

Durham County Programs 2020-2021

75% Cost Share Program to install Green Infrastructure

Workforce Development & E-STEM Education

Environmental Justice & Sustainability

Michael Dupree

Former Agribusiness & Environmental Services Manager



CCAP Highlights

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Cost Share Programs - CCAP



The Community Conservation Assistance Program (CCAP) is a voluntary, incentive-based program designed to improve water quality through the installation of various best management practices (BMPs) on urban, suburban and rural lands not directly involved with agriculture production.

Who is eligible?

Eligible landowners may include homeowners, businesses, schools, parks and publicly owned lands.

Why is this program important?

How rapid urbanization affects water quality becomes important as North Carolina's land use continues to change. CCAP can help educate landowners on water quality, stormwater management and retrofit practices to treat stormwater runoff.

How does CCAP work?

Interested landowners may apply to their local soil and water conservation district for financial and technical assistance for the installation of BMPs to protect water quality. Applications are ranked based on local water quality priorities and, if eligible, a conservation plan is prepared. Landowners may receive financial assistance of up to 75 percent of the pre-established average cost of the BMP.

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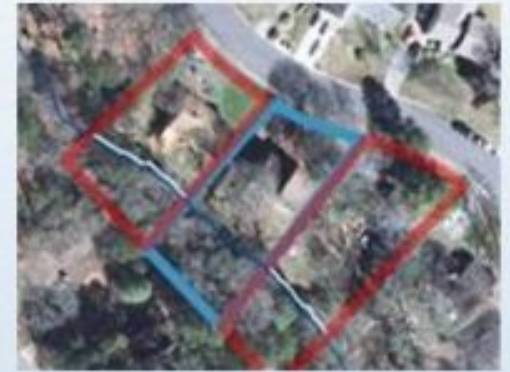
[CS²](#)

[Program Reviews](#)

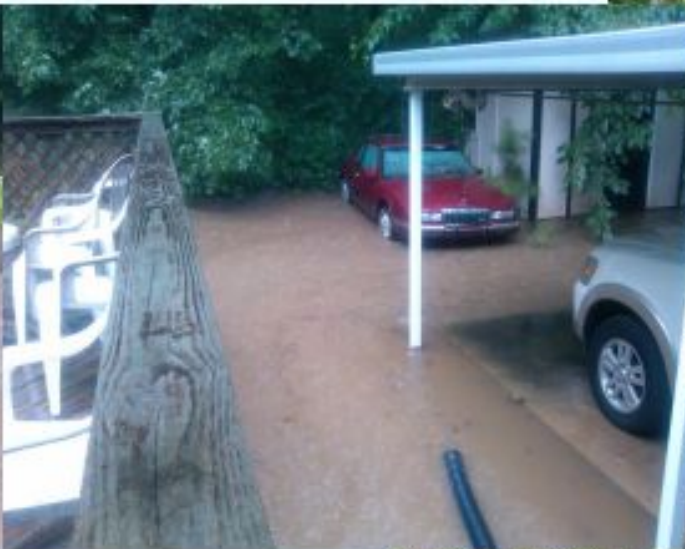
Search Soil and Water

Search

CCAP Targeted Efforts

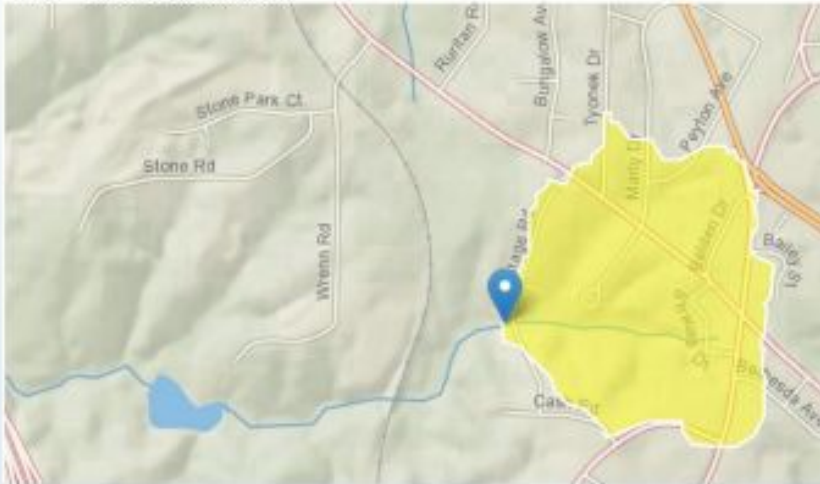


Streambank Protection



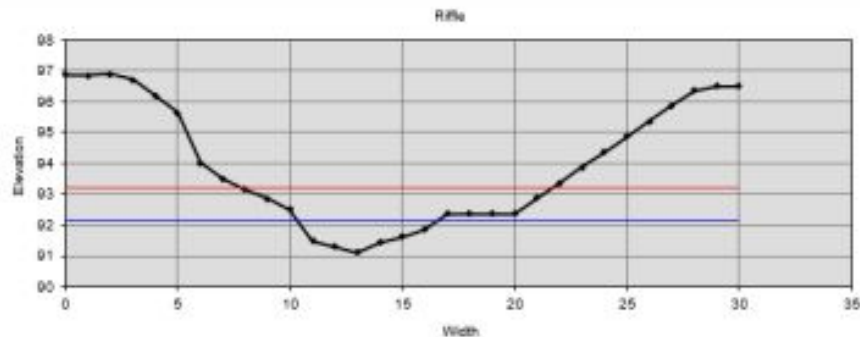
Streambank Protection

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 Time: 2017-09-13 08:40:46 -0400



DA= (acres)		121.60000
DA= (Mi ²)	No Conversion Needed	0.19
A=	19.133x ^{0.6538}	6.46
W=	17.41x ^{0.3682}	9.43
D=	A/W	0.68
D _{max} =	D*1.55	1.06
TW=	Deepest pt/Lowest Elev.	91.10
Bench Elev.=	TW+D _{max}	92.16
Min BKF width	0.1*W or 3' (greater)	0.94
Floodprone Width (elevation)		93.22

Cross Section 5



Bankfull Dimensions

4.0 w-section area (ft²)
 6.3 width (ft)
 0.6 mean depth (ft)
 1.1 max depth (ft)
 6.8 wetted perimeter (ft)
 0.6 hyd radi (ft)
 5.8 width-depth ratio

Flood Dimensions

13.5 w flood prone area (ft)
 2.2 entrenchment ratio
 low bank height (ft)
 low bank height ratio

Materials

D50 (mm)
 D84 (mm)
 threshold grain size (mm)

Bankfull Flow

velocity (ft/s)
 discharge rate (cfs)
 Froude number

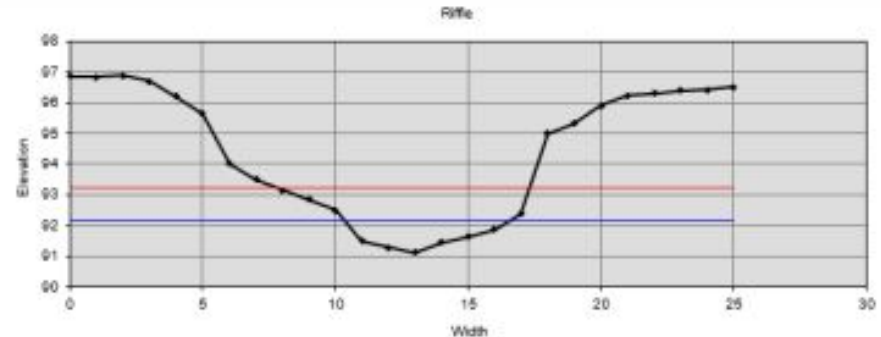
Flow Resistance

Manning's roughness
 D'Arcy-Weisbach fco
 resistance factor u⁺
 relative roughness

Forces & Power

channel slope (%)
 shear stress (lb/sq ft)
 shear velocity (ft/s)
 unit strm power (lb/ft/s)

Cross Section 6



Bankfull Dimensions

4.0 w-section area (ft²)
 6.3 width (ft)
 0.6 mean depth (ft)
 1.1 max depth (ft)
 6.8 wetted perimeter (ft)
 0.6 hyd radi (ft)
 5.8 width-depth ratio

Flood Dimensions

3.6 w flood prone area (ft)
 1.5 entrenchment ratio
 low bank height (ft)
 low bank height ratio

Materials

D50 (mm)
 D84 (mm)
 threshold grain size (mm)

Bankfull Flow

velocity (ft/s)
 discharge rate (cfs)
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Forces & Power

channel slope (%)
 shear stress (lb/sq ft)
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Cisterns in combination with other practices

Rain Gardens, Technology & Drip Irrigation

How can a cistern & rain garden benefit you and your community?

Rain gardens and cisterns are designed to collect water runoff from gutters and down spouts. This water is then filtered through the plants and soil of the garden. Rain gardens and cisterns help to protect our soil and water resources in the following ways:

- They reduce the speed of the runoff water, lessening erosion damage that usually occurs from fast-moving runoff.
- They remove pollutants and excess nutrients from the water.
- They recharge groundwater with filtered water.
- They reduce polluted runoff water that enters waterways.

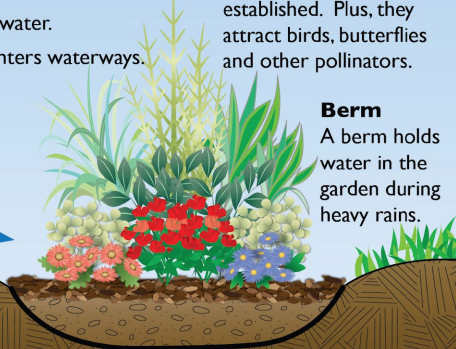
Gutters and down spouts

Assist with directing rain water from your roof to your cistern and/or rain garden.



Deep Roots

Plants with a deep root system encourage infiltration and help absorb nutrients.

