glass, amber, bottleneck	crown finish; refits	1	37.0
Locus 3	datum	0-15	bottle glass, clear		5	9.6
Locus 3	datum	0-15	bottle glass, clear, bottleneck	external thread finish	2	3.8
Locus 3	datum	0-15	bottle glass, clear, canning jar fragment	external thread finish; refits	1	110.4
Locus 3	datum	0-15	bottle glass, clear, embossed	"One quart"	1	12.9
Locus 3	datum	0-15	bottle glass, clear, embossed	"D.E…"; refits	1	12.8
Locus 3	datum	0-15	whiteware, plain		1	1.6
Locus 3	datum	0-15	melted glass		1	1.0
Locus 3		surface	whiteware, hand painted, bowl fragment, maker's mark	polychrome; refits; Southern Potteries, Inc. (1917 to 1957)	1	163.9
				Project Totals:	*189*	*4,801.1*

APPENDIX D: STATE HISTORIC PRESERVATION OFFICE LETTER

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TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
2941 LEBANON PIKE
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550
www.tnhistoricalcommission.org

April 8, 2019

Mr. Jim Vasquez
Shelby County Office of Resilience
125 N. Main Street, Room 443
Memphis, TN 38103

RE: HUD / Department of Housing and Urban Development, Millington, Shelby County, TN

Dear Mr. Vasquez:

In response to your request, we have reviewed the archaeological report of investigations and accompanying documentation submitted by you regarding the above-referenced undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicants for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

In the final report, please address the following editorial comments:

1. Page 37 error in citation of Figure 4.01
2. Please include a map that shows the location of previously recorded archaeological sites in the vicinity of the undertaking's area of potential effects.

Considering the information provided, we find that no archaeological resources eligible for listing in the National Register of Historic Places will be affected by this undertaking. If project plans are changed or archaeological remains are discovered during project construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. Complete and/or updated Tennessee Site Records should be submitted to the Tennessee Division of Archaeology for all sites recorded and/or revisited during the current investigation. Questions or comments may be directed to Jennifer Barnett (615) 687-4780.

Your cooperation is appreciated.

Sincerely,

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jmb

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Shelby County Government
Office of Resilience

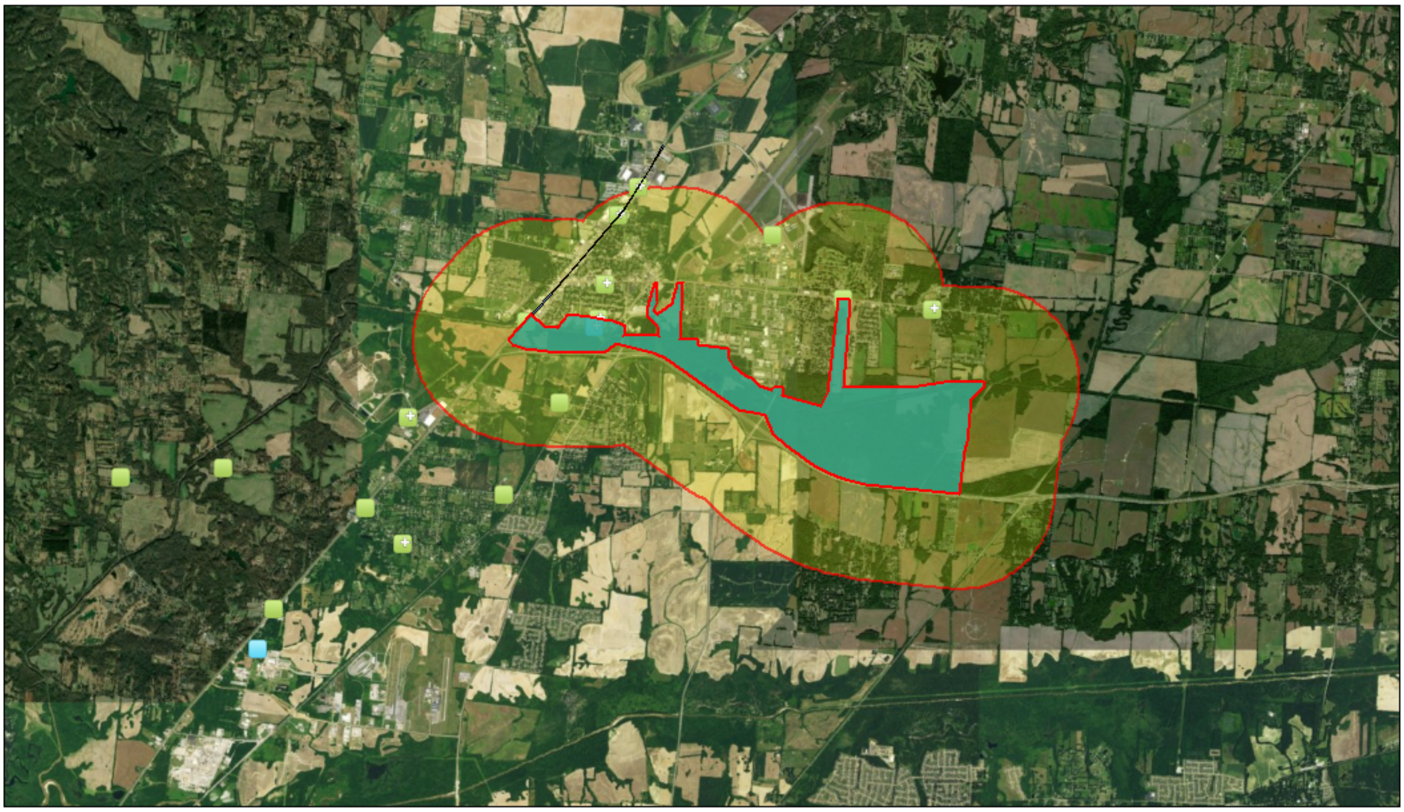
Big Creek National Disaster Resilience Design Project

Appendix G

NEPAssist Report

NEPAssist Report

Big Creek Activity



August 7, 2019

Project 1 | TRI (clustered) | RCRAINFO (single)
Project _Area_Main | TRI (single) | Buffer Area
Project_Area | RCRAINFO (clustered)

1:104,853
0 0.75 1.5 3 mi
0 1.25 2.5 5 km
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Input Coordinates: 35.308951,-89.835400,35.310498,-89.852818,35.311253,-89.856978,35.312088,-89.859700,35.313335,-89.862592,35.316479,-89.868090,35.318224,-89.870264,35.320921,-89.871917,35.321148,-89.872554,35.321808,-89.876786,35.329716,-89.890458,35.330508,-89.892794,35.331739,-89.898740,35.331731,-89.900079,35.330991,-89.901283,35.330661,-89.902280,35.330749,-89.912395,35.331167,-89.916617,35.331863,-89.919123,35.332538,-89.920003,35.336510,-89.915772,35.334692,-89.913113,35.334472,-89.910751,35.336451,-89.908828,35.336055,-89.904364,35.335594,-89.902091,35.335440,-89.900151,35.335073,-89.898875,35.334648,-89.898040,35.333256,-89.898192,35.333329,-89.893171,35.333124,-89.891850,35.334721,-89.891904,35.336165,-89.893863,35.337653,-89.893764,35.340481,-89.892659,35.341207,-89.892641,35.341207,-89.892084,35.340042,-89.891994,35.338305,-89.892084,35.337096,-89.892749,35.336517,-89.891958,35.337235,-89.890431,35.338122,-89.889362,35.341207,-89.888374,35.341214,-89.887341,35.332574,-89.887808,35.332530,-89.884502,35.331709,-89.884412,35.331160,-89.878672,35.329914,-89.878816,35.328536,-89.877908,35.327063,-89.875474,35.326645,-89.874324,35.325575,-89.872725,35.324850,-89.870524,35.325480,-89.869967,35.325231,-89.868422,35.324065,-89.868467,35.322365,-89.861299,35.324505,-89.860068,35.329555,-89.859250,35.338906,-89.858137,35.338723,-89.855900,35.325333,-89.857211,35.325297,-89.844608,35.326323,-89.836667,35.326074,-89.830639,35.325223,-89.830909,35.323398,-89.833190,35.316992,-89.833999,35.315475,-89.834421,35.308951,-89.835400

Project Area	3.06 sq mi
Within 1 mile of an Ozone 8-hr (1997 standard) Non-Attainment/Maintenance Area?	yes
Within 1 mile of an Ozone 8-hr (2008 standard) Non-Attainment/Maintenance Area?	yes
Within 1 mile of a Lead (2008 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a SO2 1-hr (2010 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a PM2.5 24hr (2006 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a PM2.5 Annual (1997 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a PM2.5 Annual (2012 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a PM10 (1987 standard) Non-Attainment/Maintenance Area?	no
Within 1 mile of a Federal Land?	yes

Within 1 mile of an impaired stream?	yes
Within 1 mile of an impaired waterbody?	no
Within 1 mile of a waterbody?	no
Within 1 mile of a stream?	yes
Within 1 mile of an NWI wetland?	Available Online
Within 1 mile of a Brownfields site?	no
Within 1 mile of a Superfund site?	no
Within 1 mile of a Toxic Release Inventory (TRI) site?	yes
Within 1 mile of a water discharger (NPDES)?	yes
Within 1 mile of a hazardous waste (RCRA) facility?	yes
Within 1 mile of an air emission facility?	yes
Within 1 mile of a school?	yes
Within 1 mile of an airport?	no
Within 1 mile of a hospital?	no
Within 1 mile of a designated sole source aquifer?	no
Within 1 mile of a historic property on the National Register of Historic Places?	no
Within 1 mile of a Toxic Substances Control Act (TSCA) site?	no
Within 1 mile of a RADInfo site?	no
Within 1 mile of a Land Cession Boundary?	yes
Within 1 mile of a tribal area (lower 48 states)?	no

