



Grant Application

Applicant Information				
Applicant Name:				
Mailing Address:				
City, State and Zip:			County:	
Utility Service Population:		<input type="checkbox"/> Check here if applicant is submitting on behalf of a not-for-profit water/sewer company or other eligible entity. Name: _____		
30,000 or more	3,301 - 10,000			
10,001 - 29,999	3,300 or fewer			
NPDES Permit Number:	<input type="checkbox"/> N/A	PWS ID Number:	<input type="checkbox"/> N/A	
Regional Project Participants:				<input type="checkbox"/> N/A
Project Description:				
Project Title:				
Project Summary: <i>(2-3 sentences)</i>				
Grant Category:		Type of Project:		Project Benefit:
<input type="checkbox"/> Community Impact <input type="checkbox"/> Regional Solutions <input type="checkbox"/> Viability Planning		<i>Check all that apply:</i> <input type="checkbox"/> Water <input type="checkbox"/> Stormwater <input type="checkbox"/> Sewer <input type="checkbox"/> Planning		Number of customers/taps directly served by project: Residential: _____ * Business: _____
Funding Request & Budget Summary				<i>A detailed estimate of all costs must be attached.</i>
Source	Construction Costs*	Non-Construction Costs	Total	% of Total**
SCIIP Funds Requested:				
RIA State Funds Requested: <i>Service pop ≤10K or Tier III/IV</i>			Total Local Investment Dollars:	Total Local Investment Percentage:
Other: _____				
Other: _____				
Local Funds:	#	%		
Total Project Funding:				
* Include a 25% construction contingency allowance ** SCIIP local investment requirements (the minimum percentage of project costs that must be provided by non-SCIIP funds): Community Impact Large Systems (≥30,000 service pop.): 25% of project costs Small Systems (<30,000 service pop.) or those in Tier III/IV Counties: 15% of project costs Regional Solutions: 15% Viability Planning: None				



Project Schedule & Readiness

Milestone	Expected/Actual Completion		
Final Design	Date: _____ <input type="checkbox"/> N/A	Permits required (list types):	^
Permits Acquired	Date: _____ <input type="checkbox"/> N/A		
Acquisition	Date: _____ <input type="checkbox"/> N/A	# of easements/parcels needed:	\$
Advertise for Bids	Date: _____ <input type="checkbox"/> N/A	# of contracts planned:	+
Start of Work	Date: _____ <input type="checkbox"/> N/A	<i>Federal final expenditure deadline is December 2026</i>	
Completion of Work	Date: _____ <input type="checkbox"/> N/A		

Contact Information

	Name	Title	Phone	Email Address
Chief Elected or Administrative Official:				
Local Project Contact:				
Local Financial Contact:				
Engineer/Consultant:				

Certification

As the Chief Executive Official for the applicant, I certify that the information in this request and the attachments is complete and correct and that the applicant has authorized submission of this request for the SC Infrastructure Investment Program, which is funded through State Fiscal Recovery Funds allocated to the State of South Carolina and authorized by the American Rescue Plan Act, to assist in carrying out the project described herein. Further, I acknowledge that the herein described project will meet an eligible use of these funds as defined by U.S. Treasury's State and Local Fiscal Recovery Funds program guidelines, and that if awarded this project will comply with all applicable federal, state, and local regulations and laws.

Name of Chief Executive Official (Elected or Administrative)		Title	
Signature*		Date	

** Please save this completed form for electronic submission prior to signing. Do NOT submit a scanned version. The printed form with original, pen-and-ink signature must be mailed or delivered as detailed on page 6.*

Please see the following pages for **required attachments** and **application submission instructions**.

Applications must be received by 5:00 pm on September 12, 2022.

ATTACHMENTS FOR CAPITAL IMPROVEMENT PROJECTS (Community Impact & Regional Solutions Grants)

ATTACHMENT 1: APPLICATION NARRATIVE

Attach a brief narrative about the project that addresses each of the topics indicated.

A. NEED

Explain the need for this project including:

- a summary of the current condition, capacity and deficiencies of existing facilities
- the frequency and severity of the problem

B. PROJECT DESCRIPTION

Provide a detailed description of the project, including all activities regardless of funding source

C. FEASIBILITY

- Identify how the project will cost-effectively solve the problem or improve conditions including consideration of two other alternatives.
- Explain how the project will be carried out to meet the December 2026 federal expenditure deadline, including any anticipated problems or delays
- Provide specific plans for preparing for and dealing with cost overruns
- **For systems serving up to 10,000 people or those in Tier III/IV counties that are requesting up to \$500,000 in RIA state grant funds to supplement local investment,** provide rationale for the need and impact of requesting these funds
- Describe any interest in implementation of a “dig once” plan for incorporation of broadband conduit during project construction. Such projects will be referred to the Office of Regulatory Staff for possible coordination and funding.

D. BENEFITS/IMPACT

- Explain how the project will make a transformative impact on the community and address one or more of the following priorities:

Community Impact Grants

1. Regional Solutions
projects that implement solutions that impact multiple systems
2. Water Quality
projects that address consent orders, violations, or other public health or environmental impacts
3. Resilience and Storm Protection
projects that help utilities prepare for emergencies
4. Other Aging Infrastructure
projects that upgrade or replace infrastructure that has exceeded its useful life
5. Capacity
projects that improve service for existing residents while preparing for future opportunities

Regional Solutions Grants

1. The project results in a consolidation or operating agreement with at least one small system with viability concerns
2. The project results in an expanded partnership agreement with at least one small system with viability concerns
3. The project results in a consolidation or operating agreement with other systems

- Include any additional information that should be considered in evaluating the proposed project.

Required attachments for capital improvement projects are CONTINUED on the next page.

CAPITAL IMPROVEMENT PROJECTS – Community Impact & Regional Solutions Grants

ATTACHMENTS FOR CAPITAL IMPROVEMENT PROJECTS (Community Impact & Regional Solutions Grants) *cont'd*

ATTACHMENT 2: PRELIMINARY ENGINEERING COST ESTIMATE

- A detailed, itemized cost estimate for both construction and other costs, prepared within the past year.
- A 25% construction contingency should be included as a separate line item.
- A PER may be attached but is NOT required.

ATTACHMENT 3: PROJECT LOCATION AND SERVICE AREA MAPS

One or more maps showing the system service area as well as location, size and/or capacity of existing and proposed infrastructure within the project service area. Identify census tracts for the proposed infrastructure. Use symbols and color-coding to identify activities.

