



Application for Section 319 Non Point Source Pollution Control Grant---FY2009

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

1. Project Title	Bolin Creek Watershed Restoration Initiative
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2. Grantee Primary Contact or Project Manager¹	
Name	Randy Dodd
Title	Environmental Planner
Organization Name	Town of Carrboro
E-mail address	rdodd@townofcarrboro.org
Mailing Address	301 West Main Street
City	Carrboro State NC Zip 27510
Telephone	919 918-7326 Fax Number 919 918-4454

¹ 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.

3a. Grantee Execution Address (where contract will be mailed for signature)	
Name	Randy Dodd
Title	Environmental Planner
Organization Name	Town of Carrboro
E-mail Address	rdodd@townofcarrboro.org
Mailing Address	301 West Main Street
City	Carrboro State NC Zip 27510
Telephone	919 918-7326 Fax Number 919 918-4454
Federal Tax ID Number	56-6001194

3b. Grantee Payment Address (where invoice payments will be mailed)	
Name	Randy Dodd
Title	Environmental Planner
Organization Name	Town of Carrboro
E-mail Address	rdodd@townofcarrboro.org
Mailing Address	301 West Main Street
City	Carrboro State NC Zip 27510
Telephone	919 918-7326 Fax Number 919 918-4454

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Total Section 319 Funds Requested	\$200,000	5. Type of Funding Requested (check one)	Competitive Base	Restoration (Incremental)
				x
Match funds or in-kind Match Services	\$153,393	6. Type of Project (check one)	x	Development or implementation of a Watershed Restoration Plan
				Development or implementation of a TMDL
4. Total Project Cost	\$353,393			Innovative BMP Technology Demonstration
				Education/Technology Transfer
				Other: (please indicate)

7. General Goal of Project (Check all that apply)	Protect and/or Maintain Water Resource Quality	Restore Water Resource Quality	Educate	
		x	x	
8. Project Start Date	9/2009	Project End Date	6/2012	
9. Geographic Coverage	Statewide	Regional	Watershed x	Site Specific

10. Project Location – Important to submit as completely as possible, especially the Lat/Long coordinates and 303(d) List Assessment Unit Number	
River Basin	Cape Fear River Basin
Watershed(s)	Bolin Creek (drains to Jordan Lake)
Watershed size	7800 acres
303(d) listed Stream	Yes <input checked="" type="checkbox"/> No
303(d) List Assessment Unit Number	16-41-1-15-1-(0.5)b
HUC(s) (14 digit USGS Hydrologic Unit Codes)	03030002060100
County	Orange
USGS. 7.5 minute topographic quadrangle map(s) in project area	Chapel Hill, NC quad
Position coordinates of project location	Latitude 35° 55' 00" Longitude 79° 03' 30"

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

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

12a. Estimate Load Reduction, if checked for excess nitrogen, excess phosphorus and/or sedimentation²	
# pounds of nitrogen saved from project implementation McDougle cistern and bioretention:5 lbs/yr Dry Gulch restoration:121.3 lbs/yr	Reference: EarthTech Geomorphic Assessment Report (9/2007)
# pounds of phosphorus saved from project implementation McDougle cistern and bioretention: 0.5 lbs/year Dry Gulch restoration:60.6 lbs/yr	Reference: EarthTech Geomorphic Assessment Report (9/2007)
# tons of soil saved from project implementation McDougle cistern and bioretention:0.1 tons/year Dry Gulch restoration: 60.6 tons/year	Reference: EarthTech Geomorphic Assessment Report (9/2007)
Load Reduction Model Used: BANCS; Watershed Deposition Tool; Export Coefficient	

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

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

These projects provide a continuation of a multi-year program to improve the biological health of Bolin Creek as part of the participation of the Towns of Carrboro and Chapel Hill in EPA's Watershed Restoration Program.

- 1) Installation of a cistern and bioretention at McDougle School, a public middle school as both a retrofit and demonstration and education site.
- 2) Restoration of an intermittent stream, Dry Gulch, including streambank stabilization, stream restoration, and an offline wetland (adjacent to the Pacifica subdivision that has received 319 funding for monitoring and is a demonstration Low Impact Development [LID] site).
- 3) Continuation of runoff monitoring from the Pacifica subdivision for 2 years.