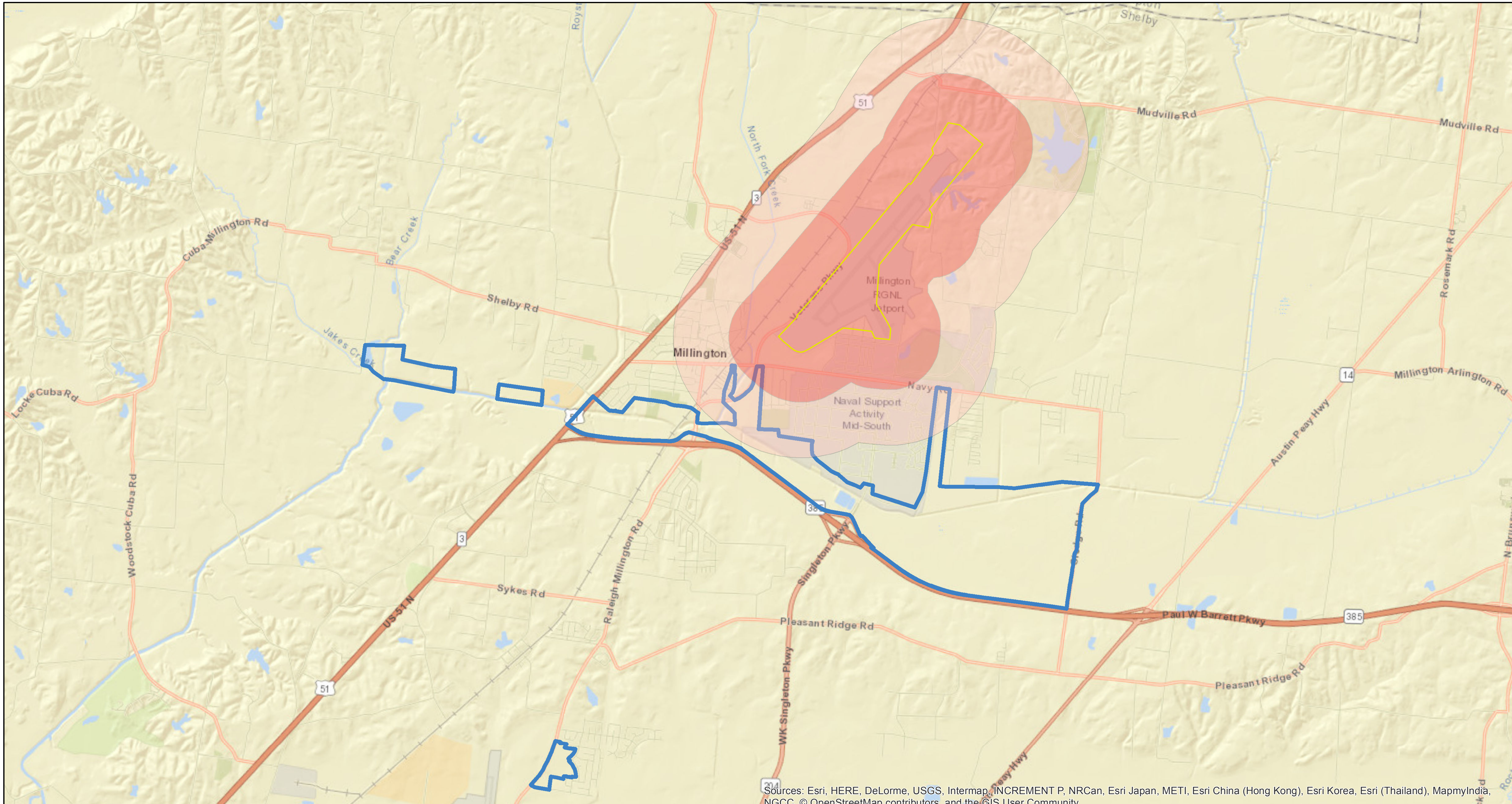
Created on: 8/7/2019 4:59:06 PM

Shelby County Government
Office of Resilience

Big Creek National Disaster Resilience Design Project

Appendix H

Millington Regional Jetport Airport Master Plan



N

0 0.5 1 Miles

Tennessee State Plane (feet) 4100fips
North American Datum 1983

Airport Hazard Map

Big Creek National Disaster Resilience Design Project

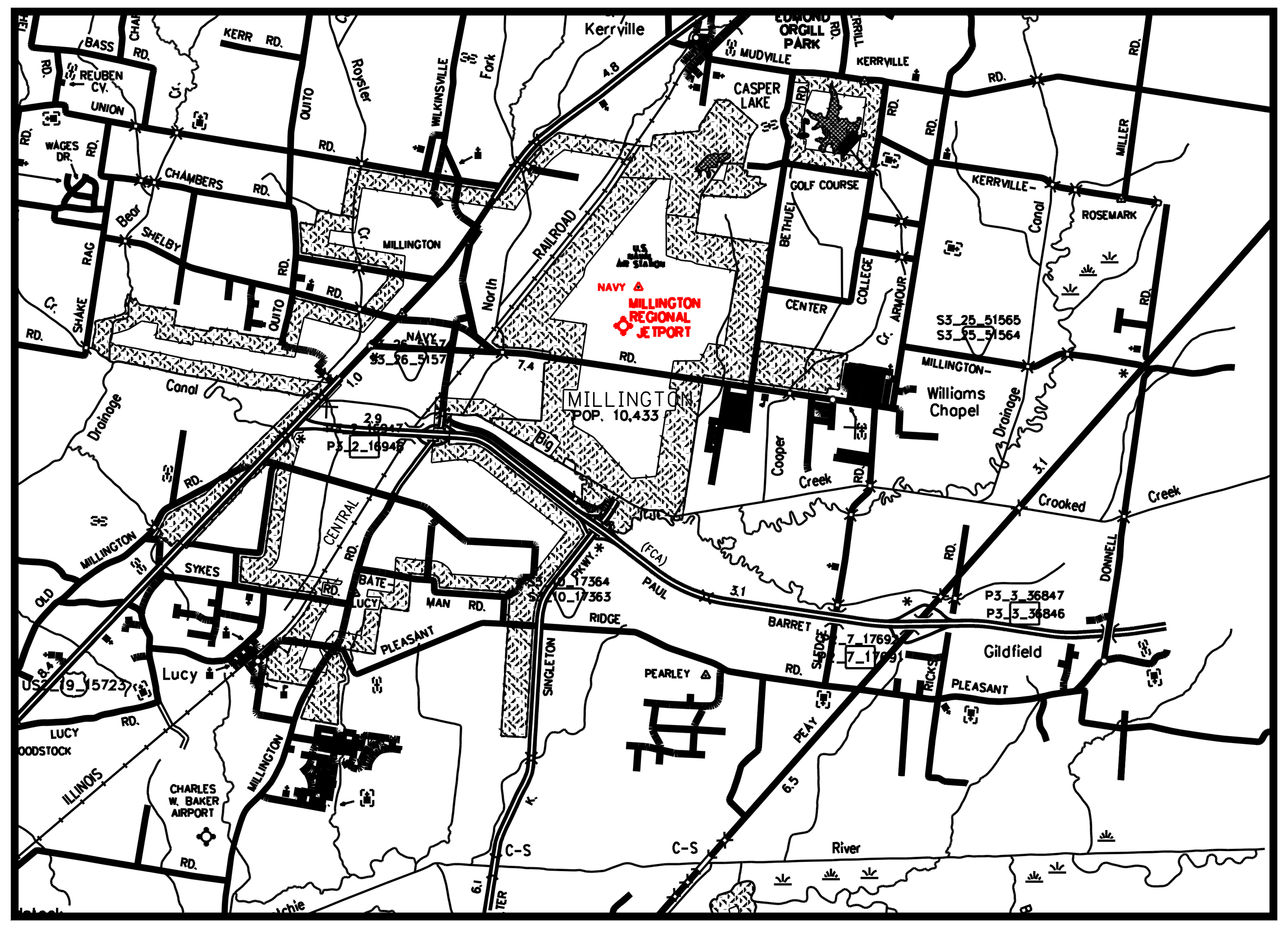
Millington, Shelby County, Tennessee

- Project Limits
- Millington Airport
- 2,500-FT Buffer
- 1-Mile Buffer

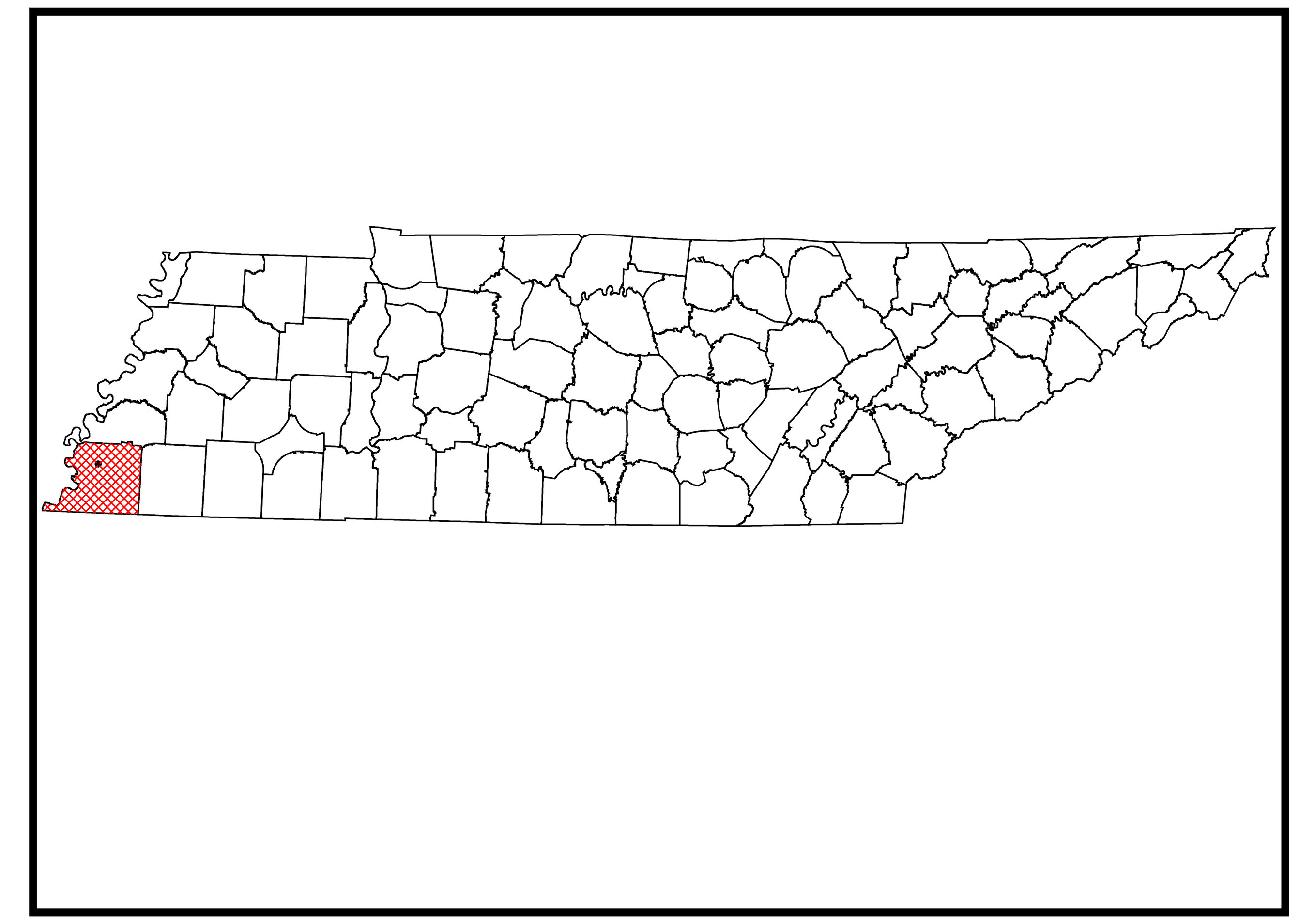
File Path: F:\36\36969\3696902\03_PROJECT_EXECUTION\EWR\Maps\Airport_Hazard.mxd

Date: 28 June 2019

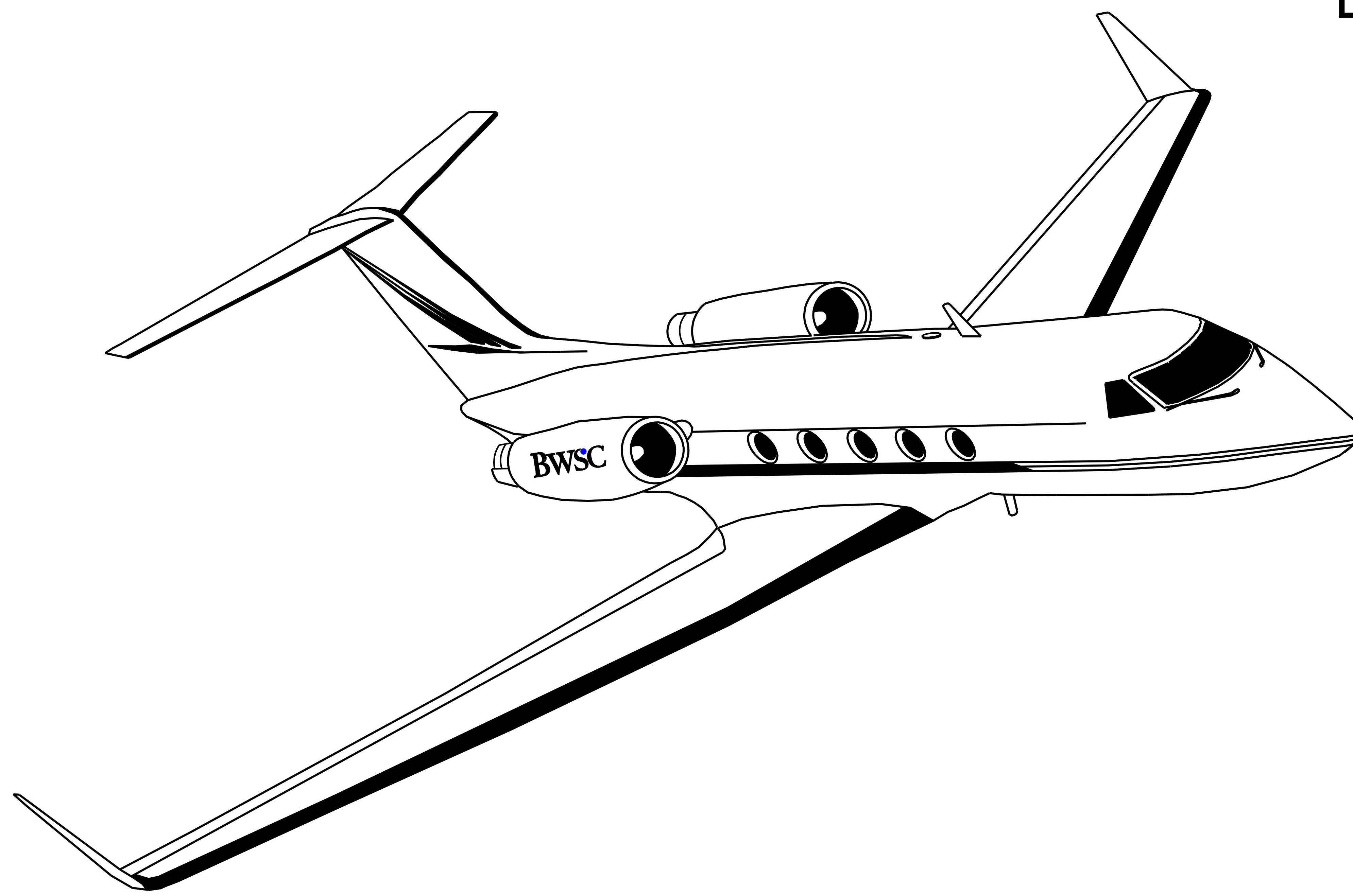
MILLINGTON REGIONAL JETPORT
MILLINGTON, TENNESSEE
AIRPORT MASTER PLAN



VICINITY MAP
MILLINGTON REGIONAL JETPORT
NTS.



