[THIS AGREEMENT IS NULL AND VOID UNLESS WRITTEN AND NEGOTIATED BY NC STATE UNIVERSITY'S OFFICE OF SPARCS]

NORTH CAROLINA STATE UNIVERSITY

Sponsored Project Agreement (v 10-11-2010)

Number: [2014-2157]

This Sponsored Project Agreement is entered into by and between North Carolina State University, Raleigh North Carolina (hereinafter called "University"), and City of Durham with a principal place of business at 101 City Hall Plaza, Suite 3100, Durham, NC 27701 (hereinafter called "Sponsor") (collectively hereinafter called "Parties").

RECITALS

A. The project contemplated by this Agreement is of mutual interest and benefit to University and Sponsor and will further the instruction, research and public service objectives of University in a manner consistent with its status as a public educational institution; and

B. Sponsor desires to provide funding in support of this project in exchange for completion of the Subtasks identified in Table 1 of Appendix A, "Project Schedule, Deliverables, & Budget"; and

C. Sponsor is committed to managing stormwater to comply with water quality regulations and improve the health of the streams draining the City of Durham, NC; and

D. Third Fork Creek is subject to two Total Maximum Daily Loads (TMDL) and the Jordan Lake Nutrient Management Strategy which aims to restore and maintain water quality in Jordan Lake, protect the lake's classified uses, and maintain or enhance protections currently implemented by local governments in existing water supply watersheds; and

E. A regenerative stormwater conveyance project was devised by University and Sponsor in order to stabilize an erosional gully and treat stormwater runoff from existing development , hereinafter referred to as "Project" and/or "Research". The University submitted the Project for funding to the North Carolina Section 319 Nonpoint Source Pollution Control Grant Program;

F. The North Carolina Section 319 Nonpoint Source Pollution Control Grant Program is administered through the North Carolina Department of Environment and Natural Resources (NCDENR). The program seeks to fund innovative stormwater control practices and restore impaired streams in order to reduce nonpoint source pollution in local watersheds; and

G. The Project will involve the design, installation, and monitoring of a regenerative stormwater conveyance device on a tributary to Third Fork Creek in Durham located in a wooded area at the Public Works Operations Center (Parcel ID – 134659); and

H. Regenerative stormwater conveyance devices have been found to reduce stormwater runoff, nutrients, and erosion in steep areas not suitable for other stormwater control measures; and

I. The Project will provide local monitoring results to evaluate the performance of regenerative stormwater conveyance devices in Triassic Basin soils and data to potentially refine NCDENR crediting of this practice; and

J. Sponsor has identified funds to supply a portion of the costs to cover salary and fringe benefits for the graduate student, extension associate and research technician who are to work on the Project; and

K. Sponsor has appropriated the sum of Sixty Six Thousand, Sixty Six dollars ($66,066.00) to support this purpose, said sum being derived from City of Durham funds in accordance with the Budget Summary description provide in Appendix A; and

L. It is desirable and necessary to enter into this Agreement in order to set forth the terms and conditions of University's receipt and retention of said funds from the Sponsor and its commitment to complete the Project hereafter described;

M. this AGREEMENT shall be effective upon execution by the Parties.

NOW, THEREFORE, the Parties agree as follows:

1. Project Field of Research

University shall execute the project as described in the proposal entitled "Researching a Regenerative Stormwater Conveyance Technology to Stabilize an Erosional Gully in Third Fork Creek", (hereinafter called "Project" and/or "Research") that is hereby incorporated into this Agreement as "Appendix A".

2. Principal Investigator

William Hunt III will serve as Principal Investigator and will supervise the Project. If for any reason the Principal Investigator is unable to continue to serve and a successor acceptable to both Parties is not available, this Agreement may be terminated as hereinafter provided.

3. Period of Performance

The Project began on 01/01/2014, and will be completed by 08/15/2016. This period of performance will be subject to renewal or extension only by written modification in accordance with Article 18.