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14. Funding Requested										
Budget Categories (itemize all categories)	Section 319				Non-Federal Match *				Total	Justification (Include statement for each budget line item)
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4		
Personnel/Salary	0	0	0	0	\$13,403	\$15,865	\$9,763	0	\$39,031	Carrboro and CHCCS staff time,
Fringe Benefits	0	0	0	0	\$5,361	\$6,346	\$3,905	0	\$15,612	Carrboro and CHCCS staff fringe benefits
Supplies	0	0	0	0	0	0	0	0	0	
Equipment	0	0	0	0	0	0	0	0	0	
Travel	0	0	0	0	\$500	\$500	\$500	\$0	\$1,500	Use of vehicles for monitoring, educational events / stakeholder meetings
Contractual	\$46,000	\$123,000	\$31,000	0	\$19,000	\$39,000	\$12,000	0	\$270,000	NCSU CWR for design, permitting, construction, incl. vegetation; , monitoring incl. lab analysis
Other	0	0	0	0	\$3,750	\$3,750	\$19,750	0	\$27,250	Carrboro benthic ,water quality sampling (Year 3 only); Volunteer labor; FoBC cash
Total Direct	\$46,000	\$123,000	\$31,000	\$0	\$42,014	\$65,461	\$45,918	\$0	\$353,393	
Indirect (max. 10% of direct costs, per 40 CFR 35.268)									\$0	
Annual Totals										
Grand Total	\$200,000				\$153,393				\$353,393	\$0
% of Total Budget	57				43				100%	
*Note: Non-Federal match must be a minimum of 40% of the total project budget										

Year 1: January 1, 2010-June 30, 2010 (6 months) – Total MUST equal sum of quarters 1-2 in Milestone Table #18
Year 2: July 1, 2010-June 30, 2011 (12 months) – Total MUST equal sum of quarters 3-6 in Milestone Table #18
Year 3: July 1, 2011-June 30, 2012 (12 months) – Total MUST equal sum of quarters 7-10 in Milestone Table #18
Year 4: July 1, 2012-August 31, 2012 (2 months) – Total MUST equal amount for quarter 11 in Milestone Table #18

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15. Budget Summary (Combined federal and match funds)							
	BMP Implementation	Project Management	Education Training or Outreach	Monitoring	Technical Assistance	Other	Total
Personnel	\$ 3,045	\$ 8,971	\$ 20,877	\$ 3,591	\$ 2,547	\$ -	\$ 39,031
Fringe Benefits	\$ 1,218	\$ 3,589	\$ 8,351	\$ 1,436	\$ 1,018	\$ -	\$ 15,612
Supplies	\$ -						\$ -
Equipment	\$ -						\$ -
Travel	\$ 500		\$ 500	\$ 500			\$ 1,500
Contractual	\$ 182,000			\$ 88,000			\$ 270,000
Operating Costs							\$ -
Other			\$ 16,250	\$ 11,000			\$ 27,250
Total	\$ 186,763	\$ 12,560	\$ 45,978	\$ 104,527	\$ 3,565	\$ -	\$ 353,393

16. Local and State Match (non-federal) Summary	
Total Match amount	\$153,393
Cash Match	\$5,000
In-kind Match	\$148,393
Source(s) of Cash Match	Friends of Bolin Creek
Source(s) of In-kind Match	Labor/volunteer time from NCSU faculty and staff, Carrboro staff, Chapel Hill-Carrboro School System staff, Friends of Bolin Creek; Carrboro benthic and water quality monitoring;

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17. Project Partners (may add more, if needed)³			
Agency Name	NC State University – Center for Watershed Restoration		
Agency Address	Campus Box 7637, Raleigh, NC 27695-7619		
Role/contribution to Project	Engineering design, permitting, construction, monitoring, data analysis		
Contact Person	Dr. Greg Jennings	Phone No.	919-515-6791
E-mail address	jennings@ncsu.edu		
Agency Name	Friends of Bolin Creek		
Agency Address	Box 234, Carrboro, NC 27510		
Role/contribution to Project	Volunteer assistance with sample collection and site monitoring. Education and outreach		
Contact Person	Julie McClintock	Phone No.	919-967-3661
E-mail address	mcclintock.julie@mindspring.com		
Agency Name	Chapel Hill Carrboro City Schools		
Agency Address	McDougle Middle School, 900 Old Fayetteville Road, Chapel Hill, NC 27516		
Role/contribution to Project	Education and outreach. Volunteer assistance with sample collection and site monitoring		
Contact Person	Leigh Aultman	Phone No.	919-933-1556
E-mail address	leigh.aultman@gmail.com		
Agency Name			
Agency Address			
Role/contribution to Project			
Contact Person		Phone No.	
E-mail address			

