ID-1. Introduction

Impervious Surface Disconnection involves managing runoff close to its source by intercepting, infiltrating, filtering, treating or reusing it as it moves from the impervious surface to the drainage system. Disconnection practices can be used to reduce the volume of runoff that enters the combined or separate sewer systems.

Impervious Surface Disconnection can be used to:

- Partially manage the first one-inch of rainfall from impervious cover on-site when applying Simple Disconnection in all Hydrologic Soil Groups (HSGs), with or without Soil Amendments (see **Table ID-1**)
- Reduce pollutant loads to meet water quality targets (total maximum daily loads or TMDLs) (See **Table ID-2**)
- Retrofit existing developed areas

Two kinds of disconnection are provided:

(1) **Simple Disconnection**, whereby rooftops and/or on-lot residential impervious surfaces are directed to pervious areas or conservation areas, on lots/parcels that are generally 6,000 square feet or more (depending on local conditions), and (2) **Disconnection with Compensatory Practices**, where adequate space for simple disconnection is not available, or a higher volume reduction credit is desired. Compensatory (micro-scale) runoff reduction practice(s) can be applied immediately adjacent to the rooftop downspout or impervious surface. Compensatory Practices can use less space than Simple Disconnection and can enhance runoff reduction rates.

Disconnection with Compensatory Practices include:

- Infiltration by small infiltration practices (dry wells or french drains, see **Specification 4.2.6. Infiltration**)
- Filtration or extended filtration by rain gardens or stormwater planters (see **Specification 4.2.3. Bioretention**)
- Storage and reuse with a cistern or other vessel (rainwater harvesting) (see **Specification 4.2.8. Rainwater Harvesting**)

Both types of disconnection are applicable to residential scale projects or small commercial rooftops (similar in size to residential). More highly impervious and/or commercial applications should use the other best management practices (BMPs) in this Manual.

Figure ID-1 further illustrates typical Impervious Surface Disconnection applications. **Figure ID-2** is a schematic of a typical rooftop disconnection to compensatory practices. **Tables ID-1** and **ID-2** describe two levels of disconnection design and associated volume reduction and pollutant removal performance rates. **Table ID-3** is a design checklist to help guide the design process for disconnection practices.

ID-1.1. Planning This Practice

Figure ID-1. Typical Applications of Impervious Surface Disconnection

Simple Rooftop Disconnection

Simple Rooftop Disconnection with Soil Amendments

Disconnection with Compensatory Practice: Small-Scale Infiltration (Source : http://www.brickstoremuseum.org/campaign_timeline.shtml)

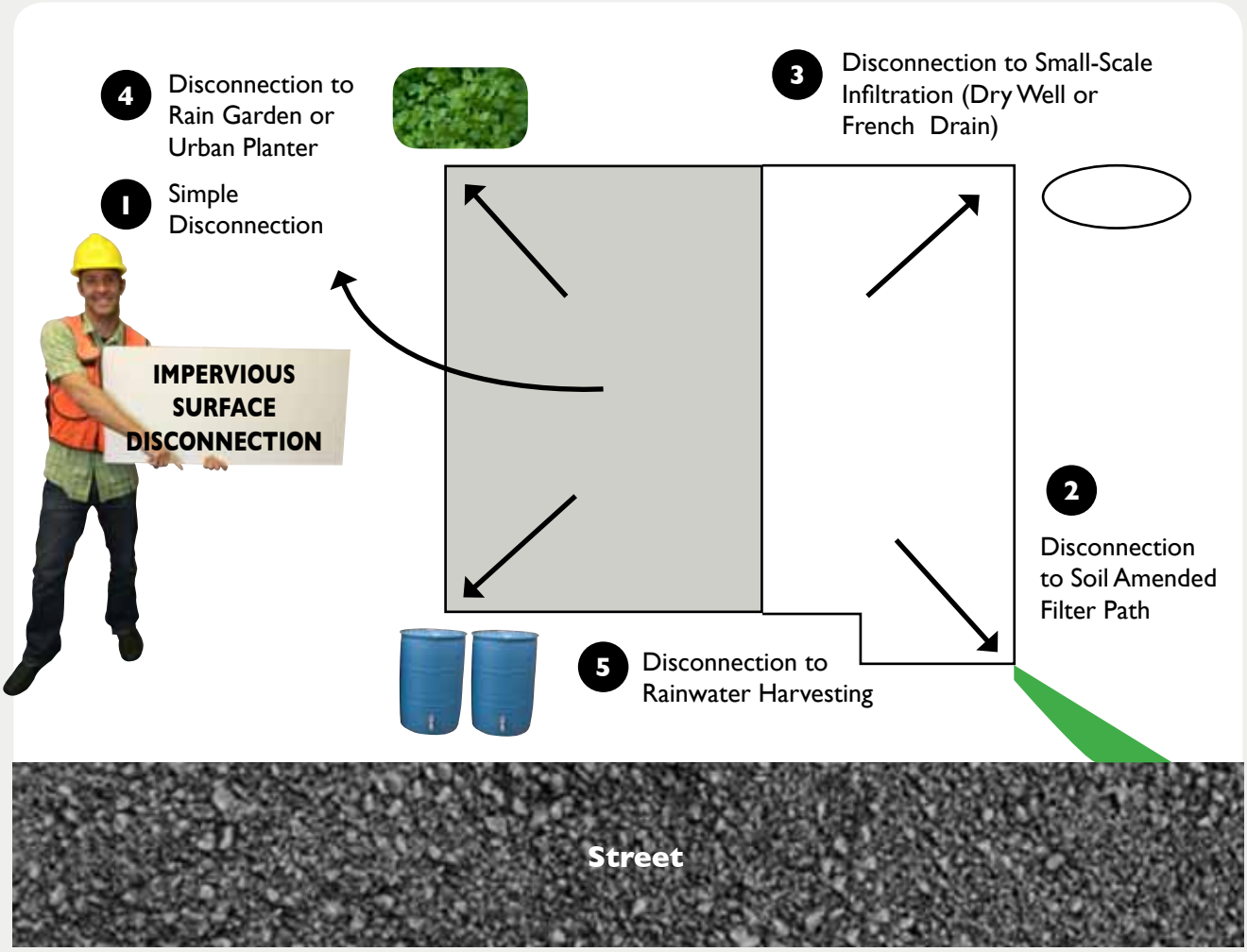
Disconnection with Compensatory Practice: Residential Rain Gardens

