

APPENDIX I

SIMPLIFIED STORMWATER MANAGEMENT PROCEDURES FOR EXISTING SINGLE FAMILY DWELLING LOTS

SIMPLIFIED STORMWATER MANAGEMENT PROCEDURES FOR EXISTING SINGLE FAMILY DWELLING LOTS

Projects eligible for this procedure

Individual home construction projects on single family lots which result in less than two thousand five hundred (2,500) square feet of new impervious area (including the building footprint, driveway, sidewalks, and parking areas) and less than five thousand (5,000) square feet of earth disturbance may utilize the simplified procedure contained in this Appendix to meet volume requirements of this Part and are not required to submit detailed stormwater management plans as required by Article IV to the Township. This procedure may not be utilized for proposed subdivisions or land developments.

Are professional services necessary to meet these requirements?

This Appendix has been developed to assist the individual homeowner in meeting the water quality and groundwater recharge goals of the Stormwater Management Ordinance. If the guidelines are followed, the homeowner will not require professional services to comply with these water quality and groundwater recharge goals.

What do I need to submit to Hilltown Township?

Even though a formal stormwater management plan is not required for individual lot owners, a brief description of the proposed infiltration facilities, including types of material to be used, total impervious areas and volume calculations, and a simple sketch plan showing the following information shall be submitted to the Township prior to construction:

- Location of proposed structures, driveways or other paved areas with approximate surface area in square feet.
- Location of any existing or proposed onsite septic system and/or potable water wells showing proximity to infiltration facilities.
- Bucks County Conservation District erosion and sediment control “Adequacy” letter.

Determination of Recharge Volume

The amount of recharge volume that must be provided is determined by following the simple steps below. Impervious area calculations must include all areas on the lot proposed to be covered by roof area or pavement which would prevent rain from naturally percolating into the ground, including sidewalks, driveways or parking areas. Sidewalks, driveways or patios that are constructed with turf pavers and are not included in this calculation.

Example Recharge Volume:

STEP 1 – Determine Total Impervious Surfaces:

House Roof (Front)	12 ft. x 48 ft.	=	576 sq. ft.
House Roof (Rear)	12 ft. x 48 ft.	=	576 sq. ft.
Driveway	12 ft. x 50 ft.	=	600 sq. ft.
Parking Pad	12 ft. x 12 ft.	=	144 sq. ft.
Walkway	4 ft. x 20 ft.	=	80 sq. ft.

			1,976 sq. ft.

STEP 2 – Determine Required Infiltration Volume (Rv) Using the Following Equation

$$Rv = \frac{3.26 \text{ inches} \times (\text{total impervious area in square feet})}{12} = \text{_____ cubic feet of recharge}$$

$$Rv = \frac{3.26 \times 1,976 \text{ sq. ft.}}{12} = 537 \text{ cu. ft.}$$

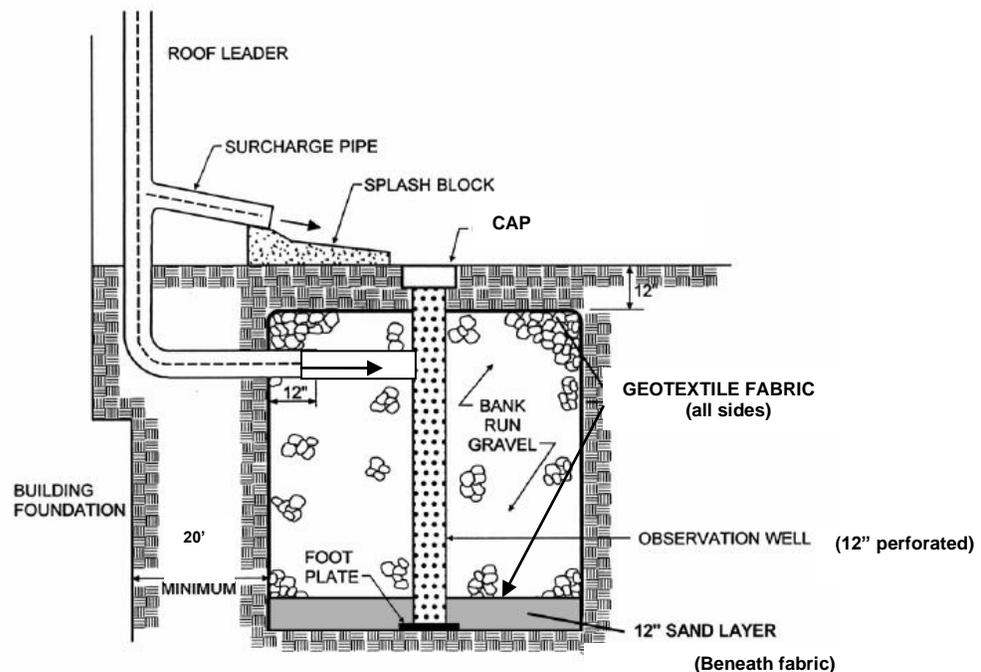
STEP 3 – Sizing of Selected Infiltration Method

