DAVIS • MARTIN • POWELL
ENGINEERS & SURVEYORS dmp

December 30, 2019

Re: City of Greensboro, NC
Horsepen Creek and Ryan Creek
Streambank Stabilizations
Professional Services Proposal

Mr. Johnnie Hill
City of Greensboro
Water Resources Department
P.O. Box 3136
Greensboro, NC 27402-3136

Dear Mr. Hill:

Davis • Martin • Powell (DMP) is pleased to offer this proposal to provide professional services for the Streambank Stabilizations project.

Understanding of Project

The City of Greensboro Water Resources Department has identified two (2) sites within the City where significant streambank erosion has occurred, which include the following:

1. Horsepen Creek at Spring Oak Court
2. Ryan Creek at Creek Ridge Road

Exhibits for each site, prepared by the Water Resources Department, are included as attachments to this Proposal. The City desires to design and construct stream restoration and streambank stabilizations at these sites to prevent further streambank erosion.

Scope of Work

DMP has assembled the Project Team below to perform the specific tasks listed:

Firm	Task
Carolina Ecosystems	Wetland/Stream Delineations, Permitting Assistance
CriTek Engineering	Erosion Control Design and Permitting
Davis-Martin-Powell	Project Management, QA/QC, Surveying & Base Mapping, and Easement Mapping
Jewell - LJB	Hydraulic Modeling, Streambank Stabilization Design, and Permitting
Kris Bass Engineering	Stream Restoration and Streambank Stabilization Design
Terracon	Geotechnical Investigation

Proposals from each Sub-Consultant are attached, outlining their respective Scopes of Work.

DMP will perform field surveying and base mapping for the two sites. Final survey maps for each site will include the following elements:

- Planimetric features and topography. For detailed topography of the channels, cross-sections will be performed at intervals as recommended by Jewell and Kris Bass Engineering.
- Property lines, ownership references, and existing recorded easements and rights-of-way.
- Sanitary sewer and storm sewer pipes and structures, and associated tops and inverts.
- Underground utilities (where discernible from the surface and/or marked by locator service).
- Wetland boundaries (as delineated and flagged by Carolina Ecosystems).
- Trees 12 inches or larger in diameter.
- Geotechnical soil boring locations.

Surveys will be tied horizontally to the North American Datum of 1983 (NAD83) and vertically to the North American Vertical Datum of 1988 (NAVD88).

Easement-related services will be performed by DMP. At this time, the exact number and configuration of easements is unknown. For the purpose of this Proposal, we have assumed that up to two (2) G-drawings will be needed (one for each site). The City owns one parcel at the Horsepen Creek site near Spring Oak Court, but easements could be needed on up to four other private properties at the Horsepen Creek site. Easements could also be needed on the private property at 318 Creek Ridge Road. We would only invoice for preparation of easement maps and exhibits if they are needed.

DMP will also provide project management, coordination, and QA/QC to make sure all Team Members are working together cohesively to deliver final plans/specifications and obtain necessary permits for the project. Professional services will extend through the bidding phase of the project.

Construction Administration services are not included as part of this Proposal, but can be scoped once the project is close to being ready for construction.

Compensation

The Project Team will perform the professional services based on our Understanding of the Project and the Scope of Work described herein for the Lump Sum Fee of $102,500.00. A breakdown of fees for the Project Team Members is listed below:

Firm	Fee	Lump Sum / Not-to-Exceed	% of Total Contract
Carolina Ecosystems	$ 2,770.00	Lump Sum	2.70%
CriTek Engineering Group	$ 12,500.00	Lump Sum	12.20%
Davis-Martin-Powell (Project Mgmt.)	$ 12,530.00	Lump Sum	12.22%
Davis-Martin-Powell (Surveying & Esmts.)			
Surveying and Base Mapping	*$ 16,000.00*	*Lump Sum*	
Easement Services	*$ 4,000.00*	*Not-to-Exceed*	
Sub-Total for DMP (Surveying & Esmts.)	$ 20,000.00	Not-to-Exceed	19.51%
Jewell - LJB	$ 33,400.00	Lump Sum	32.59%
Kris Bass Engineering	$ 15,000.00	Lump Sum	14.63%
Terracon	$ 6,300.00	Lump Sum	6.15%
TOTAL	**$ 102,500.00**	Not-to-Exceed	**100.00%**

The terms and conditions of DMP's current "Agreement for Professional Services" with the City of Greensboro Water Resources Department shall apply.

Closing

DMP and our Project Team Members appreciate the opportunity to submit this proposal. If acceptable, please forward the appropriate contract documents to our office for execution. If you have any questions or if you would like to discuss this proposal in more detail, please let me know.

