

**Beaufort County**

**Stormwater Retention Worksheet for Single Family Lot**

May, 2011 (Applicant input in Red Italics)

Amended December, 2021

**Section 1 – Lot Information**

Total Impervious Area to be created

*Home (rooftop)* \_\_\_\_\_sq. ft.

*Other Impervious* \_\_\_\_\_sq. ft.

(walkways, driveways, patio etc)

Total Impervious surface \_\_\_\_\_sq. ft. *Total Lot Size* \_\_\_\_\_sq.ft.

Pervious surface on lot = lot size – impervious surface

*Soil Type: \_\_\_Sandy\_\_\_ Clay -- Area of lot to be irrigated \_\_\_\_\_sq ft*

(will be equal or less to pervious surface)

**Section 2 – Post Construction Stormwater Run-off Calculation:**

**New** gallons of rainfall to be displaced by creation of new impervious areas

(Runoff expected from a 1.95 inch storm = 1.85 inch per square foot of impervious surface)

For Sandy soils

\_\_\_\_\_sq.ft. X 1.15 gals/sq.ft. = \_\_\_\_\_gallons

(total impervious surface)

**Less** pre-construction run-off for new impervious surface

(for sandy soils there would be no runoff and clayey would be .5 inch from 1.95 inch storm)

For Clay soils

\_\_\_\_\_sq.ft. X 0.82 gals/sq.ft. = \_\_\_\_\_gallons

(1.15-0.33)

**Section 3 – Application of Best Management Practices**

**Total** excess runoff \_\_\_\_\_gallons (amount to be retained, infiltrated or reused on property)

**Best Management Practices to be used:** (apply in order, can use a combination of practices to control excess runoff.)

**1. Storage and infiltration or reuse on the property**

This will utilize cistern or rain barrels to retain runoff from rooftops to be infiltrated or utilized between rainfall events according to notes and conditions. Note maximum and minimum credit.

**Storage and Reuse Credit**

**a. Rainbarrel**

\_\_\_\_\_ number X \_\_\_\_\_ size of rainbarrel-gals = \_\_\_\_\_ gallons of excess runoff controlled

**b. Cistern**

\_\_\_\_\_ size of cistern-gals = \_\_\_\_\_ gallons of excess runoff controlled

(credit size is limited to rooftop impervious surface X 1.15 gal/sq.ft)

**2. Disconnected Impervious Area** – allowance based on amount of impervious surface that sheet flows over pervious surface before leaving property.

- Allowance also varies for soil type and amount of area runoff sheet flows over.
- If storage and infiltration or reuse practice is used must only use unaddressed impervious surface
- May have to do multiple calculations if water flows off- lot in more than one direction. Generally front and back

**First Runoff direction.**

\_\_\_\_\_ sq.ft. divided by \_\_\_\_\_ sq.ft. = \_\_\_\_\_ *Disconnected Impervious ratio*  
(unaddressed impervious to pervious surface) (pervious sheet flow area)

**Second Runoff direction (if applicable)**

\_\_\_\_\_ sq.ft. divided by \_\_\_\_\_ sq.ft. = \_\_\_\_\_ *Disconnected Impervious ratio*  
(unaddressed impervious to pervious surface) (pervious sheet flow area)

Credit Table for Disconnected Impervious Area

Disconnected Impervious Ratio	Runoff reduction Gal/sq.ft-impervious area	Runoff reduction Gal/sq.ft-impervious area
	Clayey	Sandy
0.1	.40	1.15
0.2	.40	1.12
0.4	.38	1.08
0.8	.33	1.01
1.0	.31	.98
2.0	.24	.84
3.0	.19	.74
4.0	.16	.67
5.0	.14	.60

**Disconnected Impervious area credit**

**First Runoff Direction**

\_\_\_\_\_ sq ft X \_\_\_\_\_ gal/sq ft = \_\_\_\_\_ gallons of excess runoff controlled  
(Unaddressed impervious (from credit table) to pervious surface)

**Second Runoff Direction**

\_\_\_\_\_ sq ft X \_\_\_\_\_ gal/sq ft = \_\_\_\_\_ gallons of excess runoff controlled  
(Unaddressed impervious (from credit table) to pervious surface)

Sum of Disconnected Impervious Area \_\_\_\_\_ plus \_\_\_\_\_ = \_\_\_\_\_ gallons of excess runoff controlled  
 (first direction) (2<sup>nd</sup> Dir)

**3. Excess Runoff to Raingarden** Volume not controlled by the first two practices will be addressed by this last treatment train. Location will depend where uncontrolled volume is.