Disconnection with Compensatory Practice: Urban Planter
(Source: U.S. EPA)

Disconnection to Rainwater Harvesting Apparatus Cistern
(Source: U.S. EPA)

Disconnection to Rainwater Harvesting Apparatus Rain Barrel
(Source: U.S. EPA)

Figure ID-2. Roof Disconnection with Compensatory Runoff Reduction Practices



(Source for base graphic: Schueler et al., 2007)

1. Simple impervious disconnection – Table ID-1 & Section ID-4.1
2. Disconnection to Soil Amended Filter Path – Section ID-4.2 & Appendix D
3. Disconnection to Small-Scale Infiltration – Section ID-4.3
4. Disconnection to Rain Garden or Urban Planter – Section ID-4.4
5. Disconnection to Rainwater Harvesting – Section ID-4.5

ID-1.2. Impervious Surface Disconnection Design Options & Performance

Table ID-1 describes the design options for Simple Disconnection and Disconnection with Compensatory Practices, and the practice performance in terms of reducing the volume associated with one inch of rainfall on the site. **Table ID-2** summarizes pollutant removal performance values for Simple Disconnection based on the site soil profile. This is for the purpose of calculating site-based pollutant load reductions in the context of TMDLs and/or watershed plans. Performance credits for Disconnection with Compensatory Practices vary by design and site conditions. See Section ID-4 for sizing details.

Table ID-1. Impervious Surface Disconnection: Descriptions & Performance

Hydrologic Soil Group	Description	Applications[1]	Performance[2]
A / B	Simple Disconnection • Max. 1,000 sq. ft. rooftop area to each disconnection point • Non-rooftop impervious area longest flow path ≤ 75 ft. • Disconnection area width: ≥15 ft. / ≤ 25 ft. • Disconnection area length: = 40 ft. [3] • Grade of receiving pervious area ≤ 2%; or ≤ 5% with turf reinforcement	• Residential or small commercial rooftops and/or other small areas of on-lot impervious cover; • Lot sizes ≥ 6,000 sq. ft. (this is a recommended lot size for Simple Disconnection; local governments may determine a locally-appropriate size. Smaller lots can still disconnect to Compensatory Practice)	4 cu. ft. of volume reduction for every 100 sq. ft. of pervious receiving area.
C / D	Simple Disconnection • Same design criteria as above	• See above	2 cu. ft. of volume reduction for every 100 sq. ft. of pervious receiving area.
C / D	Soil Amendments[4] • Same design criteria as above • Soils of pervious receiving area amended as per specifications	• See above	4 cu. ft. of volume reduction for every 100 sq. ft. of pervious receiving area

Hydrologic Soil Group	Description	Applications[1]	Performance[2]
Any Soil Group[4]	Compensatory Practices[5]: • Infiltration • Rain Garden • Rainwater Harvesting	• Residential or small commercial rooftops or on-lot impervious cover; • Lot sizes may vary[6]	Varies[7]

[1] Disconnection is applicable in residential applications and small areas of imperviousness in commercial/office settings.
[2] Performance achieved toward reducing one inch of rainfall
[3]Disconnection receiving area is limited since credit is measured as "per 100 sq. ft." of receiving area.
[4]Refer to **Section ID-4.2 and Appendix D** *for Soil Amendments*
[5]Refer to **Section ID-4** *for feasibility, limitations, and design elements for compensatory Practices.*
[6] Compensatory Practices are often applied on lots that are smaller and therefore do not have the space for the Simple Disconnection practices and/or the soils are not suitable.
[7]The runoff reduction performance credits for the Compensatory Practices vary by design and site conditions. See **Section ID-4** *for sizing details.*

Table ID-2. Total Pollutant Load Reduction Performance Values for Impervious Surface Disconnection[1]

Hydrologic Soil Groups	Total Suspended Solids (TSS)	Nutrients: Total Phosphorus (TP) & Total Nitrogen (TN) [2, 3]
A & B	TSS = 75%	TP = 50% TN = 50%
C & D	TSS = 63%	TP = 25% TN = 25%

[1] Performance values for the Compensatory Practices vary by design and site conditions. See **Section 4** *for sizing details.*
[2] Total Pollutant Load Reduction = combined functions of runoff reduction and pollutant removal. Pollutant removal refers to the change in event mean concentration as it flows through the practice and is subjected to treatment processes, as reported in Hirschman et al. (2008).
[3] There is insufficient monitoring data to assign a nutrient removal rate for Simple Disconnection at this time. Therefore, Simple Disconnection does not receive any nutrient removal credit, and only moderate TSS removal; therefore, nutrient load reduction is a function of runoff volume reduction only.

ID-1.3. Impervious Surface Disconnection Design Checklist

Table ID-3. Impervious Surface Disconnection Design Checklist

CHECKLIST

This checklist will help the designer through the necessary design steps for Impervious Surface Disconnection.