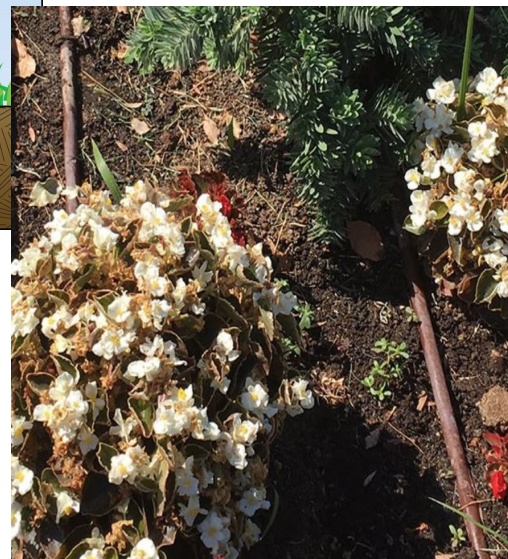


Native Plants

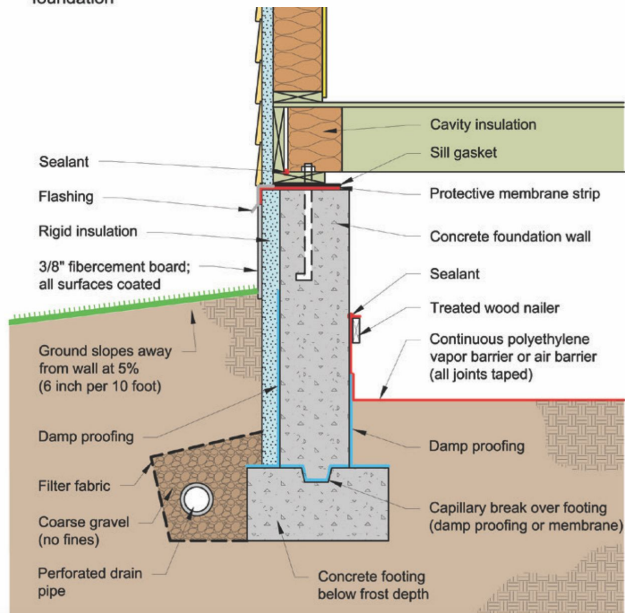
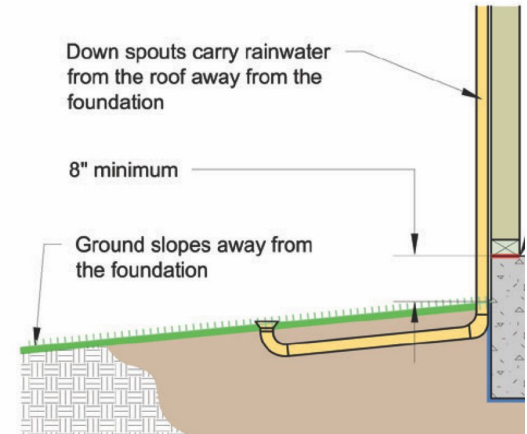
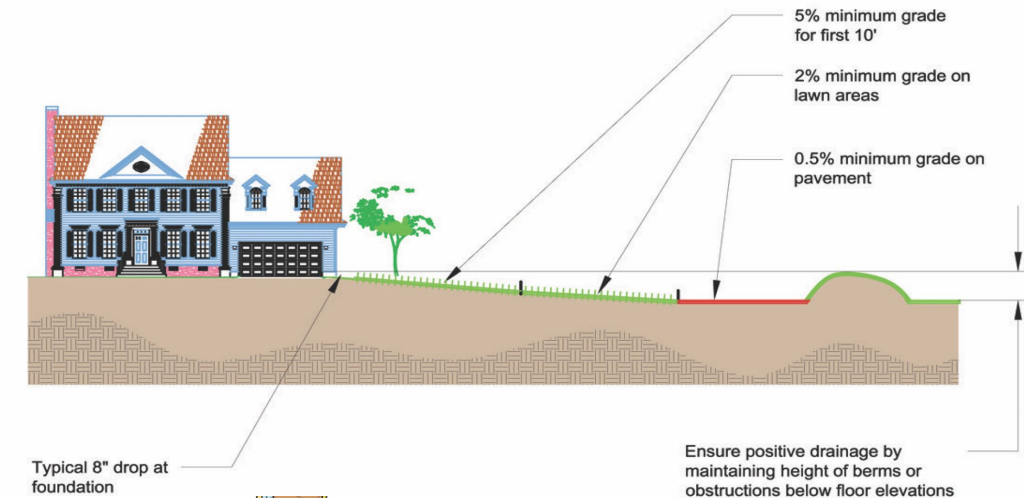
Native plants are adapted to local conditions and are easy to maintain once established. Plus, they attract birds, butterflies and other pollinators.

Berm

A berm holds water in the garden during heavy rains.



Indoor Air Quality & Drainage



Gutters \$600 to \$1200
Grading \$1200 to \$1500
Moisture Barrier \$1000 to \$1200



New Gutters with Grant
funds, new swale &
cistern using water
quality funds
No more water under
the house





No More
water under
the house



Work Force Development/NCSSM Curriculum



https://www.dropbox.com/sh/f7aa77ls5inglbs/AABMSNU6USEdTIG3qbBUk89Ra/Energy%20and%20Sustainability/Energy%20and%20Sustainability%20-%20Year%202/10ES08_Storm%20Water%20Management%20Capstone?dl=0



North American Association of Environmental Education/ UL Innovative Education Award 2016

*“Durham’s BETC program has had a proven track record in its ability to leverage public and private funds for conservation, earned income for schools, and sustainability improvements for local homeowners. BETC is a scalable model that has a strong foundation and well-conceived incremental building blocks to continue to expand the program. Its solid foundation includes teacher training that enables program materials and curriculum to reach more students; solid partnerships with public organizations, government, and additional schools; and successful implementation in both high-achieving and lower-resourced schools. BETC benefits institutions, homeowners, and students: schools earn revenue and students gain workforce and public speaking skills. Meanwhile, homeowners increase their knowledge of stormwater runoff and increase their sustainability. **BETC inspires youth to participate in local environmental challenges in real-world service and solutions for homeowners.**”*

UL Innovative Education Award Judging Panel



Students & Teachers work in the community Environmental Justice Component



Students completed six online afterschool training courses & then worked two Saturday mornings with teachers to help citizens in the community. Each student earns \$220 for participating in this effort.

Community Garden/East Club Blvd.



Southern High Students and 15 volunteers installed garden beds and provided deer fencing.
\$4,000 for materials

Community Garden /Braggtown



Two 5,000 gallon cisterns were donated. Grant funds paid for gutters and the cistern installation.

Students from Southern High installed , blueberries, grapes and drip irrigation.

Community Impact & Innovation

Town Government:

- Improved water quality through focused community efforts
- Expanded Environmental Literacy
- Compliance with Nutrient Management Rules
- Providing summer jobs for youth and teachers
- Sustainability & Climate Resiliency

Landowners:

- Improved property values, better indoor air quality & reduced erosion
- Opportunities to save money on water bills
- Increased community involvement by engaging with schools

School System:

- Improved student performance with experiential instruction
- Teachers are more connected to the community
- Retention of Highly Qualified teachers

Students:

- Exposure to E-STEM skills and experience
- Leadership skill development in the apprenticeship program
- Higher self-esteem through community service opportunities
- Increased Environmental Stewardship



Durham Soil & Water Conservation District

May 19, 2021

Michael Dupree

Agribusiness & Environmental Services
Manager

Durham County Soil & Water

Mission: To conserve, enhance and promote Durham County's natural resources by providing citizens with environmental education and outreach, technical assistance, and economic incentives through diversified programs to meet the County's changing needs.



Soil & Water

Drainage & Erosion Case Studies

Fiscal Year	# of Case Studies	Cost share applications
2015	206	42
2016	270	66
2017	299	31
2018	223	33
2019	173	16
2020	118	18
2021	454	35

Case Type	Case Type Descriptor	Case Status	Description	Received Date	Reporter Name	Owner Name
Drainage & Erosion I&E		Open	Homeowner's main concern is the	3/9/2021		Tom Shaffer
Drainage & Erosion I&E		Open	Home owner has a myriad of drai	3/9/2021		Stefanie Conrad
Drainage & Erosion I&E		Closed	Home owner is having various dra	3/9/2021		Collen Cowperthwait
Drainage & Erosion I&E		Closed	Accessory building is flooding an	3/9/2021		Greer Yelverton
Drainage & Erosion I&E		Open	Home owner is having drainage p	3/9/2021		Daniel Lapidus
Drainage & Erosion I&E		Closed	Home owner has drainage proble	3/9/2021		Betsy Norman
Drainage & Erosion I&E		Open	Home owner has excess water on	3/3/2021		Chuck Fennimore
Drainage & Erosion I&E		Open	Home owner needs new gutters a	3/3/2021		Denise Brandon
Drainage & Erosion I&E		Closed	Home owner is having drainage is	3/8/2021		Kathy Powell
Miscellaneous		Closed		3/5/2021		Erin Sills
Drainage & Erosion I&E		Closed	Landowner having problems with	3/9/2021		Zerlina Agbogbe

Article 73.

Community Conservation Assistance Program.

§ 106-860. Community Conservation Assistance Program.

(a) Program Established. - There is established the Community Conservation Assistance Program. The Program shall be implemented and supervised by the Soil and Water Conservation Commission of the Department of Agriculture and Consumer Services.

(b) Purposes. - The purpose of the Program shall be to reduce the input of nonpoint source pollution into the waters of the State. The Program shall be subject to the following requirements and limitations:

- Voluntary program to reduce nonpoint source pollution

- Not used to aid new development, nor meet the requirements of existing regulations

- CCAP: Up to 75% in cost-share, maximum of \$5,000 per landowner per year, with 25% cash match from landowners.
ISIP: 100% cost-share for low-income households funded by Durham County

- Both require signed maintenance agreements for 5 to 10 years





[Tell us how we're doing! Fill out our website user survey.](#)

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Why is this program important?