4. Payment of Costs

In consideration of University's performance hereunder, Sponsor agrees to reimburse the University for all costs incurred up to the agreed upon amount of $66,066. Invoices will be sent at least quarterly and no more frequently than monthly and should be paid by Sponsor within 30 days of receipt. Sponsor shall be invoiced for completion of the Subtasks identified in Table 1 of Appendix A, "Project Schedule, Deliverables, & Budget". Sponsor's payment obligations shall not exceed the amounts identified as "Durham Funds" in Table 1 of Appendix A for each associated Subtask. For payment by check, the remittance address is shown below. For payment by electronic funds transfer, contact the below office at 919-515-2153.

North Carolina State University
Office of Contracts and Grants

Box 7214, 2701 Sullivan Dr.
Raleigh, NC 27695-7214

University reserves the right to terminate this Agreement, pursuant to the provisions of Article 10. Termination, described herein, should payment be delayed, without cause and/or mutual agreement by both Parties, by more than 60 days from the date of invoice.

5. Export Controls and Confidentiality

(a) The Sponsor does not anticipate exchanging any information, data or software that is Export Controlled under the Export Administration Regulations (EAR), Title 15, sections 730-774 of the Code of Federal Regulations (CFR) or the International Traffic in Arms Regulations (ITAR), 22 CFR §§ 120-130. Sponsor agrees that in addition to the requirements of paragraph (b), Sponsor will give University 15 days advance written notice of their intention to deliver any information, data, software, technology, or material that is Export Controlled.

(b) In the performance of the Project, it may be necessary for one party to disclose information that is proprietary and confidential to the disclosing party. All such information must be disclosed in writing and designated as confidential or, if disclosed orally, must be identified as confidential at the time of disclosure and confirmed in writing and designated as confidential within thirty (30) days of such disclosure. Except as otherwise provided herein, for a period of Three (3) years following the date of such disclosure, the receiving party agrees to use the confidential information only for purposes of this Agreement and further agrees that it will not disclose or publish such information except that the restrictions of this §5(b) do not apply to:

(i) information that is or becomes publicly known through no fault of the receiving party;

(ii) information learned from a third party entitled to disclose it;

(iii) information already known to or developed by receiving party before receipt from disclosing party, as shown by receiving party's prior written records;

(iv) information for which receiving party obtains the disclosing party's prior written permission to publish;

(v) information required to be disclosed by court order or operation of law, including, but not limited to, the North Carolina Public Records Act; or

(vi) information that is independently developed by the receiving party's personnel who are not privy to the disclosing party's confidential information.

(c) The receiving party must use a reasonable degree of care to prevent the inadvertent, accidental, unauthorized or mistaken disclosure or use by its employees of confidential information disclosed hereunder.

6. Reporting

University must deliver to Sponsor a final report showing the results of the work performed in accordance with Appendix A, within 90 days following termination of this Agreement.

7. Intellectual Property

(a) "Intellectual Property" means all forms of intellectual property under the laws of any state or country, including but not limited to, patentable inventions, patentable plants, copyrightable works, mask works, novel plant varieties, trademarks, service marks, and trade secrets.

(b) Ownership of any Intellectual Property made or conceived in the performance of the Project shall be determined in accordance with the following criteria:

(i) Each respective Party (the University or Sponsor), shall exclusively own title to any Intellectual Property made or conceived solely by its respective employees in the performance of the Project.

(ii) University and Sponsor shall jointly own title to any Intellectual Property made or conceived by one or more University employee and one or more Sponsor employee in the performance of the Project (hereinafter called "Joint Intellectual Property").

(c) Each Party has the right to file and prosecute intellectual property applications on any Intellectual Property to which it holds exclusive title.

(d) The parties shall agree on the procedure to be used for the protection and administration of Joint Intellectual Property.

(i) If one party does not wish to participate in the preparation, prosecution, and maintenance of intellectual property protection, that party shall assign all its right, title and interest to the party electing to pursue intellectual property protection. The assigning party will retain a non-exclusive, royalty free license to use the intellectual property for its own internal research and educational use.

(ii) If the parties agree to pursue intellectual property protection jointly, they will enter into an administration agreement which will include rights and responsibilities of the parties with respect to intellectual property prosecution, marketing, royalty sharing, and defense of patents or other intellectual property rights.

