



- Notes:**
- Rain gardens not to be constructed on slopes that exceeds 25 percent.
  - Direct overflow discharge shall comply with Thornbury Township, Chester County Conservation District, and/or PADEP BMP regulations.
  - Recommended ponding depths are not to exceed 1 foot.
  - Native vegetation that can tolerate dry and wet weather.
  - Overflow area where, if the bioretention area were to overflow, the overflow would flow over pervious surfaces (i.e. grass, meadow), and would not cause harm to property, or;
  - An overflow, such as a domed riser, to allow excess flow from large storms to travel to other infiltration areas, pervious areas, or connected storm systems designed to receive the excess runoff.
  - For most areas, side slopes should be limited to 3:1, maximum.
  - The soil/planting mix depth should not be less than 1.5 feet deep and typically consist of a mixture of topsoil, sand and compost (i.e. mulch). the topsoil, sand and compost should be uniformly mixed by volume in a 50%, 30%, 20% mixture, respectively.
  - See Chester County Water Resources Authority, Appendix A.2: "Simplified Approach to Stormwater Handbook for Small Projects", @ www.chesco.org for more information.
  - All plants, unless otherwise specifically permitted, shall conform to the standards of the current edition of the Pennsylvania Stormwater Best Management Practices Manual.

**GENERAL OVERALL EQUATION AND SAMPLE CALCULATION**

Rain garden/bioretention area volume, and surface area can be determined by calculating the roof top water yield for any given rainfall, using the following general equation:  
 Equation:  $V = (P \times (1/12) \times I)$ , and  $A = V/D$ , where:

V = volume of rain garden/bioretention area (cubic feet)  
 P = rainfall (feet) [Using 1 in. rainfall = 0.083 ft.]  
 I = impervious area surface = equivalent roof area (square feet)  
 D= depth of rain garden/bioretention area (feet)

Example: Given a rooftop area of approximately 50 square feet for 1 inch (0.083 ft.) of rainfall, a rain garden/bioretention area of 8 sf with a depth of 6 in (0.5 ft) would provide suitable runoff storage.

$V = ((1 \text{ in} \times (1\text{in}/12 \text{ ft}) = 4 \text{ cf}$   
 $A = 4 \text{ sf} / 0.5 \text{ ft.} = 8 \text{ sf}$

Overall Domensions = 0.5 ft x 2 ft. x 4 ft = 4 cf (OK)

\*FINAL RAIN GARDEN/BIORETENTION AREA DIMENSIONS MAY VARY ACCORDING TO SITE CONDITIONS. FINAL RAIN GARDEN/BIORETENTION AREA DIMENSIONS MUST BE THE EQUIVALENT VOLUME OF OF INITIAL CALCULATION. ANY VARIATIONS IN BED DIMENSIONS OR DESIGN THAN SHOWN MUST BE APPROVED BY THE TOWNSHIP.

RAIN GARDEN/BIORETENTION VOLUME = LENGTH TIMES WIDTH TIMES DEPTH

NOTE: THE INFORMATION PROVIDED ON THIS DETAIL IS A STORMWATER QUALITY BEST MANAGEMENT PRACTICE (BMP) DEVICE, AND IS NOT INTENDED AS A STORMWATER MANAGEMENT STORMWATER QUANTITY DEVICE. THIS STORMWATER QUALITY BMP IS ONLY SUITABLE FOR SMALL INCREASES OF IMPERVIOUS SURFACES UP TO A MAXIMUM TOTAL OF 999 SQUARE FEET. GREATER INCREASES IN PROPOSED IMPERVIOUS SURFACES ARE ADDRESSED BY THE THORNBURY TOWNSHIP STORMWATER MANAGEMENT ORINANCE PER LATEST ADOPTION.

REVISIONS

Column 1	Column 2	Column 3	
Total Proposed Impervious Area (square feet)	Volume of Rain Garden/Bioretention Basin <sup>1</sup> (cubic feet)	Surface Area of Rain Garden/Bioretention Acceptable Depths for BMP are indicated below (square feet)	
		Area Required for a BMP with a Depth (D) of 0.5'	Area Required for a BMP with a Depth (D) of 1.0'
I	V	A (sf)	
Sum of all Proposed Impervious Areas	$1 \times (1/12) \times I = V$	$V/D = A$	
50	4	8	4
100	8	17	8
150	13	25	13
200	17	33	17
250	21	42	21
300	25	50	25
350	29	58	29
400	33	67	33
450	38	75	38
500	42	83	42
550	46	92	46
600	50	100	50
650	54	108	54
700	58	117	58
750	63	125	63
800	67	133	67
850	71	142	71
900	75	150	75
950	79	158	79
999	83	167	83

<sup>1</sup>It is assumed that the rain garden/bioretention area is empty prior to receiving runoff (i.e. 0% full)

References:  
 1. Thornbury Township Stormwater Management Ordinance <http://www.thornburytp.com/>  
 2. Chester County Water Resources Authority, Appendix A.2 Simplified Approach to Stormwater Handbook for Small Projects @ www.chesco.org  
 3. Pennsylvania Stormwater Best Management Practices Manual. <http://www.chesco.org/index.aspx?nid=1550>  
 4. Urban Design Tools @ www.lid-stormwater.net  
 5. LA Stormwater @ www.lastormwater.org

**FIGURE A.7: SMALL SCALE RESIDENTIAL RAIN GARDEN/BIORETENTION AREA**

PREPARED FOR  
**Thornbury Township**

Thornbury Township Township \* Chester County \* Pennsylvania

**YERKES ASSOCIATES, INC.**

CONSULTING ENGINEERS      SITE PLANNERS      SURVEYORS

PROJECT -	W-13-0314-12
DATE -	03-26-2014
SCALE -	NOT TO SCALE
DRAWN -	CEJ3
CHECKED -	MRC
CAD FILE -	ThornburyTwp details.pro
TAX PARCEL -	N/A
NOTEBOOK -	N/A
PLAN NO. -	N/A
SHEET NO. -	1