A LANDOWNERS GUIDE TO

STORMWATER MANAGEMENT (SWM)

FOR SINGLE-FAMILY RESIDENCES

DISTURBING 1 ACRE OR MORE

SPECIAL REQUIREMENTS APPLY FOR ANY LAND DISTURBING ACTIVITY DISTURBING MORE THAN 10,000 SF BUT LESS THAN 1 ACRE

Patrick County Virginia Stormwater Management Authority

February, 2022

Stormwater Management Minimum Requirements for Single-Family Residential Construction

Purpose

The goal of the Virginia Stormwater Management Act is to ensure the general health, safety, and welfare of the citizens of the Commonwealth, and to protect the quality and quantity of state waters from potential harm of unmanaged stormwater. The Patrick County Virginia Stormwater Management Program (VSMP) Authority is authorized by the State Water Control Board under the Virginia Stormwater Management Act to manage the quality and quantity of runoff resulting from land-disturbing activities within the county through the enactment of the Patrick County Stormwater Management Ordinance which effectively establishes policies and procedures for the issuance of a VSMP Authority Permit, SWM Plan review, site inspections, and enforcement of the ordinance and its requirements. The following is a brief overview of responsibilities associated with any non-exempt land-disturbing activity associated with the construction of a detached single-family residential structure.

Requirement

Prior to construction of a single-family residential structure, the owner must contact the County Building Inspection Department and secure a building permit. As a pre-requisite to issuance of a building permit, an assessment will be made as to the amount of land-disturbance that the construction of the residence will create. If the amount of land-disturbance will be 1 acre or more, and is not part of a common plan or sale (e.g. – subdivision) the owner must obtain a VSMP Authority Permit from the County's SWM Office. Likewise, any amount of land-disturbance that is part of a common plan or sale (e.g. – subdivision) the owner must obtain a VSMP Authority Permit. As a part of the VSMP Authority Permit, an "Agreement in lieu of a SWM Plan" shall be executed by the owner. This agreement allows the owner of the proposed

construction of a detached single-family residential structure to obtain a permit without having to submit a formal SWM Plan for approval. This agreement is not applicable to land-disturbing activities that disturb 1 acre or more and which will be used for commercial or industrial use. In such a case, it is required that a formal SWM Plan be submitted to the County SWM Office for approval prior to the issuance of permit. In addition to a VSMP Authority Permit, all detached single-family residential construction projects must obtain coverage under the state VPDES Construction General Permit (VAR10). The County SWM Office administers the issuance of that permit as well. As part of the state VAR10 Permit, a Stormwater Pollution Prevention Plan (SWPPP) must be implemented prior to land-disturbing activities and is to be maintained during construction for all single-family residential structures. A SWPPP Template for the use of the owner is available from the County SWM Office.

General

The following are considered the minimum post-construction best management practices (BMPs) required in order to meet the requirements under an "Agreement in lieu of a SWM Plan". Additional BMPs may be required if deemed necessary by the County SWM Office. Post-construction runoff from the developed property should be minimized to the maximum extent practicable and should be controlled to prevent flooding or erosion damage to adjacent or downstream properties.

1. **Rooftop Disconnect**

   This BMP strategy involves managing stormwater runoff close to the source of gutter and downspout systems by intercepting the concentrated flow at its source (downspout), turning that concentrated flow into a shallow and evenly distributed flow (sheet flow), and by providing well-vegetated pervious surfaces downstream of that sheet flow where the runoff can be absorbed into the ground before reaching a downstream channel or stream. During construction, any functional downspouts should be temporarily diverted away from denuded or

disturbed areas by the use of pipes to deliver that flow to well-vegetated areas. Prior to disconnecting any temporary downspout diversions, the area downstream of the disconnection point should be well-stabilized with a permanent vegetative cover. Concentrated runoff flows at downspouts can be converted into a sheet flow by the simple use of a manufactured downspout splash block placed at the end of the downspout.

