

LID/ESD Maintenance



**MONTGOMERY COUNTY, MD
DEPARTMENT OF ENVIRONMENTAL
PROTECTION**



MARY TRAVAGLINI

2015

MAINTENANCE CONTRACTOR LISTS

Services & Info.

County Cable 6

DEP Home Page

Air

Climate
Change

Community
Concerns

Energy

Trash &
Recycling

Water

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I Need Assistance

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Local Green News

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Internships

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The



Department of Environmental Protection

Stormwater Facility Maintenance: Contractor Resources

The Department of Environmental Protection's (DEP) Stormwater Facility Maintenance Program relies on skilled and knowledgeable contractors to perform maintenance on stormwater management facilities. A company that performs maintenance on a stormwater management facility must hold a certificate of attendance from an approved training program. DEP offers a list of all the companies that have completed the required training.

Download a [list of contractors approved by the County for maintenance of aboveground structures](#)  (PDF, 4 pp, 50K)

Download a [list of contractors approved by the County for maintenance of underground structures](#)  (PDF, 3 pp, 34K)

Download a [list of landscape contractors approved by the County for maintenance of ESD/LID vegetated facilities](#)  (PDF, 2 pp, 21K)

How Can My Company Become Certified To Perform Maintenance in Montgomery County?

Quick Links

On this page

- [How Can My Company Become Certified?](#)
- [DEP Stormwater Facility Maintenance Contractor Training](#)
- [DEP Training Materials](#)
- [Interim Certification Test](#)

Related Topics

- [Stormwater Pollution](#)
- [Stormwater Facility Maintenance Maintenance Transfer Process](#)

Get Help

For questions about contractor resources and training, contact DEP:
311
Email: askdep@montgomerycountymd.gov

ESD/LID Stormwater Facility Inspection & Maintenance



ESD = ENVIRONMENTAL SITE DESIGN
LID = LOW IMPACT DEVELOPMENT

- **KEY MAINTENANCE ELEMENTS**
 - plant practices
 - non-plant practices



MAINTENANCE RESPONSIBILITY

- ESD facilities - Primarily property owner
- Some have Easement/Maintenance Agreements
- ALL required to remain and be maintained
- Will be inspected by DEP



LID/ESD IN MONTGOMERY COUNTY

**3,501 ESD/LID Practices =
~40% of Stormwater
Practices**



...and growing



PERMITTED & VOLUNTARY LID/ESD IN MONTGOMERY COUNTY

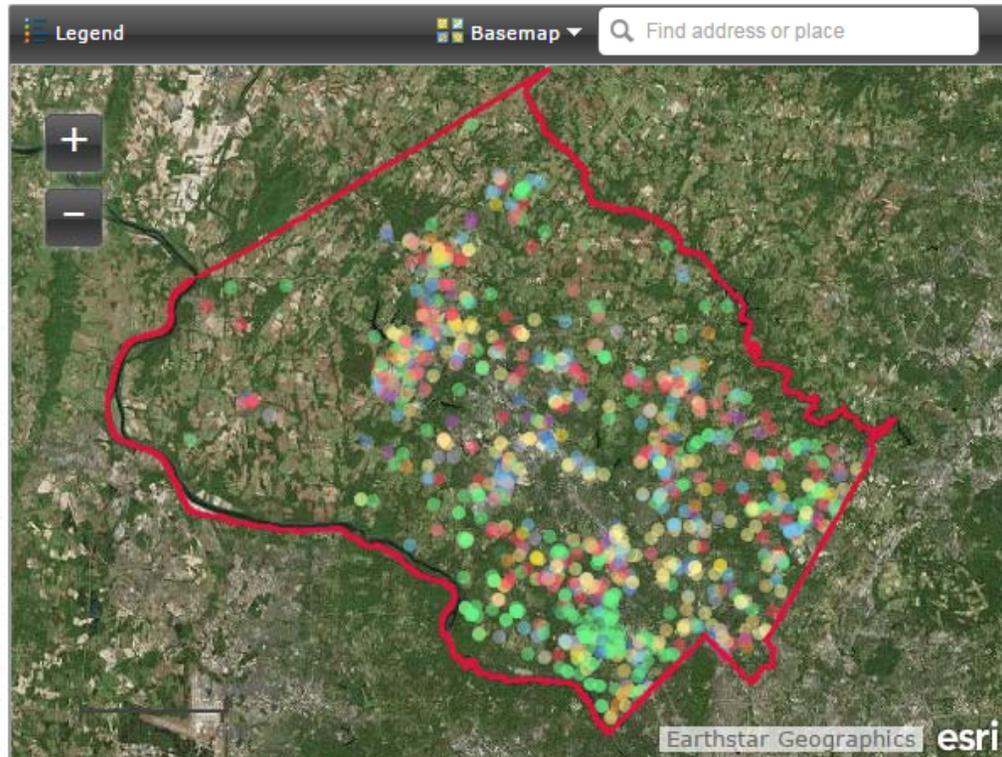
Practice Type	Permitted	RainScapes Projects
Dry Wells	2,672	31
Bioretention / BioSwale/Microbioretention/Rain Garden	581	164
Dry swale & Microinfiltration	18	
Porous Pavement	103	17
Tree Box	57	
Greenroofs	46	2
Rain Barrel/Cistern	24	356
Canopy Trees		212
Pavement Removal		58
Conservation Landscape		200

STORMWATER FACILITY MAPS

<http://www.montgomerycountymd.gov/stormwater>

Where are the County's Stormwater Facilities?

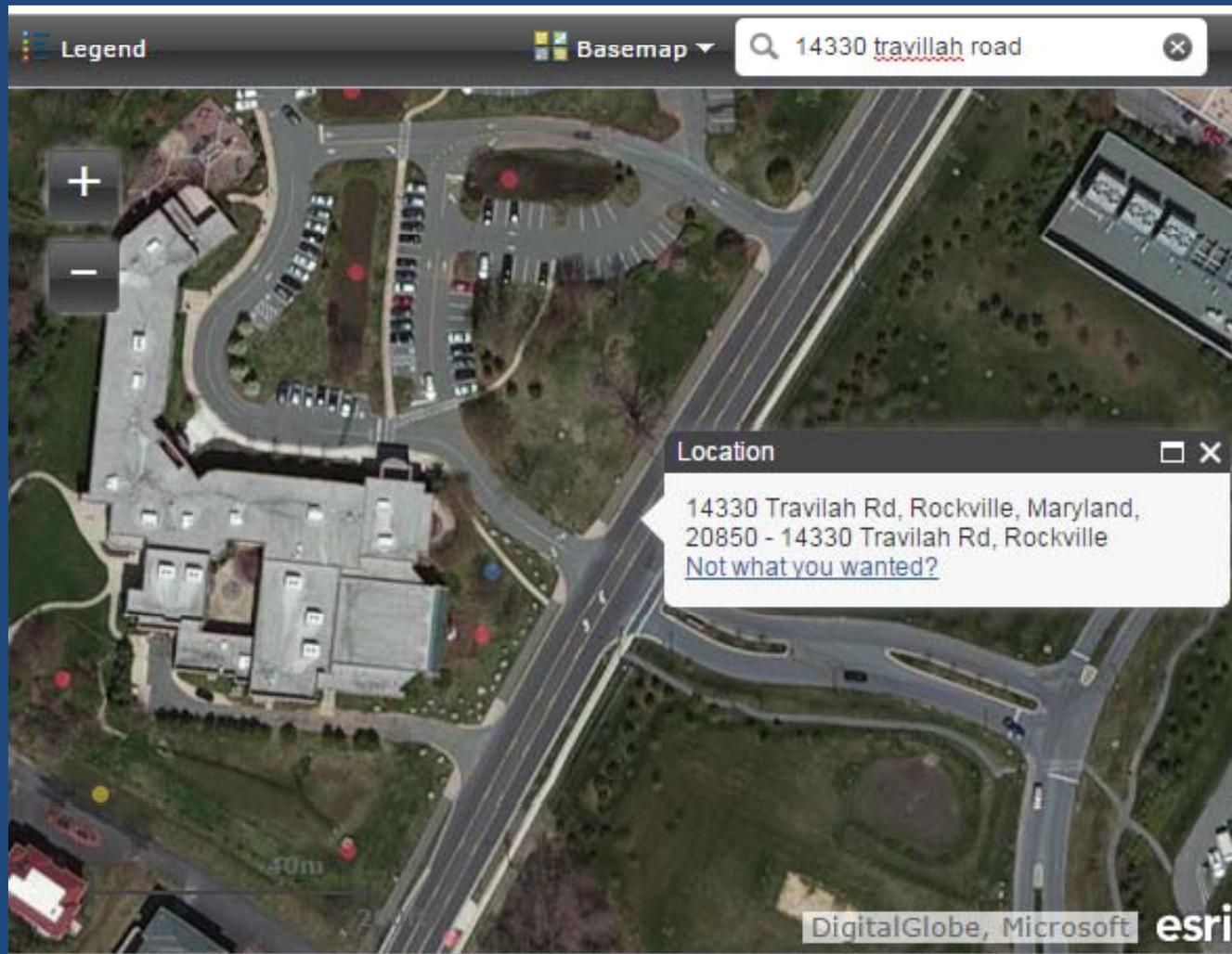
The interactive map below shows all of the County's stormwater facilities. The colored dots represent different types of stormwater facilities. Clicking on a dot will reveal that particular facilities type. Look for your property on the map!