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18. 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 2009	<ul style="list-style-type: none"> • Initial project designs • Finalize NCSU contract • Get final approval from private property owners • Submit quarterly report 	5%
Second Quarter Apr-Jun 2010	<ul style="list-style-type: none"> • Design work • Consult with property owners and stakeholders • Have kickoff public information meeting • Construction contracts finalized – McDougle • Install automated stormwater samplers/level loggers • Monitoring activities: stormflow samples as appropriate, discharge measurements, collect streamflow data from datalogger, measure for erosion on bank pins/scour chains • Submit quarterly report 	18% (23%)
Third Quarter Jul-Sep 2010	<ul style="list-style-type: none"> • Construction: McDougle • Design work • Monitoring activities • Start meetings with specific watershed stakeholders • Submit quarterly report 	9% (32%)
Fourth Quarter Oct-Dec 2010	<ul style="list-style-type: none"> • Design work • Construction: McDougle • McDougle cistern/bioretenion workshop • Baseline channel geomorphic characterization, install bank pins and scour chains to measure erosion • Local/401/404 permit applications submitted • Monitoring activities • Meetings with specific watershed stakeholders • Submit quarterly report 	7% (39%)
Fifth Quarter Jan-Mar 2011	<ul style="list-style-type: none"> • Local/401/404 permit applications approved • Construction contracts finalized – Dry Gulch • Meetings with specific watershed stakeholders • Submit quarterly report 	9% (48%)
Sixth Quarter Apr-Jun 2011	<ul style="list-style-type: none"> • Hold plant care workshops • Start construction – Dry Gulch • Install signage • McDougle cistern/bioretenion workshop • Monitoring activities • Meetings with specific watershed stakeholders • Submit quarterly report 	36.5% (84.5%)
Seventh Quarter Jul-Sep 2011	<ul style="list-style-type: none"> • Complete construction: Dry Gulch • Monitoring activities • Start riparian/bank/bioretenion plantings • Submit quarterly report 	3.5% (88%)

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Eighth Quarter Oct-Dec 2011	<ul style="list-style-type: none"> • Monitoring activities • Replace/refresh bank/riparian plantings as needed • Submit quarterly report 	1% (89%)
Ninth Quarter Jan-Mar 2012	<ul style="list-style-type: none"> • Replace/refresh bank/riparian plantings as needed • Monitoring activities • Submit quarterly report 	1% (90%)
Tenth Quarter Apr-Jun 2012	<ul style="list-style-type: none"> • Monitoring activities • Monitoring data analysis • Submit final report 	10% (100%)

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 #14
 Sum of funds spent in quarters 3-6 MUST equal year 2 total in Budget Table #14
 Sum of funds spent in quarters 7-10 MUST equal year 3 total in Budget Table #14
 Sum of funds spent in quarters 11-12 MUST equal year 4 total in Budget Table #14 (min.10% of 319 funds)

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

Bolin Creek's headwaters are located in Orange County, NC, north and west of the Town of Carrboro. Flowing south and east, Bolin Creek flows through the Towns of Carrboro and Chapel Hill and is a major tributary to Little Creek (eventually flowing to Jordan Lake). Moving downstream, the watershed transitions from rural to suburban to dense urban. (See the attached maps of the watershed and surrounding area, and locations of proposed projects.

Bolin Creek is impaired for biological integrity (NCDENR-DWQ). It exhibits a progressive decline in watershed functional health from up to downstream (EEP August 2004). As one moves downstream, the increasing impervious surface area generates higher stormwater flows that in turn can have a negative impact on the stream morphology. The high stormwater flows can cause erosion of the stream banks, aggregation or degradation of the channel, and other impacts. The greater impervious surface also can result in reduced base flow that can have a negative impact on the biological community. The greater developed area also provides a greater source of potential toxic substances to the stream.

In 2002 and 2003, assessments of the Bolin Creek watershed conducted by DWQ-WARP indicated that several effects of urbanization, including habitat degradation, riparian degradation, channel incision/embeddedness, low base flow, and toxicity, are believed to be the primary factors stressing this watershed. Most of these problems were more prominent moving downstream in the watershed. Other potential stressors included temperature (ranges and extremes), high BOD/COD, nutrients, and cross-connections or leaks from sanitary sewer lines. No streamflow data were taken as part of this study, but scour and related morphological and hydrological modifications were considered a primary contributor to the aforementioned stressors. It has been recommended that feasible and cost-effective stormwater retrofit projects be implemented to mitigate the hydrologic and potential toxic effects of existing development (NCDENR-DWQ June 2003).