2. **Impervious Surface Disconnect**

   This BMP strategy involves managing stormwater runoff from impervious surfaces such as driveways, parking areas, and sidewalks by making sure that the runoff from these impervious surfaces is delivered in shallow and evenly distributed flows (sheet flow) to adjacent pervious areas which are well-vegetated where the runoff velocity is slowed down, allowing the runoff to be absorbed into the ground where sediment and attached pollutants will settle and be filtered by the vegetation before the flow reaches a downstream channel or stream. Well-vegetated areas can consist of a naturally forested area (open space) or managed turf, or lawn area (vegetated filter strip).

3. **Managed Turf or Lawn Disconnection**

   This BMP strategy involves managing stormwater runoff from managed turf, or lawn, areas by making sure that the runoff from this relatively impervious surface is delivered in shallow and evenly distributed flows (sheet flow) to adjacent pervious areas which are well-vegetated where the runoff velocity is slowed down, allowing the runoff to be absorbed into the ground where sediment and attached pollutants will settle and be filtered by the vegetation before the flow reaches a downstream channel or stream. Ideally, well-vegetated areas should consist of naturally forested areas (open space).

Maintenance

Gutters and downspout systems should be checked regularly for debris that could cause clogging of the system. The flow path below the downspout, if composed of managed turf, or a lawn, should be regularly mowed and kept clear of items that may impede the flow of runoff.

The landowner should perform regular inspections to ensure that stormwater runoff flow paths below the disconnected areas (Downspout, Impervious Surfaces, and Lawns) do not exhibit any signs of erosion or scour. Any erosion or scour is an indication that the runoff flow has concentrated itself from a shallow evenly distributed sheet flow into deeper, narrower, higher velocity flow. The eroded and or scoured area should be repaired as soon as possible so that the concentrated flow is returned back to a shallow sheet flow. The repaired area should be immediately stabilized in order to minimize any erosion of the repaired area.

Grassed areas receiving runoff from disconnected areas should be checked regularly for proper grass density. Grass density in these runoff areas should exhibit 90% coverage. If coverage is observed that is below 90%, over-seeding efforts should be performed.

The Landowner should perform maintenance inspections of the disconnection areas at least annually.

During construction, periodic inspections will be performed by the County SWM Office and any additional BMPs that may be deemed necessary, BMPs that are not functioning properly, and BMPs that have not been maintained or are deficient shall be noted on an inspection report. A deadline for correcting all deficient items will be noted on the report and all items shall be corrected prior to the deadline.

For Technical Assistance:

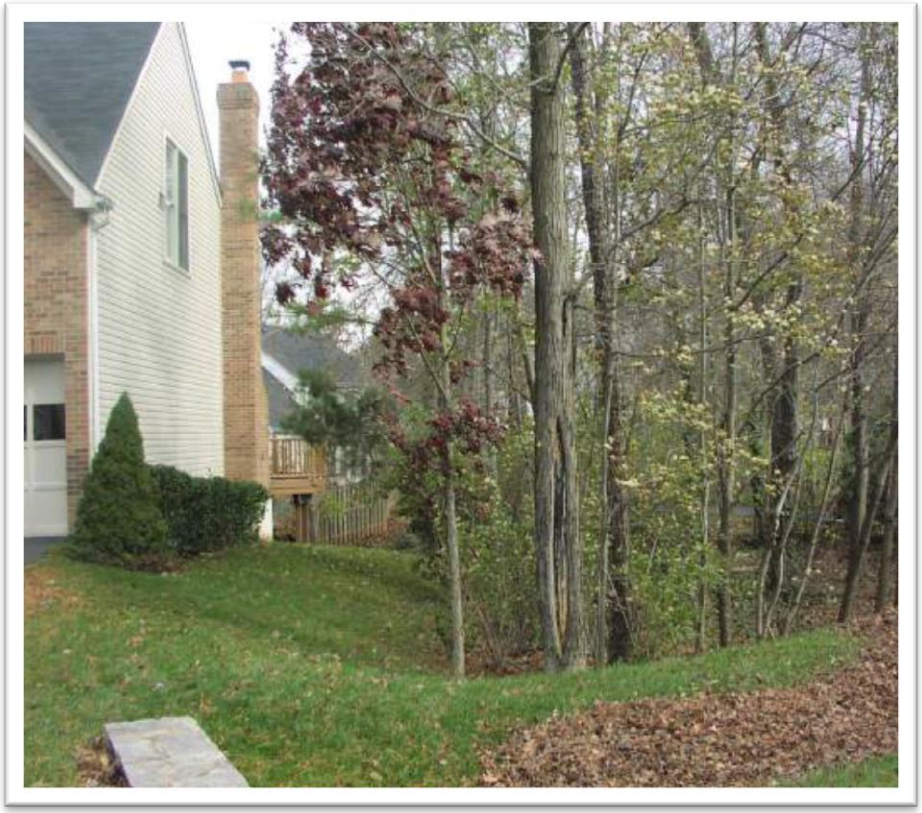
Patrick County SWM Office: Mark A. Vernon
Combined ESC & SWM Administrator
Patrick County Administration Building
Suite 218
106 Rucker Street
Stuart VA 24171
(276) 694-6094