- ☐ Check feasibility for site: lot size, soils, slope, etc. – **Section ID-3**
- ☐ Determine if Simple Disconnection is applicable, or if Compensatory Practices are necessary – **Section ID-3**
- ☐ Complete Design Compliance Spreadsheet to plan and confirm Simple Disconnection or Disconnection with Compensatory Practices, and additional practices as needed for overall site compliance – **Chapter 3, Section 3.4.4**
- ☐ Check practice sizing guidance and verify that adequate footprint is available at each downspout or disconnection location – **Section ID-4**
- ☐ Check design adaptation appropriate to the site – **Section ID-6**
- ☐ Design Simple Disconnection or Disconnection with Compensatory Practices in accordance with design criteria and typical details – **Sections ID-2 and ID-4**
- ☐ Provide all necessary plan view, profile, and cross-section details along with elevations, materials specifications, grading, and construction sequence and notes – **Section ID-2 and ID-4**

4.2.2. Impervious Surface Disconnection (ID)

ID-2. Typical Details

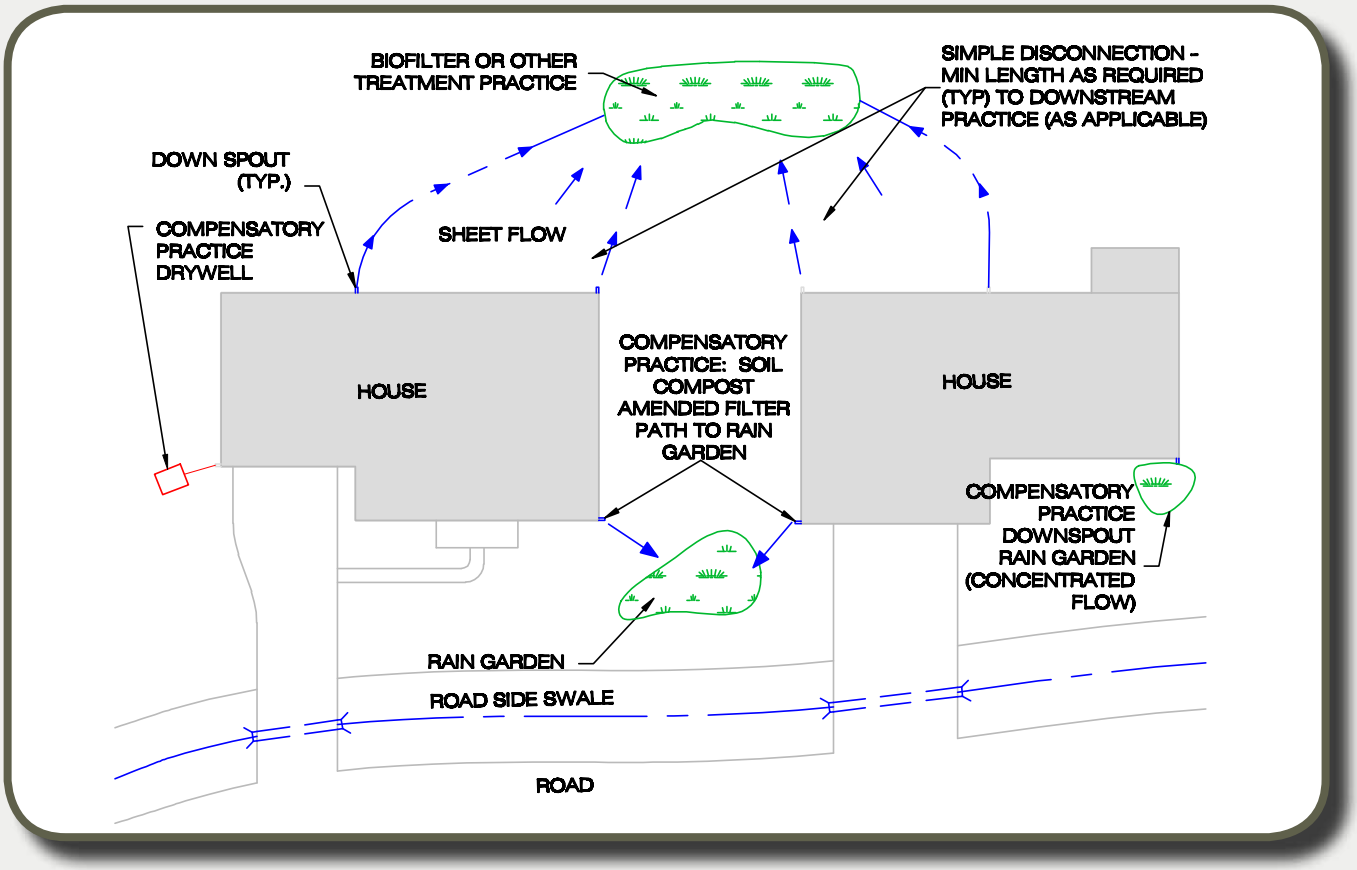


Figure ID-3. Example of Impervious Disconnection Options for Residential Rooftop: Plan View

