ADDENDUM No. 1

CDOT

South Chickamauga Greenway Connector Project
Contract Number: T-15-032
Chattanooga Department of Transportation

The following is the Schedule for this project:

Request for Information: All questions for this project should be submitted to the city's purchasing department by **4:00 PM** on **Tuesday, February 4, 2020**.
Addenda: All questions will be answered in addenda no later than **4:00 PM** on **Tuesday, February 11, 2020**.
Bid Opening: All Bids ***MUST*** be received by the city's purchasing department located at 101 East 11th Street Chattanooga, TN 37402 no later than **2:00 PM** on **Tuesday, February 18, 2020** in the Purchasing Conference Room.

Comment 1:
Please note the following Boardwalk Spec Changes from last time the project was bid:

- Reduced the Gross Vehicle Weight for the Boardwalk to 2 tons which aligns with the current pedestrian bridges along the greenway. This will allow a 2" deck boards in place of 3" deck boards. This will affect the structural design which is delegated to the contractor.
- Change the specification of the boardwalk mesh railing from the 8 gauge galvanized wire mesh to an 11 gauge coated wire mesh. This change allows for the mesh to be rolled out to be installed and is also a commonplace product with good durability.
- Change the boardwalk stain from a 3 Step process to a 2 Step process as described in the specifications in the bid book.

Comment 2:
Attached you will find the Geotechnical Services Report for this project.

Below are some questions that were asked during the last bidding process and were read at the pre-bid meeting on January 28, 2020.

Question 1:
Are there any wet lands?
Answer 1:
No, but there are some stream conveyances, wet weather conveyances.

Question 2:
We are not working at all in the waterway, right?

Answer 2:
That is correct.

Question 3:
Should the cleared logs, trees, and bushes be disposed of offsite?
Answer 3:
Yes, they must be disposed of offsite. Dirt and rocks may be distributed along the land.

Question 4:
Where are we allowed to do staging?
Answer 4:
Construction staging may take place on the Adams' track at the contractors choosing. The Adams tract is on the Youngstown Road side of the project.

Question 5:
Is there Field Flagging done already?
Answer 5:
Barge staked it 2.5 years ago so do not rely on these.

Question 6:
You mentioned Bat Trees. Are they noted on the plans?
Answer 6:
Natural Resource Assessment Report which includes the Bath Habitat Trees is provided for reference.

Question 7:
Who will be the CEI on this project?
Answer 7:
Arcadis will be the CEI on this project.

Question 8:
Do our subs have to be TDOT Prequalified?
Answer 8:
Construction subs do not. The prime contractor does.

Question 9:
Who did the road (trail) compactment previously?
Answer 9:
Stein and Robert Smith 2000 Square Feet of RCC and 2000 Square Feet of Boardwalk

Question 10:
Are there any concerns for karst topography that needs to be considered for the area? If discovered during foundation construction what are the procedures for mitigation?
Answer 10:
If karst situations occur during the project the CEI engineer for the project will work with Contractor, Owner and Engineer of Record to identify a repair method for the specific karst situation. Change Cost for the recommendation will be reviewed and approved prior to construction.

Question 11:
In the Geotech report the augured pilot holes will be required prior to installing the piles

supporting the boardwalk past station 30+60. What is the size of the pilot hole compared to the pile diameter? How does augured vs non-augured pilot holes compare to each other in lateral capacity from geotech report, Table 7-1?

Answer 11:

The Contractor's Structural Engineer will need to evaluate this in the boardwalk design. This same method was utilized on previously installed portions of the greenway on similar topography.

Question 12:

Is there even enough potential pile embedment to limit deflections on the flat side of the deflection curve? What's the max allowable pile deflection at the top of ground surface? Are there P-Y curves developed for various pile sizes?

Answer 12:

The Contractor's Structural Engineer will need to evaluate this in the boardwalk design.

Question 13:

Can the goetech provide an equivalent lateral soil capacity for short piles similar to IBC Ch 18, 1807.3 Embedded posts and poles?

Answer 13:

The Contractor's Structural Engineer will need to evaluate this in the boardwalk design.

Question 14:

If Top Down Construction specified in SECTION 02851 is not practical, what alternate methods or techniques are acceptable to the owner?

Answer 14:

Alternative methods to Top Down Construction are not considered viable due to the existing topography encountered along the length of the proposed greenway

Question 15:

What capacity will the geotech or record be made available during the contractor's design and review? From SECTION 02851, if alternate foundations types are required because of constraints in the terrain, will the geotech of record be available for consultation and provide additional information as needed for design? Who is responsible for paying for their services?

Answer 15:

Any additional geotechnical investigations will be at the Contractor's expense.

Below are some questions that were asked during the pre-bid meeting.

Question 16:

What are the clearing and grubbing requirements at the boardwalk?

Answer 16:

There is some rock removal because we need to remove some of the high point to be able to have ADA slope compliance throughout the whole project (less than 5% slope). The rock can be disposed of within the corridor. For reference, it is the highest point in the cross section drawings on Page 8B. Cleared logs must be disposed of since vegetated debris cannot stay in place but dirt and rock can be disposed of along the corridor.

Question 17:

Is there a grade accessible entrance for the RCC?

Answer 17:
We recommend that the RCC is done from the Faith Rd Trailhead

Question 18:
Do you have a laydown area for the RCC?
Answer 18:
There is a parcel of land that had a house on it near the Youngstown trailhead. The land was purchased and donated to the City of Chattanooga, and the house was torn down. The contractor is welcome to use this area if they wish.

Question 19:
Can you give me information about installing the wooden piles?
Answer 29:
Previous section was a dolomite rock that was drillable and the pile driven. No shallow foundations were used. Please refer to attached Geotechnical Report.

Question 20:
Is there an alternative to the Top Down construction?
Answer 20:
Top down is the specified methodology because of the steep side slope which makes other alternatives economically unfeasible. The existing greenway was constructed with this method.

Question 21:
Why is the boardwalk 12'?
Answer 21:
It is 12' because of the multi-modal standards.

Question 22:
Can you tell us what the construction sequence should be?
Answer 22:
Based on observations, the at grade portion cannot be constructed until the dry season. The RCC portion will also have a shorter duration so that needs to be accounted for. The Boardwalk should mobilize and stage from Youngstown in the Adams tract and the construction will go at a rate of around 30-40' every day as long as there are no special geotechnical concerns. The construction should continue until the interface with the at grade portion. Depending on the adjustments required during construction due to the terrain conditions there might be a small difference on this interface point. It is important to note that all adjustments should be discussed in advance so that there is not a significant impact to the lineal footage of the project.

Question 23:
How do you suggest we get to the high point of the boardwalk?
Answer 23:
The project is designed to start at the high point and use the boardwalk to get to at grade section. It is very important to start at the high point specified in the plans because this will drive the length of the boardwalk.

Question 24:
With the reduced weight capacity of the boardwalk, will it still be able to support the weight of the construction equipment?

Answer 24:
The structural engineer for the boardwalk will be able to guide you in the appropriate method of construction.

Question 25:
What is the difference between "Water" items 203-06 and 801-03?
Answer 25:
203-06 is payment for water related to project earthwork for either dust control or water added for compaction of the soil.
801-03 is payment for water utilized during temporary or permanent grass establishment.

Question 26:
There are a lot of elements in this bid, can we extend the bid time?
Answer 26:
Please submit a formal request to Debbie Talley.

Question 27:
Is the boardwalk material still wood?
Answer 27:
Yes. Please see boardwalk specifications for details.

Question 28:
The wood gets very slick with rain. Can the boardwalk get some kind of coating to reduce the slickness?
Answer 28:
There is no non-skid coating specified in this project, please see boardwalk specifications.

Question 29:
What are the asphalt requirements?
Answer 29:
Asphalt will be installed in accordance with TDOT Specifications.

Here are questions from Addendum 3 from the Previous Bidding Process that may be pertinent:

Question 30:
What are the seismic parameters for TDOT design including site class, seismic design category, Ss, S1?
Answer 30:
Seismic design standards Ss= 0.1g to 0.5g, S1= 0.07g to 0.25g Site classification D

Question 31:
What seismic hazards are consider for slope stability? Do the boardwalk piles need to design for slope stability concerns or any other seismic hazards?
Answer 31:
Pile design must address lateral pile stability based on geotechnical report. No specific seismic slope stability standard are required. Given the nature of the slopes the pile driving and construction will have to be completed using a top down construction method.

Question 32:
What are the lateral drift requirements of the boardwalk for seismic, wind, and vehicle?

Answer 32:
Seismic and wind drift L/240. No vehicle drift is considered.

Question 33:
Are there any vehicle impact requirement for curb, railing, or framing members?
Answer 33:
The boardwalk curb, railing or framing members are not required to meet vehicular impact standards.

Pre Bid Meeting Agenda

T-15-032 South Chick Greenway Connector (Faith-Youngstown) -

January 28, 2020 – 11:00 AM

DRC Conference Room 3-B

Owner:	**City of Chattanooga**
Transportation Engineer:	**Mark Heinzer, P.E.**
Engineering Project Manager:	**Melissa D. Kelly, P.E.**
Designer:	**Barge Design Solutions**
CEI:	**TBD**

1. **Introductions & Sign-in**

2. **Project description and scope**

   Construction of multi-modal path along South Chickamauga Creek from the existing greenway to a new trailhead with accessible parking at Youngstown Road. The project consists of common and borrow excavation, installation of new sidewalks, detached curbs, curb and gutter, ADA ramps, driveway aprons, erosion control, topsoil and seeding, and traffic control, demolition and removal of existing sidewalks, storm drainage, and other miscellaneous items as needed. Located in Chattanooga, TN and approximately 3100 feet long with 1472' 10' wide roller compacted concrete path and 1600' 12' wide boardwalk.

   This project is funded through the Transportation Alternatives Program, so please read carefully through the bid documents and follow all the instructions to avoid disqualification.

Chattanooga Department of Transportation
1250 Market Street. Suite 3030, Chattanooga, TN 37402
Office 423.643.5950, Fax 423. 643.5951

3. Requests for Information

All questions for this project should be submitted to the city's purchasing department by 4:00 PM on Tuesday, February 4, 2020.

4. Addenda

All questions will be answered in addenda no later than 4:00 PM on Tuesday, February 11, 2020.

5. Bid Opening.

All Bids must be received by the city's purchasing department located at 101 East 11th Street Chattanooga, TN 37402 **no later than 2:00 PM** on Tuesday, February 18, 2020 in the Purchasing Conference Room.

6. Instructions to bidders

a. When submitting your sealed bid to Purchasing, you must include Form 00201, Contractor's ID on the outside of the envelope.
b. Power of Attorney has to be dated within 3 days of the bid being signed
c. No add alternates or deducts by contractors.
d. Set cannot be unbound. This will be a motive for disqualification. Be sure to have all bid specs completed and returned as issued.
e. Bids must be submitted in a sealed envelope/box
f. Contractor's license number is not required, because this is a federal project.
g. Only complete the forms in the bid specs as issued – along with any you receive in an addendum.
h. The Power of Attorney MUST be dated within 3 days of the bid being signed
i. All addendums are included in the returned bid specs for the bid opening
j. All addendums are acknowledged on the bid envelope or on the bid form
k. All line items on the bid form must have a number greater than $0.00 assigned to them
l. No add alternates or deducts by contractors or local agency are allowed
m. Bidders must be TDOT pre-qualified to submit a bid. CDOT will check again before opening bid on bid day
n. Bidders have a 90-day grace period once their pre-qualification status has expired so they are still eligible to bid
o. Since a DBE goal is assigned, form 8-5 (DBE Participation) has to be completed by the contractor and submitted within 3 business days of the bid opening. A bidder must be on TDOT's Small Business Development website to be considered for DBE participation.

p. Double check you bids prior to submittal for mathematically unbalanced bids. Unbalanced bids will be thrown out.
q. Double check for any discrepancies in your unit prices
r. Any changes made on the bid form must be initialed by bidders
s. Ensure whomever signed the pre-qualification paperwork with TDOT signs the bid documents
t. All forms must be completed in their entirety (i.e. if there is a place to print name and sign, you must do both)
u. Bid must be in numerals and in words

7. Contractor pre-qualification

All prospective bidders are to be TDOT (Tennessee Department of Transportation) pre-qualified. In addition, before opening the bids we have to make sure the bidders have not been removed from the pre-qualification list.

If you are not currently prequalified with TDOT, you MUST complete the process as soon as possible by going to this link: https://www.tn.gov/tdot/tdot-construction-division/construction-contractor-prequalification.html.

Construction subcontractors do not need to be pre-qualified. The prime contractor does.

8. DBE goal

The DBE goal for this project is 10% or greater.
You must be TDOT pre-qualified and TNUCP Certified in order to work as a DBE on the project. You have to be qualified through the DBE Offices of TDOT. If you are not already certified, there are forms to complete and it is a great idea to get that done as soon as possible by going to this link: https://www.transportation.gov/civil-rights/disadvantaged-business-enterprise/ready-apply.

Contact TDOT at TDOT.DBE.Program@tn.gov to get more information. The application has been added to this addendum for your convenience.

You need to submit Form 8-5 for the project with bid. It can be found in the Local Programs website and will also be issued with Addendum #1.

9. Contract length

240 days

10. Buy America

Steel and iron products must be domestically produced and certification must be provided and kept on file.

11. Questions.

Chattanooga Department of Transportation
1250 Market Street. Suite 3030, Chattanooga, TN 37402
Office 423.643.5950, Fax 423. 643.5951

Pre Bid Meeting Agenda
T-15-032 S Chick Greenway - Youngstown Road Connector-
January 28, 2020 – ~~10:00 AM~~ 11AM
DRC Conference Room 3-B

	Name	Company	Phone:	Email:
1	Tim Fountain	Talley Construction	423-364-9814	TFountain@Talleyconstruction.net
2	Lisa Williams	CDOT	423-643-5963	lwwilliams@chattanooga.gov
3	Melissa Kelly	CDOT	423-643-5968	mjkelly@chattanooga.gov
4	Kyle Akers	Kleenco Construction	(423) 624-4111	Kyle.akers@kleencoconstruction.com
5	Estan Fuller	Kleenco	(423) 624-4111	estan.fuller@kleencoconstruction.com
6	David Johnson	The Trust for Public Land	423-541-1886	david.johnson@tpl.org
7	Debbie Talley	COC	423-643-7230	dtalley@chattanooga.gov
8	RONALD SIMMONS	COC	423-643-5869	rlsimmons@chattanooga.gov
9	BEN NEMEC	BARGE DESIGN	423-774-2905	BEN.NEMEC@BARGEDESIGN.COM
10	Marcus Fuller	Kleenco Const	423-624-4111	marcus.fuller@kleencoconstruction.com
11	Mark Heinzer	CDOT	423.643.6023	mheinzer@chattanooga.gov
12				
13				
14				
15				
16				
17				
18				
19				
20				

SECTION 00201

CONTRACTOR'S IDENTIFICATION

This form shall be attached to the sealed envelope containing the Bid.