ATTACHMENT 4: FUNDING AND OTHER COMMITMENTS

- Commitments of all non-RIA funds required to implement the project:
 - For local funds, a letter of commitment (with original signature) from the chief elected or administrative official. The letter should identify the source of the funds (e.g., general fund or enterprise fund) and when the funds will be available.
 - For other sources, a copy of the award letter or other documentation from the agency that includes the amount of funds awarded.
- Certification of public ownership for all necessary easements/rights-of-way or other real property already acquired for this project.
- If the applicant proposes improving infrastructure that it does not own, include a letter from the system owner describing the partnership between the two entities and granting permission for the applicant to carry out the project.

ATTACHMENT 5: VIABILITY SELF-ASSESSMENT FOR RIA STATE GRANT REQUESTS

Utilities serving 10,000 people or less OR located in Tier III/IV counties may request RIA state grant funds up to \$500,000 to supplement the local investment requirement. Those applicants must download and complete the Utility Viability Tool and submit the Results Summary as part of this application. Other applicants may **choose** to complete the tool and submit the results to document need.

The Utility Viability Tool can be downloaded at ria.sc.gov/utility-viability/.

ADDITIONAL ATTACHMENTS

Include any other relevant documentation that supports the application narrative. Examples may include:

- Sanitary surveys or compliance inspections to document existing issues
- Notice of violations, consent orders, or corrective action plans related to the project
- Test results, customer complaints, repair logs, photos, etc. documenting the problem to be addressed

ATTACHMENTS FOR VIABILITY PLANNING PROJECTS

ATTACHMENT 1: APPLICATION NARRATIVE

Attach a brief narrative about the project that addresses each of the topics indicated.

A. NEED

Explain the need for this project including:

- Specific technical, financial and managerial challenges faced by the applicant
- Steps that have been taken to strengthen viability

B. PROJECT DESCRIPTION

Provide a detailed description of all proposed planning activities regardless of funding source

C. FEASIBILITY

- Identify how the planning activities will cost-effectively address the challenges identified
- Explain how the planning activities will be carried out to meet the December 2026 federal expenditure deadline, including any anticipated problems or delays
- Provide specific plans for preparing for and dealing with cost overruns

D. BENEFITS/IMPACT

- Describe how the outcome of the planning activities will be used to support long-term viability, including plans for the implementation of any recommendations
- Include any additional information that should be considered in evaluating the proposed project

ATTACHMENT 2: DETAILED COST ESTIMATE

A detailed, itemized cost estimate for all proposed activities, prepared within the past year

ATTACHMENT 3: SERVICE AREA MAPS

County or municipal road/street maps identifying the applicant’s service area including the census tracts

ATTACHMENT 4: FUNDING AND OTHER COMMITMENTS

- Commitments of all non-RIA funds required to implement the project:
 - For local funds, a letter of commitment (with original signature) from the chief elected or administrative official. The letter should identify the source of the funds (e.g., general fund or enterprise fund) and when the funds will be available.
 - For other sources, a copy of the award letter or other documentation from the agency that includes the amount of funds awarded.

ADDITIONAL ATTACHMENTS

Include any other relevant documentation that supports the application narrative. Examples include:

- Sanitary surveys, compliance inspections, or other documentation of regulatory issues
- Documentation of system challenges such as financial statements or the results summary from the Utility Viability Tool which can be downloaded at ria.sc.gov/utility-viability/.

VIABILITY PLANNING PROJECTS


To ensure the proposed project complies with program guidelines (including eligibility, local investment and budget/cost feasibility), please review the [SCIIP Program Strategy](#) before completing the application.

Submission Instructions		
Applications must be submitted both electronically and in hard copy. Please carefully review the required submissions:		
<p>1. 2 hard copies of the signed application and attachments:</p> <ul style="list-style-type: none"> a. One original version with original, pen-and-ink signatures on the application certification and any local funding commitment letters b. One duplicate copy of the full application (all attachments included) <p>AND</p> <p>2. Required electronic files (2 separate PDFs):</p> <ul style="list-style-type: none"> a. The PDF of the application form, completed but unsigned and saved in its original format (NOT printed and scanned) b. A single PDF of all attachments, in the requested order 	<p><i>Hard copies may be mailed or hand-delivered but must be received by 5:00 p.m. on September 12, 2022.</i></p>	
	<p><i>Electronic files may be emailed to info@ria.sc.gov or sent on a flash drive with the hard copies.</i></p>	
Mailing Address	Delivery Address	Email Address
SC Rural Infrastructure Authority 1201 Main Street, Suite 1600 Columbia, SC 29201	SC Rural Infrastructure Authority 1201 Main Street, Suite 1740 Columbia, SC 29201	info@ria.sc.gov

All application submissions (both hard copies and electronic files) must be RECEIVED by 5:00 p.m. on September 12, 2022.

Please contact RIA staff with any questions about application requirements or submission procedures.