LOCATION MAP
SHELBY COUNTY, TN
NTS.



MILLINGTON AIRPORT AUTHORITY

TRACY WILLIAMS, EXECUTIVE DIRECTOR
DON LOWRY, CHAIRMAN
AL BEAN
LINDA CARTER
MIKE EVANS
LEE LAWSON
JACK LEONARD
DENNIS WAGES
BUCK WALTERS
ALLAN H. WILLIAMS

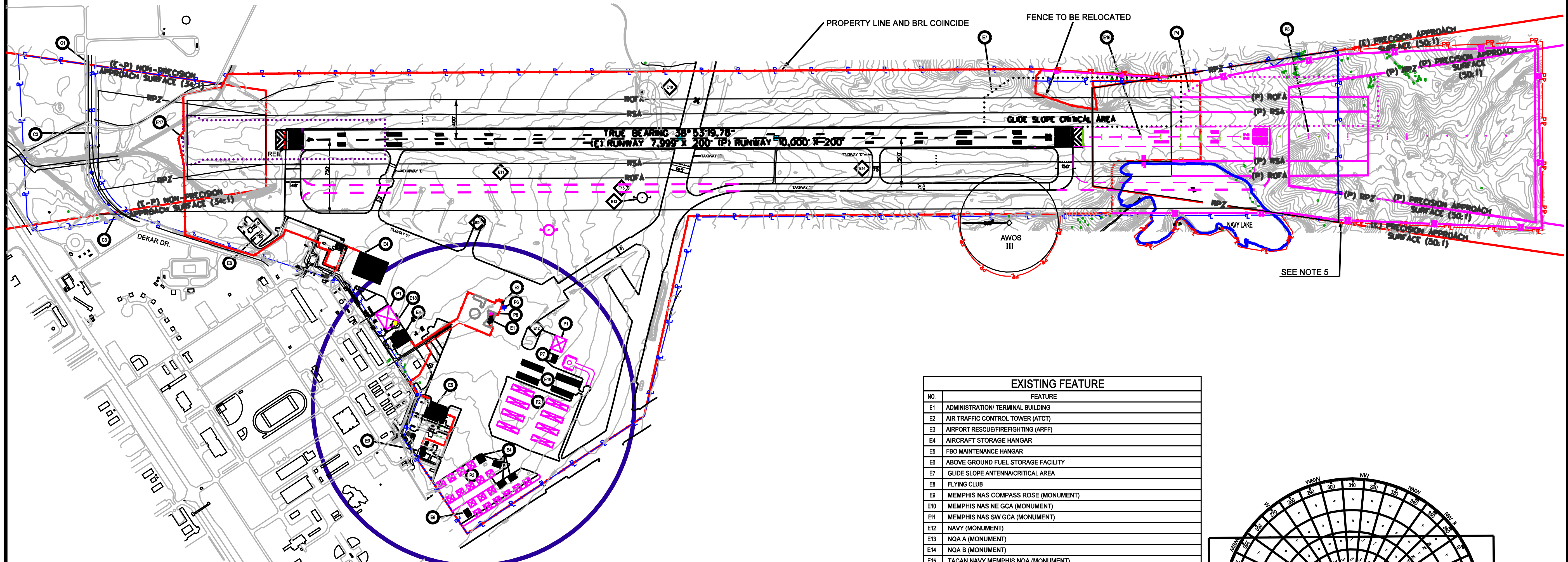
MILLINGTON AIRPORT AUTHORITY
MILLINGTON, TENNESSEE

BWSC
BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS AND PLANNERS

60 GERMANTOWN COURT, SUITE 100
MEMPHIS, TN 38018
901.755.7166
901.755.7844 FAX

TAD PROJECT
#79-555-0780-04

SHEET INDEX



AIRPORT DATA

	EXISTING	PROPOSED	ULTIMATE
AIRPORT REFERENCE POINT COORDINATES (NAD 83)	N35°21'24"	SAME	N35°21'32"
	W89°52'13"	SAME	W89°52'06"
MEAN MAX. TEMP. HOTTEST MONTH	91° JULY	SAME	SAME
AIRPORT ELEVATION	320'	SAME	SAME
NAVIGATIONAL AIDS	GPS,NDB,ILS,VOR,BEACON	SAME	SAME
AIRPORT ACREAGE	550.5 ACRES	564.64 ACRES	659.74 ACRES

RUNWAY DATA 04/22

		EXISTING	PROPOSED	ULTIMATE
AIRPORT REFERENCE CODE		D - IV (SEE NOTE 3)	SAME	SAME
CRITICAL AIRCRAFT		C-130 (SEE NOTE 3)	SAME	SAME
RUNWAY LENGTH		7,999'	SAME	10,000'
RUNWAY WIDTH		200'	SAME	SAME
MARKINGS		PRECISION	SAME	SAME
LIGHTING		HIRL/MITL (SEE NOTE 4)	SAME	SAME
% WIND COVERAGE (20 KNOTS)		99.79%	SAME	SAME
TRUE RUNWAY BEARING		38°53'19.78"	SAME	SAME
EFFECTIVE GRADIENT		0.55%	SAME	SAME
PAVEMENT CONSTRUCTION		ASPHALT W/ CONCRETE ENDS	SAME	SAME
RUNWAY HIGH POINT		319.7'	SAME	SAME
RUNWAY LOW POINT		275.8'	SAME	SAME
PAVEMENT STRENGTH (LBS)	SWL	150,000	SAME	SAME
	DWL	170,000	SAME	SAME
	DTWG	309,000	SAME	SAME
RUNWAY END COORDINATES (NAD 83)	RWY 4	N35°20'53.12" W89°52'43.86"	SAME	SAME
	RWY 22	N35°21'54.70" W89°51'43.22"	SAME	N35°22'10.09" W89°51'28.06"
RUNWAY END ELEVATIONS	RWY 4	275.8'	SAME	SAME
	RWY 22	319.7'	SAME	SAME
TOUCHDOWN ZONE ELEVATIONS	RWY 4	291.8'	SAME	SAME
	RWY 22	319.7'	SAME	SAME
APPROACH SLOPE	RWY 4	34:1	SAME	SAME
	RWY 22	50:1/40:1	SAME	SAME
AIRPORT LANDING AIDS	RWY 4	PAPI-4	PAP1-4 LPV	PAP1-4 LPV
	RWY 22	MALSR, PAPI-4, GLIDE SLOPE, LOCALIZER	SAME PLUS LPV	SAME PLUS LPV
APPROACH VISIBILITY MINIMUMS	RWY 4	1 MILE	SAME	SAME
	RWY 22	1/2 MILE	SAME	SAME

LEGEND

	EXISTING	PROPOSED
GRADE CONTOURS	650	NOT SHOWN
AIRPORT PROPERTY LINE	PL	PPL
BUILDING RESTRICTION LINE (BRL)	BRL	NOT SHOWN
FENCE LINE		
PAPI		
BUILDING		
PAVEMENT		
AIRPORT REFERENCE POINT (ARP)		
AIRPORT MONUMENTS		NOT SHOWN
BEACON		
RUNWAY SAFETY AREA (RSA)	RSA	(P)RSA
RUNWAY PROTECTION ZONE (RPZ)	RPZ	(P)RPZ
RUNWAY OBJECT FREE ZONE (ROFZ)	SEE NOTE 1	SEE NOTE 1
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	(P)ROFA
APPROACH SURFACE	APPROACH SURFACE	(P)APPROACH SURFACE
WIND CONE/ SEGMENTED CIRCLE		
REIL		NOT SHOWN

RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS

RWY END	EXISTING	PROPOSED / ULTIMATE
4 RPZ	500' IW x 1010' OW x 1700' L	SAME
22 RPZ	1000' IW x 1750' OW x 2500' L	SAME

RUNWAY OBJECT FREE AREA (ROFA) DIMENSIONS

RWY END	EXISTING	PROPOSED / ULTIMATE
4	800'W X 1,000' BEYOND END OF RUNWAY	SAME
22	800'W X 1,000' BEYOND END OF RUNWAY	SAME

RUNWAY SAFETY AREA (RSA) DIMENSIONS

RWY END	EXISTING	PROPOSED / ULTIMATE
4	500'W X 1,000' BEYOND END OF RUNWAY	SAME
22	500'W X 1,000' BEYOND END OF RUNWAY	SAME

RUNWAY OBSTACLE FREE ZONE (ROFZ) DIMENSIONS

RWY END	EXISTING	PROPOSED / ULTIMATE
4	400'W X 200' BEYOND END OF RUNWAY	SAME
22	400'W X 200' BEYOND END OF RUNWAY	SAME

EXISTING FEATURE

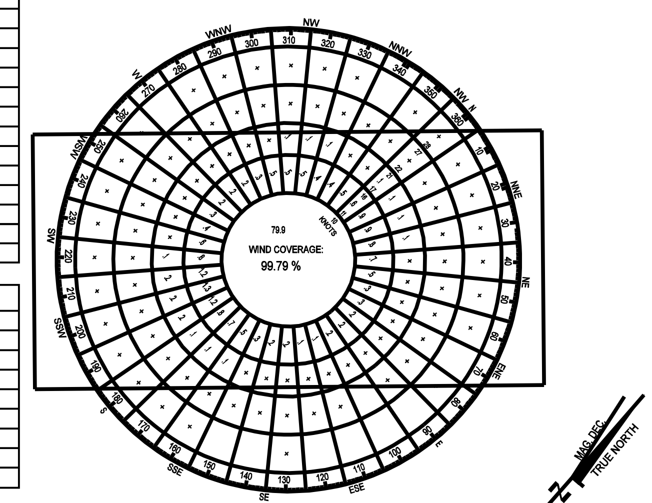
NO.	FEATURE
E1	ADMINISTRATION/ TERMINAL BUILDING
E2	AIR TRAFFIC CONTROL TOWER (ATCT)
E3	AIRPORT RESCUE/FIREFIGHTING (ARFF)
E4	AIRCRAFT STORAGE HANGAR
E5	FBO MAINTENANCE HANGAR
E6	ABOVE GROUND FUEL STORAGE FACILITY
E7	GLIDE SLOPE ANTENNA/CRITICAL AREA
E8	FLYING CLUB
E9	MEMPHIS NAS COMPASS ROSE (MONUMENT)
E10	MEMPHIS NAS NE GCA (MONUMENT)
E11	MEMPHIS NAS SW GCA (MONUMENT)
E12	NAVY (MONUMENT)
E13	NQA A (MONUMENT)
E14	NQA B (MONUMENT)
E15	TACAN NAVY MEMPHIS NQA (MONUMENT)
E16	MALSR
E17	LOCALIZER ANTENA
E18	BEACON
E19	T-HANGAR

PROPOSED FEATURE

NO.	FEATURE
P1	OWNER MAINTENANCE BUILDING
P2	PROPOSED T-HANGARS
P3	PROPOSED STORAGE HANGARS
P4	PROPOSED GLIDE SLOPE ANTENNA/CRITICAL AREA
P5	RELOCATED MALSAR
P6	BEACON - MOUNT ON CONTROL TOWER
P7	ARFF FACILITY - COMPLETED 2011
P8	TERMINAL EXPANSION

TRAVERSE WAY CLEARANCES

EXISTING	PROPOSED	ELEVATION	CLEARANCE
C1	N/A	270.2'	58.5'
C2	N/A	268.9'	59.8'
C3	N/A	264.1	55.8'



SOURCE: NATIONAL CLIMATIC DATA CENTER
LOCATION: MEMPHIS INT'L, TN
PERIOD: 1995-2004
OBSERVATIONS: 72,334
COVERAGE:
RWY 4/22 99.76 % FOR 20 KNOTS

500' 0 500' 1000' 1500'
1" =500'

NOTES

1. THERE ARE NO ROFZ PENETRATIONS
2. THE BUILDING RESTRICTION LINE IS FOR A 25' STRUCTURE
3. ALTHOUGH THE CRITICAL AIRCRAFT IS A C-III, THE AIRFIELD CURRENTLY MEETS D-IV STANDARDS. SINCE THIS MASTER PLAN STARTED, THE NATIONAL GUARD HAS CHANGED TO LOCKHEED C-5 AIRCRAFT AND HAS OVER 500 OPERATIONS AT MILLINGTON; HOWEVER, THESE ARE PRIMARILY TOUCH AND GO LANDINGS. ADDITIONALLY, FEDERAL EXPRESS IS FLYING MD 11 AIRCRAFT INTO THE MILLINGTON JETPORT, BUT THE OPERATIONS DO NOT MEET CRITICAL AIRCRAFT REQUIREMENTS. AFTER REVIEW WITH THE STATE BUREAU OF AERONAUTICS, IT WAS DETERMINED NOT TO CHANGE THE CRITICAL AIRCRAFT OR AIRPORT REFERENCE CODE. THE D-IV CODE IS CONSISTENT WITH THE REQUIREMENTS FOR THE MD11, HOWEVER, THE CODE WOULD HAVE TO BE CHANGED TO C-VI TO MEET THE REQUIREMENTS OF THE C-5. THE AIRFIELD ACTUALLY MEETS ALL OF THE REQUIREMENTS FOR THE C-5, EXCEPT FOR THE TAXIWAY WIDTH OF 100'.
4. PILOT CONTROLLED LIGHTING
5. THE RUNWAY EXTENSION AND ALL ASSOCIATED LAND IS NOT TO BE CONSIDERED WITHIN THE 20 YEAR PLANNING PERIOD. THE EXTENSION HAS BEEN SHOWN TO PROTECT THE POSSIBILITY OF AN EXPANSION
6. NO THRESHOLD SITING SURFACE OBJECT PENETRATIONS.
7. ALL GVGSI SITING MUST BE IN ACCORDANCE WITH FAA GUIDANCE
8. ALL COORDINATES BASED UPON NAD 83.
9. NO PART 77 VIOLATIONS

ALP APPROVAL BLOCK

TRACY WILLIAMS
EXECUTIVE DIRECTOR

DATE

CONSTRUCTION NOTICE REQUIREMENT

TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED BY THE AIRPORT OWNER WITH TDOT - AERONAUTICS DIVISION PRIOR TO CONSTRUCTION.

