# *Roan Creek – FY 2015 Watershed Based Plan*

**Name of Project: Roan Creek - this application is specific to Phase 2 of the Roan Creek grant. Following a successful Phase 1 and the continued need in the watershed, Appalachian RC&D is requesting continued funding.**

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

**Watershed Identification** (name, location, HUC, etc.)**: Roan Creek (HUC ID: TN06010103 034-1000, 2000) and Town Creek (a Roan Creek tributary - HUC ID: TN06010103 034-300) are located at 36° 25' 53"N, 81° 46' 34" W (see location map), within the Watauga River watershed (HUC ID: 06010103) in Johnson County, Tennessee.**

**Causes and Sources of Non-point Source Pollution in the Watershed**

- Loss of biological integrity due to siltation caused by pasture grazing.
- Nitrate + nitrite - pollutant source pasture grazing and Municipal Point Source Discharge (MPSD)
- Escherichia coli - likely sources both MPSD and pasture grazing
- Project site impacts include highly impermeable residential development, light-industrial and historical influences.
- Runoff from row crop and livestock practices (to include but not limited to): tillage, corn-tobacco production, pastureland, high-impact grazing.
- Historical influences; drainage placement in blue-line USGS features, dredging sections of Roan Creek over approximately 30 years in turn creating highly eroded shear bank areas, floodplain filling, reduction of riparian buffers, hard bank stabilization, and an increase in impermeable areas with inadequate sized pipes.

**Estimate of Load Reductions:**

Excess sediment loading to waterbodies in the Roan Creek watershed has many sources including livestock practices which degrade streambanks, removal of riparian vegetation by landowners and/or their livestock, and streambank erosion due to upstream channelization and stormwater flows. Sediment load reduction from the three (3) sites proposed in the TDA-NPS FY-2014 Roan Creek Workplan (Attachment B) was calculated to determine the impact of BMPs on addressing waterbody impairment from the siltation and sediment loading. These sites referred to as Johnson County Site, Corn Creek Site, and Central Baptist Church, are shown on the attached Roan Creek NPS/BMP Map. All three sites are impacted by channelization and/or lack of floodplain connectivity and upstream stormwater flows. Riparian buffer are diminished (width) or lacking as well.

The Bank Assessment for NPS Consequences of Sediment (BANCS) method (Rosgen 2001) was used to assess load estimate reductions from locations where stream and riparian restoration is proposed for the Phase 2 project . The reduction was calculated using an assumed decrease in

bank erodibility ratings(Bank Erosion Hazard Index and Near Bank Stress) from moderate to low. BMP implementation at these three sites would reduce sediment export to the streams and lake from roughly **87 tons per year to 18 tons per year (~69 ton per year reduction)**. This is estimated using the three sites mentioned in this grant application over a stream length of 2,000 linear feet (ln ft) and approximately 22 acres.

Cattle exclusion and waste management BMPs are not proposed at the three preliminarily planned sites, thus, associated nitrate-nitrite and *E. coli* load reductions could not be estimated for specific sites. However, estimated Nitrogen (N) load reduction (lbs/yr) per head of cattle (slaughter steer) associated with fencing cattle from waterbodies and establishing a terraced, vegetated riparian buffer (terrace and filter strip BMP for EPA Region 5 Model 6) is estimated at 232 lb N/yr. During Phase I of the Roan Creek Restoration Project, cattle exclusion was coupled with streambank stabilization at four (4) of the 14 projects.

**BMP List, Educational Activities and Budget**

- **Potential BMPs include:**
    i. Streambank stabilization
    ii. Riparian buffer enhancement
    iii. Livestock exclusion
    iv. Alternate watering sources
    v.
- **Educational Activities:**
    vi. Arrange for local schools (elementary, highschool, colleges) to visit the Project Sites and view BMPs at work.
    vii. Arranging volunteer riparian planting events.
    viii. Working with local news media to educate the public on watershed issues.
    ix. Educate landowners one at a time through BMP installation on their property.
    x. Speaking at local schools (elementary, high school, colleges) to visit the Project Sites and view BMPs at work.

**Budget Notes:** There are many non-point source pollutant sites contributing sediment to these 303(d) listed streams within the ~163 square mile Subject Watershed. The below listed budget table is approximate and intended as a starting point for the project.

| BMP Name | Quantity | Cost/Unit | Budget Estimate |
|---|---|---|---|
| * Streambank Protection | ~4380 linear feet | $80.12 is the 2013 NRCS EQIP rate | $350,925.60 |
| *Livestock Exclusion Fence | ~6625 linear feet | $2.03/per foot is the 2013 EQIP rate | $11,102.00 |
| *Alternate Watering Source (Drinkers) | 8 drinkers | $1,600.90 is the 2013 EQIP rate | $10,545.10 |
| * Well (drinker water source) | 1600 feet | $7.50/ft of drilling depth is the 2013 EQIP rate | $9,885.41 |
| | | | |
| **APPROXIMATE BMP TOTAL:** | | | $382,458.01 |