[View Larger Map](#)

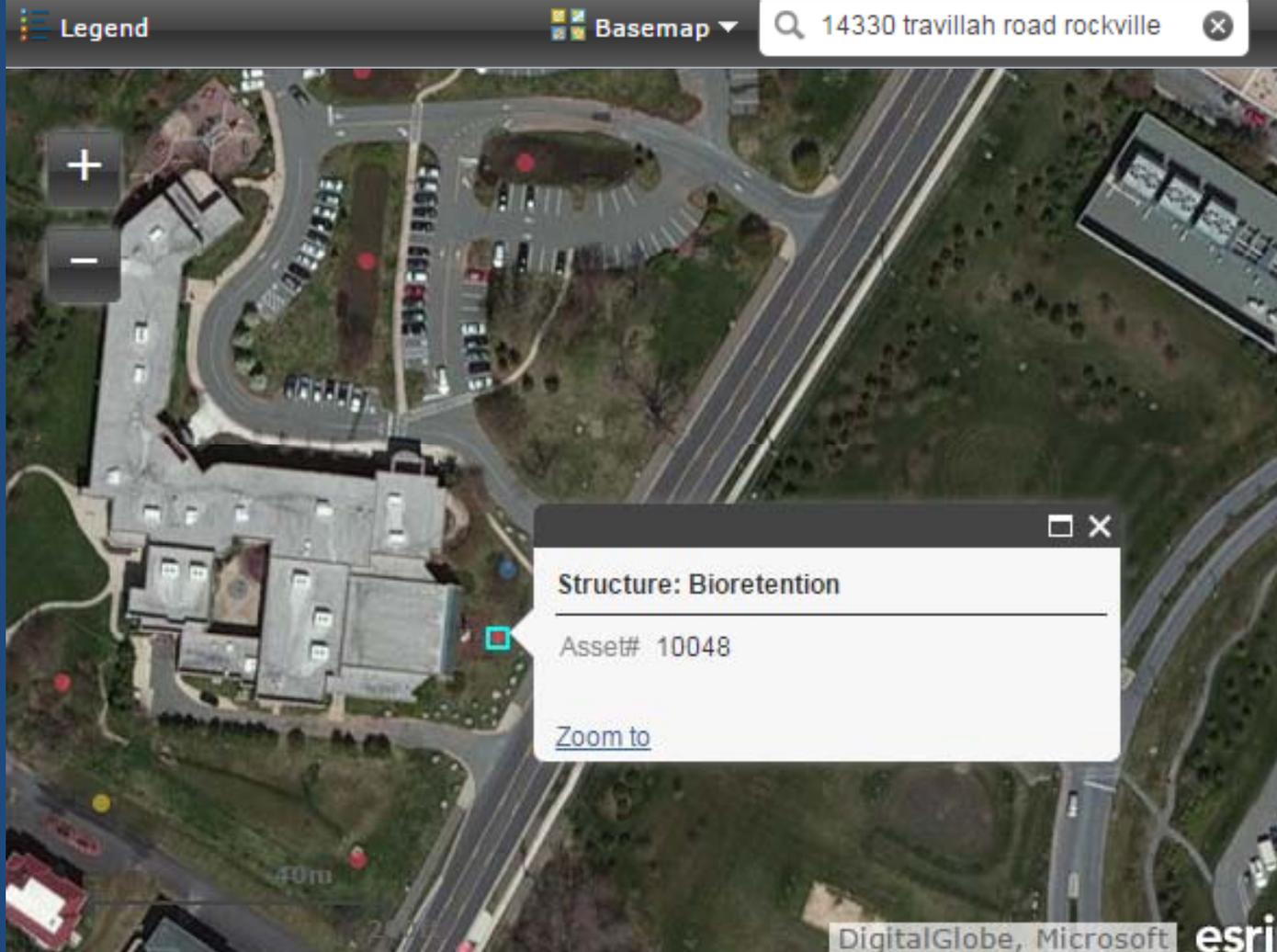
STORMWATER FACILITY MAPS

<http://www.montgomerycountymd.gov/stormwater>

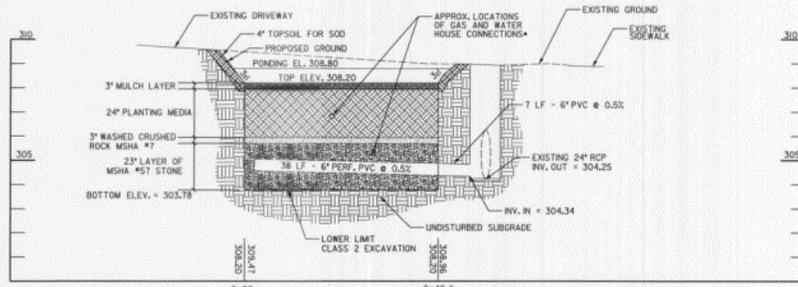
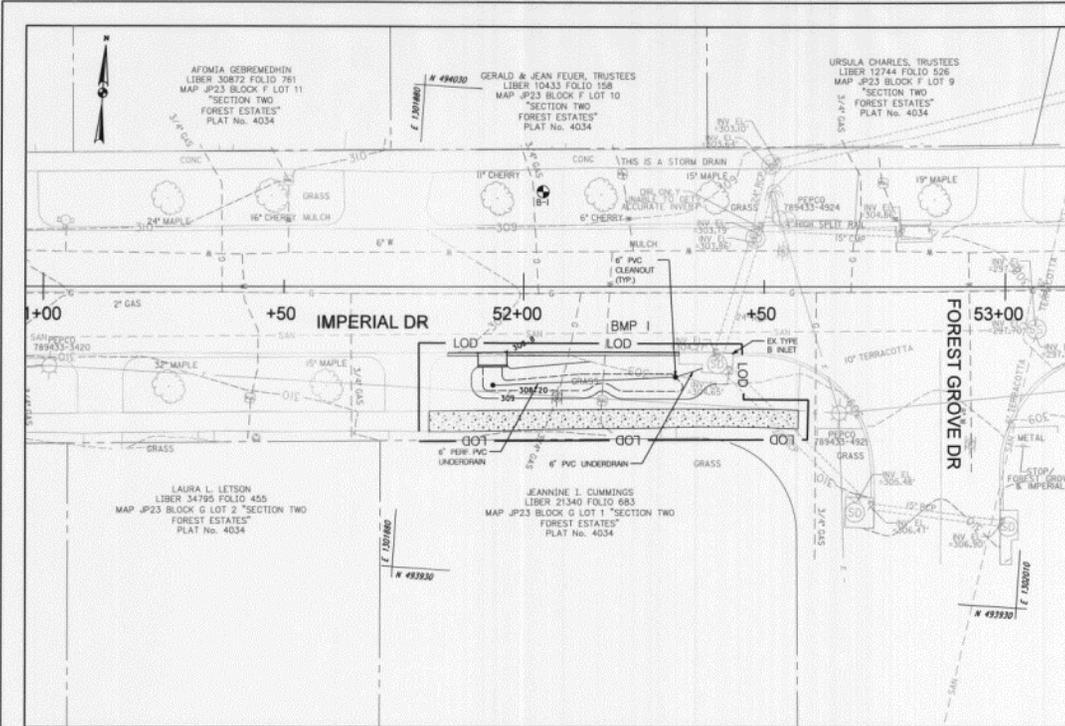


STORMWATER FACILITY MAPS

<http://www.montgomerycountymd.gov/stormwater>



ASK DEP FOR AS-BUILT PLANS



PROFILE - BIORETENTION FACILITY (BMP I)
SCALE: HORIZ. 1"=10'
VERT. 1"=2'

