

**FY 2007 Virginia Water Quality Improvement Fund
Department of Conservation & Recreation
Grant Application Package**

**Mudlick Creek Urban Stream Restoration Project
At Garst Mill Park
Phase II**



**Roanoke County Department of Community Development
Roanoke County Department of Parks, Recreation & Tourism**



2007 WQIF Application Form & Proposal Narrative Guidelines

Virginia Department of Conservation and Recreation
Water Quality Improvement Fund

Contact the DCR regional office or Sarah Capps for an electronic version of this application form. For contact information see the “DCR Contacts” section on page 12 of the 2007 WQIF RFP.

1. APPLICANT INFORMATION				
Project Sponsor:	Roanoke County Department of Community Development			
Mailing Address:	5204 Bernard Drive SW			
City, State, Zip:	Roanoke, Virginia 24018			
Federal ID #:	54-6001572			
Contract Person:	George W. Simpson, III., County Engineer			
- Phone:	(540) 772-2083 x. 238			
- E-mail:	GSIMPSON@roanokecountyva.gov			
2. PROJECT INFORMATION				
Project Name:	Mudlick Creek Urban Stream Restoration at Garst Mill Park, Phase II			
Start and End Dates:	The anticipated start date and end dates are estimated to be May 2007 to June 2009.			
WQIF Grant Request and Match Funds:	\$ 110,000.00	WQIF Request	\$144,782.00	Match
Location Information:	Garst Mill Park			
- City, County, Town:	Roanoke County			
- Watershed Name*:	Mudlick Creek			
- Watershed Number (NWBD)*:	275/L04			
Is water body on DEQ 303(d) Impaired Waters List? **	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
Identify TMDL segment and stream:	VAW-L04R_MDL01A06 Mudlick Creek, VAW-LO4R-02 Roanoke River			
Identify TMDL impairment(s) addressed by this project:	Escherichia coli, Benthic, Fish Tissue			
Does project address TMDL activity identified in Attachment C?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
<p>* PDF maps by county of Watershed Names and Watershed Numbers (NWBD) are available from the DCR FTP site: ftp://ftp.dcr.virginia.gov/NWBD. Username = guest Password = c0nserv (use zero in c0nserv)</p> <p>** Details on the DEQ 303(d) Impaired Waters List including an Interactive Map are available on the DEQ website, http://www.deq.state.va.us/wqa/ir2006.html</p>				

3. ELIGIBLE WQIF NPS ACTIVITIES (Refer to pages 5-8)	
<i>Mark an X to the left of the eligible WQIF NPS activity(s) proposed in the project.</i>	
Stormwater Management (*TMDL-SWM)	
	Retrofit(s) to existing detention facilities
	Retrofit(s) to existing impervious surfaces
	Retrofit(s) to manage rooftop runoff
	Better site design and/or low impact development
	Local stormwater management program
Nutrient Management	
	Urban nutrient management planning and implementation
	Alternative animal waste solutions
Residential Septic Systems (*TMDL-Septic)	
	Septic system repair and replacement
	Establishment of septic tank pumpout maintenance program
Other WQIF NPS Funding Priority Areas	
	Riparian buffer protection program
	Abandoned or orphaned mine land reclamation (*TMDL-Mining)
X	Stream restoration (*TMDL-SR)
	Small acreage horse facilities
	Other: _____

4. BUDGET NARRATIVE

This section must clearly identify estimated project costs according to the budget categories provided below. Identify all expected project costs and all sources of match funds. Additional rows may be added under the budget categories to provide a line item detail. Rows for budget categories not included in the proposed project budget may be deleted. Reference the 2007 WQIF RFP Attachment B "Budget Narrative Guidelines" in completing this section.