In 2003 through 2004, the NC Ecosystem Enhancement Program (then Wetlands Restoration Program) undertook a Local Watershed Planning Initiative for the Morgan and Little Creek watersheds, of which Bolin Creek is a part. Although the resulting EEP report made some recommendations for preservation opportunities, stream restoration projects, and potential stormwater management measure retrofit sites, these were selected based on the particular requirements of the EEP. These requirements are based on the use of the EEP as a mitigation bank for the state's Department of Transportation, and selected projects did not target specific identified problem areas or stressors.

The Bolin Creek Watershed Restoration Initiative was started in 2006 to provide organization and support for the Towns of Chapel Hill and Carrboro to participate in EPA's Watershed Restoration Program. The primary goal of the Initiative is to restore the biological health of the Bolin Creek Watershed. The Initiative focuses on hydrologic modification and habitat degradation by addressing some of the primary causes of these stressors including streambank and streambed erosion, disconnection from stream floodplains, sedimentation, scour, thin or absent forested riparian buffers, the "flashy" nature of urban stream hydrographs, very low base flow, the effects of stream crossings, and purposeful modifications such as channelization and desnagging. Water quality issues related to toxins will be addressed separately by the Towns' respective Illicit Discharge Detection and Elimination programs as part of their NPDES MS4 permits.

In 2007, the Bolin Creek Watershed Restoration Team decided a geomorphological analysis of the watershed with BMPs targeted to problem areas would identify projects more likely to have measurable results and directly address the Team's goal. The Team applied for and was awarded a CWMTF stormwater minigrant. These funds were used to contract with EarthTech to conduct a geomorphological analysis including surveying the entire watershed and walking the majority of the watercourses in the

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watershed. During this survey, potential stormwater management measures and stream restoration sites targeted to the worst problems were identified, with a greater focus on the former. EarthTech's report serves as an initial guide in the selection of projects for this 319 grant application. The restoration team plans to concentrate its efforts in individual subwatersheds over time in order to concentrate hydrological, morphological, and biological improvements that can be most readily detected as measurable results. In 2008, the BCWRT, led by Chapel Hill, received a 319 grant that includes four components:

- 1) restoration projects for a tributary to Mill Race in Chapel Hill and a tributary to Tanyard Branch at Baldwin Park (joint project on Chapel Hill/Carrboro municipal boundary);
- 2) completion of a comprehensive 9 step watershed restoration plan (a grant requirement);
- 3) an alternatives to instream mitigation analysis for Tanyard Branch subwatershed (downtown Chapel Hill and Northside neighborhood); and
- 4) watershed monitoring to demonstrate measureable improvements from projects and improve baseline information.

The projects proposed for this 319 grant supplement the 2008 application by continuing this concentrated approach that follows up on prioritized sites, pursues measurable improvements, prepare for more concentrated work at public schools, leverages LID and monitoring work pursued at the Pacifica subdivision, adjacent to the Dry Gulch site, and includes tractable outreach and education efforts.

20. A detailed description of the project. Note: if project entails developing or implementing a Watershed Restoration Plan, see section 25. Expand space, if necessary

McDougle Cistern and Bioretention

A bioretention BMP and cistern will be installed in a courtyard at a public school to treat roof and patio runoff. As a site draining less than an acre of rooftop and courtyard, the project will serve less for its demonstrable improvements and more as a highly effective demonstration and education site. It will: (1) allow for clear measurement of bioretention reductions in nitrogen; (2) serve as a valuable educational tool and curriculum enhancement for students at the school; (3) be used to promote widespread homeowner and neighborhood scale efforts to treat stormwater at the source by incorporating backyard rain gardens and wetlands, rainwater catchment and plantings into the landscape; and (4) serve as a pilot project for considering future site retrofits and projects for other schools in the Bolin Creek watershed. The students and community at large, through school and Town staff, Friends of Bolin Creek, the PTA, and the Chapel Hill Carrboro School System Foundation will participate in design, finish installation (plants/mulch), outreach (two public workshops), and routine ongoing maintenance. Educational signage will be included in the project. The cistern will be used for bioretention and adjacent landscape irrigation needs.