AS-BUILT DATA FOR FILTERS (BIORETENTION/RAIN GARDENS)
*TO BE COMPLETED BY THE CERTIFYING ENGINEER

TYPE OF FACILITY: BIORETENTION		BMP ID: 1
FEATURE	DESIGN	*AS-BUILT
DRAINAGE AREA (AC)	1.05	
TREATMENT VOLUME (CF)	225	
TARGET WQV TREATMENT VOLUME (CF)	933	
FILTER BED AREA (SF)	130	
FILTER BED SURFACE ELEVATION	308.20	
DESIGN POINT ELEVATION	308.80	
OUTLET PIPE (UNDERDRAIN) SIZE / INVERT ELEV.	6" / 304.34	
THICKNESS OF FILTER MEDIA	REFER TO PROFILE	
PLACEMENT OF GEOTEXTILE (SIDES ONLY)	REFER TO FACILITY TYP. SECTION - SHEET 4	
PLANTINGS	REFER TO LANDSCAPE PLAN - SHEET 33	
COMPOSITION OF FILTER MEDIA	REFER TO MCDSP SPECIFICATIONS	

NOTE: CONTRACTOR SHALL TEST PIT UTILITIES PRIOR TO CONSTRUCTION. IF UTILITY IS UNAVOIDABLE, CONTRACTOR SHALL REFER TO DETAIL ON SHEET 4 FOR UTILITY CROSSING TREATMENT WITHIN THE FACILITY.

COMBINATION CONC. CURB AND GUTTER - (TYPE A) MC-100.01

STA. TO STA.	OFFSET	L.F.	REMARKS
51+88 TO 51+90	R	5	
51+90 TO 51+92	R	3	

4 FOOT CONC. SIDEWALK - MC-110.01

STA. TO STA.	OFFSET	S.F.	REMARKS
51+88 TO 52+57	R	304	

CONTRACTOR SHALL REPLACE SIDEWALK TO NEAREST EXISTING SIDEWALK JOINT.



DPS PERMIT NO. 27-3-21-3
MONTGOMERY COUNTY, MARYLAND
DEPARTMENT OF PERMITTING SERVICES
FINAL APPROVAL
DATE: 10/5/11
BY: [Signature]

509 South Exeter Street
4th Floor
Baltimore, Maryland 21202
(410) 662-7400
McCormick & Pimentel Taylor
Engineers & Planners
Since 1941

PLAN AND PROFILE - BMP 1
FOREST ESTATES
BLUO (130) ELECTION DISTRICT
PARCEL X, SUBDIVISION X, LIBER # FOLD X
MONTGOMERY COUNTY, MARYLAND

CLIENT: MONTGOMERY COUNTY DEPT OF ENVIRONMENTAL PROTECTION
255 ROCKVILLE PIKE, RM 130
ROCKVILLE, MD 20850-4166
MR. PAUL BOGLE, P.E.
(301) 777-7757

DESIGN NO. 6
SHEET 33

Maintenance of Vegetated Stormwater Practices

VEGETATED PRACTICES



**BIORETENTION,
RAIN GARDEN,
BIOSWALE**



TREE BOX



**GREEN
ROOF**



**GRASS
SWALE**

Rain Garden vs. Regular Garden



ARE THEY DIFFERENT?