BIDDER:

Name: _____

_____

Address: _____

_____

_____

SEALED BID PROPOSAL FOR :

_____

_____

_____

BID OPENING DATE AND TIME:

_____

LOCATION:

City Hall, Purchasing Department
101 E. 11th Street
Suite G13
Chattanooga, TN 37402

Elecrtical Subcontractor: _____

HVAC Subcontractor: _____

Plumming Subcontractor: _____

Masonry Subcontractor: _____

CITY OF CHATTANOOGA
Purchasing Department
101 E. 11th Street, Suite G13
Chattanooga, Tennessee 37402

For projects with Federal Funds only

TN TDOT Department of Transportation

Local Government Guidelines Form 8-5
March 9, 2018

DBE AWARD INFORMATION FOR CONTRACTORS AND CONSULTANTS ON LOCALLY LET FEDERAL AID CONTRACTS

County: Wilson
PIN: 129888.00
Contract Award Amount: $900,000.00
Federal Project Number: STBG-M-1234(00)
Federal Dollars in Contract: $720,000.00
State Project Number: 95LPLM-F3-011
Contract Award Date: 12/5/18
Name of Prime Contractor: Allen & Son Pavers, LLC
Proposed DBE Goal or None: 9% or ☐None

**This form must be resubmitted to Local.Programs@tn.gov if the DBEs change on the project.*

NAMES OF SUBCONTRACTORS	ETHNICITY**	GENDER	SUBCONTRACT AMOUNT
ERH Construction			
DBE Certified Work Type to be performed: Traffic Control ☐ 2nd Tier	African American	Male	$64,000.00
Agee General Contracting			
DBE Certified Work Type to be performed: Landscaping ☐ 2nd Tier	Hispanic	Female	$17,000.00
DBE Certified Work Type to be performed: ☐ 2nd Tier			$
DBE Certified Work Type to be performed: ☐ 2nd Tier			$
DBE Certified Work Type to be performed: ☐ 2nd Tier			$
		TOTAL DBE COMMITMENT:	$81,000.00

SUBMITTED BY: Ron Swanson
DATE: 12/7/18

**Ethnicity= Black American (BA), Hispanic American (HA), Native American (NA), Asian Indian American (AIA), Asian-Pacific American (APA), Non-Minority Women (FBE), Other (OT)

TN TDOT Department of Transportation

Local Government Guidelines Form 8-5
March 9, 2018

DBE AWARD INFORMATION FOR CONTRACTORS AND CONSULTANTS ON LOCALLY LET FEDERAL AID CONTRACTS

County: _____ PIN: _____

Contract Award Amount: _____ Federal Project Number: _____

Federal Dollars in Contract: _____ State Project Number: _____

Contract Award Date: _____

Name of Prime Contractor: _____

Proposed DBE Goal or None: % or ☐ None

**This form must be resubmitted to Local.Programs@tn.gov if the DBEs change on the project.*

NAMES OF SUBCONTRACTORS	ETHNICITY**	GENDER	SUBCONTRACT AMOUNT
DBE Certified Work Type to be performed: ☐ 2nd Tier			$
DBE Certified Work Type to be performed: ☐ 2nd Tier			$
DBE Certified Work Type to be performed: ☐ 2nd Tier			$
DBE Certified Work Type to be performed: ☐ 2nd Tier			$
DBE Certified Work Type to be performed: ☐ 2nd Tier			$
		TOTAL DBE COMMITMENT:	$

SUBMITTED BY: _____ DATE: _____

**Ethnicity= Black American (BA), Hispanic American (HA), Native American (NA), Asian Indian American (AIA), Asian-Pacific American (APA), Non-Minority Women (FBE), Other (OT)

Report of Geotechnical Services
South Chickamauga Greenway
Phase II, Segment 1
Chattanooga, Tennessee
S&ME Project No. 1281-16-030, Ph. 1

S&ME

Prepared for:
Barge, Waggoner, Sumner & Cannon, Inc.
1110 Market Street, Suite 200
Chattanooga, Tennessee 37402

Prepared by:
S&ME, Inc.
4291 Highway 58
Chattanooga, TN 37416

May 10, 2017

S&ME

May 10, 2017

Barge, Waggoner, Sumner & Cannon, Inc.
1110 Market Street, Suite 200
Chattanooga, Tennessee 37402

Attention: Mr. Ben Nemec, PE

Reference: Report of Geotechnical Services
South Chickamauga Greenway – Phase II, Segment 1
Chattanooga, Tennessee
S&ME Project No. 1281-16-030, Ph. 1

Dear Mr. Nemec:

This report presents the results of the geotechnical exploration for the South Chickamauga Greenway – Phase II, Segment 1 site in Chattanooga, Tennessee. Our work was performed in general accordance with S&ME Proposal No. 41-1600167, dated February 24, 2016.

This report describes our understanding of the project, presents the results of the field exploration and laboratory testing, and discusses our conclusions and recommendations. S&ME appreciates this opportunity to be of service to you. Please call if you have questions concerning this report or any of our services.

Sincerely,

S&ME, Inc.

Jonathan M. Smolen, PE
Project Engineer

JONATHAN MICHAEL SMOLEN REGISTERED ENGINEER AGRICULTURE COMMERCE NO. 00110146 STATE OF TENNESSEE

James P. McGirl, PE
Principal Engineer

Table of Contents

Appendices

Executive Summary

This summary is presented for the convenience of the reader. The full report text should be studied and understood before preparing an estimation of quantities or preparing designs based on this report, as it contains important information and recommendations that are not included in this brief summary.

1. The limited geotechnical exploration included a site reconnaissance and hand auguring with dynamic cone penetrometer testing of 11 borings. A member of our professional staff logged the soil conditions encountered in the hand auger borings and collected soil samples from select borings and depths for subsequent laboratory testing.

2. Natural moisture content, Atterberg limits and wash #200 sieve tests were performed on representative samples to aid our soil classification and to evaluate the relative volume change potential of on-site soils.

3. Alluvial soils were encountered from the ground surface in three of the hand auger borings to auger refusal or boring termination. The alluvial soils encountered at the site were typically composed of firm to stiff, orange brown sandy clay. Residual soils were encountered from the ground surface in the remaining 8 hand auger borings to auger refusal. The residual soils encountered at the site were typically composed of firm to stiff, orange-brown silty clay with chert.

4. Hand auger refusal was encountered in each of the borings except B-2 and B-3 at depths ranging from about 2 ½ feet to about 5 ½ feet below the existing ground surface. Each of the hand auger refusals except B-1 occurred on chert. Borings B-2 and B-3 were terminated at a depth of about 8 ½ feet, the maximum practical depth attainable with hand tools.

5. Groundwater was not encountered in the hand auger borings at the time of excavation. We do not expect groundwater will present significant site development problems.

6. The site is adaptable for the proposed support of the boardwalk using timber piles. Further, due to the abundance of chert in the residual soils, augured pilot holes will be required to allow for pile installation.

7. After completion of stripping in areas to receive fill, and once grade is achieved in cut areas, the subgrade soils for the at-grade sections of the greenway should be evaluated by proofrolling. The purpose of proofrolling is to locate pockets of soft or unstable soils. Proofrolling should be observed by our geotechnical engineer.

1.0 Introduction

S&ME, Inc. has completed the geotechnical exploration at the South Chickamauga Greenway – Phase II, Segment 1 site in Chattanooga, Tennessee. Our work was performed in general accordance with S&ME Proposal No. Proposal No. 41-1600167, dated February 24, 2016. Our services were authorized by Mr. Russell Moorehead of Barge Waggoner Sumner and Cannon on March 22, 2016.

The purpose of our work was to explore the subsurface soil conditions and groundwater level, provide feasible shallow foundation recommendations, applicable earthwork recommendations, and pavement thickness recommendations. This report describes our understanding of the project, presents the results of the field exploration and laboratory testing, and discusses our conclusions and recommendations relative to the above considerations.

A Site Location Plan and Boring Location Plan are included in Appendix I. A discussion of the field investigative procedures, a legend of soil classification and symbols, and the Hand Auger Boring Records are included in Appendix II. Appendix III contains a discussion of the laboratory testing procedures and the laboratory test results. Appendix IV contains a document titled "Important Information About Your Geotechnical Engineering Report".

2.0 Project and Site Description

Project information was provided by Mr. Nemec in the form of a document titled First Addended Request for Proposal for Engineering Services for Trail and Bridge Design for South Chickamauga Creek Greenway from Faith Road Trailhead to Youngstown Road and Youngstown Road to Cromwell Hills Housing Authority, dated January 14, 2016. Mr. Nemec has also provided us a with the South Chickamauga Greenway Youngstown Road Connector, 75% review project drawings, dated 12-2-2016 with proposed boring locations superimposed.

2.1 Project Description

The South Chickamauga Creek Greenway, Phase II, Segment 1 project consists of the installation of a boardwalk and at-grade trail that will begin at the current greenway terminus at Faith Road and continue along the South Chickamauga Creek to Youngstown Road. Stationing referenced in the report is based on the provided Proposed Profile drawings. The trail will be an at-grade walkway from the Faith Road terminus to station 24+72.83. The boardwalk section extends from station 24+72.83 to station 40+52.52. The at-grade portion will be roller compacted concrete (RCC). The boardwalk will be heavy timber construction supported on driven wooden piles.

2.2 Site Description

From the Faith Road terminus at station 10+00 to about station 30+60 the greenway runs along a relatively level, low lying area within or just along the outside edge of the floodplain for the South Chickamauga Creek. The existing ground surface elevation along this section of the proposed greenway ranges from about 651 feet to 658 feet. The area has moderately spaced young to mature trees and moderate underbrush.

From about station 30+60 to where segment one connects to segment 2 at station 40+52.52, the greenway runs along a topographically rugged and relatively steep section along the creek. The section is wooded with moderately spaced young to mature trees and moderate amounts of underbrush. The existing ground elevation along this section of the greenway ranges from about 656 feet to 694 feet.

3.0 Regional Geology

Chattanooga, Tennessee is located in the Valley and Ridge Physiographic Province. Elongated ridges that trend in a northeast-southwest direction characterize this province. The ridges are typically formed on highly resistant sandstones and shales, while the valleys and rolling hills are formed on less resistant limestone, dolomite, and shales.

Based on our review of the Geologic Map of the East Chattanooga Quadrangle, dated 1989, the project site is underlain by the Chapultepec Dolomite formation. The Chapultepec consists of light- to medium dark-gray, thin- to very thick-bedded, fine- to very coarse-grained dolomite. The Chapultepec formation is part of the Knox Group. Residual soils derived from the Knox Group are typically red-brown to yellow-brown clays with locally heavy amounts of chert fragments. The strata of the Knox formations weather to form an overburden typically in excess of 40 feet thick.

Carbonate bedrock such as the strata underlying this site, is of great geologic age and has been subject to solution weathering over geologic time. Rainwater falling onto the surface and percolating downward through the soil and into cracks and fissures gradually dissolves the rock, producing insoluble impurities such as chert and clay. Since carbonate bedrock varies greatly in its resistance to weathering, the soil/bedrock contact may be extremely irregular. More soluble bedrock develops a thicker soil cover and a more irregular bedrock surface with pinnacles and slots, and less soluble bedrock usually develops a thinner soil cover and a less irregular soil-bedrock surface.

These large variations in bedrock depth are greatly enhanced by the presence of fractures, bedding planes, and faults, which provide an increased opportunity for a greater influx of percolating water. The weaknesses may form clay-filled cavities or enlarge into caves and may be connected by a network of passageways. If a cave forms close to the bedrock surface, its roof may collapse and the overlying soils may erode into the cave. Once the weight of the overlying soil exceeds the soil's arching strength, the soil collapses and an open hole or depression may appear at the ground surface. Such a feature is termed a sinkhole.

There is always some risk associated with developing any site underlain by carbonate bedrock. We have reviewed the USGS quadrangle map for this area. The map does not show a pattern of closed depressions. Further, we did not observe open holes or other signs of sinkhole conditions during our site reconnaissance or in the hand auger borings. We also observed successful development in the surrounding area. Therefore, we believe the risk of sinkhole formation does not present a significant obstacle to the development of this project.

4.0 Subsurface Conditions

4.1 Field Exploration Procedures

The procedures used by S&ME, Inc. for field sampling and testing are in general accordance with ASTM procedures and established engineering practice in the State of Tennessee. Appendix II contains brief descriptions of the procedures used in this exploration.

S&ME conducted a site reconnaissance along the full length of the greenway segment and a limited subsurface exploration along the proposed boardwalk portions of the greenway segment. We hand augured 11 borings on about 50 to 250 foot centers along the boardwalk portions of the trail segment. Members of our professional staff established the hand auger boring locations in the field utilizing a hand held GPS unit (Trimble GeoExplorer 2008 Series – GeoXT) with the Boring Location Plan georeferenced onto the visual display. Boring elevations were obtained by superimposing boring locations onto the provided topographic site plan and interpolating between contours. Therefore, both the hand auger boring locations shown on Figure 2 – Boring Location Plan in Appendix I, and the elevations shown on the Hand Auger Boring Records in Appendix II, should be considered approximate.

A member of our professional staff logged the conditions encountered during hand auger excavation and visually classify the soils observed in accordance with the Unified Soil Classification System (USCS) guidelines. Dynamic Cone Penetrometer (DCP) testing was conducted in each of the borings. The soil consistency was estimated based on the difficulty of excavation and Dynamic Cone Penetrometer testing. We also collected soil samples from select hand auger borings and depths for subsequent laboratory testing. Upon boring completion, we noted the groundwater depth if present and the hand auger borings were then backfilled with the excavated material. The resulting soil descriptions are shown on the Hand Auger Boring Records in Appendix II. A general description of the subsurface conditions encountered at the hand auger boring locations are provided in the following report sections.

4.2 Soil Stratification

The results of our field testing program are summarized in the following paragraphs, and are shown on the Test Boring Records in Appendix II. These records present our interpretation of the subsurface conditions at specific boring locations at the time of our exploration. The stratification lines represent the approximate boundary between soil types. The actual transitions may be more gradual than implied.

ALLUVIUM

Alluvial soils were encountered in hand auger borings B-1, B-2, and B-3 from the ground surface to hand auger refusal or boring termination depths. Alluvial soil is soil that has been transported to its present location by flowing water. The alluvial soils encountered at the site were typically composed of orange-brown sandy clay. The DCP test values in the alluvial soil ranged from 2 ½ to 12 blows per test increment, indicating soft to stiff soil consistencies. However, most of the alluvial soil fell in the firm to stiff consistency ranges.

RESIDUUM

Residual soils were encountered from the ground surface in each of the hand auger borings except B-1, B-2, and B-3 to auger refusal depths. Residual soil forms from the in-place weathering of the underlying bedrock. The residual soils encountered at the site were typically composed of orange-brown silty clay with chert. The DCP test values in the fill ranged from 5 to 23 ½ blows per test increment, indicating firm to very stiff soil consistencies.

HAND AUGER REFUSAL

Hand auger refusal was encountered in each of the borings except B-2 and B-3 at depths ranging from about 2 ½ feet to about 5 ½ feet below the existing ground surface. Hand auger refusal within the residuum occurred on chert. Borings B-2 and B-3 were terminated at a depth of approximately 8 ½ feet.

4.3 Water Levels

Groundwater was not observed in the hand auger borings. We backfilled the boreholes shortly after completion due to safety concerns. Therefore delayed groundwater level measurements were not obtained. It should be noted that groundwater levels can fluctuate with seasonal, climatic, and environmental changes as well as fluctuation with the water elevation in South Chickamauga Creek. Further, groundwater may be encountered within the reach of our hand auger borings at some future time.

5.0 Laboratory Testing

Laboratory tests were performed on representative split-spoon samples obtained during the field exploration phase of this project. We conducted moisture content, Atterberg limits, and wash #200 sieve tests on representative samples to aid our soil classification and to evaluate the relative volume change potential of on-site soils. The resulting soil descriptions are shown on the Hand Auger Boring Records in Appendix II. The laboratory test results and a brief description of the laboratory test procedures are presented in Appendix III.

6.0 Assessment

On the basis of this geotechnical exploration, we conclude that timber piles are suitable for support of the proposed boardwalk. However, due to the cherty nature of the residual soils encountered in the hand auger borings, augured pilot holes will be required prior to installing the piles beginning around station 30+60. Based on the conditions encountered in the hand auger borings, the piles can likely be driven in place in the section of the boardwalk before station 30+60.

After completion of stripping in areas to receive fill, and once grade is achieved in cut areas, the subgrade soils for the at-grade sections of the greenway should be evaluated by proofrolling. The purpose of proofrolling is to locate pockets of soft or unstable soils. Proofrolling should be observed by our geotechnical engineer.

7.0 Design Recommendations

7.1 Limitations of Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based on applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made.

The analyses and recommendations submitted herein are based, in part, on the data obtained from the limited subsurface exploration. The nature and the extent of variations between the widely-spaced hand auger borings will not become evident until the time of construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event any changes in the nature, overall design, or boardwalk elevations, grades, structural loads, or location of the boardwalk or at grade trail areas are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and the conclusions verified or modified in writing.

We recommend S&ME be provided the opportunity to review the final design plans and specifications in order that our recommendations are properly interpreted and implemented. The recommendations in this report are contingent on S&ME, Inc.'s observation and monitoring of grading and construction activities.