**** NOTE: Unit Costs were taken from the NRCS 2013 EQIP guidance.***

**NOTE: The above listed BMP budget is 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.**

| Educational Event | Quantity | Cost/Unit | Budget Estimate |
|---|---|---|---|
| Install an educational sign at the most public site of the Phase 2 grant funding project | 1 | $2,526.19 | $2,526.19 |

| Total Budget for Project: | **$384,984.20** |
|---|---|

## Timeline, Tasks, and Measurable Milestones

*Phase 2 grant dollars will immediately be put to work on the ground in the Roan Creek watershed to enable BMP implementation. Multiple landowners have contacted BFEC during/since the closing of the Phase 1 Roan Creek grant - these landowners will be priority sites if/when Phase 2 dollars come available. Tasks highlighted in **bold** below are measurable milestones used by Appalachian RC&D and BFEC to measure success of NPS management measure implementation.*

| Month: | Task: |
|---|---|
| **0-12 Months –** | **Year 1 Project Implementation:** |
| 0-6 | Appalachian RC&D Council landowner outreach dinner in Mountain City |
| 0-6 | Perform outreach to various other local public/private landowners in the Watershed |
| 0-12 | Project Design and Permitting at the Johnson Co. and Central Baptist Project Site |
| 0-12 | **Construct BMPs at the Johnson Co. and Central Baptist Project Sites resulting in ~ 1600' ln ft of Streambank Stabilization BMPs.** |
| 0-12 | **Perform at least one community education event**. |
| | |
| **12-24 Months –** | **Year 2 Project Implementation** |
| 12-24 | **Execute permitting/design/BMP construction at the Corn Creek Project Site resulting in ~400 ln ft of Streambank Stabilization BMPs.** |
| 12-24 | Identify additional Project Sites and continue landowner outreach in the Watershed. |
| 12-24 | **Execute permitting/design/BMP construction at another Project Site(s) resulting in at least ~1500 ln ft of Streambank Stabilization BMPs.** |
| 12-24 | Cattle exclusion from the streambank and alternate watering facilities shall be included in **at least one project design**. |
| 12-24 | **Perform at least one community education event.** |
| | |
| **24-36 Months –** | **Year 3 Project Implementation** |
| 24-36 | Identify additional project sites for Streambank Stabilization BMPs. |
| 24-36 | **Execute permitting/design/BMP construction at Project Site(s) resulting in 880 ln ft of Streambank Stabilization BMPs** |
| 24-36 | Cattle exclusion from the streambank and alternate watering facilities shall be included in **at least two project designs**. |
| 24-36 | **Perform at least one community education event.** |
| 24-36 | **Install educational sign at most visible project site.** |

## Criteria to Assess Acheivment of Load Reduction Goals

The previous section presents measureable milestones for the Phase 2 Roan Creek Restoration Project. Milestones that specifically addressing quantifiable reductions in sediment, nitrate-nitrite, and E. coli export to Roan Creek waterbodies are linear ft of streambank stabilization BMPs (decreased streambank lateral recession rate, pasture to forest conversion), heads (#) of cattle excluded from streams, and cattle waste management measures (filter strips, manure management areas). The success of NPS management at project sites, and for the overall project grant, can be assessed relative to the actual and percent reductions in pollutant export due to those BMP milestones.

The TMDL for siltation and/or habitat alteration in the 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, Lower Roan (_0103) and Upper Roan (_0102), the TMDL required load reductions are 82.4% and 87.6%, respectively. This unit, lbs/acre/year, is difficult to compare with the reporting unit from the BANCS method used to assess streambank erosion and sediment loading estimates associated with streambank stabilization BMPs, reported in tons/ft streambank/yr. On a per foot basis, stabilization measures in the Roan Creek basin may result in reductions ranging from approximately 0.02 tons/ft/yr to 2 tons/ft/yr based on bank height and erosion potential. 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: an **80% load reduction criteria, in-line with the TDL required load reduction, for streambank sediment export** as estimated using the BANCS method. In order to assess whether project may meet this criteria or has met this criteria, the BANCS method will be performed pre- and post- BMP implementation.

The TMDL for E. Coli in the Watauga River Watershed (HUC 06010103) presents a Pollutant Load Reduction Goal (PLRG) for Lower and Upper Roan Creek at 67.6% and 51.3%, respectively, including reductions from WWTP, NPDES point sources, and NPS. However, it becomes quite difficult and beyond the scope of this contract to determine the impact cattle removal (per head) on the reduction of E. coli levels in waterways. Therefore, we will use fulfillment of our annual measurable milestones as criteria for success in addressing this parameter, i.e. a minimum of one cattle exclusion project per annual cycle (Years 2 and 3).

Currently, no TMDL for nitrate-nitrite has been developed for the Watauga River Watershed (HUC 06010103). Thus, PLRGs remain ambiguous. To address nitrate-nitrite reduction in Phase I, and subsequently Phase II of the Project, a riparian buffer which serves as a filter strip BMP, is required in any cost-share assistance agreement which provides streambank stabilization and/or cattle exclusion and watering facility.

## Monitoring and Documenting Success: **(specific to watershed assessment)**

1) Gain acceptance from local landowners and work with them to locate problem areas.
2) Design, permit, an implement plan that is accepted from the majority of landowner in the Roan Creek watershed to address their stream degradation issues.
3) Establish dense riparian buffers in degraded portions of the stream.
4) Monitor percent reductions in sediment and E. coli loading at project sites; monitor cattle (# heads) removal at project sites.
5) Coordinate efforts with TDEC (Beverly Brown - Johnson City Environmental Field Office to be included in their annual monitoring process of the watershed.