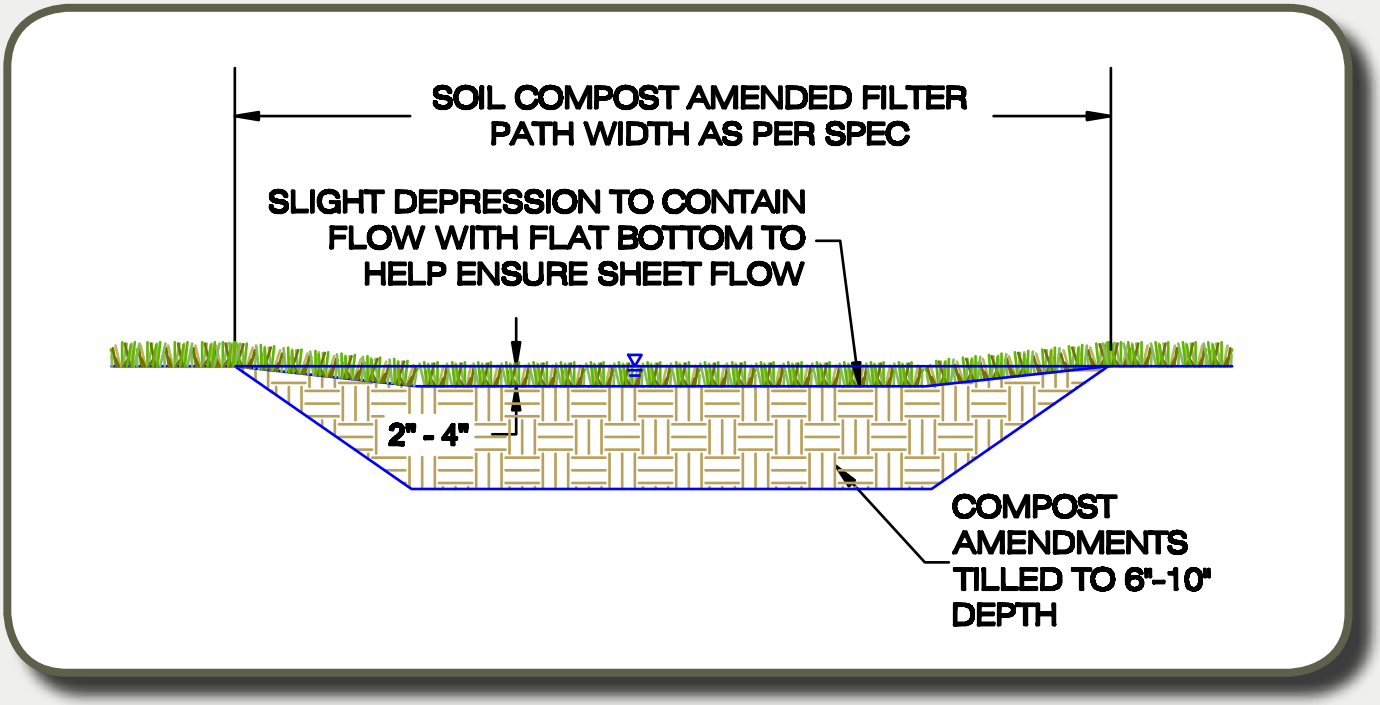


Figure ID-4. Simple Disconnection with Soil Compost Amended Filter Path

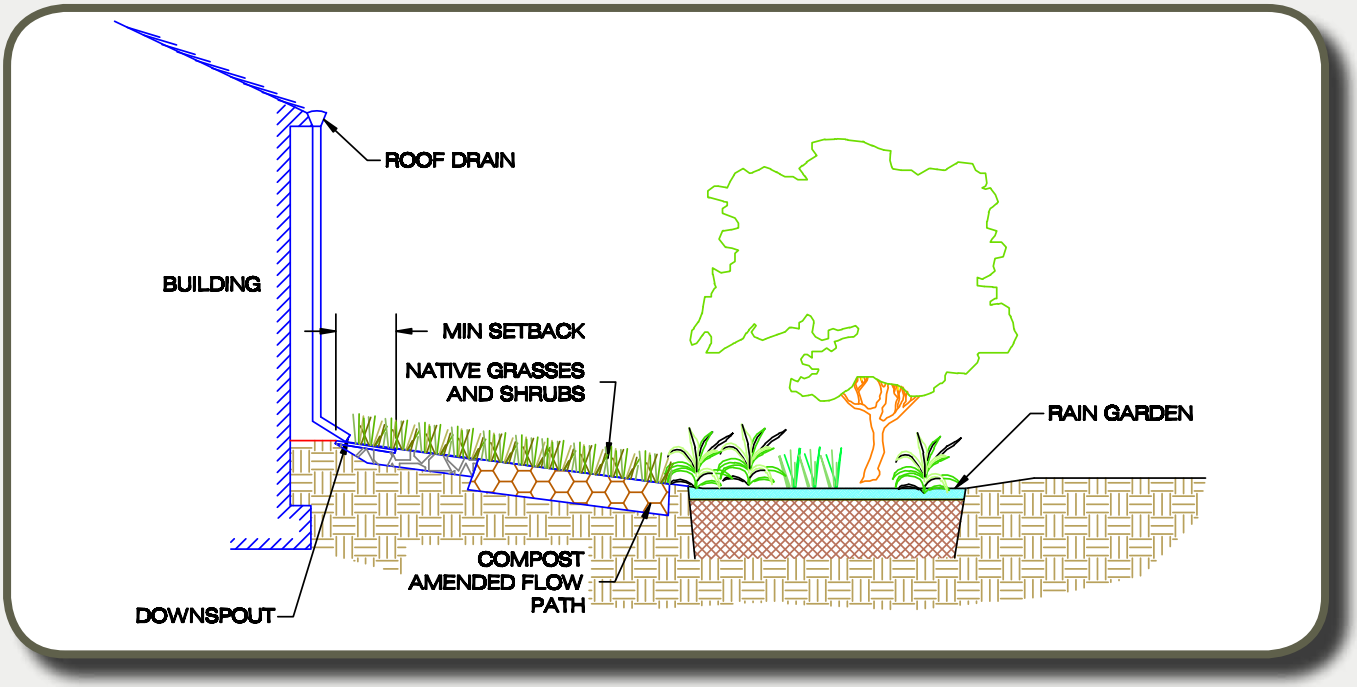


Figure ID-5. Example of Residential Disconnection with Compost Amended Flow Path to Downstream Rain Garden