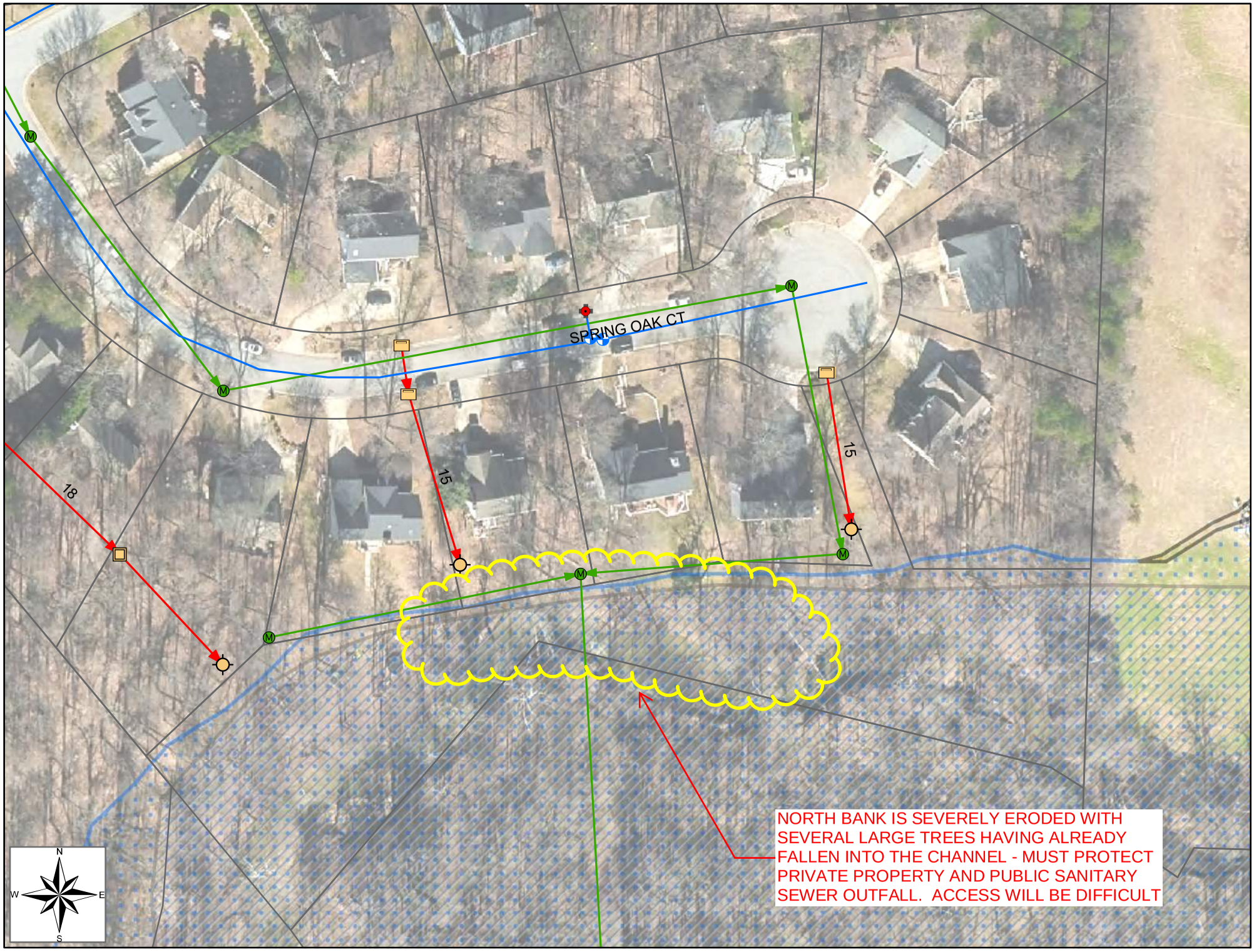
Sincerely,

DAVIS • MARTIN • POWELL & ASSOCIATES, INC

Andrew P. Larrick

Andrew P. Larrick, PE

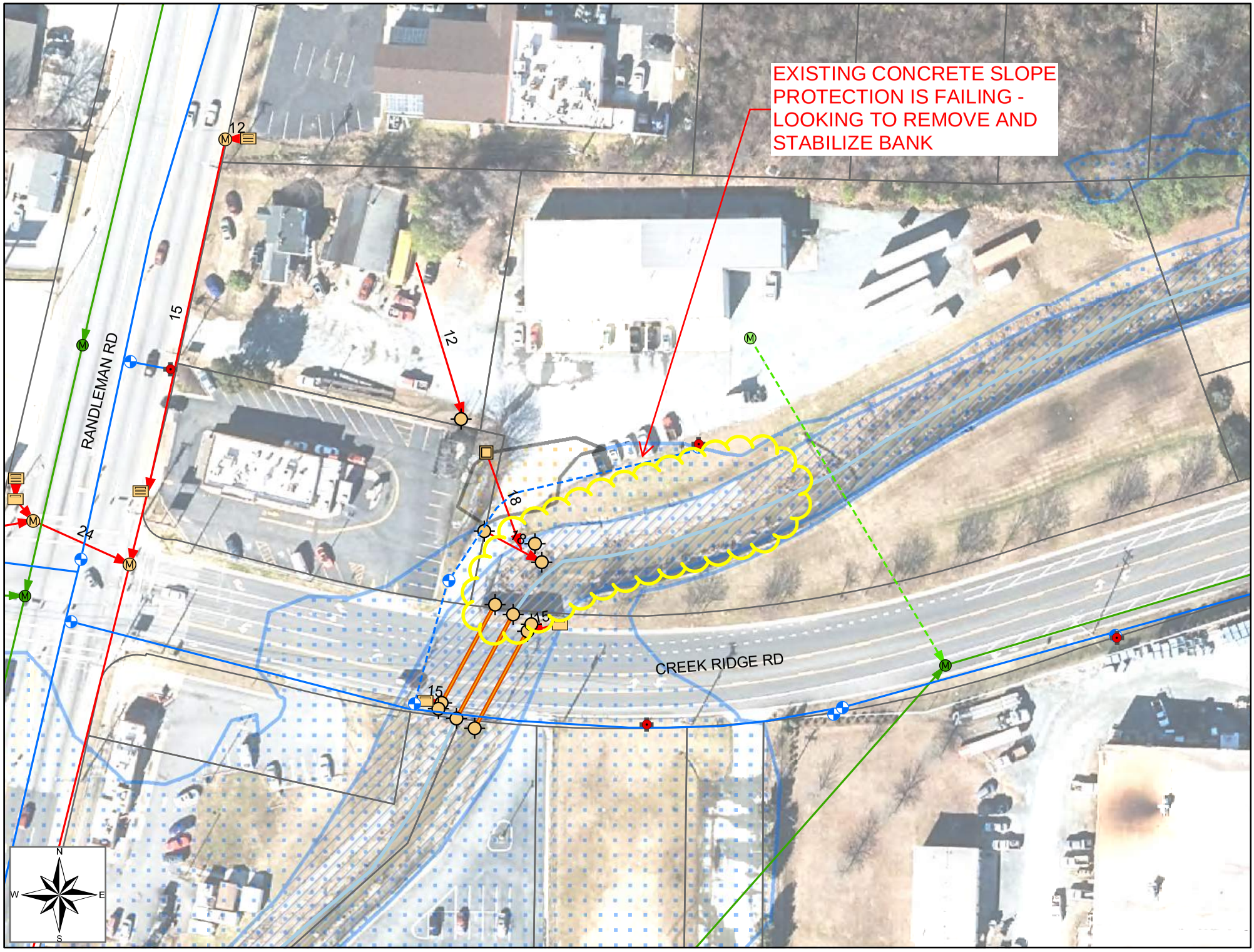
Attachments:
Site Exhibits, Sub-Consultant Proposals



14 Spring Oak Court

1 in = 80 ft

0 5 10 20 30 40
Feet



318 Creek Ridge Road

1 in = 80 ft

0 5 10 20 30 40
Feet

CAROLINA ECOSYSTEMS

PO Box 41; Lewisville, NC 27023
P:919.606-1065 - F:919-585-5570

September 15, 2019

Andy Larrick, P.E.
Davis Martin Powell
6415 Old Plank Road
High Point, NC 27265

RE: Scope of Services
Stream and Wetland Delineation, Preliminary Jurisdictional Determination, & Jordan Lake Rules Buffer Determination
North Buffalo Creek Sites (Transmission Tower & Footbridge) & Spring Oak Court Greensboro, NC

Dear Andy:

As requested, Carolina Ecosystems, Inc. (CEI) is pleased to offer the following scope of services for the above referenced project. The scope includes evaluation of three project areas in Greensboro, NC for streams and wetlands under the jurisdiction of the Clean Water Act (CWA), and/or stream buffers subject to the Jordan Lake Buffer rules (Buffer Rules). Preparation of a request for Preliminary Jurisdictional Determination (PJD) and buffer determination will follow the evaluation if applicable. The three project sites are Spring Oak Court, North Buffalo Creek Transmission Tower, and North Buffalo Creek Footbridge.

Scope of Services

CEI will provide the following services in support of each project upon authorization to proceed:

1. **Wetland/Stream Delineation & Buffer Determination:**
   a) Delineate wetlands under the jurisdiction of the CWA within the proposed project boundaries. Wetland/upland and/or wetland/open water boundary delineation will be performed and follow current US Army Corps of Engineers (USACE) methodologies including regional supplements. Jurisdictional boundaries of wetland areas will be flagged in the field for survey by others.
   b) Characterize and identify stream channels under the jurisdiction of the CWA and/or Buffer Rules using current USACE and NC Department of Environmental Quality (NCDEQ) methodologies. Representative stream channel points (origin and intermittent-perennial transition points) will be flagged in the field for survey by others as necessary. Sub-meter GPS points will be acquired on any origin or transition points along streams (i.e. intermittent-perennial changes). NC Stream Assessment Method (NCSAM) forms will be completed for each stream channel.

2. **Request for PJD & Buffer Determination**: Upon completion of Task 1, CEI will prepare a PJD application for the USACE and a Request for Stream Buffer Determination(s) from NCDEQ or their local delegated authority. The request will include appropriate field documentation and approximate maps (or accurate maps if surveying is complete at that

time). One on-site visit with the USACE and/or NCDEQ/local delegated authority are included in this scope. This task may not be required depending on the results of Task 1.

Deliverables and Schedule

CEI will complete the delineation within 60 days of authorization to proceed. Agency verification requests will be submitted within 21 days of completion of the field and survey work.

Assumptions

This scope and fee was prepared with the following assumptions. If any of these assumptions are invalid, the scope and fee may be subject to change.

1. Field work will be limited to areas shown on the exhibits emailed on 9/6/2019.
2. Access to the site is provided prior to field work commencing, and site conditions allow for timely and accurate delineation to be performed during the field visits.
3. Formal survey of wetland flagging and streams, and production of a wetland plat, is not included in this scope. No wetlands are anticipated at the site.
4. Data provided by CEI as a result of the delineation scope will be approximate in nature and should not be used for design purposes.
5. No archaeological or cultural resources surveys will be required for the project.
6. No threatened/endangered species surveys or consultation with the USFWS are required.
7. No permitting services are included in the scope.

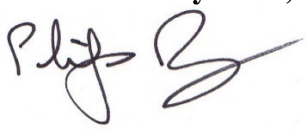
Payment

For 2 sites at North Buffalo Creek: 2 sites x $2,770/site = $5,540.
For Spring Oak Court site at Horsepen Creek: 1 site x $2,770/site = $2,770.

Tasks described above will be completed for a cost of $2,770.00 per project, or $8,310.00 total. The work will be billed on a monthly basis, with payment due in 30 days. If additional fee is required due to a change in scope, un-anticipated site conditions, or the assumptions above being invalid, CEI will provide full justification for the additional fee and no work will commence without prior approval.

If the scope and fee above meet your approval, please authorize us to proceed under our existing master subconsultant agreement. The proposed scope, schedule, and fee are valid for six months from the date of this letter. If you have any questions regarding this scope please call me at your earliest convenience at (919) 606-1065 or phil.may@carolinaeco.com.

Sincerely,
Carolina Ecosystems, Inc.



