

Guidelines for Control of Water Runoff on Small Lots

Revised 6/09

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Introduction and Purpose

Chapter 8, Section 8-29B of the Montgomery County Code establishes requirements to manage water runoff from new construction of single family dwellings and additions to single family dwellings on residential lots of less than 15,000 square feet. Any application for a building permit for a new house that increases the existing lot coverage and/or changes the existing drain pattern must include provisions for the control or safe conveyance of any increase in runoff. New houses that are built on lots covered by an approved on-site storm water management concept with on-site controls are exempted from the requirements of this legislation. However, any application for a new house replacing a house built on a lot covered by an approved on-site storm water management concept with on-site controls must include provisions for the control or safe conveyance of the runoff. Any application for a building permit for an addition that increases the building lot coverage by more than 400 square feet must include provisions for the control or safe conveyance of any increase in runoff.

The purpose of this manual is to provide guidance to the building permit applicants, home owners, contractors, and design consultants for compliance with requirements in the County Code.

Administrative Procedures

1. Applicant shall submit two sets of the drainage plans and a copy of the Maryland Department of Assessments and Taxation, Real Property Data Search, showing the property land area for review and approval. The plans shall be submitted as part of the building permit application to the Land Development Division for drainage requirement screening.
2. After approval, one set of the approved Drainage plans, stamped and signed by the plan reviewer, will be returned to the applicant together with the other approved documents for the building permit. Permittee must ensure that work is done in accordance with the approved plans.
3. Prior to final building inspection, permittee (owner's designee) must provide the Certification of Completion to the Sc/SM Inspection Section that the drainage system is adequate.
4. If any changes are made to the approved drainage plans, a revision must be obtained from Land Development Division following the same procedures noted above.
5. If the water runoff is discharged onto public right-of-way (ROW), a ROW permit may be required, see Appendix A. Drainage plans will be reviewed to ensure that any runoff to the public ROW will be safely conveyed onto the public street/drainage system. The building permit will be issued after the ROW permit is issued.
6. In case that a ROW inspection may be required, the building final inspection will not be approved before the ROW inspection has been approved.

Plan Submittal Requirements

The drainage plans must indicate the proposed drainage system for collecting, transporting, and disposing of the water runoff. Collected water runoff shall be discharged into County approved drainage systems or natural drainage systems. Existing drainage patterns must not be altered in a manner that adversely affects adjoining or nearby properties.

Two sets of the drainage plans shall, engineering scale 1" to 10 feet, include the following information:

1. All lot dimensions, lot area, widths of easements, and rights of way

2. Location of all existing and proposed buildings and structures, driveways, sidewalks, drainage devices, drainage ditches, swales, curb and gutter, patios and any other impervious surfaces
3. Area of existing and proposed impervious surfaces mentioned in items 1 and 2.
4. Elevations at the corners and halfway between the corners of the existing and proposed house or addition, corresponding front-, side-, and backyard-yard midpoints, and corresponding lot lines points
5. Elevations of the lower floor, basement floor slab, garage floor slab, and impervious surfaces for existing and proposed buildings
6. Location and elevation of roof downspouts for existing and proposed buildings
7. Directional arrows to show the existing and proposed drainage pattern. For example, show downspout flows and sheet flows that are conveyed off the lot or collected to an on-site device or facility
8. Size, material, length and class of drainage pipes within the existing and proposed collection system, and the elevation of the bottom of the pipe at discharge points
9. If fill is added on the lot, the grades on neighboring properties must be shown for the existing and proposed buildings. Site grading shall not obstruct existing drainage from adjacent properties
10. Plans prepared by an engineer, surveyor or architect licensed in Maryland, must include his/her seal, date and signature.

General Design Criteria

When designing a new house or an addition, you must take into consideration how the building, along with its associated grading, driveways, accessory structures decks and patios will affect the current water runoff patterns. All runoff from additional impervious areas must be safely conveyed away from adjoining properties, or controlled in a way which the effects of the runoff to adjoining properties is minimized.

All pervious areas remaining within the disturbed area on the lot after construction should be topsoiled as per the Montgomery County topsoil specifications (see appendix A). Construction activities tend to compact the soil. Loosening the subsoil and replacing the top soil will encourage rain water to percolate into the ground, helping to reduce runoff. The top soil also has the added benefit of reducing the amount of fertilizer and irrigation needed to maintain healthy lawns and gardens.