8. License

(a) In consideration for sponsoring the Project, the University shall grant to Sponsor a fully paid-up, non-exclusive, non-transferable, royalty-free license (without the right to sublicense) to use all results of the Research owned by University, either solely or jointly, exclusively for Sponsor's own internal, research and development purposes. Such licensed use by Sponsor includes the duplication or use of the results of the Research at other locations on property owned or controlled by the Sponsor.

(b) Sponsor also has the first right to negotiate for a fee or royalty-bearing exclusive license or fee bearing option to any University-owned Intellectual Property and/or University's interest in Joint Intellectual Property ("Negotiation Right"). Sponsor has 90 days following disclosure of an Intellectual Property by the University to exercise its Negotiation Right (the "Negotiation Period"). The Sponsor must submit a written notice to the University, within the Negotiation Period, in order to exercise their Negotiation Right. If the Negotiation

Period expires before University receives the Sponsor's written notice exercising the Negotiation Right or as provided below, the Sponsor shall have no further rights to the Intellectual Property.

(c) If Sponsor has not begun good faith, substantive negotiations with University for an option or license to such Intellectual Property within 90 days of the date of Sponsor's exercising its Negotiation Right in accordance paragraph 8(b), the University may, in its sole and unfettered discretion, terminate Sponsor's Negotiation Right.

(d) Further, if Sponsor and University have not negotiated a mutually agreeable license agreement on or before twelve months from the disclosure of the Intellectual Property by the University, then University may, in its sole and unfettered discretion, terminate Sponsor's Negotiation Right.

9. Publications

University has the right to publish any of the results of the Project. University must furnish Sponsor with a copy of any proposed publication or public disclosure, at least 60 days in advance of the proposed publication date to allow for the protection of Sponsor's proprietary, confidential, or patentable information.

10. Termination

(a) Sponsor may terminate performance under this Agreement at any time upon 60 days written notice to University. Upon receipt of notification, University must proceed in an orderly fashion to limit or terminate any outstanding commitments and/or to conclude the Project. Sponsor agrees to reimburse University for all costs and noncancelable obligations incurred in performance of the Project prior to receipt of termination notice.

(b) University may terminate performance if circumstances beyond its control preclude the continuation of the Project. If University terminates, Sponsor agrees to reimburse University for all costs and noncancelable obligations incurred in performance of the Project prior to issuing the termination notice. University agrees to reimburse Sponsor any funds that have been received but remain unexpended at the time of termination, except for those funds needed to pay for noncancelable obligations.

11. Use of Names

Neither party will use the name of the other in any form of advertising or publicity related to commercial sales without the express written permission of the other party. Sponsor is advised that this Agreement is subject to the North Carolina Public Records Act and as such, the existence of this Agreement is recorded in a database accessible to the public.

12. Notices

Any notices required to be given or which may be given under this Agreement must be in writing delivered by private overnight mail service, first-class mail, facsimile, or by electronic mail (email) addressed to the Parties as follows:

For University:	For Sponsor:
Office of Sponsored Programs and Regulatory Compliance Services North Carolina State University 2701 Sullivan Drive, Suite 240 Campus Box 7514 Raleigh, North Carolina 27695-7514 Ph.: 919-515-2444, Fax: (919) 515-7721	City of Durham Attn.: Lance P. Fontaine 101 City Hall Plaza – Suite 3100 Durham, NC 27701 Ph: 919-560-4326 x30257 Lance.Fontaine@durhamnc.gov

13. Independent Parties

For purposes of this Agreement the Parties are independent contractors and neither may be considered an agent or an employee of the other at any time or for any purpose. No joint venture, partnership or like relationship is created between the Parties by this Agreement.

14. Assignment

This Agreement is binding upon and inures to the benefit of the Parties and may be assigned only to the successors to substantially the entire business and assets of the respective Parties. Any other assignment by either party without the prior written consent of the other party is void.

15. Governing Law

This Agreement is acknowledged to have been made and must be construed and interpreted in accordance with the laws of the State of North Carolina, without regard for its conflict of laws provisions, provided that all questions concerning the construction or effect of patent applications and patents shall be decided in accordance with the laws of the country in which the particular patent application or patent concerned has been filed or granted, as the case may be.