Soil & Water

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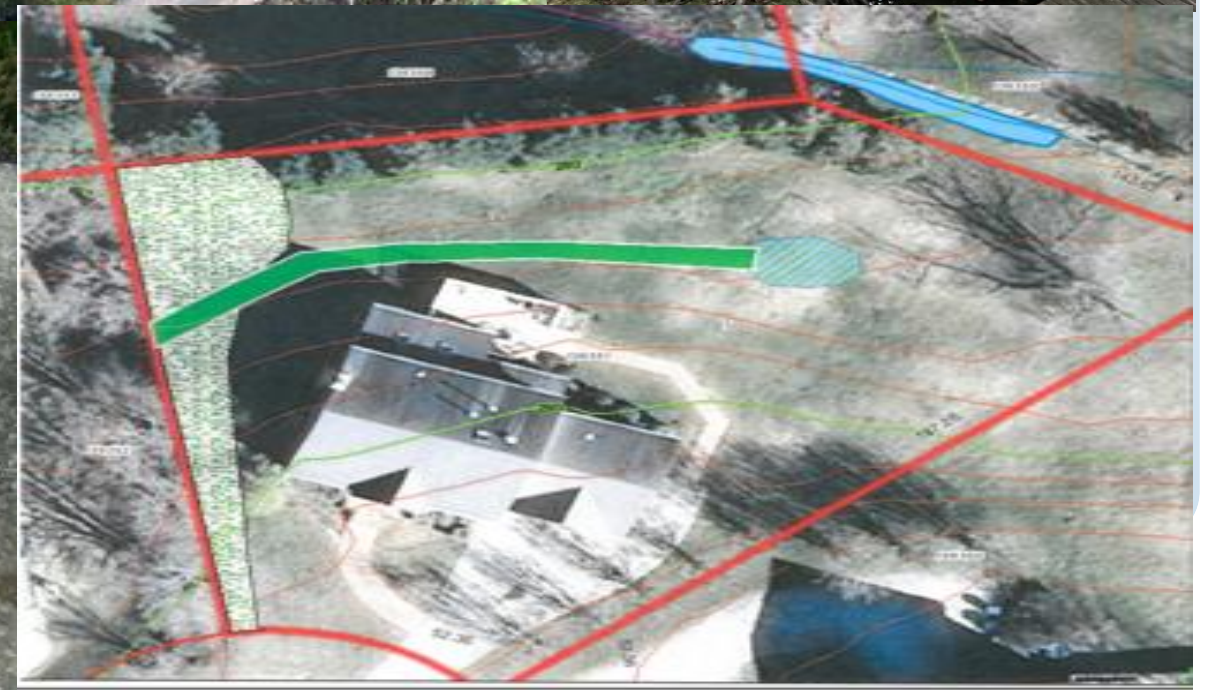
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Search Soil and Water

Water Quality Concerns



CCAP Targeted Efforts

Ranking System

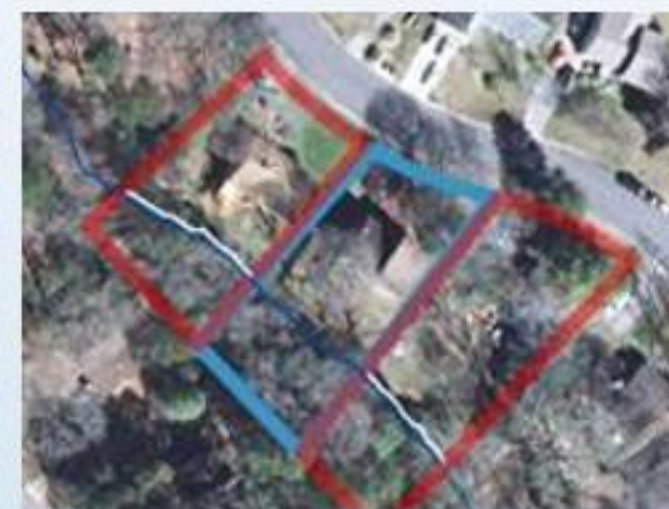
All applications are evaluated to prioritize the most beneficial water quality improvement projects.

- I. Drinking Water Supplies
 - A. Proximity to Durham County drinking water reservoirs
 - 1 0 to 5 miles (15 pts)
 - 2 6 to 15 miles (10 pts)
 - 3 > 15 miles (5 pts)
 - B. Reduced sediment delivery into: (pick only one)
 - 1 303d listed area (25 pts)
 - 2 Perennial Stream/Creek (10 pts)
 - 3 Intermittent Stream/Creek (5 pts)
 - C. Proximity to DWQ monitoring sites
 - 1 0 to 2 miles (15 pts)
 - 2 3 to 5 miles (10 pts)
 - 3 > 5 miles (5 pts)
- II. Site Information
 - A. Runoff being treated by existing stormwater feature
 - 1 No existing feature (25 pts)
 - 2 Feature is more than 10 yrs old (10 pts)
 - 3 Feature is less than 10 yrs old or permitted (5 pts)
 - B. Runoff in relationship to buffers
 - 1 Directly connected to stormdrain impervious surface or blueline stream (25 pts)
 - 2 0 to 20 ft of vegetated buffer (10 pts)
 - 3 > 20 ft vegetated buffer (5 pts)
 - C. Runoff - slope %
 - 1 slope is > 15% (15 pts)
 - 2 slope is 6 to 14% (10 pts)
 - 3 slope is 0 to 5% (5 pts)
- III. Priority Best Management Practices
 - A. Impervious watershed area of BMP
 - 1 > 1500 ft² (15 pts)
 - 2 500 to 1500 ft² (10 pts)
 - 3 < 500 ft² (5 pts)



*DURHAM SOIL & WATER CONSERVATION EVALUATION FORM for
N.C. COMMUNITY CONSERVATION ASSISTANCE PROGRAM (CCAP)*

CCAP Targeted Efforts



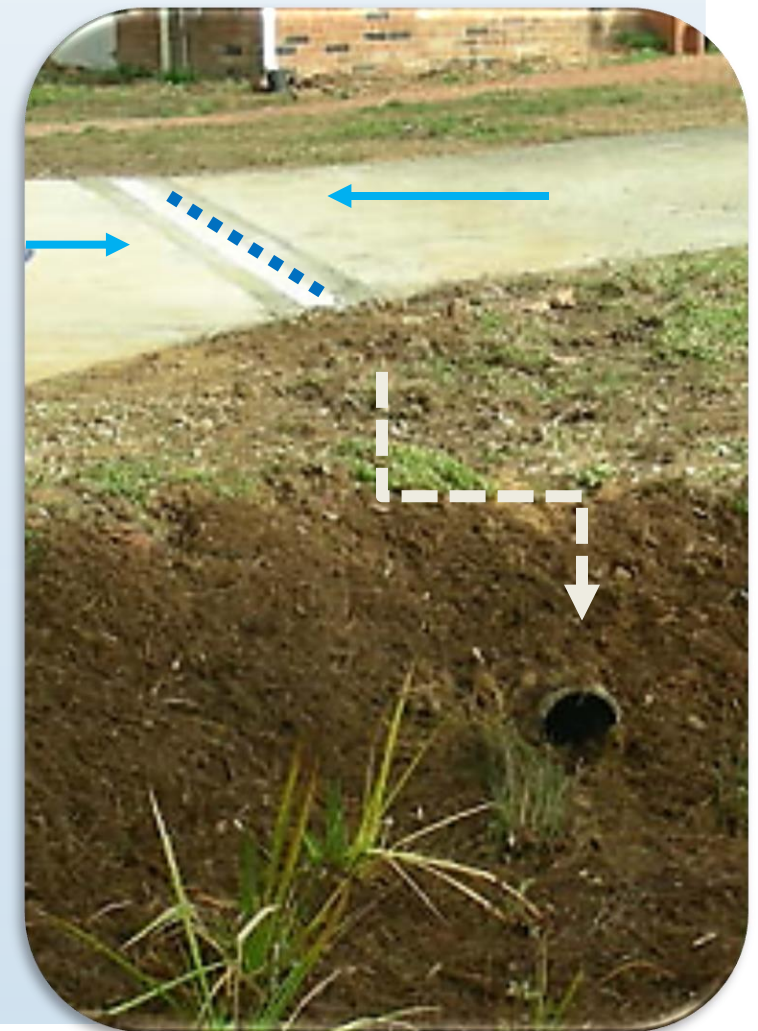
Soil & Water

Project Design & Installation

265 BMPs installed to date to treat “connected stormwater runoff” as defined in the NC CCAP Design manual:

- 74 Rain Gardens
- 74 Cisterns (ranging from 300 gallon to 10,000 gallon)
- 17 Critical Area Plantings
- 15 Impervious Surface Conversions
- 46 Streambank & Shoreline Protection
- 19 Riparian Buffer installations
- 16 Grassed Swales
- 4 Structural Stormwater Conveyance

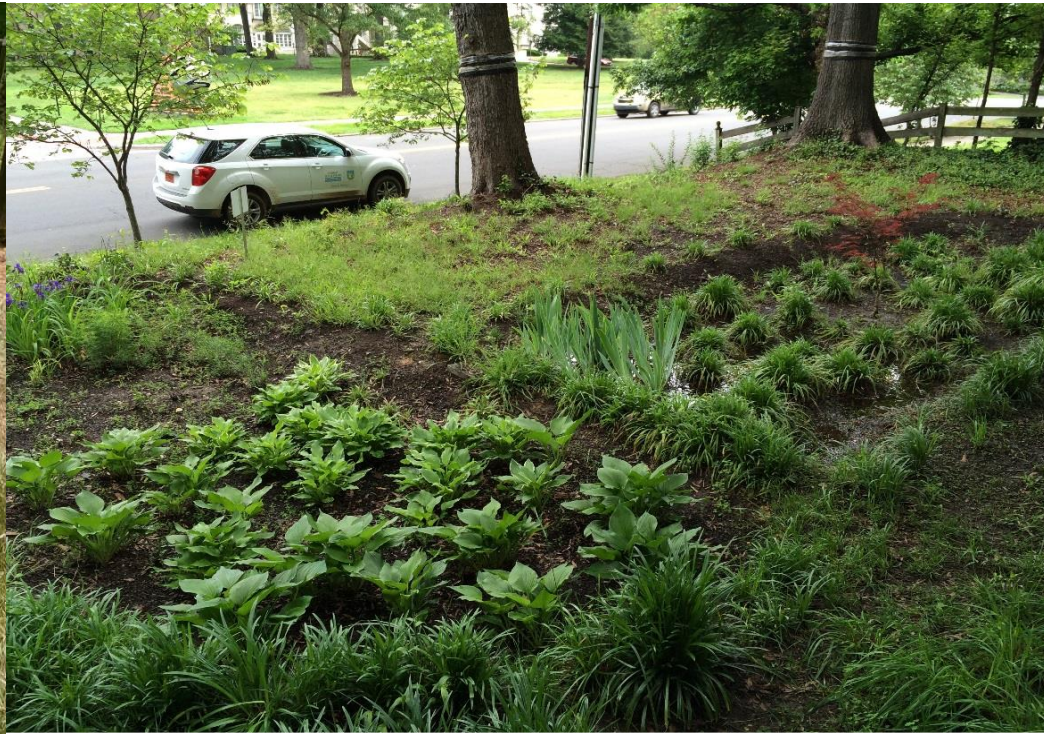
*Utilized in conjunction with other BMPs to capture additional impervious surface runoff