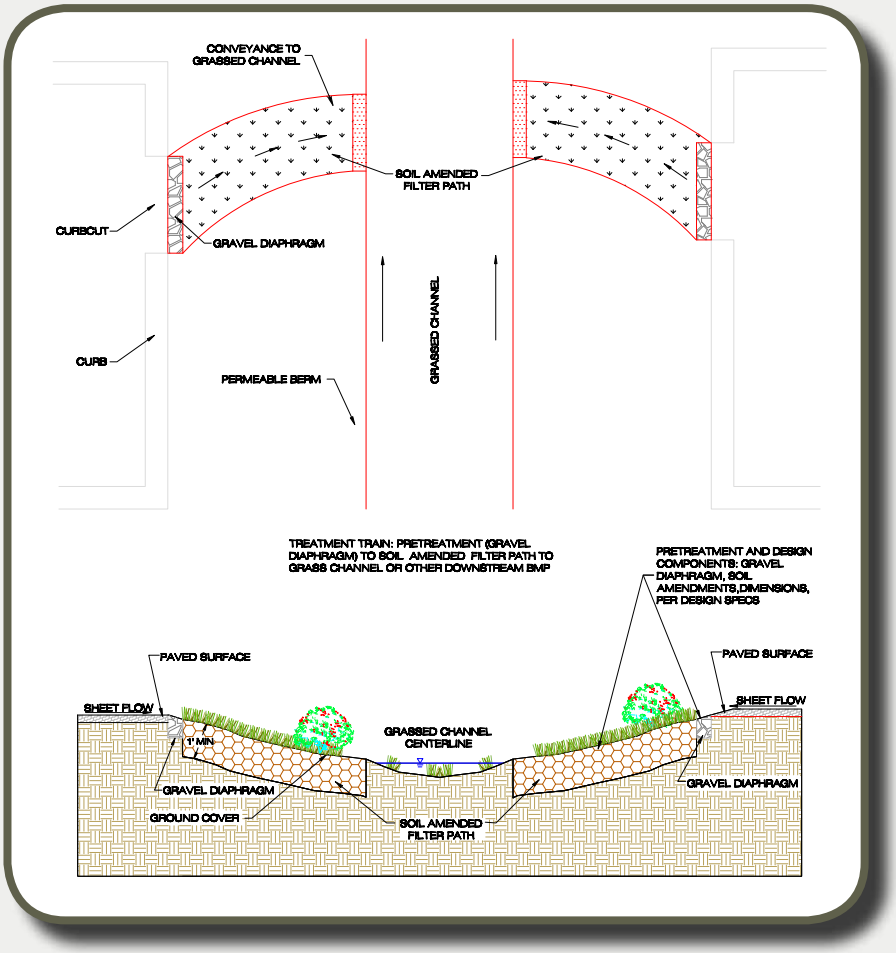


Figure ID-6. Disconnection of Small Impervious Area (e.g., ¼ acre or less): Soil Amended Filter Path to Downstream Grass Channel (or other treatment): Example of Disconnection as Part of Treatment Train

4.2.2. Impervious Surface Disconnection (ID)

ID-3. Feasibility Criteria and Design Considerations

Impervious Surface disconnections are ideal for use on residential single family developments. Simple Disconnection can be applied to roof drains, driveways, and other small scale impervious areas on individual residential lots. Simple Disconnection becomes gradually more difficult to apply as the overall density and scale of impervious cover increases. Commercial, institutional, municipal, and multi-family residential developments will appear to have pervious areas throughout the development footprint; however, the maximum contributing drainage area and the various design requirements for simple disconnection often limit its use on these developments.

Disconnection with a Compensatory Practice is intended to address the limitations of available space or soils that are common on multi-family residential and non-residential development projects. Disconnection to a Compensatory Practice still relies on a relatively simple design that employs sheet flow through a pervious area to the downstream practice. For larger areas of impervious cover (generally greater than 2,500 square feet) the designer should employ the other stand-alone specifications in this Manual.

Use the Other BMPs in This Manual for Larger (generally greater than 2,500 square feet) Multi-Family, Commercial, or Institutional Rooftops & Other Areas of Impervious Cover

Impervious Surface Disconnection is intended for residential lots and small areas of impervious cover at commercial or institutional development sites. Often, the practice can be used as part of a treatment train in conjunction with other downstream practices. However, Impervious Surface Disconnection is NOT intended to be a stand-alone BMP for larger areas of impervious cover.

Feasibility criteria and design considerations for Impervious Surface Disconnection are provided in this section. The designer is encouraged to refer to the Feasibility Criteria and Design Consideration sections for the individual Compensatory Practices for more detailed information:

- Infiltration: **Specification 4.2.6**
- Water Quality **Swale: Specification 4.2.3.A**
- Urban Bioretention: **Specification 4.2.3.B**
- Residential Rain Gardens: **Specification 4.2.3.C**
- Rainwater Harvesting (Cisterns): **Specification 4.2.8**

Feasibility criteria and design considerations for Simple Disconnection include the following:

Available Space. Simple Disconnection is generally not advisable for residential lots less than 6,000 square feet in area, although it is likely possible to employ one of the runoff reduction Compensatory Practices on smaller lots (e.g., cistern, infiltration, etc.). The available disconnection area must be at least 15 feet wide and 40 feet long. The disconnection width is limited to 25 feet. Concentrated flow must be converted to sheet flow across the entire width with a level spreader at the entrance to the disconnection area.

Site Topography. Simple Disconnection is best applied when the grade of the receiving pervious area is greater than 1% and less than 5%, or can be applied to individual terraces with slopes of 1-5%. The slope of the receiving areas must

be graded away from any building foundations. Turf reinforcement may include biodegradable erosion control matting 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.

Soils and Underdrains. Impervious Surface Disconnection can be used on any post-construction HSG. However, for Simple Disconnection, the permeability of the receiving pervious area is an important factor in the runoff reduction performance. Therefore, HSGs A & B receive a higher annual runoff reduction credit than HSG C & D soils. The performance of disconnection in HSG C & D soils can be improved by providing Soil Amendments (e.g., compost-amended filter path) or a Compensatory Practice (e.g., infiltration, bioretention, or cisterns).

The performance credit is designated by soil type; however, the premise of the credit is the minimum theoretical permeability or infiltration rate of 0.5 in./hr. for HSG A & B soils. The designer should verify the soil type as well as the erodibility of the soils by conducting a geotechnical investigation.

Use Caution When Infiltrating Water in Fill Sections

Soil slips can result from infiltrating water in areas of fill material, especially if the interface between the fill material and the native soil is shallow and on a steep grade (as compared to the gentle topography of the finished grade). Geotechnical investigations are required if any design that infiltrates water is proposed in a fill section.

Contributing Drainage Area. For rooftop impervious areas, the maximum impervious area treated cannot exceed 1,000 sq. ft. per disconnection. For non-rooftop impervious areas, the longest contributing impervious area flow path cannot exceed 75 feet.