Philip May
Vice President

CRI TEK
ENGINEERING GROUP

1 Centerview Drive, Suite 307
Greensboro, NC 27407
Telephone: (336) 348-1889
CriTekGroup.com

December 22, 2019

Mr. Andy Larrick, PE
Davis Martin Powell
6415 Old Plank Road
High Point, NC 27265

Subject: **Proposal for Engineering Services for**
Stream Restoration & Streambank Stabilization Project

CriTek # **GSO.2019.07**

Dear Mr. Larrick:

CriTek Engineering Group, P.C. (CriTek), at your request, is pleased to submit this proposal for engineering services to design erosion and sediment control features for the Stream Restoration & Streambank Stabilization Projects. CriTek has put together a team of professionals, all of which have significant experience working on similar projects, to complete the work on the project.

The total Lump Sum Engineering Cost to prepare final design erosion and sediment control drawings for this work is $25,000.00. A detailed work plan is attached to provide more detail on the engineering scope, and the fee presented above. CriTek appreciates the opportunity to work with Davis Martin Powell and the City of Greensboro towards the successful completion of this project. If you have any questions, or need additional assistance, please do not hesitate to call (336-348-1889) or email (dcrite@critekgroup.com).

Very truly yours,

CriTek Engineering Group

J. Dawayne Crite, PE
President

Attachments
File: GSO.2019.07

CRITEK ENGINEERING GROUP
1 Centerview Drive, Suite 307
Greensboro, NC 27407
Telephone: (336) 348-1889
CriTekGroup.com

EXHIBIT A
SCOPE OF WORK

PROJECT DESCRIPTION

Based on initial discussions with Davis Martin Powell, Inc. (DMP) the project is anticipated to include and erosion and sediment control design (E&SC) for four independent sites located in Greensboro, North Carolina. The purpose of the design and construction activities at each site is to restore and or rehabilitee the stream and streambank along various bodies of water. The detailed scope of services for the basic services follows:

Task 1: Erosion and Sedimentation Control Design

CriTek shall prepare final erosion and sediment control design drawings suitable for construction of four independent construction sites. For reference, the sites are titled: North Buffalo Creek at Transmission Tower; North Buffalo Creek at Pedestrian Bridge, Horsepen Creek and Ryan Creek. Based on conversations with DMP, both of the North Buffalo locations will be bid in one construction package and the Horsepen Creek and Ryan Creek sites will be bid in a separate construction package.

For Design, preliminary erosion and sedimentation control drawings and specifications will be submitted at the 90% design stage. A final set of erosion and sediment control construction drawings will be submitted at the 100% design stage along with all necessary erosion and sedimentation control specifications and completed erosion control permit application.

The following design assumptions were made during development of this Scope of Work:

- CriTek will be provided with the State of North Carolina and City of Greensboro's latest standard specifications and standard details for erosion and sediment control.
- Plat development, subconsultant management (including geotechnical investigations, field survey, utility locations, property search, right-of-way mapping, etc.) shall be performed by others.
- All necessary survey and geotechnical information will be made available to CriTek.
- Model files of the site and supporting topographic CAD information will be provided in AUTOCAD Civil 3D, version 2016 or earlier.
- Temporary and permanent (if required) erosion and sediment control features shall be shown on the site plan drawings prepared by others.
- CriTek will sign and seal the technical drawings they produce.
- Construction at each site will be limited to 1 acre or less, therefore a full permit and submittal to the NC Department of Environmental Quality (NCDEQ) is not required.
- All other local, state and federal permits will be provided by others.
- Others will be responsible for paying all permitting fees to the respective agency.

Task 1.1 -North Buffalo Creek Sites

Erosion and sediment control construction drawings will be prepared along with all necessary erosion and sedimentation control specifications and completed erosion control permit application for construction. The following list of drawings are expected for the project:

- Site Drawings with Erosion and Sediment Control Features (4 sheets)
- Standard Details and Notes (4 sheets)

Task 1.2-Horsepen and Ryan Creek Sites

Signed and sealed erosion and sediment control construction drawings will be prepared along with all necessary erosion and sedimentation control specifications and completed erosion control permit application for construction. The following list of drawings are expected for the project:

- Drawings and Erosion and Sediment Control Features (4 sheets)

1 Centerview Drive, Suite 307
Greensboro, NC 27407
Telephone: (336) 348-1889
CriTekGroup.com

- Standard Details and Notes (4 sheets)

Deliverable(s): CriTek will prepare and submit preliminary and final design documents as described above and listed below for Task 1.1 and Task 1.2 projects:

- One (1) electronic (PDF and CAD) set of preliminary drawings and specifications at the 90% design review stage.
- One (1) electronic (Word and CAD) set of erosion and sedimentation control specifications and drawings will be provided at the 100% design stage.
- One (1) complete erosion and sedimentation control application.

SCHEDULE

The tasks outlined above will be initiated within one week of a Notice to Proceed from DMP. It is assumed that all work will initiate in the third quarter of Year 2020 and conclude in the fourth Quarter of Year 2020. Should CriTek's work be delayed beyond year 2020, the fee shall increase by five percent (5%).

STAFFING AND COORDINATION

CriTek will perform work as a sub-consultant under the guidance of DMP. CriTek will work directly with DMP and their representatives to perform the scope of work.

FEE FOR SERVICES

For the Basic Services described above, DMP agrees to pay CriTek on a **Lump Sum basis for the amount of Twenty-Five Thousand dollars $25,000.00** for Tasks 1. The proposed fees assigned to each task are represented below. Partial payments shall be made by DMP on a monthly basis based on the percentage of work completed in the billing cycle.

Fee Per Task
Task 1.1 – $12,500.00
Task 2.1 - $12,500.00

SCOPE OF WORK – STREAM BANK STABILIZATION ON HORSE PEN CREEK AND RYAN CREEK

The Kernersville office of LJB Inc. (JEWELL-LJB) respectfully submits this Scope of Work (SOW) to DMP for stream bank stabilization design and permitting in areas designated by the City of Greensboro.

1. Horse Pen Creek at Spring Oak Court (permitting only - design to be done by Kris Bass Engineering)
2. Ryan Creek at Creek Ridge Road

For Site 2, JEWELL-LJB will design the bank stabilization measures and develop construction plans. For Site 1, design and construction plans will be developed by Kris Bass Engineering. JEWELL-LJB will be responsible for preparing and submitting a Pre-Construction Notification (PCN) and developing hydraulic modeling to support a No-Rise Certification in compliance with City of Greensboro's flood damage prevention ordinance.

The SOW for this project is comprised of 7 tasks, as listed below and described in the following sections.

Task 1 – Ongoing Project Coordination
Task 2 – Existing Conditions Survey and Assessment for Site 2
Task 3 – Project Options/Conceptual Plans for Site 2
Task 4 – Preliminary Construction Plans for Site 2
Task 5 – Permitting for 2 Sites
Task 6 – Construction Documents
Task 7 – Bid Phase Services

Task 1 – Ongoing Project Coordination

The stream stabilization project will require coordination with Greensboro Water Resources staff, other City departments, and the property owners in areas adjacent to the Project Areas to implement a successful project. The JEWELL-LJB project manager, together with DMP, will coordinate with these parties throughout the duration of the project.

JEWELL-LJB's scope and budget includes a project kick-off meeting, and up to two (2) project status meetings with City staff. Time for an informal onsite presentation/meeting with adjacent property owners, and miscellaneous communication, such as phone calls and e-mails, is included in the SOW.

Task 2 – Existing Conditions Survey and Assessment for Site 2

JEWELL-LJB will coordinate with subconsultants as appropriate in their site investigations, survey, and assessments.

The effective FEMA HEC-RAS model geometry file will be updated and refined with improved topographic information as appropriate to reflect existing conditions. The model will be used as a basis for evaluating parameters such as shear stress and velocity through Site 2.

Task 3 – Project Options/Conceptual Plans for Site 2

Site 2 is a large concrete-lined channel, about 45' wide from top of bank to top of bank and approximately 10 feet deep, with roughly a 15-foot bottom width and ~1.5:1 side slopes. The concrete along the left bank has been undercut from the top and is failing for much of the distance downstream of Creek Ridge Drive. The concrete left bank appears to be stable, with no evidence of erosion problems behind the concrete along the top of the bank. JEWELL-LJB expects that the most cost-effective option will be to remove the damaged concrete along the left bank and install a more flexible liner, such as articulated concrete block or gabion mattress. We will also investigate possible options for changing the channel geometry in order to implement a more environmentally enhancing stabilization option. Because runoff from the adjacent paved area appears to have been a factor in the failure of the concrete slope, improved routing of this runoff to the creek in a manner which minimizes potential for future bank problems will be incorporated into the project plan.