When control or conveyance measures are used to manage the runoff, the facilities must be sized to handle 1.5 inches of rainfall over a 24 hour period. Based on this, 100 square feet of impervious generates 12.5 cubic feet or 94 gallons of water. There are several simple facilities which can be used to achieve this goal.

The following section gives guidance on acceptable methods for runoff control. Permittees are encouraged to utilize the best combination of practices to meet the needs of each site.

Dry Wells

Dry wells are gravel filled excavations which encourage water to infiltrate into the ground. Extreme care must be taken when deciding where to install a dry well. Dry wells should be a minimum of 20 feet from all foundations or 10 feet from slab on grade buildings; this includes the foundation on adjacent lots. The additional water from the dry wells can have adverse effects on adjacent foundations. Each 100 sq ft of roof area will require a 3' x 3' x 3.5' deep dry well. No more than 1000 sq ft of roof area should be directed to each dry well. Overflow from the dry well should be directed to a safe area away from adjacent houses. Dry wells shall not be placed in fill, nor shall they be installed on slopes greater than 15%. Dry wells must not be installed under pavement.

A proprietary substitute may also be used. See Appendix B for a dry well detail.

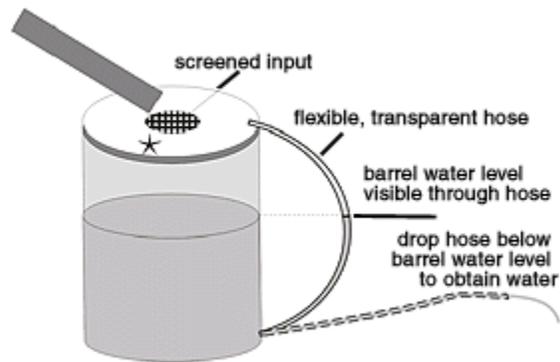
Roof Square Footage (square feet)	Dry Well Size (feet)
100	3 x 3 x 3.5
200	4 x 4 x 3.5
400	6 x 6 x 3.5
500	6 x 6 x 4
1000	9 x 9 x 4

Rain Barrels

Rain barrels come in many shapes and sizes. The size and number of rain barrels is based on the square footage of roof draining to them. Rain barrels must be maintained by emptying them before each successive rainfall. Water draining from the barrel must be directed away from adjacent homes, preferably out to the street or to existing swales or storm drains. Remember to design this into your system. Water from the rain barrels can be used for irrigation.

Roof Square Footage	Number of 60 gal Rain Barrels	Number of 90 gallon Rain Barrels
100	2	1
400	6	4
500	8	5
1000	16	10
1200	19	13
1500	24	16

Simple Rain Barrel Design Considerations



Critical Points

- modify downspout to barrel inflow site
- screened inflow design
- outflow hose/barrel connection
- design to keep hose above barrel rim

Cisterns

Cisterns can be used to capture and store large amounts of runoff. Cisterns can be slowly emptied through gravity flow, or by pumping the water out. The water from the cistern can be used for irrigation. Cisterns also need to be emptied before each rainfall.

When emptying a cistern, the runoff must be directed away from adjacent homes to a safe outfall.

A design of the cistern must be submitted for review. A separate building permit is required for the construction of cistern.

Natural Topography/Buffers

When the slope of the lot is less than 5%, allowing the runoff to flow through a vegetated area before it leaves the property will help slow the runoff and allow more of it to be absorbed into the ground. Landscaping which slows down water flow and promotes infiltration is encouraged. Proper ground preparation including the addition of topsoil is required. Runoff must drain toward areas such as parkland, floodplains and other areas where the runoff will not affect homes. These undeveloped areas can allow excess runoff to infiltrate into the ground.

Rain Gardens/Biofilters

Rain gardens and Biofilters are landscaped areas which collect and filter rainwater. Rain gardens must also be designed with a safe overflow. Since rain gardens are designed to hold water for an extended period, they should be kept a minimum of 20 feet from all foundations or 10 feet from slab on grade buildings. Some of this water can infiltrate into the ground and cause adverse effects on adjacent foundations. Rain Gardens/Biofilters should not pond more than 1 ft of water. Each 100 square feet of roof area will need a minimum 3.5' x 3.5' x 1 ft deep rain garden. See Appendix C.

Rain Gardens and Biofilters must be designed by an engineer, land surveyor, or landscape architect registered by the State of Maryland.