Department of Environment Quality (DEQ):

Blue Ridge Regional Office, Roanoke VA
(540) 562-6700

Design Specification No. 1

Rooftop (Impervious Surface) Disconnection



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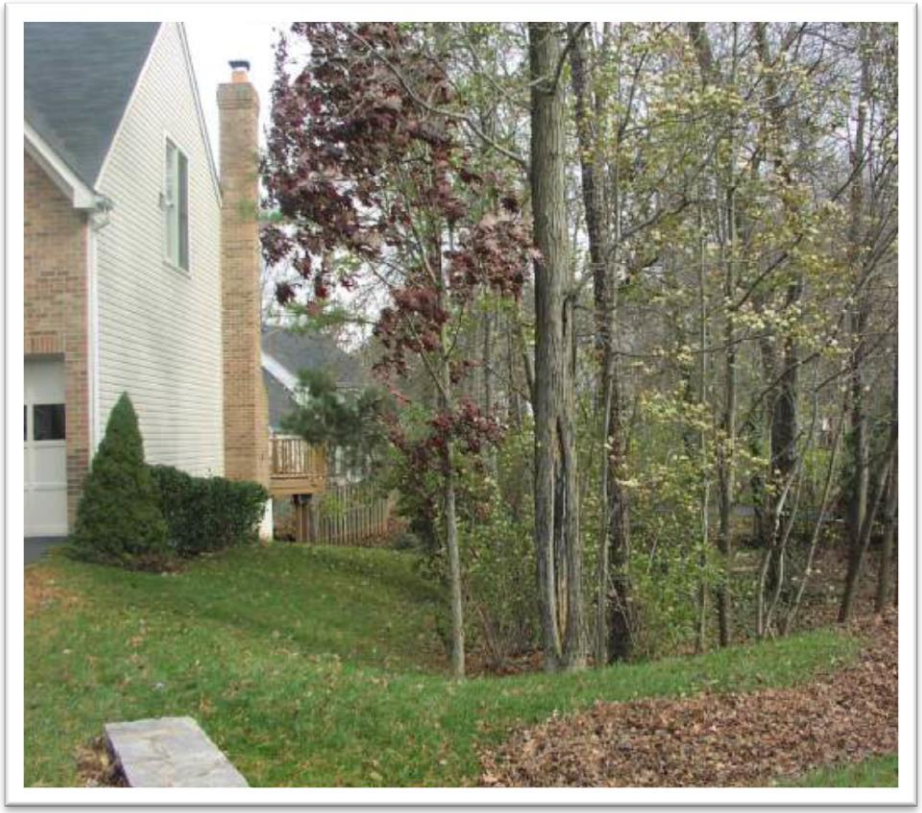
Two disconnection types allowed:

1. Simple
2. Alternative



Type 1. Simple Disconnection

Rooftops and/or on-lot impervious surfaces are directed to pervious areas

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Overview: Simple Disconnection

- Runoff volume reductions achieved by managing runoff as sheet flow close to its source and infiltrating into pervious areas

Key Considerations

- Advisable for lots > 6,000 ft^2
- Filter corridors from downspout
- Level spreader required for concentrated inflow

Simple disconnection design criteria

Design Factor	Simple Disconnection
Maximum impervious (Rooftop) Area Treated	1,000 sq. ft. per disconnection
Longest flow path (roof/gutter)	75 feet
Disconnection Length	Equal to longest flow path (no less than 40 feet)
Disconnection slope	< 2% or < 5% with turf reinforcement
Distance from buildings or foundations	Extend downspouts 5 ft. (15 ft. in karst areas) away from building *if grade is less than 1%.*
Type of Pretreatment	External (leaf screens, etc)

Key Considerations

- Table 1.2
- Disconnection length
- Disconnection slope
- Distance from building or foundations

Key Considerations

- Level Spreader for Concentrated Flow
  - Level spreader length should be equal to width of disconnection area

SECTION 3: DESIGN TABLES AND CRITERIA

3.1. Simple Rooftop Disconnection

Table 1.2 provides the primary design criteria for simple rooftop disconnection.

- Simple disconnection is generally not advisable for residential lots less than 6,000 square feet in area, although it may be possible to employ one of the alternative runoff reduction practices on these lots (e.g., cistern, infiltration, etc.).
- Simple disconnection can be used on any post-construction Hydrologic Soil Group. However, for Soil Groups C or D, alternative runoff reduction practices (e.g., compost-amended filter path, rain garden, rainwater harvesting) can boost the runoff reduction rate. Also, erodibility of soils must be considered when designing simple disconnection.
- Maintenance of disconnected downspouts usually involves the regular lawn or landscaping maintenance in the filter path from the roof to the street. In some cases, runoff from a simple disconnection may be directed to a more natural, undisturbed setting (i.e., where lot grading and clearing is "fingerprinted" and the proposed filter path is protected).

Table 1.2: Simple Rooftop Disconnection Design Criteria [1]

DESIGN FACTOR	SIMPLE DISCONNECTION
Maximum impervious (Rooftop) Area Treated	1,000 sq. ft. per disconnection
Longest flow path (roof/gutter)	75 feet
Disconnection Length	Equal to longest flow path, but no less than 40 feet [2]
Disconnection slope	< 2%, or < 5% with turf reinforcement [3]
Distance from buildings or foundations	Extend downspouts 5 ft. [4] (15 ft. in karst areas) away from building *if grade is less than 1%.*
Type of Pretreatment	External (leaf screens, etc)

[1] For alternative runoff reduction practices, see the applicable specification for design criteria. See Table 1 in this specification for eligible practices and associated specification numbers.

[2] An alternative runoff reduction practice must be used when the disconnection length is less than 40 feet.

[3] Turf reinforcement may include EC-2, EC-3, or other appropriate reinforcing materials that are confirmed by the designer to be non-erosive for the specific characteristics and flow rates anticipated at each individual application, and acceptable to the plan approving authority.

[4] Note that the downspout extension of 5 feet is intended for simple foundations. The use of a dry well or french drain adjacent to an in-ground basement or finished floor area should be carefully designed and coordinated with the design of the structure's water-proofing system (foundation drains, etc.), or avoided altogether.