Hotspot Land Uses. Simple Disconnection should not be used in areas of potential or confirmed hotspots. However, disconnection can still be used to treat "non-hotspot" parts of the site; for instance, rooftop runoff and small parking areas can be disconnected to a pervious area while vehicular maintenance areas or other stormwater hotspot sources would be treated by a more appropriate hotspot practice.

For a list of potential stormwater hotspots, please consult Chapter 5 of the Manual.

Floodplains. Stream buffers and other pervious areas typically associated with floodplains should not be used for disconnection credit without prior approval from the local plan approving authority (see **Specification 4.1** Better Site Design Practices).

Setbacks. If the grade of the receiving area is less than 1%, downspouts must be extended 5 ft. away from building. 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.

Proximity to Utilities. Interference with underground utilities should be avoided whenever possible, particularly water and sewer lines. However, the limited contributing drainage area and the continuous grade of disconnection areas is such that the presence of underground utilities should not preclude the practice from being used. Since conflicts with water and sewer laterals (e.g., house connections) in residential settings may be unavoidable, the construction sequence must be considered to ensure the stabilization of the disconnection flow path occurs after the installation of utilities that intersect the flow path.

Community Factors. Simple Disconnection is a safe and easy way to reduce the effect of impervious cover by utilizing the surrounding landscape. Since this can be a very subtle practice, property owners must be specifically advised as to the presence of the practice. Disconnection to Compensatory Practices (e.g. disconnection to cisterns or rain gardens) are more visible, and have the added community benefits of aesthetics and educational opportunity.

Underground Injection Permits. Simple Disconnection is generally not subject to permits under the Underground Injection Control (UIC) Program (U.S. EPA, 2008). However, certain Compensatory Practices, especially infiltration, may require consideration when in close proximity to sensitive groundwater areas (e.g., aquifers overlain with thin, porous soils), and/or designs that are deeper than their widest surface dimension.

4.2.2. Impervious Surface Disconnection (ID)

ID-4. Design Criteria

The following design criteria apply to Simple Disconnection and Disconnection with Compensatory Practices:

ID-4.1. Simple Disconnection

Simple Disconnection should be designed in accordance with the following criteria:

Table ID-4. Simple Disconnection

Design Factor	Design Criteria
Impervious Area Treated	• 1,000 sq. ft per rooftop disconnection. • Non-rooftop impervious areas: longest contributing impervious area flow path ≤ 75 ft.
Sizing/Geometry	• Pervious disconnection area width: ≥ 15 ft. and ≤ 25 ft. • Pervious disconnection area length: 40 ft.
Grade	• ≤ 2% • ≤ 5% with turf reinforcing • receiving areas must be graded away from any building foundations
Inflow	• Sheet flow with level spreader for the entire width of the pervious area

Design Factor	Design Criteria
Pretreatment	• Generally not required (other than level spreader) for Simple Disconnection
Minimum Soil Infiltration Rate	• 0.5 inches/hour for Simple Disconnection (or use Compensatory Practice)
Building Setbacks	• 5 ft. away from building if the grade of the receiving area is less than 1%
Underdrains	• Generally not required for Simple Disconnection
Impermeable Liner	• Generally not required for Simple Disconnection

Level Spreader: A level spreader must be used to disperse or "spread" concentrated flow thinly over the vegetated pervious area to promote greater runoff infiltration and minimize erosion. A level spreader consists of a permanent linear structure constructed at a 0% grade that transects the slope. The influent concentrated runoff must be spread over the entire width of the pervious area. Detailed information on the design and function of level spreaders can be found in Hathaway and Hunt (2006) and Van Der Wiele (2007).

- The minimum required width of the level spreader should be equal to the width of the disconnection flow path.
- A pea gravel or river stone diaphragm, concrete, timber, or other accepted flow spreading device should be installed at the downspout outlet to distribute flows evenly across the filter path.

More details about level spreader design can be obtained from **Specification 4.2.1. Sheet Flow to Vegetated Filter Strips and Conservation Areas.**

Conveyance. Simple Disconnection should be designed to safely convey design and large storm events over the receiving area without causing erosion. Since the rooftop drainage systems (roof leaders) typically limit the flow, there are generally no detailed conveyance criteria related to a design storm or peak flow rate.

The strip should have adequate "freeboard" so that flow remains within the strip and is not diverted away from the strip. This means that the strip should be lower than the surrounding land area in order to keep flow in the filter path. Similarly, the flow area of the filter strip should be level to discourage concentrating the flow down the middle of the filter path.

Landscaping. Landscaping of pervious areas for Simple Disconnection consists of designating an appropriate grass species for the site conditions. All receiving disconnection areas must be stabilized to prevent erosion or transport of sediment to receiving practices or drainage systems. Several types of grasses appropriate for disconnection practices are listed in **Specification 4.2.5. Grass Swales** and WVDEP (2006).

ID-4.2 Simple Disconnection to a Soil Compost-Amended Filter Path

For detailed information on the design, function, and specifications for the incorporation of Soil Amendments, designers should consult **Appendix D**.

The pervious area for Simple Disconnection to a soil compost-amended filter path should meet the design criteria in **Table ID-4,** as well as the following:

- The amended filter path should be at least 10 feet in width and 20 feet in length within the larger disconnection pervious area.
- A simple level spreading device (e.g., stone apron, gravel diaphragm) should be installed at the downspout outlet to distribute flows evenly across the filter path.
- Use 2 to 4 inches of approved compost material and till to a depth of 6 to 10 inches within the filter path.

ID-4.3 Disconnection with Compensatory Practice: Infiltration

Depending on soil properties, rooftop runoff may be infiltrated into a shallow dry well or french drain. The design for this Compensatory Practice should meet the requirements of Infiltration practices, as described in **Specification 4.2.6**. Infiltration and summarized in **Table ID-5** below. Note that the building setback 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.