Dry Gulch Stream Restoration

Dry Gulch is an intermittent stream flowing through older residential neighborhoods into Bolin Creek, and was highlighted as one of the 10 high priority projects in the Earth Tech report. This stream was estimated by Earth Tech to contribute 61 tons of sediment per year (estimate made using the BANCS model). At the proposed project site, it is characterized by an adjacent sewer easement along one side of the riparian corridor and forested land cover along the other side, and a badly eroding streambank along a meandering section.

The conceptual plan for this project is a modification of the Earth Tech recommendation proposed by NC State's Water Quality Group. Stream restoration, including channel realignment, changes in channel cross-section, stabilizing eroding bank slopes, creating a bankfull bench, and improving riffle and pool

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habitats would be done on about 150 feet of the stream. An offline wetland BMP would also be installed. Due to the built-out condition of the subwatershed, and Carrboro ordinances requiring no increase in off-site runoff in new and redevelopment, we do not anticipate problematic changes in hydrology that might negate our restoration efforts.

Pacifica Monitoring

Runoff monitoring from Pacifica, an LID, will be continued for 2 years to assess LID and BMP effectiveness in minimizing the effects of development on the hydrology of Bolin Creek, and site level nutrient loading. One year of pre-development and 2 years of during development (6 months of this might be considered post development) runoff monitoring have already occurred and now post-development data is needed to complete the assessment. Storm by storm and annual pollutant export data will be compiled and compared to pre-development data and to runoff data from conventional developments to assess the effectiveness of this LID.

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21. Monitoring/Environmental Data Collection Describe in 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 guidance and additional information, visit: <http://www.epa.gov/owow/monitoring/volunteer/qappcovr.htm>

In order to demonstrate measurable improvement in these subwatersheds, monitoring of these project locations will be conducted. Sediment mobilization, water quality and field parameters, soil erosion, stability/quality of stream banks and instream features and habitats, and survivorship of desired riparian vegetation will be used as indicators of success of these projects. Monitoring will commence when a Quality Assurance Program Plan has been developed at the beginning of the contract period to obtain sufficient data to properly compare pre- and post- conditions at these sites. A QAPP Level 2 will be developed with assistance from the NC State Water Quality Group. This group has considerable experience assisting others to write QAPPs for 319 grant projects.

For McDougle, water quality monitoring will include precipitation and bioretention water quality samples. The primary reason for this monitoring is to demonstrate BMP effectiveness for this device, and for student and community education. The site is very well suited to direct measurement of bioretention removal efficiencies given atmospheric deposition inputs.

For Dry Gulch, water quality monitoring will include monthly base flow and storm flow suspended sediment and nutrient samples, and continuous monitoring of dissolved oxygen and temperature throughout storm events. Bank pins and scour chains will be installed to monitor instream scour. Annual monitoring will include cross-section and longitudinal surveys, evaluation of vegetation survivorship, pebble counts, and instream morphology. The primary reason for this monitoring will be to demonstrate measurable improvement in this subwatershed.

In addition to the above monitoring, runoff from Pacifica, an LID subdivision, will be continued for 2 years to assess LID and BMP effectiveness in minimizing the effects of development on the hydrology of Bolin Creek, as well as site level nutrient loading in anticipation of Jordan Lake rules. One year of pre-development and 2 years of during development (6 months of this might be considered post development) runoff monitoring have already occurred and now post-development data is needed to complete the assessment. The monitoring will involve installing 2 automated sampling stations at previously used locations and maintaining them for 2 more years. Flow-proportional samples of runoff will be collected in pairs with one of the pairs pre-acidified (H_2SO_4 to $pH < 2$) and the other not. The acidified samples will be analyzed for TKN, NH_4-N , $NOx-N$, and TP, while the nonacidified sample will be analyzed for TSS. Samplers will be visited every 2 weeks to conduct maintenance, download data, and recover samples to transport to the lab. Samples will be analyzed using standard methods to produce accurate and reliable data. Storm by storm and annual pollutant export data will be compiled and compared to pre-development data and to runoff data from conventional developments in the Piedmont to assess the effectiveness of this LID.