Design specification No. 2

Sheet Flow to a Vegetated Filter Strip or Conserved Open Space

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Two Types of Filter Strips

1) Conserved open space
2) Designed vegetated filter strips

Remember…

- Stormwater **must** enter as sheet flow
  - Inflow from pipe or channel requires an engineered level spreader

Conserved Open Space

- Outside limits of disturbance
- Marked on all construction drawings
- Protected by signage and erosion controls

Vegetated Filter Strips

- Maximum slope steepness is 8% to maintain sheet flow through practice

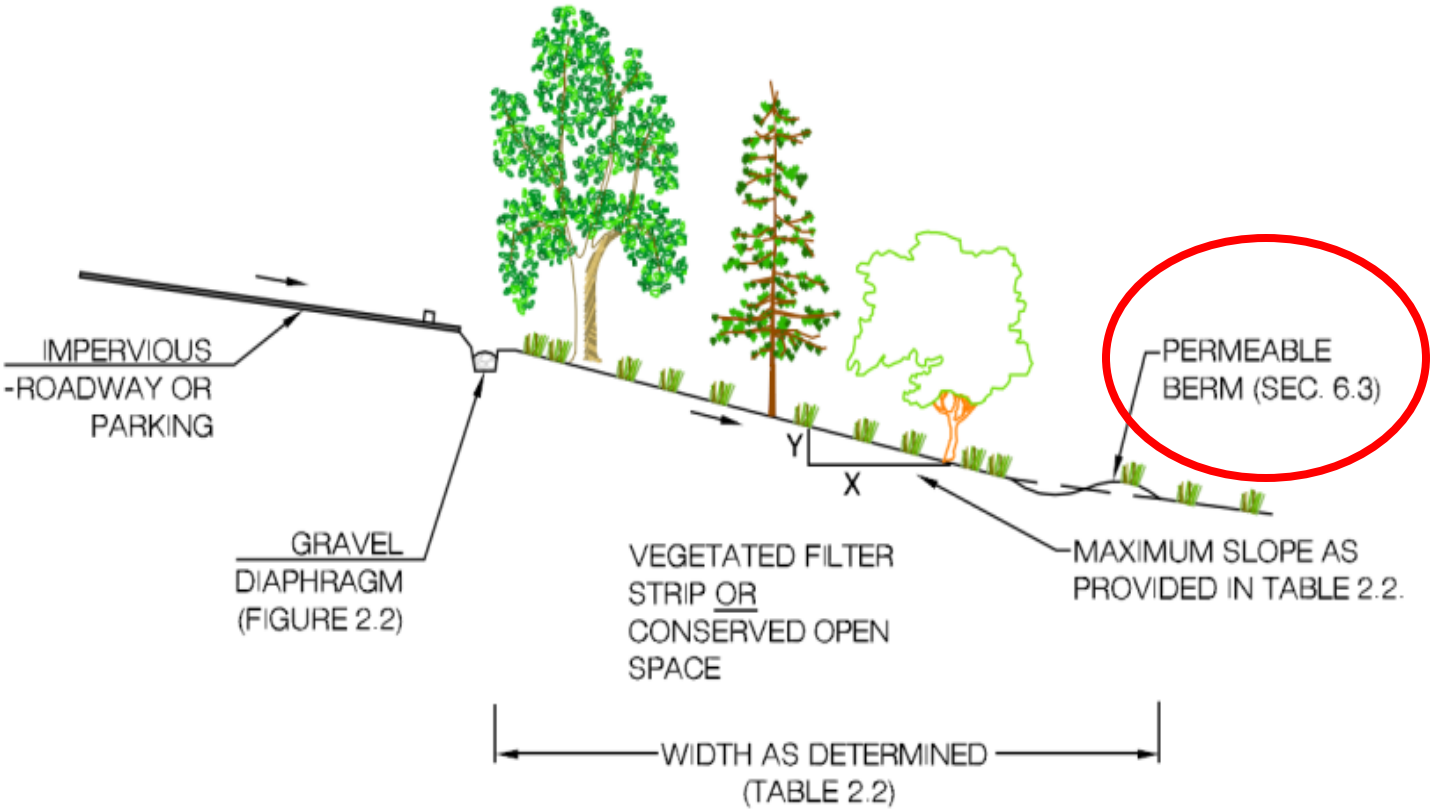
Vegetated Filter Strip

- Planting and Vegetation Management
  - 90% cover after second growing season
  - Seed, not sod
  - Compost soil amendments may be added

Vegetated Filter Strips

- Gravel Diaphragms:
  - Pea gravel diaphragm at top of slope required for **both** Conserved Open Space and vegetated filter strips that receive sheet flow

Vegetated Filter Strip



- TYPICAL CONFIGURATION OF SHEET FLOW TO VEGETATED FILTER STRIP OR CONSERVED OPEN SPACE.