7.2 Foundations

TIMBER PILES

Based on the subsurface data and our experience, we conclude that timber pile foundations are a suitable foundation for support of the proposed boardwalk. However, due to the cherty nature of the residual soils encountered in the hand auger borings, augured pilot holes will be required prior to installing the piles supporting the boardwalk past station 30+60. Based on the conditions encountered in the hand auger borings, the piles supporting the section of the boardwalk before station 30+60 can likely be driven in without pilot holes. Further, we recommend each timber pile have a steel driving shoe to protect the pile tip during installation.

We recommend the piles be designed using a maximum allowable end bearing pressure of 4 ksf. For calculation of side friction and uplift resistance, we recommend an adhesion value of 500 psf be used. However, side friction should be disregarded to a depth equal to two times the pile diameter when calculating uplift capacities and omitted altogether when calculating the pile's compressive load capacity.

Material parameters for lateral load analysis and design of piles to support the boardwalk are provided in Table 7-1. The parameters provided in Table 7-1 represent a generalized stratigraphic profile based on the material encountered in the hand auger borings and the underlying mapped geology. The recommended ε50 and subgrade modulus parameters are based on the criteria furnished in the L-Pile software user's manual and the laboratory and field test results.

Table 7-1: Lateral Resistance Parameters Piles

Geomaterial	Total Unit Weight γ (pcf)	Effective Unit Weight γ (pcf)	Soil Strain Parameter E50	Soil Modulus Parameter K (pci)	Undrained Shear Strength (psf)	Internal Friction Angle (degrees)
Firm to Stiff Clay	120	120	0.007	500	1,500	-
Loose to Firm Sand	120	120	-	50	0	30

7.3 Groundwater

Based on the test boring results, we do not expect that groundwater will present significant site development problems.

8.0 Construction Considerations

8.1 Site Preparation

STRIPPING

Topsoil, vegetation, roots, and other organic material should be stripped from the construction area for the at-grade section of the greenway and disposed of off-site. Topsoil was not encountered in the hand auger borings. However, organics and roots were encountered in the upper portions of the hand auger borings and we expect topsoil may be encountered in unexplored areas, particularly in drainage features.

GENERAL

After completion of stripping in areas to receive fill, and once grade is achieved in cut areas, we recommend proofrolling the exposed surface of the subgrade soils. The purpose of proofrolling is to locate pockets of soft or unstable soils. Proofrolling should be performed using a fully loaded dump truck or other heavy equipment approved by our geotechnical engineer.

An engineer from S&ME should be present to observe the proofrolling operations and to provide recommendations should unstable soils be encountered. Unstable materials supporting the at grade sections of the trail should generally be undercut to stable materials or a maximum of 2 feet below planned grade, at which time our geotechnical engineer should evaluate options other than additional undercutting (e.g. bridging). Backfill should consist of compacted soil as described in Section 8.2 of this report. After proofrolling and prior to placing fill on the site, the upper surface soils should be scarified and properly compacted.

Subgrade repair can be expected to be more extensive if grading operations are performed during wet periods of the year. The onsite soils are moisture sensitive and will be softened by rubber-tired construction traffic when wet. Once areas that need remediation have been repaired, the site may be brought to grade with structural fill. Depending on climatic conditions and the speed of contractor activities during the grading phase of this project, proofrolling may be required on multiple occasions.

8.2 Fill Placement

MATERIALS

Fill soils should consist of low to moderately plastic clay or silt with a plasticity index of less than thirty (PI<30) and a standard Proctor maximum dry density greater than 95 pounds per cubic foot. The fill should contain no rock fragments larger than 4 inches in any dimension, and no organic matter.

Soil fill operations should not begin until representative samples of proposed fill soils are collected and tested. The test results will be used to assess whether the proposed fill material meets the previously discussed plasticity and density criteria, and for quality control during grading. Please allow at least 3 to 5 days for testing before the fill operations begin.

COMPACTION

Fill should be placed in thin lifts with a maximum loose thickness of 8 inches, then compacted to 95 percent of the standard Proctor maximum dry density, with a moisture content within 3 percent of the optimum moisture content, depending on the shape of the Proctor curve. Wetting or drying of these soils may be required, depending on the time of year site grading is performed. We recommend the top one foot below grade supported slabs, and the top 2 feet beneath pavements be compacted to 100 percent standard Proctor compaction. The edge of the compacted fill should extend at least 10 feet beyond the outside building edge, and at least 5 feet beyond the outside edge of pavements before sloping. A representative of S&ME should test the density and moisture content of each lift before placing additional lifts.

In confined areas such as utility trenches, portable compaction equipment and thin lifts of 3 to 4 inches may be required to achieve specified degrees of compaction.

We recommend that fill placements be observed by one of S&ME's qualified soils technicians on a full time basis. Frequent fill density and moisture tests should be performed to evaluate that the specified degree of compaction is being achieved. However, the actual testing frequency should be determined by the geotechnical engineer based on the type of soil being placed, the equipment being used, and the time of year the fill is being placed. More frequent testing should be performed in confined areas. Any areas that do not meet the compaction specification should be re-compacted to achieve compliance.

8.3 Drainage and Runoff Concerns

In the Tennessee Valley Region, frequent and sometimes substantial rainfalls occur from November through May. These rainy months can greatly influence the cost and schedule of construction projects, particularly earthwork and work in confined excavations. The clay soils present at the site will be difficult to work in periods of wet weather. Construction traffic repeatedly crossing exposed wet soil subgrades can damage the subgrades to the point that over-excavation may be required.

The contractor should be prepared to provide adequate methods to control the infiltration of surface water into open excavations. We recommend subgrades be sufficiently sloped to provide rapid drainage. Water that collects in excavations should be removed as soon as possible to prevent softening the subgrade soils.

Maintenance of the exposed subgrade surface will be important to achieve moisture control and to prevent softening of the surface soils due to rainwater infiltration. We recommend keeping the ground surface free from depressions or ruts that would hold water, and sealing the surface using rubber tired equipment to reduce water infiltration.

9.0 Follow-Up Services

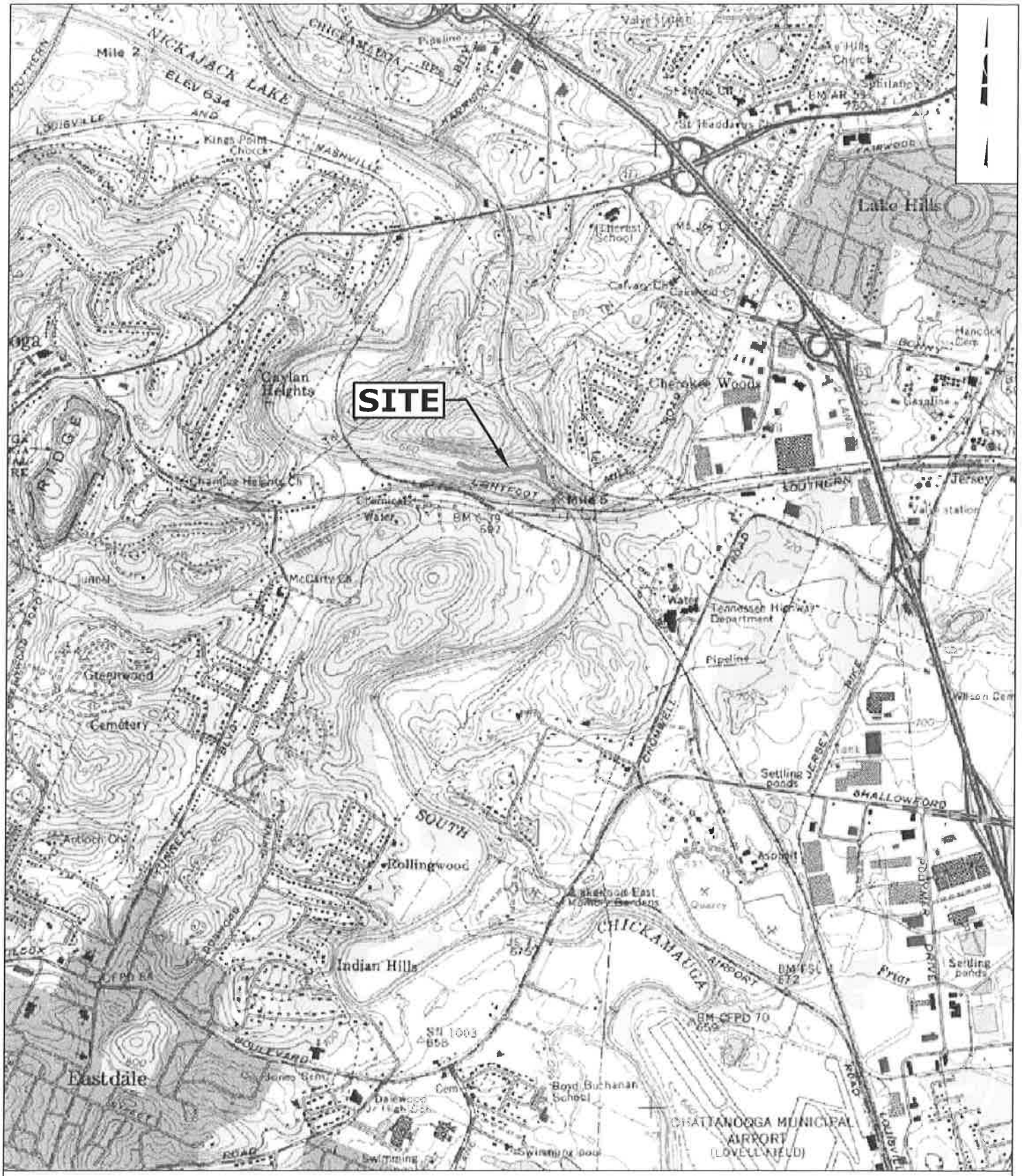
Our services should not end with the submission of this geotechnical report. S&ME should be kept involved throughout the design and construction process to maintain continuity and to determine if our recommendations are properly interpreted and implemented. To achieve this, we should review project plans and specifications with the designers to see that our recommendations are fully incorporated and have not been misinterpreted. We also should be retained by the owner to monitor and test the site preparation and foundation construction.

S&ME's familiarity with the site and foundation recommendations makes us a valuable part of your construction quality assurance team. S&ME recommends that we be retained by the owner on a full time basis to observe earthwork and foundation construction. Our personnel are uniquely qualified to recognize unanticipated ground conditions and can offer responsive remedial recommendations should these unanticipated conditions occur.

Appendix I

Figure 1 - Site Location Plan

Figures 2 - Boring Location Plan

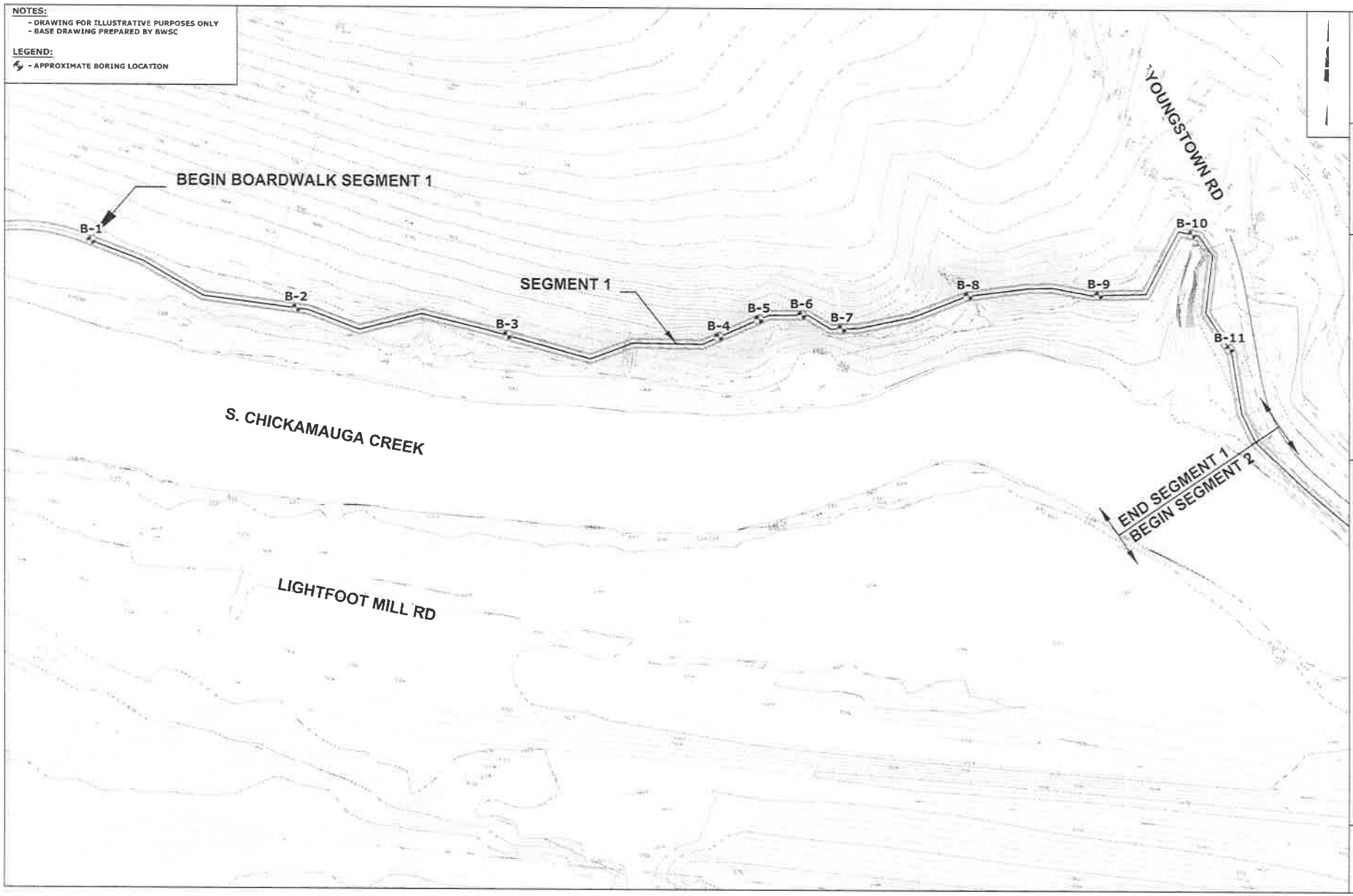


SOURCE: USGS 7.5 Minute Topographic Map -- EAST CHATTANOOGA, TENNESSEE (1976)
DRAWING FOR ILLUSTRATION PURPOSES ONLY

S&ME

SITE LOCATION PLAN
SOUTH CHICKAMAUGA GREENWAY-PHASE II, SEGMENT 1
CHATTANOOGA, TENNESSEE

JOB NUMBER:	1281-16-030 PH.1	**APPROXIMATE SCALE:**	1"=2,000'
DRAWN BY:	JLN	**CHECKED BY:**	JMS
DATE:	5/10/2017	**FIGURE:**	1



VERTICAL SCALE: N/A
HORIZONTAL SCALE: 1" = 100'
DRAWN BY: JLN
PROJECT NO.: 1281-16-030 PH.1
CHECKED BY: JMS
DATE: 5/10/2017

S&ME

BORING LOCATION PLAN
SOUTH CHICKAMAUGA GREENWAY-PHASE II, SEGMENT 1
CHATTANOOGA, TENNESSEE

FIGURE NO.
2

Appendix II

Field Exploration Procedures

Test Boring Record Legend

Hand Auger Boring Records

HAND AUGERING WITH DYNAMIC CONE PENETROMETER TESTING

The borings were advanced using hand auger drilling techniques. Soil samples were obtained from the auger bucket. At regular intervals, Dynamic Cone Penetrometer (DCP) tests are performed. The test is performed using a DCP. The DCP consists of a 1-1/2 inch diameter cone point attached to E-size drilling rods. The point is advanced by dropping a 15-pound weight on the rod from a height of 20 inches. The test is conducted in three intervals – the first at 2 inches and the second and third at 1-3/4 inches. The number of blows required to advance the penetrometer through each interval is recorded. The DCP blow count is the average of the second and third intervals. The DCP blow count is correlated to the consistency of the soil and can help in determining the strength properties of the in-situ soils.