AIRPORT LAYOUT DRAWING

MILLINGTON REGIONAL JETPORT
MILLINGTON, TENNESSEE

BWSC BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS PLANNERS AND SURVEYORS

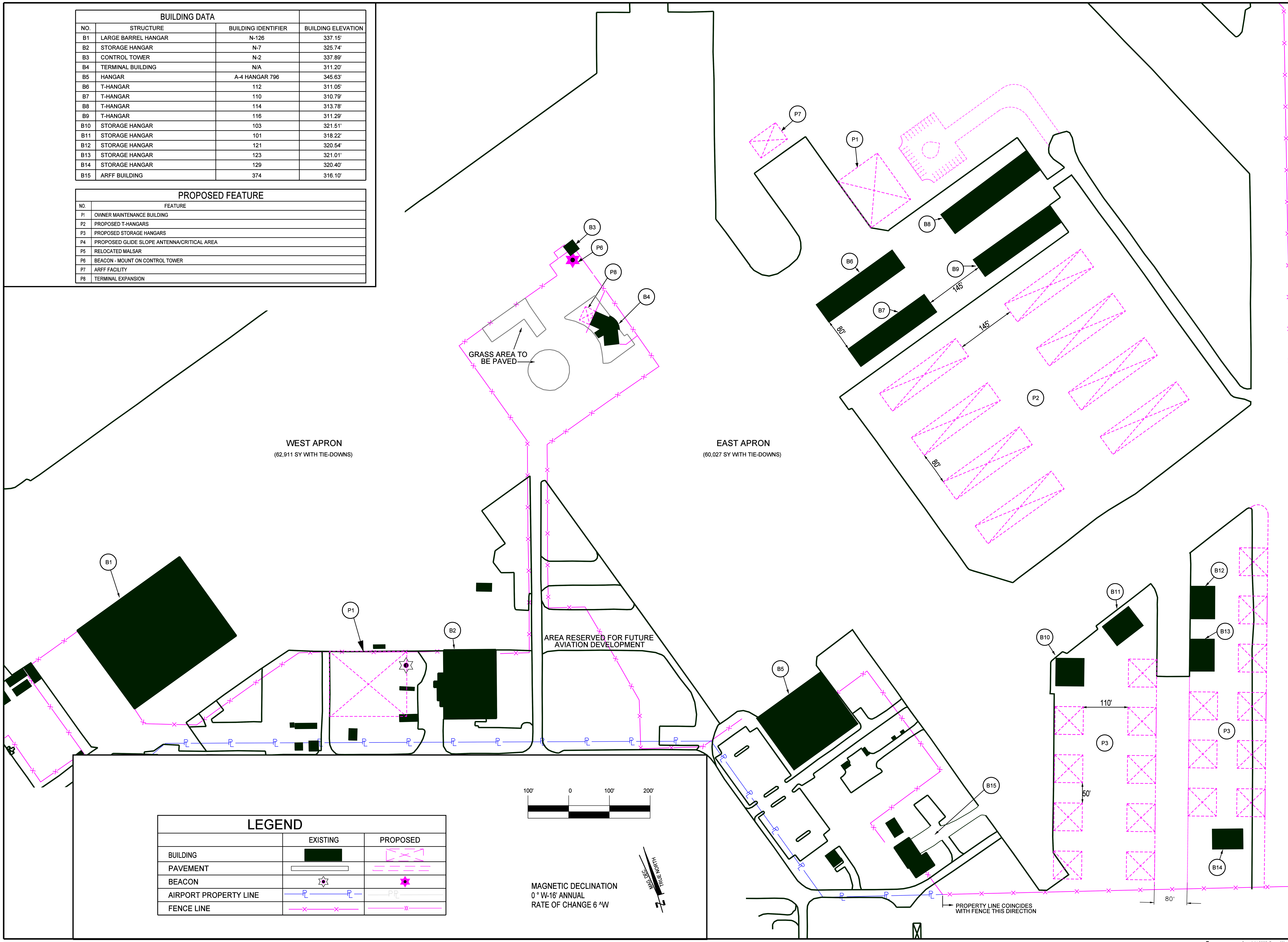
DR.	CHK.	DATE	DESCRIPTION
LD	CG	SEPT. 2008	FINAL PLANS

2 OF 9

FILE NO. 32475-00

BUILDING DATA			
NO.	STRUCTURE	BUILDING IDENTIFIER	BUILDING ELEVATION
B1	LARGE BARREL HANGAR	N-126	337.15'
B2	STORAGE HANGAR	N-7	325.74'
B3	CONTROL TOWER	N-2	337.89'
B4	TERMINAL BUILDING	N/A	311.20'
B5	HANGAR	A-4 HANGAR 796	345.63'
B6	T-HANGAR	112	311.05'
B7	T-HANGAR	110	310.79'
B8	T-HANGAR	114	313.78'
B9	T-HANGAR	116	311.29'
B10	STORAGE HANGAR	103	321.51'
B11	STORAGE HANGAR	101	318.22'
B12	STORAGE HANGAR	121	320.54'
B13	STORAGE HANGAR	123	321.01'
B14	STORAGE HANGAR	129	320.40'
B15	ARFF BUILDING	374	316.10'

PROPOSED FEATURE	
NO.	FEATURE
P1	OWNER MAINTENANCE BUILDING
P2	PROPOSED T-HANGARS
P3	PROPOSED STORAGE HANGARS
P4	PROPOSED GLIDE SLOPE ANTENNA/CRITICAL AREA
P5	RELOCATED MALSAR
P6	BEACON - MOUNT ON CONTROL TOWER
P7	ARFF FACILITY
P8	TERMINAL EXPANSION



LEGEND

	EXISTING	PROPOSED
BUILDING		
PAVEMENT		
BEACON		
AIRPORT PROPERTY LINE		
FENCE LINE		

MAGNETIC DECLINATION
0 ° W-16' ANNUAL
RATE OF CHANGE 6 ^W

CONSTRUCTION NOTICE REQUIREMENT

TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED BY THE AIRPORT OWNER WITH TDOT - AERONAUTICS DIVISION PRIOR TO CONSTRUCTION.

TERMINAL AREA DRAWING

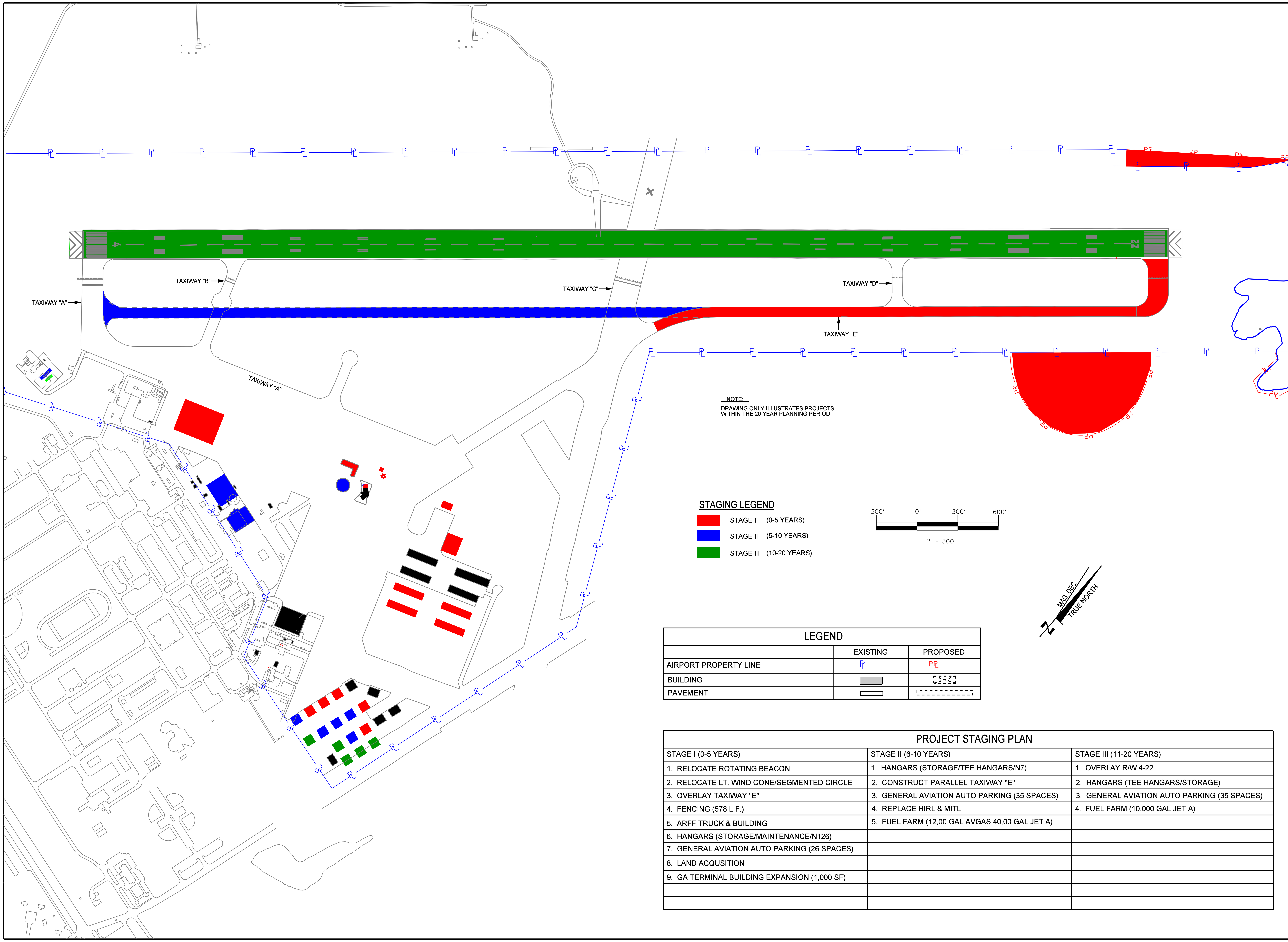
MILLINGTON REGIONAL JETPORT
MILLINGTON, TENNESSEE

BWSC
BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS PLANNERS AND SURVEYORS

DR.	CHK.	DATE	DESCRIPTION
LD	CG	SEPT 2008	FINAL PLANS

3 OF 9

FILE NO. 32475-00



LEGEND

	EXISTING	PROPOSED
AIRPORT PROPERTY LINE		PP
BUILDING		
PAVEMENT		

PROJECT STAGING PLAN

STAGE I (0-5 YEARS)	STAGE II (6-10 YEARS)	STAGE III (11-20 YEARS)
1. RELOCATE ROTATING BEACON	1. HANGARS (STORAGE/TEE HANGARS/N7)	1. OVERLAY R/W 4-22
2. RELOCATE LT. WIND CONE/SEGMENTED CIRCLE	2. CONSTRUCT PARALLEL TAXIWAY "E"	2. HANGARS (TEE HANGARS/STORAGE)
3. OVERLAY TAXIWAY "E"	3. GENERAL AVIATION AUTO PARKING (35 SPACES)	3. GENERAL AVIATION AUTO PARKING (35 SPACES)
4. FENCING (578 L.F.)	4. REPLACE HIRL & MITL	4. FUEL FARM (10,000 GAL JET A)
5. ARFF TRUCK & BUILDING	5. FUEL FARM (12,00 GAL AVGAS 40,00 GAL JET A)	
6. HANGARS (STORAGE/MAINTENANCE/N126)		
7. GENERAL AVIATION AUTO PARKING (26 SPACES)		
8. LAND ACQUSITION		
9. GA TERMINAL BUILDING EXPANSION (1,000 SF)		

CONSTRUCTION NOTICE REQUIREMENT

TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED BY THE AIRPORT OWNER WITH TDOT - AERONAUTICS DIVISION PRIOR TO CONSTRUCTION.