BUDGET CATEGORIES & ITEMIZED DESCRIPTION	WQIF Grant	Match Funds
PERSONNEL <i>Personnel Subtotal</i> →	\$	\$ 70,250.00
In-kind construction services to be performed by Roanoke County engineering and parks project construction crews AND in-kind contribution of technical assistance to be provided by the US Fish & Wildlife Service during design & construction		
FRINGE BENEFITS <i>Fringe Subtotal</i> →	\$	\$ 14,532.00
Fringe benefits associated with personnel charges are approximately 40% for Roanoke County employees		
TRAVEL <i>Travel Subtotal</i> →	\$	\$
- (Describe Travel)		
EQUIPMENT <i>Equipment Subtotal</i> →	\$	\$
- (Describe Equipment)		
SUPPLIES <i>Supplies Subtotal</i> →	\$	\$
- (Describe Supplies)		
CONTRACTUAL <i>Contractual Subtotal</i> →	\$50,000.00	\$ 20,000.00
\$50,000 of WQIF funds will be used to partially address professional engineering consultant fees associated with project analysis, permitting and design; \$20,000 of County match funds will be used to totally address professional engineering consultant fees associated with public education/involvement and outreach services for the project		
CONSTRUCTION <i>Construction Subtotal</i> →	\$ 60,000.00	\$ 40,000.00
WQIF and County match construction funds will be used to address any specialized construction services and materials costs associated with bank grading, toe stabilization, in-stream structure placement, bioengineering and riparian plantings		
- (Describe Construction)		
- (Describe Construction)		
OTHER DIRECT <i>Other Direct Subtotal</i> →	\$	\$
- (Describe Other Direct)		
INDIRECT <i>Indirect Subtotal</i> →	Not allowed	\$
- (Describe Indirect)	Not allowed	
TOTAL COSTS	\$ 110,000.00	\$ 144,782.00

5. NPS RESULTS & NPS POLLUTION REDUCTION ESTIMATES						
BMP(s) Name and Work Description	<i>(Specify and describe the type of BMPs to be installed, repaired, replaced, retrofitted or otherwise modified.)</i> Stream Restoration: It is expected that a combination of stream bank protection and stabilization BMP's (Appendix D), channel geometry redesign, and public education and awareness efforts will be used.					
Estimate Size or Quantity of BMP(s):	<i>(Specify targeted number of acres, linear feet, number of units or other appropriate unit for BMPs to be implemented.)</i> Approximately 2900 linear ft of stream will be targeted.					
Drainage Area: (If applicable)	<i>(Estimate drainage area, such as acres to be treated by BMP(s) and including % acres or % of area to be treated that is pervious vs. impervious.)</i> 6121 Acres					
Estimated annual NPS reductions: (If possible)	1556	Nitrogen (lbs)	532	Phosphorus (lbs)	659	Sediment __ (lbs) _x_ (tons)
	List other Pollutant(s) and reductions (e.g. Pathogens).			E. coli Bacteria		
Describe basis or source for NPS reduction estimates:	<i>(e.g. SWM engineering calculations, Bay Model efficiencies, TMDL studies and implementation plans, National Small Flows standards for septic, scientific study results, manufactured BMP design specifications, etc.)</i> Scientific Study Results: See Appendix E					
Other NPS Results information:						
APPLICATION & PROPOSAL SUBMISSION						
<p>Applicants are required to submit 7 hard copies and one electronic version (Microsoft Word or Adobe Acrobat PDF files are preferred) of the completed 2007 WQIF Application Form and the project proposal narrative to the Virginia Department of Conservation and Recreation by 5:00 pm on May 15, 2007 or postmarked by this date and time. Incomplete RFP application documents not delivered or mailed accordingly may be disqualified. Address the final application package to:</p> <p style="text-align: center;">Sarah Capps, WQIA Program Manager Virginia Department of Conservation and Recreation 203 Governor Street, Suite 206 Richmond, Virginia 23219 Email, sarah.capps@dcr.virginia.gov</p>						

PROPOSAL NARRATIVE GUIDELINES

The project proposal narrative **must not exceed five pages (10 or 12 point font)**. Below is an outline that serves as the proposal narrative guidelines. Proposals submitted that do not follow the exact outline, will still be considered but are advised to address the same type content as presented below.

- I. **Project Abstract** – Brief description of project and NPS reduction or water quality improvement activities, and expected results or other project deliverables.

- II. **Proposal**
 - A. **Project Need** – Describe the nature of the problem and the water quality or nutrient loading concern for the selected project area to be addressed by the proposed project.

 - B. **Objectives** – Provide a bulleted or numbered list of the project’s anticipated outcomes. Be as descriptive and quantitative as possible.