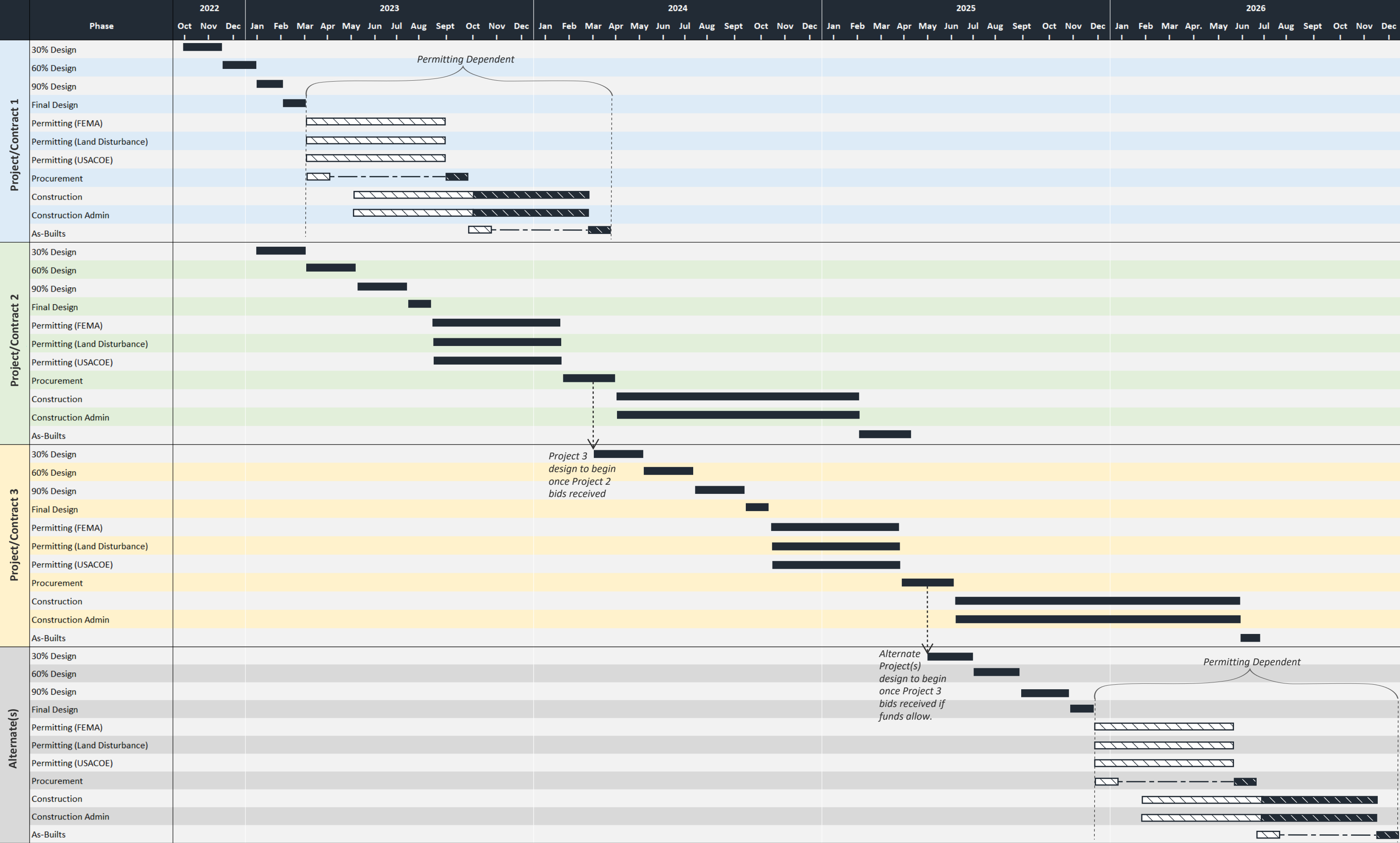
803-737-0390
info@ria.sc.gov



Grant Application Footnotes

- * *County Population was used for the service area of this project. Specific population for each proposed project can be found in project and alternate service area maps found in Attachment 3.*
- # *Included breakdown of Construction Local Funds are subject to change, but will likely only increase. The total and percent contribution of Local funds will remain the same.*
- % *Included breakdown of Non-Construction Local Funds are subject to change, but will likely only decrease (to fund additional construction costs). The total and percent contribution of Local funds will remain the same.*
- ^ *The types of permits required will depend on the project, but may include FEMA Letter of Map Revision(s), USACOE (NWP 3, 13, 29, etc.), and SCDHEC Land Disturbance Permit,*
- \$ *The number of easements/parcels required for this submittal varies by project (of which there are 3 and 6 alternates). Greenville County is working to have establish right-of-ways (ROW), and if necessary, acquire land. Should ROW or land acquisition efforts fail, all included alternate projects are on Greenville County Property.*
- + *The number of contracts for the proposed projects will be 3 unless funds remain to cover alternate projects discussed in this submittal. Please refer to the Preliminary project Schedule on the next page for more information.*

Preliminary Project Schedule



Phase Underway
 Phase Underway (Estimated Earliest)
 Phase Underway (Estimated Latest)
 Phase Underway (Estimated Range)

ATTACHMENT 1: APPLICATION NARRATIVE



Figure 0.1 – Eroding bank in the Long Branch Watershed.

A. OVERALL PROJECT NEED & DESCRIPTION

The Reedy River watershed is a headwater watershed that starts north of the City of Greenville in Travelers Rest and flows south to Lake Greenwood. Water from the watershed is used as a potable water supply in the Laurens County area and for multiple intakes downstream (Lake Murray, Congaree, etc.). This waterway has a storied history of modification and abuse. It is thought that at one point, nearly the entire watershed was cotton fields and eventually this transitioned to a textile mill town. These mills and others would use the Reedy River to discard untreated process water, debris, garbage, and sanitary sewage. At some point, the river earned the moniker of the *Rainbow Reedy*, because it would change colors every day depending on the color dye being used in the mills that day. A more detailed timeline of the Reedy River watershed is available at <https://www.friendsofthereedyriver.org/river-history>. Today, the Reedy River no longer changes colors and industrial discharges are regulated, but there are still other pollutants of concern. Aside from historical waste streams and legacy chemicals, the most pressing pollutants are Total Nitrogen (TN), Total Phosphorous (TP), and Total Suspended Solids (TSS). These nutrients and solids, when present in high enough amounts become pollutants, and can result in harmful algal blooms (HABs), fish kills, and can even make water contact unsafe for people and pets. In 1999, it happened: an algae bloom occurred in the Reedy River arm of Lake Greenwood. Since then, local stakeholders, regulators, and other entities have made great strides and have been working to prevent this from occurring again (see an example of their progress Figure 0.2 below). The requested investment from RIA will help ensure this goal is attained. To date, the Reedy River is one of only three watersheds in the state to have a nutrient impairment.

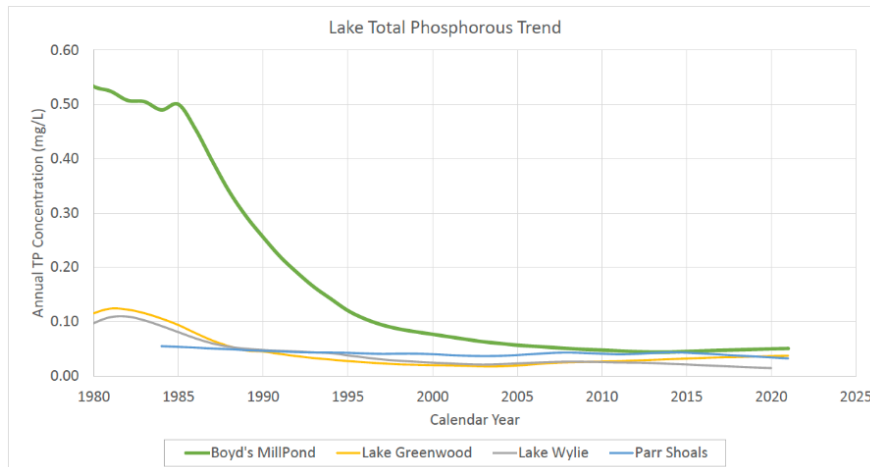


Figure 0.2 – Total phosphorous (TP) trend over time in the Reedy River (measured at Boyd’s Millpond) and other upstate lakes.

In 2013, a proposed Total Maximum Daily Load (TMDL) for nutrients was discontinued to allow for a stakeholder-led process of over 30 entities to guide improvements in the watershed. This initiative has led to the ongoing development of an EPA 5R Watershed Plan (see additional information in Attachment 5). The goal of this process is to create a plan that will result in the decrease of nutrients to acceptable levels and to monitor its progress. One

great example of this progress can be found in the Reedy River Report Cards, with the most recent update found at <http://reedyreportcard.org/>. Target pollutants include TN, TP, and TSS. Additionally, the Reedy River was recently found to be impaired for bacteria and a bacteria TMDL has been proposed for the watershed in the most recent 303(d) Impaired Waters List released from the South Carolina Department of Health and Environmental Control (SCDHEC) in June. Therefore, bacteria load reduction is also of importance.