The following pages identify several methods to infiltrate stormwater runoff. Their appropriateness depends on the amount of required infiltration volume and amount of available land. More than one method may be implemented on a site, depending on site constraints. Dry wells may be used only for receiving runoff from roof drains. Infiltration trenches are appropriate for receiving runoff from driveways, sidewalk or parking areas. Other methods may be appropriate, but these must be reviewed with the Township Engineer prior to installation.

Dry Wells

Dry wells are effective methods to infiltrate runoff from roof leaders. These facilities must be located based upon a determination by the design professional to reduce potential basement seepage problems but not less than a minimum of twenty (20) feet from the building foundation. A dry well maybe either a structural prefabricated chamber or an excavated pit filled with aggregate. Dry well shall not be constructed until all other areas of the site are stabilized, to avoid clogging. During construction, compaction of the subgrade soil shall be avoided, and construction may be performed with only light machinery. Depth of dry wells in excess of three and one-half (3 ½) feet should be avoided unless warranted by soil conditions. “Clean” gravel fill should average one and one half to three (1.5 – 3.0) inches in diameter. Dry wells should be inspected at least four (4) times annually as well as after large storm events.

**FIGURE 1
TYPICAL DRY WELL CONFIGURATION**



Source: Maryland Stormwater Design Manual
Example Sizing For Drywells:

STEP 1 – Determine Total Impervious Surfaces

House Roof Area: 12 ft. x 48 ft. = 576 sq. ft.

STEP 2 – Determine Required Infiltration Volume using Equation

$$\frac{3.26 \text{ in.} \times 576 \text{ sq. ft.}}{12} = 156 \text{ cu. ft.}$$

$$\frac{156 \text{ cu. ft.}}{0.4^*} = 390 \text{ cu. ft.} \text{ (*assumes 40\% void ratio in gravel)}$$

STEP 3 – Sizing of Selected Infiltration Method

Volume of facility = Depth x Width x Length

Set D = 3.5 ft; Set W = L for a square chamber

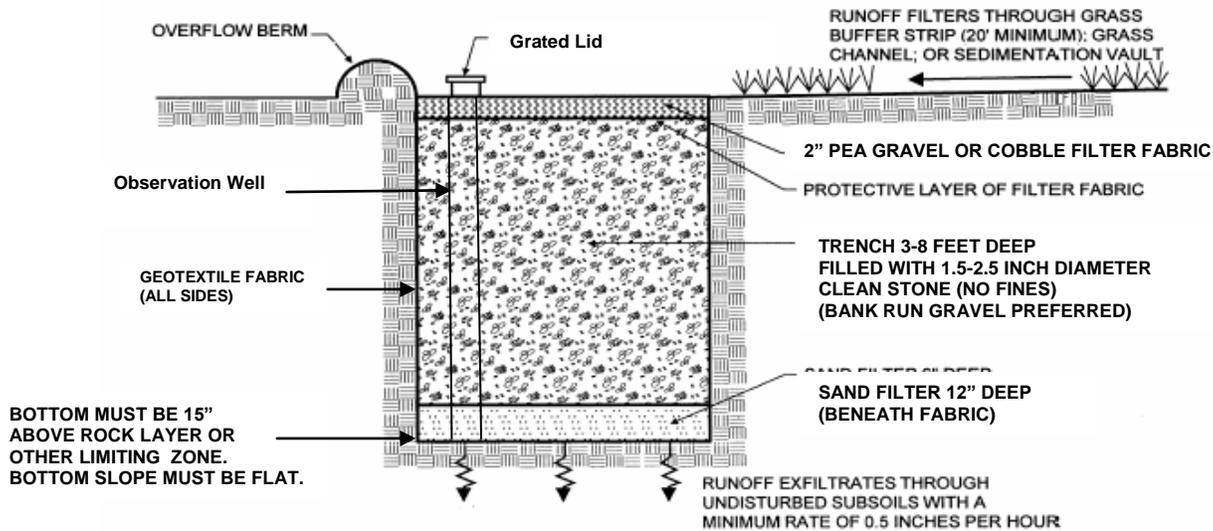
$$390 \text{ cu. ft.} = 3.5 \times L \times L ; L = 10.5 \text{ ft.}$$

Final Facility Dimensions: 3.5 ft. (D) x 10.5 ft. (W) x 10.5 ft. (L)

Infiltration Trenches

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

**FIGURE 2
TYPICAL INFILTRATION TRENCH CONFIGURATION**



Source: Maryland Stormwater Design Manual, 2000

Example Sizing For Infiltration Trenches:

STEP 1 – Determine Total Impervious Surfaces

Driveway	12 ft. x 50 ft.	=	600 sq. ft.
Parking Pad	12 ft. x 12 ft.	=	144 sq. ft.
Walkway	4 ft. x 20 ft.	=	80 sq. ft.