 - C. **Overall Content**
 - Describe how the project will contribute toward achievement of nutrient reduction targets outlined in Virginia Tributary Strategies, TMDL Implementation Plans, or other local or watershed planning documents.
 - Describe how the project will contribute to expanding the implementation of cost-effective, innovative, or sustainable strategies for NPS reductions.
 - Describe how the project differs or goes beyond ongoing efforts to comply with legally mandated requirements at the local, state, or federal level.
 - Indicate if the project is a continuation or expansion of an existing WQIF grant funded under the FY2006 WQIF Request for Grant Applications.

 - D. **Methodology & Timeline** – Describe the project methodology including a timeline for the project implementation. Indicate if any permits may be required for the project.

 - E. **NPS Results, NPS Reductions, or Environmental Results** – This section may be used to provide additional information, beyond what is provided in the 2007 WQIF Application Form under Section 5, “NPS results & NPS Pollution Reduction Estimates”, or to identify other environmental results expected to be achieved.

 - F. **Partner Justification** – Provide a list of project partners and their roles in the project. Describe the qualification and nature of the contributions of the project sponsor organization and other collaborating organizations. Indicate level of involvement of other organizations in development and review of the proposed project.

Project Narrative Abstract

The **Mudlick Creek Urban Stream Restoration Project at Garst Mill Park, Phase II** is a continuation of a WQIA project funded in 2006 and will carry forward the project goals of the previously funded project centered on stream restoration design and construction using natural channel design techniques within the approximately 3,000-foot section of Mudlick Creek that flows through Garst Mill Park. Between 2002 and 2005, approximately one ton of soil was being lost per year per foot of stream in one highly eroding stretch of Mudlick Creek, a soil loss figure that is approximately 100 times the average for the entire watershed. The goal of the project is to reduce sediment losses in the section of Mudlick Creek within Garst Mill Park by 75-90% with the implementation of stream protection and stabilization best management practices that will serve to stabilize the stream channel, improve the riparian zone and provide stormwater filtration consistent with the directives of the 2006 Roanoke River Benthic TMDL Report.

Stream restoration efforts along Mudlick Creek in Garst Mill Park have continued with DCR's support through the awarding of a FY 2006 WQIF grant in the amount of \$148,000 (WQIA-2006-31). This grant has enabled the County to enter into a contract with McCormick Taylor, an engineering and planning firm that has a long and successful history of completing stream and wetland projects. DCR's continued support of the project as addressed in this WQIF grant proposal will allow Roanoke County to move forward into Phase II of the project that will include design and construction for the entire 3,000-foot section of Mudlick Creek that flows through Garst Mill Park. Phase II project funding associated with this grant proposal will enable Roanoke County to complete design and construction of this project in a shorter time frame and for a lower cost than was originally envisioned in the FY 2006 grant application.

The project consultant, McCormick Taylor, has begun a geomorphic evaluation of the site to determine the degree of impairment and an estimation of an appropriate stable morphology for the channel using a relatively stable reach at the site or within a nearby watershed. The stream restoration effort proposed will focus on improving the aquatic habitat, decreasing sediment loss through bank erosion, and improving channel morphology to induce proper storage, sorting, and transport of sediment. Key to this effort will be the determination of a bankfull channel or the flow that best defines and maintains the primary channel characteristics such as cross-section, slope and plan form.

The project consultant will oversee permit coordination with the appropriate regulatory permitting agencies, including the Virginia Department of Environmental Quality (DEQ), the US Army Corps of Engineers (COE), and the Virginia Marine Resource Commission (VMRC). Through preliminary discussions with DEQ and COE representatives, it is our understanding that a Joint Permit Application will be required and the project consultant is scheduled to begin this effort immediately.

The stream restoration process will be formulated to ensure the involvement of all relevant partners in order to secure commitment to the stream restoration effort. Representatives of the COE, DEQ, US Fish & Wildlife Service (FWS) and Virginia Department of Game and Inland Fisheries (DGIF) have met with county staff at the project site and have voiced their support for and offered their assistance on the project. The FWS has committed to provide an in-kind contribution in the form of technical assistance that will include permitting assistance, design oversight of consultant plans (including review of preliminary and final design plans), construction management assistance, pollutant loading documentation assistance, development of monitoring protocol, monitoring assistance, and as-built survey.