JEWELL-LJB will present options/concept plans for proposed bank stabilization measures for Site 2 to City staff in a summary report with graphics or with an in-person presentation, dependent on the extent of consideration and evaluation which may be appropriate.

Task 4 – Preliminary Construction Plans

4.1 Preliminary (60%) Construction Plans - JEWELL-LJB will prepare drawings which include a planimetric view and profiles of existing conditions and the proposed design for the bank stabilization measures. Preliminary details will be provided. JEWELL-LJB's plan view drawings and profiles will show proposed bank stabilization measures, proposed grading along the channel and in the adjacent area, existing utilities, and other relevant features. The plans will be prepared to approximately a 60% completion level and JEWELL-LJB will also incorporate drawings for Site 1 from Kris Bass Engineering (KBE) into the plan set. JEWELL-LJB will review the 60% plan set with the City to verify the concept and validate proceeding to final construction plans.

4.2 Preliminary (90%) Construction Plans – JEWELL-LJB will prepare drawings which include plans, profiles and cross-sections of existing conditions and the proposed design for the bank stabilization measures. The drawings will show channel materials, dimensions, elevations, and details for upstream and downstream termination points. Details for connections of the new stabilization measures to remaining concrete will be provided. Details for addressing any known utility conflicts will be provided. The plans will be prepared to approximately a 90% completion level. Technical specifications for non-standard construction items will be drafted. Technical specifications for non-standard construction items will be drafted. JEWELL-LJB will be responsible for incorporating drawings and specifications from KBE, and ESC plans, details and specifications from Critek, into the plan set and the project specifications.

Task 5 – Permitting

5.1 401/404 Permitting – JEWELL-LJB will prepare and electronically submit a Pre-Construction Notification (PCN) with appropriate supporting documentation to the USACE and NCDEQ for approval at least 60 days prior to the initial day of construction. We expect that separate submittals will be required for the two sites. JEWELL-LJB will utilize the 90% plans and data layers to prepare the PCN.

The City can choose to provide a signed "Agent" form for JEWELL-LJB to be authorized to electronically sign the PCN online submittal, or JEWELL-LJB can fill in the electronic form and then send the log-in information to the City for electronic signature and submittal.

JEWELL-LJB will conduct a protected species habitat review based upon available data from the US Fish and Wildlife (USFWS) database, and communication with regulatory agencies. Formal surveys for populations of protected species and Section 7 consultation services are not included under this SOW.

JEWELL-LJB will prepare and submit a Project Review Request to the North Carolina Department of Cultural Resources, State Historic Preservation Office (SHPO) for the sites. Further coordination with SHPO, and formal surveys and/or excavations are not included in this SOW.

5.2 FEMA Permitting

JEWELL-LJB and KBE will work towards designing bank stabilization measures which can be permitted under a No-Rise Certification. The hydraulic modelling will be developed concurrent with the early design phases, such that 60% preliminary design plans will have been checked to verify a No-Rise impact prior to presentation of 60% plans to the City. When 90% preliminary plans have been prepared, the No-Rise Certifications and documentation will be submitted to the City's floodplain administrator for review and approval. Separate certifications and permit applications will be prepared for Sites 1 and 2.

Task 6 – Construction Documents (100% Plans)

6.1 Final Design Plans – JEWELL-LJB will revise the 90% Construction Plans for the bank stabilization projects to incorporate comments from the permitting agencies, and the City and coordinate with other subconsultants to incorporate their required revisions and then compile Final Construction Plans certified by a Professional Engineer.

The final plan set will include:

- Title and symbol sheets with project location maps, symbology, and definitions;
- Plan and profile sheets, with channel cross-sections as warranted;
- Detail sheets for the bank stabilization measures, stream structures, planting, and erosion control measures;
- Landscape plans for areas identified for floodplain and stream bank vegetation enhancement;
- Erosion control plans and detail sheets (prepared by Critek); and
- A written construction sequence to facilitate efficient construction progress, and compliance with permitting agencies.

6.2 Engineer's Estimate of Construction Quantities and Cost – JEWELL-LJB will coordinate with KBE and Critek to prepare an overall set of quantities of all construction materials. Based on recent construction bids, JEWELL-LJB will approximate unit costs to estimate the construction cost for the Site 2 improvements. JEWELL-LJB will incorporate estimates from KBE for the Site 1 improvements to compile a complete estimate of project construction costs.

6.3 Technical Specifications – JEWELL-LJB will write project specific technical specifications for construction items related to Site 2 and will also incorporate specifications provided by KBE to develop a complete compilation.

Task 7 – Bid Phase Services

JEWELL-LJB will attend a pre-bid meeting to assist the City with questions from bidding contractors and will also assist the City with issuing addenda to the construction documents.

SUMMARY OF DELIVERABLES

- Existing conditions mapping
- Conceptual Plans/Alternatives
- Preliminary (60%) construction drawings
- Preliminary (90%) construction drawings
- 401/404 (DEQ/USACE) permit application/pre-construction notification
- FEMA No-Rise Certification
- Construction Documents (plans and technical specification)

ASSUMPTION/LIMITATIONS

The following assumptions and limitations were used in developing the SOW and project fees for the seven tasks associated with this contract:

- Permit fees are not included in this scope of work and fee schedule. If JEWELL-LJB submits the PCN and pays the NCDEQ review fee on behalf of the City, this will be considerable a reimbursable expense additional to the lump sum fee.
- Construction plans will include up to 14 sheets (24” x 36”), including existing conditions survey provided by DMP and plan and detail sheets developed by KBE and Critek.
- Construction phase services are not included in this SOW.
- JEWELL-LJB is not responsible for compensatory mitigation if required by the US Army Corps.
- The SOW does not require JEWELL-LJB to perform any cultural resource identification or resource delineation if discovered during construction.
- Right of access to all properties will be provided to JEWELL-LJB prior to initiation of field work activities.
- The SOW assumes no engineering change orders by others that adversely affect the project limits up to the initiation of field work. All project limit or boundary changes that may require supplemental investigations is out-of-scope and is subject to separate change orders.
- JEWELL-LJB will provide up to two (copies) of each deliverable, and will also supply an electronic copy via email, ftp link or cloud server.
- JEWELL-LJB will not facilitate bid advertisement or pre-qualify contractors.

- JEWELL-LJB assumes no more than (3) addenda will be issued.
- JEWELL-LJB will not be involved in the bid-opening process.

PROJECT FEES

JEWELL-LJB will provide the services documented in the SOW for the following LUMP SUM fee;

Project Task	Fee
Task 1 – Project Coordination	$2,800
Task 2 – Existing Conditions Assessment	$1,800
Task 3 - Project Options/Conceptual Plans	$3,000
Task 4 – Preliminary Construction Plans	$6,500
Task 5 – Permitting	$13,000
Task 6 – Construction Documents/Specs/OPC	$5,000
Task 7 – Bid Phase Services	$1,000
Direct Expenses	$ 300
Total	**$33,400**

Kris Bass Engineering, PLLC
625 S Lakeside Dr.
Raleigh, NC 27606
Office: 919.960.1552
Email: kbass@kbeng.org

September 5, 2019

Client: Davis Martin Powell
Phone: 336.886.4821
Email: alarrick@dmp-inc.com

Proposal and Scope of Services
Greensboro Stream Restoration

Background

The purpose of this project is to complete a stream restoration design at one site in Greensboro, NC. The site off of Spring Oak Court has a high bank that is eroding into a residential backyard and threatening a sewer line. A mixture of traditional stream restoration measures and bank stabilization techniques will be needed. This proposal includes all tasks that will be needed to develop a final, detailed plan set for the project. Tasks include a geomorphic survey and stream assessment, development of concept and detailed plans, and permitting document support.

Task Descriptions

Geomorphic Survey and Stream Assessment

This task will involve a field investigation and stream survey by our staff. Field investigation will include geomorphic measurements of stream depth, width, and slope that will be used to complete the repair design. A general assessment of stream health will also include simple metrics of streambed condition and aquatic habitat suitability that will be an important part of a permit application.

Stream Restoration Design

A 60% stream restoration plan will be developed to outline potential alignment options for this site. This plan will be presented to the client for feedback before more detailed decisions are incorporated. Based on this feedback, the plan will then be developed to the 90% design level. This plan will include further details on structure locations and in-stream features. The extent of bank and floodplain grading will be identified and the location of all bioengineering features will be determined. A new proposed alignment and a vertical profile will be developed that can be included in this design plan. Typical cross sections for riffles and pools in various stream locations will also be a part of the plan submittal. The final product of this phase will be provided as a series of cad files for incorporation into the developing client plan sets.