Carrboro and NC DWQ will continue their existing monitoring efforts which can also be used to demonstrate measurable improvement in the Bolin Creek watershed as a whole. Carrboro has been working with Chapel Hill to collect base flow water quality samples at three points along the mainstem of Bolin Creek since 1994. Parameters include suspended sediment, turbidity, nitrogen series, phosphorus, fecal coliform, metals, and field parameters. Discharge measurement is not conducted yet but is being planned. Carrboro has been conducting annual macroinvertebrate collection at four points along the mainstem of Bolin Creek for seven years, and is expanding efforts working with a leading benthic macroinvertebrate scientist (Dave Lenat) to review and enhance this program. DWQ conducts fish

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sampling at 3 stations and benthic macroinvertebrate sampling at 5 stations once every five years. DWQ has no ambient water quality monitoring stations in the watershed. See the attached map showing locations of historical Carrboro, Chapel Hill, and DWQ monitoring sites. The entire monitoring program for the watershed is currently being reviewed by the BCWRT.

Complimentary to and independent of the Bolin Creek watershed restoration efforts, the Town is pursuing activities as part of their NPDES Phase 2 permits to address illicit discharges and connections. The area that Bolin Creek flows through includes both relatively recent and older neighborhoods, including some of the central business district in Carrboro, a priority area for the IDDE program. It is expected that IDDE activities will address the issue of toxins as contributing stressors as identified in the NCDENR 2003 Biological Assessment report.

22. Public Involvement

In general, the project will be publicized through many avenues such as workshops, meetings, festivals, hikes, cleanups, demonstrations, local media (Carrboro Citizen and WCOM local radio), listservs, websites, and work days proposed as part of the project. Cooperation with Friends of Bolin Creek, the PTA, the Chapel Hill Carrboro School System Foundation, and the Town's Environmental Advisory Board will maximize public involvement.

McDougle Project

For the McDougle project, an eighth grade science class will work with the assembled team. Currently the 8th grade science curriculum, devotes 2 ½ months exploring the hydrosphere and learning about local water issues. Students will have the opportunity to perform hydrologic calculations and learn how to identify ideal locations for BMPs. Students will also learn about plant species and maintenance requirements over time. Students will be given the task of educating their peers and the public both broadly on watershed restoration and specifically on practical management practices that can be pursued. In almost every aspect of the project, we see numerous possibilities for the community to become involved in learning about the project with the objective of applying that knowledge to solving other stormwater problems within the watershed. As part of our community outreach, parents will be notified by sending a letter home informing them about the project, and encouraging their participation. After construction, the project will be used as a focal point for demonstration workshops that will include considerations not only for schools but for residential and commercial sites. Community members will experience first-hand simultaneously improving water quality and their properties. We propose to publicize and hold at least two public demonstration workshops during the course of the project. CHCCS facilities staff will review plans and insure that the bioretention and cistern design and installation meets all site requirements such as safety, aesthetics, access, and maintenance planning. The School Board will be apprised of the project to provide policy support for the project and potential future projects.

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Dry Gulch Project

In addition to the coordinated work of the project team made up of government, university, and local citizens, the Dry Gulch project will include, at a minimum, the following outreach/participation components

- Direct consultation with local residents and property owners (and/or their landscapers) to vegetate the projects in a way that is aesthetically pleasing and easy to maintain, in addition to the usual enhancement goals of bank stability, shade, and native species. Following construction we will hold an onsite workshop – intended to allow property owners to learn how to care for the riparian plants they have selected (plant selection by owners helps guarantee care and acceptance) as part of a proposed Stream Steward Program. This would include education about targeted eradication of invasive species.
- Direct consultation with the Orange Water and Sewer Authority regarding routine streamside sanitary sewer line maintenance guidelines/BMPs.
- Involvement of the Bolin Forest and Pacifica neighborhood associations.
- NCSU uses the Pacifica development as an LID educational site. LID tours/workshops at Pacifica will include the Dry Gulch restoration project for both pre and post construction phases.

Public outreach, education, and participation will be greatly enhanced by the participation of the Friends of Bolin Creek.

23. Project Measures of Success or “Measurable Results Anticipated from the Project”

As part of the final report, Town staff and NCSU will report on effectiveness monitoring results as well as measures of outreach effectiveness (e.g., people reached, voluntary site scale improvements such as backyard rain gardens, downspout disconnection, riparian plantings, and erosion control efforts, and watershed plan modifications in light of project). Monitoring will result in specific measurable environmental benefits that will quantify reductions in stressors. This information will be invaluable in ongoing watershed planning and restoration work and will help prioritize future restoration opportunities, and to gauge progress.