Fiscal Year	# of Contracts	Cost-share	Funding Source	Total	Funding Status
2008	3	\$12,226			
2009	1	\$4,075			
2010	7	\$11,456			
2011	13	\$22,293			
2012	23	\$41,643			
2013	8	\$20,395			
2014	13	\$27,315			
2015	23	\$68,788	2019 EPA 319	\$100,000	\$57,861 remaining
2016	34	\$117,159	County funds	\$20,000	Re-occurring
2017	28	\$115,471	State funds	\$20,000	Regional Application
2018	27	\$111,503	City Interlocal Agreement	\$30,000	\$14,692 remaining
2019	19	\$52,792			
2020	9	\$40,764			
2021	14	\$42,838			
Total	222	\$688,718			



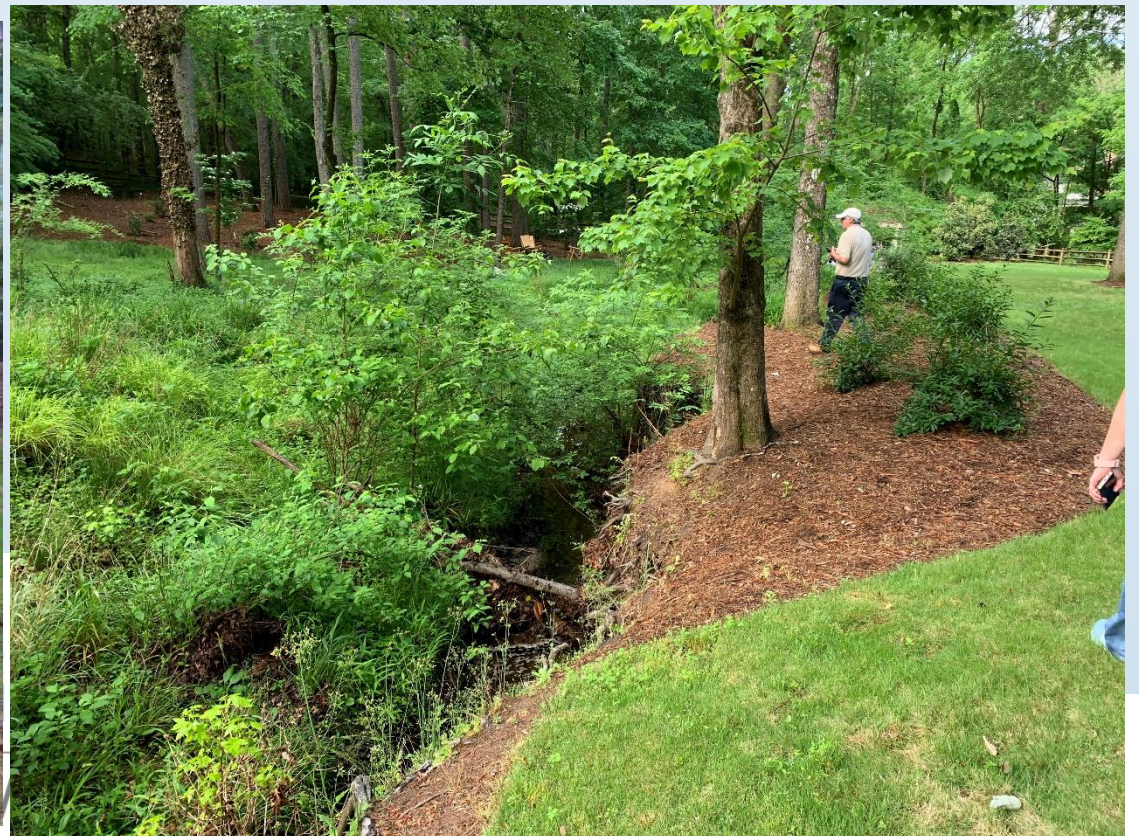
Community Conservation



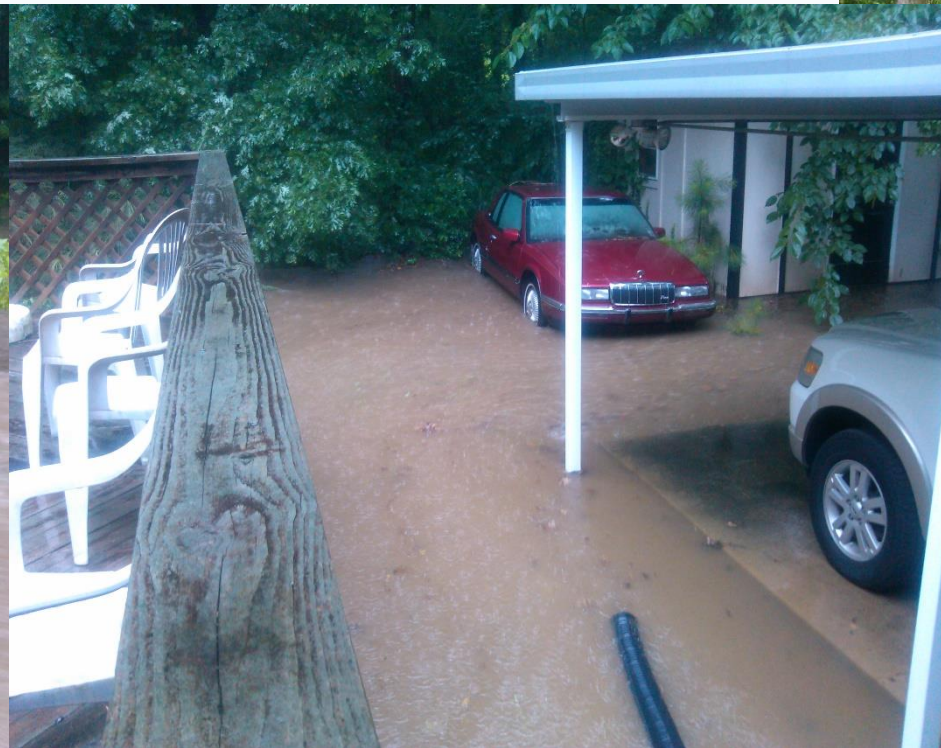
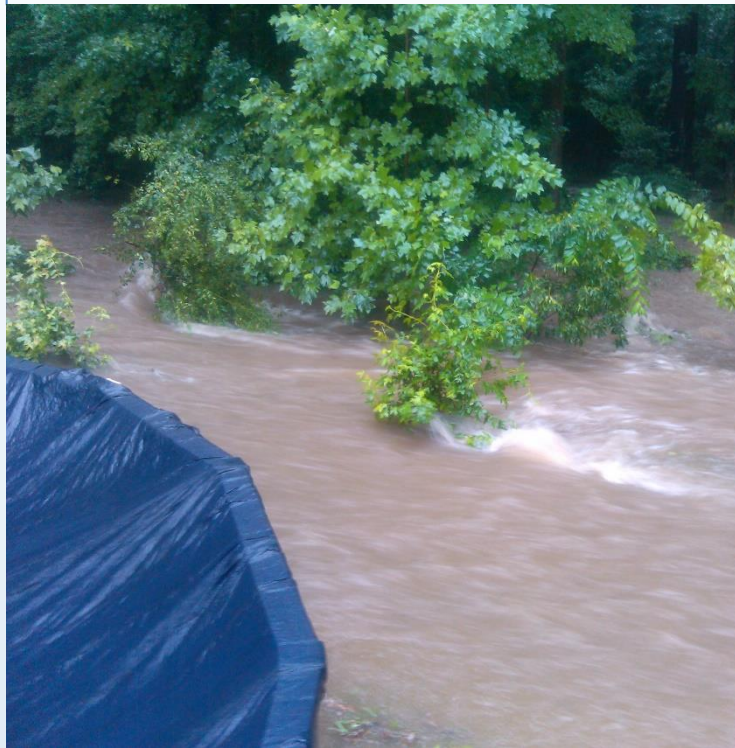
**DURHAM
SOIL & WATER**
CONSERVATION DISTRICT