Final stream restoration plans will be developed incorporating any feedback. This phase will include modelling and calculations that are needed to support the testing of the stream design. The final plans will include detailed grading and proposed contours for the restored stream reaches. Our staff will work

with the client to produce needed details in an appropriate format. Our staff can participate as needed in the development or review of technical specifications that will be part of the final submittal.

The design portion of the work will also include developing a detailed planting plan. The plan will incorporate natural riparian zone plantings, seasonality, planting methods, requirements, and warranty specifications. The plan might also include barrier or screening plantings for neighbors as coordinated with the city. An Engineers Opinion of Probable Cost will also be developed for use with the bidding phase of the project. The cost will be based on previous project work and published guidance.

Permitting and Meetings

Our staff will assist with application preparation and supporting data for a stream restoration permit. We will attend a site visit and assist with permitting agencies to explain the restoration plans until the proper approvals can be obtained. We will work with Jewell LJB to make needed adjustments for floodplain/No-Rise certification. In addition, our staff commits to office or site meetings at the completion of each phase of this project for review and feedback.

Cost Estimates

Task	**Price**
Spring Oak Court	
Geomorphic Survey and Stream Assessment	$2,500
Stream Restoration Design	
- Advanced Concept	$1,500
- 60% Design	$2,500
- Final Design	$5,000
Permitting and Meetings	$3,500
Spring Oak Court Total	**$15,000**
Project Total	**$15,000**

The total proposal for the Stream Restoration Design of 1 site is **$15,000**.

October 8, 2019

Davis Martin Powell & Associates
6415 Old Plank Road
High Point, North Carolina 27265

Attn: Mr. Andy Larrick, P.E.
P: (336) 886-4821 x 281
E: alarrick@dmp-inc.com

Re: Proposal for Geotechnical Engineering Services
City of Greensboro – Stream Restoration
Greensboro, North Carolina
Terracon Proposal No. PR75195202 (Revised)

Dear Mr. Larrick:

We appreciate the opportunity to submit this proposal to Davis Martin Powell & Associates (DMP) to provide Geotechnical Engineering services for the above-referenced project. The following are exhibits to the attached Agreement for Services.

Exhibit A	Project Understanding
Exhibit B	Scope of Services
Exhibit C	Compensation and Project Schedule
Exhibit D	Site Location
Exhibit E	Anticipated Exploration Plans

Our base fee to perform the Scope of Services described in this proposal is shown in Exhibit C and includes additional services for your consideration.

Your authorization for Terracon to proceed in accordance with this proposal can be issued by signing and returning a copy of the attached Agreement for Services to our office.

Sincerely,
Terracon Consultants, Inc.

Kalen B. Cuthbertson
Project Manager

Joey N. Link, P.E.
Geotechnical Department Manager

EXHIBIT A - PROJECT UNDERSTANDING

Our Scope of Services is based on our understanding of the project as provided by DMP and the expected subsurface conditions described below. We have visited each of the project sites to assess and properly scope the project to provide an appropriate approach to evaluating soils for these locations. We request the design team verify all information prior to our initiating site exploration activities.

Site Location and Anticipated Conditions

Item	Description
Property Information	■ Located at four separate sites in Greensboro, North Carolina o Site A: 14 Spring Oak Court (36.1187°N, 79.8950°W) o Site B: 318 Creek Ridge Road (36.0304°N, 79.8000°W) o Site C: Footbridge at North Buffalo Creek (36.0827°N, 79.8190°W) o Site D: Transmission Tower at North Buffalo Creek (36.0801°N, 79.8061°W)
Existing Improvements	■ Site A: Existing residential properties and wooded along the creek alignment ■ Site B: Existing concrete stream embankments ■ Site C: Existing pedestrian bridge/community park area, and heavily vegetated along the stream alignment and embankments ■ Site D: Open community park area with heavily vegetated/partially wooded areas along the stream alignment and embankments
Current Ground Cover	■ Grass-covered and heavily-vegetated areas along the stream embankments at all four of the project sites
Exploration Location Access	■ Site A: clearing / difficult access expected due to proximity to residential properties ■ Site B: no clearing or difficult access expected ■ Site C: Hand clearing expected along embankment for access ■ Site D: No clearing expected; however, offsetting exploration locations will be required due to overhead transmission

Planned Construction

Item	Description
Information Provided	■ From email and phone conversations with Andy Larrick at DMP ■ Email and phone conversations with Cindy Lancaster and Kris Bass ■ Jewell Engineering provided aerial plans detailing the requested boring locations with notations of the current streambank conditions at the four project sites ■ Terracon personnel visited each of the four locations to evaluate site access to properly scope our services for the project
Project Description	■ The project will consist of steam restoration and streambank stabilization at four sites located on sections of North Horsepen Creek, North Buffalo Creek, and Ryan Creek ■ Currently, the streambanks are heavily eroded with nearly vertical faces in some areas
Construction	■ We understand construction will likely consist of stabilizing the stream embankments and using native soils and vegetation to limit future erosion ■ We understand the design of these improvements will be performed by Jewell – LJB and Kris Bass Engineering
Grading/Slopes (assumed)	■ We expect cut and fill depths may be on the order of 10 feet in some areas

EXHIBIT B - SCOPE OF SERVICES

Our proposed Scope of Services consists of field exploration, laboratory testing, and engineering/project delivery. These services are described in the following sections.

Field Exploration

Jewell Engineering prescribed the following Exploration locations:

Number of Locations	Planned Exploration Depth (feet) [1, 2]	Planned Location
Site A (drilled borings): 3	15	North embankment
Site A (Wildcat DCP): 5	5 to 15	Streambed and southern Embankment
Site B (drilled borings): 3	15	Stream embankment
Site B (Wildcat DCP): 2	5	Streambed
Site C (drilled borings): 2	15	Stream embankment
Site C (Wildcat DCP): 2	5	Streambed
Site D (drilled borings): 3	15	Stream embankment
Site D (Wildcat DCP): 2	5	Streambed

1. Below ground surface
2. Locations will be advanced to the depths indicated unless auger refusal is encountered prior to reaching the planned depths indicated

Exploration Location Layout and Elevations: We will use handheld GPS equipment to position locations with an estimated horizontal accuracy of +/-15 feet. Field measurements from existing site features may also be utilized. If available, approximate elevations will be obtained by interpolation from a site specific, surveyed topographic map or the Guilford County GIS website.

Subsurface Exploration Procedures: We will advance drilled borings with track-mounted equipment in general accordance with local standard procedures for standard penetration tests (SPTs). Hand augers and Dynamic Cone Penetrometer (DCP) tests will be performed in areas not accessible with drilling equipment (streambed and unstable stream embankment areas).

During the drilled SPT, four samples are obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. Soil sampling is typically performed using split-barrel sampling procedures. In the split barrel sampling procedure, a standard 2-inch outer diameter split barrel sampling spoon is driven by a 140-pound automatic hammer falling 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. The samples are placed in

appropriate containers, taken to our soil laboratory for testing, and classified by a geotechnical engineer.

During the hand augers and DCPs, hand auger samples will be obtained at approximately 1-foot intervals coupled with DCP tests to help determine the approximate density / consistency of the in-place materials. Where hand augers and conventional DCPs are unable to be performed (below groundwater table / stream elevation) Wildcat DCPs will be performed. The Wildcat DCP will be continuously driven in 10 centimeter increments to help provide approximate density / consistency of the soils.

Our exploration team will prepare field logs as part of standard drilling operations including sampling depths, penetration distances, and other relevant sampling information. Field logs include visual classifications of materials encountered during drilling, and our interpretation of subsurface conditions between samples. Final boring logs, prepared from field logs, represent the Geotechnical Engineer's interpretation, and include modifications based on observations and laboratory tests.

Property Disturbance: We will backfill borings with soil upon completion. Our services do not include repair of the site beyond backfilling our boreholes. Excess auger cuttings will be dispersed in the general vicinity of each borehole. Because backfill material often settles below the surface after a period, we recommend periodically checking and backfilling boreholes, if necessary. We can provide this service, or grout the boreholes for additional fees, at your request.

Safety

Terracon is not aware of environmental concerns at this project site that would create health or safety hazards associated with our exploration program; thus, our Scope considers standard OSHA Level D Personal Protection Equipment (PPE) appropriate. Our Scope of Services does not include environmental site assessment services, but identification of unusual or unnatural materials encountered while drilling will be noted on our logs and discussed in our report.

