TOWN *of*
WAKE FOREST

301 S. Brooks Street
Wake Forest, NC 27587
t 919.435.9400

www.wakeforestnc.gov

May 23, 2012

Kim Nimmer
North Carolina Division of Water Quality
1617 Mail Service Center
Raleigh, NC 27699-1617

Re: 319 (h) Grant Application (FY 2012)
Smith Creek Watershed Restoration Plan and Implementation Project
Town of Wake Forest, NC

Dear Ms. Nimmer:

Thank you for the opportunity to submit a 319 grant application to develop and conduct the Smith Creek Watershed Restoration Plan and Implementation Project. Smith Creek Watershed (HUC id 030202010704) is comprised of 15,025 acres. It is currently listed on the 2008, 2010, and draft 2012 303d list of impaired waters for fair bioclassification for benthos.

The Town of Wake Forest is proactive when it comes to protecting the environment and would like to improve the water quality of Smith Creek with the help of the 319 grant funds. To give you an example of how the Town has incorporated the environment into our standards, our new Town Hall (which is in the Smith Creek Watershed) is a L.E.E.D. Certified Platinum Green Building by US Green Building Council. The 44,000 square foot, 4 story structure utilizes recycled and renewable materials, low e glass, occupancy light sensors in every office, a constructed wetland, a bioretention area, native plants on the entire grounds, removal of contaminated soils, addition to a park and buffer area, tree save areas for two large historic oaks, and PV solar panels. We have made it a priority to require any building retrofit or new facility to be L.E.E.D. Certified building.

The Town has been awarded and successfully completed multiple grants from NCDOT, ARRA, and CWMTF. We have multiple staff members who have managed grants and are comfortable with the additional requirements and time that needs to be dedicated to a grant funded project. The Town recently completed a $494,506 ARRA Stimulus Grant from the North Carolina State Energy Office that replaced T-12 florescent lights with LED lights, T-12 lights with T-8's, converted an HVAC unit to a recycled motor oil heater, and converted an existing HVAC system to a solar HVAC/hybrid water heater system. The project is estimated to save the Town and its citizens 40% in operating costs. We also received four Clean Water Management Trust Fund Grants in the past ten years. Two were to design and restore a 1,500 lineal foot section of Richland Creek (project id 2002A-406 and 2006A-416, with a combined grant total of $586,000). A third was to develop an innovative stormwater BMP that utilizes floating islands in wetlands to increase nitrogen and phosphorus uptake (project id 2008-1030 grant total $341,000). We were able to partner with North Carolina State University, North Carolina Cooperative Extension, Wake County Soil and Water, and Heritage High School in order to complete the project. The forth grant was to acquire conservation and greenway easements along Smith Creek near the Smith Austin Creek Restoration Site (project id 2000A-016 grant total $1,128,300). The conservation easements were then donated to Ecosystem Enhancement Program for the highly successful restoration of Smith and Austin Creeks (EEP Project 343) which was completed in 2002. The project restored over 11,000 linear feet of stream near one of our most prominent greenway trails and parks.

In addition to restoration and BMP projects, the Town has made it a priority to protect and improve our natural resources, particularly when it comes to water quality. Within the last five years, the Town has implemented an NPDES Phase II Stormwater Program, has been delegated an Erosion and Sediment Control Local Program that requires strict measures and permits for projects over half an acre, installed two rain gardens, two large roof water cisterns, and has increased our floodplain protection to the 500 year line. The Town has also developed hands on environmental education programs that are geared towards students and citizens of Wake Forest. The programs introduce participants to point source pollution by using environmental models such as the Enviroscape, stream buffer requirements and signage installation, stream buffer replanting, stream bank restoration via live staking, macro identification and counts, utilization of water quality testing equipment such as a turbidity meter and YSI meter, and installation of stormwater curb markers to remind citizens that storm drains lead into creeks, streams, rivers, and eventually oceans.

If the 319 grant is awarded, the Project's findings will be integrated into Town policy for the Smith Creek Watershed and also in part for Tom's, Richland, and Horse Creek Watersheds. The Project will also identify point and non-point source pollution areas that may require BMP installation, BMP renovations, enforcement, education, and possible stream restoration locations. The list will serve as a guide to the Town on both large and small restoration projects, which the Town will implement after it is received.

Thank you for your consideration of the 319 grant application for the Smith Creek Watershed Restoration Plan and Implementation Project. We look forward to working with you and improving the Smith Creek Watershed.

Sincerely,

Vivian A. Jones, Mayor
Town of Wake Forest

Cc: Holly Miller, Town of Wake Forest
Chip Russell, Town of Wake Forest
Eric Keravuori, Town of Wake Forest
Roe O'Donnell, Town of Wake Forest
Ward Marotti, WK Dixon

Application for Section 319
Non Point Source Pollution Control Grant---FY2012

Division of Water Quality
North Carolina Department of Environment and Natural Resources

1. Project Title	Smith Creek Watershed Restoration Plan and Implementation Project

2a. Grantee Primary Contact or Project Manager[1]					
Name	Holly E. Miller, EI, CPESC, CFM				
Title	Assistant Town Engineer				
Organization Name	Town of Wake Forest				
E-mail address	hmiller@wakeforestnc.gov				
Mailing Address	301 South Brooks Street				
City	Wake Forest	State	NC	Zip	27587
Telephone	(919) 435-9443	Fax Number		(919) 435-9539	

[1] **A one-page Statement of Qualifications must be provided in Section 3 of the application form to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.**

2b. Grantee Execution Address (where contract will be mailed for signature)					
Name	Holly E. Miller				
Title	Assistant Town Engineer				
Organization Name	Town of Wake Forest				
E-mail Address	hmiller@wakeforestnc.gov				
Mailing Address	301 South Brooks Street				
City	Wake Forest	State	NC	Zip	27587
Telephone	(919) 435-9443	Fax Number		(919) 435-9539	
Federal Tax ID Number					

2c. Grantee Payment Address (where invoice payments will be mailed)					
Name	Holly E. Miller				
Title	Assistant Town Engineer				
Organization Name	Town of Wake Forest				
E-mail Address	hmiller@wakeforestnc.gov				
Mailing Address	301 South Brooks Street				
City	Wake Forest	State	NC	Zip	27587
Telephone	(919) 435-9443	Fax Number		(919) 435-9539	

3. Required Statement of Qualifications (to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.)

Holly E. Miller, EI, CPESC, CFM
Assistant Engineer, Town of Wake Forest

EDUCATION/CERTIFICATIONS/TRAINING:
Graduate Certificate Watershed Assessment and Restoration, NCSU, 2010
B.S. Civil Engineering, Clarkson University, 2002

- Engineer In Training- 2002
- Certified Professional in Erosion and Sediment Control (CPESC) #4425
- Certified Floodplain Manger (CFM) # NC 09-0351
- NCDENR Certified Environmental Educator
- NCDOT BMP Inspection and Maintenance Certified
- NCDENR BMP Design Certified
- Stream Morphology Assessment, NCSU Stream Restoration Program
- Construction Practices for Stream Restoration, NCSU Stream Restoration Program
- Natural Channel Design Principles, NCSU Stream Restoration Program
- Stormwater BMP Design NCSU BAE 575
- Watershed Monitoring and Assessment NCSU BAE 575
- Fluvial Geomorphology NCSU BAE 590M
- Ecohydraulics and River Corridor Function NCSU BAE 590Y
- Land and Water Engineering NCSU BAE 590W

PROFESSIONAL ACCOMPLISHMENTS:

- Development of Wake Forest Erosion and Sediment Control program, including ordinance approval, permitting, and enforcement
- Environmental education program for citizens, students, contractors, and educators
- Neuse River Foundation grant ($16,000): stream water quality monitoring and education program
- Clean Water Management Trust Fund grant #2006A-416 ($346,000): Richland Creek restoration
- Clean Water Management Trust Fund grant #2008-1030 ($341,000): innovative constructed wetland. Supervised wetland project design, construction, maintenance, and testing of inflow and outflow water quality that utilized new floating island technology
- Worked closely with local high school students to learn about wetlands, water quality, native plants, and stream restoration techniques
- Co-Chaired Area 4 NC Envirothon Team from Heritage High School in 2011/2012
- Replanted degraded, cleared, or eroded stream buffers with native trees, grasses, and plants
- Installation of stormwater BMP education signs and Neuse River Buffer conservation signs

