HEADWATERS ENGINEERING

SCOPE OF WORK

Lamb Creek Stabilization at Brevard Greenway / Ecusta Trail

Norton Creek Stabilization at Silversteen Dr. and Aiken St.

Brevard, NC

September 21, 2026

Background:

This scope of work covers two sites, one on Norton Creek at the southeast corner of the intersection of Silversteen Drive and Aiken Street, and the other on Lamb Creek at the Brevard Greenway / Ecusta Trail crossing. Bank erosion at both sites is threatening infrastructure. The goal of the projects is to stabilize the eroding banks to promote long term stability and function while protecting adjacent infrastructure.

On Norton Creek, the left descending bank is unstable and an abandoned sanitary sewer line along the top of bank appears to be causing piping and loss of bank soil. The reach of Norton Creek measures about 100 linear feet (LF). On Lamb Creek, bank erosion and lateral channel migration has eroded soil from in front of the eastern abutment of the greenway bridge. The project reach extends from about 120 LF upstream of the bridge to about 50 LF downstream of the bridge.

Both sites are located within FEMA special flood hazard areas with defined floodways. The City of Brevard flood damage prevention ordinance requires that any grading within a floodway be studied in advance to determine if adverse flooding impacts would result. Both streams are also classified by the State of North Carolina as trout water, so both will require coordination with NC Department of Environmental Quality (DEQ) regarding trout buffer impacts.

Scope of Work

Task 1. Site Assessment

As a first step, Headwaters will gather publicly available aerial imagery and LiDAR topographic data. We will use these data to assemble base maps for both sites. We will also determine the watershed area contributing to the project reaches and estimate the bankfull discharges and channel areas based on regional hydraulic geometry relationships. We will then visit the sites to collect measurements on the creek dimension and profile and make observations of existing site constraints, including mature trees and structures. We will also make a photographic record of existing conditions.

Task 2. Design

Data and results from Task 1 will inform the design process. The design goal is to develop bank stabilization plans that support long-term stability and protect adjacent land and infrastructure. We use a natural channel design approach that anticipates channel evolution and makes use of natural materials such as stone, wood and native plants.

Headwaters will present the preliminary designs on half size plan sets (one for each site) that will include:

- Plan sheet showing:
  - Existing topography and other site features relevant to design and construction;
  - Proposed bank grading limits, in-stream structures, and bioengineering measures; and
  - Profile adjustments as appropriate to support project goals.
- Details for:
  - In-stream structures;
  - Bioengineering practices;
  - Erosion control measures and practices;
  - Planting, live staking and seeding details and species lists; and
  - Typical creek cross sections.
- Construction quantities and a bid item list.

We will share the preliminary plans with the City to solicit feedback. We will address comments and incorporate feedback into the final designs as appropriate. The final designs will be presented in separate sealed plan sets and bid item lists as described above. Design and plan preparation will be performed by a North Carolina Professional Engineer. Plans will be delivered in digital (pdf) format.

We note that structural evaluation of the existing greenway bridge abutment and design of repairs or retrofits is beyond this scope of work.

Task 3. Permitting

404/401:

We are assuming coverage will be available under Nationwide Permit (NWP) 13 from the US Army Corps of Engineers and Water Quality Certification (WQC) 8568 from the NC Division of Water Resources. The length of the projects and the trout water classification require submittal of a Pre-Construction Notification (PCN). Headwaters will prepare a single PCN for both sites, which will include a summary of the proposed work, supporting data and calculations, and preliminary plans.

Floodplain:

The floodplain permitting task will include the following for both sites:

- Obtain the effective computer model and flood mapping for the study reach;
- Reference the base map from Task 1 and update the effective model as needed to reflect current conditions, including the presence of the greenway bridge on Lamb Creek;
- Model the proposed bank stabilization work and evaluate its effects on flooding relative to the effective model; and
- If modeling indicates no adverse flooding impacts, complete a no-rise certification, summarize findings in an engineering report, and assist with preparation of a floodplain development permit application.

We will prepare a separate report for each site. Effort required to develop and submit a Conditional Letter of Map Revision application (in the event that a no-rise result is not achievable) is not included in this scope of work for either site, but the designs will seek to achieve no-rise results.

Trout Buffer:
DEQ regulates work within buffers along trout waters. We will prepare a single trout buffer waiver request to DEQ, which will include a summary of proposed buffer impacts at both sites, a description of proposed erosion and sedimentation control measures, and copies of the preliminary plans.

Task 4: Construction Support Services

Headwaters typically provides the following construction support services:

- Soliciting bids from experienced stream restoration contractors and assisting with pre-bid meetings, bid reviews and contract award recommendations;
- Convening a pre-construction meeting with the selected construction crew to review the plans and design intent;
- Part-time field observation to check conformance with the design;
- Photographic and written documentation of construction activities; and
- Preparation of as-built redline plans.

For budgeting purposes, we have assumed the following:

- At Norton Creek: bid phase support; a pre-construction meeting; one half day site visit during construction; and a second site visit to document as-built conditions.
- At Lamb Creek: bid phase support; a pre-construction meeting; two half-day site visits during construction and a third site visit to document as-built conditions

Fee and Schedule

Based on the scope of work described herein, the estimated fee and delivery schedule (weeks from notice to proceed) for our services will be as indicated in the following table.

Task	Estimated Fee	Target Completion Date (Weeks from NTP)
1. Site Assessment	$2,500	3
2. Design	$6,000	6
3. Permitting Submittals	$7,000	10
4. Construction Support	$7,000	TBD
Total	$22,500	

We will bill hourly plus reimbursable expenses and will not exceed the estimated fees without prior approval. The fee estimate includes the $810 permit fee that DWR charges for review of the PCN.