TEST BORING/PIT RECORD LEGEND

FINE AND COARSE GRAINED SOIL INFORMATION

COARSE GRAINED SOILS (SANDS & GRAVELS)

N	Relative Density
0-4	Very Loose
5-10	Loose
11-20	Firm
21-30	Very Firm
31-50	Dense
Over 50	Very Dense

FINE GRAINED SOILS (SILTS & CLAYS)

N	Consistency	Qu, KSF Estimated
0-1	Very Soft	0-0.5
2-4	Soft	0.5-1
5-8	Firm	1-2
9-15	Stiff	2-4
16-30	Very Stiff	4-8
Over 31	Hard	8+

PARTICLE SIZE

Boulders	Greater than 300 mm (12 in)
Cobbles	75 mm to 300 mm (3 to 12 in)
Gravel	4.74 mm to 75 mm (3/16 to 3 in)
Coarse Sand	2 mm to 4.75 mm
Medium Sand	0.425 mm to 2 mm
Fine Sand	0.075 mm to 0.425 mm
Silts & Clays	Less than 0.075 mm

The **STANDARD PENETRATION TEST** as defined by ASTM D 1586 is a method to obtain a disturbed soil sample for examination and testing and to obtain relative density and consistency information. A standard 1.4-inch I.D./2-inch O.D. split-barrel sampler is driven three 6-inch increments with a 140 lb. hammer falling 30 inches. The hammer can either be of a trip, free-fall design, or actuated by a rope and cathead. The blow counts required to drive the sampler the final two increments are added together and designate the N-value defined in the above tables.

ROCK PROPERTIES

ROCK QUALITY DESIGNATION (RQD)

Percent RQD	Quality
0-25	Very Poor
25-50	Poor
50-75	Fair
75-90	Good
90-100	Excellent

ROCK HARDNESS

Very Hard:	Rock can be broken by heavy hammer blows
Hard:	Rock cannot be broken by thumb pressure, but can be broken by moderate hammer blows.
Moderately Hard:	Small pieces can be broken off along sharp edges by considerable hard thumb pressure; can be broken with light hammer blows.
Soft:	Rock is coherent but breaks very easily with thumb pressure at sharp edges and crumbles with firm hand pressure.
Very Soft:	Rock disintegrates or easily compresses when touched; can be hard to very hard soil.

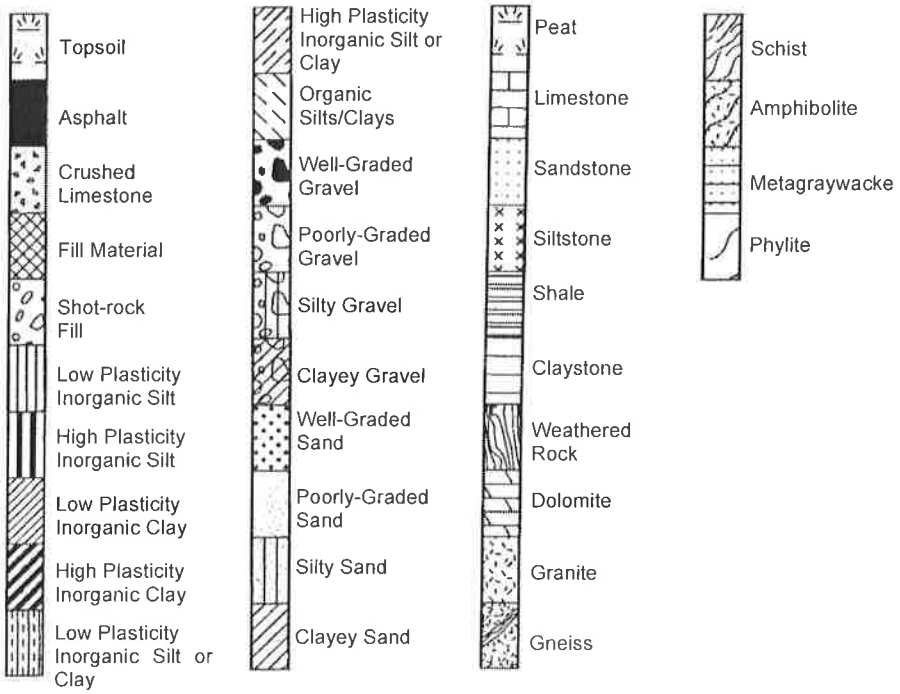
$$\text{RQD} = \frac{\text{Sum of 4 in. and longer Rock Pieces Recovered}}{\text{Length of Core Run}} \times 100 = \frac{43\ \text{RQD}}{\text{NQ}}$$

$$\text{Recovery} = \frac{\text{Length of Rock Core Recovered}}{\text{Length of Core Run}} \times 100 = \frac{\text{NQ}}{63\ \text{REC}}$$

Core Diameter	Inches
BQ	1-7/16
NQ	1-7/8
HQ	2-1/2

SYMBOLS

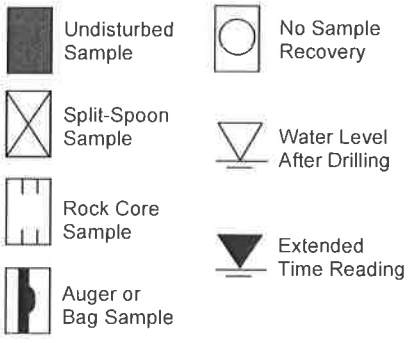
KEY TO MATERIAL TYPES



SOIL PROPERTY SYMBOLS

N:	Standard Penetration, BPF
M:	Moisture Content, %
LL:	Liquid Limit, %
PI:	Plasticity Index, %
Qp:	Pocket Penetrometer Value, TSF
Qu:	Unconfined Compressive Strength Estimated Qu, TSF
γ_D:	Dry Unit Weight, PCF
F:	Fines Content

SAMPLING SYMBOLS



S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-1**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 654	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	654.0	0	SANDY CLAY (CL), orange-brown, firm to stiff - ALLUVIUM								
		1					1	5	7	7	7
		2					2	11	14	10	12
		3									
	650.5		*Hand-auger refusal at 3.5 feet, boring terminated*								
		4									
		5									
		6									
		7									
		8									
		9									
		10									

HAND AUGER BORING RECORD SEGMENT 1 - HAND AUGERS.GPJ 2016.GDT 5/10/17

S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-2**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 653	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	653.0	0	SANDY CLAY (CL), orange-brown, firm to stiff - ALLUVIUM								
		1					1	3	5	5	5
		2					2	5	6	7	6.5
		3					3	6	7	8	7.5
		4					4	9	11	11	11
		5					5	9	11	11	11
		6					6	7	7	8	7.5
		7					7	6	6	8	7
		8					8	6	7	7	7
	644.5		*Hand Auger terminated at 8.5 feet*								
		9									
		10									

S&ME

4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-3**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 659	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	659.0	0	SANDY CLAY (CL) with organics, orange-brown, firm to stiff - ALLUVIUM								
		1					1	3	4	5	4.5
		2					2	4	6	6	6
		3					3	8	10	11	10.5
		4					4	7	9	11	10
		5					5	11	12	12	12
		6					6	6	7	7	7
	652.5	6.5'	SANDY CLAY (CL), orange-brown, soft to firm - ALLUVIUM								
		7					7	5	2	3	2.5
		8					8	4	5	5	5
	650.5	9	*Hand Auger terminated at 8.5 feet*								
		10									

S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-4**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 675	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	675.0	0	SILTY CLAY (CL) with chert, light brown, very moist, firm - RESIDUUM								
		1					1	5	5	7	6
		2					2	8	6	6	6
	672.5	2.5'	SILTY CLAY (CL) with chert, orange-brown, stiff - RESIDUUM								
		3					3	8	8	14	11
		4									
	670.5		*Hand-auger refusal at 4.5 feet, boring terminated*								
		5									
		6									
		7									
		8									
		9									
		10									

HAND AUGER BORING RECORD SEGMENT 1 - HAND AUGERS.GPJ 2016.GDT 5/10/17

S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-5**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 686	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	686.0	0	SILTY CLAY (CL) with chert, light brown, very moist, stiff - RESIDUUM								
		1					1	15	15	13	14
		2									
	683.5		*Hand-auger refusal at 2.5 feet, boring terminated*								
		3									
		4									
		5									
		6									
		7									
		8									
		9									
		10									

HAND AUGER BORING RECORD SEGMENT 1 - HAND AUGERS.GPJ 2016.GDT 5/10/17

S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-6**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 690	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	690.0	0	SILTY CLAY (CL) with organics and trace chert, light brown and orange-brown, very moist, stiff - RESIDUUM								
		1					1	9	9	12	10.5
		2					2	12	12	13	12.5
	687.5	2.5'	SILTY CLAY (CL) with chert, orange-brown, very stiff - RESIDUUM								
		3					3	21	22	22	22
		4					4	22	22	25	23.5
		5									
	684.5		*Hand-auger refusal at 5.5 feet, boring terminated*								
		6									
		7									
		8									
		9									
		10									

S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-7**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 680	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	680.0	0	SILTY SAND (SM) with chert, light brown, very moist, loose to firm - RESIDUUM								
		1					1	7	5	5	5
		2					2	7	9	14	11.5
		3									
	676.5		*Hand-auger refusal at 3.5 feet, boring terminated*								
		4									
		5									
		6									
		7									
		8									
		9									
		10									

HAND AUGER BORING RECORD SEGMENT 1 - HAND AUGERS.GPJ 2016.GDT 5/10/17

S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-8**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 676	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	676.0	0	SILTY CLAY (CL) with organics and trace chert rocks, orange-brown, firm - RESIDUUM								
		1					1	7	7	7	7
		2					2	7	7	8	7.5
	673.5	2.5'	SILTY CLAY (CL) with abundant chert, orange-brown, stiff - RESIDUUM								
		3					3	18	11	13	12
		4									
	671.5		*Hand-auger refusal at 4.5 feet, boring terminated*								
		5									
		6									
		7									
		8									
		9									
		10									

S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-9**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 667	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	667.0	0	SILTY CLAY (CL) with chert, orange-brown, stiff - RESIDUUM								
		1					1	9	11	13	12
		2					2	15	13	15	14
		3									
	663.5		*Hand-auger refusal at 3.5 feet, boring terminated*								
		4									
		5									
		6									
		7									
		8									
		9									
		10									

HAND AUGER BORING RECORD SEGMENT 1 - HAND AUGERS.GPJ 2016.GDT 5/10/17

S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-10**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 666	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	666.0	0	SILTY CLAY (CL) with organics, brown, very stiff - RESIDUUM								
		1					1	17	19	22	20.5
	664.5	1.5'	SILTY CLAY (CL) with chert, orange-brown, very stiff - RESIDUUM								
		2					2	22	22	21	21.5
		3									
	662.5		*Hand-auger refusal at 3.5 feet, boring terminated*								
		4									
		5									
		6									
		7									
		8									
		9									
		10									

HAND AUGER BORING RECORD_SEGMENT 1 - HAND AUGERS.GPJ 2016.GDT 5/10/17

S&ME
4291 Highway 58
Chattanooga, Tennessee 37416

HAND AUGER BORING RECORD

BORING NO: **B-11**

PROJECT: South Chickamauga Greenway - Phase II, Segment 1		JOB NO: 1281-16-030, Ph. 1
PROJECT LOCATION: Chattanooga, Tennessee		
ELEVATION: 661	BORING STARTED: 3/2/17	BORING COMPLETED: 3/2/2017
GROUNDWATER: Dry upon completion	AUGER TYPE: Hand Auger	SHEET 1 OF 1
REMARKS:		

G	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESCRIPTION	L	S	R	SAMPLE DEPTH (FT.)	DYNAMIC CONE PENETRATION BLOWS			DCP AVERAGE VALUE
	661.0	0	SILTY CLAY (CH) with organics, brown, firm - RESIDUUM								
		1					1	5	5	5	5
		2					2	6	6	6	6
	658.5	2.5'	SILTY CLAY (CH) with chert, orange-brown, stiff - RESIDUUM								
		3					3	10	9	9	9
		4					4	6	8	10	9
		5									
	655.5		*Hand-auger refusal at 5.5 feet, boring terminated*								
		6									
		7									
		8									
		9									
		10									

HAND AUGER BORING RECORD SEGMENT 1 - HAND AUGERS.GPJ 2016.GDT 5/10/17

Appendix III

Laboratory Test Procedures

Laboratory Test Results

NATURAL MOISTURE
ASTM D 2216, EM 1110-2-1906

The moisture content of soils is an indicator of various physical properties, including strength and compressibility. Selected samples obtained during exploratory drilling were taken from their sealed containers. Each sample was weighed and then placed in an oven heated to 110oC + 5o. The sample remained in the oven until the free moisture had evaporated. The dried sample was removed from the oven, allowed to cool, and re-weighed. The moisture content was computed by dividing the weight of evaporated water by the weight of the dry sample. The results, expressed as a percent, are shown on the attached Laboratory Test Results Summary.

ATTERBERG LIMITS DETERMINATION
ASTM D 4318/AASHTO T89/T90

Representative samples were subjected to Atterberg limits testing to determine the soil's plasticity characteristics. The plasticity index (PI) is the range of moisture content over which the soil deforms as a plastic material. The liquid limit (LL) marks the transition from the plastic state to the liquid state. The plastic limit (PL) marks the transition from the plastic state to the solid state.

To determine the liquid limit, a soil specimen is wetted until it is in a viscous fluid state. A portion of this soil is then placed in a brass cup of standardized dimensions, and a groove made through the middle of the soil specimen with a grooving tool of standardized dimensions. The cup is attached to a cam that lifts the cup 10 mm, and then allows the cup to fall and strike a rubber base of standardized hardness. The cam is rotated at about 2 drops per second until the two halves of the soil specimen come in contact at the bottom of the groove along a distance of 13 mm. The number of blows required to make this degree of contact is recorded, and a portion of the specimen is subjected to a moisture content determination. Additional water is added to the remainder of the specimen, and the grooving process and cam action process repeated. This testing sequence is repeated until the soil flows as a heavy viscous fluid. The number of blows vs. moisture content is then plotted on semi-logarithmic graph paper, and the moisture content corresponding to 25 blows is designated the liquid limit.

The plastic limit is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into threads 3 mm in diameter. It is determined by taking a pat of soil remaining from the liquid limit test, and repeatedly rolling, kneading, and air drying the specimen until the soil breaks into threads about 3 mm in diameter and 3 to 10 mm long. The moisture content of these soil threads is then determined, and is designated the plastic limit. The results of these tests are presented on the Laboratory Test Results Summary.

GRAIN SIZE TEST PROCEDURES
ASTM D 1140

The clay and silt content of granular soils affects their physical properties such as strength, compressibility, and permeability. Selected granular soil (sand and gravel) samples were tested to determine the percent, by weight, of soil particles finer than the No. 200 sieve (silt and clay sized particles). Soil particles finer than 75 microns were flushed through a No. 200 sieve using water. The coarse materials retained on the No. 200 sieve were dried to obtain their dry weight. The dry weight of materials retained on the No. 200 sieve was compared to the dry weight of the total test specimen. The difference in weight, expressed as a percentage of the pre-wash weight, is designate as the percentage of "fines" (silt and clay particles). The results are plotted on the Grain Size Distribution Test Reports.

South Chickamauga Greenway – Phase II, Segment 1
Chattanooga, Tennessee
S&ME Project No. 1281-16-030, Ph. 1

Laboratory Test Results Summary

Boring Number	Sample Type	Sample Depth (ft)	Moisture Content (%)	ATTERBERG LIMITS			Percent Passing #200 Sieve
				Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	
B-7	Grab	1-2	14.0	NP	NP	NP	40.5
B-10	Grab	2-3	22.1	36	20	16	79.1
B-11	Grab	2-3	24.4	59	24	35	-

Grab – Sample collected in Conjunction with Hand Auger Excavation (1 to 2 lbs.)