Bioretention



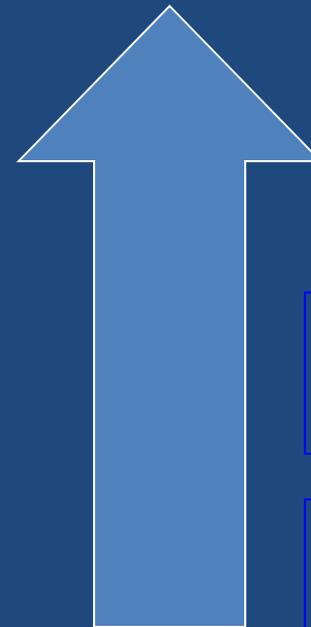
Micro-Bioretention



Landscape Infiltration



Rain Garden

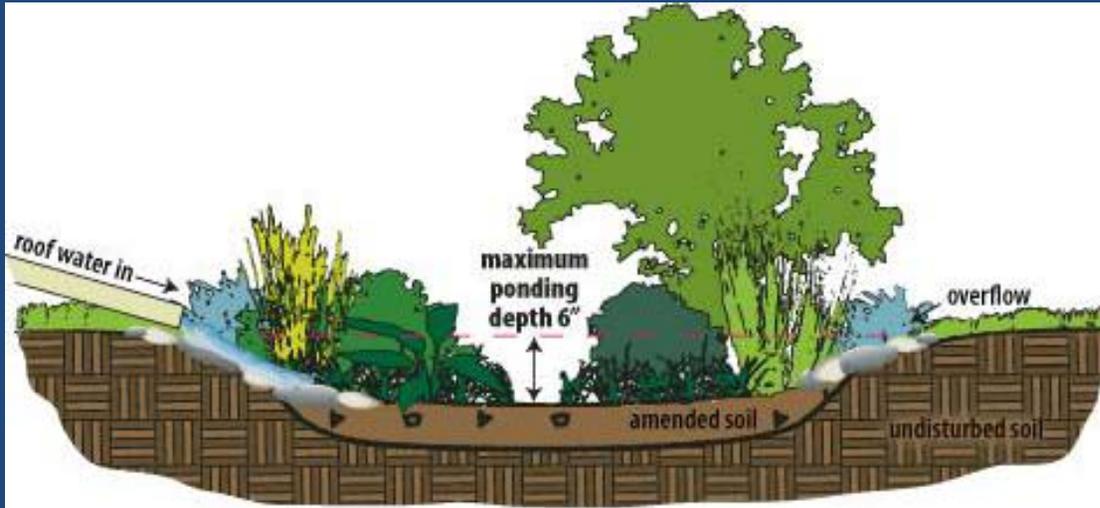


INCREASING

Drainage
Area

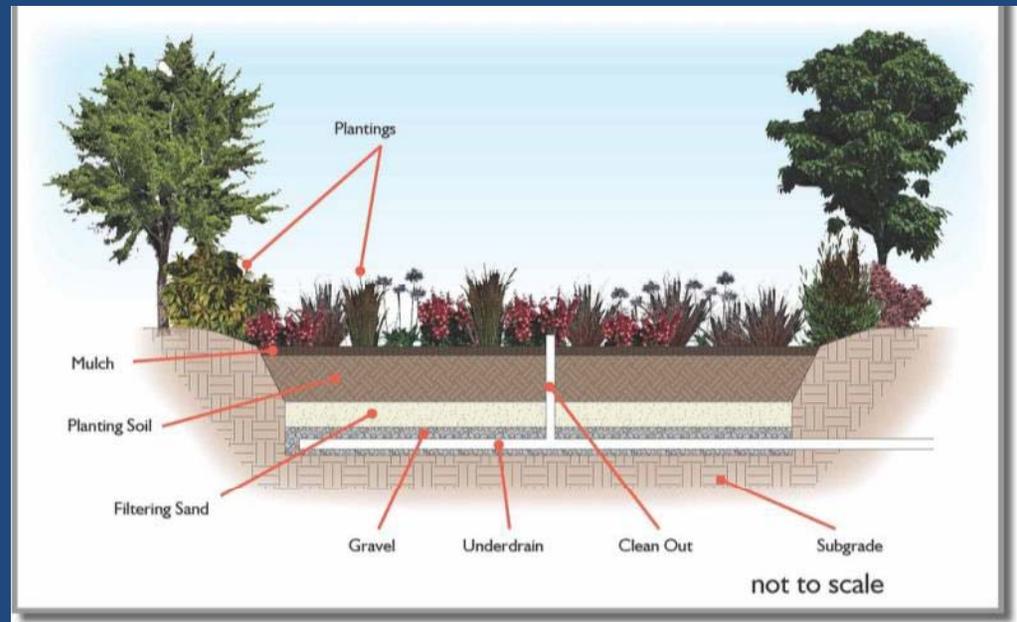
Structural
Components

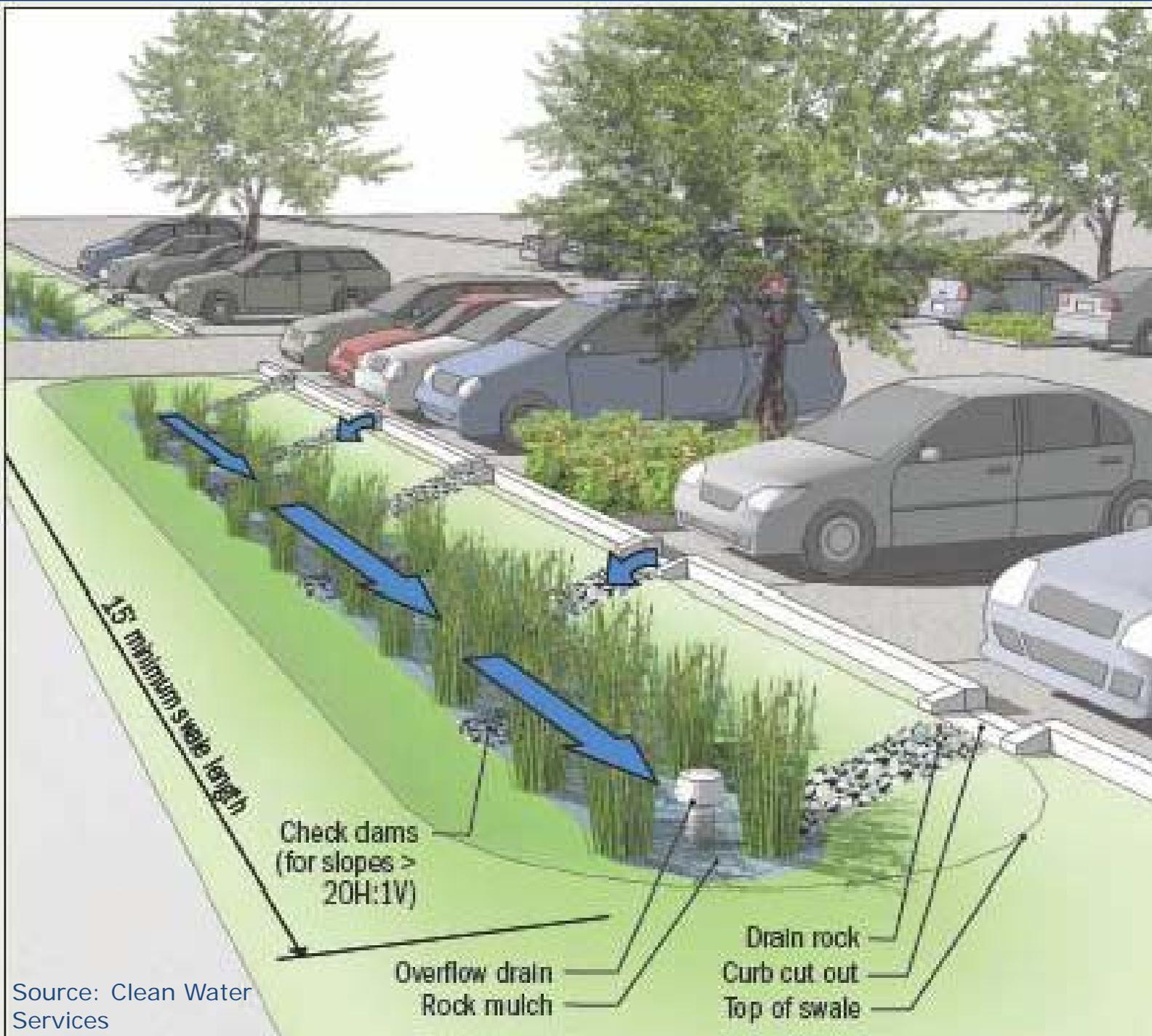
ARE THEY DIFFERENT?



RAIN GARDEN

BIORETENTION





Source: Clean Water Services

Rain Garden and Bioretention Maintenance



- ✓ **MOWING**
- ✓ **WEEDING**
- ✓ **EDGING**
- ✓ **LEAF REMOVAL**
- ✓ **SEDIMENT REMOVAL**
- ✓ **MULCHING**

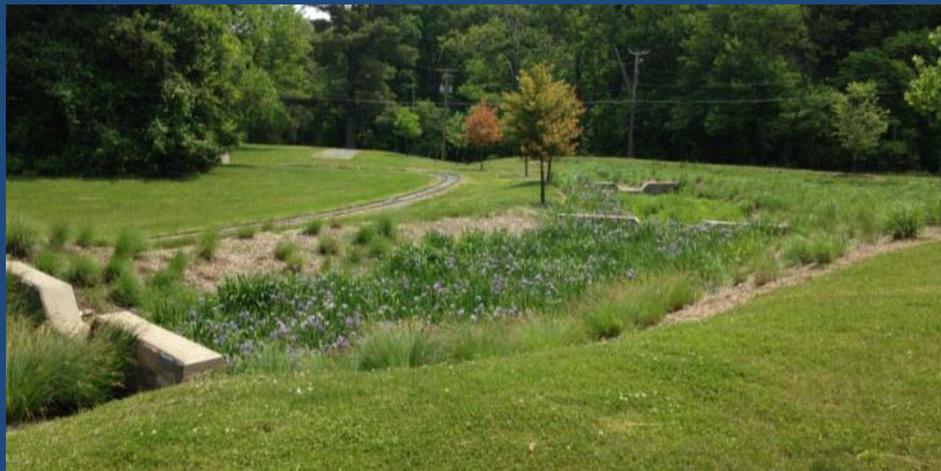
- PLANTS**
- ✓ **PRUNING**
 - ✓ **REPLANTING**
 - ✓ **WATERING**
 - ✓ **DIVIDING PERENNIALS**

SAFETY/VISIBILITY

- Safety Vests
- Company Identification on trucks



GOOD BIORETENTION MAINTENANCE



GOOD BIORETENTION MAINTENANCE



POOR BIORETENTION MAINTENANCE



MAINTENANCE NEEDS

- Seasonal/Monthly Maintenance for bioretention

Recommended timeframes for typical maintenance

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Remove Sediment Leaves, & Debris		✿			✿			✿			✿	
Remove Trash	✿	✿	✿	✿	✿	✿	✿	✿	✿	✿	✿	✿
Weeding				✿	✿	✿	✿	✿	✿	✿	✿	
Pruning		✿							✿	✿	✿	
Mulching				✿								
Watering, Replanting, Repair Eroded Areas	— — — A S N E E D — — —											

See the *Vegetated Facility Maintenance Guidance Documents* for additional information.

REGULAR VISUAL INSPECTION

Water drains in
2-3 days

Inlet and Outlet
clear of debris

Dead Plants

Erosion



MOSQUITO PREVENTION

- Keep inlets and outlets clear
- Reset stone or grades
- Increase plants and predator habitat



PREVENT DAMAGE – DON'T PLOW SNOW OR PILE LEAVES



LEAF REMOVAL

- Check and remove trash, organic debris and sediment from cell
- Remove leaves from cell



Recommended timeframes for typical maintenance

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Remove Sediment Leaves, & Debris		✿			✿			✿			✿	

Leaf and natural debris:



SEDIMENT, DEBRIS REMOVAL



inlets and stone check dams.

- Clear sediment and debris from inlets, and from approximately 5-10 feet upstream of inlet, along flow path, within the inlet, and from facility forebay.
- Clear sediment from cleaning pad of both entrance and outlet curb cuts of facility.
- Accumulated sediment must be removed from top 3 inches when voids between stones are approximately 75% filled.
- Must be removed from site and disposed of legally (i.e. trash or compost)