			824 sq. ft.

STEP 2 – Determine Required Infiltration Volume using Equation

$$\frac{3.26 \text{ in.} \times 824 \text{ sq. ft.}}{12} = 224 \text{ cu. ft.}$$

$$\frac{224 \text{ cu. ft.}}{0.4^*} = 560 \text{ cu. ft.} \text{ (*assumes 40\% void ratio in gravel bed)}$$

STEP 3 – Sizing of Selected Infiltration Method

Volume of facility = Depth x Width x Length

Set D = 3 ft; determine required surface area of trench

$$560 \text{ cu. ft.} / 3 \text{ ft.} = 187 \text{ sq. ft.}$$

The width of the trench should be greater than 2 times its depth (2 x D); therefore, in this example a trench width of 6 feet is selected;

$$\text{Determine trench length: } L = 187 \text{ sq. ft.} / 6 \text{ ft.} = 31 \text{ ft.}$$

Final trench dimensions: 3 ft. (D) x 6 ft. (W) x 31 ft. (L)

Rain Gardens

A Rain Garden is a planted shallow depression designed to catch and filter rainfall runoff. The garden captures rain from a downspout or a paved surface. The water sinks into the ground, aided by deep rooted plants that like both wet and dry conditions. The ideal location for a rain garden is between the source of runoff (roofs and driveways) and the runoff destination (drains, stream, low spots, etc).

Design Considerations:

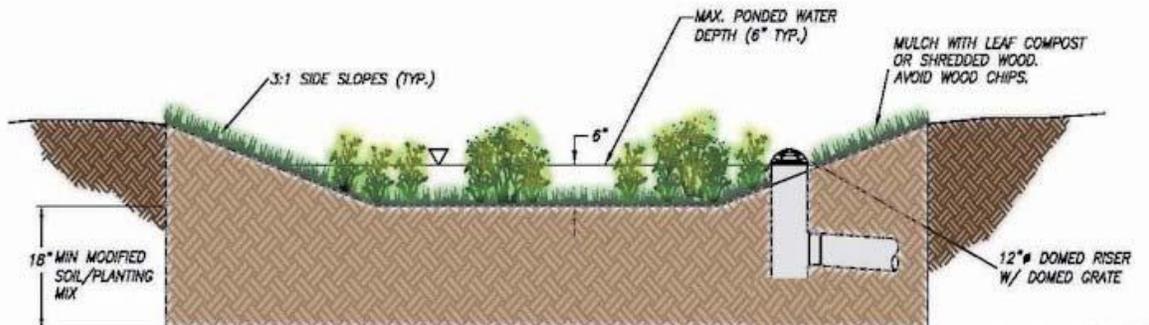
- A maximum of 3:1 side slope is recommended.
- The depth of a rain garden can range from 6 - 8 inches. Ponded water should not exceed 6 inches.
- The rain garden should drain within 72 hours.
- The garden should be at least 10-20 feet from a building's foundation and 25 feet from septic system drainfields and wellheads.
- If the site has clay soils, soil should be amended with compost or organic material.
- Choose native plants. See http://pa.audubon.org/habitat/PDFs/RGBrochure_complete.pdf for a native plant list. To find native plant sources go to www.pawildflower.org.
- At the rain garden location, the water table should be at least 2' below the soil level. If water stands in an area for more than one day after a heavy rain you can assume it has a higher water table and is not a good choice for a rain garden.

Maintenance:

- Water plants regularly until they become established.
- Inspect twice a year for sediment buildup, erosion and vegetative conditions.
- Mulch with hardwood when erosion is evident and replenish annually.

- Prune and remove dead vegetation in the spring season.
- Weed as you would any garden.
- Move plants around if some plants would grow better in the drier or wetter parts of the garden.