Sieve Analysis of Soils

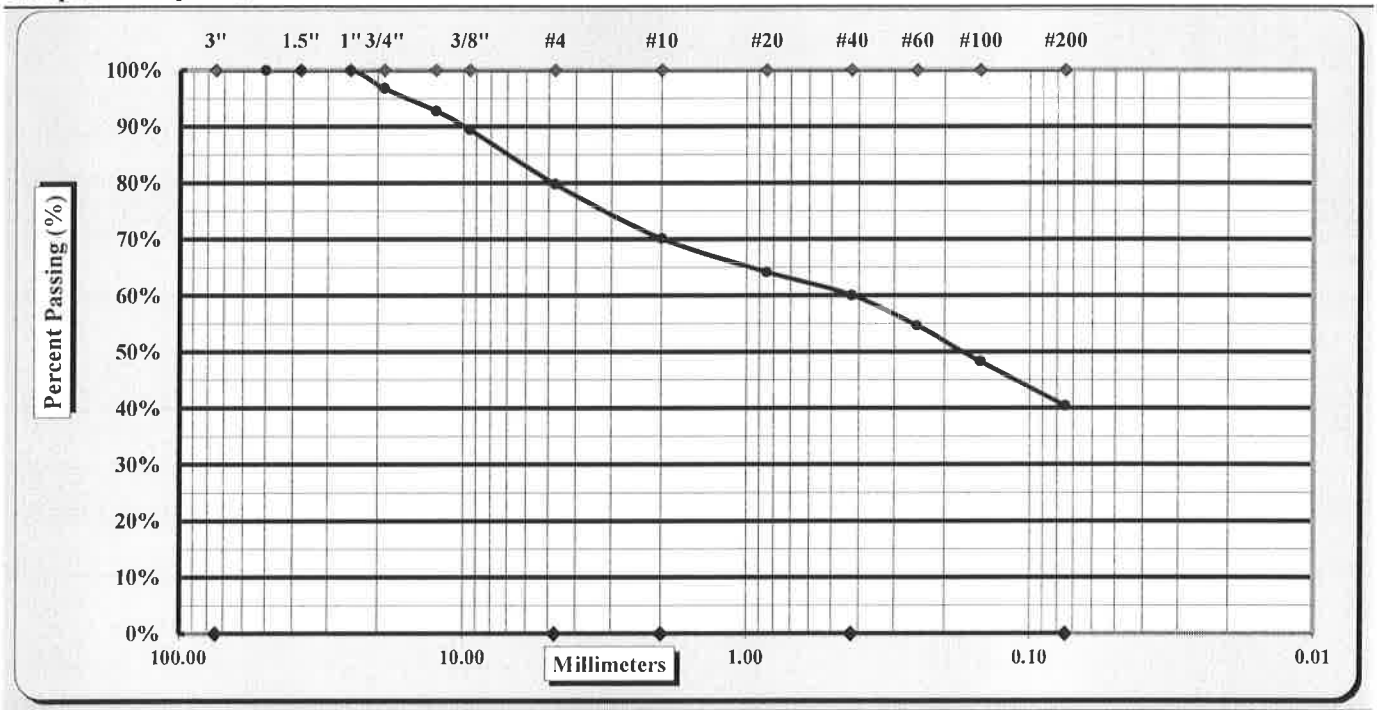
ASTM D 422

Quality Assurance

S&ME, Inc. - Chattanooga, 4291 Highway 58, Suite 101, Chattanooga, TN

Project #:	**1281-16-030**	**Log:17-085**	Report Date: 4/12/2017
Project Name:	South Chickamauga Creek Greenway-Ph. II, Seg. 1		Test Date(s): 4/11/2017
Client Name:	Barge Waggoner Sumner & Cannon		
Client Address:	1110 Market Street, Suite 200 Chattanooga, TN 37402		
Sample Id. B-7	Type: ML		Sample Date:
Location: On-site	Sample:		Elevation: 1'

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size				Coarse Sand	9.7%	Fine Sand	19.6%
Gravel	20.2%			Medium Sand	10.1%	Silt & Clay	40.5%
Liquid Limit	19			Plastic Limit	18	Plastic Index	1
Specific Gravity	2.852	**Cc =**	**0.003**	**Cu =**	**8.636**	Moisture Content	
Coarse Sand	9.7%			Medium Sand	10.1%	Fine Sand	19.6%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐

Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Notes / Deviations / References:

Jonathan M. Smolen, PE — *Technical Responsibility*

_____ — *Signature*

Geotechnical Group Leader — *Position*

5/10/2017 — *Date*

Sieve Analysis of Soils

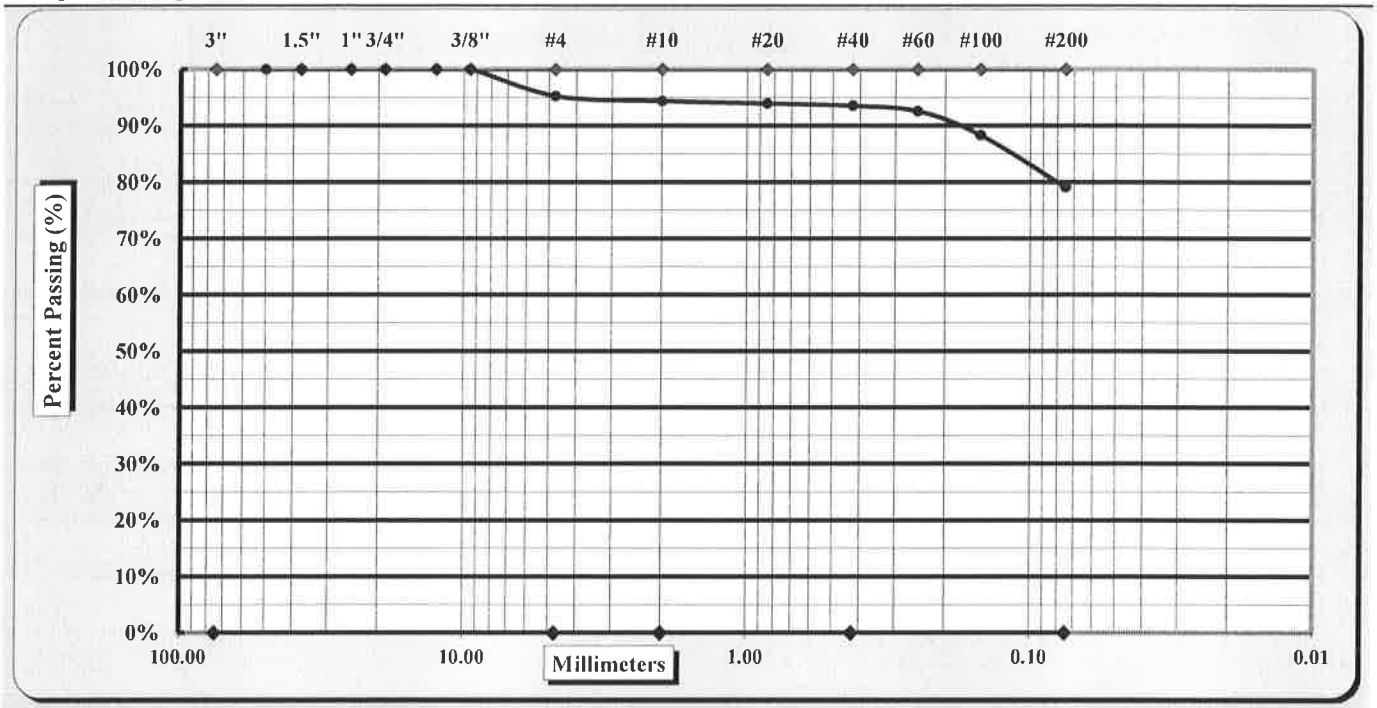
ASTM D 422

Quality Assurance

S&ME, Inc. - Chattanooga, 4291 Highway 58, Suite 101, Chattanooga, TN

Project #:	**1281-16-030 PH 002** **Log:17-085**	Report Date:	4/12/2017
Project Name:	South Chickamauga Creek Greenway-Ph. II, Seg. 1	Test Date(s):	4/11/2017
Client Name:	Barge Waggoner Sumner & Cannon, Inc.		
Client Address:	1110 Market Street, Suite 200 Chattanooga, TN 37402		
Sample Id.	B-10 Type: CL	Sample Date:	
Location:	On-site Sample:	Elevation:	8'

Sample Description:



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size				Coarse Sand	0.9%	Fine Sand	14.5%
Gravel	4.7%			Medium Sand	0.8%	Silt & Clay	79.1%
Liquid Limit	36			Plastic Limit	20	Plastic Index	16
Specific Gravity	2.852	**Cc =**	**0.003**	**Cu =**	**8.636**	Moisture Content	
Coarse Sand	0.9%			Medium Sand	0.8%	Fine Sand	14.5%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐
Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Notes / Deviations / References:

Jonathan M. Smolen, PE — *Technical Responsibility*
_____ — *Signature*
Geotechnical Group Leader — *Position*
5/10/2017 — *Date*

Appendix IV

Important Information About Your Geotechnical Engineering Report

S&ME

Important Information About Your Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Scope of Geotechnical Services

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects

Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project. Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues

The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

Geotechnical Recommendations Are Not Final

Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.

S&ME

June 24, 2016

Barge Waggoner Sumner & Cannon, Inc.
1110 Market Street, Suite 200
Chattanooga, TN 37402

Attention: Mr. Ben Nemec

Reference: **Natural Resources Assessment**
South Chickamauga Creek Greenway Phase 2-Segment 1
Faith Road to Youngstown Road
Chattanooga, Tennessee
S&ME Project No. 4181-16-015 P001

Dear Mr. Nemec:

S&ME, Inc. (S&ME) is pleased to submit this report of natural resources services including jurisdictional waters and protected species assessments for the above referenced project in Chattanooga, Tennessee. The work was conducted in general conformance with the scope of services outlined in S&ME Proposal No. 41-1600167, dated February 24, 2016, and authorized with your subconsultant agreement on March 22, 2016.

Project Information

This project, which is referred to as Phase 2, will provide the final trail connection to complete the South Chickamauga Creek Greenway. Phase 2 is divided into two segments designated Segments 1 and 2 based on funding sources and associated project proponents. The combined segments are approximately 1.5 miles in length and, based on preliminary information, about one-third of the total length will be boardwalk and the remainder will be an at-grade walkway.

Segment 1 will begin at the current greenway terminus at Faith Road and continue to Youngstown Road and is the focus of this report; the results of our assessment of Segment 2 are reported under separate cover. This segment will be partially-funded through the Transportation Alternatives Program (TAP) and, as such, will be subject to the National Environmental Policy Act of 1969 (NEPA). The attachments to this report include several figures and photographs depicting the location and conditions within Segment 1.

S&ME was requested to conduct a jurisdictional waters determination and protected species assessment of the proposed trail alignment and potential construction staging areas. S&ME was requested to evaluate the forested areas to identify whether trees with suitable habitat for the Indiana and northern long-eared (NLE) bats are present. The centerline of the proposed trail was flagged in the field by Barge Waggoner Sumner & Cannon, Inc. (BWSC) prior to S&ME's assessment. In addition, a data file depicting the proposed alignment and review corridor including potential staging and access areas was provided to S&ME by BWSC. Based on the provided location information, the width of the area assessed in the field by S&ME ranged from about 60 feet to 200 feet (see Figures 2 – 2B).

Methodology

Jurisdictional Waters

Jurisdictional waters of the U.S., including wetlands, are defined by 33 CFR Part 328.3 and are protected by Section 404 of the Clean Water Act (33 USC 1344), which is administered and enforced by the U.S. Army Corps of Engineers (USACE). The Tennessee Department of Environment and Conservation-Division of Water Resources (TDEC-DWR) has jurisdiction over waters of the state. Potential wetlands were assessed following the Routine On-Site Determination Method as defined in the Corps of Engineers 1987 Wetlands Delineation Manual and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region. This technique uses a multi-parameter approach, which requires positive evidence of three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology. Areas exhibiting all three wetland characteristics, as well as surface waters, are considered jurisdictional.

We evaluated drainage features according to the TDEC Guidance for Making Hydrologic Determinations, Version 1.4. The procedures outlined in this guidance are intended to be applied to drainage features that could be considered either a wet-weather conveyance (WWC) or a stream. A score of less than 19 indicates the feature meets the definition of a wet-weather conveyance and a score of 19 or greater indicates the feature is a stream. Typically, features considered to be a stream by TDEC would be considered an intermittent or perennial stream by the USACE.

Our assessment for the possible occurrence of jurisdictional waters, including wetlands, within the project area consisted of a field reconnaissance employing the USACE and TDEC-DWR methodology referenced above.

Protected Species

Existing federal- and state-listed species information and site habitat information was reviewed online to determine the likely occurrence of rare, threatened, or endangered species within the proposed project area. The lists of protected state and federal listed species is included in the attachments and summarized in Table 2. Our assessment for the possible occurrence of protected species or their habitats within the project area consisted of pedestrian transects through the project review area. S&ME assessed the trees within the project review area for potential summer roosting habitat of protected forest-dwelling bats in accordance with the United States Fish and Wildlife Service (USFWS) guidance; live or dead trees with cracks, crevices, or loose or exfoliating bark with a diameter at breast height (DBH) greater than three inches are considered by the USFWS to be potential roosting habitat for the Indiana and NLE bats.

Results of Jurisdictional Waters Assessment

S&ME conducted a site assessment for potential jurisdictional waters on June 3, 2016. In the seven days preceding the site assessment, according to https://www.wunderground.com/history/airport/KCHA/2016/, no measurable rainfall was recorded for the site vicinity.

No areas of wetlands were identified within the project corridor during our assessment. Six drainage features were encountered and evaluated. Figures 2 – 2B depict the locations of these features. A summary of these is presented in the table below.

Table 1 – Summary of Drainage Features Evaluated

Label	TDEC Score	Feature Type TDEC / USACE	Photo #	Comments
S1	9	WWC / Ephemeral Stream	1	Connects to South Chickamauga Creek
S2	4	WWC / Upland Drainage	5	Doesn't connect to South Chickamauga Creek
S3	4.5	WWC / Upland Drainage	6	No connection to S. Chickamauga Creek; feature composed of two parallel channels (A&B) separated by a berm
S4	10.5	WWC / Upland Drainage	7	Doesn't connect to South Chickamauga Creek
S5	4	WWC / Upland Drainage	8	Doesn't connect to South Chickamauga Creek
S6	21	Stream / Intermittent Stream	9	Connects to South Chickamauga Creek

The photographs and completed TDEC Hydrologic Determination Field Data Sheets for each of these features are included in the attachments.

Results of Protected Species Assessment

The project area is forested and contains mature trees with a relatively dense understory of Chinese privet (*Ligustrum sinense*), wild rose (*Rosa carolina*), blackberry (*Rubus sp.*), and Japanese honeysuckle (*Lonicera japonica*). The trees within the area included: American sycamore (*Platanus occidentalis),* red maple *(Acer rubrum),* shagbark hickory (*Carya ovata*), willow oak (*Quercus phellos*), white oak (*Q. alba*), hackberry (*Celtis occidentalis*), eastern red cedar (*Juniperus virginiana*), and sweetgum (*Liquidambar styraciflua*).

Species Evaluation

Existing federal- and state-listed species information and site habitat information was reviewed to determine the likely occurrence of rare, threatened, or endangered species within the proposed project area. The USFWS Information for Planning and Conservation (IPaC) tool was accessed from their website and utilized to determine the list of federally-protected species that may occur within the project review area. The state-listed species presented below are those identified as being associated with properties located within the Lower South Chickamauga Creek watershed, which includes the proposed project area. Copies of the IPaC and state-listed species are included in the attachments. The IPaC report indicates that no critical habitat has been reported as occurring within the proposed project area. As included in the attached lists and as listed in Table 2 below, several protected species are listed within the vicinity of the project site. Information regarding the listed species is provided following Table 2.