INLETS THAT NEED CLEANING



DON'T LET YOUR INLETS GET LIKE THIS



CLEANING VOIDS AND RESETTING COBBLE



Voids over 75%
filled



Voids clean

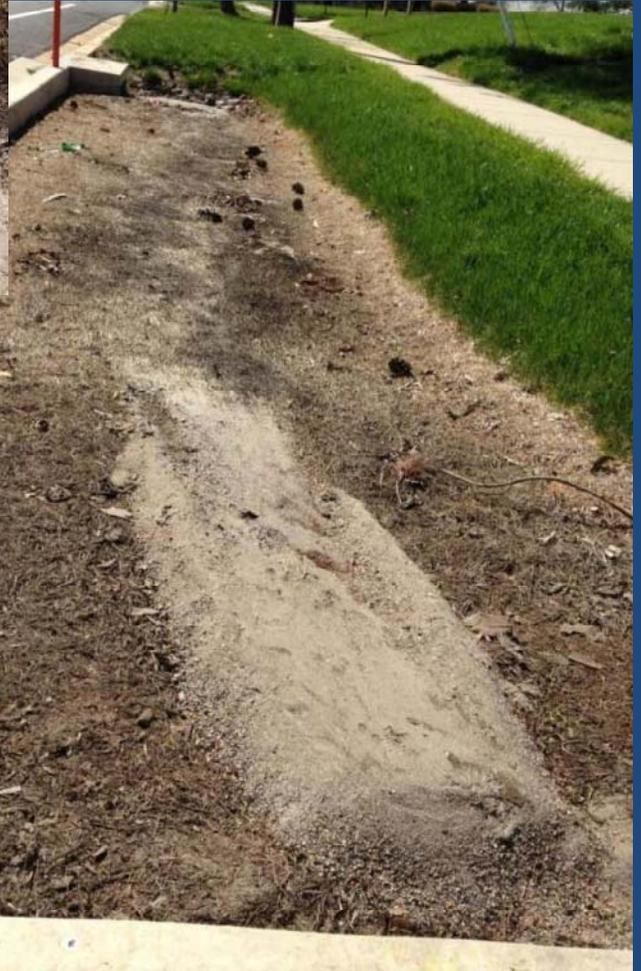
Without frequent maintenance:



With frequent maintenance:



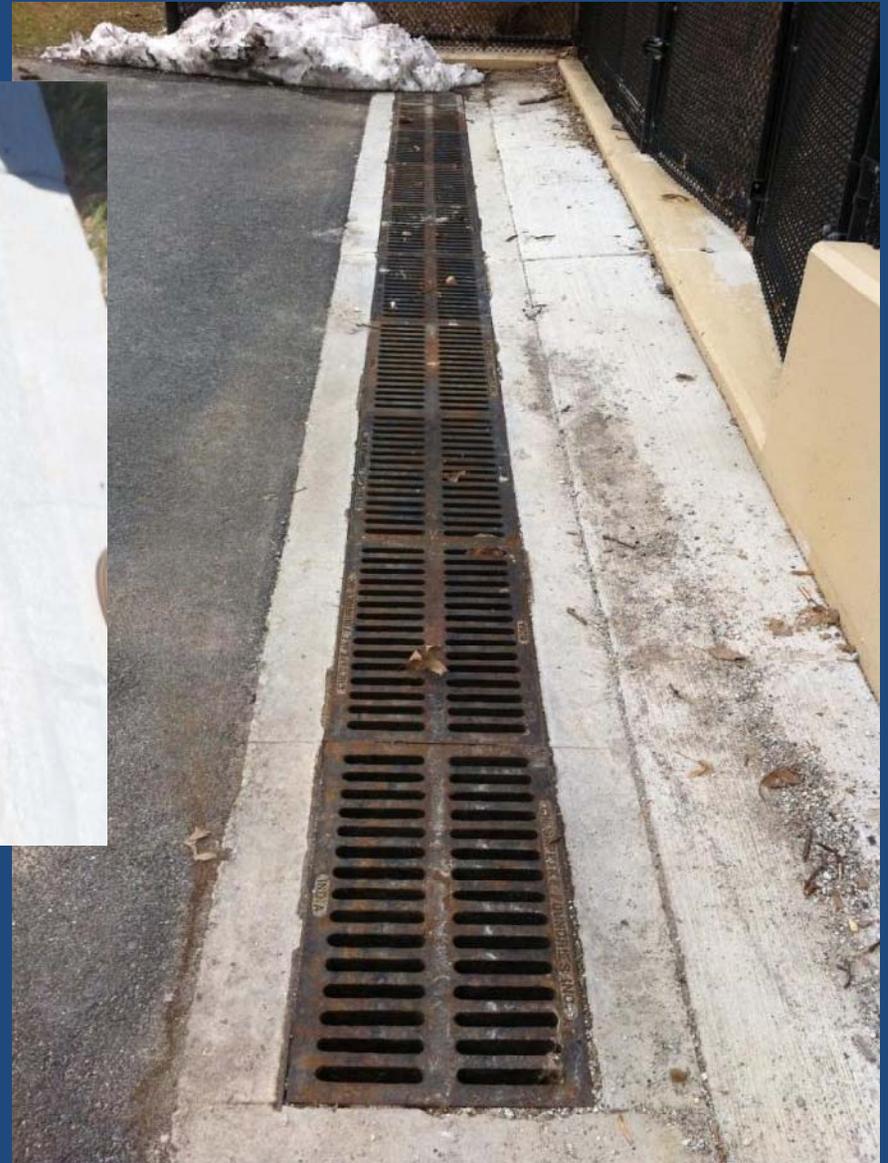
Sediment can
move past
forebay:



Sediment in snow piles



Trench Drains need cleaning, too

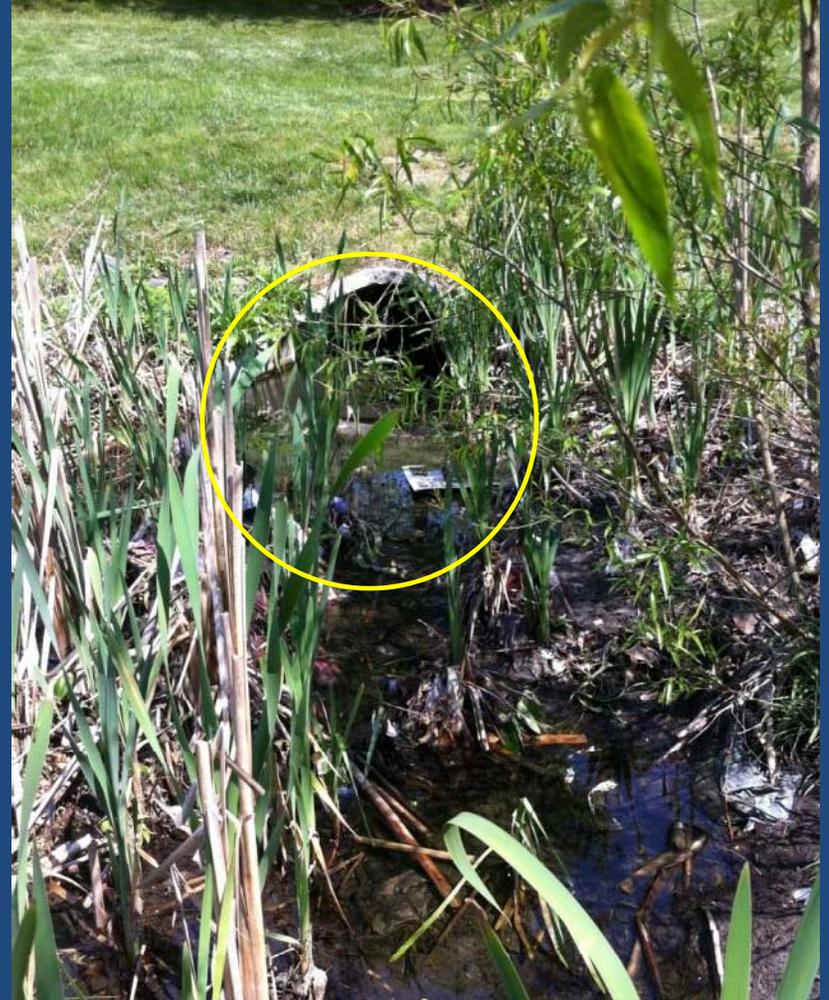


CLEAN THE WATER SOURCE



- Read your plans—clean inlets and flow splitters.

KEEP FLOW PATHS CLEAR



- Patch small areas of erosion from water flow or human activity with either topsoil or bioretention media (topsoil usually only on side slopes).
- Reset cobble or riprap displaced by water or human activity.



Biomedix mix vs topsoil

--Biomedix-only use as specified, always used on basin surface

Check with companies listed on the MSHA Base Soil Suppliers Eligible List

5 parts Coarse Sand, 3 parts Base Soil, and 2 parts Fine Bark

~Biomedix has storage requirements.

--Topsoil-only used as specified, usually only on sideslopes

In accordance with MSHA Section 701. Topsoil shall be a loam, sandy loam, clay loam, silt loam, sandy clay loam, or loamy sand.

Mowing



Adjust mower blade height to avoid
Scalping

Mowing



LEAVE NO GRASS CLIPPINGS IN BIO

Edging



EDGE THE INTERFACE BETWEEN THE TURFGRASS AREAS AND THE MULCHED OR PLANTED AREAS OF THE FACILITY.