Soil & Water

Streambank Protection

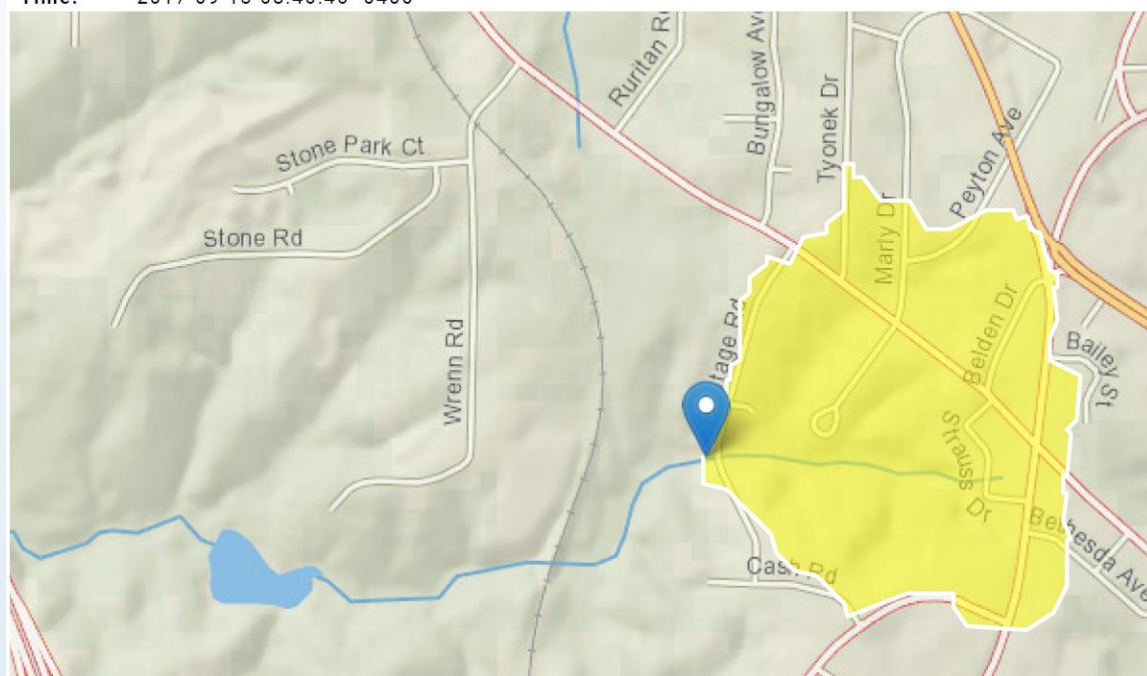


Streambank Protection



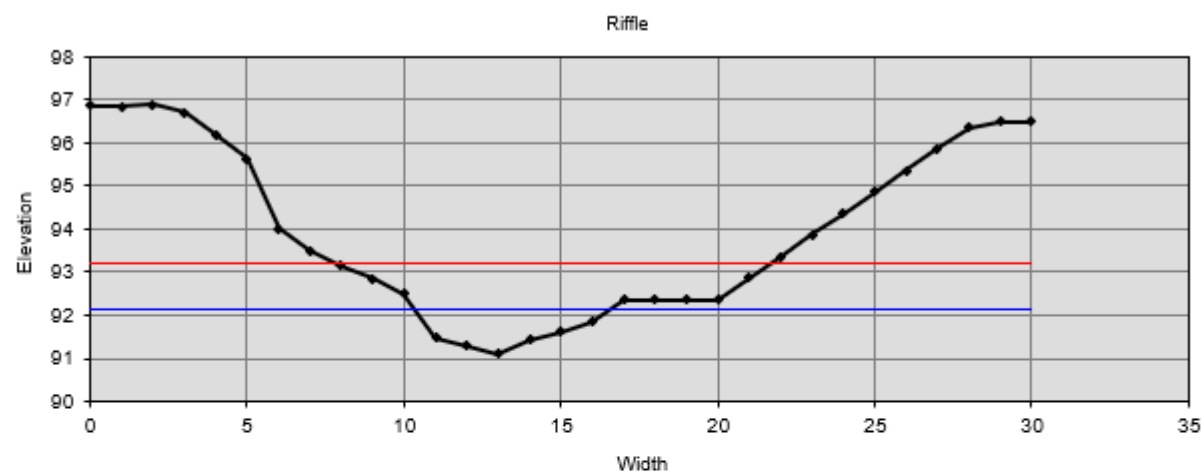
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Min BKF width	0.1*W or 3' (greater)	0.94
Floodprone Width (elevation)		93.22

Cross Section 5



Bankfull Dimensions

4.0 x-section area (ft.sq.)
 6.3 width (ft)
 0.6 mean depth (ft)
 1.1 max depth (ft)
 6.8 wetted perimeter (ft)
 0.6 hyd radi (ft)
 9.8 width-depth ratio

Flood Dimensions

13.9 W flood prone area (ft)
 2.2 entrenchment ratio
 --- low bank height (ft)
 --- low bank height ratio

Materials

--- D50 (mm)
 --- D84 (mm)
 --- threshold grain size (mm):

Bankfull Flow

--- velocity (ft/s)
 --- discharge rate (cfs)
 --- Froude number

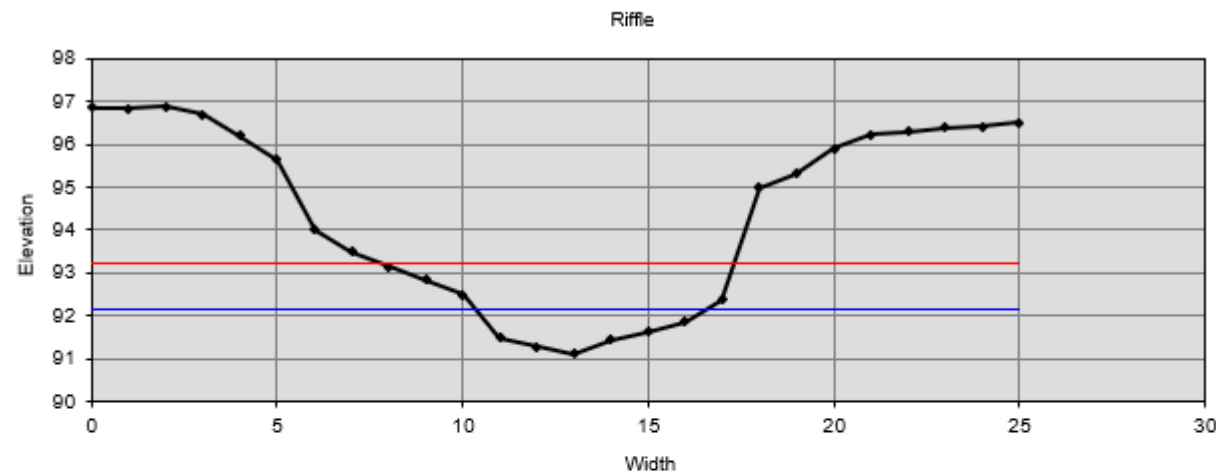
Flow Resistance

--- Manning's roughness
 --- D'Arcy-Weisbach fric.
 --- resistance factor u^*
 --- relative roughness

Forces & Power

--- channel slope (%)
 --- shear stress (lb/sq.ft.)
 --- shear velocity (ft/s)
 --- unit strm power (lb/ft/s)

Cross Section 6



Bankfull Dimensions

4.0 x-section area (ft.sq.)
 6.3 width (ft)
 0.6 mean depth (ft)
 1.1 max depth (ft)
 6.8 wetted perimeter (ft)
 0.6 hyd radi (ft)
 9.8 width-depth ratio

Flood Dimensions

9.6 W flood prone area (ft)
 1.5 entrenchment ratio
 --- low bank height (ft)
 --- low bank height ratio

Materials

--- D50 (mm)
 --- D84 (mm)
 --- threshold grain size (mm):

Bankfull Flow

--- velocity (ft/s)
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Forces & Power