Ward Marotti - WK Dickson & Co., Inc.
EDUCATION/CERTIFICATIONS/TRAINING:
BA - Environmental Studies, University of Northern Colorado

- Advanced Stream Restoration Design, NCSU Stream Restoration Program
- Stream Restoration Design Principles, NCSU Stream Restoration Program
- Stream Classification and Assessment, NCSU Stream Restoration Program
- CVS/EEP Vegetation Monitoring, NC Ecosystem Enhancement Program
- Freshwater Wetland Construction Techniques, Rutgers University
- Hydric Soils for Wetland Delineation, NRCS Wetland Science Institute
- DRAINMOD, NC State University
- Level Spreader Design, NCSU Biological and Agricultural Engineering

- EEP On-call Calibration/Training, NC Ecosystem Enhancement Program
- Erosion and Sediment Control for Stream Restoration Design, NC Ecosystem Enhancement Program
- Land Desktop for Stream Restoration and Monitoring, NC Stream Restoration Institute
- USACE/NCDWQ Consultant Workshop, Rapanos

PROFESSIONAL ACCOMPLISHMENTS:
Mr. Marotti has 20 years experience in the application of environmental sciences to achieve natural resource restoration, conservation, management, and permitting goals. His wide-ranging natural resources evaluation and restoration experience has spanned many diverse physiographic provinces including: the Piedmont, the Inner and Outer Coastal Plain, the Blue Ridge Mountains, as well as numerous others throughout the West and South America.

David Kiker, PE, CFM - WK Dickson & Co., Inc.
EDUCATION/CERTIFICATIONS/TRAINING:
BS – Civil Engineering, Virginia Polytechnic and State University
- Professional Engineer, NC # 027419, SC #22144, GA # 028858
- Certified Floodplain Manager (CFM)
- River Restoration and Natural Channel Design; Wildland Hydrology; Elkin, NC
- River Assessment and Monitoring; Wildland Hydrology; Meadows of Dan, VA
- River Morphology and Applications; Wildland Hydrology; Pagosa Springs, CO
- Applied Fluvial Geomorphology; Wildland Hydrology; Pinedale, WY
- Sediment Transport Analysis Using HEC-RAS; American Society of Civil Engineers, New Orleans, LA

PROFESSIONAL ACCOMPLISHMENTS:
Mr. Kiker has over 23 years of experience in water resources management, with particular emphasis in computer simulations of watershed hydrology, channel hydraulics, pollutant transport and attenuation, and stream restoration. David has prepared stream restoration and stabilization designs in Virginia, North Carolina and South Carolina on a variety of projects in both urban and rural settings. Designs have incorporated innovative measures to meet both channel stability and habitat objectives along with water quality improvement goals and FEMA requirements. He has extensive experience in the analysis and design of water quality features such as bioretention sites, stormwater wetlands, and in hydraulic control structures. He is proficient in the applications of standard geomorphic analytical methods as well as the Classification of Natural Rivers and attendant protocols developed by Rosgen.

319 Experience (Kiker and Marotti):
- Soco Creek Watershed Management/Restoration Plan - Jackson County, NC –2006
- Lower Oconaluftee Watershed Management/Restoration Plan - Jackson and Swain Counties, NC – 2010
- Goose Creek Stream Restoration Design and Construction Oversight - Swain County, NC – 2010
- Soco Creek Restoration Design and Construction Oversight – Swain County, NC - ongoing
- Hiwassee Watershed Management/Restoration Plan – Cherokee County, NC - ongoing

Greg Jennings, PhD, PE - NC State University
EDUCATION/CERTIFICATIONS/TRAINING:
PhD – Agricultural Engineering (Water Resources), University of Nebraska
MS - Agricultural Engineering, Pennsylvania State University
BS - Agricultural Engineering, Pennsylvania State University
- Professional Engineer, NC #25454

- Additional training includes short courses taught by D. L. Rosgen, PhD: Applied Fluvial Geomorphology, River Morphology and Applications, River Assessment and Monitoring, River Restoration and Natural Channel Design, River Restoration Design Implementation

PROFESSIONAL ACCOMPLISHMENTS:
Dr. Jennings directs the NCSU Stream Restoration Program which coordinates multi-agency technical support and education for natural resource professionals. He directs grant-funded demonstration projects to implement and evaluate natural channel design techniques for restoring stream functions in a variety of watershed conditions. He has provided consulting services in stream assessment and restoration project management, feasibility assessment, planning, design, permitting, construction, and monitoring to government agencies, consulting firms, landowners, businesses, and non-profit organizations. Dr. Jennings teaches professional development workshops in stream and riparian assessment, classification, restoration, natural channel design, vegetation, hydraulic modeling, evaluation, and habitat assessment. He has also provided technical support for restoration of over 150,000 linear feet of streams on 50+ project sites in Coastal Plain, Piedmont, and Mountain regions throughout the Southeastern USA.

Sarah Sheldon
GIS Planner, Town of Wake Forest

EDUCATION/CERTIFICATIONS/TRAINING:
M.A. Geography, Appalachian State University, 2005
B.S. Geography, University of Wisconsin-Eau Claire, 2003

- Computer Techniques in Geography, UWEC GEOG 199
- Introduction to Cartography, UWEC GEOG 280
- Remote Sensing of the Environment, UWEC GEOG 388
- Advanced GIS, ASU GHY 5812
- NC Property Mappers Association, Mapping School
- GPS in North Carolina, URISA workshop
- GIS Program Management, URISA workshop
- Using the US National Grid in NC, URISA workshop
- ArcGIS Desktop II: Tools and Functionality, ESRI
- Working with Map Topology in ArcGIS, ESRI
- Customizing ArcPad, ESRI
- GIS Enterprise Architecture & System Integration, URISA workshop
- Data Management in the Multiuser Geodatabase, ESRI

PROFESSIONAL ACCOMPLISHMENTS:
Sarah Sheldon has 6.5 years of experience creating GIS data and products to support a variety of local government activities.

Evan Keto
Urban Forester, Town of Wake Forest

EDUCATION/CERTIFICATIONS/TRAINING:
M.S. Forestry, NCSU, 2010
B.S. Environmental Science & Policy, University of Maryland, 2004
Concentration in Landscape Ecology

- Ecology Studies Program, Poolesville High School, 2000
- ISA Certified Arborist SO-6594A

- Wetland Ecology UMD NRMT450
- Silviculture NCSU FOR507
- Woody Plant Materials I & II UMD PLSC253/254
- Plant Ecology UMD BSCI460/461
- Environmental Plant Physiology UMD NRSC401
- Forest Wildlife Management NCSU FW595D

PROFESSIONAL ACCOMPLISHMENTS:

- Coordinated planting of more than 600 native trees at 3 locations by more than 100 volunteers on March 16, 2012.
- Designed and guided volunteers to create an educational low-water public garden that received a 2010 Sir Walter Raleigh Award for Community Appearance and 2011 City of Raleigh Environmental Award.
- Received 2009 NCSU Outstanding Graduate Teaching Assistant award for undergraduate courses in Natural Resource Measurements NR 300 (Spring 2008, Spring 2009) and Urban and Community Forestry FOR 220 (Fall 2008). Both classes involved a mix of field studies and lectures.
- Assisted with streambank and wetland restoration projects for Anacostia Watershed Society, Bladensburg MD, including riparian tree planting, live staking, transplanting emergent wetland vegetation, and maintaining native tree and wetland plant nurseries.
- Experience with water quality testing, including turbidity, pH, DO, nitrates/nitrites, and macroinvertebrate sampling.

Publications:

- Keto et al. 2012. Design Choices and Urban Forest Characteristics in Raleigh, North Carolina, U.S. Parking Lots. Arboriculture & Urban Forestry
- Hess and Keto. 2009. Counting Grass as a Rich Introduction to Population Estimation. Journal of Natural Resources and Life Sciences Education.