16. Liability

To the extent permitted and in the manner prescribed under applicable law including but not limited to the North Carolina Tort Claims Act, GS § 143-291, et seq. for the University, the Sponsor and University agree to each be responsible for their own negligence and the negligence of their employees and agents. Neither the Sponsor nor University waive any rights or defenses under applicable law, nor do they waive any defense of sovereign immunity except to the extent provided in applicable law. Employees of the Sponsor and employees and/or students of University shall not be considered employees or agents of the other party.

17. Order of Precedence

If any provisions stated in this Agreement and/or Appendix A are in conflict, the order of precedence, beginning with the first to last, shall be (1) this Agreement, (2) Appendix A.

18. Entire Agreement

Unless otherwise specified herein, this Agreement, including Appendix A, embodies the entire understanding of the Parties for this project, superseding any prior or contemporaneous

representations, either oral or written regarding this matter. Only written modifications, signed by both Parties will affect changes to this Agreement including, without limitation, changes in the field of research, total estimated cost, and period of performance.

19. E-Verify Compliance

Each of the parties covenants that if it enters into any subcontracts in order to perform any of its obligations under this Agreement, it shall require that the contractors and their subcontractors comply with the requirements of NC Gen. Stat. Article 2 of Chapter 64. In this E-Verify Compliance section, the words contractors, subcontractors, and comply shall have the meanings intended by N.C. Gen. Stat. 160A-20.1.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement effective as of the date written in Article 3.

ATTEST: CITY OF DURHAM

_____ By:_____

preaudit certificate, if applicable _____

[THIS AGREEMENT IS NULL AND VOID UNLESS WRITTEN AND NEGOTIATED BY NC STATE UNIVERSITY'S OFFICE OF SPARCS]

NORTH CAROLINA SATE UNIVERSITY
ATTEST:

By_____ By:_____
Name & Title Signature

State of _____ ACKNOWLEDGMENT BY UNIVERSITY

County of _____

I, a notary public in and for the aforesaid county and state, certify that _____ Personally appeared before me this day and North Carolina State University, a public, land grant, institute of higher education, and that by authority duly given and as the act of the university, the forgoing Agreement with the City of Durham was signed in its name by its (title)_____, whose name is _____, and attested by _____.
This the _____day of _____, 2011.

_____
Notary Public

My commission expires:

_____

Appendix A

Researching a Regenerative Stormwater Conveyance Technology to Stabilize and Erosional Gully in Third Fork Creek

Submitted to: City of Durham, Lance Fontaine, 101 City Hall Plaza, Durham, NC 27701
Submitted by: William F. Hunt and Jonathan L. Page, NC State University

This project is a complement/match to funding provided by the North Carolina Section 319 Nonpoint Source Pollution Control Grant Program which is administered through the North Carolina Department of Environment and Natural Resources (NCDENR). Additional project funds are being provided by North Carolina State University (NCSU). The North Carolina Section 319 Nonpoint Source Pollution Control Grant Program Project Title is *Implementation of the Regenerative Stormwater Conveyance Technology to Stabilize an Erosional Gully.*

Project Summary

The project includes the design, construction, and monitoring of an innovative stormwater control measure (SCM) device on an unnamed tributary to Third Fork Creek in the City of Durham. The device is a regenerative stormwater conveyance (RSC) (Brown et al., 2010) which will be located just upstream of Martin Luther King Parkway in an unused wooded area at the Public Works Operations Center (PWOC) . The RSC design will fill the existing incised ephemeral stormwater channel with a mixture of sand and mulch. Grade control will be achieved with a combination of parabolic boulder weir and cascade structures to stabilize the existing eroding channel banks. Water quality will be improved through filtration processes to reduce biological oxygen demand, pathogens/bacteria, nitrogen loading, phosphorus loading, heavy metal loading and oil and grease loading. In addition, The RSC will desynchronize high stormwater flows and promote groundwater infiltration.