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Streambank Protection



streambank stabilization



Streambank Protection



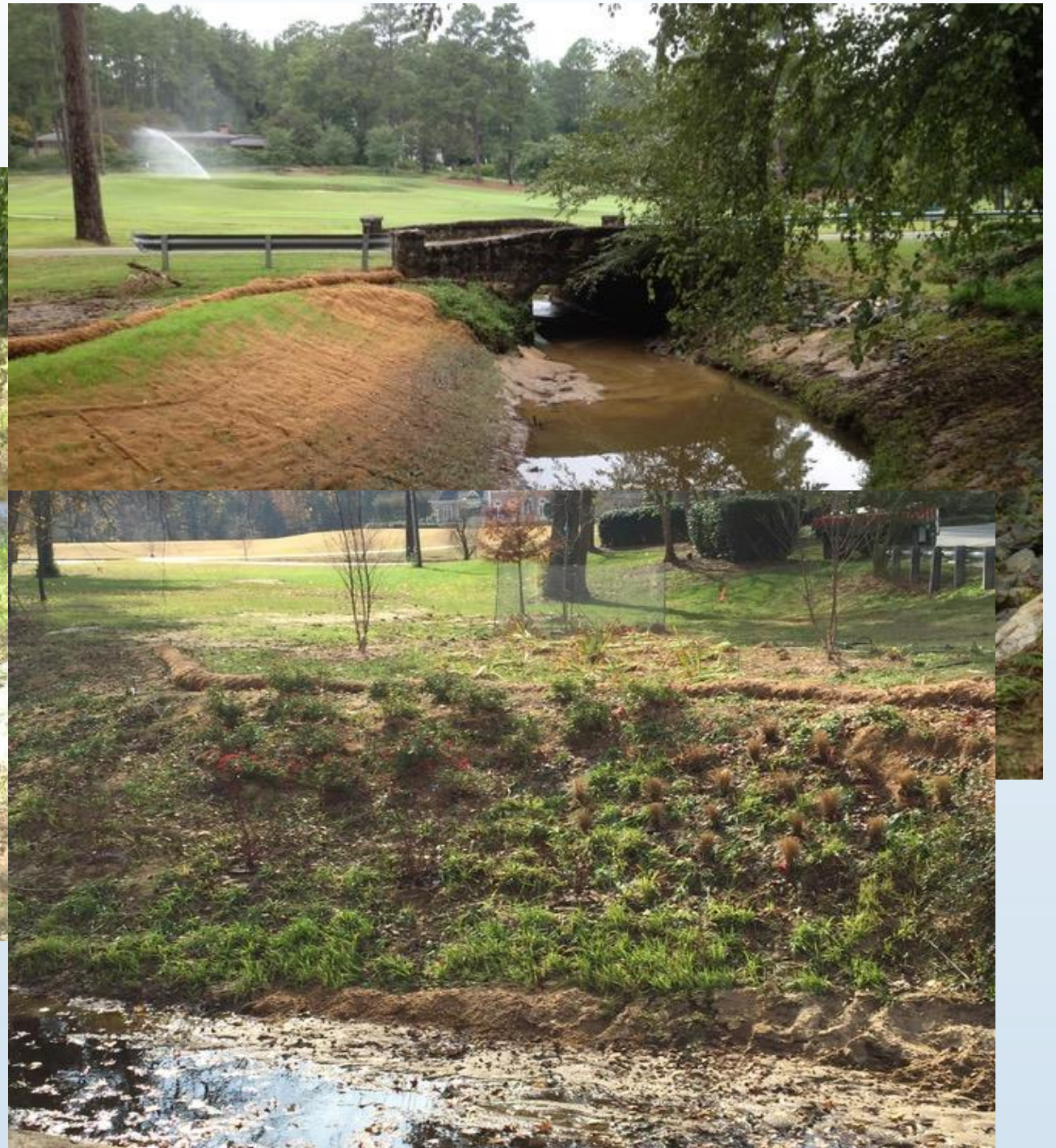
Soil & Water

Streambank Protection



Soil & Water

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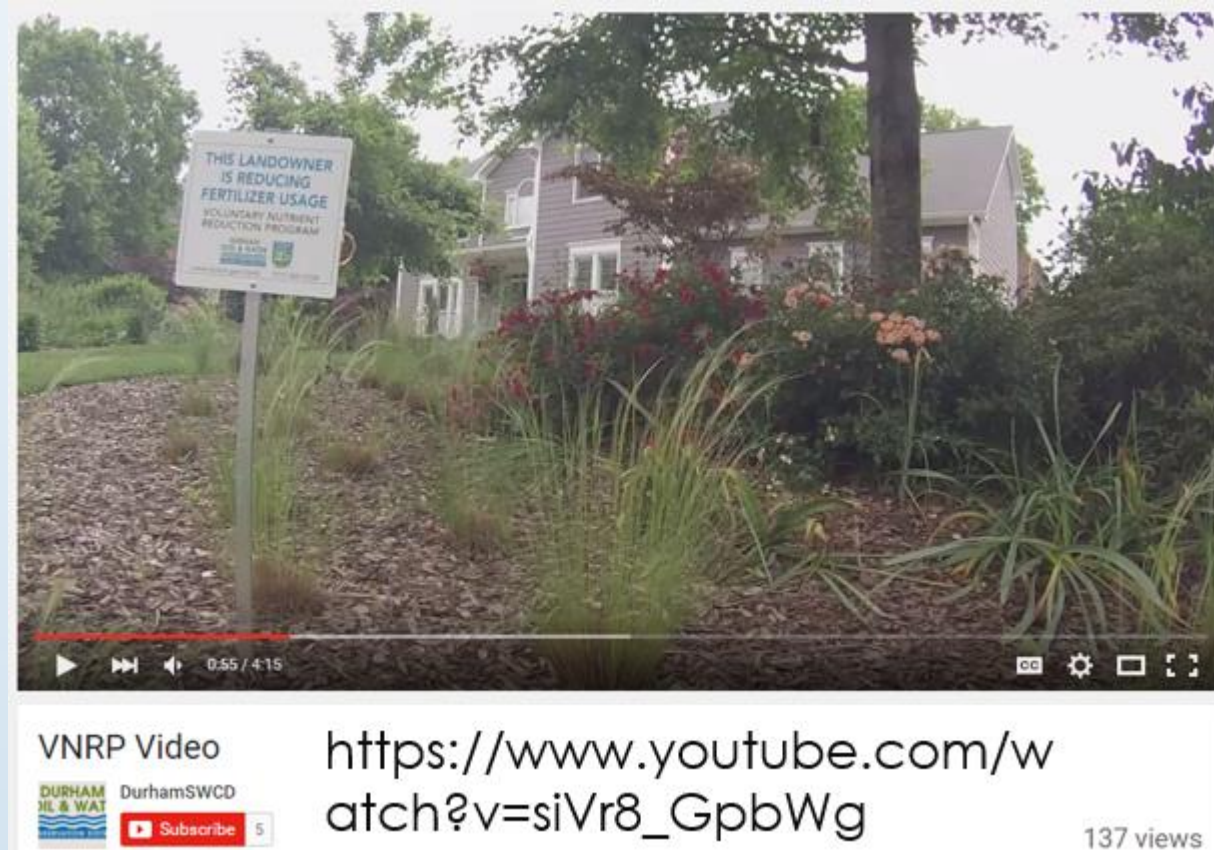


Soil & Water

Durham County Soil & Water



Voluntary Nutrient Reduction Program (VNRP)



Voluntary Nutrient Reduction Program (VNRP)



What is the VOLUNTARY NUTRIENT REDUCTION PROGRAM?

Durham County's Voluntary Nutrient Reduction Program (VNRP) encourages citizens to reduce their fertilizer use by 40%. By improving fertilizer application practices, landowners are protecting their county's water resources and improving water quality in North Carolina. The Best Management Practices (BMPs) recommended by the VNRP include the following:



Test your soil.

Collect and send a soil sample to the North Carolina Department of Agriculture & Consumer Services Agronomic Division. This soil sample information is an important first step in determining what type and how much fertilizer should be used. This soil test is a free service. You can obtain the sample boxes and forms from the Durham County Agriculture Building located at 721 Foster St. in Durham.

Do not apply fertilizer right before a runoff-producing heavy rain or when the ground is frozen. This helps prevent fertilizer from being washed into storm drains, ending up in our streams and lakes.



Sweep up spilled fertilizer from driveways, sidewalks and curbs.

This will help prevent fertilizer spilled on impervious areas from being washed into storm drains and streams.



It is best for the environment and your lawn to make more frequent low-rate applications and to use slow release or controlled release fertilizers. Apply fertilizer at the "basic" rate of nitrogen per year according to the chart on the back of this brochure.

Do not apply fertilizer within 20 feet of any body of water.

Streams, ponds and bodies of water need a minimum of a 20 ft. vegetated buffer area to help reduce the excess runoff of nutrients from the fertilized and managed areas.



FERTILIZER FORMULA

To determine the correct amount of fertilizer to use, following the procedure described below.

- To apply 1 lb. of Nitrogen per 1000 sq. ft., divide the 1st number on the fertilizer bag into 100. For example, a 16-4-8 fertilizer should be applied at a rate of 6.25 lbs. per 1000 sq. ft. ($100 / 16 = 6.25$).
- To apply 1/2 lb. of Nitrogen per 1000 sq. ft., divide the 1st number on the fertilizer bag into 50.

We provide personalized nutrient management recommendations.

SUGGESTED MAINTENANCE FERTILIZATION FOR ESTABLISHED LAWNS IN THE PIEDMONT

LAWN GRASS TYPE	Fertilization	Monthly Application Rate (lb N/1000 sq. ft.)												Total lb. N Per 1000 sq. ft./yr.
		J	F	M	A	M	J	J	A	S	O	N	D	
Bermudagrass	Basic					1		1		1				3
	High				1	1	1	1	1	1				6
Tall Fescue	Basic		0.5							1		0.5		2
	High		1	0.5						1	1	0.5		4
Zoysiagrass Emerald & Meyer cultivars	Basic					1								1
	High				1			1						2
Zoysiagrass Other cultivars	Basic					1		1						2
	High				1		1	1						3

Recommended by Carolina Lawns - A Guide to Maintaining Quality Turf in the Landscape by NCSU, A&T University Cooperative Extension

NCSA/CS Agronomy Division Phone: (919) 233-2655 Web Site: www.ncsu.edu/extension										Report No. _____									
Soil Test										Crop: _____ Crop: _____									
Sample: _____ Location: _____ Agreement: _____										Alamance County Page 1 of 4									
Field: _____ Sample: _____ Location: _____ Agreement: _____										Field: _____ Sample: _____ Location: _____ Agreement: _____									
Test Results Soil: _____ Moisture: _____ pH: _____ EC: _____ CEC: _____ Base Sat: _____ Acid Sat: _____ gM: _____ P: _____ K: _____ Ca: _____ Mg: _____ Na: _____ Cl: _____ S: _____ Cu: _____ Zn: _____ B: _____ Mn: _____ Fe: _____ Al: _____ Si: _____ As: _____ Se: _____ Mo: _____ Ni: _____ Co: _____ Pb: _____ Cd: _____ Hg: _____ Cr: _____ Mn: _____ Fe: _____ Al: _____ Si: _____ As: _____ Se: _____ Mo: _____ Ni: _____ Co: _____ Pb: _____ Cd: _____ Hg: _____ Cr: _____										Test Results Soil: _____ Moisture: _____ pH: _____ EC: _____ CEC: _____ Base Sat: _____ Acid Sat: _____ gM: _____ P: _____ K: _____ Ca: _____ Mg: _____ Na: _____ Cl: _____ S: _____ Cu: _____ Zn: _____ B: _____ Mn: _____ Fe: _____ Al: _____ Si: _____ As: _____ Se: _____ Mo: _____ Ni: _____ Co: _____ Pb: _____ Cd: _____ Hg: _____ Cr: _____									

Soil tests are FREE from Apr. 1 – Nov. 24

Durham County Soil & Water

What is the VOLUNTARY NUTRIENT REDUCTION PROGRAM?

Durham County Government must promote training and education regarding the proper use of fertilizers in order to meet state requirements for nutrient reductions.

Durham County's Voluntary Nutrient Reduction Program encourages citizens to reduce their fertilizer use by 40% and follow these guidelines:

1. Fertilizers to be applied to turf areas should contain no less than 50% slow release nitrogen, per the guaranteed analysis label.
2. Use of fertilizers containing phosphorus should not be used unless a soil test has been conducted and the test indicates that phosphorus is required.
3. Fertilizers should not be applied when a run-off producing rainfall is occurring or predicted.
4. Fertilizers should not be applied to impervious surfaces or washed or blown off of impervious surfaces into storm drains or roadways.
5. Fertilizers should not be applied within 10 ft. of any waterway or body of water.

FERTILIZER FORMULA

To determine the correct amount of fertilizer to use, follow the procedure described below:

- To apply 1 lb. of Nitrogen per 1000 sq. ft., divide the 1st number on the fertilizer bag into 100. For example, a 16 - 4 - 8 fertilizer should be applied at a rate of 6.25 lbs. per 1000 sq. ft. ($100 / 16 = 6.25$)
- To apply 1/2 lb. of Nitrogen per 1000 sq. ft., divide the 1st number on the fertilizer bag into 50.

SUMMARY OF RULES

CATEGORY	JORDAN LAKE	FALLS LAKE
Reductions Required	35% Nitrogen 5% Phosphorus	Stage I 20% N 40% P Stage II 40% N 77% P
Rules Effective	August 11, 2009	January 15, 2011
Baseline Data	1997-2001	2006
Nutrient Management	Applicators must be certified by August, 2012 (or) Nutrient management plans for parcels of > 5 acres	No applicator certification required (or) No nutrient management plans required (Neuse Rules) > 50 acres
Registration	Not required	Required for agriculture operations including those related to crops, horticulture, livestock and poultry or engaging in research activities in support of commercial productions.

BENEFITS TO COUNTY CITIZENS

- A reduction in county expenditures and tax revenue requirements which are estimated to be in the range of 1.25 to 2.16 billion dollars.
- This program's strategy will help the county meet its nutrient reduction goals, as required by the Jordan and Falls Lake Rules.
- This program is a proactive approach to nutrient reductions and watershed protection and will serve as a conservation and education model for other counties.
- Reductions in nutrients made by registered individuals and entities will be tracked and cataloged.
- Citizens of Durham County will gain a greater knowledge with regard to the sources of nutrient pollution and nutrient migration.
- This program will educate and better prepare citizens concerning good water conservation practices that will further help the county prepare for future water demands as the population increases.

Environmental Education/Outreach



Environmental Education/Outreach



The Bionomic Educational Training Center (BETC, pronounced “Betsy”) Program provides local youth (ages 14-21) paid green infrastructure training, work experience, and practical STEM skills.