Memberships:
Alliance for Community Trees, International Society of Arboriculture, North Carolina Urban Forest Council, and Triangle J Council of Governments Regional Appearance Committee

319(h) Grant Funds Requested	$123,040.00			
Match funds or in-kind Match Services	$112,876.00	***5. Type of Project (check one)***	x	Development or implementation of a Watershed Restoration Plan
				Development or implementation of a TMDL
4. Total Project Cost	$235,916.00			Other: (please indicate)

6. Project Start Date	January 1, 2013	***Project End Date***	December 31, 2014

7. Geographic Coverage	Statewide	Regional **X, Neuse River**	Watershed **X, Smith Creek**	Site Specific

8. Project Location – REQUIREMENT: Important to submit as completely as possible, especially the Lat/Long coordinates and 303(d) List Assessment Unit Number. (NOTE: Payment of 319 Invoices will be held if all required information is not submitted in quarterly reports and the final reports, AU numbers, Lat/Long, and coordinates for all installed BMP practices)	
River Basin	Neuse River
Watershed(s)	Smith Creek
Watershed size	15,025 acres
303(d) listed Stream	Yes **x** No
303(d) List Assessment Unit Number	27-23-(2)
HUC(s) (12 digit USGS Hydrologic Unit Codes)	030202010704
County	Wake and Franklin
USGS. 7.5 minute topographic quadrangle map(s) in project area	Wake Forest, Rolesville, Franklinton
Position coordinates of project location	Latitude 35.949192 Longitude -78.508262

9. NPS Pollution Sources to be addressed (Check all that apply)			
x	Agriculture	x	Waste Disposal (includes onsite systems)
x	Construction	x	Hydrologic Modification
x	Silviculture		Marina and Recreational Boating
x	Urban runoff/Stormwater	x	Groundwater Loading
	Resource Extraction	x	Natural Sources
x	Habitat Modification (drainage/filling wetlands, streambank destabilization)		Other:

10. NPS Pollutants to be addressed (check all that apply)			
x	Excess Nitrogen	x	Pesticides
x	Excess Phosphorus	x	Oil and grease
x	Sedimentation	x	Temperature
x	Pathogens/Bacteria	x	pH
x	Metals	x	Alterations
x	Low dissolved oxygen		Other:

11. *Estimate Load Reduction, if checked for excess nitrogen, excess phosphorus and/or sedimentation*[2]	
# pounds of nitrogen saved from project implementation	Reference:
# pounds of phosphorus saved from project implementation	Reference:
# tons of soil saved from project implementation	Reference:
Load Reduction Model Used: STEPL, Region 5, L-THIA, Other	

[2] **Providing a load reduction estimate is required for all BMP implementation projects, including demonstrations.**

12. *Do you intend for collected data to be used by DWQ for Use Support decisions?*	
Yes	**Explanation:** Collected data will be used to update 303d listing (i.e. detail/specify extent of impaired reach, or remove from list).

13. *Do you propose to install BMPs or other ag management measures that would be eligible for NC Agricultural Cost Share Program (ACSP) funding? If Yes, please document that the demand for ACSP funding in your county exceeds the supply, prompting your application for a 319(h) grant.*	
Yes	No x

14. *Does this proposal address needs that were identified in a DWQ basin plan? If yes, please identify the specific need and the basin in which the need is outlined.*	
Yes	**Explanation:** Collecting additional water quality, benthic macroinvertebrate, and fish community bioclassification data throughout the watershed will provide the information necessary to "determine the impact from development occurring in this area" (Neuse Basinwide Plan 2009).

15. Project Abstract (short concise summary of the project – DO NOT EXPAND SPACE PROVIDED)

Smith Creek is a Neuse River tributary which confluences with the Neuse approximately 1.1 river miles downstream from the Capital Boulevard (US 1) bridge. The *Neuse River Basinwide Water Quality Plan* (2009) indicates that Smith Creek "...is Impaired for aquatic life based on a Fair fish community bioclassification at site JF 31." The *2012 Draft North Carolina 303(d) List-Category 5* rates Smith Creek as Impaired because of its “Fair Bioclassification.” The “Reason for Rating” listed is “Fair Bioclassification” and the “Parameter” listed is “Ecological/biological Integrity Benthos.” Based on this, Smith Creek (from the Wake Forest Reservoir dam at the GG Hill Water Treatment Plant, to its confluence with the Neuse River) was added to the 2008 303(d) list of impaired waters, and remains on the 2010 and draft 2012 303(d) lists. From the dam to its headwaters in Franklin County, Smith Creek is fully supporting. The Smith Creek Watershed Restoration Plan will provide a detailed evaluation of water quality and aquatic habitat conditions throughout the Smith Creek watershed, from its headwaters in Franklin County, to its confluence with the Neuse River in Wake County, immediately adjacent to the Smith Creek Wastewater Treatment Plant (NPDES Permit NC0030759). It will clarify the site specific and reach (catchment) specific conditions associated with the Town of Wake Forest's most rapidly developing watershed, how these conditions have affected water quality, and rank the most effective (cost and implementation) methods to improve water quality and have Smith Creek removed from the 303(d) list.

Because monitoring will continue for four years and the final *Watershed Restoration Plan* will not be completed until 2016, site-specific implementation will begin following the first year’s preliminary evaluation and identification of appropriate water quality improvement projects.

16. Funding Requested										
Budget Categories (itemize all categories)	Section 319				Non-Federal Match *				Total	Justification (Include detailed explanation for each budget line item)
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4		
Personnel/Salary					$11,492	$34,476	$22,984	$22,984	$91,936	In-kind cost for education, project administration, and project management
Fringe Benefits									$0	
Supplies									$0	
Equipment					$4,204	$4,204	$4,204	$4,204	$16,816	New and existing equipment
Travel									$0	
Contractual	$43,064	$47,986	$9,843	$22,147	$1,031	$1,031	$1,031	$1,031	$127,164	Detailed watershed assessment done by WK Dickson & Co, Inc.
Other									$0	
Total Direct	$43,064	$47,986	$9,843	$22,147	$16,727	$39,711	$28,219	$28,219	$235,916	
Indirect (max. 10% of direct costs, per 40 CFR 35.268)										
Annual Totals	$43,064	$47,986	$9,843	$22,147	$16,727	$39,711	$28,219	$28,219	$235,916	
Grand Total	$123,040				$112,876				$235,916	
% of Total Budget	52%				48%				100%	

***Note: Non-Federal match must be a minimum of 40% of the total project budget

Year 1: January 1 - June 30, 2013 (6 months) – Total MUST equal sum of quarters 1-2 in Milestone Table #20
Year 2: July 1, 2013-June 30, 2014 (12 months) – Total MUST equal sum of quarters 3-6 in Milestone Table #20

Year 3: July 1, 2014-June 30, 2015 (12 months) – Total MUST equal sum of quarters 7-10 in Milestone Table #20
Year 4: July 1 - December 31, 2015 (6 months) – Total MUST equal sum of quarters 11-12 in Milestone Table #20

17. Budget Summary (Combined federal and match funds)							
	BMP Implementation	Project Management	Education Training or Outreach	Monitoring	Technical Assistance	Other	Total
Personnel		$ 27,130	$ 64,806				$ 91,936
Fringe Benefits							
Supplies							
Equipment			$ 16,816				$ 16,816
Travel							
Contractual			$ 4,124	$ 23,040	$ 100,000		$127,164
Operating Costs							
Other							
Total	$0	$ 27,130	$ 85,746	$ 23,040	$ 100,000	$ 0	$ 235,916

18. Local and State Match (non-federal) Summary	
Total Match amount	$112,876
Cash Match	$11,896
In-kind Match	$100,980
Source(s) of Cash Match	Town of Wake Forest annual budget
Source(s) of In-kind Match	Town of Wake Forest, NC Cooperative Extension, Wake County Soil and Water, Franklin County Soil and Water, NC State University Biological and Agricultural Engineering Department, Heritage High School, Franklin Academy, and Wake Forest/Rolesville High School