Weeding and Edging

**AVOID
PESTICIDE/
HERBICIDE**



MONTGOMERY COUNTY WEEDS

- Weeding
 - Keeping up with it as it grows will reduce the overall effort required
 - More dense planting will reduce problem
 - Careful selection of mulch source



MULCH

- Replenishment to 3"
- Shredded pine or hardwood mulch
- Raking – evenly disperse
 - Check after large storms



PLANTS - PRUNING

- Full prune/cut back plants and remove cut material from the cell between February 20 and April 1
- Grasses– Not below 6 inches

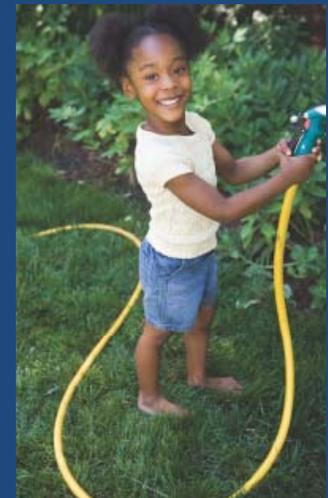


LESSON LEARNED—WHY WE DON'T PRUNE IN FALL



PLANTS - WATERING

- Water until established
 - weekly May – Sept if it hasn't rained
 - water the equivalent of one inch of rain
- After established, only water if drought stressed



PLANTS - REPLANTING

- Natives
- Deer resistant
- Flood tolerant
- Drought tolerant
- Salt tolerant



PLANTS – CAN DIVIDE PERENNIALS



Typical well managed Vegetation:



Typical well managed Vegetation:



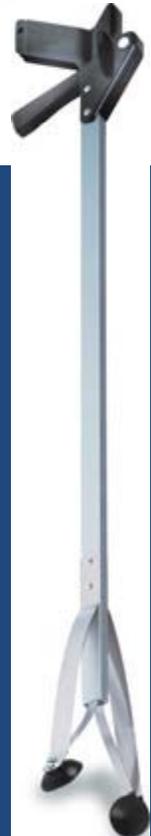
TOOLS

- Buckets
- Shovels (flat head)
- Hoes
- Brooms
- Shop vac



TOOLS

- Hard tine rake
- Leaf rake
- Wheelbarrow
- Garbage bags
- Trash tongs



TOOLS

- Pruning shears
- Hand pruners
- Edger
- Weed whacker
- Leaf blower



TOOLS

- Adjustable wrench, socket wrenches
- Screwdrivers
- Pipe wrench
- Manhole hook



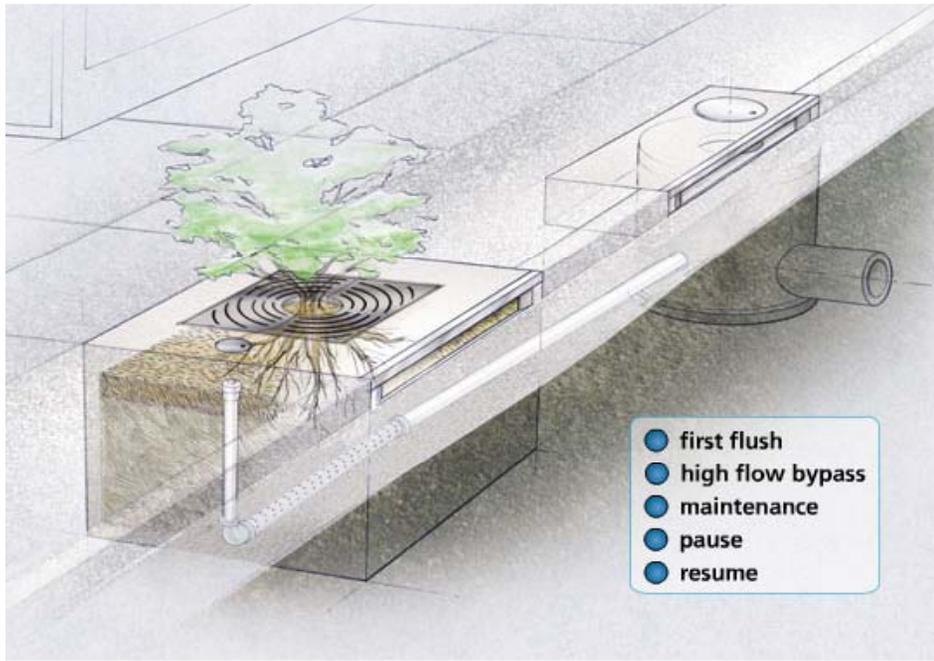
Grass Swales



- Clear inlets regularly
- Remove leaves
- Be cautious mowing around cleanouts
- Leave grass longer if turf
- Prune perennial grasses once a year
- Avoid scalping with mowers, and only mow when dry

Tree Box Maintenance

FILTERRA® STORMWATER BIORETENTION FILTRATION SYSTEM

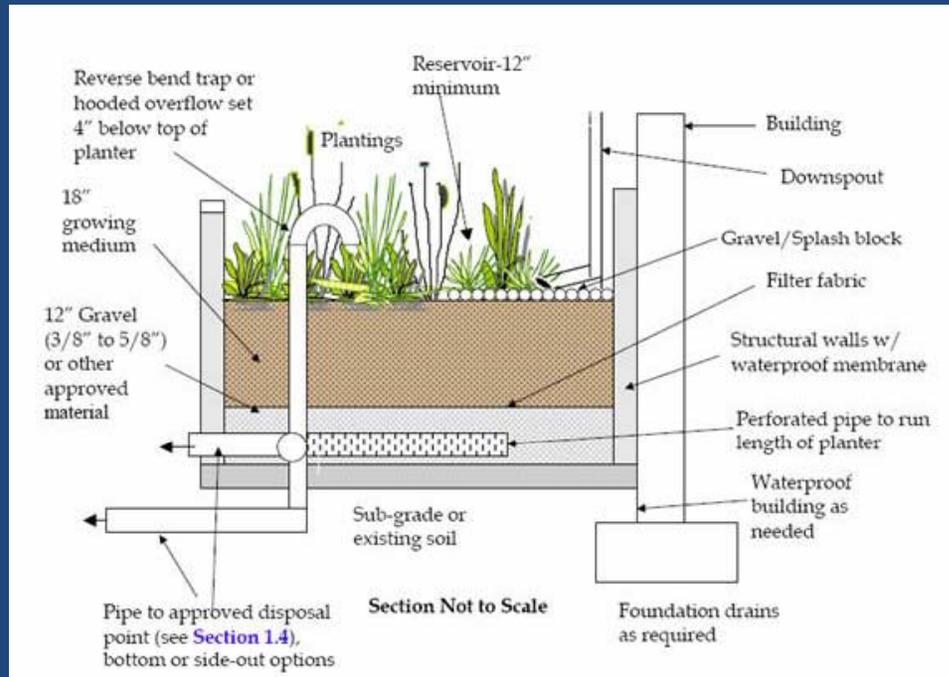


TREE BOXES (FILTERRA)

- Weed and/or prune
- Clear inlets and flow paths
- Clear trash and sediment
- Remove old mulch
- Lift out entry stone
- Remulch with 3"
- Replace entry stone



PLANTER BOXES

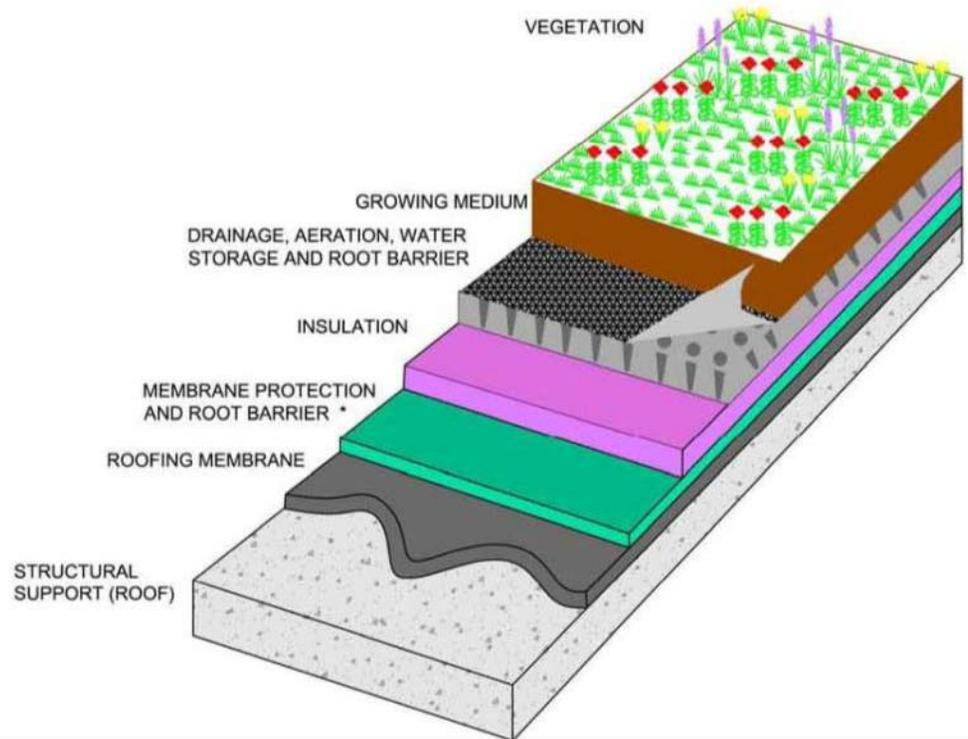


- Trash removal, sediment and debris removal
- Mulch
- Weeding, care and replacement of plants
- Repair eroded areas
- Inspect planter box (concrete) underdrain, and inlets