A qualified garden designer can recommend plants for the rain garden. Remember, rain garden soils are not meant to stay wet all the time. Therefore plants which require wet or constantly moist soils will not do well. Plants which tolerate floodplain conditions are ideal. Native plants are preferred, but the garden should be designed to blend into the surrounding landscaping.

Roof Square Footage (square feet)	Rain Garden size (feet)
100	3.5 x 3.5 x 1
300	6 X 6 X 1
500	8 x 8 x 1
1000	11 x 11 x1

Storm Drains/Yard Drains/Swales

Protection of adjacent properties can also be accomplished by safely conveying the runoff away from the properties through the use of swales or pipes. Always remember to direct the water to an area which will not impact adjacent houses.

Grass swales are the preferred conveyance method. Grass swales allow runoff to percolate into the ground, reducing the amount of runoff leaving the property. If the grass swales are not designed in accordance with Appendix D, they must be designed by a professional land surveyor or professional engineer.

Downspouts can be buried and taken to a safe outfall. The minimum slope for a pipe should be 5% or 6 inches in 10 ft. The minimum pipe size shall be 4 inches.

Discharging pipes and swales directly onto sidewalks is not permissible due to the possibility of ice forming on the sidewalk.

The discharge should outfall to a location such as common space area, stream valley, drainage swale, roadside open-section, or an existing enclosed drainage system.

A right of way permit is necessary to connect a downspout to the street or to an existing storm drain.

Pervious Pavers

For areas such as patios and driveways, pervious pavements can also be used to meet the requirements. Pervious pavements include pervious concrete, pervious asphalt, gravel pavers and concrete pavers set in sand. Pavers set in regular concrete or in stone dust would not be approved as water control structures.

Rooftop Gardens/Greenroof

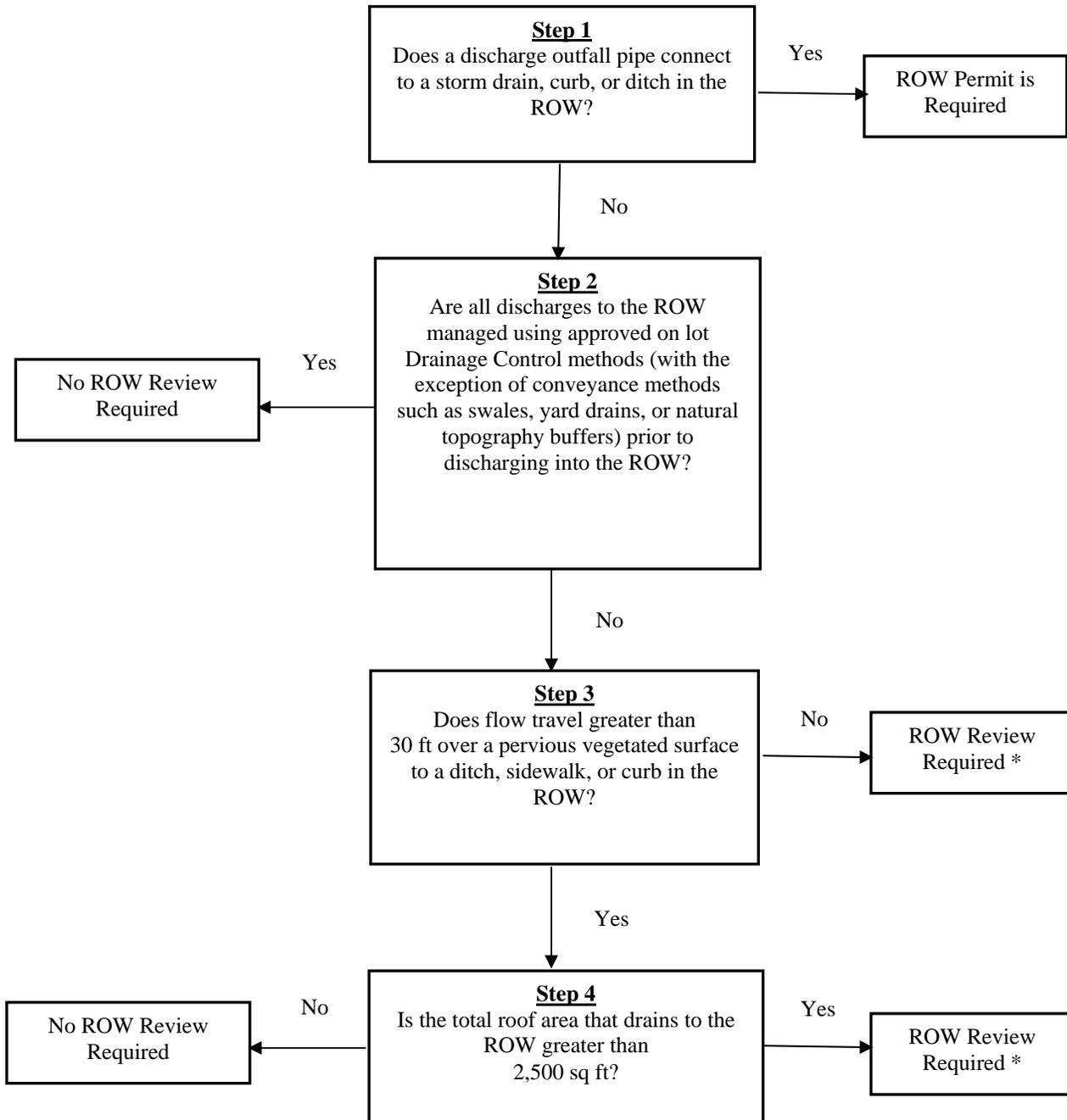
Roof gardens and Greenroofs can be used to reduce the amount of effective impervious area. They should be designed and installed by a qualified contractor.