19. Project Partners (may add more, if needed)[3]			
Agency Name	WK Dickson & Co., Inc		
Agency Address	720 Corporate Center Drive, Raleigh, NC 27607		
Role/contribution to Project	Field work, water quality analysis, watershed modeling, watershed restoration plan, professional services, environmental education		
Contact Person	Ward Marotti	Phone No.	(919) 782-0495
E-mail address	wmarotti@wkdixon.com		
Agency Name	Heritage High School		
Agency Address	1150 Forestville Road, Wake Forest, NC 27587		
Role/contribution to Project	Environmental education, FFA, forestry/ag science, horticulture, stormwater project assistance		
Contact Person	Camber Starling	Phone No.	(919) 570-5600
E-mail address	cstarling@wcpss.net		
Agency Name	Franklin Academy High School		
Agency Address	648 Flaherty Avenue, Wake Forest, NC 27587		
Role/contribution to Project	Science Education, stormwater project assistance		
Contact Person	Kelly Hartzell	Phone No.	(919) 453-5090
E-mail address	hartzellk@franklinacademy.org		
Agency Name	North Carolina State University- Bio Ag Engineering		
Agency Address	Room 210A, Weaver Labs, Box 7625, Raleigh, NC 27695-7625		
Role/contribution to Project	Education, stream evaluation, watershed modeling, stormwater project assistance		
Contact Person	Greg Jennings, PhD	Phone No.	(919) 600-4790
E-mail address	Jennings@ncsu.edu		
Agency Name	North Carolina Cooperative Extension		
Agency Address	103 South Bickett Blvd, Louisburg, NC 27549		
Role/contribution to Project	Environmental education, stormwater project assistance		
Contact Person	William Lord/Mitch Woodward	Phone No.	(919) 496-9944
E-mail address	wglord@ncsu.edu; mitchell_woodward@ncsu.edu		
Agency Name	Wake Forest- Rolesville High School		
Agency Address	420 West Stadium Drive, Wake Forest, NC 27587		
Role/contribution to Project	Environmental education		
Contact Person	Samantha Brynne Pontrelli	Phone No.	(919) 554-8611
E-mail address	spontrelli@wcpss.net		
Agency Name	Wake County Soil and Water Conservation District		
Agency Address	4001D Carya Drive, Raleigh, NC 27610		
Role/contribution to Project	Environmental education, stormwater project assistance		
Contact Person	Teresa Hice	Phone No.	(919) 250-1061

E-mail address	thice@wakegov.com		
Agency Name	Franklin County Soil and Water Conservation District		
Agency Address	101-B South Bickett Blvd, Louisburg, NC 27549		
Role/contribution to Project	Environmental education, stormwater project assistance		
Contact Person	Charles Bass	Phone No.	919-496-3137 ext 3
E-mail address	charles.bass@nc.nacdnet.net		
Agency Name	NC DWQ		
Agency Address	512 N Salisbury St, Raleigh, NC 27603		
Role/contribution to Project	Watershed Plan development review, Neuse Basin Planner		
Contact Person	Nora Deamer	Phone No.	919-807-6431
E-mail address	nora.deamer@ncdenr.gov		
Agency Name	NC DWQ		
Agency Address	512 N Salisbury St, Raleigh, NC 27603		
Role/contribution to Project	Environmental Sampling Assistance, Water Quality Sampling Assistance		
Contact Person	Cam McNutt	Phone No.	919-807-6435
E-mail address	Cam.mcnutt@ncdenr.gov		
Agency Name	TJCOG		
Agency Address	4307 Emperor Blvd, Suite 110, Durham, NC 27703		
Role/contribution to Project	Water resources education, possible 205j funding		
Contact Person	Michael Schlegel	Phone No.	919-295-0017
E-mail address	mschlegel@tjcog.org		

[3] **A one-page Statement of Qualifications must accompany applications to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.**

20. Project Milestone Schedule		
Time Period/Date	Activities (List specific quantifiable outputs or activities that will be achieved during each quarter)	Anticipated % of Requested Funding Spent[1]
First Quarter Jan-Mar 2013	- create stakeholder list; contact stakeholders - delineate sub-watersheds and evaluate existing data - identify data gaps - conduct impervious cover analysis - estimate sediment loads using RUSLE, create mean annual flood curve, establish ArcIMS website - begin field assessment using EPA Rapid Habitat Assessment protocol - develop environmental education schedule, revise website, schedule education days - conduct initial benthos sampling	$12,304; 10% (quarter); 10% (total)
Second Quarter Apr-June 2013	- conduct impervious cover analysis - estimate sediment loads using RUSLE - create mean annual flood curve, establish ArcIMS website - begin field assessment using EPA Rapid Habitat Assessment protocol - start environmental education workshops/public education - conduct benthos sampling	$30,760; 25% (quarter); 35% (total)
Third Quarter July-Sept 2013	- rank/prioritize sub-watersheds - complete prioritization report - conduct follow up data collection at selected sites - conduct benthos sampling - continue ongoing public school education programs - update ArcIMS website	$30,760; 25% (quarter); 60% (total)
Fourth Quarter Oct-Dec 2013	- finalize and rank stream and BMP projects - recommend additional measures - identify/flag stormwater project locations and schedule- rain gardens, BMP's, buffer restoration via planting, and protection signage - complete draft Watershed Restoration Plan - continue ongoing public school education/data collection - conduct benthos sampling - hold a series of public meetings to summarize results	$12,304; 10% (quarter); 70% (total)
Fifth Quarter Jan-Mar 2014	- ongoing monitoring - conduct benthos sampling - continue public education - start mini stormwater projects	$2,461; 2% (quarter); 72% (total)
Sixth Quarter Apr-Jun 2014	- ongoing monitoring - conduct benthos sampling - continue public education - continue mini stormwater projects	$2,461; 2% (quarter); 74% (total)
Seventh Quarter July-Sept 2014	- ongoing monitoring - conduct benthos sampling - continue public education - continue mini stormwater projects	$2,461; 2% (quarter); 76% (total)

Eighth Quarter Oct-Dec 2014	- ongoing monitoring - conduct benthos sampling - continue public education - continue mini stormwater projects	$2,461; 2% (quarter); 78% (total)
Ninth Quarter Jan-Mar 2015	- ongoing monitoring - conduct benthos sampling - continue public education - continue mini stormwater projects	$2,461; 2% (quarter); 80% (total)
Tenth Quarter Apr-June 2015	- ongoing monitoring - conduct benthos sampling - continue public education - continue mini stormwater projects	$2,460; 2% (quarter); 82% (total)
Eleventh Quarter[2] July-Sept 2015	- ongoing monitoring - conduct benthos sampling - continue public education - complete mini stormwater projects	$2,461; 2% (quarter); 85% (total)
Twelfth Quarter Oct-Dec 2015	Edit/finalize Watershed Restoration Plan; develop: project atlas, implementation schedule, interim measurable milestones, and goals; create monitoring methodology	$19,686; 15% (quarter); 100% (total)

[1] Please show anticipated dollar amount, percent of grant spent that quarter, and cumulative percent of grant spent for project. Quarterly invoices will only be reimbursed up to percent indicated. Unused funds will carry forward to next quarter.
[2] 10% of grant will be held until receipt of Final Project Report

Note: Sum of funds spent in quarters 1-2 MUST equal year 1 total in Budget Table #16
Sum of funds spent in quarters 3-6 MUST equal year 2 total in Budget Table #16
Sum of funds spent in quarters 7-10 MUST equal year 3 total in Budget Table #16
Sum of funds spent in quarters 11-12 MUST equal year 4 total (min. 10% of 319 funds)

21. Background and goals of the project. Expand space, if necessary

Background
Smith Creek's headwaters are in Franklin County, approximately 0.6 miles upstream from the Wake/Franklin county border and approximately 2.6 miles upstream of the Wake Forest Reservoir Dam. Above the dam it is classified as WS-II; HQW, NSW (from source to a point 0.3 mile downstream of the Franklin-Wake County Line); and WS-II; HQW, NSW, CA (from a point 0.3 mile downstream of the Franklin-Wake County Line to dam at Wake Forest Reservoir), an area of 58 acres which is currently under development and has strict watershed development regulations. The balance of Smith Creek (from the dam at Wake Forest Reservoir to its confluence with the Neuse River) is classified as C; NSW, as are its tributaries (Spring Branch, Hatters Branch, Austin Creek, and Sanford Creek), a length of 5.8 miles.