A broadscale, regional effort is required to achieve the desired improvement, and the methods and best management practices (BMPs) proposed herein will mix prevention, detention, treatment, infiltration techniques with improved education and community access. A mixture of several thousand feet of stream restoration and trails¹, regenerative stormwater conveyances, bioretention cells, enhanced bioswales, and stormwater water wetlands are proposed in the following application. Each project has been carefully considered and vetted to optimize the reduction of pollutants and other benefits relative to costs.

This effort encompasses all five of the section priorities identified by the RIA:

- 1) **Regional Solutions** – Greenville County is one of 30 regional stakeholders in the Reedy River Water Quality Group (RRWQG) and the 5R process, which has been developed *specifically* to improve water quality in the Reedy. Eight of nine projects (three projects and six alternates) outlined below are within the Reedy River watershed (only one alternate is outside the Reedy River watershed), and Projects 1-3 and nearly all alternate projects occur upstream of other major stakeholders (Renewable Water Resources and the City of Greenville).
- 2) **Water Quality** – The primary goal of the proposed projects is to remove pollutants and pollutant sources from the watershed. With many public parks located adjacent to the Reedy River and the Swamp Rabbit Trail meandering along the river corridor, local citizens are given direct access to the waterway. These proposed projects are highly important to reduce existing environmental impacts from degraded streams and to ensure public health during recreational activities. Public health benefits extend downstream as improved source water used for potable water supply.
- 3) **Resilience and Storm Protection** – On all proposed projects, flood storage will increase, peak flows will be reduced, and flooding will be lessened in certain areas as the County leverages previous flood buy-out properties.
- 4) **Modernization of Aging Infrastructure** – In the past, urban streams were viewed solely as a means to quickly drain storm water runoff and to reduce the risk of potential floodwaters. Drainage channels and the streams themselves were often straightened and excavated with this single goal in mind. One unintended consequence of this prior engineered approach was poorly stabilized channel banks that resulted in significant erosion (that often impacted roadway crossings and adjacent utilities) and the loss of water quality benefits provided by native vegetation. The County and other water resources practitioners now recognize the importance of stable, natural channel banks for water quality and ecology within the stream corridor. The proposed stream restoration projects bring a modernized approach and new recognition of this important local, yet natural community infrastructure for both flood control and water quality.
- 5) **Capacity Development and Economic Opportunities** – The primary projects are intended to be leveraged for increased community impact through the expansion of the County’s existing trail system (known as the Swamp Rabbit Trail) and will be done so in some of the poorest urban communities. The expansion of the trail into these neighborhoods provides better, safe pedestrian access to other areas, and can be an economic boon to the areas near these trail extensions by providing expanded recreational and soft mobility² opportunities.

Should the Rural Infrastructure Authority decide to fund these projects, the County and its partners can take a large step towards appreciably improving water quality, storm resilience, public access, and citizen engagement with its most impaired waterway.

¹ Trails will be funded by the Greenville County and are separate from this proposal.

² **Soft Mobility** – Environmentally friendly forms of transportation that are more accessible and beneficial residents that generally result higher quality of living. This is a priority for the County, which is also expanding its e-bike subscription program, further increasing mobility. (For more information see reference: Montgomery, 2013)

B. OVERALL PROJECT DESCRIPTION & FEASIBILITY

The proposed *All Trails Lead to Reedy River Water Quality* project package is a series of projects lumped together by a common primary goal: to improve water quality within the Reedy River watershed. The projects occur on a mix of municipal, non-governmental organization (NGO), and private lands along streams (that will have easements established or will be outright purchased) that feed the Reedy River. These efforts are projected to:

1. Improve Water Quality *via increased density of native plants selected for nutrient uptake*
2. Prevent Erosion *by improving stream form and function (See Attachment 8)*
3. Mitigate Flooding Impacts *by increasing capacity and securing easements in flood zones*
4. Protect Utilities *by creating resilient³ stream corridors and decreasing the number of emergency repairs required.*
5. Improve Public Access and Mobility *by securing easements for an expanded trail system*
6. Increase Awareness *through educational kiosks and increased visibility of waterways*

From a feasibility standpoint, the proposed practices utilize existing water conveyances to move, treat, and infiltrate stormwater and can be modeled to show their direct annual reductions for TN, TP, TSS, water volume, and bacteria. For the proposed stream enhancements, the benefits are much more difficult to directly quantify; however, there is a substantial body of work that estimate its benefits. One study in in the nearby Piedmont region of Georgia⁴ found that “60% of the suspended sediment in streams originated from eroding banks,” and with it the nutrients bound to those sediments. By reducing the slopes of channel banks and stabilizing unvegetated material, sources of the target pollutants would substantially decrease. *This study is further affirmed by others⁵ who found that bank stabilization could remove as much as 3,100 pounds of phosphorous per year per mile of stream and that riparian restoration, hyporheic connection, and floodplain reconnection could remove as much as 5,000 pounds of nitrogen per year per mile of stream.* Additionally, by adding high density, deep rooted, native species of plants, the exchange of water between groundwater and surface water (hyporheic connection) is improved, which additionally encourages nutrient reduction through denitrification and direct nutrient uptake through increases in plant biomass along the stream and in the riparian area.

The County is not new to the concept of stream restoration. **In 2020, Greenville County won the SC APWA Project of the year for its restoration of Brushy Creek.** This extremely successful project not only demonstrated the benefits of stream restoration but did so through cooperation with private landowners and cost sharing with Renewable Water Resources and the City of Greenville. What was once a degraded and incising stream reach, overrun with invasive vegetation, with erosion that was endangering bordering infrastructure, is now a fully functional stream reach. The stream is well-vegetated and no longer eroding and contributing nutrients to the watershed or endangering infrastructure. It is an attractive and naturalized stream corridor that supports wildlife with greater abundance and resists damage from flooding and climate change more effectively. Pictured in Figure 0.3 is a portion of the Brushy Creek restoration project three years after completion. For a more complete picture of the project, please consider watching a video of the project found at <https://cleanreedy.org/sbrvideo/>, which was produced by the County at the completion of the project.

³ Green infrastructure that utilizes vegetation is perhaps the most resilient type of infrastructure because it’s alive. It can heal itself as root systems grow denser over time.

⁴ Mukundan et al.: Sediment Fingerprinting in the Southern Piedmont

⁵ Lammers, R.W. and Brian P. Bledsoe: What role does stream restoration play in nutrient management?