STAGING DRAWING

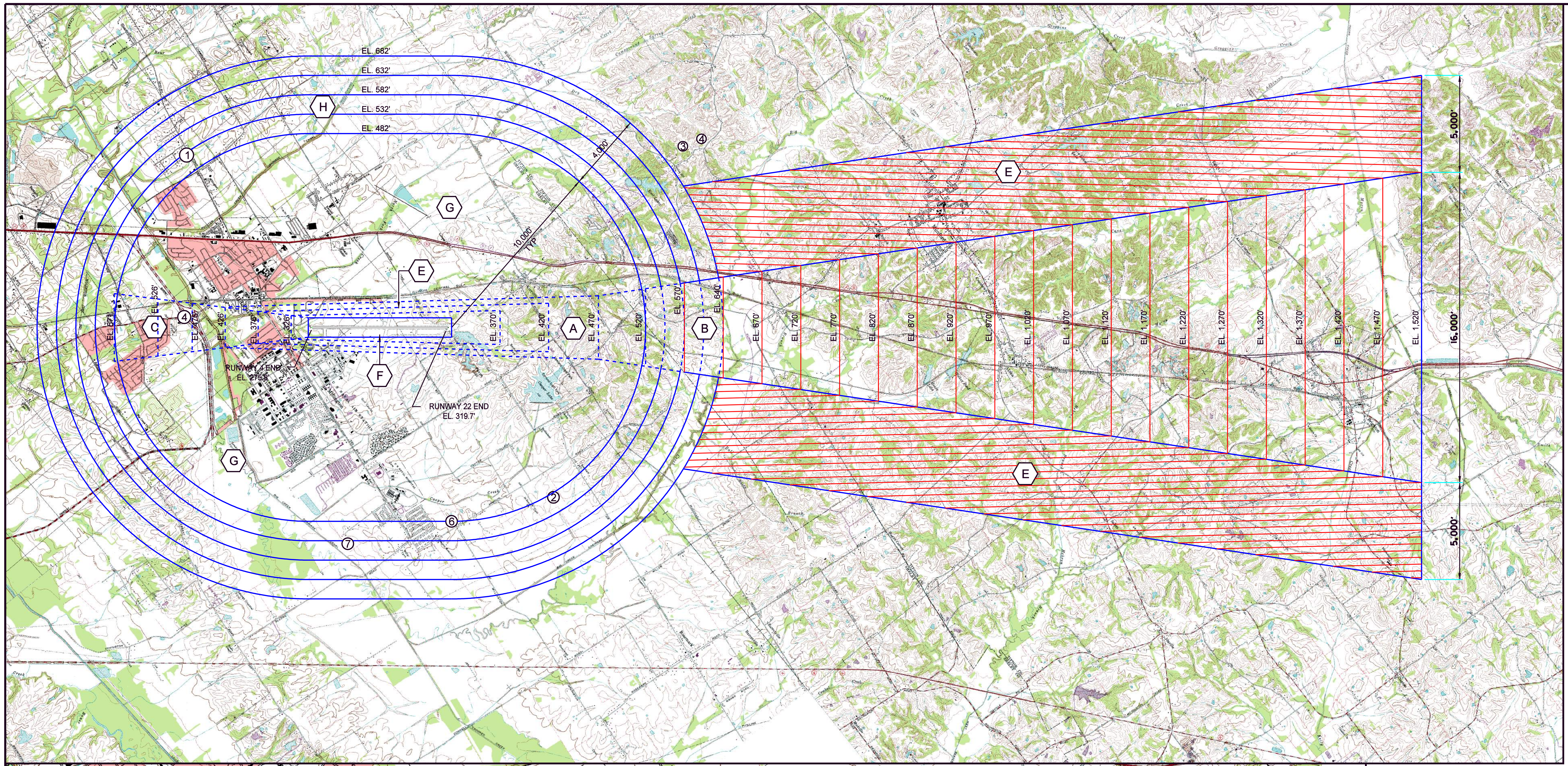
MILLINGTON REGIONAL JETPORT
MILLINGTON, TENNESSEE

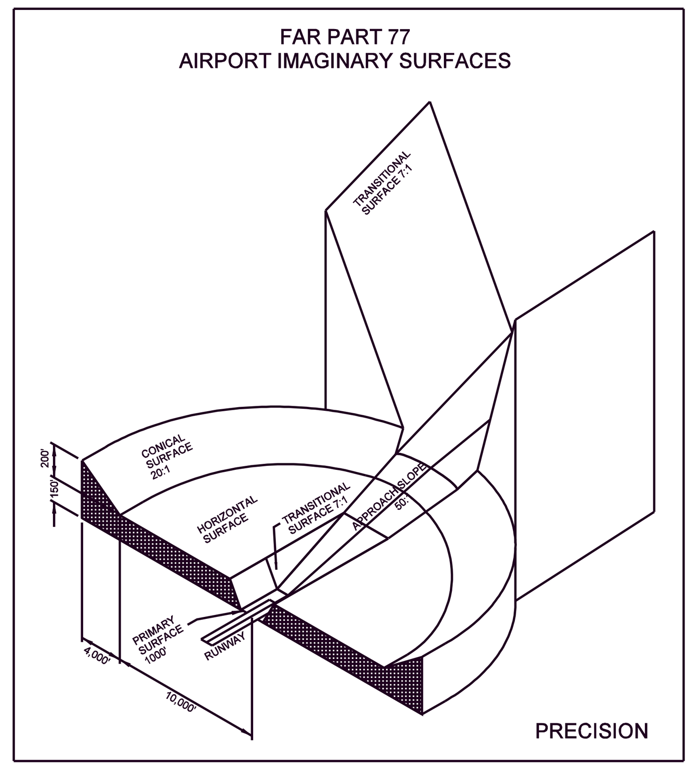
BWSC
BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS PLANNERS AND SURVEYORS

DR.	CHK.	DATE	DESCRIPTION
LD	CG	SEPT 2008	FINAL PLANS

4 OF 9

FILE NO. 32475-00





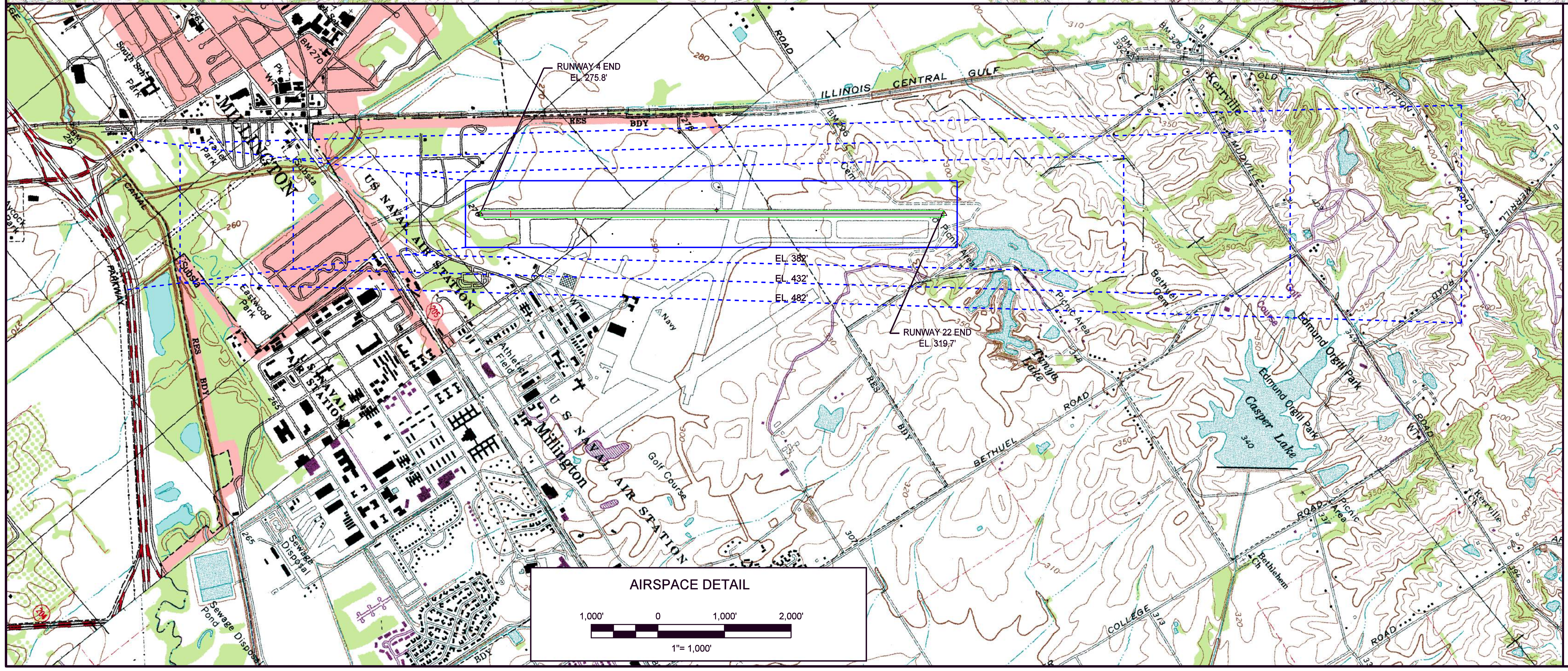
NOTES:

1. ALL ELEVATIONS ARE MSL.
2. THE AIRPORT ELEVATION IS 320'.
3. THERE ARE NO VIOLATIONS OF THE FAR PART 77 SURFACES.

MAG. DEC.
TRUE NORTH

MAGNETIC DECLINATION
0°W-16' ANNUAL
RATE OF CHANGE 6"W

3,000' 0 3,000' 6,000'
1"= 3,000'



AIRSPACE DETAIL

1,000' 0 1,000' 2,000'
1"= 1,000'

TALL TOWER TABLE

ITEM NUMBER	DESCRIPTION	ELEVATION	DISPOSITION
1	TOWER	345' AGL	TO BE LIGHTED
2	TANK	320' AGL	TO BE LIGHTED
3	TOWER	298' AGL	TO BE LIGHTED
4	TOWER	285' AGL	TO BE LIGHTED
5	TANK	189' AGL	TO BE LIGHTED
6	TOWER	345' AGL	TO BE LIGHTED
7	TOWER	1199' AGL	TO BE LIGHTED

LEGEND

- A — APPROACH SURFACE (50:1 SLOPE)
- B — APPROACH SURFACE (40:1 SLOPE)
- C — APPROACH SURFACE (34:1 SLOPE)
- D — APPROACH SURFACE (20:1 SLOPE)
- E — TRANSITIONAL SURFACE (7:1 SLOPE)
- F — PRIMARY SURFACE
- G — HORIZONTAL SURFACE (150' ABOVE ESTABLISHED AIRPORT ELEVATION)
- H — CONICAL SURFACE (20:1 SLOPE)

CONSTRUCTION NOTICE REQUIREMENT

TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED BY THE AIRPORT OWNER WITH TDOT - AERONAUTICS DIVISION PRIOR TO CONSTRUCTION.

