Community Conservation Assistance Program (CCAP)
Water Quality Benefits Tool
User's Guide: January 2010

BACKGROUND

This tool is only intended to calculate the nitrogen, phosphorus, and total suspended solids (TSS) removal efficiencies of the CCAP best management practice (BMP). You should be able to take outputs from the designed BMP and simply "plug-in" data from your design into this tool to arrive at the nutrient/sediment removal figures for the practice.

This tool is for use with the following CCAP best management practices (BMPs):

- Backyard rain gardens
- Bioretention
- Backyard wetlands
- Stormwater wetlands
- Grass swales
- Impervious surface conversion
- Riparian buffer (50 feet or wider)

This spreadsheet tool is available in Microsoft Excel and includes two worksheets that must be completed for each CCAP BMP listed above. The spreadsheet was developed by staff from North Carolina State University and the Division of Water Quality, with the assistance of Soil and Water Conservation District and Division of Soil and Water Conservation employees. It relies on the use of the Simple Method for calculating runoff volume, and builds on the existing Division of Water Quality (DWQ) export calculation worksheets for the Tar-Pamlico River Basin. The percent removals for total nitrogen, total phosphorus, and total suspended solids are based on approved rates from the NC Department of Environment and Natural Resources Stormwater Best Management Practices Manual and the DWQ's BMP removal calculation worksheet for the Tar-Pamlico River Basin. This tool will be updated as DWQ revises their worksheet and BMP manual.

WATERSHED WORKSHEET

On the watershed details worksheet, you will need to enter specific information about the watershed that is draining to the CCAP BMP you are proposing.

The information that you will enter will be highlighted in green cells, as seen below.

Type of Land Cover	**Definition** *Consider only the acreage that is draining to the CCAP BMP for treatment*	**Catchment Acreage (ac)**
Transportation impervious	Acreage in watershed of roads, driveways, sidewalks, etc.	0.00
Roof impervious	Acreage in watershed of rooftops from houses, buildings, etc.	0.00
Managed pervious	Acreage in watershed of maintained vegetation such as lawns or landscaped areas, etc.	0.00
Wooded pervious	Acreage in watershed of forests areas.	0.00
Area taken up by BMP	Acreage in watershed that will be taken up by the BMP.	0.00

You will also need to enter information in the Simple Method for calculating volume.

The information that you will enter will be highlighted in green cells, as seen below.

	Definition	Data
I (%)	Connected impervious percentage in watershed	Automatically calculated
Rv	Runoff coefficient (fraction of rainfall that will produce runoff)	Automatically calculated
A (ft2)	Area that drains to BMP	Automatically calculated
P (in)	Precipitation event (in depth) that approximately 90% of the storms are equal to or less than: **1" throughout the state or 1.5" in CAMA counties**	
Volume (ft3)	Volume of runoff	Automatically calculated
Ponding Depth (in)	Ponding depth normally is associated with stormwater wetlands, backyard wetlands, backyard raingardens, and bioretention areas. Use the average design depth of these BMPs for this entry. For grassed swales, use the design depth of the swale. For buffers and impervious surface conversion to grass and/or trees, use the value "1" for one inch. For permeable pavement, use 50% of the design depth of the gravel sub-base (minimum recommendation is generally 6 inches, if so use the value " 6 inches * 50% = 3 inches". You should also use 50% of the sub-based plus 25% of the design depth of the actual pervious material you are using. *Example: you are converting 1000 square feet of concrete driveway into permeable pavement. The design requires a 6-inch sub-base of gravel plus 6-inches of permeable pavers. You would calculate:* *6 inches * 50% = 3 inches PLUS* *6 inches of pavement * 25% = 1.25 inches for a total of 4 inches of ponding depth.*	
Recommended BMP Size:		Automatically calculated

When you have entered data into all seven of the green cells, you can move to the next worksheet: BMP details. You can access this worksheet by clicking on the cell that reads "Enter BMP Details" or selecting the BMP worksheet at the bottom of the screen.

BMP WORKSHEET

On the BMP details worksheet, you will need to enter specific information about the CCAP BMP you are proposing.

The first step will be to select the BMP you are proposing. Remember that this tool is only for use with 7 of the 16 approved CCAP BMPs, so not all BMPs will display. There is an abbreviated list available in this tool using a pull down box, so please make the following assumptions.

BMP Type:	

BMP Type	**CCAP BMPs**
Wetland	Stormwater wetlands Backyard wetlands
Bioretention	Bioretention Backyard rain gardens
Swale	Grass swales
Impervious conversion	Impervious surface conversion
Buffer	Riparian buffer (50 feet or wider)

In CCAP, there will be BMPs that may be sized smaller than that recommended using the methodology in the CCAP Design Manual. This may be due to site limitations on the property, since CCAP is a voluntary, retrofit only program. This means that landowners are not installing these BMPs to obtain mandatory pollutant reductions, so sizing can be more flexible to the nature of the site and the landowner objectives.

If the size of the BMP is the same as the recommended design size, enter 100 in the green box below.

If the size of the BMP is smaller than the recommended design size, enter the appropriate percent in the green box below.

Example: Backyard rain garden designed to be 615 square feet in size.

- Impervious surfaces = 521 sq ft (walkways, parking lot)
- Pervious surfaces = 27,971 sq ft (grass lawn)
- Ponding depth = 3 inches
- P = 1”

According to the spreadsheet tool, the ***Recommended BMP Size*** for this rain garden is 609 square feet. The next step is to compare the tool’s **recommended size** with the **design size**. For this example, the design size is greater than the recommended BMP size, so you will enter 100 in the percent size relative to recommended design size box on the BMP page.

Design Size ≥ ***Recommended BMP Size*** = 100%

Design Size ≤ ***Recommended BMP Size*** = $\frac{\textbf{\textit{Design Size}}}{\textbf{\textit{Recommended BMP Size}}} * 100 = X\%$

For example, if the **design size** was 515 square feet, you would compare that to the ***Recommended BMP Size*** Design size/recommended BMP Size = (515/609)*100 = 85% Enter 85 in the percent size relative to recommended design size box on the BMP page.

This percent is essential for calculating the water quality benefits of the BMP, because the worksheet uses proportional values of percent reduction based on the size of the BMP. This ensures that CCAP does not overestimate water quality benefits for BMPs that might be sized differently.

Percent Size Relative to Recommended Design Size:	

There is an additional box that must be completed only for the impervious surface conversion BMP. This box takes into consideration the volume both before and after the conversion to calculate the water quality benefits of this practice. You can obtain these volumes by completing the Watershed Worksheet twice, and entering the data output from row 19 (volume). For the volume pre-conversion, complete the watershed worksheet using the current state of the watershed. For the volume post-conversion, complete the watershed worksheet using the future state of the watershed (after the impervious surface conversion has occurred).

For impervious conversion only	
Volume Pre-Conversion (ft3):	
Volume Post-Conversion (ft3):	

After all of the green cells on both worksheets are completed, you will obtain reportable results for your CCAP contracts. Submit the pounds/year for total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) for each applicable BMP.

RESULTS

Total TN Removed :	#VALUE!	lbs/year
Total TP Removed:	#VALUE!	lbs/year
Total TSS Removed:	#VALUE!	lbs/year

If you have questions while using this worksheet, please contact the CCAP Coordinator in the Nonpoint Source Programs Section