Glossary

Building Lot Coverage	The area of a lot that is occupied by the main and accessory buildings, including covered decks, porches and steps.
Impervious –	Those surfaces that cannot infiltrate rainfall. Examples are rooftops, driveways and roadways.
Pervious –	Areas which are permeable to rainfall. Examples are yards and gardens.
Right-of-Way (ROW)	A strip of land occupied by a road, sidewalk, utility pipe or other special use that the County owns and regulates

**Appendix A – Right-of-Way Review Criteria for Drainage
Plans**

Right-of-Way Review Criteria for Drainage Plans



* Note: A ROW review will determine if a ROW permit is needed.

Appendix B – Montgomery County Standards and Specifications for Topsoil

STANDARDS AND SPECIFICATIONS
FOR
TOPSOIL

Definition

Placement of topsoil over a prepared subsoil prior to establishment of permanent vegetation.

Purpose

To provide a suitable soil medium for vegetative growth. Soils of concern have low moisture content, low nutrient levels, low pH, materials toxic to plants, and/or unacceptable soil gradation.

Conditions Where Practice Applies

This practice is limited to areas having 2:1 or flatter slopes.

For the purpose of these Standards and Specifications, areas having slopes steeper than 2:1 require special consideration and design for adequate stabilization. Areas having slopes steeper than 2:1 shall have the appropriate stabilization shown on the plans.

Construction and Material Specifications

Topsoil salvaged from the existing site may be used provided that it meets the standards as set forth in these specifications.

Topsoil Specifications - Soil to be used as topsoil must meet the following:

1. Topsoil shall be a loam, sandy loam, clay loam, silt loam, sandy clay loam, loamy sand. Other soils may be used if recommended by an agronomist or soil scientist and approved by DPS. Regardless, topsoil shall not be a mixture of contrasting textured subsoils, and shall contain less than 5 % by volume of cinders, stones, slag, coarse fragments, gravel, sticks, roots, trash, or other materials larger than 1 1/2 " in diameter.

The subsoil shall be tilled to a minimum depth of 6 inches before placement of topsoil.

Where the subsoil is either highly acidic or composed of heavy clays, ground limestone shall be spread at the rate of 4-8 tons/acre (200-400 lbs per 1000 sq ft) prior to the placement of topsoil. Lime shall be distributed uniformly over designated areas and worked into the soil.

Topsoil shall be tested and amended as per soil test recommendations.

Topsoil Application.

1. When topsoiling, maintain needed erosion and sediment control practices.
2. Topsoil shall be uniformly distributed in a 4-8 inch layer and lightly compacted to a minimum thickness of 4 inches. Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets.
3. Topsoil shall not be placed while the topsoil is in a frozen or muddy condition, when the subsoil is excessively wet or in a condition that may otherwise be detrimental to proper grading and seedbed preparation.