FAR PART 77 AIRSPACE DRAWING

MILLINGTON REGIONAL JETPORT
MILLINGTON, TENNESSEE

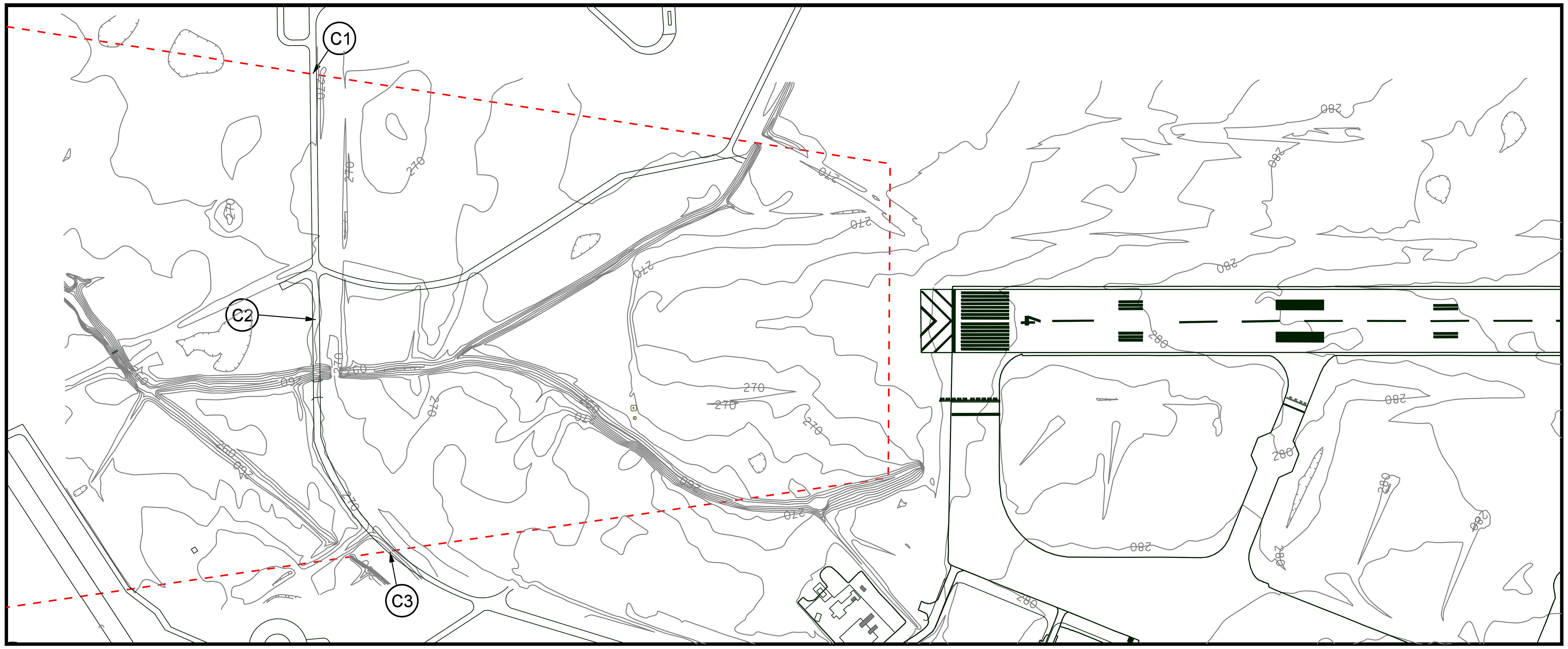
BWSC BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS PLANNERS AND SURVEYORS

DR.	CHK.	DATE	DESCRIPTION
LD	CG	SEPT. 2008	FINAL PLANS

5 OF 9

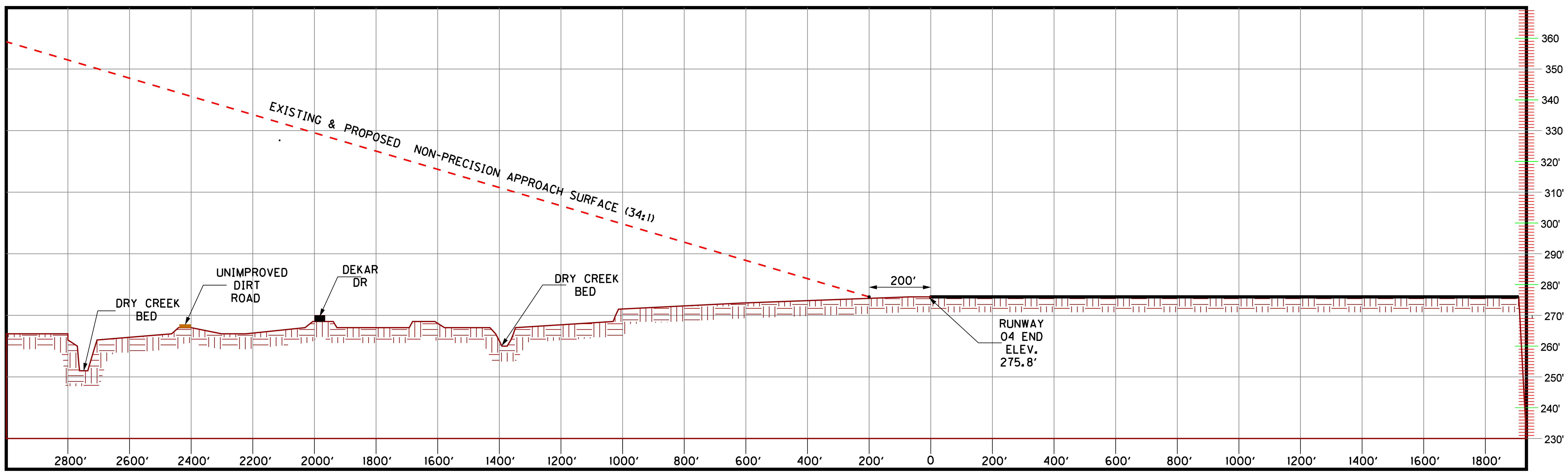
FILE NO. 32475-00

NOTES:
1. THERE ARE NO VIOLATIONS OF THE FAR PART 77 SURFACES.



RUNWAY 04 PLAN VIEW
SCALE: 1'=200'

TRAVERSE WAY CLEARANCES			
EXISTING	PROPOSED	ELEVATION	CLEARANCE
C1	N/A	270.2'	58.5'
C2	N/A	268.9'	59.8'
C3	N/A	264.1	55.8'



RUNWAY 04 PROFILE VIEW
SCALE: 1"= 20' VERTICAL
1" = 200' HORIZONTAL

CONSTRUCTION NOTICE REQUIREMENT
TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED BY THE AIRPORT OWNER WITH TDOT - AERONAUTICS DIVISION PRIOR TO CONSTRUCTION.

INNER APPROACH SURFACE DRAWING RUNWAY 04

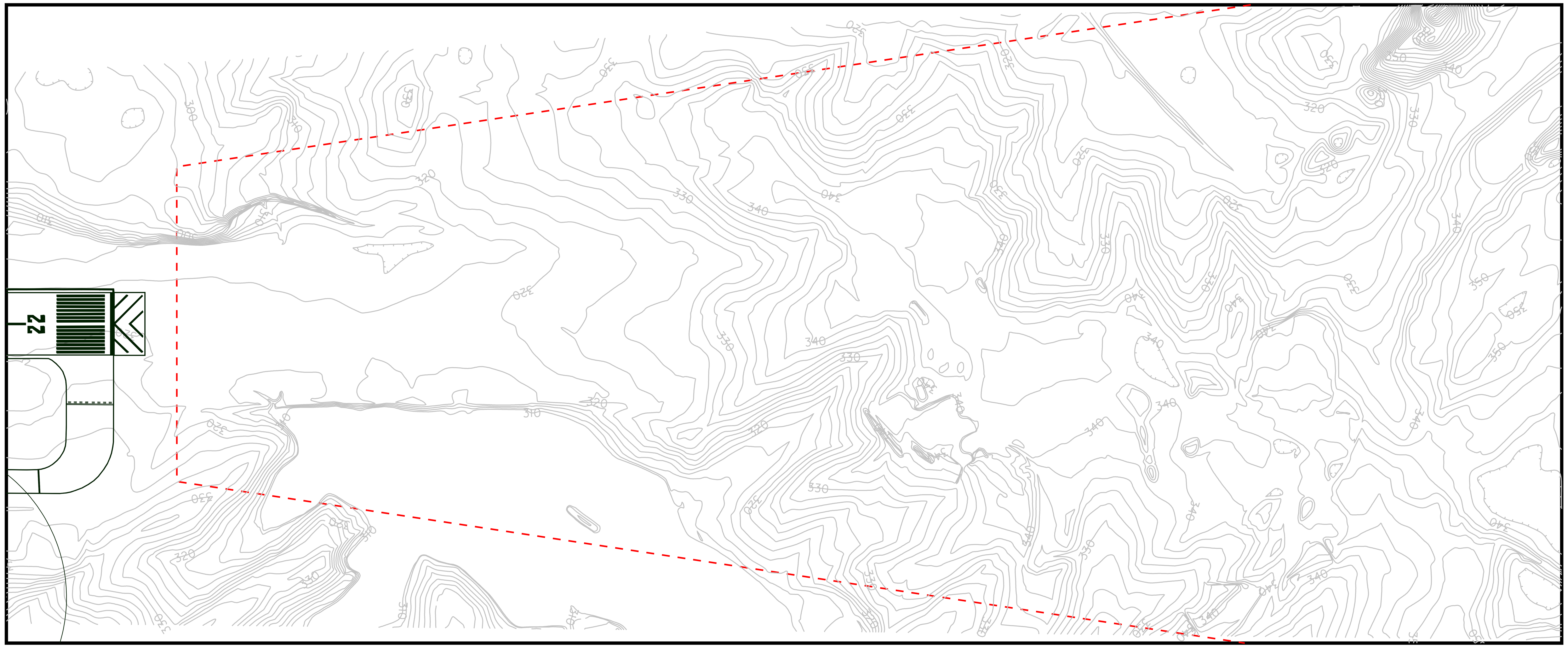
MILLINGTON REGIONAL JETPORT
MILLINGTON, TENNESSEE

BWSC
BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS PLANNERS AND SURVEYORS

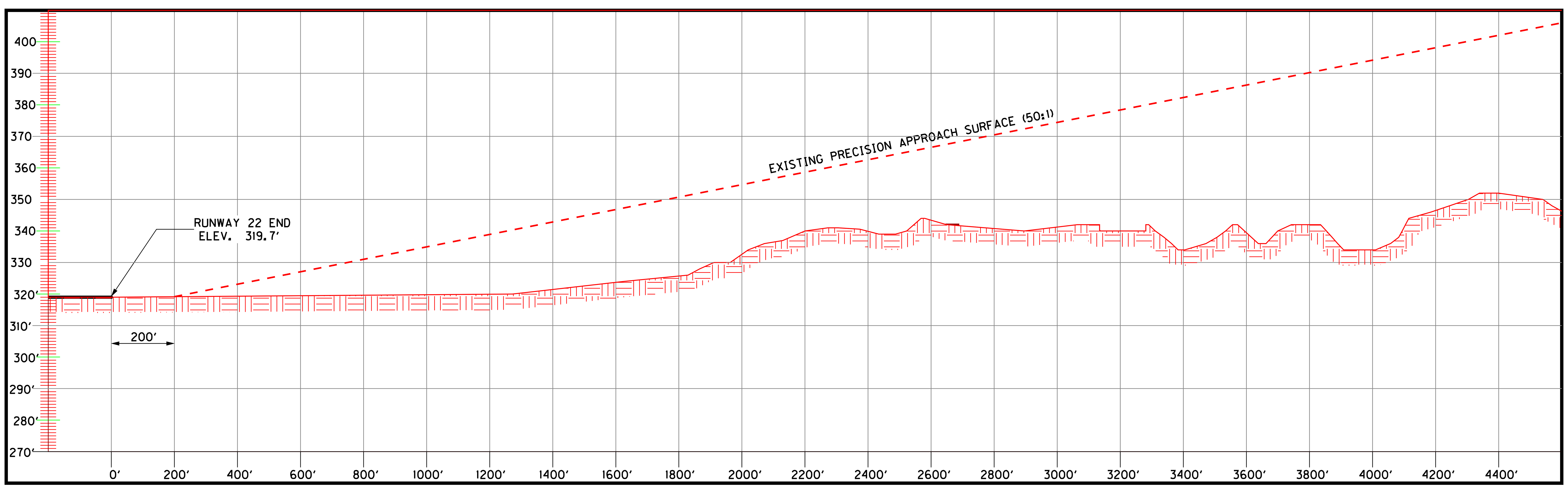
DR.	CHK.	DATE	DESCRIPTION
LD	CG	SEPT 2008	FINAL PLANS

6 OF 9
FILE NO. 32475-00

NOTES:
1. THERE ARE NO VIOLATIONS OF THE FAR PART 77 SURFACES.



RUNWAY 22 PLAN VIEW
SCALE: 1"=200'



RUNWAY 22 PROFILE VIEW
SCALE: 1"= 20' VERTICAL
1" = 200' HORIZONTAL

CONSTRUCTION NOTICE REQUIREMENT
TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED BY THE AIRPORT OWNER WITH TDOT - AERONAUTICS DIVISION PRIOR TO CONSTRUCTION.