Green Roof Maintenance



North Bethesda Center, Photo:
Hydrotech



GREEN ROOF MAINTENANCE



- Establishing plants (watering)
- Weeding, pruning, thinning (1-4 inspections/yr)
- Care, replacement & harvesting of plant material
- Inspection of drains

Recommended timeframes for typical maintenance

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Weeding				✿	✿	✿	✿	✿	✿	✿	✿	
Watering	— — — A S N E E D E D — — —											
Inspect Drains		✿			✿			✿			✿	

Maintenance of Non-Vegetated Stormwater Practices

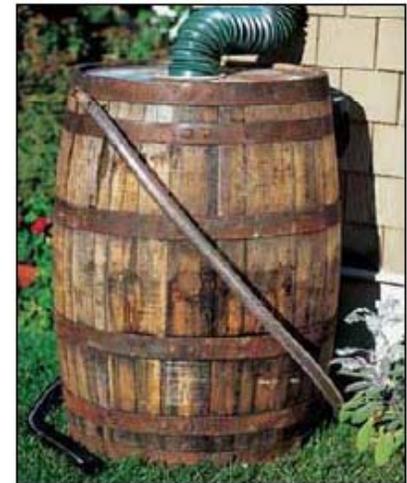
NON-PLANT BASED PRACTICES



**PERMEABLE
PAVEMENT**



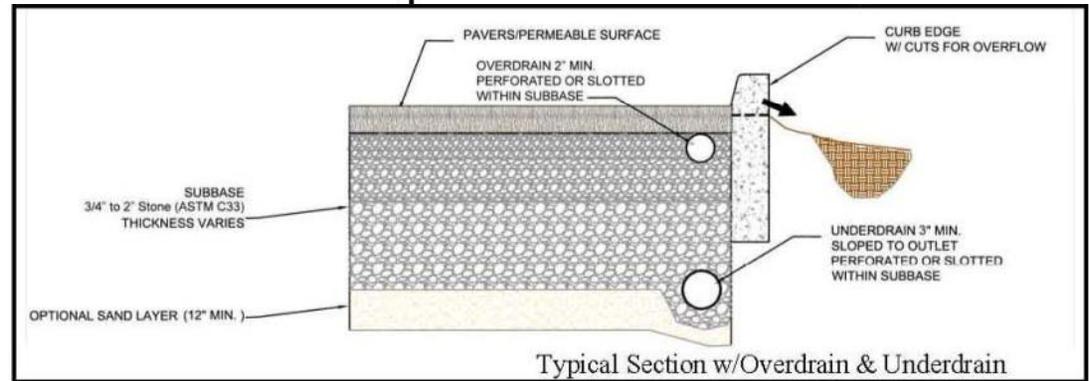
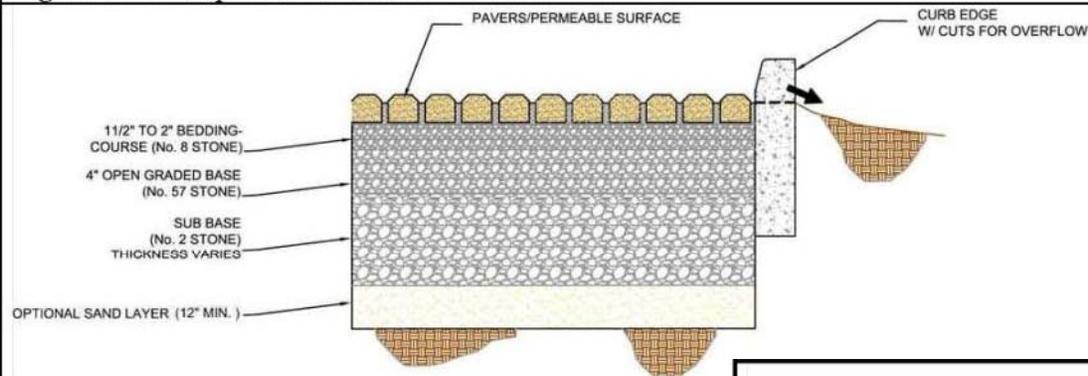
DRY WELLS



**RAIN
BARREL**

Permeable Pavement Maintenance

Figure 5.3 Examples of Permeable Pavements



WHITE OAK REC CENTER



Permeable Pavement Maintenance

- Blow off leaves and debris or vacuum
- Street sweepers—Vacuum or Regenerative Air
- *If clogged, may need power washing to loosen debris*



Permeable Pavement Maintenance



Recommended timeframes for typical maintenance

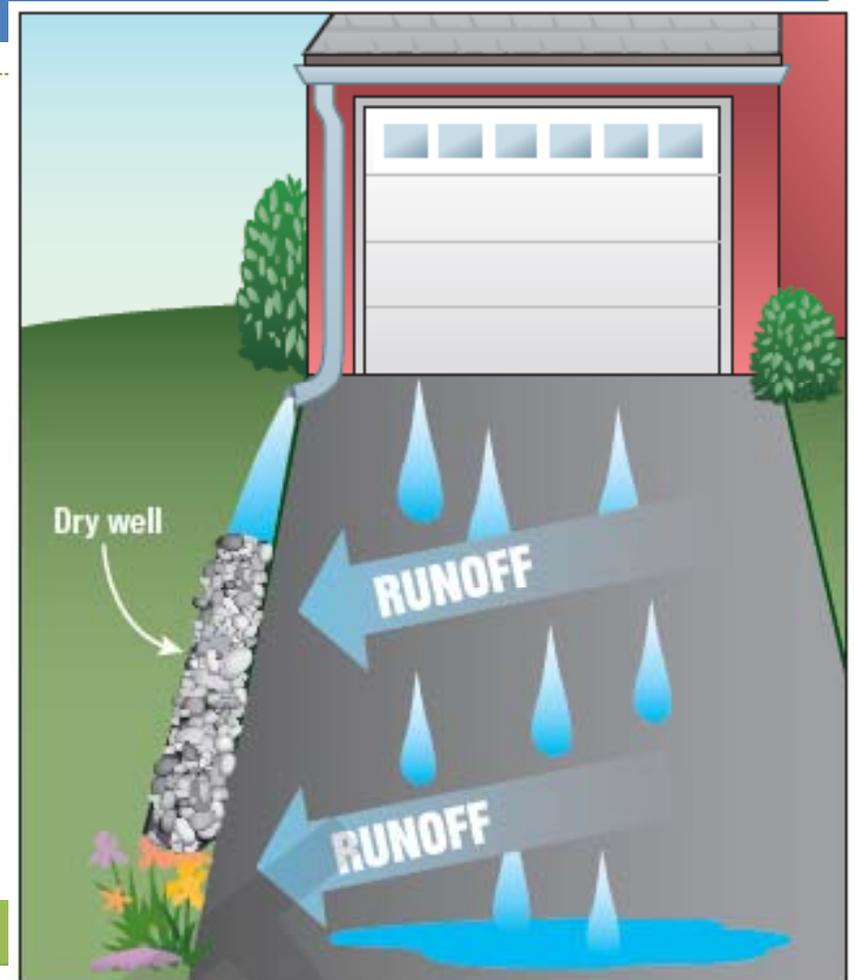
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Sweep/ Vacuum to Remove Leaves/Debris					✿						✿	
Pressure Washing												
Debris* Removal	✿	✿	✿	✿	✿	✿	✿	✿	✿	✿	✿	✿

*Debris includes acorns, seeds, branches, grass clippings, sand/sediment, cigarette butts, trash, etc.