Table 2-Federal and State Protected Species List

Common Name	Scientific Name	Species Type	Protection Status
Snail darter	*Percina tanasi*	Fish	Federal and State Threatened
Large flowered skullcap	*Scutellaria montana*	Plant	Federal and State Threatened
Small-whorled pogonia	*Isotria medeoloides*	Plant	Federal Threatened
Virginia spirea	*Spiraea virginiana*	Plant	Federal Threatened
Yellow honeysuckle	*Lonicera flava*	Plant	State Threatened
Narrow-leaved trillium	*Trillium lancifolium*	Plant	State Threatened
Southern nodding-trillium	*Trillium rugelli*	Plant	State Threatened
Gray bat	*Myotis grisescens*	Mammal	Federal Endangered
Indiana bat	*Myotis sodalis*	Mammal	Federal Endangered
Northern long-eared bat	*Myotis septentrionalis*	Mammal	Federal Threatened
Backman's sparrow	*Aimophila aestivalis*	Bird	State Endangered
Chickamauga crayfish	*Cambarus extraneus*	Invertebrate	State Threatened

The sharp-shinned hawk (*Accipiter striatus*), least bittern (*Ixobrychus exilis*), southeastern shrew (*Sorex longirostris*), and king rail (*Rallis elegans*) are listed as "Deemed in need of management" by the TDEC-Natural Heritage Inventory Program (NHIP) as potentially occurring in the project site watershed. These species are not listed as state or federally protected.

Aquatic Species

Snail darter

The snail darter is a small fish (two to three inches in length) in the perch family that is typically found in sand and gravel shoals with no silt and with moderate to strong currents. The intermittent stream within the project area does not provide suitable habitat for this species due its substrate and flow regime.

Chickamauga crayfish

The Chickamauga crayfish is a state-threatened species that is known to occur within the South Chickamauga Creek basin. This species occurs in shallow, moderately-flowing streams with gravel/cobble substrates and, like other stream-dwelling crayfish, is typically found during the day hiding under large rocks or leaf litter. They are opportunistic feeders that emerge at night and enter the stream channel to feed. One stream (depicted as S-6 in Figures 2 and 2B) is located within the project review area that, when flowing, could potentially provide habitat for this crayfish. Based on our understanding that the greenway trail will completely span this stream and not result in an impact, the project will have no effect on this species.

Plants

Large-flowered skullcap

The large-flowered skullcap has been a designated protected species since 1986. It was downgraded by the USFWS from endangered to threatened in 2002. The perennial herb is a member of the mint family. Its preferred habitat is well-drained, slightly acidic slopes in ravine and stream bottom forests within the Ridge and Valley and Cumberland Plateau provinces of North Georgia and southeastern Tennessee. The plants typically occur in colluvial soils, which are loose soils that have accumulated at the base of cliffs or slopes. In this region, the plant is in bloom for approximately three weeks in May. The inflorescence of the entire group of skullcaps is easily recognized by the two-lobed calyx, with a "cap" just above the base of the upper lobe. Suitable habitat for this species was not observed within the project site. Furthermore, no individuals of this species were observed during the assessment.

Small-whorled pogonia

This perennial is approximately four to 10 inches tall with a terminating whorl of five to six light green, slightly pointed elliptical leaves. Flowering, which is not always annual, occurs from mid-May to mid-June and lasts for less than a week. This species prefers acidic soils, in dry to mesic second-growth, deciduous or deciduous-coniferous forests, with a light to moderate leaf litter, an open herbaceous layer with moderate to light shrub layer, and relatively open canopy. Suitable habitat was not observed within the project area.

Virginia spirea

This shrubby plant is two to 10 feet tall and has upright arching stems. It bears cream-colored flowers on branched and flat-topped axes in June and July. It spreads clonally and forms dense clumps, which spread in rock crevices and around boulders. It occurs along rocky, flood-scoured riverbanks and thickets in gorges and canyons. Flood scouring is essential to the plant's survival eliminating taller woody competitors.

Although the project area parallels South Chickamauga Creek, the rocky habitat typical of this species does not occur. The project area does not included thickets within gorges or canyons. Neither the in-house research nor the site survey identified populations, individuals, or habitat of this species within the project area.

Yellow honeysuckle

This twining, deciduous woody vine has tubular yellow flowers in whorls at the ends of stems that appear in April to May. Round, fleshy, orange to red berries appear in late summer. The vine is typically five to 6.5 feet long. The preferred habitat is upland, rocky forests or rock bluffs, or in rocky ground along streams. It occurs in thin soils in the vicinity of sandstones and granite that may contribute to the slight acidification of the soil. Neither the in-house research nor the site survey identified populations, individuals, or habitat of this species within the proposed project area.

Narrow-leaved trillium

The narrow-leafed trillium, also known as the lance-leafed wake robin, has narrow grey-green, heavily speckled foliage. The stems are purple below and green above and a liver-colored flower blooms from late winter to early spring (February to March). This trillium occurs on wooded slopes and bluffs in bottomland forests. Although the project area contains wooded slopes, bottomland forest habitat is not present. Several areas of bluffs occur beyond the project review area. Neither the in-house research nor the site survey identified narrow-leaved trillium populations, individuals, or habitat of this species within the proposed project area.

Southern nodding trillium

Southern nodding trillium is a perennial herb with an erect stem that terminates in a whorl of three leaves and a solitary pale yellow or cream flower. It flowers in early spring and produces a berry-like fruit capsule that matures in the early to mid-summer. It occurs in rich woodlands and forest over calcareous rocks, in areas that are moist, but well-drained. It prefers areas dominated by closed or nearly-closed canopy of mesophytic trees (e.g., black walnut, chinkapin oak, white ash). The wooded habitat within the project review area could provide habitat for this plant species although it lacks areas that would provide moist, well-drained conditions. Only limited portions of the review area contain forest over calcareous rocks. No individuals of this species were observed during the site assessment.

Birds

Bachman's sparrow

The Bachman's sparrow is 5.5 inches long with a conical bill and pale lower mandible. The crown is brown and the face is pale with a brown streak extending behind the eye. This sparrow has a gray back, a long brown tail, and wings with brown streaks. It is a shy and secretive bird that builds its nest on the ground in clumps of grass or at the bases of bushes.

Within the project area, the clumps of grass typically preferred for nesting are absent. Although many areas within the understory contain shrubs, they would not be expected to provide suitable nesting habitat for this sparrow. Neither the in-house research nor the site survey located Bachman's sparrow populations, individuals, or habitat within the project area.

Mammals

Gray bat

The gray bat is the largest member of *Myotis* weighing between seven and 16 grams and is distinguished from other bats by its dark gray fur on their back. After the gray bat molts in July or August, the dark gray fur often bleaches to a chestnut brown or russet. Additionally, the bat's wing membrane connects to its ankle instead of at the toe as in other species of *Myotis*. The gray bat lives in caves year-round with rare exceptions. During the winter, the gray bat hibernates in deep vertical caves and in summer they roost in caves that are typically scattered along rivers in limestone karst areas, feeding on flying aquatic and terrestrial insects. Females give birth to a single pup in late May or early June.

Based on our observations and data review, no caves exist within the project vicinity. It is unlikely that the gray bat occurs within the proposed project site.

Indiana Bat and Northern Long-Eared Bat

The Indiana bat is a small bat with a wingspan of about nine to 11 inches and fur that is dark-brown to black. The NLE bat is a medium-sized bat with a wingspan of about nine to 10 inches and fur that is medium to dark brown on the back and tawny to pale-brown on the underside.

During winter, these bats hibernate in humid caves or other similar structures (e.g., abandoned mines) that provide stable temperatures between 32° F and 50° F. After hibernation, they migrate to their summer habitat in wooded areas where they usually roost under the loose tree bark of dead or dying trees. During summer, males roost alone or in small groups, while females roost in larger groups of up to 100 bats or more. They also forage in or along the edges of forested areas.

Based on S&ME's previous experience and current USFWS guidance, the USFWS considers live or dead trees with cracks, crevices, or loose or exfoliating bark with a diameter at breast height (DBH) greater than three inches to be potential roosting habitat for the Indiana and NLE bats. Twenty-one potential summer roosting habitat trees were observed within the project review area. Figures 2 – 2B depict the approximate locations of these potential summer roosting habitat trees. The project team will be using this information to determine the final trail alignment with the intent of avoiding the removal of these 21 trees.

Conclusions and Recommendations

S&ME conducted a jurisdictional waters assessment within the project review area and identified four WWCs/upland drainages, one WWC/ephemeral stream, and one stream/intermittent stream. All stream determinations are preliminary until verified by the USACE and TDEC-DWR and should be used for planning purposes only until the verification is complete. If any of these features are proposed to be impacted by the project, additional coordination in the form of permit approvals from the USACE and TDEC-DWR will be needed.

The results of the protected species assessment indicate that potential habitat for the Chickamauga crayfish and the Indiana and NLE bats is present within the project review area. Based on the outcome of the trail design, if any of the trees will require removal or if the intermittent stream (S6) will be impacted, additional coordination will be required with the USFWS and/or TWRA.

S&ME appreciates the opportunity to provide services for this project. If you have any questions, please call.

Sincerely,

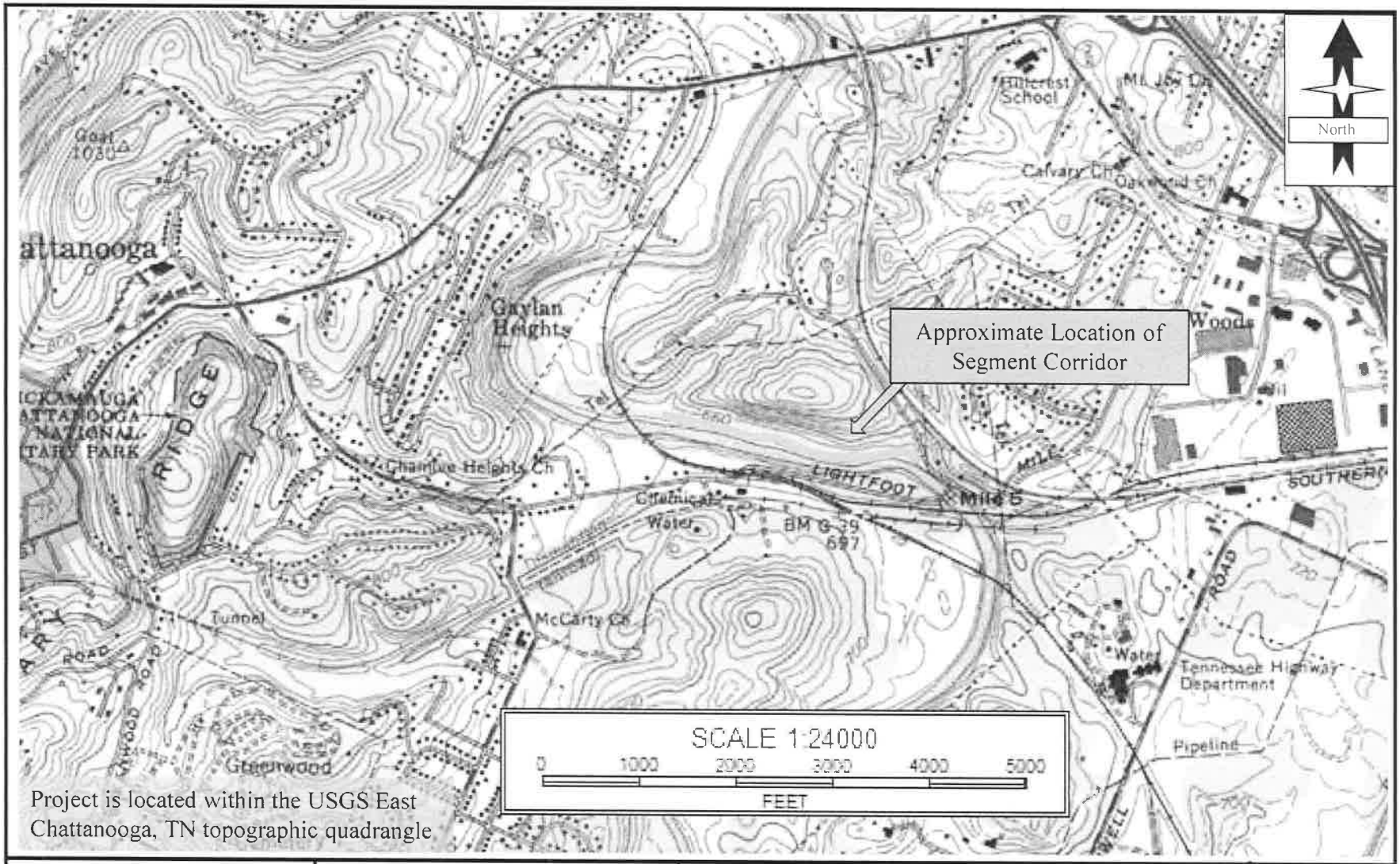
S&ME, Inc.

Kristy Smedley, QHP
Senior Scientist

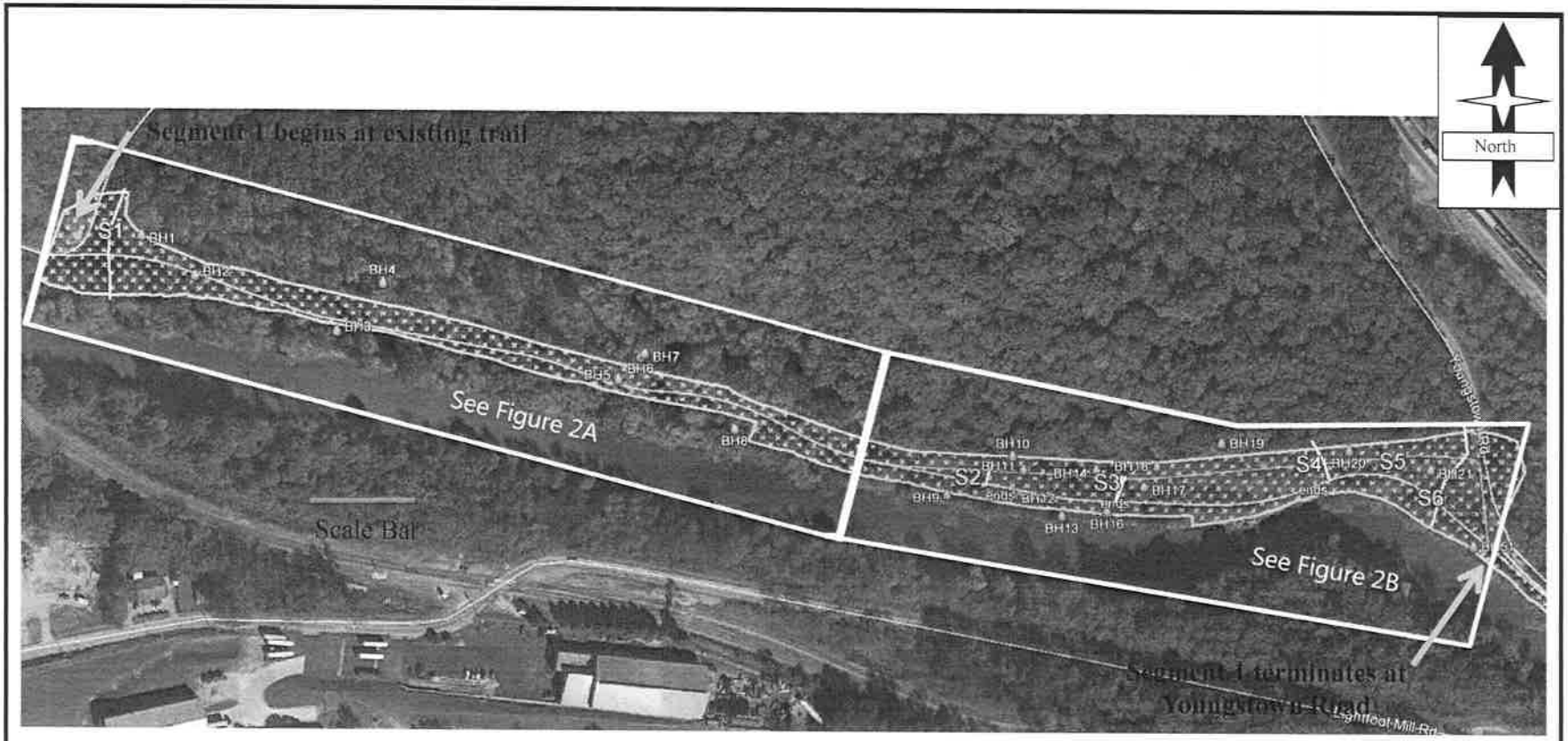
Elizabeth M. Porter
Senior Reviewer

Attachments: Figures
Photographs
TDEC Hydrologic Determination Forms
USFWS and TDEC-NHIP Protected Species Lists