Figure 0.3 - Photograph of a 3-year-old stream improvement project along Brushy Creek in the Reedy River watershed.

Traditional drainage project grant applications for the South Carolina Infrastructure Investment Program (SCIIP) may find challenges in securing contractors and materials, both due to the influx in demand, as well as continuing supply chain issues. The nature of stream stabilization projects means that very few pipes, control structures and other materials are needed, and even when they are, the materials are amenable and can be modified to accommodate a shifting landscape of seemingly continual supply chain shortages. Rock, sand, soil, plants, and matting are all readily available and are local materials that have not been largely impacted by supply chain issues. *This fact likely makes the projects contained herein among the most feasible submitted to the RIA in terms of material acquisition and project deadlines.*

Earlier this year, the County conducted a community-wide watershed prioritization effort to identify those watersheds with the greatest of water quality needs. The prioritization considered regulatory concerns from SCDHEC, impervious and agricultural land cover, highly sensitive waters, recent water quality data, and source water using for consumption. Informed by this watershed-scale prioritization process, three proposed projects and six alternates are discussed in greater detail in the following sections.

Project 1: Stormwater Wetland at Hampton Avenue

NEED:

This 12-acre watershed drains to a series of outfalls that combine to discharge directly to the Reedy River. The watershed is comprised of industrial, commercial, and high-density mill homes that were built nearly a century ago with no stormwater controls in place. Adding detention and some form of water quality treatment would help to mitigate flooding impacts downstream and decrease nutrient and bacteria loading to the Reedy.

PROJECT DESCRIPTION:

A half-acre stormwater wetland (SWW) is proposed on this site. The SWW would be located on land owned by Duke Power where there is an existing Greenville County lease agreement for the greenway. The SWW would lie between the greenway and the river in an otherwise unusable piece of property between two sewer rights-of-way (ROW) and along a Duke powerline easement. The current ditch conveyance will be made larger by excavating the material around it to make a shallow depression and a new, longer channel, with deep pools and a low, vegetated bench. This design will not only help ensure no material is eroded from the BMP by dissipating storm flow energy over a wider area, but this increased contact area will also aid in nutrient removal and retention time. As a result, the Reedy River will receive cleaner, polished water from this watershed and a dampened hydrograph.



Figure 1.1 - Map of proposed area and stormwater wetland.

Table 1.1 – Project 1 cost estimate including 25% required contingency. This project could come in as low as \$315K, including the 25% contingency.

ITEM	TYPE	QTY	UNIT ESTIMATE	BID ESTIMATE
Mobilization	LS	1	\$28,385.51	\$28,385.51
Sediment and Erosion Control	AC	1.05	\$7,232.00	\$7,593.60
Clearing and Grubbing	AC	1.05	\$10,200.00	\$10,710.00
As-Builts	AC	1.05	\$4,800.00	\$5,040.00
Large Tree Removal	EA	20	\$1,871.04	\$37,420.85
Vegetation Management	AC	1.05	\$2,480.00	\$2,604.00
Excavate/Haul	CY	1,869	\$63.48	\$118,644.12
Excavate/Move	CY	110	\$41.92	\$4,610.65
TRM or ECB Matting	SY	1,271	\$39.95	\$50,756.48
Boulders	CY	11	\$235.86	\$2,594.46
Riprap Apron / Level spreader 1	CY	23	\$156.86	\$3,607.78
Riprap Apron / Level Spreader 2	CY	17	\$156.86	\$2,666.62
Riprap Apron / Level Spreader 3	CY	14	\$156.86	\$2,196.04
24" CMP Culvert Replacements (RCP or HDPE)	LF	42	\$211.00	\$8,862.00
Outfall Structure	EA	1	\$3,744.92	\$3,744.92
Native Plant Plugs	EA	1,400	\$5.93	\$8,303.55
Specialty Seeding and HECP	AC	1.05	\$10,000.00	\$10,500.00
Educational Signage	EA	1	\$4,000.00	\$4,000.00
SUBTOTAL				\$312,240.58
Initial Survey	AC	1.05	\$4,800.00	\$5,040.00
Engineering and Design	-	15%	-	\$46,836.09
Construction Admin.	-	15%	-	\$46,836.09
Permitting	-	3%	-	\$9,367.22
SUBTOTAL				\$108,079.39
25% CONTINGENCY				\$105,080.18
TOTAL				\$525,400.89

FEASIBILITY:

This condition and two alternatives were considered as part of the design process:

1. Do Nothing: This option would result in no net change or flooding improvement and a continued pollutant input to the Reedy River watershed. This does not move Greenville County towards its goal of maintaining a healthy, safe waterway for its citizens or those downstream.
2. Bioretention: Although this could be an effective option and hold many of the same benefits as a SWW, the landscape and proximity to the stream are not as conducive for this BMP. This BMP relies on a special media for infiltration and cannot be in an area that will receive a high amount of fine sediment material such as is expected in a floodplain, eventually clogging the BMP.
3. Stormwater Wetland: This option would treat runoff from the watershed and will also provide additional flood storage along the Reedy River.

The stormwater wetland was selected due to its cost effectiveness, the proximity of the water table to the surface, and its low maintenance requirements. This BMP provides a good balance of water quality treatment and flood reduction.

Ownership: Greenville County currently leases this parcel from another utility indefinitely due to the greenway (Swamp Rabbit Trail). The proposed changes will reduce the cost of maintenance for the power utility through careful selection of vegetation in an otherwise unusable piece of the parcel.

Permitting: This project will not require a land disturbance permit, nor is it expected to require other permitting unless modeling determines it necessary. The permitting line item is included in the estimate as a contingency.

BENEFITS/IMPACT:

The wetland is expected to detain approximately 5 acre feet of water. Not only does this result in treatment and improved water quality, but it dampens flooding impacts in the areas downstream (i.e., the City of Greenville). Additionally, using the County's IDEAL water quality model, the proposed feature is expected to remove 21 pounds of TP, 398 pounds of TN, thousands of pounds of TSS, and 99% of the bacteria contributed to the the Reedy River waterway on an annual basis from the treated drainage area. As an ancillary benefit to Duke and the sewer utility, the area in and around the SWW would be cleared of all existing vegetation (primarily invasive in nature) and would be revegetated with low-growth species suitable for powerline easements and no longer requiring vegetation management or herbicides. Additionally, this attractive stormwater feature will be located in an area that serves a population that is 65% low-income.



Figure 1.2 – An example of what the proposed wetland may look like.

Not only will this improve water quality and quantity in the Reedy, but being along the greenway, it will be very public in nature and signage will be included that will highlight and describe the feature (see Figure 1.3). An additional aim of the County is for these sorts of strategies to be employed by private landowners and developers. Therefore, the County also intends to incorporate educational signage with the SWW. It is the County's plan that education will lead to greater acceptance and eventually mass adoption of similar strategies, which will benefit the Reedy River watershed much more than any one entity could.



Figure 1.3 – An example of what the proposed educational signage (large) may look like.

Project 2: Stream Improvement near Hampton Station

NEED:

This unnamed tributary to the Reedy River has a watershed area that is approximately 538 acres. The watershed is primarily older development with some newer commercial and industrial sites. It is beginning to become revitalized but remains largely low income and older mill-style houses and mobile homes. The tributary is confined by a railway line along one side with utilities along its other side for short sections. As with most streams confined by utilities, the stream does not have the ability to meander or dissipate energy. Either the increase in flow from watershed changes or from direct trenching of the system along the railway corridor has caused the channel to incise. Vertical banks are exposed in many locations. These banks pose a risk to water quality in the Reedy, as they can serve as a direct source for nutrients (TP, TN) and increased total suspended solids (TSS) and in a stream also tend to result in higher bacteria levels.



Figure 2.1 - Existing conditions along the unnamed tributary.

PROJECT DESCRIPTION:

A 4,842-foot stream improvement project is proposed along this corridor. The purpose of this project would be to dissipate erosive energy in the system by laying back vertical banks to at least a 3:1 slope, and where possible, creating a bankfull bench. In some locations a one-sided stream improvement may be the only viable option due to the proximity of the stream to the railroad. However, any improvement to even one side of the stream will ultimately help to lower the stress applied to the opposite bank especially for Priority 2 and 3 stream restorations (see below which shows the options typically available in stream restoration).

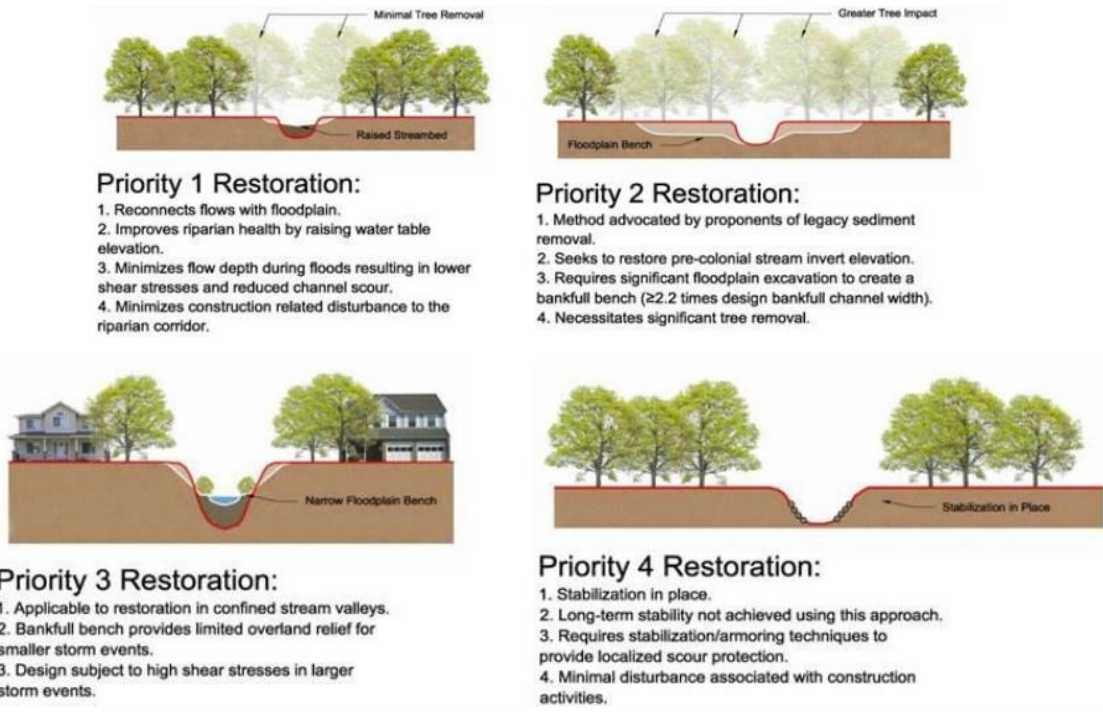


Figure 2.2 - Types of stream restoration.



Figure 2.3 - Map of proposed stream restoration.

Table 2.1 – Project 2 cost estimate including 25% required contingency. Previous projects have demonstrated costs per linear foot of stream to be \$300-600 per linear foot. Using a figure of \$400/lf, this project could come in as low as \$3.3M, including the 25% contingency.

ITEM	TYPE	QTY	UNIT ESTIMATE	BID ESTIMATE
Mobilization	LS	1	\$404,955.78	\$404,955.78
Sediment and Erosion Control	AC	21.2	\$4,890.21	\$103,832.76
Clearing and Grubbing	AC	21.2	\$21,032.00	\$446,567.88
Survey and As-Builts	AC	21.2	\$4,800.00	\$101,917.36
Vegetation Management	AC	21.2	\$2,480.00	\$52,657.30
Excavate/Move/Haul	CY	28,651	\$63.48	\$1,818,765.48
Matting	SY	12,912	\$39.96	\$515,963.52
Boulders	CY	749	\$235.86	\$176,659.14
Riprap	CY	832	\$156.86	\$130,542.38
Gravel	CY	936	\$94.67	\$88,631.65
Cross Vane	EA	18	\$9,175.17	\$165,153.02
Single Arm Vane	EA	30	\$6,069.92	\$182,097.45
Native Plant Plugs	EA	9,684	\$5.93	\$57,436.87
Specialty Seeding and HECP	AC	6.7	\$5,331.00	\$35,554.69
Tree Planting	EA	121	\$396.00	\$47,935.80
Live Stakes	BN	581	\$197.65	\$114,842.56
Educational Signage	EA	2	\$4,000.00	\$8,000.00
Educational Signage (Small)	EA	2	\$1,500.00	\$3,000.00
SUBTOTAL				\$4,454,513.62
Land Acquirement	AC	21.2	\$14,830.00	\$314,882.16
Initial Survey	AC	21.2	\$4,800.00	\$101,917.36
Engineering and Design	-	12%	-	\$534,541.63
Construction Admin.	-	10%	-	\$445,451.36
Permitting	-	3%	-	\$133,635.41
SUBTOTAL				\$1,530,427.92
25% Contingency	-	-	\$1,870,294.46	\$1,496,235.57
TOTAL				\$7,481,177.86

FEASIBILITY:

As part of the design process, this condition and two alternatives were considered:

1. Do Nothing: This option would result in no net change or flooding improvement and a continued pollutant input to the Reedy River watershed. This does not move Greenville County towards its goal of maintaining a healthy, safe waterway for its citizens or those downstream.
2. Priority 1 Stream Restoration: Generally, the preferred option where feasible and low risk, a Priority 1 restoration attempts to return the stream to its natural condition. It raises the bed to its previous condition, allows the stream to re-access the historic floodplain, and will result in a higher water table. However, it may increase flooding, is the most expensive option, and holds the most risk. In this case, the confinement of the exiting channel and proximity to buildings and properties makes this option infeasible.
3. Priority 2 & 3: This is the most cost-effective, low-risk option for the area that provides a good balance of pollutant reduction, additional conveyance, and floodplain storage. This option will focus on stabilizing the banks as well as help prevent any future bank failures (i.e., nutrient inputs) to the impaired watershed.

Ownership: Greenville County has a right-of-way (ROW) for the existing greenway along the stream for the bottom portion of the proposed project. The old bleachery in the middle section of this project is being re-vitalized and the owners will be conveying ROW and extending the trail through their property as well. The upper portion of the project is owned by a prominent contractor in the area who is also amenable to the idea of a stream restoration and trail along his property. Each of these property owners have signed Right-of-Entry (ROE) agreements and we fully expect will them to allow a ROW to established along the stream where improvements are made. If for some reason this is not the case, a Land Acquisition line item in Table 2A has been to account for the possible purchase of this land.

Permitting: This project will require a land disturbance permit through the South Carolina Department of Health and Environmental Compliance (SCDHEC), permitting from the United States of America Corps of Engineers (USACOE), and will require a Letter of Map Revision (LOMR) through the Federal Emergency Management Agency (FEMA). It is estimated that these will take approximately 4-6 months to acquire.

BENEFITS/IMPACT:

For this project a mixture of stream restoration techniques will be utilized, with the lowest number priority technique (i.e., better) being used where possible. A Priority 1 restoration was considered for this project, but the spatial constraints and location make it unfeasible for this project. Wherever a priority 2 or 3 restoration is completed, floodplain storage will be increased and the net impact downstream should be a decrease in flood levels. This restoration is expected to result in a net decrease in nutrient loading rates by an estimated 2,310 pounds of TN and pounds of 2,144 pounds of TP annually. In addition to the nutrient benefits, the removal of invasive vegetation, the addition of larger natural vegetation, increased shading of the stream, and general increases in habitat diversity is expected to improve the ecology of the stream.

As mentioned in previous sections, there are educational, aesthetic, and access impacts as well, which are especially important in a service area that is 68% low-income. Along an expected greenway there will also be educational signage. It has been shown that an increase in environmental awareness goes a long way towards improving waterways. In some cases, the design may expand the channel width by as much as 60 feet. This increase over the 4,842-foot length of the project is expected to significantly lower the impact of flooding downstream.

Project 3:
Long Branch Stream Corridor Improvement Project



Figure 3.1 – Existing conditions along Long Branch.

NEED:

Long Branch is a tributary to the Reedy River has a watershed area that is approximately 2,400 acres. Like Project 2, this watershed is primarily older development with some newer commercial and industrial sites, and has begun to become revitalized, but is largely low income and older mill-style houses and mobile homes. The tributary is less confined, with only some utilities along one side for short sections. However, the stream is extensively incised with many of the evaluated reaches having vertical banks upwards of 9 vertical feet. These banks pose an extreme risk to water quality in the Reedy River, as they can serve as a direct source for pollutants (TP, TN, and TSS). An increase in total suspended solids in a stream also tends to result in higher bacteria levels.



Figure 3.2 – Existing conditions along Long Branch.

PROJECT DESCRIPTION:

A 11,300-foot stream improvement project is proposed along Long Branch. The purpose of this project would be to dissipate erosive energy in the system by laying back vertical banks to at least a 3:1 slope, and where possible, creating a bankfull bench. In some limited locations a one-sided stream improvement may be the only viable option due to the proximity of the stream to utilities or other existing construction conflicts. However, improvement to even one side of the stream will ultimately help to lower the stress applied to the opposite bank especially for Priority 2 and 3 stream restorations (please see Figure 2.2).