Public educational outreach and involvement will be an integral part of the stream restoration project and will include project branding, website information updates, project location signage, postcard mailings, fact sheets, brochures and display boards, and development of video footage that will depict the creek's history and design and construction stages for its restoration. Stream monitoring will be coordinated through the Upper Roanoke River Roundtable with oversight from Roanoke County, the project consultant and the FWS.

Project Proposal Narrative

Project Need

The **Mudlick Creek Urban Stream Restoration Project at Garst Mill Park, Phase II** is a continuation of a WQIA project funded in 2006, known as DCR Grant #WQIA-2006-31, and will carry forward the project goals of the previously funded project centered on stream restoration design and construction using natural channel design techniques within the approximately 3,000-foot section of Mudlick Creek that flows through Garst Mill Park (see Appendix A). The restoration of Mudlick Creek at Garst Mill Park will focus on controlling the hydrologic regime by restoring natural channel geometry (recreating meanders and accessing the floodplain) to reduce stream bank erosion, restoring the in-stream habitat structure and augmenting the riparian cover through native vegetation plantings. Between 2002 and 2005, approximately one ton of soil was being lost per year per foot of stream in one highly eroding stretch of Mudlick Creek, a soil loss figure that is approximately 100 times the average for the entire watershed.

Mudlick Creek is one of 16 watersheds that were identified as high priority watersheds in the Roanoke Valley Regional Stormwater Management Plan and upon which analyses were conducted at both the watershed and subwatershed levels. These 16 watersheds are tributary to the Roanoke River in the Southern Rivers watershed and collectively drain a combined area of 247 square miles. Mudlick Creek is an approximately 6.2-mile tributary of the Roanoke River and receives flow from a watershed of approximately 6,121 acres. Mudlick Creek is located within the Roanoke River/Mason Creek state watershed (state watershed number 275, HUC LO4). Mudlick Creek and the Roanoke River have been designated impaired water resources according to information from the DEQ Final 2006 305 (b)/303 (d) Water Quality Assessment Integrated Report. The report indicates that 6.85 miles of Mudlick Creek and 32.02 miles of the Roanoke River are impaired due to an impaired benthic community and high *Escherichia coli* (*E. coli*) levels. Both water resources are classified as Category 5 impaired waters. Mudlick Creek is scheduled for a TMDL for the year 2018. The TMDL for the Roanoke River has been approved as of March 2006.

History of Streambank Erosion and Channel Movement

Appendix B includes information that documents the history of streambank erosion and stream channel movement within the approximately 3,000-foot section of Mudlick Creek within Garst Mill Park. Photos that depict the severity of streambank erosion and flooding problems along the section of Mudlick Creek within Garst Mill Park are also included in Appendix B. The section of Mudlick Creek within Garst Mill Park has been classified into three reaches for water quality study and analysis (see Appendix C for the Garst Mill Park Stream Characteristics Map). The table shown in Appendix C includes stream characteristics for this 3,000-foot section of Mudlick Creek that flows through Garst Mill Park in terms of water quality, bank quality, channel quality and algae parameters. Data were collected on July 6, 2004 and weather conditions were clear and sunny. The bank quality data indicate that both the left and right creek banks were observed to be “unacceptable” in terms of stability, and variable in terms of vegetative protection and riparian buffer zone.

Detailed dimensional and hydraulic data have been collected for 17 stream cross-sections located within the Garst Mill Park section of Mudlick Creek consistent with Rosgen classification guidelines. The stream survey that generated this data was conducted during the weeks of August 8-12 and 15-19, 2005. These data were entered into *The Reference Reach Spreadsheet, Version 2.1 T* computer software for analysis, planning and design purposes. Detailed data for six stream cross-sections located within Reach 3 can be found in Appendix C. At each cross-section, location of features and slope breaks such as top of bank, bankfull, edge of water, and thalweg were recorded. The cross-section survey provided the necessary information to calculate stream dimensions such as bankfull cross-sectional area, bankfull width, mean depth and max depth.

History of Stream Restoration Efforts

Initial stream restoration efforts began along Mudlick Creek in Garst Mill Park in 1997 when the Roanoke County Department of Parks, Recreation and Tourism (PR&T) received a \$25,000 Virginia Recreation Trails Fund Program grant from DCR to construct the Garst Mill Park Pedestrian and Bicycle Trail. While the main thrust of the project was the construction of the paved trail, a substantial portion of the overall project budget of \$61,000 was allocated to streambank stabilization based upon recommendations provided by DCR Environmental Engineer, Deborah Mills.