All stakeholders/BCWRT restoration team members will be able to measure education and outreach success through multiple approaches. The project will provide an important launching pad for the school system to integrate site improvements, education, and service work, both at McDougle and other school sites. That work will be quantified by asking students, the project team, parents, workshop participants and supporting organizations to complete questionnaires about the effectiveness and value of using the rain garden and cistern as educational and outreach tools. Data that will be gathered through the questionnaires will measure educational outcomes for specific project features and environmental benefits, and by subsequent interest in individual pursuit of installation of rain gardens and cisterns at home and business locations.

A major benefit of this project is that it will provide a valuable link within a larger framework being pursued by the Bolin Creek Watershed Restoration Team (BCWRT). While this application is “stand alone” and rests on its own merits, it is being pursued along with other efforts such as the current 319 project, ongoing implementation of NPDES Phase II permit, land use ordinance upgrades (e.g., stream buffers), consideration of new stormwater retrofit requirements for rulemaking in the Jordan Lake watershed, and anticipated future grant submittals for watershed restoration work. This project will also help the Friends of Bolin Creek build capacity and extend its outreach and advocacy work into the community.

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24. 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.)

- BMP implementation (1 cistern and 1 raingarden installed at McDougale; stream restoration, including channel realignment, changes in channel cross-section, stabilizing eroding bank slopes, creating a bankfull bench, and improving riffle and pool habitats, and an offline wetland BMP at Dry Gulch
- Quarterly Progress Reports
- Draft and Final Reports including McDougale and Dry Gulch Projects, Pacifica Monitoring, and synthesis section on implications for Jordan Lake Rules
- Maintenance plans for McDougale and Dry Gulch
- New 8th grade science curriculum
- A minimum of 2 bioretention/cistern advertised demonstration workshops during the project period (Town of Carrboro will work with CHCCS to use the site for workshops indefinitely into the future.)
- A minimum of two volunteer workdays for vegetation planting and maintenance at McDougale School
- 1 Pre and 1 Post LID and Dry Gulch advertised tours during the project period. (Town of Carrboro will provide tours of the LID project and restoration site indefinitely into the future.)
- A minimum of two volunteer workdays for vegetation removal, planting and maintenance at Dry Gulch
- Outreach materials (e.g., updated Town and FoBC websites; media events, including at a minimum an article in the Carrboro Citizen and a show/spot on WCOM radio; on site brochures/signage, including one rain garden sign and one cistern sign at McDougale and one restoration sign at Dry Gulch)

25. 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

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9	A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.
<p>A watershed restoration plan is being developed separately under a 319 grant received in 2008. Information from work pursued in this application will be used in preparing and implementing the watershed restoration plan.</p>	

26. References and Literature Cited
<p>NC Department of Environment and Natural Resources, Division of Water Quality, Planning Branch. 2003. Assessment Report: Biological Impairment in the Little Creek Watershed. A report of the WARP (Watershed Assessment Restoration Project).</p> <p>Tetra Tech. 2004. Targeting of Management Report. In: NC Ecosystem Enhancement Program, 2004. Morgan and Little Creeks Local Watershed Plan.</p> <p>EarthTech of North Carolina, Inc. 2007. Bolin Creek Watershed: Geomorphic Analysis and Potential Site Identification for Stormwater Structures and Retrofits.</p>

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Town of Carrboro

301 West Main Street
Carrboro, NC 27510
(919) 918-7326
Project Manager: Randy Dodd
1981 B.S. Zoology, UNC-Chapel Hill
1983 M.E.M Environmental Management, Duke University

Qualifications:

The Town in general has provided leadership for the Bolin Creek Watershed Restoration Team since it's inception. In his current capacity as Environmental Planner, Randy Dodd will serve as project manager. Mr. Dodd is the Carrboro principal representative for the Bolin Creek Watershed Restoration Team, the principal Town staff for environmental review of development applications and environmental provisions of the Town's land use ordinance, the staff liaison to the Environmental Advisory Board, and the principal staff member overseeing implementation of NPDES Phase 2 programs for Carrboro. He is currently developing watershed restoration and monitoring plans for the Carrboro section of the Bolin Creek watershed, designing a demonstration rain garden, and serving as Carrboro's principal staff person for the Baldwin Park restoration project. He has lived in the Bolin Creek watershed for 12 years, and grew up in Chapel Hill. His long time residence and activity in the community provide intangible benefits to the project. Mr. Dodd will be supported by other Carrboro Town, Sungate Engineering, and OWASA staff with technical, administrative, financial, contractual, legal, and public review and participation aspects of the project. Mr. Dodd has over 25 years of experience in water quality related studies. He was employed by the NC Division of Water Quality from 1983 to 1989 as an Environmental Engineer and Supervisor. During that time he participated in projects to support wasteload allocations and watershed and basin plans. From 1989 to 2007 he worked at Research Triangle Institute providing support for water quality programs for EPA and state and local governments in North Carolina on a variety of water quality and watershed management topics, including watershed planning, nonpoint source management, and stormwater management.