Vegetated Filter Strip

- Engineered Level Spreaders
  - Concrete, metal, non-erodible material
  - Well anchored footer
  - Ends of level spreader section should be tied back into slope to avoid scouring around ends

Table 2.2. Filter Strip Design Criteria

Design Issue	Conserved Open Space	Vegetated Filter Strip
Soil and Vegetative Cover (Sections 6.1 and 6.2)	Undisturbed soils and native vegetation	Amended soils and dense turf cover or landscaped with herbaceous cover, shrubs, and trees
Overall Slope and Width (perpendicular to the flow) (Section 5)	0.5% to 3% Slope – Minimum 35 ft width 3% to 6% Slope – Minimum 50 ft width The first 10 ft. of filter must be 2% or less in all cases [2]	1% [1] to 4% Slope – Minimum 35 ft. width 4% to 6% Slope – Minimum 50 ft. width 6% to 8% Slope – Minimum 65 ft. width The first 10 ft. of filter must be 2% or less in all cases
Sheet Flow (Section 5)	Maximum flow length of 150 ft. from adjacent pervious areas; Maximum flow length of 75 ft. from adjacent impervious areas	
Concentrated Flow (Section 6.3)	Length of ELS [6] Lip = 13 lin. ft. per each 1 cfs of inflow if area has 90% Cover [3] Length = 40 lin. ft. per 1 cfs for forested or re-forested Areas [4] (ELS [6] length = 13 lin.ft. min; 130 lin.ft. max.)	Length of ELS [6] Lip = 13 lin.ft. per each 1 cfs of inflow (13 lin.ft. min; 130 lni.ft. max.)
Construction Stage (Section 8)	Located outside the limits of disturbance and protected by ESC controls	Prevent soil compaction by heavy equipment
Typical Applications (Section 5)	Adjacent to stream or wetland buffer or forest conservation area	Treat small areas of IC (e.g., 5,000 sf) and/or turf-intensive land uses (sports fields, golf courses) close to source
Compost Amendments (Section 6.1)	No	Yes (B, C, and D soils) [5]
Boundary Spreader (Section 6.3)	GD [6] at top of filter	GD [6] at top of filter PB [6] at toe of filter

[1] A minimum of 1% is recommended to ensure positive drainage.
[2] For Conservation Areas with a varying slope, a pro-rated length may be computed only if the first 10 ft. is 2% or less.
[3] Vegetative Cover is described in **Section 6.2**.
[4] Where the Conserved Open Space is a mixture of native grasses, herbaceous cover and forest (or re-forested area), the length of the ELS [6] Lip can be established by computing a weighted average of the lengths required for each vegetation type. Refer to **Section 6.3** for design criteria
[5] The plan approving authority may waive the requirement for compost amended soils for filter strips on B soils under certain conditions (see **Section 6.1**).
[6] ELS = Engineered Level Spreader; GD = Gravel Diaphragm; PB = Permeable Berm.