Several sections of streambank were successfully stabilized as a result of this project, thus serving to reduce erosion, enhance park aesthetics and promote wildlife habitat.

Around this same time, a regional stormwater management plan was developed for the Roanoke Valley that identified projected growth to 2020 and the flooding impacts of that growth in the area's 16 priority watersheds of the Roanoke River. The Roanoke Valley Regional Stormwater Management Plan: Water Quality Report (1997) identified water quantity control measures in each watershed. Within the Mudlick Creek watershed, two BMP locations were recommended to mitigate impacts of development, anticipated to be 50% high density, 30% low density and 10% medium density land use classes in hilly terrain of the Blue Ridge and Valley and Ridge geologic provinces.

In 1999, improving water quality and reducing flood damage became compatible goals and shaped the design of a stormwater management facility that was constructed in conjunction with the development of a 70-acre high school within the Mudlick Creek watershed. A potential site for a regional stormwater management facility had been identified in this general area during preparation of the county's regional master plan and it seemed that this might be the opportunity to create a regional stormwater facility that addressed water quality and as well as water quantity goals. The design criteria for the facility were modified to include reduction of nutrients, metals and sediment loads in accordance with the Commonwealth of Virginia's stormwater regulations, even though the NPDES requirements to meet such standards were not in place at the time of project construction. The water quality element of the regional stormwater management facility that included bioretention capabilities made the project eligible for funding under the Virginia Water Quality Improvement Act (WQIA). With support of the county Board of Supervisors and the School Board and with endorsement by the Roanoke Valley Greenway Commission and Project Impact, Roanoke County was awarded a \$230,000 WQIA matching grant in FY 2000 to aid in the construction of the Hidden Valley High School Stormwater Management Facility (Hidden Valley SWMF).

The Mudlick Creek watershed has been viewed as the County's "pilot" watershed for looking at urban stream restoration, flooding and stormwater quality issues since construction of the Hidden Valley SWMF. The **Mudlick Creek Urban Stream Restoration Project at Garst Mill Park, Phase II** is a continuation of a WQIA project funded in 2006 (WQIA-2006-31) and continues to be a logical extension of stormwater management efforts along this tributary of the Roanoke River.

Project Objectives

It is the goal of the project to reduce sediment losses in the section of Mudlick Creek within Garst Mill Park by 75-90% with the implementation of stream protection and stabilization best management practices as outlined in this proposal that will serve to stabilize stream channels, improve riparian zones and provide stormwater filtration consistent with the directives of the Roanoke River Benthic TMDL Report. For the three-year time period between 2002 and 2005, the 75-90% sediment loss goal would equate to an estimated reduction in sediment loss in the range of 180 to 216 tons per year in the 250-foot section of stream in Reach 3 that is located near the highly eroding point bar in the vicinity at Station 28+00 (see above discussion of estimated sediment losses of 720 tons over three-year period, or 240 tons of soil lost per year in the 250-foot section). The next section describes the project objectives in more detail. Please see Appendix E for additional pollutant reduction information.

Overall Content: Stream Restoration Contribution to Water Quality Improvements

The Roanoke Valley Regional Stormwater Management Plan (SWMP): Water Quality Report (1997) indicated that once regional facilities proposed in the stormwater plan are implemented to control the hydrologic regime, the targeted stream reaches can be restored using a combination of traditional and bioengineering techniques and natural stability concepts. Construction of the Hidden Valley Stormwater Management Facility upstream from Garst Mill Park represents the initiation of regional stormwater control measures on Mudlick Creek. Consistent with the recommendations of the 1997 Water Quality Report, the Mudlick Creek Urban Stream Restoration Project at Garst Mill Park will include restoring the equilibrium channel geometry (recreating meanders and utilizing the floodplain) to reduce stream-bank erosion, restoring the in-stream habitat structure and augmenting the riparian cover through native vegetation plantings.