After construction, the RSC will be monitored for 12 months to determine performance of the device in Durham's Triassic Basin soils. Pollutant loading reduction will be calculated from monitored data for nitrogen, phosphorous, total suspended sediment (TSS), and select heavy metals. Information gleaned from the monitoring will be provided to the engineering, design, and regulatory community through reports, presentations and workshops. Results from this study may be used to develop a chapter for this device in the North Carolina Division of Water Resources Stormwater Best Management Practices Manual and assign nutrient removal credit. Organizations such as the Upper Neuse River Basin Association (UNRBA) are working with state agencies, universities, and local municipalities to develop and refine practices that will help the regulated community meet stringent nutrient load reduction requirements, such as the Jordan and Falls Lake Rules.

Background

Third Fork Creek and its watershed have been identified as impaired in the 303(d) process. The NC Division of Water Resources (DWR) has determined that Third Fork Creek is not meeting state water quality standards due to high turbidity (muddy water), low dissolved oxygen (impacting the fish and other life in the stream that require oxygen to survive), and poor biological conditions (habitat and health of fish and other aquatic organisms). A Total Maximum Daily Load (TMDL) for turbidity for a segment of Third Fork Creek was approved in 2005. The pollutant reductions for this TMDL are expressed as pounds per year of total suspended solids (TSS). Additionally, DWQ findings indicate that pollution from the Upper New Hope Creek basin which includes Third Fork Creek is contributing to poor water quality in Jordan Lake. A chlorophyll-a TMDL for Jordan Lake was approved in 2007 which addresses nitrogen and phosphorus from Third Fork Creek. Third Fork Creek is subject to the Jordan Lake Nutrient Management Strategy which requires reductions in the nitrogen and phosphorus being discharged to Jordan Lake.

The Regenerative Stormwater Conveyance (RSC) site shall be located on City of Durham property, in an unused, wooded area at the Public Works Operations Center (PWOC) near Southern Boundaries Park.

The City's December 2012 Watershed Management Plan for Third Fork Creek identified City-owned land, and specifically the PWOC, as a suitable location to implement various stormwater control measures (SCM). Constructing a RSC device at the location is consistent with this recommendation; this project is intended to reduce a substantial source of sediment and nutrients to Third Fork Creek through stabilization of a deeply incised channel with actively eroding banks. Additionally, the RSC filtration media will reduce nitrogen, phosphorus, sediment, and heavy metal concentrations and loads from the impervious areas in and around Southern Boundaries Park.

Detailed Project Description

The project location is a deeply incised and actively eroding stormwater channel. The device will treat an 8.87-acre watershed and will improve two head cuts. The RSC will be installed in a section the ephemeral stormwater channel that is approximately 90 feet in length. There is an approximate seven to eight-foot headcut located at the upstream end of the project reach; the channel downstream from this point averages approximately 15 feet in width from top of bank to top of bank and is incised, on average, approximately 4-5 feet. At the downstream end of the reach there is another headcut, approximately 4-5 feet in elevation. The RSC will end just upstream of the location of this existing downstream headcut.

In a RSC, water conveyance and processing is accomplished via a constructed network of sand seepage berms, pools, and boulder (or cobble, depending on the modeled flow) weirs. The arrangement of these features raises the incised invert of the incised channel back to pre-disturbance elevation and forms a new surface topography that controls the surface and subsurface hydrology. The modifications necessary to establish the sand seepage hydrology result in the creation of a series of vegetated stilling pools, sand seepage beds replete with above and below-ground biomass, and associated flow paths through the sand/mulch filter media. The physical effect of the pools and the vegetation planted on the lateral sides of the channel in the filtration media reduce water velocity and facilitate removal of suspended solid particles and associated nutrients and contaminants. Uptake of dissolved nutrients and adsorption of oils and greases by the many plant stems present in the pools yields additional benefits.