DWQ's Neuse River Basinwide Water Quality Plan (2009, DWQ Plan) indicates that Smith Creek "...is Impaired for aquatic life based on a Fair fish community bioclassification at site JF 31" (where it crosses Burlington Mills Road). It is supporting for recreational uses. Based on this, Smith Creek (from the dam at Wake Forest Reservoir, to its confluence with the Neuse River) was added to the 2008 303(d) list of impaired waters. It remains on the 2010 303(d) list, also for impaired biological integrity. Fish community data have been collected at this site during the last four DWQ monitoring cycles (1995: Good-Fair; 2000: Excellent; 2005: Fair; and 2010: Good). The DWQ Plan indicates that the fluctuation in species richness and composition may be the result of differences in historic flows, as well as the site's proximity to the Neuse River (approximately 0.71 mile), which can affect fish recruitment. "The 2005 rating dropped from Excellent to Fair because the trophic structure was extremely skewed towards tolerant insectivore species."

Benthic sampling has been collected at the site in 1986 (Poor); 1987 (Poor); 1995 (Good-Fair); 2000 (Fair); 2001 (Good); 2005 (Good-Fair); and 2010 (Fair). Because of the 'switch' in ratings between the 2005 and 2010 benthic and fish sampling results (i.e. fish: fair to good and benthos Good-Fair to Fair), Smith Creek remains listed as impaired on the Draft 2012 Integrated Report. The reason for its 2012 impairment rating is related to the 2010 benthic sampling results.

A 6,178 linear foot section of Smith/Austin Creek north of Rogers Road (030202010700-70) was restored in 2004 by the North Carolina Ecosystem Enhancement Program. Heavy storms during increased development caused many problems and overflows with inefficient erosion control devices. In 2005, the Town was delegated their own erosion control program from NC DLR (previous Wake County program) requiring erosion control measures for projects over 0.50 acre and it has implemented a Phase II Stormwater Program requiring BMP's for all projects over 1 acre. As a result more stringent regulations are in place to handle excess sediment load and stormwater pollutants. Many of the exiting developments in the Smith Creek Watershed were permitted prior to the adoption of the Town's increased environmental regulations.

Goals
The goals of the Smith Creek Watershed Restoration Plan include:

- Identify specific sites and/or reaches within the watershed that contribute to degraded water quality, specifically reductions in biological integrity;
- Estimate site specific pollutant loads resulting from identified sites/reaches;
- Specify management measures necessary to effectively address the site-specific and watershed scale degradation (e.g. site-specific BMPs, bank stabilization; land use/zoning modification);
- Begin to implement the watershed restoration plan via projects identified following the preliminary evaluation, including: riparian buffer enhancement, educational/buffer signage;
- Estimate the resulting load reductions from each identified management measure;
- Estimate load reductions necessary to restore biological integrity and maintain other use standards;

- Establish a monitoring program to track progress;
- Educate citizens about watershed ecology, stream buffers, floodplains, wetland benefits, point and non-point source pollution;
- Develop an adopt a stream program where citizens care for stream reaches by conducting quarterly clean ups, physical, biological, and chemical monitoring, bank stabilization, and stream enhancement via live stake plantings;
- Remove Smith Creek from the 303d list, without requiring a TMDL

22. A detailed description of the project. Note: if project entails developing or implementing a Watershed Restoration Plan, see section 27. Expand space, if necessary

Element Section 22. Task(s)
1. identification of the causes and sources 2.0
2. description of the NPS management measures 4.4
3. estimate of the load reductions 4.0
4. estimate of the amount of technical and financial assistance needed 4.5
5. information/education component 1.2, 3.4, and 4.3.4
6. schedule for implementing the NPS management measures 4.7
7. measurable milestones for determining whether NPS management measures 4.8
8. criteria that can be used to determine whether loading reductions are being achieved 4.9
9. monitoring component 4.10

Task 1: Watershed Planning Goals Development

1.1 Kick-off Meeting
During the first month following grant award/notice to proceed, the Grantee (Town) and Project Partners will meet to kickoff the project (collectively: the Team). A preliminary stakeholder list will be assembled during the kick-off meeting and the Town and WK Dickson (WKD) will determine future stakeholder involvement and broad, measurable goals for the watershed restoration plan. WKD will use the extensive dataset that the Town will provide to evaluate existing conditions and identify focus areas and data gaps.

1.2 Stakeholder Recruiting/Participation
The Team will collaboratively assemble a list of appropriate stakeholder groups to identify and contact, based on the identified areas of concern. The Town will determine the most appropriate context in which to seek public comment on existing conditions, priority areas, and the broad goals identified during the kickoff meeting.

Task 2: Watershed Assessment

2.1 Subwatershed Delineation

The Town and WKD will define the boundaries of sub-watersheds upstream from a significant confluence or other relevant features. Tributaries' stream orders within the sub-basins shall be classified using remote sensing techniques. Summary tables shall be prepared for each sub-basin to include drainage area and lengths by order.

2.2 Existing Data
The Town and WKD will compile and manipulate available georeferenced data (i.e. data supplied by the Town) to summarize existing watershed conditions including: physiography, topography, and relief; geology; hydrogrophy; precipitation; flood frequency; land use; and chemical, physical and biological water quality. Compiled data and existing conditions evaluation results will be manipulated to evaluate and identify water quality degradation causes and sources.

Should any data gaps be identified and/or if updated datasets become available, WKD will incorporate additional data from the Town, the Environmental Protection Agency (EPA), the North Carolina Department of Environment and Natural Resources (DENR), Wake Countys, and any other available sources.

2.3 Aerial Photography Analysis
The Town and WKD will use available aerial photography, including historical (e.g. 1965 Soil Survey), to evaluate the existing subwatershed physical conditions and temporal changes to land use and geology. Evaluations will include:

- Determination of riparian buffer function based on the width, length, type, and proximity of vegetated buffers to stream banks
- Channelization assessment, including sinuosity versus landscape position and valley morphology
- Assessment of erosion or sediment deposition relative to adjacent land use changes over time

2.4 Preliminary Water Quality Modeling
WKD will run simple pollutant-loading modeling for the study area based on land use and published event mean concentrations developed for North Carolina. The model will be created with a GIS-based program called PLOAD and will be used to predict loadings for subwatersheds for: TSS, BOD, Total N, Total P, fecal coliform, and six metals (Cd, Cr, Cu, Pb, Ni, and Zn). Outcomes of this task will include a completed PLOAD model and model results by subwatershed as GIS layers and tabular data. The model results will provide a basis for initial ranking of the water quality function of the subwatersheds.

2.5 Impervious Cover Analysis
The Town and WKD will use existing National Land Cover Data Set (NLCD) GIS data and the most-recent aerial photographs to generate percentages of impervious cover for each subwatershed. The results of this task will include new GIS layers representing imperviousness by subwatershed. These data are vital in assessing impacts to functional hydrology and will significantly contribute to identification of the causes and sources of subwatershed functional impairments.

2.6 Sedimentation Study
Using GIS data, NRCS soil survey documents, and other readily available sources of information, WKD will assess the subwatershed conditions to determine which have the highest potential for erosion and sedimentation. A custom-developed GIS routine utilizing the revised universal soil loss equation (RUSLE) will be used to estimate annual sediment loads for subwatersheds with highly erodible soils. The subwatershed GIS layer produced will be ranked for erodability and summarized in tabular format. The results will be used for BMP implementation, mitigative measures, restoration, and preservation prioritization, as well as ordinance development.

2.7 Reference Reach Data Analysis

Existing gauges in Wake and adjacent counties will be used to create a mean annual flood curve for the Smith Creek watershed. The selected gauges will be assessed for suitability using the Dalrymple homogeneity test. USGS flood frequency and maximum peak discharge data and available hydrographers' records will be obtained, analyzed, and combined with regional flood frequency curves to evaluate and determine discharge volumes at various flood frequency intervals throughout the watershed.

2.8 Field Assessment
The Town and WKD will assess the existing land use and habitat function and value of each subwatershed. Stream reaches shall be evaluated using EPA's Rapid Habitat Assessment (RHA) protocol, which identifies potentially low water quality areas using a scoring matrix, and EPA physical characterization water quality field data sheets, which measure in-situ water quality parameters (temperature, pH, conductance, dissolved oxygen, and turbidity). Where appropriate, WKD will also measure salinity, total dissolved solids, benthic macroinvertebrate assemblages, fish population assemblages and distribution, total Nitrogen, total Phosphorous, and Biological Oxygen Demand. In addition to the stream and buffer assessment, each assessment will include evaluation of size and feasibility of potential mitigation/stabilization and BMP projects. These considerations are important for selection of potential projects for inclusion in the Project Atlas.