2021-Spring & Summer-7 teachers
Training 120 youth installing 20 BMP's

2021- Operation Summer Learning 9
schools training up to 700 students

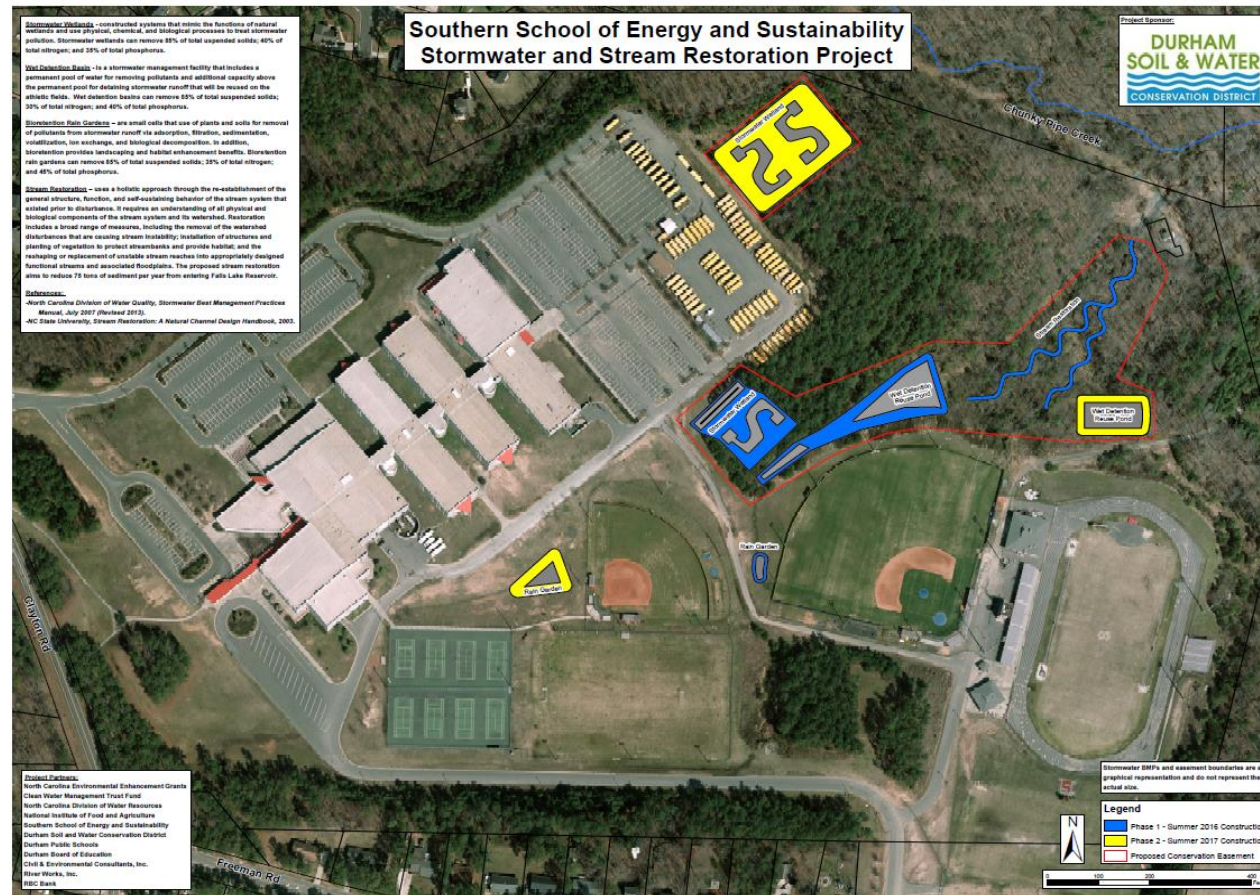


Soil & Water

Environmental Education/Outreach



BETC & Stream Restoration Projects



Partnerships

- Ellerbe Creek Watershed Association
- Northeast Creek Streamwatch
- HOAs/Community Associations
- Durham Public Schools
- DPS PTA's
- NC Division of Soil & Water
- Piedmont Conservation Council
- NC Cooperative Extension
- City of Durham Public Works
- NCSSM



Soil & Water

Questions?

Thank you!

919-560-0558

www.dconc.gov/SWCD



Soil & Water

SOIL AND WATER

STREAMBANK STABILIZATION

CHANNEL WORKSHEET 1

STREAM INFORMATION

1. STREAM NAME: _____
2. DRAINAGE AREA (DA): _____ MI² (= ACRES/640)
3. LOCATION (TOWN, COMMUNITY, COUNTY, ETC.): _____
4. LATITUDE / LONGITUDE: _____
5. DATE: _____
6. OBSERVER(S): _____
7. BENCH MARK LOCATION & ELEV: _____

STREAM CHANNEL MEASUREMENTS

8. DETERMINE CHANNEL CROSS-SECTIONAL AREA (A) AT FLOOD STAGE = $19.133 \times (DA)^{0.6539}$ = _____
THIS AREA IS REQUIRED FOR STABLE CHANNEL CONDITIONS.
9. DETERMINE CHANNEL WIDTH (W) AT FLOOD STAGE = $17.41 \times (DA)^{0.3692}$ = _____ FT
FINAL CHANNEL WIDTH MUST MEET THIS DIMENSION.
10. CALCULATE AVERAGE DEPTH (D) AT FLOOD STAGE = A / W = _____ FT
11. DETERMINE BENCH HEIGHT (Dmax) AS MEASURED FROM THE THALWEG = $(D) \times 1.55$ = _____ FT
12. MINIMUM BENCH WIDTH SHALL BE 10% OF CHANNEL WIDTH ($0.1 \times W$) OR 3 FEET, WHICHEVER IS GREATER = _____ FT Elevation = _____

NOTE: BENCH ELEVATION SHALL PARALLEL WATER SURFACE SLOPE. THE ELEVATION DIFFERENCE BETWEEN THE BENCH AND WATER SURFACE (BASE FLOW) SHALL REMAIN CONSTANT.

* *Bench and channel dimensions may have been modified in Mecklenburg Stream Program to meet site constraints/requirements*

CONSTRUCTION NOTES

STABILIZED STREAMBANK (ABOVE BENCH) SHALL HAVE A SLOPE OF 2:1 OR FLATTER, UNLESS 1.5:1 HAS BEEN APPROVED BY MECKLENBURG SOIL AND WATER CONSERVATION DISTRICT.

ESTABLISH PERMANENT VEGETATION ON ALL DISTURBED AREAS IN ACCORDANCE WITH THE USDA-NRCS CONSERVATION PRACTICE STANDARD CODE 342 (CRITICAL AREA PLANTING) OR OTHER GUIDANCE PROVIDED BY MECKLENBURG SOIL AND WATER CONSERVATION DISTRICT.

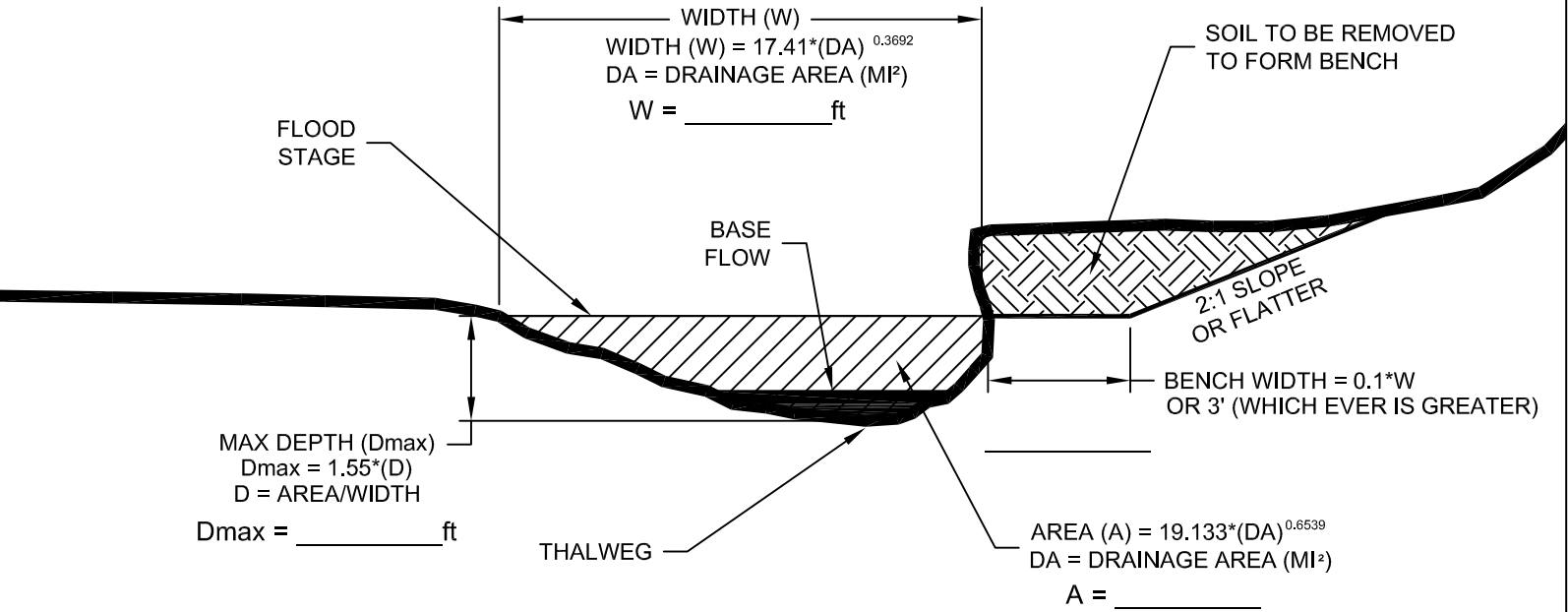
REGARDLESS SURFACE WATER CLASSFICATIONS THE USE OF NATIVE GRASSES AND PLANTS IS A REQUIREMENT FOR COST SHARE. CONSULT THE NC WILDLIFE RESOURCES COMMISSION, NC DIVISION OF WATER QUALITY FOR GUIDANCE OR MECKLENBURG SOIL AND WATER CONSERVATION DISTRICT.

STREAMBANK FROM THE WATER'S EDGE TO THE BACK OF THE CONSTRUCTED BENCH SHALL BE COVERED WITH COIR MATTING (700g) AND ANCHORED AS RECOMMENDED BY THE MANUFACTURER.

ALL STREAMBANK SLOPES ABOVE THE CONSTRUCTED BENCH SHALL BE COVERED WITH EROSION CONTROL MATTING CONSISTING OF WOOD AND/OR STRAW FIBERS SANDWICHED BETWEEN TWO LAYERS OF NETTING (i.e. CURLEX). INSTALL BLANKET AS DIRECTED BY THE MANUFACTURER.