Exploration efforts require advancing soundings/borings into the subsurface, therefore Terracon will comply with local regulations to request a utility location service through NC One-Call. We will consult with the Owner/Client regarding potential utilities, or other unmarked underground hazards. Based upon the results of this consultation, we will consider the need for alternative subsurface exploration methods, as the safety of our field crew is a priority.

We will contract the services of a private utility locator prior to mobilizing to the site. Terracon will not be responsible for damaging private utilities not disclosed to us. Terracon is providing this service to assist the Owner/Client. Fees associated with the additional services are included in our current Scope of Services. The detection of underground utilities is dependent upon the composition and construction of the utility line; some utilities are comprised of non-electrically conductive materials and may not be readily detected. The use of a private utility locate service

does not relieve the Owner of their responsibilities in identifying private underground utilities. Please contact us if additional planning and coordinating should be done before the utility locating is completed.

Site Access: Terracon must be granted access to the site by the Property Owner. By accepting this proposal, without information to the contrary, we consider this as authorization to access the property for conducting field exploration in accordance with the Scope of Services.

Laboratory Testing

The project engineer will review field data and assign laboratory tests to understand the engineering properties of various soil strata. Exact types and number of tests cannot be defined until completion of field work. The anticipated laboratory testing may include the following:

- Water content
- Atterberg limits
- Grain size analysis

Our laboratory testing program often includes examination of soil samples by an engineer. Based on the material's texture and plasticity, we will describe and classify soil samples in accordance with the Unified Soil Classification System (USCS).

Engineering and Project Delivery

Results of our field and laboratory programs will be evaluated by a professional engineer. The engineer will develop a geotechnical site characterization, perform the engineering calculations necessary to evaluate foundation alternatives, and develop appropriate geotechnical engineering design criteria for earth-related phases of the project.

Your project will be delivered using our ***GeoReport***® system. Upon initiation, we provide you and your design team the necessary link and password to access the website (if not previously registered). Each project includes a calendar to track the schedule, an interactive site map, a listing of team members, access to the project documents as they are uploaded to the site, and a collaboration portal. The typical delivery process includes the following:

- Project Planning – Proposal information, schedule and anticipated exploration plan will be posted for review and verification
- Site Characterization – Findings of the site exploration
- Geotechnical Engineering – Recommendations and geotechnical engineering report

When utilized, our collaboration portal documents communication, eliminating the need for long email threads. This collaborative effort allows prompt evaluation and discussion of options related to the design and associated benefits and risks of each option. With the ability to inform all parties as the work progresses, decisions and consensus can be reached faster. In some cases, only

minimal uploads and collaboration will be required, because options for design and construction are limited or unnecessary. This is typically the case for less-complex projects with no anomalies found at the site.

We will upload a printable version of our completed geotechnical engineering report, including the professional engineer's seal and signature, which documents our services when services are complete. Previous submittals, collaboration and the report are maintained in our system. This allows future reference and integration into subsequent aspects of our services as the project goes through final design and construction.

The geotechnical engineering report will provide the following:

- Boring logs with field and laboratory data
- Stratification based on visual soil classification
- Groundwater levels observed during and after the completion of drilling
- Site Location and Exploration Plans
- Subsurface exploration procedures
- Description of subsurface conditions
- Earth embankment and slope recommendations
- Subgrade preparation/earthwork recommendations

Additional Services

Clearing: Clearing services will be required in some areas, given the proposed boring locations and proximity to the existing stream embankments. We will utilize either machine or hand clearing methods to provide access for the drill rig and personnel for Site A (14 Spring Oak Court) and Site C (Footbridge at North Buffalo Creek). We anticipate up to 5 hours of clearing, based on our site visits and provided information.

Slope Stability Analyses: We have not included analyses for slope stability based on our understanding the geometry of the rehabilitated surfaces will not be available at the time of the final report. We can provide this service for an additional fee if requested. Please contact us for a separate proposal if global stability analyses is a consideration for the project.

EXHIBIT C - COMPENSATION AND PROJECT SCHEDULE

Compensation

Based upon our understanding of the site, the project as summarized in Exhibit A, and our planned Scope of Services outlined in Exhibit B, our base fee is shown in the following table:

Task – Subsurface Exploration, Utility Locate Services, Laboratory Testing, Geotechnical Consulting, and Reporting	Lump Sum Fee[1]
Site A: 14 Spring Oak Court (includes clearing)	$3,375
Site B: 318 Creek Ridge Road	$2,925
Site C: Footbridge at N Buffalo Creek (includes clearing)	$3,225
Site D: Transmission Tower at N Buffalo Creek	$2,925
Total Fee	**$12,450**

1. Please note the lump sum fee assumes sitework for all four locations can be performed during the same timeframe and reported under one cover. If sites are approved individually on separate dates and separate reports are requested, additional fees will apply due to additional mobilization and engineering costs.

Our Scope of Services does not include services associated with wet ground conditions or repair of/damage to existing landscape. If such services are desired by the Owner/Client, we should be notified so we can adjust our Scope of Services.

Unless instructed otherwise, we will submit our invoice(s) to the address shown at the beginning of this proposal. If conditions are encountered that require Scope of Services revisions and/or result in higher fees, we will contact you for approval, prior to initiating services. A supplemental proposal stating the modified Scope of Services as well as its effect on our fee will be prepared. We will not proceed without your authorization.

Project Schedule

We developed a schedule to complete the Scope of Services based upon our existing availability and understanding of your project schedule. However, this does not account for delays in field exploration beyond our control, such as weather conditions, permit delays, or lack of permission to access the proposed locations. In the event the schedule provided is inconsistent with your needs, please contact us so we may consider alternatives.

GeoReport® Delivery	Posting Date from Notice to Proceed [1, 2]
Project Planning	5 days
Site Characterization	30 days
Geotechnical Engineering	40 days

***GeoReport*® Delivery**	**Posting Date from Notice to Proceed** [1, 2]

2. Upon receipt of your notice to proceed we will activate the schedule component of our ***GeoReport*®** website with specific, anticipated calendar days for the three delivery points noted above as well as other pertinent events such as field exploration crews on-site, etc.
3. We will maintain a current calendar of activities within our ***GeoReport*®** website. In the event of a need to modify the schedule, the schedule will be updated to maintain a current awareness of our plans for delivery.