Attachments



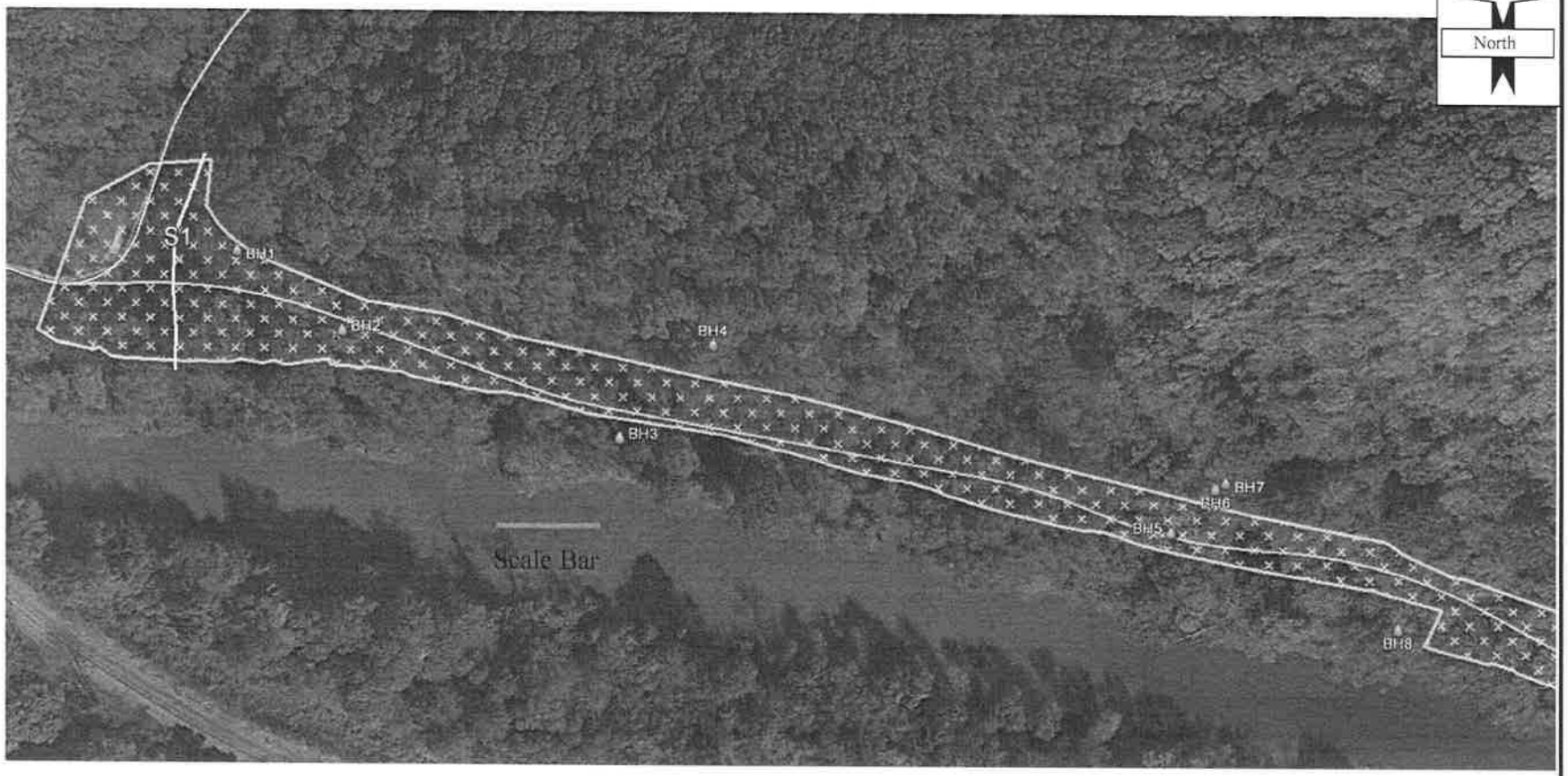
Scale: as shown	S&ME	**Site Location Plan** Segment 1 – South Chickamauga Creek Greenway Faith Hill Trail to Youngstown Road Chattanooga, Hamilton County, Tennessee	**Figure 1**
Checked By: EMP			
Date: 6/10/2016		Project 4181-16-015 P001	



S# = Identified Streams, WWC, and/or Drainage Features

BH # =Potential Bat Habitat Tree

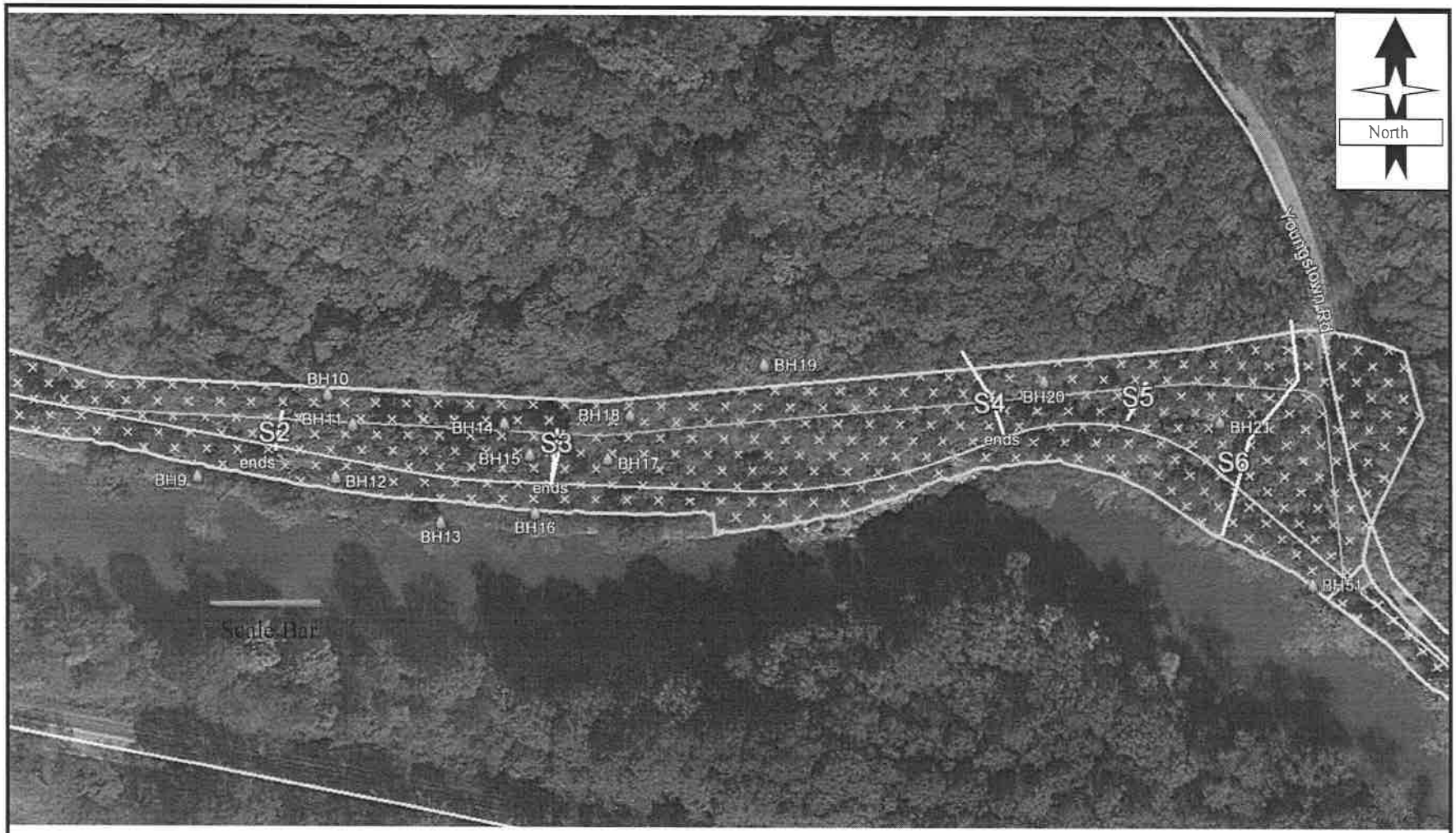
Scale bar approximately 200 feet	S&ME	**Overview of Findings** Segment 1 – South Chickamauga Creek Greenway Faith Hill Trail to Youngstown Road Chattanooga, Hamilton County, Tennessee	**Figure 2**
Checked By: KLS		Project 4181-16-015 P001	
Date: 6/10/2016			



BH # =Potential Bat Habitat Tree

S1 = Ephemeral Stream/WWC extending entire width project area

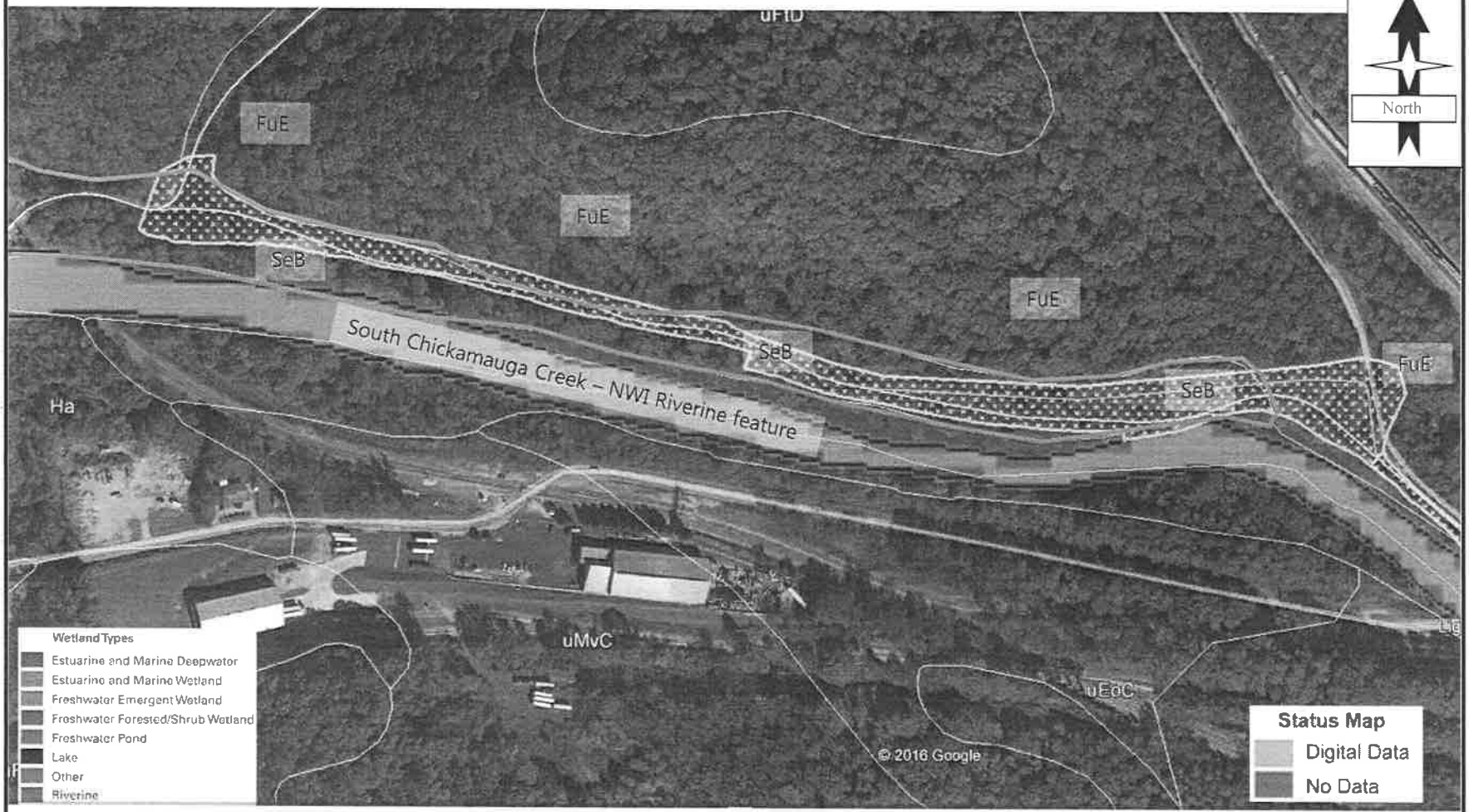
Scale Bar – approx. 200 feet	S&ME	**Overview of Findings** Segment 1 – South Chickamauga Creek Greenway Faith Hill Trail to Youngstown Road Chattanooga, Hamilton County, Tennessee	**Figure 2A**
Checked By: KLS			
Date: 6/10/2016		Project 4181-16-015 P001	



BH # = Potential Bat Habitat Tree

S2, S3, S4, & S5= TDEC WWC's / USACE Upland Drainages
S6 = TDEC Stream / USACE Intermittent Stream

Scale Bar – approx. 100 feet	S&ME	**Overview of Findings** Segment 1 – South Chickamauga Creek Greenway Faith Hill Trail to Youngstown Road Chattanooga, Hamilton County, Tennessee	**Figure 2B**
Checked By: KLS			
Date: 6/10/2016		Project 4181-16-015 P001	



SeB = Sequatchie Loam, 2 to 7% slopes
FuE = Fullerton cherty silt loam, 25 to 40% slopes

Scale: not determined	S&ME	**Soil and NWI Exhibit** Segment 1 – South Chickamauga Creek Greenway Faith Hill Trail to Youngstown Road Chattanooga, Hamilton County, Tennessee	**Figure 3**
Checked By: EMP			
Date: 6/10/2016		Project 4181-16-015 P001	

Date: 6/3/2016

Photographer: KLS

1	**Location / Orientation**	S1, looking south and downstream
	Remarks	View of WWC / Ephemeral Stream labeled S1.

Date: 6/3/2016

Photographer: KLS

2	**Location / Orientation**	In the western portion, facing east
	Remarks	Typical view of proposed trail corridor

Date: 6/3/2016

Photographer: KLS

3	**Location / Orientation**	Potential bat habitat designated BH-5
	Remarks	View of typical snag observed within reviewed corridor

Date: 6/3/2016

Photographer: KLS

4	**Location / Orientation**	Potential bat habitat designated BH-8
	Remarks	View of a large shagbark hickory observed within reviewed corridor.

Date: 6/3/2016

Photographer: KLS

5	**Location / Orientation**	S2, looking northeast and upstream
	Remarks	View of WWC / Upland Drainage feature labeled S2.

Date: 6/3/2016

Photographer: KLS

6	**Location / Orientation**	S3, looking northeast and upstream
	Remarks	View of WWC / Upland Drainage feature labeled S3 (A&B).

Date: 6/3/2016

Photographer: KLS

7	**Location / Orientation**	S4, looking northwest and upstream
	Remarks	View of WWC / Upland Drainage feature labeled S4.

Date: 6/3/2016

Photographer: KLS

8	**Location / Orientation**	S5, looking northeast and upstream
	Remarks	View of WWC / Upland Drainage feature labeled S5.