THE CONSTRUCTED BENCH AND STABILIZED STREAMBANK SHALL BE PLANTED WITH WOODY VEGETATION IN THE FORM OF LIVESTAKES (1 STEM PER 9 SQUARE FEET). FURTHER INFORMATION ON BUFFER PLANTING CAN BE FOUND AT: **GUIDELINES FOR RIPARIAN BUFFER RESTORATION** BY NC DENR - EEP, OCTOBER 2004

ERODING STREAMBANK DIAGRAM



TYPICAL CROSS-SECTION OF CHANNEL AT RIFFLE

FIELD OFFICE: _____

ADDRESS: _____

PHONE: _____

LANDOWNER: _____

ADDRESS: _____

REVISIONS				
NO.	BY	DATE	DESCRIPTION	
1				
2				
3				
4				
5				

PROJECT #: _____

SCALE: **NTS**

DRAWN BY: _____

DATE: _____

CHECKED BY: _____

DATE: _____

SHEET NO. _____ OF _____

FILENAME: _____

Recommendation for a Pilot Stormwater Initiative

Program Objective: To create a stormwater program that addresses three community issues: workforce development, environmental justice and water quality.

Proposed Funding Source: This proposal would require 10% of the \$3,000,000 currently being collected as a Stormwater fee or the use of ARP funding.

Program Abstract for the Workforce Development Component:

The Town of Chapel Hill Workgroup seeks funding to offer work force development training opportunities for students in Green Infrastructure and serve as an outreach and education program promoting the installation of Stormwater Control Measures (SCM). The program would offer paid apprenticeships to students from the Chapel Hill Carrboro School System. Community members would be working in partnership with teachers to create a program for students to obtain work experience in Green Infrastructure. Students will receive E-STEM (Environment, Science, Technology, Engineering, and Math) training via lessons in the classroom and hands-on projects in the community. The stormwater curriculum was created in 2014 by the North Carolina School of Science & Mathematics (NCSSM). This curriculum is available at the link below.

https://www.dropbox.com/sh/f7aa77ls5inglbs/AABMSNU6USEdTlG3qbBUk89Ra/Energy%20and%20Sustainability/Energy%20and%20Sustainability%20-%20Year%202/10ES08_Storm%20Water%20Management%20Capstone?dl=0

The program has the following goals:

1. Increase E-STEM (Environment, Science, Technology, Engineering, and Math) knowledge among youth and the underserved.
2. Train and retain outstanding E-STEM instructors.
3. Strengthen students' engagement with their community creating generational linkages.
4. Increase participation of landowners in the community to install SCMs.
5. Increase community awareness of the role of SCMs and the impact on water quality, water quantity and stream preservation.
6. Decrease stormwater runoff into creeks and streams over time.

The NCSSM curriculum is perfectly aligned with the Town of Chapel Hill's Climate Action Plan and is consistent with the mission to improve the lives of citizens living in poverty. In addition, the storm water curriculum further supports students not performing at grade level in math and science. The hands-on lessons support improved student performance in science, math and engineering, and fosters a greater awareness of environmental stewardship.

This program also teaches the importance of proper drainage around a home and how stormwater can impact indoor air quality and the occupants' health. Poor drainage around a structure creates opportunities for mold and injurious insects to infect dwellings, which degrade structures and the quality of life for the residents who live in the structures.

Recommendation for a Pilot Stormwater Initiative

Afterschool Program

Participating teachers will deliver the curriculum through after-school programs (in person or virtually) at the participating schools. The after-school program will include at least six one-hour modules of the stormwater curriculum available on Canvass Commons and the participation of installation of a rain garden or cistern on the school campus. Additionally, teachers will be encouraged to work with community leaders and staff to plan field trips to the sites where the installation of SCM's would have a benefit to down-stream water quality. This experience will allow students to see a variety of sites and use these as case studies for training purposes. The goals of the afterschool program are to have students work on an SCM at their school and to visit sites in the community that are either installing an SCM or where an SCM would be a benefit to the community.

Summer Apprenticeship

A summer apprenticeship program will also be offered for High School students. During the program teachers will work with staff and community leaders to implement the 2-week apprenticeship. The team will develop the schedule with community leaders to survey neighborhoods to identify projects for SCM installation. The summer teams seek to accomplish the following objectives:

1. Assist in the installation of water conservation measures at residences.
2. Assist in the installation of small-scale SCMs such as cisterns, rain gardens and vegetable gardens at single family residences.
3. Assist community leaders with surveying communities to identify and catalog sites suitable for SCM installation.

Benefits

- A. Through both the after-school program and summer apprenticeship, students receive in-depth instruction and practical experiences in the areas of biology, environmental science, math, weatherization, and energy sustainability.
- B. A minimum of fifty percent of the apprenticeships will be reserved for underrepresented groups in E-STEM. We will work with school administrators, school counselors and classroom teachers to identify and recruit participants.

The program will be an effective method to increase student interest because it has the components that research indicates are necessary to affect environmental literacy. They include:

1. An extended duration and contact hours with job training,

Recommendation for a Pilot Stormwater Initiative

2. A connection with a student's home and community, by repairing homes in the community,
3. Involving students actively and providing practice in action and experiential learning with personnel from the construction and green industries firms.

The outcomes for students include:

1. Learning the basic process skills necessary to succeed in the Green Industry.
2. Increasing insight into and appreciation of the investigative process and scientific inquiry.
3. Receiving science-related career information and introducing career prospects.
4. Connecting science and mathematics in their daily lives as it relates to stormwater management at ones' home.
5. Using digital technology to design SCMs.
6. Enabling them to interact with contractors in the industries.
7. Opportunities to explain their knowledge of science and mathematics to others, especially the elderly in the community.
8. Involving their parents and community leaders in program activities.
9. Earning service hours to apply to their school service hour requirements.

Alignment to the NC Essential Standards

In this project, gardening will serve as a vehicle for teaching the science specified in the NC Essential Standards for Science.

NC Essential Standards	Grade Level
EEn.2.4.2 Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environments.	9-12
EEn.2.8.2 Evaluate the concept of "reduce, reuse, recycle" in terms of impact on natural resources.	9-12
Bio.2.1.1 Analyze the flow of energy and cycling of matter (such as water, carbon, nitrogen and oxygen) through ecosystems relating the significance of each to maintaining the health and sustainability of an ecosystem.	9-12
Bio.2.2.2 Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next.	9-12

Recommendation for a Pilot Stormwater Initiative

Projected Timeline for Project:

The following timeline represents a projected example for three years of the project. Actual timeline dates will be determined at the beginning of each program year.

Program Year	What	When
2021-2022	Start of Project: Develop materials for distribution to participating schools	December 2021
	Present project to faculty and staff, inform schools about resources available for after-school STEM activities	December 2021
	Advertise/promote programs	March 2022
	Begin program implementation	April 2022
	Notify participants	May 2022
	Prepare for summer program rotations	June 2022
	Conduct summer program apprenticeship rotations	June-July 2022

Other project measures that impact the community will be tracked throughout the project and will be reported to state agencies. The following table below will be used to track quantities of the outputs and outcomes listed.

2021-2022 Community Service Outcomes Quantities tracked	
Number of Teachers and Students Impacted	# TBD
Hours of Training for students	# TBD
SCMs Projects Installed	# TBD
Number of Water Conservation measures installed	# TBD
Number of students who pursue additional training	# TBD
Nitrogen, Phosphorus & Total Suspended Solids removed by SCMs	# TBD

Budget Request \$50,000

Student Stipends \$21,600

Students participating in the afterschool program will earn \$220. This program requires that each student complete the six modules and participate in the two outdoor activities (approximately 4 hours in length) scheduled with the teacher regarding the rain garden or cistern installation at the school and a second trip within the community. A total of \$6,600 would provide 30 students with

Recommendation for a Pilot Stormwater Initiative

a stipend for completing this afterschool enrichment program. A total of \$15,000 would provide 30 students with a \$500 stipend for participating in the summer program.

Teacher Stipends \$18,000

A total of \$6,000 would provide 6 teachers with a stipend to lead the afterschool program to a group of 5 students. A total of \$12,000 would provide 6 teachers with a \$2,000 stipend to lead the two-week summer program.

Materials: \$10,400

The afterschool program would install a possible 12 rain gardens at a cost of \$400 each, totaling \$4,800. The summer program would install an additional 12 rain gardens for \$4,800, leaving a balance of \$800 for miscellaneous supplies.

- Note: Landowners in the community may be willing to host school groups and provide a site for rain garden installation and make cost share contributions towards the total project cost.

Program Abstract for the Environmental Justice Component

The Town Council would approve a Cost share program that would cover 100% of the cost to retrofit houses where the residents' income is below the poverty level. The program would install gutters, add moisture barrier in the crawl space and provide positive drainage away from the home. This work would be done by professional contractors (support minority owned businesses) or by non-profits like Rebuilding Together of the Triangle. This program teaches the importance of proper drainage around a home and how stormwater can impact indoor air quality and the occupants' health. Poor drainage around a structure creates opportunities for mold and injurious insects to infect dwellings, which degrade structures and the quality of life for the residents who reside in the structures.

A total of \$180,000 would provide 25 to 30 single family homes with the services listed above. The value of this expenditure improves the quality of life for the residents while reducing the quantity and improving the quality of stormwater for the entire community. When combined with the funding provided for the students and teachers this program allows youth the opportunity to assist with the installation of a cistern and a garden bed or a rain garden based on the landowners' choice.

This program is currently being implemented in Durham as part of the Southeastern Sustainability Community Fund grant. Paul Cameron with the City of Durham is the project Director.

<https://durhamnc.gov/directory.aspx?EID=1043>

Program Abstract for a Water Quality Cost Share Program

Recommendation for a Pilot Stormwater Initiative

A cost share program would be established to incentivize residents in existing development to install SCM's. The Town would allocate \$70,000 a year to residents who have a water quality concern to Cost Share up to 75% of the implementation of practices that reduce stormwater quantity and improve water quality. This program would mimic programs similar to those listed below:

City of Charlotte/Urban Cost Share Program

<https://www.mecknc.gov/LUESA/WaterandLandResources/Conservation/Pages/UCSP.aspx>

City of Raleigh/ Rain Water Rewards Program

<https://raleighnc.gov/projects/content/PWksStormwater/Articles/StormwaterQualityCostShareProgram.html>

North Carolina Division of Soil & Water/Community Conservation Assistance Program

<http://www.ncagr.gov/SWC/costshareprograms/CCAP/index.html>

Recommended Practices to cost share include:

Down Spout Disconnection

Cisterns

Rain Gardens

Streambank Stabilization

Riparian Buffer Enhancement

Impervious Conversion to vegetation

Permeable Pavement (In conjunction with Impervious Conversion)

Grass Swales

Structural Stormwater Conveyance with a Rain Garden or Grass Swale

Recommendation for a Pilot Stormwater Initiative