Table ID-5. Disconnection with Compensatory Practice: Infiltration

Design Factor	Infiltration Design
Roof Area Treated	250 to 2,500 sq. ft.
Typical Practices	Dry well and french drain
Recommended Maximum Depth	3 ft.
Sizing	See **Specification 4.2.6: Infiltration**
Minimum Soil Infiltration Rate	Field verified ≥ 0.5 in./hr.
Observation Well	No
Pretreatment	External (leaf screens, grass strip, etc.)
UIC Permit	Possible[1]

Design Factor	Infiltration Design
Head Required	Nominal, 1 to 3 ft.
Required Soil Test	One per practice
Building Setbacks	5 ft. down-gradient[2], 25 ft. up-gradient

[1] *Infiltration practice must be wider than it is deep to avoid an underground injection control permit. See* **Specification 4.2.6** *Infiltration for more information.*
[2] *Note that the building setback of 5 ft. 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.*

In general, micro-infiltration areas will require a surface area up to 3% of the contributing roof area. An on-site soil test is needed to determine if soils are suitable for infiltration. It is recommended that the micro-infiltration facility be located in an expanded right-of-way or stormwater easement so that it can be accessed for maintenance.

Conveyance. Disconnection to Infiltration should include provisions to bypass flows around the Infiltration practice when the rain event exceeds the design volume. The adjacent pervious areas should be designed to safely convey design and large storm events away from the practice and to a receiving area without causing erosion. Since the rooftop drainage systems (roof leaders) typically limit the flow, there are generally no detailed conveyance criteria related to a design storm or peak flow rate.

Landscaping. Landscaping of Infiltration areas can include a layer of top soil and turf. Refer to **Specification 4.2.6. Infiltration** for the design elements of turf cover over top of an Infiltration practice.

ID-4.4 Disconnection with Compensatory Practice: Bioretention (Residential Rain Gardens and Urban Bioretention)

For some residential applications, front, side, and/or rear yard Rain Garden may be an attractive option used to filter roof runoff (**Figures ID-2** through **ID-5 and ID-7**). The term Residential Rain Garden generally refers to a less rigorous design specification since the contributing drainage area is limited. Refer to **Specification 4.2.3 Appendix C: Residential Rain Gardens**. Where more than one structure drains to a shared Rain Garden, or the drainage area exceeds the maximum noted below, the design criteria for Bioretention (**Specification 4.2.3**) would apply.

Urban Bioretention in stormwater planters are also a useful option to disconnect and treat rooftop runoff, particularly in ultra-urban areas. The designs for both of these options should meet the requirements described in **Specification 4.2.3 Bioretention** and the criteria summarized in **Table ID-6** below.

Figure ID-7. A backyard rain garden that treats rooftop runoff

Table ID-6. Design Criteria for Disconnection to Residential Rain Garden

Design Factor	Residential Rain Garden Design
Impervious Area Treated[1]	2,500 sq. ft.
Type of Inflow	Sheet flow; Concentrated flow with level spreader or energy dissipater
Minimum Soil Infiltration Rate	0.5 in./hr. (or use underdrain)
Observation Well/Cleanout Pipes	No
Pretreatment	Energy dissipater, forebay, grass filter
Underdrain	Optional per soils[1]
Impermeable Liner	For hotspot or karst designs, or adjacent to foundations.
Gravel Layer	12 in.

Design Factor	Residential Rain Garden Design
Minimum Filter Media Depth	18 in.
Media Source	Can be mixed on-site
Head Required	Nominal, 1 to 3 ft.
Sizing	See **Specification 4.2.3: Bioretention**
Required Soil Borings	One, only when an underdrain is not used
Building Setbacks	5 ft. down-gradient, 25 ft. up-gradient (or use an impermeable liner for planters)

[1]*Refer **Specification 4.2.3 Bioretention***

Conveyance. Disconnection to Rain Gardens should include provisions to bypass flows around the practice when the rain event exceeds the design volume. The adjacent pervious areas should be designed to safely convey design and large storm events away from the practice and to a receiving area without causing erosion. Since the rooftop drainage systems (roof leaders) typically limit the flow, there are generally no detailed conveyance criteria related to a design storm or peak flow rate. Refer to **Specification 4.2.3 Bioretention Appendix C: Residential Rain Gardens**.

Landscaping: Residential Rain Gardens should be landscaped in accordance with Section BR-4.17 in **Specification 4.2.3, Bioretention**.

ID-4.5 Storage and Reuse with a Cistern or Rain Tank

This form of disconnection must conform to the design requirements outlined in **Specification 4.2.8. Rainwater Harvesting**. The runoff reduction rates for rain tanks and cisterns depends on their storage capacity and ability to draw down water in between storms for reuse as potable water, grey-water or irrigation use. The actual runoff reduction rate for a particular design can be ascertained using the design annual rainfall depth and the intended use of the water: landscaping irrigation, internal non-potable uses, etc. Refer to **Specification 4.2.8. Rainwater Harvesting**.

Pretreatment. Pretreatment for Rainwater Harvesting systems is critical to keeping the internal components clear of debris. External leaf screens, a first flush diverter, and other options should be considered in the early stages of design. Refer to **Specification 4.2.8. Rainwater Harvesting**.

Conveyance and Overflow. The design of Rainwater Harvesting systems should be in accordance with **Specification 4.2.8. Rainwater Harvesting**. All devices should have a suitable overflow area to route extreme flows into the next treatment practice or the stormwater conveyance system.