Date: 6/3/2016

Photographer: KLS

9	**Location / Orientation**	S6, looking north/northeast and upstream
	Remarks	View of TDEC Stream / USACE Intermittent Stream labeled S6.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Hamilton	Named Waterbody: Unnamed	Date/Time: 6/3/2016; 10:20 am
Assessors/Affiliation: Kristy Smedley and Barry Burnette of S&ME, Inc.		Project ID : S-1
Site Name/Description: South Chickamauga Greenway- Segment 1		
Site Location: Faith Road to Youngstown Road, Chattanooga, TN 37416		
USGS quad: East Chattanooga, TN	HUC (12 digit): 060200010905	Lat/Long: 35.070542°, -85.222958°
Previous Rainfall (7-days) : none		
Precipitation this Season vs. Normal : very wet wet average (dry) drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos (Y) or N (circle) Number : 1	
Soil Type(s) / Geology: Sequatchie loam, 2 to 7% slopes (SeB) / Knox Group (OCk) Source: NRCS Web Soil survey and Google Earth USGS Geologic Overlay		
Surrounding Land Use: Residential, Railroad l		
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	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	X	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	X	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	X	Stream
6. Presence of fish (except *Gambusia*)	X	Stream
7. Presence of naturally occurring ground water table connection	X	Stream
8. Flowing water in channel and 7 days since last precipitation in local watershed	X	Stream
9. Evidence watercourse has been used as a supply of drinking water	X	Stream

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

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

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

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 9

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 6.5)	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	
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 = 0)	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 = 2.5)	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 = 9

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: Hamilton	Named Waterbody: Unnamed	Date/Time: 6/3/2016; 12:05 pm
Assessors/Affiliation: Kristy Smedley and Barry Burnette of S&ME, Inc.		Project ID : S-2
Site Name/Description: South Chickamauga Greenway- Segment 1		
Site Location: Faith Road to Youngstown Road, Chattanooga, TN 37416		
USGS quad: East Chattanooga, TN	HUC (12 digit): 060200010905	Lat/Long: 35.069295°, -85.217310°
Previous Rainfall (7-days) : none		
Precipitation this Season vs. Normal : very wet wet average (dry) drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos (Y) or N (circle) Number: 5	
Soil Type(s) / Geology: Sequatchie loam, 2 to 7% slopes (SeB) / Knox Group (OCk) Source: NRCS Web Soil survey and Google Earth USGS Geologic Overlay		
Surrounding Land Use: Residential, Railroad		
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	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	X	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	X	WWC
5. Presence of multiple populations of obligate lotic 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) = 4

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 1.5)	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	
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 = 0)	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 = 2.5)	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 = 4

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: Hamilton	Named Waterbody: Unnamed	Date/Time: 6/3/2016; 12:50 pm
Assessors/Affiliation: Kristy Smedley and Barry Burnette of S&ME, Inc.		Project ID : S-3
Site Name/Description: South Chickamauga Greenway- Segment 1		
Site Location: Faith Road to Youngstown Road, Chattanooga, TN 37416		
USGS quad: East Chattanooga, TN	HUC (12 digit): 060200010905	Lat/Long: 35.069210°, -85.216479°
Previous Rainfall (7-days) : none		
Precipitation this Season vs. Normal : very wet wet average (dry) drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos (Y) or N (circle) Number: 6	
Soil Type(s) / Geology: Sequatchie loam, 2 to 7% slopes (SeB) / Knox Group (OCk) Source: NRCS Web Soil survey and Google Earth USGS Geologic Overlay		
Surrounding Land Use: Residential, Railroad		
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	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	X	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	X	WWC
5. Presence of multiple populations of obligate lotic 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) = 4.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 2)	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	
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 = 0)	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 = 2.5)	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 = 4.5

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: Hamilton	Named Waterbody: Unnamed	Date/Time: 6/3/2016; 1:25 pm
Assessors/Affiliation: Kristy Smedley and Barry Burnette of S&ME, Inc.		Project ID : S-4
Site Name/Description: South Chickamauga Greenway- Segment 1		
Site Location: Faith Road to Youngstown Road, Chattanooga, TN 37416		
USGS quad: East Chattanooga, TN	HUC (12 digit): 060200010905	Lat/Long: 35.069393°, -85.215191°
Previous Rainfall (7-days) : none		
Precipitation this Season vs. Normal : very wet wet average (dry) drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos (Y) or N (circle) Number: 7	
Soil Type(s) / Geology: Sequatchie loam, 2 to 7% slopes (SeB) / Knox Group (OCk) Source: NRCS Web Soil survey and Google Earth USGS Geologic Overlay		
Surrounding Land Use: Residential, Railroad		
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	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	X	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	X	WWC
5. Presence of multiple populations of obligate lotic 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) = 10.5

Justification / Notes :

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	(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	
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 = 0.5)	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 = 1.5)	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 = 10.5

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: Hamilton	Named Waterbody: Unnamed	Date/Time: 6/3/2016; 1:35 pm
Assessors/Affiliation: Kristy Smedley and Barry Burnette of S&ME, Inc.		Project ID : S-5
Site Name/Description: South Chickamauga Greenway- Segment 1		
Site Location: Faith Road to Youngstown Road, Chattanooga, TN 37416		
USGS quad: East Chattanooga, TN	HUC (12 digit): 060200010905	Lat/Long: 35.069358°, -85.214737°
Previous Rainfall (7-days) : none		
Precipitation this Season vs. Normal : very wet wet average (dry) drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos (Y) or N (circle) Number: 8	
Soil Type(s) / Geology: Fullerton cherty silt loam, 25% to 40% slopes (FuE) / Knox Group (OCk) Source: NRCS Web Soil survey and Google Earth USGS Geologic Overlay		
Surrounding Land Use: Residential, Railroad		
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	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	X	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	X	WWC
5. Presence of multiple populations of obligate lotic 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) = 4

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 1.5)	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	
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 = 0)	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 = 2.5)	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 = 4

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: Hamilton	Named Waterbody: Unnamed	Date/Time: 6/3/2016; 1:50 pm
Assessors/Affiliation: Kristy Smedley and Barry Burnette of S&ME, Inc.		Project ID : S-6
Site Name/Description: South Chickamauga Greenway- Segment 1		
Site Location: Faith Road to Youngstown Road, Chattanooga, TN 37416		
USGS quad: East Chattanooga, TN	HUC (12 digit): 060200010905	Lat/Long: 35.069121°, -85.214420°
Previous Rainfall (7-days) : none		
Precipitation this Season vs. Normal : very wet wet average (dry) drought unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos (Y) or N (circle) Number: 9	
Soil Type(s) / Geology: Fullerton cherty silt loam, 25% to 40% slopes (FuE) / Knox Group (OCk) Source: NRCS Web Soil survey and Google Earth USGS Geologic Overlay		
Surrounding Land Use: Residential, Railroad		
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	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	X	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	X	WWC
5. Presence of multiple populations of obligate lotic 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 = Stream

Secondary Indicator Score (if applicable) = 21

Justification / Notes :

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	(1.5) 2	
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 = 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 = 21

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

Notes :

U.S. Fish & Wildlife Service

Segment 1 - South Chickamauga Creek Greenway

IPaC Trust Resources Report

Generated June 21, 2016 03:21 PM MDT, IPaC v3.0.7

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.

IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

Table of Contents

U.S. Fish & Wildlife Service

IPaC Trust Resources Report

NAME

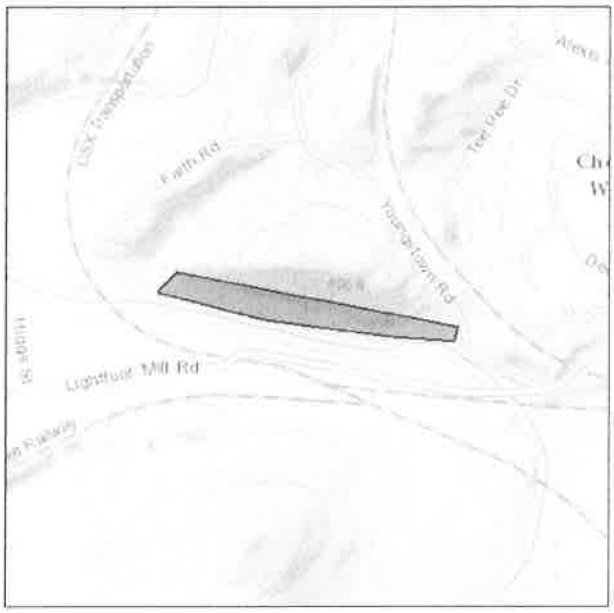
Segement 1 - South Chickamauga Creek Greenway

LOCATION

Hamilton County, Tennessee

IPAC LINK

https://ecos.fws.gov/ipac/project/26F7F-6YF2N-ANLGB-Z65AA-J655QI



U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

Tennessee Ecological Services Field Office
446 Neal Street
Cookeville, TN 38501-4027
(931) 528-6481

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Fishes

Snail Darter Percina tanasi — Threatened

CRITICAL HABITAT
No critical habitat has been designated for this species.
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E010

Flowering Plants

Large-flowered Skullcap Scutellaria montana — Threatened

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q2IA

Small Whorled Pogonia Isotria medeoloides — Threatened

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q1XL

Virginia Spiraea Spiraea virginiana — Threatened

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q2R1

Mammals

Gray Bat Myotis grisescens — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A04J

Indiana Bat Myotis sodalis — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A000

Northern Long-eared Bat Myotis septentrionalis — Threatened

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0JE

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.[1] There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

---

1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The following species of migratory birds could potentially be affected by activities in this location:

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Black-billed Cuckoo Coccyzus erythropthalmus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HI

Blue-winged Warbler Vermivora pinus — Bird of conservation concern
Season: Breeding

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Wintering

Kentucky Warbler Oporornis formosus — Bird of conservation concern
Season: Breeding

Loggerhead Shrike Lanius ludovicianus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY

Louisiana Waterthrush Parkesia motacilla — Bird of conservation concern
Season: Breeding

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Prairie Warbler Dendroica discolor — Bird of conservation concern
Season: Breeding

Prothonotary Warbler Protonotaria citrea — Bird of conservation concern
Season: Breeding

Red-headed Woodpecker Melanerpes erythrocephalus — Bird of conservation concern
Year-round

Rusty Blackbird Euphagus carolinus — Bird of conservation concern
Season: Wintering

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Willow Flycatcher Empidonax traillii — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

Wood Thrush Hylocichla mustelina — Bird of conservation concern
Season: Breeding

Worm Eating Warbler Helmitheros vermivorum — Bird of conservation concern
Season: Breeding

Wildlife refuges and fish hatcheries

There are no refuges or fish hatcheries in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS
The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

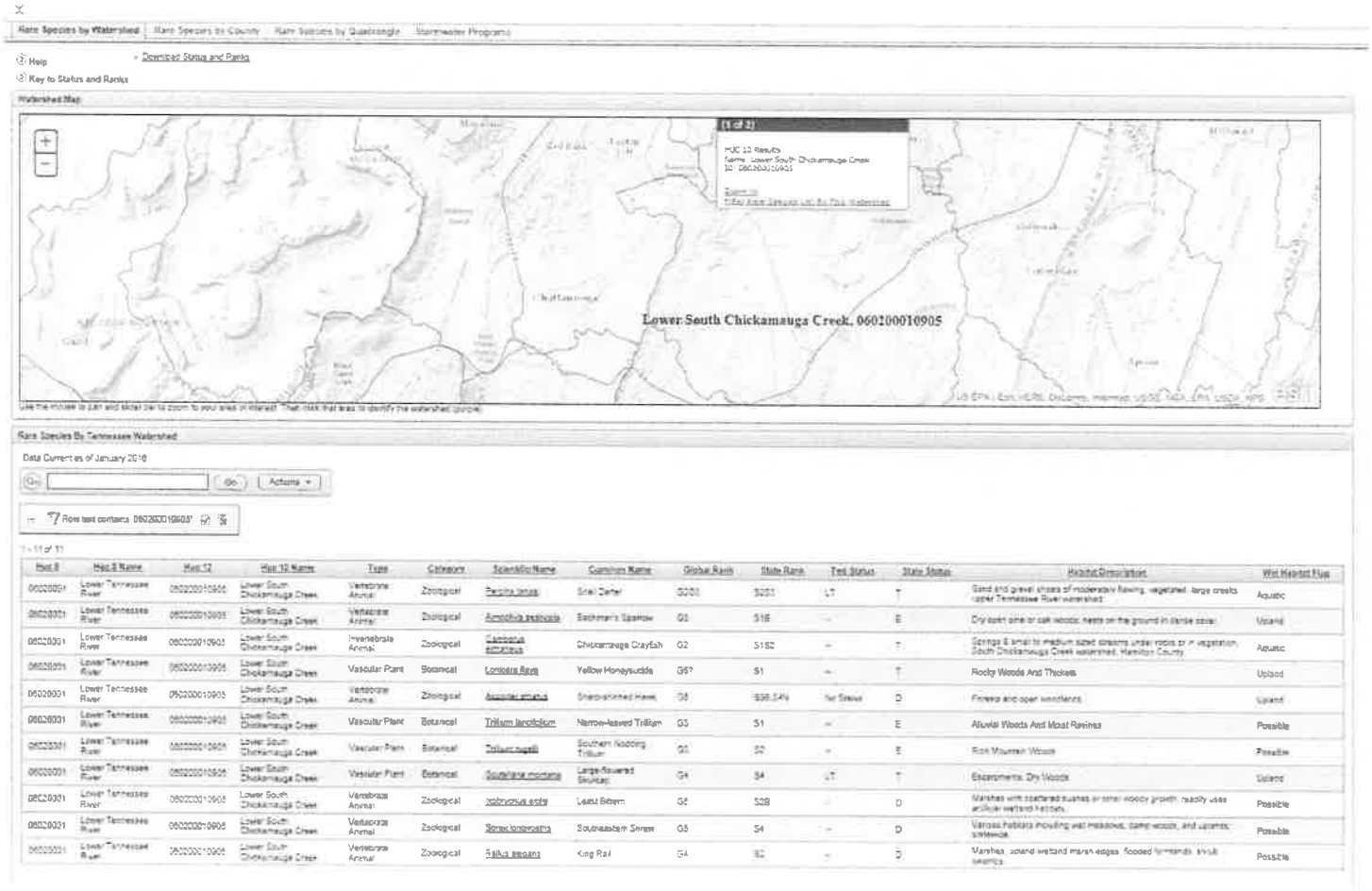
Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS
Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS
Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

There are no wetlands in this location

STATE-LISTED PROTECTED SPECIES FOR LOWER SOUTH CHICKAMAUGA CREEK WATERSHED
S&ME PROJECT 4181-16-015
JUNE 2016



Huc 8	Huc 8 Name	Huc 12	Huc 12 Name	Type	Category	Scientific Name	Common Name	Global Rank	State Rank	Fed Status	State Status	Habitat Description	Wet Habitat Flag
06020001	Lower Tennessee River	060200010904	Lower South Chickamauga Creek	Vertebrate Animal	Zoological	Percina tanasi	Snail Darter	G3G4	S3S4	LT	T	Sand and gravel shoals of moderately flowing, vegetated, large creeks upper Tennessee River watershed	Aquatic
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Vertebrate Animal	Zoological	Ammodramus leconteii	Sherman's Sparrow	G5	S1B	--	E	Dry open pine or oak woods; nests on the ground in dense cover	Upland
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Invertebrate Animal	Zoological	Cambarus extraneus	Chickamauga Crayfish	G2	S1S2	--	T	Springs & small to medium sized streams under rocks or in vegetation, South Chickamauga Creek watershed, Hamilton County	Aquatic
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Vascular Plant	Botanical	Lonicera flava	Yellow Honeysuckle	G5?	S1	--	T	Rocky Woods And Thickets	Upland
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Vertebrate Animal	Zoological	Accipiter striatus	Sharp-shinned Hawk	G5	S3B,S4N	Not Listed	D	Forests and open woodlands	Upland
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Vascular Plant	Botanical	Trillium lancifolium	Narrow-leaved Trillium	G5	S1	--	E	Alluvial Woods And Moist Ravines	Possible
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Vascular Plant	Botanical	Trillium rugelii	Southern Nodding Trillium	G3	S2	--	E	Rich Mountain Woods	Possible
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Vascular Plant	Botanical	Scutellaria montana	Large-flowered Skullcap	G4	S4	LT	T	Escarpments, Dry Woods	Upland
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Vertebrate Animal	Zoological	Ixobrychus exilis	Least Bittern	G5	S2B	--	D	Marshes with scattered bushes or small woody growth, readily uses artificial wetland habitats	Possible
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Vertebrate Animal	Zoological	Spizella pusilla	Field Sparrow	G5	S4	--	D	Various habitats including wet meadows, cane woods, and uplands; shrubland	Possible
06020001	Lower Tennessee River	060200010905	Lower South Chickamauga Creek	Vertebrate Animal	Zoological	Rallus elegans	King Rail	G4	S2	--	D	Marshes, inland wetland marsh edges, flooded farmlands, shrub swamps	Possible