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Statement of Qualifications North Carolina State University Center for Watershed Restoration

Faculty associated with the North Carolina State University Center for Watershed Restoration work with local governments and non-profit groups to plan, design, implement, and evaluate watershed restoration best management practices (BMPs) to improve water quality and habitat. The project team for the NCSU Center for Watershed Restoration includes faculty from the Departments of Biological and Agricultural Engineering and Soil Science:

Faculty Leadership:

Greg Jennings, PhD, PE, BAE Professor and Extension Specialist
Bill Hunt, PhD, PE, BAE Assistant Professor and Extension Specialist
Mike Burchell, PhD, PE, BAE Assistant Professor and Extension Specialist
Jean Spooner, PhD, BAE Extension Professor
Rich McLaughlin, PhD, Soil Science Associate Professor and Extension Specialist
Deanna Osmond, PhD, Soil Science Professor and Extension Specialist

Engineering Support Faculty:

Kris Bass, PE	Jamie Blackwell, EI	Justin Church, EI
Barbara Doll, PE	Dan Line, PE	Jan Patterson, PE
Zan Price, PE	Mike Shaffer, EI	Jason Wright, EI
Jason Zink, PE		

Environmental Science and Landscape Architecture Support Faculty:

Jon Calabria, ASLA	Carter Cone	Steve Foster
Karen Hall	Scott King	Melanie Markusic

Additional technical support is available from faculty and students in several related disciplines at NCSU and other Universities. Team members have extensive experience with teaching, research, and implementation of BMPs for construction site erosion and sediment control, urban stormwater management, low impact development, agricultural and forestry runoff, and stream and wetland restoration. Team members have collectively participated in more than 50 previous 319 projects as project leaders and technical support, including the following:

1. Bolin Creek Watershed Restoration Initiative: Watershed Plan; Baldwin Park & Mill Race Restoration;
2. Monitoring of Nutrient and Sediment Loading from Construction Sites. 2005-2008.
2. Stormwater Wetlands in Asheville. 2004-2007.
3. Asheville Low Impact Development (LID) & Stormwater BMP Demonstrations. 2004-2008.
4. Bent Creek Stream Restoration and Stormwater Best Management Practices. 2003-2006.
5. Robeson Creek NPS Restoration Watershed Project. 2004-2007.
6. Horse Manure and Pasture Management Education. 2003-2005.
7. Sediment Removal Demonstration and Evaluation for Mountain Streams. 2003-2004.
8. Demonstration of BMPs for Restoration of Degraded Coastal Plain Streams. 2002-2005.
9. Minimizing Water Quality Impacts of Mountain Construction Projects. 2002-2004.

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Statement of Qualifications Chapel Hill Carrboro City School System and Friends of Bolin Creek

The Chapel Hill Carrboro City Schools (CHCCS), including Leigh Aultman, an 8th grade science teacher, the PTA, the Chapel Hill Carrboro School System Foundation, and Facilities staff will be intricately involved in the McDougle project to maximize the project's educational and outreach benefits. The CHCCS will celebrate its 100th anniversary in May 2009, and is generally regarded as one of the finest systems in the State by many performance measures. The McDougle campus, which includes elementary and middle schools and the Town's library, was built in the 1990's, and is a neighborhood school with many students that walk to school and an engaged PTA.

The Friends of Bolin Creek (FoBC) is a non-profit organization dedicated to watershed protection and restoration through collaborative work with the University of North Carolina, the towns of Carrboro and Chapel Hill and with Orange County. FoBC activities include sediment and erosion monitoring; development plan review; educational and outreach activities, including maintenance of a website and sponsoring of the annual Bolin Creek festival and periodic outings, and land conservation advocacy. Julie McClintock, a co-chair of FoBC and the proposed principal for this project, recently retired from long term employment with EPA, and is a long term resident of Chapel Hill and former Town Council member. Ms. McClintock and the FoBC will provide substantial value to the project through their membership, community involvement, and advocacy work on behalf of Bolin Creek and its watershed.