WKD scientists' experience collecting water quality data throughout the Southeast will facilitate rapid, thorough, and accurate data collection and site evaluation.

The results of these assessments will be used to develop final prioritization of subwatersheds for stream, buffer, and wetland restoration and enhancement projects, and as the basis for selecting the most effective BMP implementation projects. All data collected in the field will be input into a spreadsheet database that will be included with project deliverables.

2.9 Establish and Maintain ArcIMS Website
The Town and WKD will set up and host an ArcIMS website for the project. ArcIMS is an interactive, internet-based GIS platform that allows users to view spatial data sets through the use of a web browser. The website will provide the project team and stakeholders access to relevant GIS and other data through high-speed internet access and without the need for specialized software. This website will allow users to track the progress of the project team and view a variety of existing datasets and new layers created by WKD through the course of the project. This website will be updated monthly throughout the project's life and provide interactive support for monthly progress reports

Task 3: Classify and Prioritize Subwatersheds

3.1 Subwatershed Classification and Ranking Once the Watershed Assessment is completed, the information gathered will be used to develop a classification of the subwatersheds and a prioritization for implementation of project goals. Watersheds will be classified as functioning, functioning-threatened, degraded, or non-functioning for:

- Water Quality
- Stream Stability
- Aquatic Habitat
- Wetland Function and Value
- Hydrology

The classification of each subwatershed will include a numeric rating based on the watershed assessment for each functional category. New GIS layers of subwatershed classifications for each functional category will be developed and incorporated into the ArcIMS website monthly.

3.2 Subwatershed Prioritization
Once the classification and rating are completed, subwatersheds will be ranked for implementation projects and other actions to improve and preserve specific watershed functions. Subwatersheds will be prioritized for enhancement, restoration, preservation and BMP location for each functional category. This prioritization will guide implementation strategies.

Functioning will refer to those subwatersheds where there has been little alteration from the natural condition of the functional categories. Functioning-threatened will refer to functioning subwatersheds that are threatened in one or more functional categories due to imminent pressures. The ArcIMS website will aid in determining which functional categories are threatened. Degraded will refer to subwatersheds with less than optimal functional levels. Non-functioning will refer to subwatersheds that exhibit highly impacted function.

3.3 Prepare Detailed Prioritization Report
The Town and WKD will prepare a document that describes the work done to complete Tasks 1.1 through 3.2 and presents the results of that work. A section of the report will be devoted to each task and will include the methods, data analysis, and results of each task. It will serve as an interim progress report and be directly incorporated into the watershed restoration plan. Which the Town plans to use for small scale stormwater projects, buffer restoration and educational signage during the grant period.

3.4 Stakeholder Education/Involvement
After the watershed assessment is complete, a series of public meetings will be organized and advertised to provide stakeholders with an introduction to watershed planning concepts and summarize results of the baseline report using detailed graphics with minimal text. Preliminary stakeholder evaluation and comment on draft goals and appropriate classification and ranking factors will be requested.

Similar meetings/presentations will be held at Heritage High School and Franklin Academy High School.

Task 4: Development of Implementation Strategies and Watershed Restoration Plan

The Detailed Watershed Restoration Plan task will identify subwatersheds where management actions are most needed. Task 4 involves ranking and selecting projects that best meet the goals identified in Task 1. It also involves identifying water quality and hydrology issues that can be corrected with BMPs or other management tools such as ordinances. There will be special emphasis placed on buffer preservation (and to some degree restoration) as there are ample opportunities to implement these types of projects in portions of the Smith Creek Watershed. There will also be special emphasis placed on aquatic habitat restoration, enhancement, and preservation within the study area.

4.1 Identification and Ranking of Potential Stream, Buffer, and Wetland Projects

4.1.1 Restoration, Enhancement and Preservation Projects. WKD will use information collected during the field assessment to identify stream, buffer, and wetland restoration and/or enhancement projects in the subwatersheds classified as degraded or non-functioning for stability, function, and habitat. The projects will be ranked within the study area as a whole and by subwatershed. Information on ranked projects will be delivered to the Town. An additional deliverable will be a new GIS layer of ranked stream and buffer projects.

4.1.2 Preservation Projects. WKD will use information collected during the field assessment to identify stream, buffer, and wetland preservation projects in the subwatersheds classified as functioning or functioning-threatened for stability, function, and habitat. The projects will be ranked within the study area as a whole and by subwatershed.

4.2 Identification and Ranking of Potential BMP Retrofit Projects

4.2.1 Field Assessment. WKD will evaluate potential BMP retrofit sites in the field with a rapid assessment procedure to rate potential BMP projects. The field evaluations will be conducted around developed areas and will focus on subwatersheds rated degraded or non-functioning for water quality. Retrofit sites will be identified using GIS data and field reconnaissance surveys and ranked after detailed field evaluation. A watershed model will be used to evaluate the effectiveness of retrofits on the highest ranked sites.

4.2.2 Watershed Modeling and BMP Analysis. WKD will utilize the Model for Urban Stormwater Improvement Conceptualization (MUSIC) (Center for Catchment Hydrology, Australia, 2005) to evaluate ranked BMP opportunities. WKD will set up a watershed model to run BMP scenarios. The model runs will be conducted with emphasis on the best locations for retrofit BMPs and identified sources of pollutants.

The model files will be delivered to the Town and WKD will train Town staff to use the models for ongoing, in-house water quality studies and evaluation of future project outcomes. This will provide added value to the Town by phasing out the ongoing need for private consultant project evaluation. The following subtasks will be necessary to complete the modeling work.

4.2.2.1 Identify and Collect Data.
Rainfall, land cover, drainage area, soils and other previously acquired data will be assembled and data gaps will be identified. Additional necessary data will be collected and assembled.

4.2.2.2 Model Setup will include:

- Development of data input files for watersheds, modeled BMPs, and water quality constituents,
- Data input and model analysis, and
- Development of alternatives to be analyzed.

4.2.2.3 Model Validation.
Validation will be conducted to ensure that the model represents existing conditions to the greatest extent possible. It will be based on available monitoring data and include:

- Total phosphorous concentration (mg/L),
- Total nitrogen concentration (mg/L),
- Total suspended solids concentration (mg/L), and
- Discharge (cfs).

4.2.2.4 Base Model Analysis. Results of the calibrated base model will be evaluated. Based on these results and information collected from field studies, priority locations will be identified for stormwater treatment scenarios.

4.2.2.5 Scenario Runs. WKD will evaluate BMP scenarios for ten (10) sites to assess pollutant loading reductions. The sites will be those ranked highest in Subtask 4.3.1. Town and stakeholder input on model scenarios will be solicited. Pollutants evaluated will include TSS, total nitrogen, and total phosphorous.

The outcomes of this task will include a completed MUSIC model, a list of BMP project recommendations, and new GIS layers of potential BMP sites and ranked BMP sites.

4.3 Recommendations for Additional Measures. WKD will evaluate potential watershed conservation and restoration measures beyond mitigation projects and make recommendations based on the detailed watershed assessment work. The following tasks will result in brief recommendations included in the final report. These recommendations will be developed based on WKD's technical work and other knowledge

gained throughout the project and will serve as a means for WKD to present ideas for consideration to the stakeholder group and Team. These will include:

4.3.1 Recommendations for Site Design and Stormwater Management Policies.
WKD will develop recommendations for implementing these types of policies in specific areas of the watershed. The Town will in turn adopt recommendations and use in future planning and projects.

4.3.1.1 Identify Priority Areas.
Priority areas will be identified based on information obtained and analysis completed during evaluation of future development. Areas that are expected to develop the most rapidly will be the focus. Subwatersheds classified as functioning-threatened for any functional category would be appropriate for this management practice.

4.3.1.2 Review Current Polices.
WKD will review land development and stormwater regulations for these areas.

4.3.1.3 Develop Recommendations.
WKD will develop recommendations for site design practices that incorporate low impact development (LID), limited impervious surface, significant tracts of conserved open space, and the use of pervious areas to allow stormwater to infiltrate, use of pocket practice stormwater management, etc.