In addition to the implications of the Roanoke Valley Regional SWMP: Water Quality Report, more recent water quality developments have given further direction to Roanoke County's water quality goals. In 2006, the Department of Environmental Quality listed Mudlick Creek as an impaired water resource due to elevated levels of Enterococci coli (E. coli). In addition, two TMDL's have been completed for the Roanoke River at the mouth of Mudlick Creek due to an impaired benthic macroinvertebrate community caused by sediment deposition and elevated levels of E. coli. This project proposes to use a number of physical practices and structures in conjunction with public education and outreach to address both sediment deposition and bacteria levels.

Sediment Deposition Reduction

Stream protection structures and methods of stream stabilization will help ensure the stability of the stream banks, consistent with technical guidance provided in the *Virginia Stream Restoration & Stabilization Best Management Practices Guide* (DCR Division of Soil and Water Conservation 2004). To the greatest extent possible, stream protection and stabilization techniques that will be implemented for this project will seek to replicate natural stream conditions by using vegetation, rock and other natural materials to achieve project goals. While emphasis will be placed on using "softer", more environmentally-friendly engineering techniques in comparison to those traditionally used in civil engineering projects, the ultimate decision on what techniques will be employed will be a function of engineering analysis based upon a thorough understanding of the erosive forces associated with stream flows for different storm events within this portion of the Mudlick Creek watershed. In reality, it is likely that a combination of techniques will be integrated into the final design based upon different stream protection and stabilization needs inherent to this specific section of Mudlick Creek. Typical bank protection and bank stabilization techniques that will be considered are shown in Appendix D.

Shear stresses and opportunities for toe scour that can undermine the stream bank resulting in bank failure are expected to be greater in the lower third of the stream profile. Therefore, bank protection techniques that utilize different types of structural revetments will likely be needed to protect the lower portion of stream banks. Bank stabilization or bioengineering techniques that rely heavily on the use of dormant woody vegetation and degradable manufactured natural fiber products can likely be used for the upper two-thirds of the stream bank as an integrated bank treatment when a more rigid bank protection technique is required for the lower third and toe of the stream bank. In conditions when the lower third of the bank is characterized as having velocities, shear stresses and scour potential that are relatively low, bank stabilization or bioengineering techniques may be used in this area as well. Where conditions allow, more environmentally-friendly bank stabilization or bioengineering techniques will be implemented in lieu of more rigid, structural stream protection techniques.

Sediment losses are based upon an analysis of approximately 250 feet of stream in Reach 3 near the highly eroding point bar located in the vicinity of Station 28+00 (see Appendix C for the aerial photo that depicts stream bank erosion in this area). Erosion measurements based upon a top of bank movement between 2002 and 2005 show that the top of bank recession ranged from 6 to 15 feet during this time period. The average bank height for this section is approximately 7.5 feet. Soil in this portion of the watershed is comprised primarily of Hayesville fine sandy loam and Chiswell-Litz urban land complex and has an estimated average density of 1.4 gm/cc (88.1 lb/ft³). It is estimated that approximately 16,335 ft³ (720 tons) of soil have been lost from the stream bank in this area over the three-year time period. Therefore, approximately one ton of soil is lost per year per foot of stream in this 250-foot stretch of Mudlick Creek. By reference, the Roanoke Valley Regional Stormwater Management Plan: Water Quality Report (1997) estimated that the Mudlick Creek watershed has an average total suspended solids (TSS) pollutant loading of 954,864 pounds/year. The watershed average is approximately 0.01 tons of soil per foot of stream per year. The banks in the highly eroding areas of the park are losing soil from the banks at approximately 100 times the average for the entire watershed.

The Department of Environmental Quality (DEQ) in their Roanoke River Benthic TMDL Report (2006) calls for a significant reduction in sediment loading in urban areas in order for the benthic macroinvertebrate community to meet the Commonwealth's Water Quality Standard pertaining to aquatic life. DEQ summarized that the sediment reduction goals outlined in the Roanoke Benthic TMDL study cannot be met without urban BMPs that stabilize stream channels, improve riparian zones and provide stormwater filtration. Sediment reduction tables from the report indicate that by reducing sediment loads from agriculture, transitional lands, developed areas and stream channel erosion by 69.5%, the sediment TMDL endpoint will be achieved and the benthic macroinvertebrate community should meet aquatic life standards. In the DEQ project support letter (see Appendix G for a copy of this

letter), DEQ notes that 69.5% reductions in sediment are required in MS4 (urban areas) locations including low intensity urban areas that characterize the Garst Mill Park area. In keeping with DEQ requirements and the Roanoke River Benthic TMDL Report, it is the goal of this project to reduce sediment losses in the section of Mudlick Creek within Garst Mill Park by 75-90% with the implementation of stream protection and stabilization best management practices that will serve to stabilize stream channels, improve riparian zones and provide stormwater filtration.