The conceptual design/structure of the RSC at the proposed location currently involves filling the incised channel with a mixture of sand (80%) and hardwood mulch or chips (20%). A parabolic weir structure will be installed at the upper headcut, at existing grade, to control grade and direct water into the RSC downstream. Continuing downstream, the incised channel will be filled with the sand/mulch filtration media, and stabilized with a series of 3 (or more) additional parabolic weir structures, of varying length and slope, depending on the existing topography. Each weir will have a pool immediately upstream for high flow storage and to enhance infiltration of stormwater downward through the sand/mulch filtration media. At the downstream end of the RSC, material will be excavated down to or below the invert of the channel immediately downstream of the headcut there. A parabolic weir will be installed at the location of the headcut itself, which will control grade at that point in the channel, and will extend upstream as far as needed to stabilize the media in place and accommodate the site topography and channel continuity. The largest pool in the RSC will be just upstream of this last parabolic weir. The RSC design will restore the basic channel invert elevations to their condition before development upstream caused excess runoff and erosion. The design of the RSC will be such that much of the stormwater flow will be treated by the sand/mulch filter media and directed downstream. The structure of the RSC encourages stormwater infiltration below the sand/mulch filtration media, which also helps to recreate pre-disturbance conditions and abate stormwater flows.

After construction, monitoring will be undertaken for 12 months to determine the functionality and performance of RSC's for nutrient load reduction in Durham's Triassic Basin soil type. A Master of Science (MS) student will focus on this research, producing a final report and presentation. This information will be provided to the engineering and design community and may be used to increase the amount of nutrient and sediment load reduction credit for this recently approved practice. Currently, the North Carolina Division of Water Resources (DWR) Stormwater Best Management Practices Manual (NCBMP Manual) conservatively applies credits to these devices as if they are sand filters. Evidence from their use in the Chesapeake Bay region and other parts of North Carolina suggests they provide greater nutrient load reductions than sand filters. An additional benefit of these devices is that that they may be installed in steep, eroded areas not suitable for traditional stormwater control measures.

NCSU continues to be involved in research with other organizations such as the Upper Neuse River Basin Association (UNRBA), North Carolina Department of Transportation (NCDOT), North Carolina Department of Environment and Natural Resources (NCDENR), and municipalities such as Durham to develop innovative stormwater control measures. Data from this project may be useful for future refinement of models and crediting to assist the regulated community in achieving stringent nutrient reduction management strategies such as the Falls and Jordan Lake Rules.

Description of Monitoring
After construction of the RSC device, stormwater monitoring will be conducted for a 12 month period. The goal of this monitoring is to determine the improvements to hydrology and water quality that these devices provide. These devices have the potential for application across North Carolina, and this study will provide data on load reduction from these devices in Durham's Triassic Basin soil type. Monitoring will occur at two locations: (1) the outlet of the untreated watershed, which will serve as the inlet to the RSC and (2) the outlet of the RSC device. These sites will be used in an upstream-downstream design to determine system performance.

Compound weirs (sharp-crested v-notch lower portion and broad crested upper portion) and bubblers will be used to determine flow volumes and peak flow rates at the inlet and outlet of the SCM. ISCO 6712 automated samplers will collect flow-proportional water quality samples (triggered by the bubblers) at these locations. These samples will be preserved (as needed) and delivered to a lab on NCSU campus for analysis. Rainfall will be measured on site continuously during the monitoring period.

The RSC device will be monitored to determine functionality for removal of nitrogen species (NH_3, NO_x, organic nitrogen, and TKN) and total nitrogen (TN), phosphorus species (orthophosphate and particle-bound phosphorus) and total phosphorus (TP), total suspended solids (TSS), and heavy metals (Cu, Pb, and Zn). After construction of the RSC, monitoring will commence for eighteen storm events (over a roughly twelve month period) for TN, TP, TSS, and heavy metals. Storm events will be spread throughout the seasons to determine if seasonal differences in performance exist. Statistical analysis will be performed to determine the hydrologic and water quality improvement imparted by the RSC device.

Budget Summary
The North Carolina Section 319 Nonpoint Source Pollution Control Grant Program administered through NCDENR has agreed to pay for approximately 57% of modified total direct costs to conduct this research project ($132,854 of total project cost of $232,798), which includes design, construction, monitoring, mileage and graduate student tuition. The City of Durham has agreed to provide 28% of the total modified direct costs ($66,066) to cover salary and fringe for the graduate student, extension associate and research technician that will work on the project. The City of Durham funding is conditional on approval by the Durham City Council and performance of the work described herein in accordance with Table 1 below. An additional 15% of the total modified direct costs in being supplied by NCSU through Dr. Bill Hunt's time (2% per year) and forfeited overhead costs. Tabulated tasks, timeline, deliverables and source of funds has been included in the Table 1.