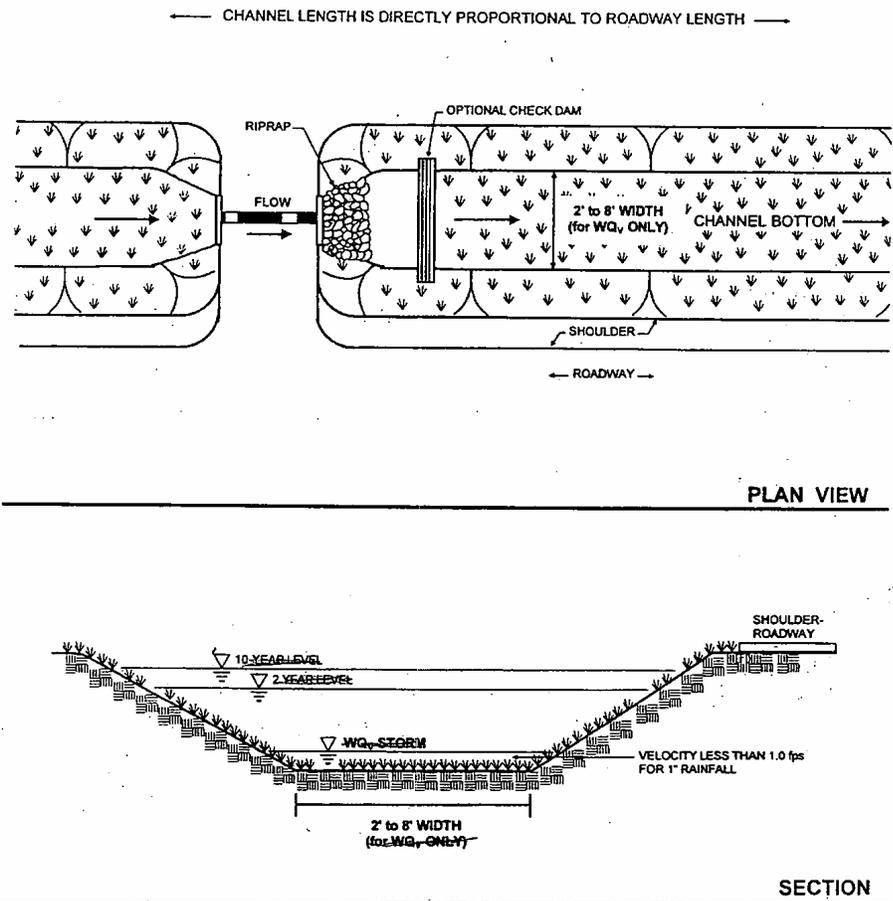
Appendix C – Dry Well Detail

Appendix D – Rain Garden Design

<http://permittingservices.montgomerycountymd.gov/permitting/pdf/RainGardenBiofilter.pdf>

Appendix E – Swale Design

Figure 5.3 Example of Grass Channel



Appendix F – Montgomery County Bill 26-05 Stormwater – Drainage and Runoff

http://www.montgomerycountymd.gov/content/council/pdf/SCANNED_DOCS/20061017_res26-05.pdf

Appendix G – Certificate of Completion

Certificate of Completion

Building Permit # (A/P) _____

Sediment Control permit # _____

Right-of-Way Use Application # _____

Project Name

Project Address

To the best of my knowledge and belief the drainage requirements have been completed in accordance with the approved construction documents and specifications (approved drainage system) without adversely impacting the adjacent or nearby properties. I certify that the approved drainage system consists of one of the methods and devices specified in Bill 26-05, Stormwater – Drainage and Runoff, Section 8-29(b):

“In this section, *approved drainage system* means any method of safe conveyance from the property or storage on the property of on-site water runoff at the design rate specified in subsection(c), using one or more of the following methods or devices or any other method or device approved by the Director that would provide equivalent or greater protection of adjacent and nearby properties:

- (1) on-site absorption or drainage device, such as rain barrel, cistern with slow release or controlled pump discharge, underground percolation and storage system, rain garden, rooftop garden or detention device, bioretention filter, or vegetation buffer;
- (2) existing or new drainage facility, such as drainage interceptor, inlet, trench, permeable paved area, or similar feature;
- (3) drainage line, inlet or pipe, or other engineered feature such as a swale or ditch; or
- (4) natural topography or buffer area that successfully absorbs water drainage.”

In addition, I understand that I and my successors in interest are required to maintain the approved drainage system and are required not to modify any element of the approved drainage system without obtaining prior approval from County.

Respectfully submitted,

Name of Permittee (owner designee) _____

Signature

Date

Return this certification to SC/SM Inspection Section, Land Development Division