EXHIBIT D – SITE LOCATION

City of Greensboro – Stream Restoration ■ Greensboro, North Carolina

October 8, 2019 ■ Terracon Proposal No. PR75195202

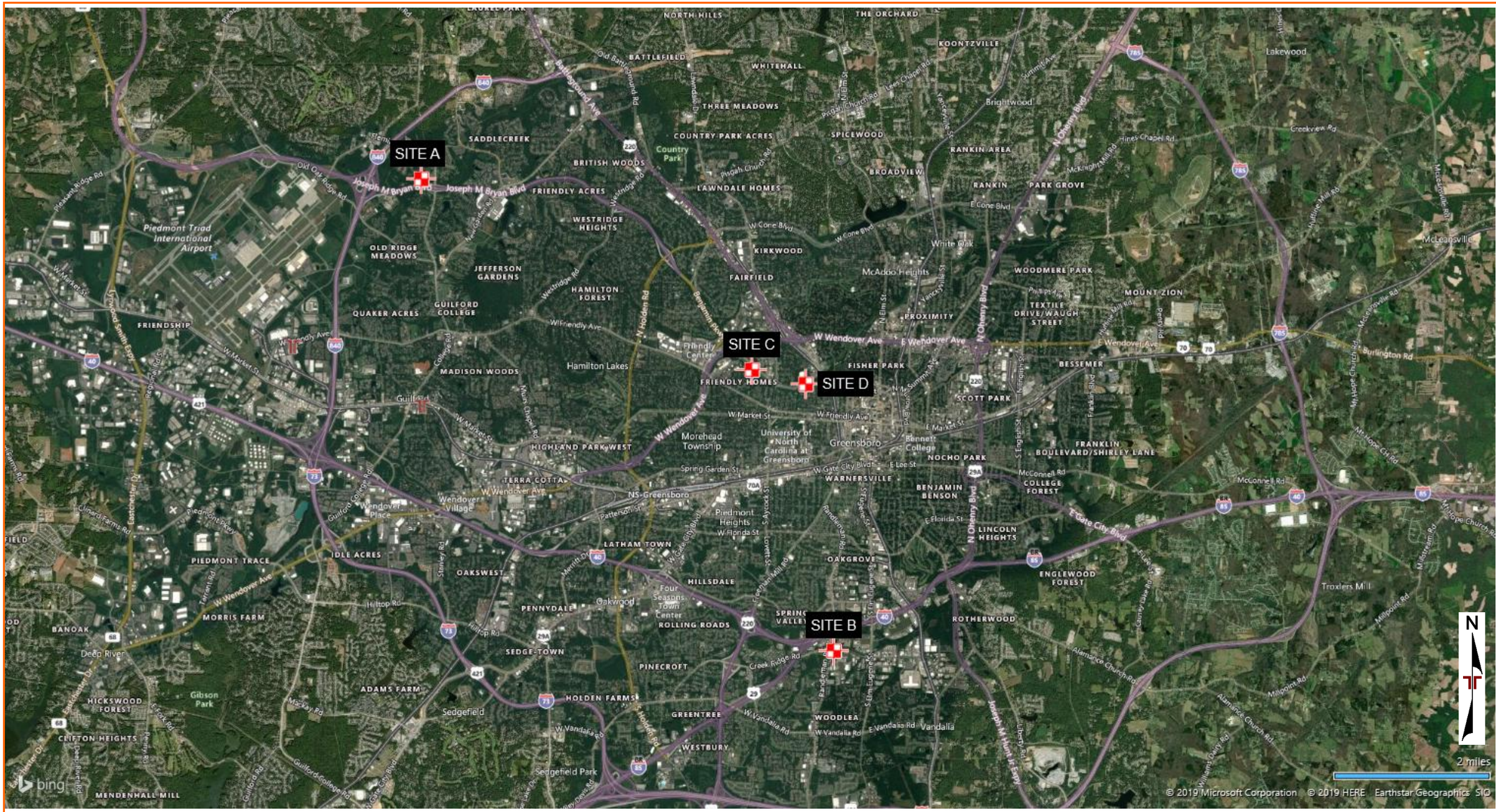


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

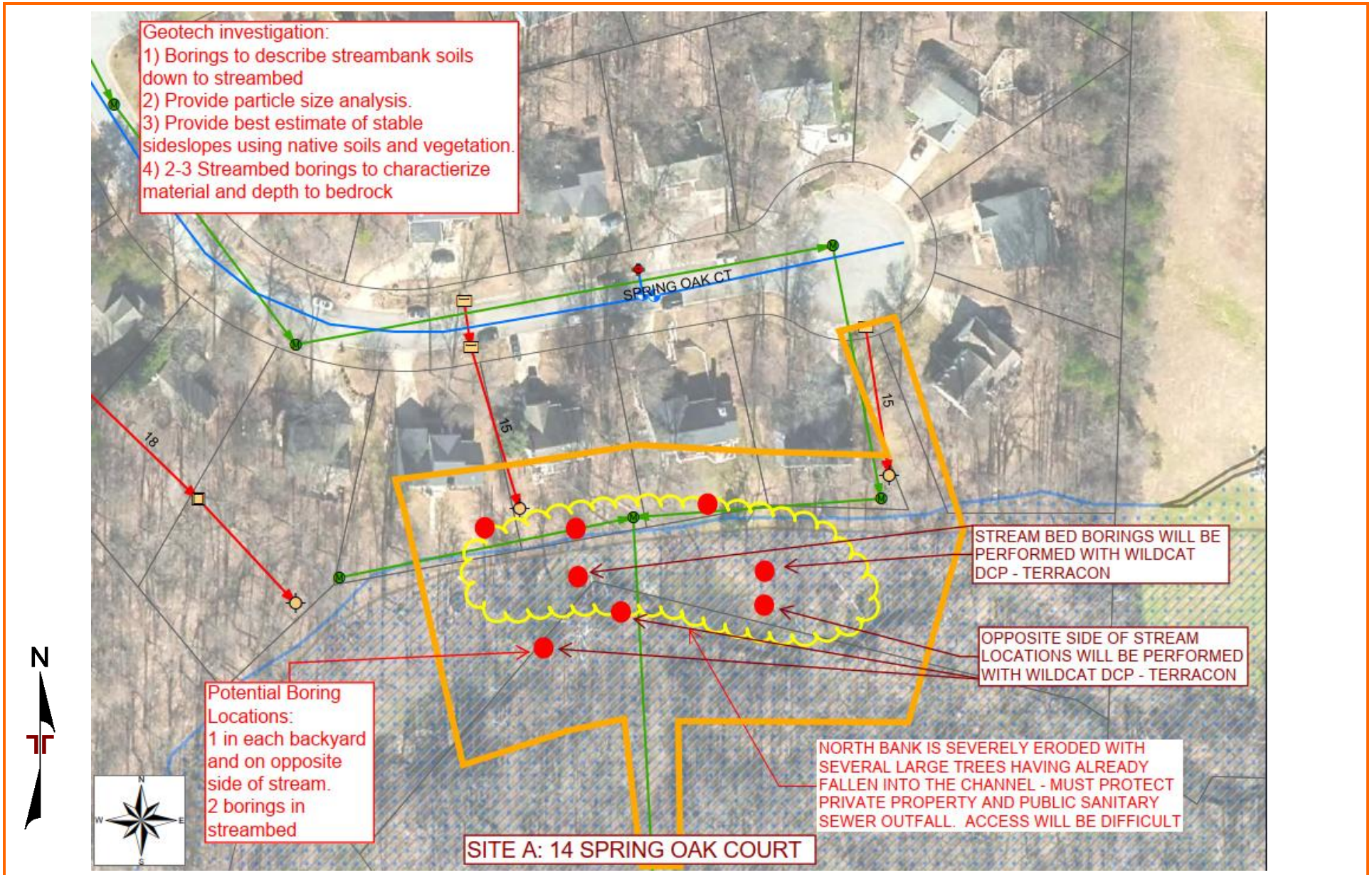


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