Justification for funds requested from City of Durham:
Graduate Student - Expected Salary: $19,500 per year for 2 years. $39,000 total.
Extension Associate - One month per year for 2 years @ $50,000 / year. $8,333
Research Technician - ½ month per year for 2 years @ $44,000 /year. $3,667
Fringe: 14% of Grad Stipend and 30% of other personnel. Total: $9,060

Total Direct Cost: $60,060
Overhead @ 10% = $6,006

Total Requested Budget from the City of Durham: $66,066.

References

Brown, T., Berg, J., & Underwood, K. (2010). Replacing incised headwater channels and failing stormwater infrastructure with regenerative stormwater conveyance. *Proceeding from Low Impact Development* Conference.

NC Department of Environment & Natural Resources. 2005. Cape Fear River Basin-wide Water Quality Plan. Division of Water Quality Planning Section, 1617 Mail Service Center, Raleigh, NC 27699-1617, p. 58.

NC Division of Water Quality. 2007. Stormwater Best Management Practices Manual. N.C. Department of Environment and Natural Resources1601 Mail Service Center, Raleigh, NC 27699-1601.

Rosgen, D.L. 2001. A Practical Method of Computing Streambank Erosion Rate. Proceedings of the Seventh Federal Interagency Sedimentation Conference, Vol. 2, pp. II - 9-15, March 25-29, 2001, Reno, NV.

Table 1. Project Schedule, Deliverables, & Budget

Task	Subtasks	Schedule	Deliverable	319 Funds	Durham Funds	NCSU Funds
I. Survey, Design, & Permitting	Existing conditions survey & site assessment	1st Quarter 2014	Survey of existing site conditions. City of Durham provided with survey data.	$3,472	$0	$3,388
	Permitting & regulatory compliance	2nd Quarter 2014	Submission of pertinent permits/notification to NCDENR, USACE. City of Durham provided with relevant documentation.	$3,472	$0	$3,388
	Design RSC	3rd Quarter 2014	Complete set of engineering and construction plans for RSC.	$7,000	$8,258	$3,388
II. Construction	Construct RSC	4th Quarter 2014	Construction of RSC. As-built drawings and photo documentation provided to City of Durham.	$65,000	$8,258	$3,388
III. Monitoring	Install hydrologic & WQ monitoring equipment, hydrologic monitoring, 4 – 5 WQ samples collected	1st Quarter 2015	Fully instrumented RSC device (with photo documentation). City of Durham provided with copy of NCDENR 319 quarterly report, including summary of available data.	$6,535	$8,258	$3,388
	Continuous hydrologic monitoring, 4 – 5 WQ samples collected	2nd Quarter 2015	City of Durham provided with copy of NCDENR 319 quarterly report, including summary of available data.	$6,535	$8,258	$3,388
	Continue hydrologic monitoring, 4 – 5 WQ samples collected	3rd Quarter 2015	City of Durham provided with copy of NCDENR 319 quarterly report, including summary of available data.	$9,185	$8,258	$3,388
	Complete continuous hydrologic monitoring, 4 – 5 WQ samples collected (16 – 20 samples total)	4th Quarter 2015	City of Durham provided with copy of NCDENR 319 quarterly report, including summary of available data.	$9,185	$8,258	$3,388
IV. Analysis & Reporting	Analyze data	1st Quarter 2016	City of Durham provided with copy of NCDENR 319 quarterly report, including summary of available data.	$6,642	$8,259	$3,387
	Compile final report present findings	2nd Quarter 2016	City of Durham provided with copy of final NCDENR 319 report. Presentation of results to City of Durham.	$6,643	$8,259	$3,387
			Project Subtotals by Funding Source	**$132,854**	**$66,066**	**$33,878**
			Total Project Funds	**$232,798**		