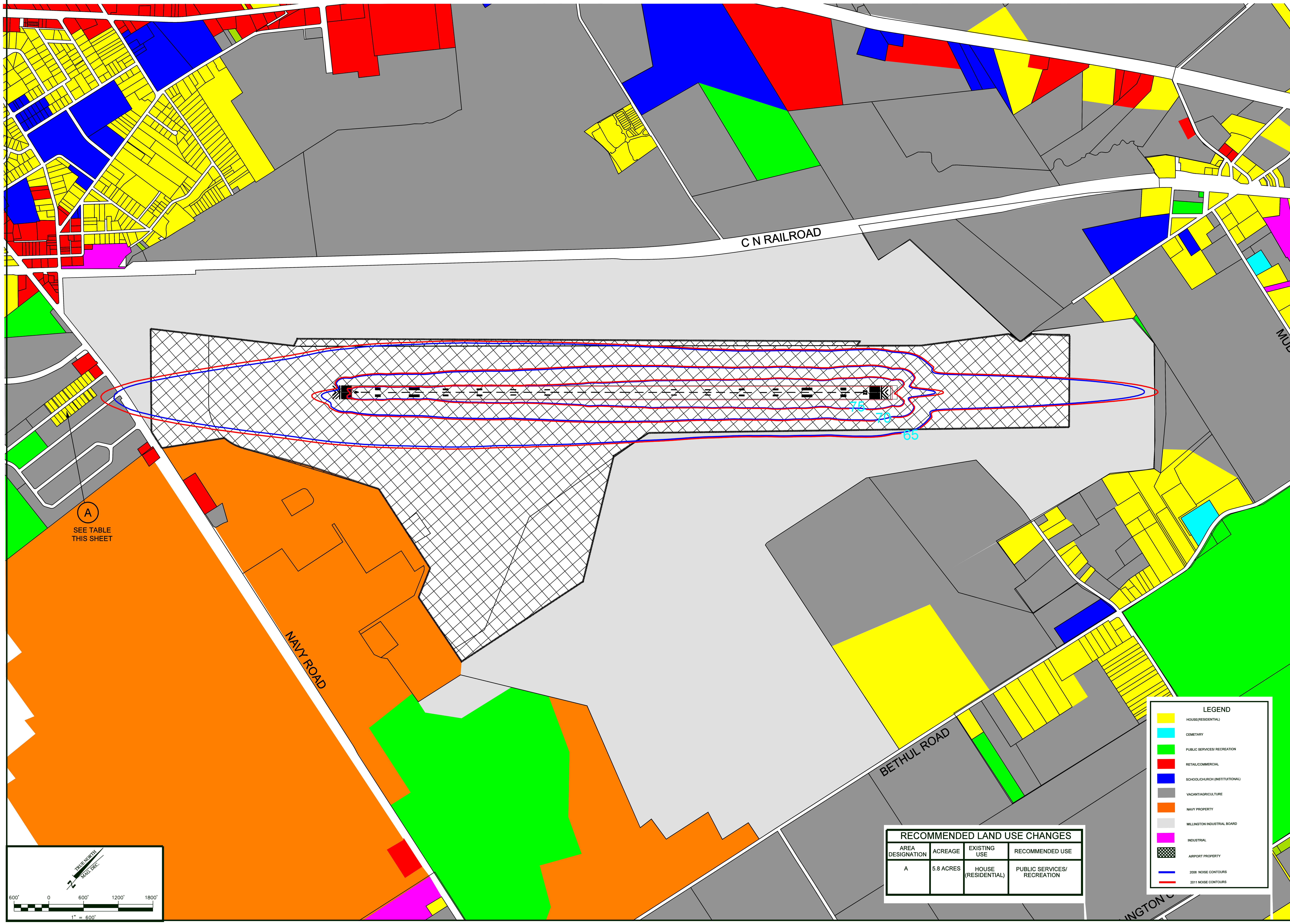
INNER APPROACH SURFACE DRAWING RUNWAY 22

MILLINGTON REGIONAL JETPORT
MILLINGTON, TENNESSEE

BWSC
BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS PLANNERS AND SURVEYORS

DR.	CHK.	DATE	DESCRIPTION
LD	CG	SEPT 2008	FINAL PLANS

7 OF 9
FILE NO. 32475-00



RECOMMENDED LAND USE CHANGES

AREA DESIGNATION	ACREAGE	EXISTING USE	RECOMMENDED USE
A	5.8 ACRES	HOUSE (RESIDENTIAL)	PUBLIC SERVICES/ RECREATION

CONSTRUCTION NOTICE REQUIREMENT

TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED BY THE AIRPORT OWNER WITH TDOT – AERONAUTICS DIVISION PRIOR TO CONSTRUCTION.

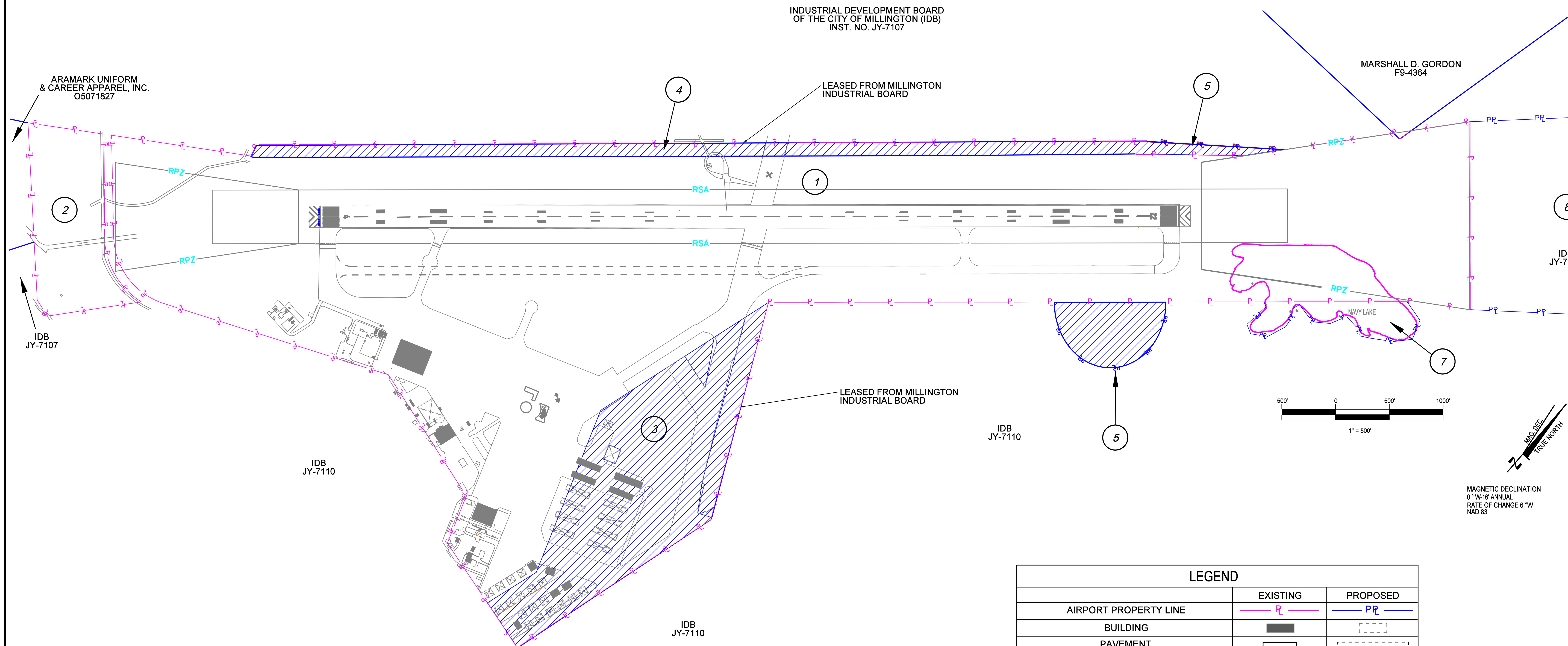
LAND USE DRAWING

MILLINGTON REGIONAL JETPORT
MILLINGTON, TENNESSEE

BWSC
BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS PLANNERS AND SURVEYORS

DR.	CHK.	DATE	DESCRIPTION
LD	CG	SEPT. 2008	FINAL PLANS

FILE NO. 32475-00



LEGEND

	EXISTING	PROPOSED
AIRPORT PROPERTY LINE	PL	PPL
BUILDING		
PAVEMENT		

EXISTING PROPERTY

REFERENCE NUMBER	TYPE	PREVIOUS OWNER	ACREAGE	DATE OF ACQUISITION	GRANT NUMBER	TYPE OF ACQUISITION	INSTRUMENT NO.
1	FEE SIMPLE	U.S. NAVY	522.77	12/1999	N/A	LAND RELEASE	JY-7103
2	FEE SIMPLE	U.S. NAVY	27.73	12/1999	N/A	LAND RELEASE	JY-7103
3	LEASE	I.D.B.	67.95	-	N/A	LEASE	N/A
4	LEASE	I.D.B.	23.08	-	N/A	LEASE	N/A

PROPOSED PROPERTY

REFERENCE NUMBER	TYPE	TAX MAP/ PARCEL NUMBER	OWNER	ACREAGE	PURPOSE OF ACQUISITION
5	LEASE	78/1	I.D.B.	11.54	AWOS CRITICAL AREA
6	LEASE	N/A	I.D.B.	2.6	GLIDE SLOPE CRITICAL AREA
7	FEE SIMPLE	N/A	I.D.B.	8.0	RUNWAY EXTENSION
8	FEE SIMPLE	N/A	I.D.B.	87.1	RUNWAY EXTENSION

CONSTRUCTION NOTICE REQUIREMENT

TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED BY THE AIRPORT OWNER WITH TDOT - AERONAUTICS DIVISION PRIOR TO CONSTRUCTION.

AIRPORT PROPERTY DRAWING

MILLINGTON REGIONAL JETPORT
MILLINGTON, TENNESSEE

BWSC
BARGE WAGGONER SUMNER & CANNON, INC.
ENGINEERS PLANNERS AND SURVEYORS

DR.	CHK.	DATE	DESCRIPTION
LD	CG	SEPT. 2008	FINAL PLANS

9 OF 9

FILE NO. 32475-00

Shelby County Government

Office of Resilience

Big Creek National Disaster Resilience Design Project

Appendix I

TIP Documentation

New TIP Page — Adopted 09.12.2019

TIP #	**STP-M-2009-03**	**TDOT PIN #**	NA	**RTP ID**	1000
Lead Agency	Various	**County**	Shelby	**Length**	NA
Horizon Year	NA	**Conformity**	Exempt	**Total Cost**	$5,200,625

Project Name/ Route: Resurfacing Grouping

Termini/ Intersection: Memphis MPO Planning Area

Federal Performance Measures


Project Description: This grouping will be used to fund road resurfacing, other preventative maintenance, and/or associated project improvements including pavement markings/signs, safety improvements, repair, rehabilitation, preservation, and construction throughout the Tennessee portion of the Memphis MPO Planning Area.

Obligated Funds	Timely Obligation	Fiscal Year	Phase of Work	Funding Type	Total Funds	Federal Funds	State Funds	Local Funds
		2020	PE-N/PE-D/ ROW/CONST	STBG	**$1,300,156**	$1,040,125		$260,031
		2021	PE-N/PE-D/ ROW/CONST	STBG	**$1,300,156**	$1,040,125		$260,031
		2022	PE-N/PE-D/ ROW/CONST	STBG	**$1,300,156**	$1,040,125		$260,031
		2023	PE-N/PE-D/ ROW/CONST	STBG	**$1,300,156**	$1,040,125		$260,031

Project Notes

Resurfacing Grouping - Programmed Phases (PE-N/PE-D/ROW/CONST)

Agency	Project Name	Phase of Work	Federal Funds
Bartlett	Elmore Road	PE-N/PE-D/ROW	$48,000
	St. Elmo Road	PE-N/PE-D/ROW	$180,000
	Brunswick Road	PE-N/PE-D/ROW	$120,000
	Elmore Park Road	PE-N/PE-D/ROW	$48,000
	Old Brownsville Road	PE-N/PE-D/ROW	$180,000
	Ellendale Road	PE-N/PE-D/ROW	$90,000
	Billy Maher Road	PE-N/PE-D/ROW	$48,000
Collierville	Houston Levee Road	PE-N/PE-D/ROW	$40,194
	Shelton Road	PE-N/PE-D/ROW	$39,680
	Progress Road	PE-N/PE-D/ROW	$60,918
Germantown	Wolf River Boulevard	PE-N/PE-D/ROW	$160,000
	Neshoba Road	PE-N/PE-D/ROW	$120,000
Millington	Big Creek Church Road	PE-N/PE-D/ROW	$25,520
	Sykes Road	PE-N/PE-D/ROW	$22,719
	Easley Street	PE-N/PE-D/ROW	$14,000
	Shelby Road	PE-N/PE-D/ROW	$15,200