Figure 3: Rain Garden Diagram



Source: PA BMP Guidance Manual, Chapter 6 Page 50

Sizing Example for Rain Garden

1. Pick a site for the rain garden between the source of runoff and between a low lying area, a.k.a., a drainage area.
2. Perform an infiltration test to determine the depth of the rain garden:
 - Dig a hole 8" x 8"
 - Fill with water and put a popsicle stick at the top of the water level.
 - Measure how far it drains down after a few hours (ideally 4).
 - Calculate the depth of water that will drain out over 24 hours.

3. Determine total impervious surface area to drain to rain garden:

House Roof (Front)	14 ft. x 48 ft.	=	672 sq ft
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4. Sizing the rain garden:

For this example the infiltration test determined 6" of water drained out of a hole in 24 hours. The depth of the rain garden should be set to the results of the infiltration test so 6" is the depth of the rain garden. The sizing calculation below is based on controlling 1" of runoff. First divide the impervious surface by the depth of the rain garden.

$$(672 \text{ sq ft} / 6 \text{ ft.}) = 112 \text{ sq. ft.}$$

In order to control 2" of runoff volume, the rain garden area needs to be multiplied by 2.

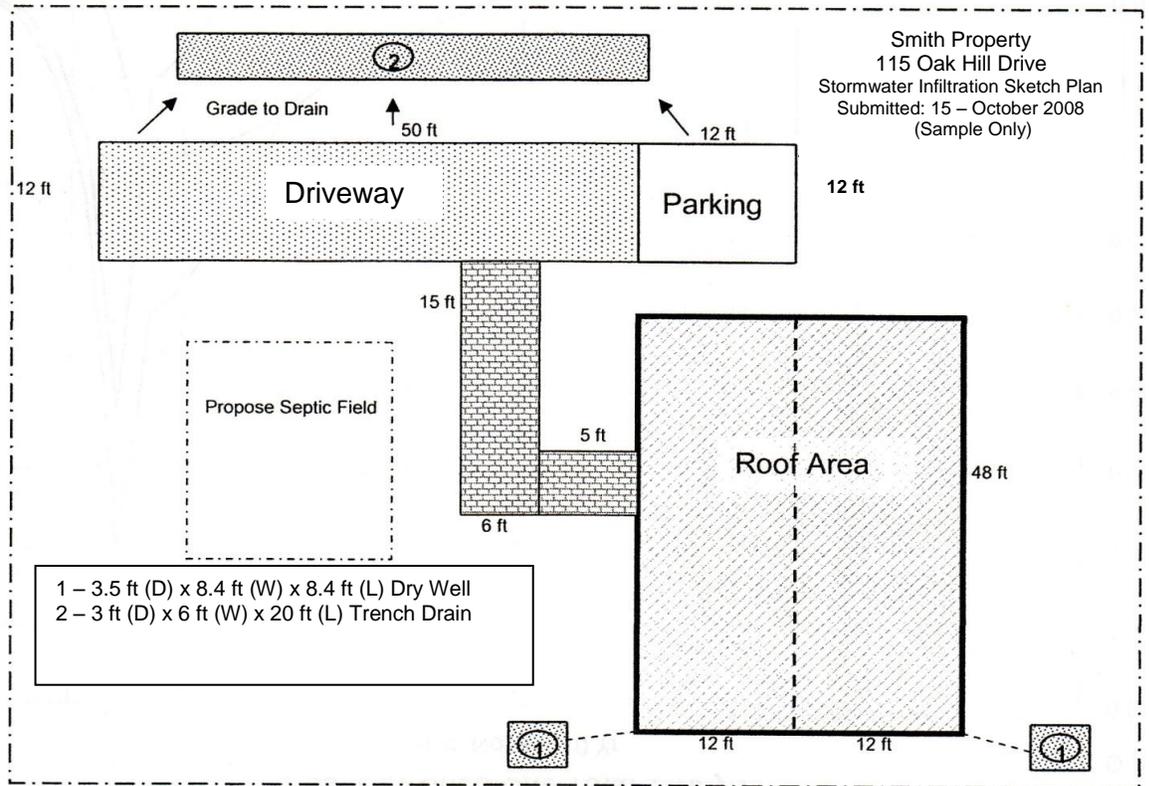
$$112 \text{ sq. ft.} * 2 = 224 \text{ sq. ft.}$$

The rain garden should be about 225 sq. ft. in size and 6" deep.

Field Conditions/Construction

Construction of the stormwater management facility must be observed by the Township Engineer pursuant to Section 26-141 of this Part. If soil conditions indicate a limiting zone (e.g. high water table, depth to bedrock) will encroach within the infiltration/dry well, the stormwater management facility construction details (width/depth/length) must be revised as determined by the Township Engineer and field documented.

FIGURE 4
 SAMPLE SITE SKETCH PLAN



Source: Maryland Stormwater Design Manual