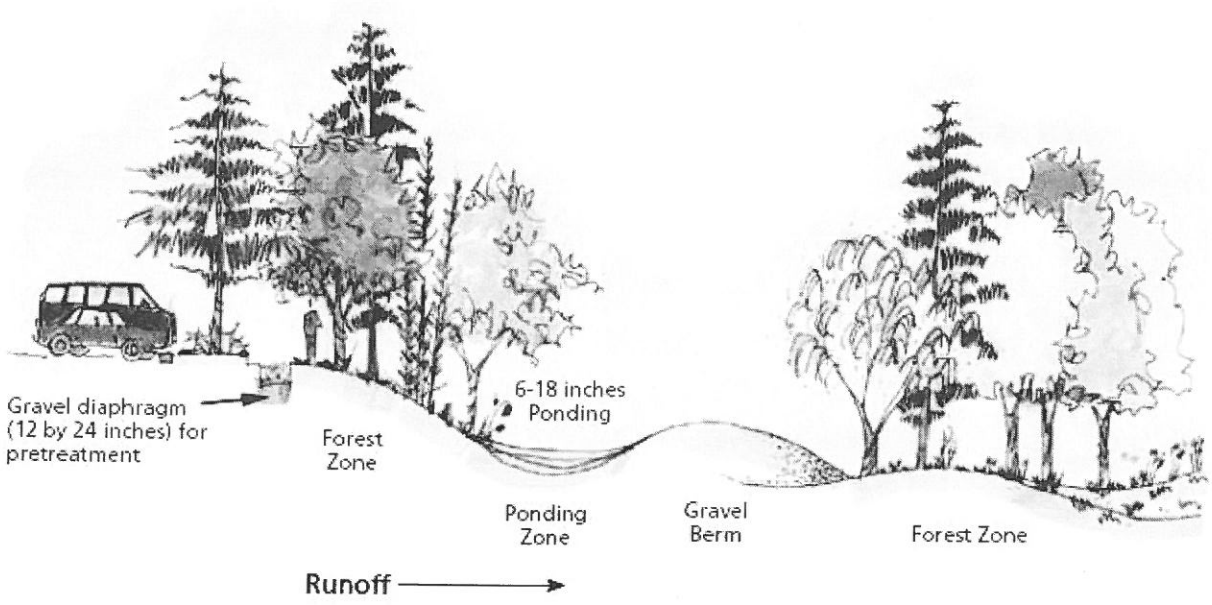


Figure 2.1. Typical Sheetflow to Conserved Open Space

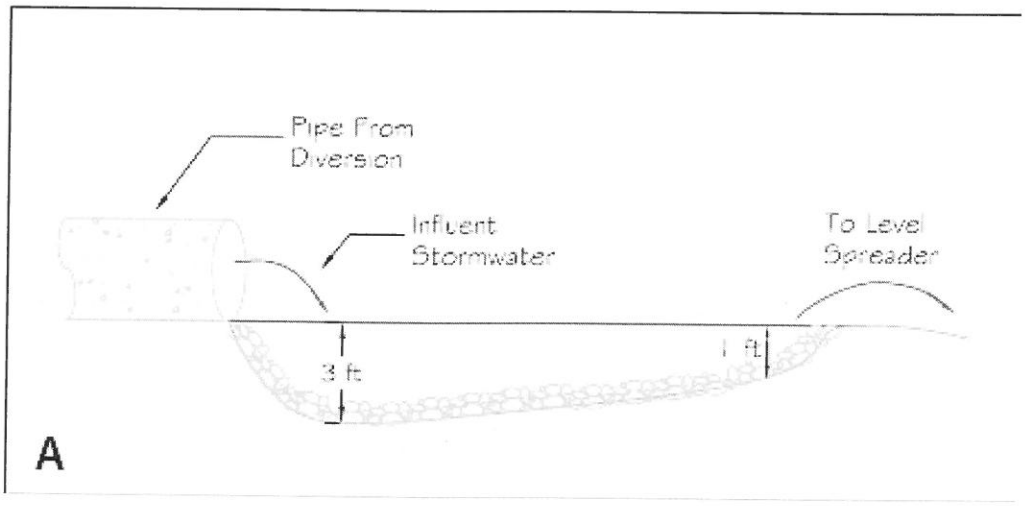


Figure 2.2. Level Spreader Forebay (Hathaway and Hunt 2006)