4.3.2 Recommendations for Open Space Preservation.
WKD will evaluate opportunities for open space preservation beyond riparian zone and wetland preservation. The focus will be on remaining intact forest habitats. Projects will be identified in subwatersheds categorized as functioning or functioning-threatened. The projects will be ranked using a methodology agreed upon by the Town and WKD before this task begins.

4.3.3 Recommendations for Erosion and Sediment Control.
WKD will develop recommendations for locations where better management of erosion and sediment control would be beneficial. These recommendations will be focused on subwatersheds where highly erosive soil conditions are an issue and subwatersheds classified as degraded or non-functioning for water quality. The Town will revise its locally administered erosion control development ordinance as necessary to meet these recommendations.

4.3.4 Recommendations for Public Education Opportunities.
WKD will develop recommendations for providing public education on watershed restoration and preservation. These measures may include recommendations for public education elements to stream and wetland projects, opportunities to increase public awareness of watershed functions and stressors, or other types of actions.

*Note: All prioritized components will be presented in a manner that facilitates their incorporation in grant and other funding applications.

4.4 Watershed Restoration Plan Development
The Town and WKD will develop a Watershed Restoration Plan (WRP) based on the findings of the above tasks. This will include development of a final prioritized list of mitigation project sites (including BMP projects). The management plan will also include both watershed-wide and subwatershed-specific recommendations related to land use management policies and practices to achieve objectives developed collaboratively with local watershed stakeholders. These practices may include strengthened ordinances for the protection of riparian buffers, stormwater management methods for new developments, strategies for the reduction of impervious cover, and protection of headwater streams.

4.5 Financial Needs Assessment
The Watershed Restoration Plan will provide estimated financial needs for each fiscal year comprehensive of all plan components, including: administration and management; information and education; installation, operation, and maintenance; and data analysis, monitoring, and management.

In addition, the Team will identify additional potential funding sources.

4.6 Project Atlas Development
The ranked implementation project recommendations listed in the Watershed Restoration Plan will be detailed in a Project Atlas, which will describe prioritized projects and include:

- A map of the study area showing prioritized subwatersheds and locations of prioritized projects.
- A description of each prioritized subwatershed including its rating for each functional category.
- Descriptions of specific prioritized projects to improve watershed functional conditions or maintain the condition of functioning watersheds. Descriptions will include:
- A narrative describing the existing conditions at the site,
- A description of the potential project,
- A map of the potential project, and
- Photographs of the site

4.7 Implementation Schedule
After the Watershed Assessment and Restoration Plan have been completed and implementation strategies have been evaluated by stakeholders and ranked by the Team, an implementation schedule will be completed which will show in detail a ranked list of projects for the Town to start installing in 2014. In addition to its 319 Grant funding requirement, implementation plans are important resources to ensure that identified watershed protection, preservation, restoration, and stakeholder involvement are executed in the most efficient and cost-effective method possible. The implementation schedule will be organized using monthly, quarterly, and annual increments to ensure that the Town protects and enhances its unique and valuable natural resources in the most efficient and effective means possible.

4.8 Interim, Measurable Milestone Development
To ensure that non-point source management measures and other control actions are being installed in a timely and cost-efficient manner, in accordance with the Implementation Schedule, the Town and WKD will develop interim and measurable milestones. The milestones will accurately evaluate the success and timeliness of each action. Appropriate methodology will be determined on a case-by-case basis for each parameter.

In addition to the evaluation of an individual milestone's success (e.g. revegetation of 1,500 feet of riparian buffer), remedial action plans for milestones' actual and/or temporal failure will be developed. Similarly, if an evaluation reveals that a milestone was met ahead of schedule and/or under cost, temporal and/or financial re-allocation will be planned.

4.9 Watershed Goal Determination Criteria
To evaluate the success of the Watershed Plan's implementation with regard to identified goals and loading reductions, the Town and WKD will develop an appropriate set of measurable progress indicators. Evaluation methodologies will vary in timing and scope, depending on the pollutant load in question. For example, reduction in stream erosion and sediment load from backyard buffer removal is likely to be reduced following riparian buffer restoration. Conversely, sediment loading that has steadily increased for years may not demonstrate rapid reduction downstream following more stringent stormwater regulation implementation (i.e. significant pre-existing loads upstream of the monitoring site could take an extended period to pass through and out of the system). For this reason, achievement criteria for specific load reductions will be produced on a case and site-specific basis and modified and/or replaced as necessary.

4.10 Monitoring
In order to evaluate the long term success of implemented management measures relative to water quality and identified load reductions over time, the Town and WKD will develop an easily implemented, accurate, repeatable, and cost-effective monitoring methodology. First, data from existing monitoring programs and sites (local, state, and federal) will be used to the maximum extent practicable. Depending on the frequency, location, accuracy, and methodology of available datasets, additional monitoring will be designed and implemented to:

1. Establish baseline water quality conditions for surface water resources (base flow and storm flow);
2. Identify critical areas where pollutant and sediment contributions are significant;
3. Establish baseline benthos sampling data;
4. Monitor benthos data twice a year;
5. Ensure the health and safety of people using waters recreationally;
6. Ensure the protection of valuable high quality water.

23. Monitoring/Environmental Data Collection Describe in the section below how project data will be used (i.e. demonstrate effectiveness of BMPs installed, calculate load reductions, data to be used for TMDL development, data to be used for State use support purposes, etc.). If monitoring is needed to document a demonstration project or water quality improvement, a Quality Assurance Project Plan (QAPP) will be required (reviewed and approved by DWQ). For a QAPP template, visit the 319 Program website at http://portal.ncdenr.org/web/wq/ps/nps/319program/applyfor319

In order to evaluate the long term success of implemented management measures relative to water quality and identified load reductions over time, the Town and WKD will develop an easily implemented, accurate, repeatable, and cost-effective monitoring methodology. First, data from existing monitoring programs and sites (local, state, and federal) will be used to the maximum extent practicable. Depending on the frequency, location, accuracy, and methodology of available datasets, additional monitoring will be designed and implemented to:

1. Establish baseline water quality conditions for surface water resources (base flow and storm flow);
2. Identify critical areas where pollutant and sediment contributions are significant;
3. Establish baseline benthos sampling data
4. Monitor benthos data twice a year
5. Ensure the health and safety of people using waters recreationally;
6. Ensure the protection of valuable high quality waters.

24. Public Involvement

The Town will conduct hands on watershed education with local area high school students at Heritage High School, Franklin Academy High School, and Wake Forest-Rolesville High School. We will be introducing students to point and non-point source pollution sources, stream buffers, floodplain awareness, watershed ecology, and stream restoration through resources such as Project WET, Aquatic WILD, CWEP educational handouts, and various other environmental education resources. The students will evaluate why Smith Creek has degraded and develop initiatives to reduce water quality impacts both at school and at home. The students will also gain hands on experience by testing in stream water quality using a YSI meter onsite at various locations, conduct biological and physical stream surveys, classify the stream at various sections, conduct macro invertebrate counts, conduct stream restoration via live staking, install buffer protection signs, and install small scale watershed BMPs such as back yard rain gardens. The students will be able to recognize all their accomplishments and the positive impact that they have had on their environment.

Quarterly education sessions will also be conducted for citizens that will address Neuse Riparian Buffer Rules, water quality testing at various locations along the stream reach, live staking, stream surveys, floodplain awareness, wetland delineation, and introduce a new adopt a stream program in conjunction with the existing (and very successful- over 290 citizens participated in first year) adopt a greenway/enhancement projects initiative. The Town will add the citizen collected data and GIS information to its environmental education webpage so users can check the status of their adopted stream reach. Educators from NCSU BAE, Wake Soil and Water Conservation District, and NC Cooperative Extension will help conduct classes on watershed enhancement in backyards and provide demonstrations of rain gardens, floating island wetlands, invasive species removal, and plant identification.

The Town will work hand in hand with individual home owners to restore stream buffers that have been removed or have been regraded by excess use or bank erosion. We will install buffer protection signage

along the entire length of the Smith, Austin and Smith Creeks to remind citizens of the increasing importance of riparian buffer protection. We will also provide educational material to citizens who live along the stream and in neighboring communities regarding fertilizer applications, tree removal, invasive species, water conservation, and point/non-point source pollution.