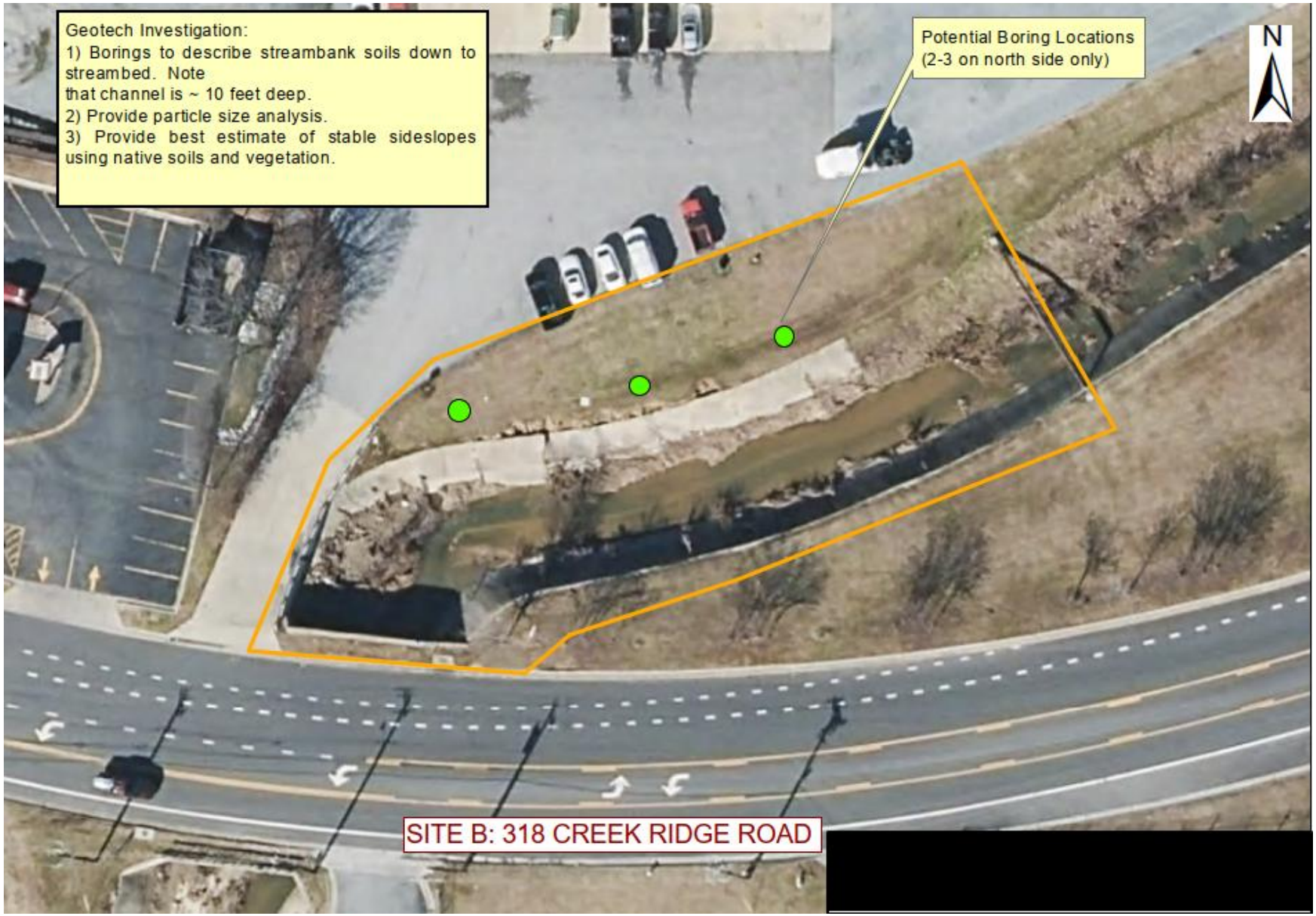
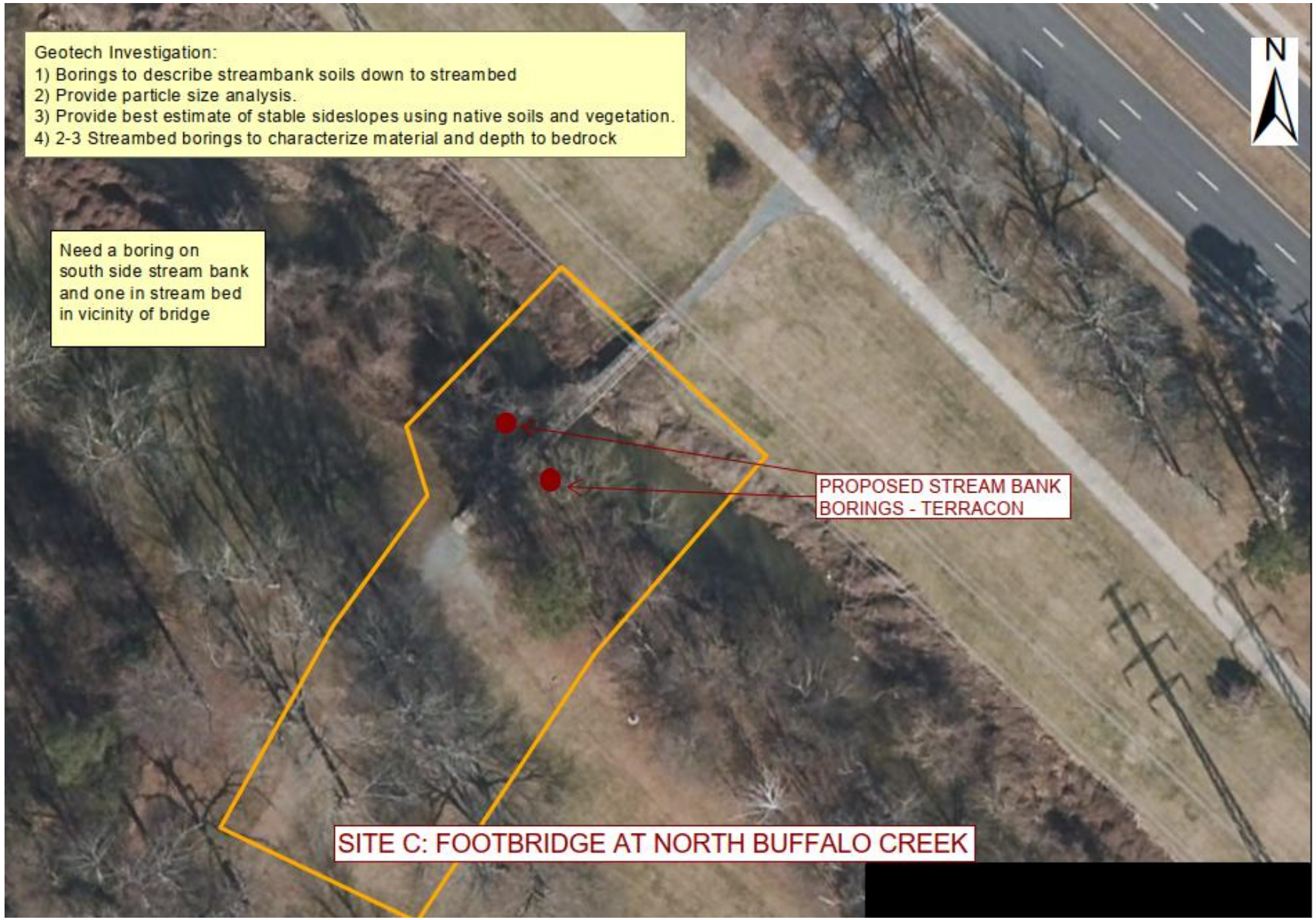


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS



N

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

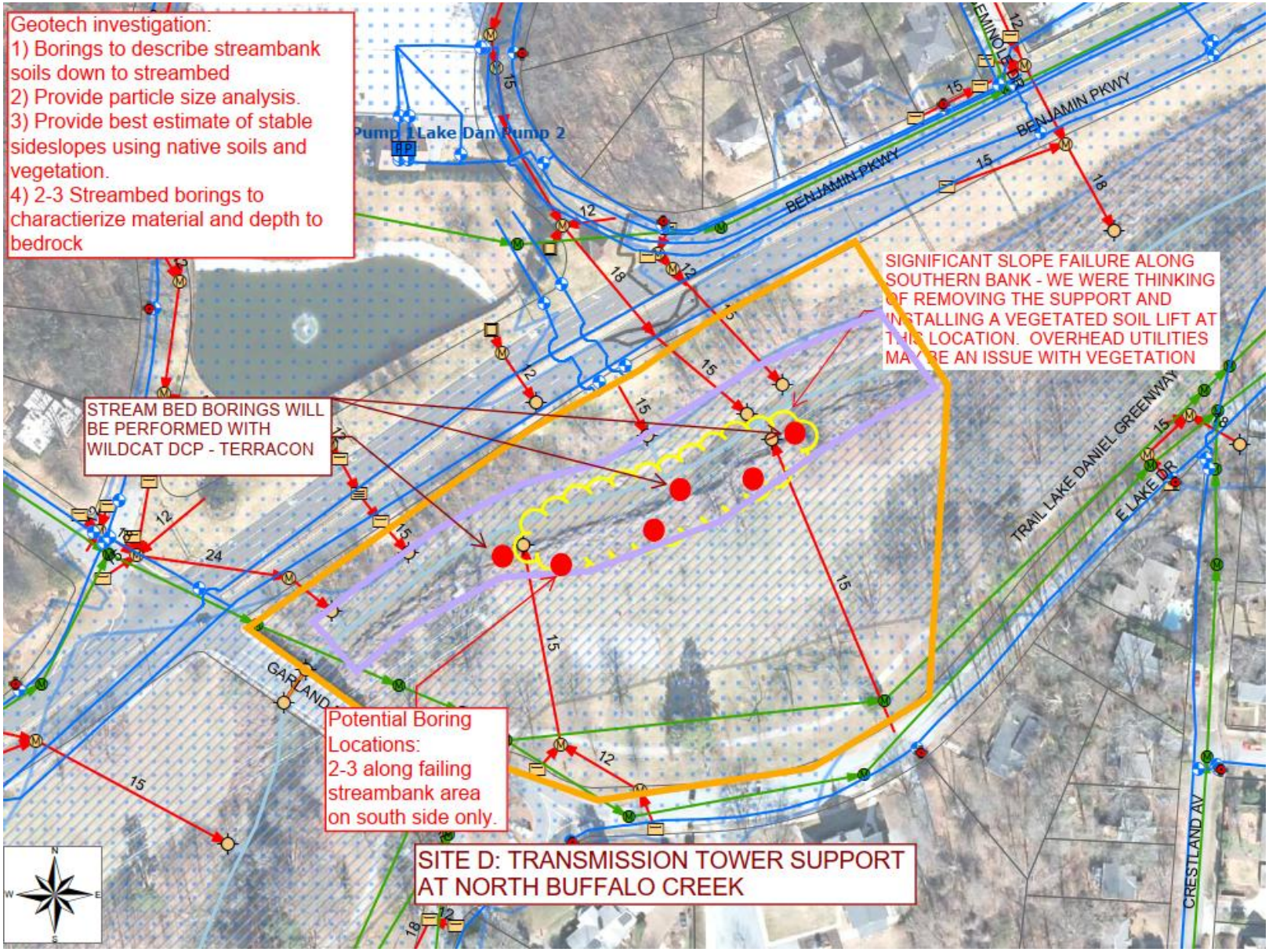


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS