Gap Creek – Watauga River
Watershed Based Plan Proposal

Name of Project: Gap Creek - Watauga River Restoration Project- this application is specific to the Tennessee Department of Agriculture Nonpoint Source Program (TN-NPS) request seeking project proposals for funding with grants provided by the United States Environmental Protection Agency (USEPA) under section 319(h) of the Clean Water Act. Appalachian RC&D is requesting funding for projects to be completed in FY 2024.

Lead Organization: Appalachian Resource Conservation & Development (RC&D)

Watershed Identification (name, location, HUC, etc.)**:** Gap Creek-Watauga River (HUC ID: TN060101030505) approximate center 36.350241°, -82.238437° (see location map), within the Watauga River watershed (HUC ID: 06010103) in Eastern Tennessee. Specific reaches to be targeted are: Gap Creek (TN06010103008-0800), the Watauga River (TN06010103008-1000, TN06010103008-2000), and Campbell Branch (TN06010103008-0200).

Causes and Sources of Non-point Source (NPS) Pollution in the Watershed

TDEC's 220 list of impaired waters provides the dominant sources of nonpoint source pollution and causes for 303(d) listing of each of the three 303(d) listed streams within the Gap Creek - Watauga River watershed. This information is compiled in the table below.

Stream Name	Cause(s) for 303(d) listing	Source(s)
Gap Creek	Alteration in stream-side/littoral vegetative cover	Streambank modifications/destabilization, Municipal (Urbanized High Density Areas)
	Sedimentation/siltation	Municipal (Urbanized High Density Areas)
	Nitrate/nitrite	Municipal (Urbanized High Density Areas)
Watauga River	Cause unknown	Municipal (Urbanized High Density Areas), Dams or Impoundments
	Temperature	Dams or Impoundments
Campbell Branch	Nitrate/Nitrite	Municipal (Urbanized High Density Area)
	Alteration in stream-side/littoral vegetative cover	Municipal (Urbanized High Density Area)
	Sedimentation/Siltation	Municipal (Urbanized High Density Area)

This watershed has experienced degradation due to agricultural practices and ongoing development within Elizabethton and the surrounding region. Primary land uses within the watershed include forest land (58.3%), pasture (23.7%), and developed land (13.9%). Elizabethton is located in the heart of the watershed, along the south (river left) side of the Watauga River. Gap Creek, a 303(d) listed tributary to Watauga River, confluences with the Watauga River on the edge of Elizabethton's city limits. Extensive commercial development is

present along the downstream reaches of Gap Creek. Due to its location within the tri-cities region, and proximity to Johnson City, it is likely that Elizabethton will see continued growth and development in the future. Increasing amounts of impervious cover, removal of riparian buffers within developed areas, and use of fertilizers and pesticides on urban landscapes all contribute to increased stormwater run-off and greater pollutant levels. Campbell Branch also confluences with the Watauga River in Elizabethton and is 303(d) listed. At the confluence with the Watauga River, Campbell Branch is highly urbanized.

Upstream and downstream of Elizabethton, the Watauga River flows through rural landscapes composed of farmland, forests, and rural residences. Similar land uses are present on the upper extents of Gap Creek and Campbell Branch. Campbell Branch is mostly developed along the entire reach with several farms on the upstream extent and residential neighborhoods on both the right and left banks as it flows into Elizabethton. Manicured lawns contribute to the lack of littoral vegetation, resulting in erosion and presenting little opportunity to filter contaminants such as nitrates, nitrites, and sediment carried by stormwater. Many rural residences and farms are present on both the right bank and left bank of Gap Creek, and Gap Creek Road is in close proximity to the stream throughout most of its length. This contributes to a lack of vegetation increased pesticide pollution, and an increase in impervious surface, resulting in a high level of nitrates and nitrites in the stream. There are a considerable amount of livestock operations on Gap Creek, and their access of the reach greatly contributes to increased bank erosion, sedimentation, and nutrient and pathogen contamination of waterways, mostly in the form of E. coli from livestock waste. In addition, row crop production is present along the Watauga River and its tributaries. Lack of a riparian buffer and tillage practices contribute to higher rates of runoff from agricultural fields. A map of the overall watershed identifying grazing operations can be found in Appendix A.

Estimate of Load Reductions

Excess sediment loading to waterbodies in the Gap Creek - Watauga River watershed has many sources, as discussed in the section above. Sediment load reduction from the site(s) proposed in the TDA-NPS FY-2021 Gap Creek - Watauga River Proposal was calculated to determine the impact of BMPs on addressing waterbody impairment from the siltation and sediment loading as well as Nitrate/Nitrite (N) reduction.

Current Projects

Two of the proposed projects are already in the planning stage. The proposed sites are the Gap Creek Project site (Gap Creek Park) and the Watauga River Project site (at Sycamore Shoals State Park), depicted in the Location Map (Appendix C). These sites have been impacted by channelization, stormwater runoff due to impervious surfaces, bank instability, and sedimentation. At Gap Creek Park the riparian buffer is narrow (approximately 20 ft) or completely absent. At the Sycamore Shoals site, the forested riparian buffer width ranges between 20-450 feet and is absent in several locations due to the paved walking path on the top of bank. In their current state, the existing buffers do little to secure the banks at either site, so mass wasting and active erosion are widespread in both reaches. Stormwater drainage

is another issue on these reaches, presenting opportunities for BMPs such as raingardens, RSCs, and other innovative stormwater management practices.

The Tennessee NPS Program Pollutant Load Reduction Estimation Tool was used to calculate the total reduction potential for nutrient, pollutant, and sediment loads for Gap Creek Park and Sycamore Shoals State Park (See Location Map, Appendix C). The reduction was calculated using an approximate stream length of ~800 linear feet at Gap Creek Park and ~490 linear feet at Sycamore Shoals State Park. BMP implementation would reduce sediment loading to Gap Creek by roughly 113 tons per year and N loads by 4,050 pounds per year. BMP implementation at Sycamore Shoals State Park would potentially reduce sediment loads by approximately 56 tons per year and N loads by 2,163 pounds per year. These load reduction calculations are outlined by BMP in Appendix D.

Potential GIS-Based Reaches

GIS-based aerial imagery was used to identify livestock operations and large open riparian areas with a lack of littoral vegetation. Outreach and recruitment for these potential sites will be sought through news releases via local publications and/or outreach events.

The Tennessee NPS Program Pollutant Load Reduction Estimation Tool was used to estimate load reductions on these reaches. The additional sites represent a total prospective load reduction of sediment loads by 124 tons per year and N loads by 5,010 pounds per year. These load reduction calculations are outlined by BMP in Appendix D.

BMP List, Educational Activities, and Budget

- **Potential Best Management Practices (BMP) to Address NPS include:**
    i. Streambank/shoreline protection
    ii. Riparian forest buffer
    iii. Critical area planting
    iv. Rain gardens
    v. Stream crossings
    vi. Access control (livestock exclusion)
    vii. Watering System (livestock watering systems)

- **Educational Activities:**
    i. Host a socially distanced informational outreach meeting for local landowners at the start of the project.
    ii. Arrange for local schools (elementary, high school, colleges) to visit the Project Sites and view BMPs at work. Alternately, send informative literature to schools if field trips are not possible.
    iii. Arrange socially-distanced volunteer riparian planting events.
    iv. Install Educational signage about NPS pollution, BMPs, and Restoration Practices used at the site.

v. Work with local news media to educate the public on watershed issues.
vi. Educate landowners individually through BMP installation on their property.

BMP Name	Quantity	Unit	Cost ($)/Unit*	Budget Estimate
Streambank/Shoreline Protection (Practice 580) on streams > 30 feet in bkf width	965	Linear feet	$200.00	$193,088.00
Streambank/Shoreline Protection on streams < 30 feet in bkf width	1287	Linear Feet	$150.00	$192,999.00
Riparian Forest Buffer (Practice 391)	3	Acres	$1,200.00	$3,716.00
Critical Area Planting (Practice 342)	1	Acres	$400.00	$413.00
Stream Crossing (Practice 578)	2531	Square Feet	$12.00	$30,378.00
Rain Garden (Practice 007)	7059	Square Feet	$6.00	$42,353.00
Access Control/Livestock Exclusion (Practice 472)	965	Linear feet	$4.00	$3,862.00
*Costs will vary depending on materials used. For example, project participants may wish to use barbed wire or woven wire for fencing.				

Educational Event	Quantity	Cost ($)/Unit*	Budget Estimate
Community Outreach – Local News Publication	2	267	$534
Phase I Volunteer Livestake Planting	1	178	$178
Phase II Volunteer Livestake Planting	1	178	$178
Year Three Volunteer Livestake Planting	1	178	$178
Educational Kiosks	4	$1,781	$7,124

NOTE: The above listed BMP and Educational budget are approximate and is proposed as a starting point for project. It is understood that following completion of the Watershed assessment, site specific needs will be addressed, and a more finite budget will be established understanding the more specific needs of the watershed.

Total Budget for Project:	**$475,000.00**

Budget Notes: There are many non-point source pollutant sites contributing sediment to these 303(d) listed streams within the ~65 square mile Subject Watershed. The above listed budget table is approximate and intended as a starting point for the project.

Timeline, Tasks, and Assessment of Progress

Month:	Task:
0-36 Months – *Phase 1* Project Implementation:	
0 - 12	Prepare and conduct presentation for Carter County Commissioners and for Sycamore Shoals State Park staff/stakeholders.
0 – 12	Appalachian RC&D will develop outreach publication to solicit other landowners in the watershed.
0 - 12	Develop Cost-share agreements with Carter County for two sites: Gap Creek and Sycamore Shoals State Park.
0 - 12	Develop Cost-share agreements with any other interested landowners in the watershed.
0 - 12	Design – Permit Phase 1 Projects.
0 - 36	Construct/Implement sites included in Phase 1.
0 - 36	Install Educational Signage at Phase I project sites.
0 - 36	Host a volunteer planting event at Phase 1 site(s) to plant riparian areas with native herb/grass, shrub, and tree species.*
0-36	Have article published in local paper to inform public about the projects and to solicit additional interested landowners for participation.
12-36 Months – *Phase 2* Project Implementation:	
12 - 36	Continue outreach to local public/private landowners, and secure additional sites for restoration and/or stormwater treatment opportunities.
12 - 36	Develop Cost-share agreements with Phase 2 landowners.
12 - 36	Design – Permit All Phase 2 Projects.
12 - 36	Construct/Implement sites included in Phase 2.
12 - 36	Host a volunteer planting event at Phase 2 site(s) to plant riparian areas with native herb/grass, shrub, and tree species.*
12-36	Have article published in local paper to inform public about the projects and to solicit additional interested landowners for participation.
24-36 Months – *Phase 3* Project Implementation:	
24 - 36	Continue outreach to local public/private landowners, and secure additional sites for restoration and/or stormwater treatment opportunities.
24 - 36	Develop Cost-share agreements with Phase 3 landowners.
24 - 36	Design – Permit All Phase 3 Projects.
24 - 36	Construct/Implement sites included in Phase 3.
24 - 36	Host a volunteer planting event at Phase 3 site(s) to plant riparian areas with native herb/grass, shrub, and tree species.*

24 - 36 Provide information to TDEC in the assistance of future water quality monitoring

**Outreach events will be completed based on current and future CDC guidelines in regard to the ongoing global pandemic and may be adjusted.*

Criteria to Assess Achievement of Load Reduction Goals

The previous section presents measurable milestones for the Gap Creek – Watauga River Watershed Plan. Reaching these milestones will result in quantifiable reductions in sediment and nitrate/nitrite to Gap Creek, Campbell Branch, and Watauga River.

The TMDL for siltation and/or habitat alteration in the Gap Creek - Watauga River Watershed (HUC 06010103) reports current and target loading in lbs/acre/year specific to sub-watersheds for the HUC-12 watersheds which contain potential project sites Gap Creek (_0800), the Watauga River (_2000), and Campbell Branch (_0200) and the TMDL required load reductions. The current TMDL required overall target load reductions for Gap Creek and Campbell Branch are both 79.2%. On a per foot basis, stabilization measures in the Gap Creek-Watauga River Watershed may result in reductions of approximately 0.11 tons/ft/yr based on the Tennessee NPS Program Pollutant Load Reduction Estimation Tool. However, this value is hard to translate into per acre reductions since a range of land areas may be contributing to erosion from specific sites. For this specific watershed plan, the following criteria shall be used to assess achievement of sediment load reduction goals presented in the approved TMDL:

TMDL	Criteria to Assess Success of Load Reduction	Goal
Sedimentation/siltation	Pre and post-project BANCCs method for estimating sediment load	80% load reductonditionion from pre-project condition
Nitrate/Nitrite	Monitor integrity of all stormwater BMPs installed, test pre and post-project nitrite/nitrate levels	Rain Gardens at all sites functioning and in good condition, Nitrites/Nitrates lower than pre-project levels
Alteration in stream-side/littoral vegetative cover	Annual vegetative survivability monitoring of vegetation plots and inspecting buffers for deer/human/invasive encroachment	75% survival rate for vegetation
Other	Pre and post-project water quality monitoring sampling: pH, DO, temperature, conductivity, salinity, and total dissolved solids	Improve parameter measurements within the reaches

If interim targets are not met during every monitoring event, it is not necessarily an indication that the project is failing to achieve load reduction goals. Natural streams have a wide range of variability, as evidenced by the varying range of parameters found in functional reference streams. Many stream restoration projects undergo a settling period as they mature to become stable streams. If variances from established load reduction goals occur, a monitoring report will be provided including an explanation and opinion of the causes and nature of the condition, including implications for project success. If it is determined that corrective action is not warranted, the rationale for such a decision shall be stated. Continued monitoring of the condition or area including the use of more detailed methodologies may be necessary. These actions shall also be documented. In instances where corrective

action or repairs are necessary to ensure project success, a corrective action plan shall be formulated. This plan will include a description of the areas of concern, proposed courses of action, an adjusted project schedule (if necessary), and revised goals if applicable.

Monitoring and Documenting Success

1. Coordinate with local landowners and work with them to locate problem areas.
2. Design, permit, and implement individual site plans to address the stream degradation issues in the watershed.
3. Establish diverse array of riparian buffers in degraded portions of the stream an average of 30 ft in width.
4. Monitor reductions in sediment, monitor integrity of installed BMPs (i.e. livestock exclusion fencing, in-stream structures, rain gardens, etc.), monitor dissolved oxygen, pH, conductivity, and temperature, monitor vegetation survival (**monitoring will be conducted by TDEC staff**).
5. Prepare annual reports with monitoring data and implement corrective actions if necessary (i.e. repairs, replanting, etc.).
6. Provide annual reports to the Appalachian RC&D.