Bacterial Loading Reduction

E. coli bacteria are used as indicators of the presence of microorganisms that cause illness in humans. These bacteria are found in the digestive systems of warm-blooded animals. The entire Mudlick Creek water resource was listed in 2006 as impaired due to elevated levels of E. coli.

As part of the public involvement portion of the stream restoration effort, Roanoke County will work with local interest groups to develop a program to address specific sources of fecal bacteria, such as pet waste, in an effort to reduce direct deposit of animal wastes to the watershed. The Upper Roanoke River Roundtable (URRR) has been a strong cooperative partner in the education effort, in the past. Roanoke County has supported of the efforts of the URRR by installing pet waste receptacles along a portion of the Mudlick Creek Greenway.



A recent study by the Virginia Department of Environmental Quality found that from June 2002- July 2003 nearly 50% of bacteria found in the Roanoke River near River's Edge Park were from pet waste.

The Upper Roanoke River Roundtable (URRR) has teamed up with Roanoke County, the City of Roanoke, Western Virginia Water Authority, VDCR, VDEQ, VDH, Virginia Environmental Endowment, Ferrum College and Virginia Tech to obtain grant monies to educate the citizens of the Roanoke Valley about water pollution associated with pet waste.

In support of the efforts of the URRR, Roanoke County has installed pet waste receptacles along the portion of the Mudlick Creek Greenway located in Garst Mill Park.



Project Continuation

Roanoke County has been continually involved in addressing water quality problems before federal, state, or local mandates are required. There are no current mandates that require the County to pursue these water quality goals. The County follows the conviction that small scale effort in the appropriate measures may have long-lasting preventative and restorative effects on the water quality of our valley.

As previously noted, this project is a continuation of an existing Water Quality Improvement Fund (WQIF) grant funded under the FY 2006 WQIF Request for Grant Applications. Stream restoration efforts along Mudlick Creek in Garst Mill Park have continued with DCR's support through the awarding of a FY 2006 WQIF grant in the amount of \$148,000 (WQIA-2006-31). This grant has enabled the County to enter into a contract with McCormick Taylor, an engineering and planning firm that has a long and successful history of completing stream and wetland projects in the Mid-Atlantic Region for regional, state and local government agencies. DCR's continued support of the project as addressed in this WQIF grant proposal will allow Roanoke County to move forward into Phase II of the project that will include design and construction for the entire 3,000-foot section of Mudlick Creek that flows through Garst Mill Park. Phase II project funding associated with this grant proposal will enable Roanoke County to complete design and construction of this project in a shorter time frame and for a lower cost than was originally envisioned in the FY 2006 grant application.

Methodology & Timeline

The project consultant, McCormick Taylor, has begun a geomorphic evaluation of the site to determine the degree of impairment and an estimation of an appropriate stable morphology for the channel using a relatively stable reach at the site or within a nearby watershed. The stream restoration effort proposed will focus on improving the aquatic habitat, decreasing sediment loss through bank erosion, and improving channel morphology to induce proper storage, sorting, and transport of sediment (see Appendix E for the preliminary project approach and project schedule). Key to this effort will be the determination of a bankfull channel or the flow that best defines and maintains the primary channel characteristics such as cross-section, slope and plan form.

The project consultant will oversee permit coordination with the appropriate regulatory permitting agencies, including the Virginia Department of Environmental Quality (DEQ), the US Army Corps of Engineers (COE), and the Virginia Marine Resource Commission (VMRC). Through preliminary discussions with DEQ and COE representatives, it is our understanding that a Joint Permit Application will be required and the project consultant is scheduled to begin this effort immediately.