Agency	Project Name	Phase of Work	Federal Funds
Memphis	Bartlett Road	PE-N/PE-D/ROW	$1,077,975
	Democrat Road	PE-N/PE-D/ROW	
	Florida Street	PE-N/PE-D/ROW	
	Graham Street	PE-N/PE-D/ROW	
	Mendenhall Road	PE-N/PE-D/ROW	
	Mendenhall Road	PE-N/PE-D/ROW	
	Mississippi Boulevard	PE-N/PE-D/ROW	
	Stratford Road	PE-N/PE-D/ROW	
	Central Avenue	PE-N/PE-D/ROW	$1,503,294
	Park Avenue	PE-N/PE-D/ROW	
	Park Avenue	PE-N/PE-D/ROW	
	Park Avenue	PE-N/PE-D/ROW	
	Highland Road	PE-N/PE-D/ROW	
	Sycamore View Road	PE-N/PE-D/ROW	
	Knight Arnold Road	PE-N/PE-D/ROW	
	Harbor Avenue	PE-N/PE-D/ROW	$195,000
	Channel Avenue	PE-N/PE-D/ROW	$172,000

Resurfacing Grouping - Unprogrammed Fiscally-Constrained Construction Set-Aside

Agency	Project Name	Phase of Work	Federal Funds
Bartlett	Yale Rd and Brother Blvd	CONST	$2,000,000
	Elmore Road	CONST	$352,000
	St. Elmo Road	CONST	$1,020,000
	Brunswick Road	CONST	$680,000
	Elmore Park Road	CONST	$352,000
	Old Brownsville Road	CONST	$1,020,000
	Ellendale Road	CONST	$510,000
	Billy Maher Road	CONST	$352,000
Collierville	Wolf River Boulevard	CONST	$1,133,192
	Houston Levee Road	CONST	$556,800
	Shelton Road	CONST	$549,670
	Progress Road	CONST	$843,867
Germantown	Wolf River Boulevard	CONST	$1,440,000
	Neshoba Road	CONST	$1,080,000
Millington	Big Creek Church Road	CONST	$556,000
	Sykes Road	CONST	$414,369
	Easley Street	CONST	$342,400
	Shelby Road	CONST	$330,000

Agency	Project Name	Phase of Work	Federal Funds
Memphis	Bartlett Road	CONST	$5,967,218
	Democrat Road	CONST	
	Florida Street	CONST	
	Graham Street	CONST	
	Mendenhall Road	CONST	
	Mendenhall Road	CONST	
	Mississippi Boulevard	CONST	
	Stratford Road	CONST	
	Central Avenue	CONST	$8,321,618
	Park Avenue	CONST	
	Park Avenue	CONST	
	Park Avenue	CONST	
	Highland Road	CONST	
	Sycamore View Road	CONST	
	Knight Arnold Road	CONST	
	Harbor Avenue	CONST	$4,415,000

Construction Set Aside $32,236,134

Revision History

Amendments

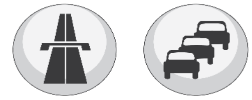
Administrative Modifications

TIP #	**STP-M-2014-05**	**TDOT PIN #**	123166.00	**RTP ID**	1012
Lead Agency	Millington	**County**	Shelby	**Length**	1.22 miles
Horizon Year	NA	**Conformity**	Exempt	**Total Cost**	$3,875,900

Project Name/ Route: Navy Road Streetscape and Median

Termini/ Intersection: US-51 to Veterans Parkway

Federal Performance Measures



Project Description: This is the second phase of the Navy Road Streetscape project. It includes the construction of paved crosswalks, sidewalk improvements, streetscape improvements, and the realignment of the intersection of Navy and Easley. Project scope will include shared bicycle lanes and ADA accessible pedestrian improvements.

Obligated Funds	Timely Obligation	Fiscal Year	Phase of Work	Funding Type	Total Funds	Federal Funds	State Funds	Local Funds
		2020	ROW	STBG	**$400,000**	$320,000		$80,000
		2020	CONST	STBG	**$3,125,000**	$2,500,000		$625,000

Project Notes:
PIN 123166.00 - PE-N and PE-D for entire project
Section 1 - PIN 123166.01 US-51 to Church
Section 2 - PIN 123166.02 Church to Veterans Parkway

Obligation History

Project Phase	PE-N	05/03/16	PE-D	01/22/18	ROW		CONST	

Revision History

Amendments

Administrative Modifications

TABLE OF CONTENTS
INTRODUCTION
TDOT PROJECTS
MDOT PROJECTS
LOCAL TN PROJECTS
LOCAL MS PROJECTS
TRANSIT PROJECTS
CMAQ PROJECTS

TIP #	**CMAQ-2017-01**	**TDOT PIN #**	125429.00	**RTP ID**	2050 RTP Goal 6
Lead Agency	Millington	**County**	Shelby	**Length**	NA
Horizon Year	NA	**Conformity**	Exempt	**Total Cost**	$917,559

Project Name/ Route: ITS Expansion

Termini/ Intersection: Various Locations

Federal Performance Measures

Project Description: The City of Millington will expand its existing Intelligent Transportation System (ITS) to add three traffic signals at Veterans Parkway and Church Street (existing), Navy Road and Bethuel Road (existing), and Wilkinsville and West Union (new) and one Radar Detection System (RDS). Fiber optic communications will be extended from the existing signal system to these three intersections.

Obligated Funds	Timely Obligation	Fiscal Year	Phase of Work	Funding Type	Total Funds	Federal Funds	State Funds	Local Funds
		2020	ROW/CONST	CMAQ	**$814,075**	$814,075		

Project Notes: This project is being funded through TDOT with a December 2016 CMAQ grant.

Obligation History

Project Phase	PE-N		PE-D		ROW		CONST	

Revision History

Amendments

Administrative Modifications

TIP #	**HIP-2018-01**	**TDOT PIN #**	NA	**RTP ID**	1000/ 1006
Lead Agency	Various	**County**	Shelby/ Fayette	**Length**	NA
Horizon Year	NA	**Conformity**	Exempt	**Total Cost**	$6,804,665

Project Name/ Route: Highway Infrastructure Program (HIP) Grouping

Termini/ Intersection: Memphis MPO Planning Area

Federal Performance Measures

Project Description: This grouping will be used to fund projects under the U.S. Department of Transportation's Highway Infrastructure Programs set-aside. Projects under this program must meet eligibility requirements, which include improvements, rehabilitation, and construction of highways and bridges.

Obligated Funds	Timely Obligation	Fiscal Year	Phase of Work	Funding Type	Total Funds	Federal Funds	State Funds	Local Funds
		2020	PE-N/PE-D/ ROW/CONST	HIP	**$6,804,665**	$5,443,732		$1,360,933

Project Notes: Funding for this program will lapse on September 30, 2021. The total apportionment for the Memphis MPO is $7,626,187. HIP funds have been applied to a project in the Resurfacing Grouping (STP-M-2009-03) as noted on the TIP page.

Highway Infrastructure Program (HIP) Grouping

Agency	Project Name	Phase of Work	Federal Funds
Millington	Shelby Road Bridge (Royster Creek)	PE-N/PE-D/ ROW/CONST	**$796,580**

Revision History

Amendments		Administrative Modifications	

TIP #	**STP-M-2014-12**	**TDOT PIN #**	NA	**RTP ID**	1006
Lead Agency	Various	**County**	Shelby	**Length**	NA
Horizon Year	NA	**Conformity**	Exempt	**Total Cost**	$9,075,936

Project Name/ Route: Bridge Grouping

Termini/ Intersection: Memphis MPO Planning Area

Federal Performance Measures

Project Description: This grouping will be used to fund bridge repair, replacement, rehabilitation, preservation, construction, systematic repairs & seismic retrofit, wetland and/or stream mitigation, safety improvements, bridge and tunnel inspection, and other preventative maintenance throughout the Tennessee portion of the Memphis MPO Planning Area.

Obligated Funds	Timely Obligation	Fiscal Year	Phase of Work	Funding Type	Total Funds	Federal Funds	State Funds	Local Funds
		2020	PE-N/PE-D/ ROW/CONST	STBG	**$6,278,900**	$5,023,120		$1,255,780
		2021	PE-N/PE-D/ ROW/CONST	STBG	**$175,000**	$140,000		$35,000
		2022	PE-N/PE-D/ ROW/CONST	STBG	**$175,000**	$140,000		$35,000
		2023	PE-N/PE-D/ ROW/CONST	STBG	**$175,000**	$140,000		$35,000
		2020	PE-N/PE-D/ ROW/CONST	HIP	**$2,272,036**	$1,817,629		$454,407

Project Notes: FY 2020 HIP funds (5th line item) are for the Sam Cooper Bridge Repairs project, PIN 119544.00.

Bridge Grouping
Programmed Phases (PE-N/PE-D/ROW/CONST)

Agency	Project Name	Phase of Work	Federal Funds
Collierville	Shelton Road Bridge - Wolf Lateral J	PE-N/PE-D/ROW	**$520,000**
Germantown	Poplar Culvert Replacements Phase 5	PE-N/PE-D/ROW	**$40,000**
Memphis	Sam Cooper Bridge Repairs (STBG)	CONST	**$4,883,120**
	Sam Cooper Bridge Repairs (HIP)	CONST	**$1,817,629**

Bridge Grouping
Unprogrammed Fiscally-Constrained Construction Set-Aside

Agency	Project Name	Phase of Work	Federal Funds
Germantown	Poplar Culvert Replacements Phase 4	CONST	**$420,000**
	Poplar Culvert Replacements Phase 5	CONST	**$400,000**
Memphis	Plough and Winchester	CONST	**$222,168**
	Mitchell Road and ICRR	CONST	**$191,258**
Millington	Raleigh Millington Bridge	CONST	**$2,920,000**
Construction Set Aside			**$4,153,426**

Revision History

Amendments

Administrative Modifications

TIP #	**STP-M-2009-04**	**TDOT PIN #**	NA	**RTP ID**	1012
Lead Agency	Various	**County**	Shelby	**Length**	NA
Horizon Year	NA	**Conformity**	Exempt	**Total Cost**	$4,606,350
Project Name/ Route	Bicycle and Pedestrian Grouping			**Federal Performance Measures**	
Termini/ Intersection	Memphis MPO Planning Area				

Project Description This grouping will be used to fund greenways, sidewalks, pedestrian and/or bicycle facilities/amenities, streetscaping, pavement markings, safety improvements, non infrastructure, school and other flashing signals, etc. throughout the Tennessee portion of the Memphis MPO area.

Obligated Funds	Timely Obligation	Fiscal Year	Phase of Work	Funding Type	Total Funds	Federal Funds	State Funds	Local Funds
		2020	PE-N/PE-D/ ROW/CONST	STBG	**$1,151,588**	$921,270		$230,318
		2021	PE-N/PE-D/ ROW/CONST	STBG	**$1,151,588**	$921,270		$230,318
		2022	PE-N/PE-D/ ROW/CONST	STBG	**$1,151,588**	$921,270		$230,318
		2023	PE-N/PE-D/ ROW/CONST	STBG	**$1,151,588**	$921,270		$230,318

Project Notes

Bicycle and Pedestrian Grouping Programmed Phases (PE-N/PE-D/ROW/CONST)

Agency	Project Name	Phase of Work	Federal Funds
Bartlett	Fletcher Creek Greenway Phase 4	PE-N/PE-D/ ROW	**$400,000**
	ADA Improvements	PE-N/PE-D/ ROW	**$80,000**
Memphis	Wolf River Greenway Phase 15	PE-N/PE-D/ ROW	**$680,000**
	Chelsea Avenue Greenline	PE-N/PE-D/ ROW	**$960,000**
	Overton Park Cooper Street Entrance	PE-N/PE-D/ ROW	**$55,200**
	Shelby Farms Greenline Bridge	PE-N/PE-D/ ROW	**$528,000**
	Memphis 3.0 (Kimball at Pendelton)	PE-N/PE-D	**$500,000**
	Memphis 3.0 (Austin Peay at Yale)	PE-N/PE-D	
	Memphis 3.0 (Frayser Town Center)	PE-N/PE-D	
Millington	Navy ADA Improvements	PE-N/PE-D/ ROW	**$481,880**

Bicycle and Pedestrian Grouping Unprogrammed Fiscally-Constrained Construction Set-Aside

Agency	Project Name	Phase of Work	Federal Funds
Bartlett	Fletcher Creek Greenway Phase 3	CONST	**$400,000**
	ADA Improvements	CONST	**$1,520,000**
Memphis	STP Sidewalk Program	CONST	**$280,000**
	Chelsea Avenue Greenline	CONST	**$3,120,000**
	Overton Park Cooper Street Entrance	CONST	**$400,000**
Shelby County	Benjestown Road Pedestrian Bridge	CONST	**$4,500,000**
Construction Set Aside			**$10,220,000**

Revision History

Amendments

Administrative Modifications