The Town will implement the Watershed Plan and develop an interactive educational website where citizens can learn more about Smith Creek, stormwater, and buffer protection. We will list opportunities for citizens to participate in small scale BMP restoration, installation as well as HOA training on BMP care and maintenance.

25. List Project Outputs and Products (All 319 funded projects are required to submit Quarterly Progress Reports and a detailed Final Project Report, which must be submitted at least *30 days before* the end of the contract for DWQ review and approval.)

- Project Website- create website in conjunction with existing environmental education, adopt a greenway/enhancement project sites
- Stakeholder Meeting #1- determine public knowledge and find out who is interested
- High School Education- streams, floodplains, buffers, water quality- ongoing monthly, pre and post surveys done annually
- Quarterly Education #1- stream intro, floodplains, buffers, wetlands – repeat annually
- Quarterly Education #2- water quality intro, point, non point source pollution- repeat annually
- Quarterly Education #3- live staking and stream surveys- repeat annually
- Quarterly Education #4- watershed BMP project- rain garden, backyard wetland, invasive species removal- repeat annually
- Adopt a Stream Program- stream clean up, stream monitoring- repeat quarterly
- Technical Memorandum of Preliminary Findings – gather sample data to determine conditions of Smith Creek
- Stakeholder Meeting #2- present preliminary findings
- Watershed Restoration Plan Report - Draft
- Stakeholder Meeting #3- present restoration plan
- Final GIS and training for Town staff
- Quarterly progress reports (5)
- Watershed Restoration Plan Report – Final
- Town Board of Commissioners watershed plan approval
- Submit Plan to DWQ for approval and possible reevaluation of Smith Creek 303d impairment status
- Implement Plan

26. Projects Developing or Implementing a Watershed Restoration Plan must include EPA's 9 Key Elements for Watershed Restoration Plans. Draft Plans must be submitted to DWQ for review and approval at least *60 days before* end of the project/contract period.

NOTE: Please provide information on the following ONLY if applying for Incremental funds to develop or implement a Watershed Restoration Plan: (use additional pages if necessary)

1	An **identification of the causes and sources** or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed
2	A **description of the NPS management measures** that will need to be implemented to achieve load reductions as well as to achieve other watershed goals identified in the watershed based plan
3	An **estimate of the load reductions** expected for the management measures
4	An **estimate of the amount of technical and financial assistance needed** associated costs and or sources and authorities that will be relied upon, to implement the plan
5	An **information/education component** that will be used to enhance public understanding of the project
6	A **schedule for implementing the NPS management measures** identified in this plan that is reasonably expeditious
7	A description of interim, **measurable milestones for determining whether NPS management measures** or other control actions are being implemented
8	A set of **criteria that can be used to determine whether loading reductions are being achieved** overtime and substantial progress is being made towards attaining water quality standards
9	A **monitoring component** to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.

Element Section 22. Task(s)

1. identification of the causes and sources: 2.0
2. description of the NPS management measures: 4.4
3. estimate of the load reductions: 4.0
4. estimate of the amount of technical and financial assistance needed: 4.5
5. information/education component: 1.2, 3.4, and 4.3.4
6. schedule for implementing the NPS management measures: 4.7
7. measurable milestones for determining whether NPS management measures: 4.8
8. criteria that can be used to determine whether loading reductions are being achieved: 4.9
9. monitoring component: 4.10

27. References and Literature Cited
Deamer, Nora. 2009. Neuse River Basinwide Water Quality Plan. North Carolina Department of Environment and Natural Resources, Division of Water Quality Planning Section. 514pp. 2012 Draft 303d Impaired Water List 2010 303d Impaired Waters List 2008 303d Impaired Waters List

FY2012 319 Grant Application – Early Review Comments & Responses from 5/17/12

Smith Creek Watershed Restoration Plan and Implementation Project

Town of Wake Forest

- They have the stream AU# wrong in box #8 (Project Locations). I'm assuming that they want to do work on Smith Creek and not Perry Creek. The 12 digit HUC should be – 030202010704.

Corrected

- I have attached an Excel file with some stream information that they need to use for their proposal. The Impairments have changed based on the Draft 2012 Integrated Report data. I have provided all of the biological data so they can update box # 21 (Background and goals of the project). This watershed keeps switching between fish and bug impairments. It's important to note that the impairment has shifted from fish to bugs between the two time periods. They need to understand this when they are addressing the needs of this watershed and plan for their future watershed assessment/monitoring that they are proposing. This information can be included in the proposal, noting its source from the Draft 2012 Integrated Report. The biological impairment is not a parameter that is likely to change during the 319 application review process.

Boxes 15 and 21 were updated to include information from both the 2010 and draft 2012 303(d) lists, as well as historic and most recent fish and benthic macroinvertebrate monitoring results.

- I am excited to see Wake Forest's interest in improving and protecting Smith Creek from the growth that is occurring in their area. They did not include any implementation of the watershed plan which I think is OK; however they need to state very clearly their commitment to implementing this plan once complete. They did indicate they intend to do this, I just think that this needs to be very clear that this plan will not sit on a shelf once complete. If they have any questions on the information that I'm providing, I'm happy to assist them. [Nora Deamer – DWQ Neuse Basinplanner]

In addition to the implementation of initially identified retrofit sites described in Boxes 15 and 21, the development and use of the project's implementation schedule (4.7, Box 22) and interim, measurable milestones (4.8, Box 22) will ensure the Restoration Plan does not 'sit on the shelf.'

- Creation of Watershed Management Plan, reassurance that implementation is going to occur would make this a stronger project. No need to create a plan unless there is a implementation plan in place – Wake Forest needs to note this in the proposal

Same as above.

- Smith Creek AU is actually 27-23-(2)

Box 8 adjusted accordingly.

- Is there an agreement in place to use the data for Use Support, reference #12, states collected data will be used to update 303(d) listing – Yet no DWQ project partners are mentioned, suggest contacting Nora Deamer –Neuse Basin Planner and Cam McNutt – Water Quality Assessment Lead

Nora Deamer and Cam McNutt contacted and added to project partners (Box 19). Wake and Franklin County Soil and Water were also added as partners.

- Details of impairment needs to be clarified, bugs vs fish community

Because reasons for impairment listing have changed from fish to benthic macro-invertebrates between the last two monitoring cycles and 303(d) listings, both will be monitored and included in the Restoration Plan. Both are summarized in Box 15 and Box 22.

- Critical area to concentrate in because of growth in Wake Forest area, without action stream will continue to degrade – again a firm commitment from Wake Forest that the plan will be implemented in the coming years will strengthen the proposal.

As noted above, in addition to the implementation of initially identified retrofit sites described in Boxes 15 and 21, the development and use of the project's implementation schedule (4.7, Box 22) and interim, measurable milestones (4.8, Box 22) will ensure the Restoration Plan does not 'sit on the shelf.'

- Is it possible to include implementation in the proposal? It seems that assessment will take place in the first 4 quarters, then monitoring to follow in quarters 5 – 11. How about establish projects with the drafting of the plan and implement smaller projects within the watershed to coincide with the plan? Work with Wake County Soil and Water Conservation to identify potential projects, or identify projects on the public school property if they are in the watershed.

Same as noted in previous bullet.

- Good education and outreach with incorporating information into all the area high schools.

No response necessary.

- Is the stream not supporting (impaired for) fish community because of the dam?? If dam is the main factor, without removing dam or bridging dam, work in the watershed may have little impact.

Because the dam has been in place for more than 40 years, and Smith Creek was determined to be supporting prior to the 2005 monitoring cycle, the dam is unlikely to be the primary causal factor in the impairment ratings. The reaches and watershed above the dam will, however, be included in existing conditions evaluation, data collection, and the Restoration Plan.

- This is all planning work. I recommend they work with TJCOG and submit this (or smaller version) for a 205j grant. The RFP for 205j will be available in about a month or so.

As stated in several bullets above, the project will include implementation following the first year's evaluation, drafting of the Restoration Plan, and project identification and ranking. We have included TJCOG as a partner for future potential projects.