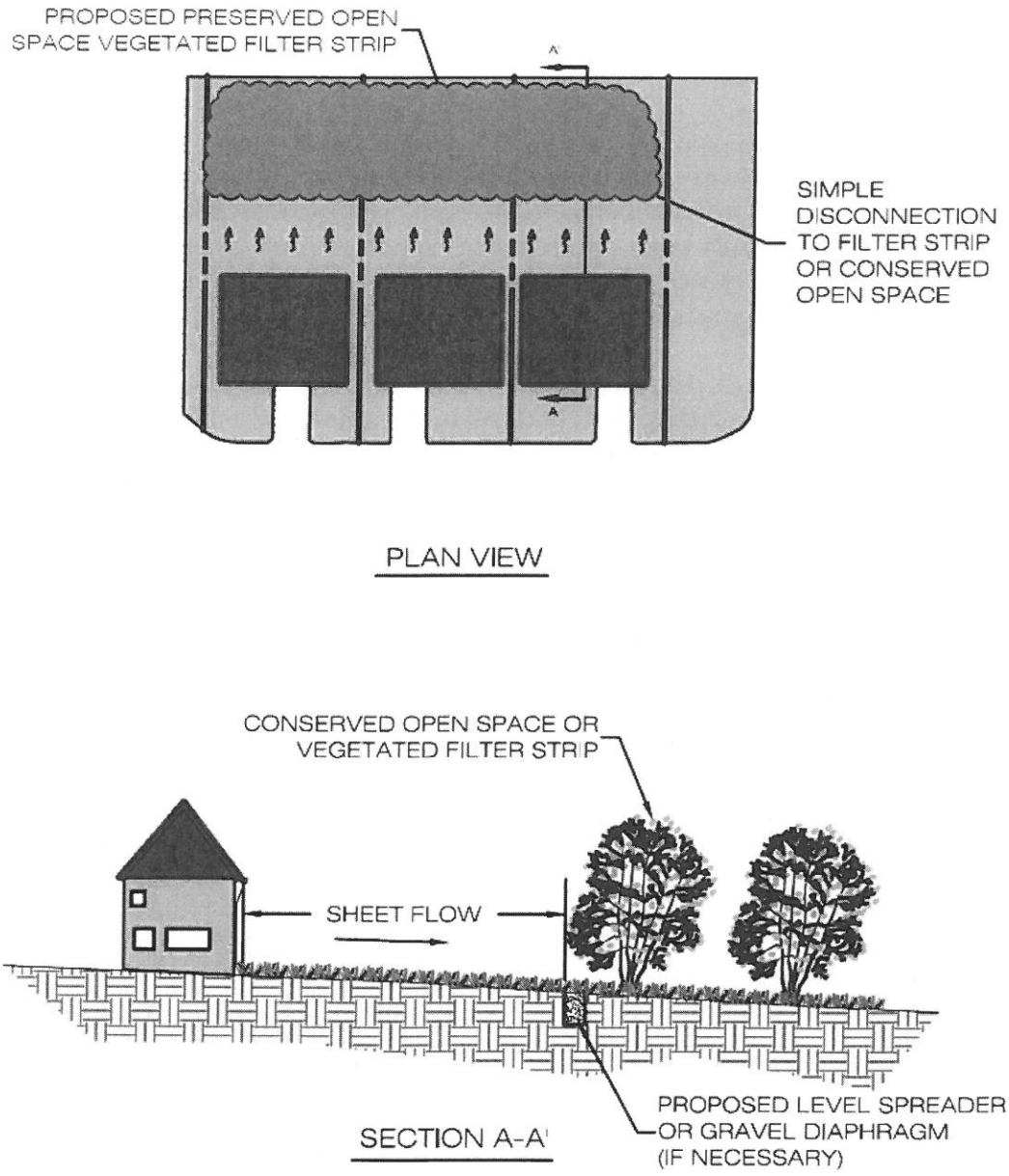


Figure 2.7: Simple Disconnection to downstream Preserved Open Space or Vegetated Filter Strip