NPS Results, NPS Reductions and Environmental Results

Please refer to information provided in the 2007 WQIF Application Form under Section 5 "NPS Results and NPS Pollution Reduction Estimates". Additional information pertinent to this section can be found under the 'Project Objectives' and 'Overall Content: Stream Restoration Contribution to Water Quality Improvements' sections within this document. Please see Appendix E for additional pollutant reduction information.

Partner Justification

The stream restoration process will be formulated to ensure the involvement of all relevant partners in order to secure commitment to the stream restoration effort (see Appendix F). Representatives of the US Army Corps of Engineers (COE), US Fish & Wildlife Service (FWS), Virginia Department of Environmental Quality (DEQ), and Virginia Department of Game and Inland Fisheries (DGIF) have met with county staff at the project site and have voiced their support for and offered their assistance on the project. Formal letters of support have been received from the following agencies and organizations:

- Department of Environmental Quality, West Central Regional Office, Roanoke VA
- Upper Roanoke River Roundtable
- Western Virginia Land Trust
- Roanoke Valley Greenways
- Pathfinders For Greenways
- Virginia Department of Game and Inland Fisheries
- U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service has committed to provide an in-kind contribution of \$33,920.00 to the project in the form of technical assistance (see Appendix G). These funds will be used specifically for permitting assistance,

design oversight of consultant plans (including review of preliminary and final design plans), construction management assistance, pollutant loading documentation assistance, development of monitoring protocol, monitoring assistance, and as-built survey. The Virginia Department of Game and Inland Fisheries has indicated that one of its staff will offer technical assistance services to the project (see Appendix G).

Educational Outreach

Public educational outreach and involvement will be an integral part of the stream restoration project (see Appendix F for more detailed information). Assistance with this effort will be provided by the project consultant, McCormick Taylor (MT) as noted below:

- Project Branding: MT to design and develop a logo/recognizable brand for the stormwater management efforts/program in the County
- Website information: MT to provide project information to be hosted on County's project website
- Project Location Signage: MT to design signage for Garst Mill Park summarizing the design and construction process
- Postcard Mailings: MT to design and print postcards with a project summary and website links to be distributed to local citizens to be made available at local libraries, schools, and businesses.
- Fact Sheets/Trade Publications: MT to design and print brief one page fact sheets to be either made available at local libraries, schools, and businesses or printed in journals and /or trade publications.
- Brochures: MT to design and print full color multi-page booklets/brochures summarizing either the project and restoration process or the County's stormwater efforts to be distributed at local libraries, schools, and businesses.
- Display Boards: MT to design and produce static display boards to be utilized at public meetings and presentations. Boards may show before and after photographs (of similar projects), to be replaced by actual photographs during and post construction as well as process graphics and other informational pieces.
- Video Design and Coordination: MT to provide information to Roanoke County Channel 3 to assist them in developing video footage depicting the creek's history and design and construction stages for its restoration

Monitoring

Stream monitoring will be coordinated through the Upper Roanoke River Roundtable (UR3) with oversight from Roanoke County, the project consultant and the U.S. Fish and Wildlife Service. The UR3 serves as an advisory group in the upper basin, and helps identify and address issues of water quality and quantity and makes recommendations about appropriate management solutions to issues that impact the upper basin of the Roanoke River (see Appendix F for more information on the stream monitoring program).

Budget Narrative – WQIF Grant and Matching Funds

The project budget reflects estimated contractual and construction costs. Contractual costs will include costs associated with Architectural/Engineering (A/E) services and other consultant fees for surveying, site analysis, preliminary and final BMP design, permitting, construction document preparation, bidding, construction management and inspection, monitoring, and water sampling and analysis. Construction costs will include costs associated with mobilization, erosion and sediment control, BMP construction, maintenance of stream flow during BMP construction and demobilization. It is anticipated that WQIF Funds will be allocated toward payment of contractual services and for direct costs related to installation of BMPs and pollution control measures, and specialized construction services as needed for project construction. It is anticipated that Match Funds will also be allocated toward payment of contractual services, and will include in-kind construction services performed by Roanoke County. In-kind Match Funds will also come from the U.S. Fish and Wildlife Service in the form of technical assistance during project planning, design and construction. Local government capital project funds will also be used as Match Funds consistent with project funding requested through the Roanoke County Capital Improvement Program (see Appendix H for more detailed information on the project budget).