4.2.2. Impervious Surface Disconnection (ID)

ID-5. Materials Specifications

Materials Specifications for Simple Disconnection and Disconnection with Compensatory Practices can be found in the specifications for the individual practices. Refer to the following:

Specification 4.2.1: Sheet Flow to Vegetated Filter Strips and Conservation Areas (for Level Spreader);
Specification 4.2.3: Bioretention
Specification 4.2.6: Infiltration
Specification 4.2.8: Rainwater Harvesting
Appendix D: Soil Amendments

4.2.2. Impervious Surface Disconnection (ID)

ID-6. Design Adaptations

ID-6.1. Karst Terrain

Impervious Surface Disconnection is strongly recommended for most residential lots greater than 6,000 square feet, particularly if it can be combined with a secondary small scale (compensatory) practice to increase runoff reduction. The discharge point from the disconnection should extend at least 15 feet from any building foundations. Impervious Surface Disconnection is also recommended for commercial sites that are not likely to be stormwater hotspots.

ID-6.2. Steep Slopes

Simple Disconnection is generally not appropriate on steep slopes. However, terracing can establish pockets or relatively flat area for either Simple Disconnection or Disconnection with Compensatory Practices. Refer to Design Adaptations in the individual practice design specifications for specific guidance.

ID-6.3. Stormwater Retrofitting

Simple Disconnection is an on-site retrofit technique with the goal of systematically retrofitting as many rooftop and/or on-lot residential impervious surfaces as possible within a given watershed. Some of the chief considerations for retrofitting are available space, soil permeability, and soil compaction.

For more information on retrofitting, see the Center for Watershed Protection's manual, Urban Stormwater Retrofit Practices (Schueler et al., 2007).

4.2.2. Impervious Surface Disconnection (ID)

ID-7. Construction & Installation

Residential Impervious Surface Disconnection will often be identified on the construction drawings before the designer knows the dimensions and exact location of the dwelling unit. Therefore, designers should identify reasonable areas on each lot as being protected for future use until such time as a final house location plat is developed and the pervious areas of Compensatory Practices can be sited.

In the meantime, care should be taken during site construction to protect the disconnection pervious areas in the vicinity of the proposed house and driveway location from compaction. To help prevent soil compaction, heavy vehicular and foot traffic should be kept out of the receiving pervious area both during and after construction. This can be accomplished by clearly delineating the receiving pervious areas on all development plans and protecting them with temporary fencing prior to the start of land disturbing activities. If compaction occurs, the soils should be amended or aerated post-construction to increase permeability.

ID-7.1. Construction Sequence for Simple Disconnection

For Simple Disconnection, the receiving pervious area can be within the limits of disturbance during construction. The following procedures should be followed during construction:

- Before site work begins, the receiving pervious disconnection area boundaries should be clearly marked.
- Construction traffic in the disconnection area should be limited to avoid compaction. The material stockpile area shall not be located in the disconnection area.
- Construction runoff should be directed away from the proposed disconnection area, using perimeter silt fence, or, preferably, a diversion dike.
- If existing topsoil is stripped during grading, it shall be stockpiled for later use.
- The disconnection area may require light grading to achieve desired elevations and slopes. This should be done with tracked vehicles to prevent compaction.
- Topsoil and/or compost amendments should be incorporated evenly across the disconnection area, stabilized with seed, and protected by biodegradable erosion control matting or blankets.
- Stormwater should not be diverted into any compost amended areas until the turf cover is dense and well established.

ID-7.2 Construction Inspection

Construction inspection is critical to ensure compliance with design standards. Inspectors should evaluate the performance of the disconnection after the first big storm to look for evidence of gullies, outflanking, undercutting or sparse vegetative cover. Spot repairs should be made, as needed.

An example construction phase inspection checklist is available in **Appendix A** of this Manual.

4.2.2. Impervious Surface Disconnection (ID)

ID-8. Maintenance Criteria

Maintenance of disconnected downspouts usually involves 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).

Maintenance agreements must be executed between the owner and the local authority. The agreements will specify the property owner's primary maintenance responsibilities and authorize local agency staff to access the property for inspection or corrective action in the event that proper maintenance is not performed. The agreements must ensure that downspouts remain disconnected, treatment units are maintained and filtering/infiltrating areas are not converted or disturbed.

When the disconnection occurs on private residential lots, homeowners will need to (1) be educated about their routine maintenance needs, (2) understand the long-term maintenance plan, and (3) be subject to modified maintenance agreements as described above.

Rooftop disconnection areas and supplementary treatment devices must be covered by a drainage easement to allow inspection and maintenance.

Example maintenance inspection checklists for disconnection areas can be found in Appendix A of this Manual.

REFERENCES

Hathaway, J.M. and Hunt, W.F. 2006. Level Spreaders: Overview, Design, and Maintenance. Urban Waterways Design Series. North Carolina Cooperative Extension Service. Raleigh, NC. Available online: http://www.bae.ncsu.edu/stormwater/PublicationFiles/LevelSpreaders2006.pdf

Hirschman, D., Collins, K., and T. Schueler. 2008. Technical Memorandum: The Runoff Reduction Method. Center for Watershed Protection and Chesapeake Stormwater Network. Ellicott City, MD.

Schueler, T., D. Hirschman, M. Novotney, and J. Zielinski. 2007. Urban Stormwater Retrofit Practices, Version 1.0, Urban Subwatershed Restoration Manual No. 3.

United States Department of Agriculture (USDA). 1954. Handbook of channel design for soil and water conservation. SCS-TP-61. Washington, DC. Available online: http://www.wsi.nrcs.usda.gov/products/w2q/h&h/docs/TRs_TPs/TP_61.pdf

U.S. Environmental Protection Agency. 2008. Memorandum: Clarification on which stormwater infiltration practices/technologies have the potential to be regulated as "Class V" wells by the Underground Injection Control Program. From: Linda Boornazian, Director, Water Permits Division and Steve Heare, Director, Drinking Water Protection Division.

Van Der Wiele, C.F. 2007. Level Spreader Design Guidelines. North Carolina Division of Water Quality. Raleigh, NC. Available online: http://h2o.enr.state.nc.us/su/documents/LevelSpreaderGuidance_Final_-3.pdf

West Virginia DEP, 2006. Erosion and Sediment Control Best Management Practices Manual; available on-line: http://apps.dep.wv.gov/dwwm/stormwater/BMP/index.html