- Do not seal or repave with non porous materials
- No Winter Sand

Dry Well/Micro-Infiltration Maintenance

- **TYPICALLY
LOCATED 20 FT
FROM HOUSE**
- **SURFACE RUNOFF
VS. DIRECT
DOWNSPOUT
CONNECTION**



DRYWELL MAINTENANCE



Clean gutters will help keep debris from clogging your dry well

- Keep pipes, gutters, downspouts cleaned



DRYWELL MAINTENANCE—CAPS AND DOWNSPOUTS



Dry well downspout overflow for large storms



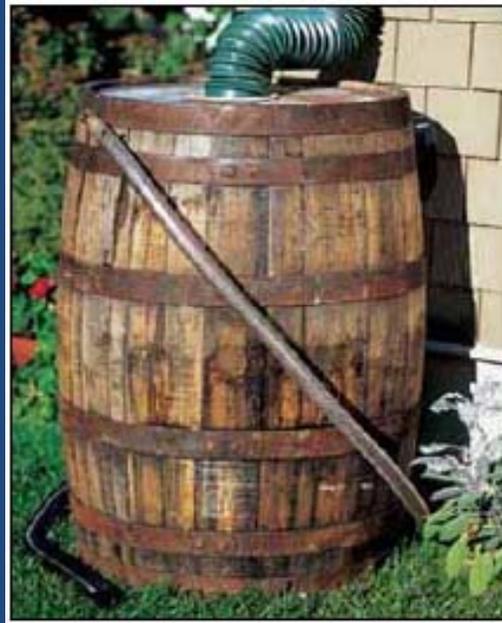
Rain Barrel Maintenance



Rain barrels with "planter tops"

RAIN BARREL MAINTENANCE

- Drain and use water during dry spells so it's empty by the next rain
- Clean screens, maintain level base
- Keep pipes, gutters, downspouts cleaned
- Disconnect in winter



2-PG MAINTENANCE FACT SHEETS

How to maintain your POROUS PAVEMENTS

Montgomery County, Maryland
Department of Environmental Protection
Sustainable Facility Maintenance Program



What is porous pavement?
Porous pavement can replace traditional impervious surfaces with a surface that is made through an interlocking curb, tile, asphalt, or permeable pavers that allow water to infiltrate the ground.



How to maintain your SWALES

Montgomery County, Maryland
Department of Environmental Protection
Sustainable Facility Maintenance Program

What is a swale?
A swale is an open ditch designed to collect stormwater runoff from impervious surfaces. Swales can be lined with concrete, stone, or other materials, and they can be vegetated with grass, shrubs, or trees.



How to maintain your SUBMERGED GRAVEL WETLANDS

Montgomery County, Maryland
Department of Environmental Protection
Sustainable Facility Maintenance Program

Submerged gravel wetland?
A submerged gravel wetland is a wetland area that is submerged by water. It is designed to filter runoff and improve water quality. It consists of a series of cells, each with a layer of soil, a layer of gravel, and a layer of water. The water flows through the gravel and into the water cells, where it is filtered and oxygenated.

Benefits?
• Reduces runoff
• Improves water quality
• Provides habitat for wildlife
• Reduces sediment and debris
• Reduces the need for chemical treatments

How to keep your swalm maintained?
• Inspect the swale regularly for debris and sediment.
• Remove debris and sediment as needed.
• Replenish gravel as needed.
• Replenish plants as needed.

Who is responsible for this maintenance?
As the property owner, you are responsible for all of the maintenance of your submerged gravel wetland, including:
• Inspecting the wetland regularly for debris and sediment.
• Removing debris and sediment as needed.
• Replenishing gravel as needed.
• Replenishing plants as needed.

Who is responsible for this maintenance?
As the property owner, you are responsible for all of the maintenance of your submerged gravel wetland, including:
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• Replenishing plants as needed.

How to maintain your GREEN ROOFS

Montgomery County, Maryland
Department of Environmental Protection
Sustainable Facility Maintenance Program



What is a green roof?
A green roof is a roof that is covered with vegetation. It can be a traditional roof with a layer of soil and plants, or it can be a more advanced system with a layer of soil, a layer of gravel, and a layer of plants. Green roofs provide many benefits, including:
• Reducing runoff
• Improving air quality
• Providing habitat for wildlife
• Reducing the need for chemical treatments

How does it work?
A green roof absorbs rainwater that falls on your roof. The rainwater is either absorbed by the plants or it is collected in a reservoir. The rainwater can be used for irrigation or it can be collected in a reservoir and used for other purposes.



How to maintain your NON-STRUCTURAL PRACTICES

Montgomery County, Maryland
Department of Environmental Protection
Sustainable Facility Maintenance Program



What are non-structural practices?
Non-structural practices are practices that do not involve structural changes to a building. They include:
• Landscaping
• Planting trees and shrubs
• Installing rain gardens
• Installing rain barrels

How do they work?
Non-structural practices help to reduce runoff and improve water quality. They do this by:
• Absorbing runoff
• Filtering runoff
• Reducing sediment and debris
• Reducing the need for chemical treatments

What are the benefits?
• Reduces runoff
• Improves water quality
• Provides habitat for wildlife
• Reduces sediment and debris
• Reduces the need for chemical treatments

Why is it important to maintain your non-structural practices?
It is important to maintain your non-structural practices because they help to:
• Reduce runoff
• Improve water quality
• Provide habitat for wildlife
• Reduce sediment and debris
• Reduce the need for chemical treatments

Who is responsible for this maintenance?
As the property owner, you are responsible for all of the maintenance of your non-structural practices, including:
• Inspecting the practices regularly for debris and sediment.
• Removing debris and sediment as needed.
• Replenishing plants as needed.

Who is responsible for this maintenance?
As the property owner, you are responsible for all of the maintenance of your non-structural practices, including:
• Inspecting the practices regularly for debris and sediment.
• Removing debris and sediment as needed.
• Replenishing plants as needed.

How to maintain your BLUE WELLS

Montgomery County, Maryland
Department of Environmental Protection
Sustainable Facility Maintenance Program



What is a dry well?
A dry well is a structure that is designed to collect and store runoff. It is typically made of concrete or masonry and is filled with gravel. The runoff flows into the dry well and is stored there until it is needed for irrigation or other purposes.

How does it work?
A dry well collects runoff from a roof or other impervious surface. The runoff flows into the dry well and is stored there until it is needed for irrigation or other purposes.



What are the benefits?
• Reduces runoff
• Improves water quality
• Provides habitat for wildlife
• Reduces sediment and debris
• Reduces the need for chemical treatments

How to maintain your MICRO-BIORETENTION, RAIN GARDENS, AND BIOSWALES

Montgomery County, Maryland
Department of Environmental Protection
Sustainable Facility Maintenance Program



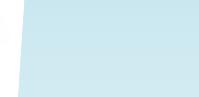
Micro-bioretenion facilities, rain gardens, and bioswales?
Micro-bioretenion facilities, rain gardens, and bioswales are designed to filter runoff and improve water quality. They do this by:
• Absorbing runoff
• Filtering runoff
• Reducing sediment and debris
• Reducing the need for chemical treatments



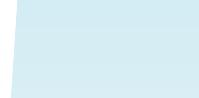
How to keep your rain garden maintained?
• Inspect the rain garden regularly for debris and sediment.
• Remove debris and sediment as needed.
• Replenish plants as needed.



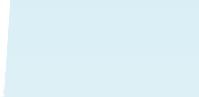
Who is responsible for this maintenance?
As the property owner, you are responsible for all of the maintenance of your micro-bioretenion facility, rain garden, and bioswale, including:
• Inspecting the facility regularly for debris and sediment.
• Removing debris and sediment as needed.
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WATER QUALITY PROTECTION CHARGE (WQPC) CREDIT

- Reduced Fee for maintained practices:
 - Up to 60% for ESD/LID on Nonresidential or Multifamily
 - Up to 50% for ESD/LID on Single Family Residential
- Creates More Contractor Opportunities for Maintenance

INTERESTED IN CONTRACTOR RECOGNITION?

- **Join Us:** County Green business certification
- **Consider VOLUNTEERING?** Contractors can adopt-a-rain garden and volunteer to maintain a public rain garden at a Green Street, library, etc.



Questions?



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