This will be for a standard designed raingarden of three foot planting media depth and a 6 inch maximum ponding depth. Raingardens will be used primarily for surface impervious surface but can be used for rooftop impervious surface in small lots without sufficient pervious surface. BMP manual requires storage in raingarden of 1.5 inch per impervious acre and suitable site (generally above water table)

Runoff to Raingarden

\_\_\_\_\_ gal of Excess Site Runoff - \_\_\_\_\_ gal of Storage - \_\_\_\_\_ gal of disconnected impervious area = \_\_\_\_\_ gal runoff to raingarden

(Conversion of gallons to impervious surface controlled as follows \_\_\_\_\_ gal of runoff to raingarden divided by 1.15gal/sq.ft. = \_\_\_\_\_ sq ft of impervious circle.)

Size of standard raingarden

\_\_\_\_\_sq.ft impervious surface divided by(7 for sandy and 4 for clayey soils) =

\_\_\_\_\_sq ft of standard raingarden

(impervious surface directed to raingarden)

**Raingarden Credit**

\_\_\_\_\_sq. ft. impervious surface X 1.15 gals/sq.ft. = \_\_\_\_\_gallons runoff controlled (unaddressed impervious surface directed to raingarden)

**Section 4 – Summary of Volume Reduction Practices**

Practice Reductions (from section 3)

Infiltration or Reuse	_____gallons
Disconnected Drainage	_____gallons
Raingarden	_____gallons (used to treat remaining volume)
Total	_____gallons
Total Required (from section 2)	_____gallons

**Section 5 – Notes and Conditions**

1. Sandy Soils are considered A and B soils and Clayey soils are considered C and D soils. SCS soils map can be used to determine classification or utilize infiltration rates. Sandy soils have infiltration above .5 in/hr and clayey soils are below this.
2. Storage from rainbarrels and cisterns for reuse should be utilized between rainfall events and a minimum of 10 percent should be utilized for irrigation if it had not rained the previous day.
3. When in ground irrigation system is installed the recommended storage requirement should be above 0.3 gallon per square foot of rooftop impervious surface. The maximum allowed credit is 1.15 gallon per square foot. Storage can

- be greater to reduce irrigation needs or improve infiltration, but will not receive credit greater than 1.15 gallon per square foot.
4. When storage is utilized, the amount of rooftop impervious surface going to the disconnected impervious surface step is reduced by storage. Example: If rooftop square footage is 2500 and storage is 1,150 gallon then the impervious surface in the disconnected impervious surface step is reduced by 1000 square feet. The unaddressed rooftop impervious surface is going to the disconnected impervious surface step is now 1,500 square feet.
  5. Credits for non standard raingardens can be developed from criteria in Beaufort County BMP manual page 5-48

## **Definitions and Conversion explanations**

### **Definitions**

**Impervious Surface** – hard surface that allow rainfall to run off and not infiltrate into soil.

**Rooftop impervious surface** – horizontal surface area of rooftops including overhangs and other detached buildings/sheds.

**Other impervious** – generally hard surfaces on the ground like paved driveways, patios, walkways and sidewalks.

**Pervious Surface** – surface that is not hard, might be grass, garden or tree area.

**Irrigated area** is area that would be served by an installed irrigation system.

**Unaddressed impervious surface** – term used to determine amount of impervious surface that had not been controlled by a previous practice.

**Standard Raingarden/Bioretenion** – raingarden that has 3 ft of fill material and a 6 inch maximum ponding depth. Different sizes can be constructed but then credits must be computed from Beaufort County BMP manual. BMP manual requires storage of 1.5 inch per acre of impervious surface.

### **Conversions**

#### **Rainfall to gallons of Runoff**

Design storm is 1.95 inch of which 1.85 inch is available to run off impervious surface. 1.85 inch on 1 square foot of impervious surface is equivalent to 1.15 gallon of runoff

#### **Preconstruction Runoff**

Clayey Soils – 0.53 inches run off for a 1.95 inch storm. 0.53 inch on 1 square foot is equivalent to 0.33 gallon of runoff.

Sandy Soils – No runoff for a 1.95 inch storm

#### **Raingarden/Bioretenion**

Square foot of impervious surface per square foot of standard raingarden

- Clayey soils 4 sqft of impervious surface to 1 sqft of standard raingarden
- Sandy soils 7 sqft of impervious surface to 1 sqft of standard raingarden