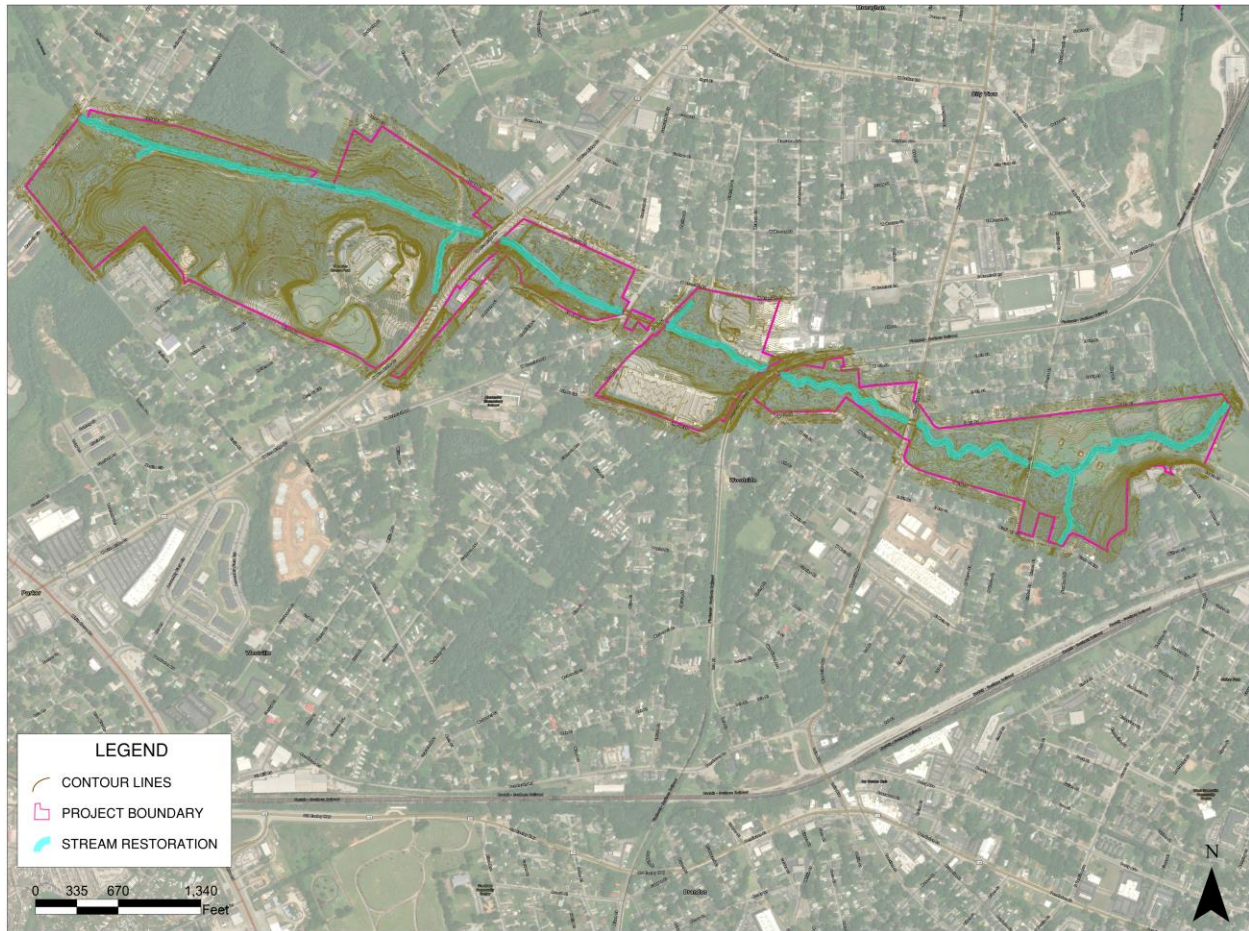


Figure 3.3 – Map of proposed area and stream restoration.

Table 3.1 – Project 3 cost estimate including 25% required contingency. Previous projects have demonstrated costs per linear foot of stream to be \$300-600 per linear foot. Using a figure of \$400/lf, this project could come in as low as \$7.4M, including the 25% contingency.

ITEM	TYPE	QTY	UNIT ESTIMATE	BID ESTIMATE
Mobilization	LS	1	\$1,342,304.37	\$1,342,304.37
Sediment and Erosion Control	AC	38.9	\$4,890.21	\$190,287.10
Clearing and Grubbing	AC	38.9	\$21,032.00	\$818,393.94
Survey and As-Builts	AC	38.9	\$4,800.00	\$186,776.86
Vegetation Management	AC	38.9	\$2,480.00	\$96,501.38
Excavate/Move	CY	130,759	\$63.48	\$8,300,557.90
Matting	SY	35,156	\$39.96	\$1,404,816.00
Boulders	CY	1,130	\$235.86	\$266,521.80
Riprap	CY	1,256	\$156.86	\$196,946.44
Gravel	CY	1,413	\$94.67	\$133,716.64
Cross Vane	EA	60	\$9,175.17	\$550,510.05
Single Arm Vane	EA	100	\$6,069.92	\$606,991.50
Native Plant Plugs	EA	22,600	\$5.93	\$134,043.09
Specialty Seeding and HECP	AC	15.6	\$5,331.00	\$82,975.62
Tree Planting	EA	452	\$396.00	\$178,992.00
Live Stakes	BN	1,356	\$197.65	\$268,013.40
Educational Signage (Large)	EA	1	\$4,000.00	\$4,000.00
Educational Signage (Small)	EA	2	\$1,500.00	\$3,000.00
SUBTOTAL				\$14,765,348.08
Land Acquirement	AC	38.9	\$14,830.00	\$577,062.67
initial Survey	AC	38.9	\$4,800.00	\$186,776.86
Engineering and Design	-	12%	-	\$1,771,841.77
Construction Admin.	-	10%	-	\$1,476,534.81
Permitting	-	3%	-	\$442,960.44
SUBTOTAL				\$4,455,176.55
25% Contingency	-	-	\$6,006,414.19	\$4,805,131.35
TOTAL				\$24,025,656.75

FEASIBILITY:

As part of the design process, this condition and two alternatives were considered:

1. Do Nothing: This option would result in no net change or flooding improvement and a continued pollutant input to the Reedy River watershed. This does not move Greenville County towards its goal of maintaining a healthy, safe waterway for its citizens or those downstream.
2. Priority 1 Stream Restoration: Generally, the preferred option where feasible and low risk, a Priority 1 restoration attempts to return the stream to its natural condition. It raises the bed to its previous condition, allows the stream to re-access the historic floodplain, and will result in a higher water table. However, it may increase flooding, is the most expensive option, and holds the most risk. In this case, the stream has already incised to bedrock in many areas, which makes it extremely difficult to install structures that hold grade and make the likelihood of failure significantly higher.
3. Priority 2 & 3: This is the most cost-effective, low-risk option for the area that provides a good balance of pollution prevention, additional conveyance, and storage. This option will focus on stabilizing the banks as well as help in preventing future bank failures (i.e., nutrient inputs) to the impaired watershed.

Priority 2 & 3 Stream restoration was chosen due to the cost effectiveness and existence of exposed bedrock in the channel.

Ownership: This project contains a mixture of public and private (ROWs in progress) lands. Public land and those with ROEs in place currently account for 82% of the proposed project. Contiguous portions of this projects confined between roads or railway crossings will be prioritized (See various sections in Appendix 3, Figures A3.3.3-9).

Permitting: This project will require a land disturbance permit through SCDHEC, permitting through the USACOE, and will require a LOMR through FEMA. It is estimated that these will take approximately 4-6 months to acquire.

BENEFITS/IMPACT:

For this project, a mixture of Priority 2-4 stream restorations will be utilized, with the lowest number priority being used where possible. Priority 1 restoration techniques were considered for this project, but the spatial constraints and location make it unfeasible for this project. Wherever a Priority 2 or 3 restoration is completed, storage will be increased and the net impact downstream should be a decrease in flood levels. Regardless of the priority, this restoration is expected to result in a net decrease in nutrient loading rates of approximately an estimated 4,914 pounds of TN and pounds of 4,588 pounds of TP annually. In addition to the nutrient benefits, the removal of invasive vegetation, the addition of larger natural vegetation which increase shading of the stream, and general increase in habitat diversity is expected to improve the ecology of the stream.

There are educational, aesthetic, and access impacts as well. The proximity of the greenway to this project can be leveraged with educational signage. Stream restorations increase the aesthetic value of the stream and simply by promoting awareness and bringing into view what used to be “out of sight, out of mind” can make many consider what they send to a storm drain system. Finally, the rights-of-entry and rights-or-ways secured through this project will help to extend the existing greenway to these low-income (65%) and older-developed areas, improving access and safe recreation.



Figure 3.4 – Section of Brushy Creek restoration with cross vane and boulder wall armoring along a sewer line.

Finally, the methods used on this project will help show property owners, developers, and engineers the benefits of stream restoration. By demonstrating key strategies for stream restoration along highly public corridors, it is the County’s intention that the value of the stream will be perceived as much more than a flooding source, but as an asset. Mass adoption of stream restoration practices could have a significant impact on water quality and ecology throughout the Reedy River watershed and the County.