

# ESD/LID Stormwater Facility Inspection & Maintenance



**ESD = ENVIRONMENTAL SITE DESIGN**

**LID = LOW IMPACT DEVELOPMENT**

**Maintain after development, as nearly as possible, the predevelopment runoff characteristics of a site=handling stormwater by slowing it down, spreading it out and letting it soak into the ground**

**VEGETATIVE AND NON-VEGETATIVE PRACTICES**

Donna Evans

# MAINTENANCE RESPONSIBILITY

- ESD facilities - Primarily property owner
  - Residential and Commercial
  - Schools and Parks
  - Government
- ALL required to remain and be maintained
- Will be inspected by DEP



# LID/ESD IN MONTGOMERY COUNTY

**6,633 ESD/LID Practices =  
~46% of Stormwater  
Practices**



...and growing



# PERMITTED & VOLUNTARY LID/ESD IN MONTGOMERY COUNTY

Practice Type	Permitted	RainScapes Projects
Dry Wells	3,530	31
Bioretention / BioSwale/Microbioretention/Rain Garden	874	120
Dry swale & Microinfiltration	222	
Porous Pavement	127	80
Tree Box	72	
Greenroofs	64	4
Rain Barrel/Cistern	30	243
Canopy Trees		189 Tree Montgomery
Conservation Landscape		269



# Maintenance of Vegetated Stormwater Practices

## VEGETATED PRACTICES



**RAIN GARDENS,  
BIO-RETENTION  
FACILITIES**

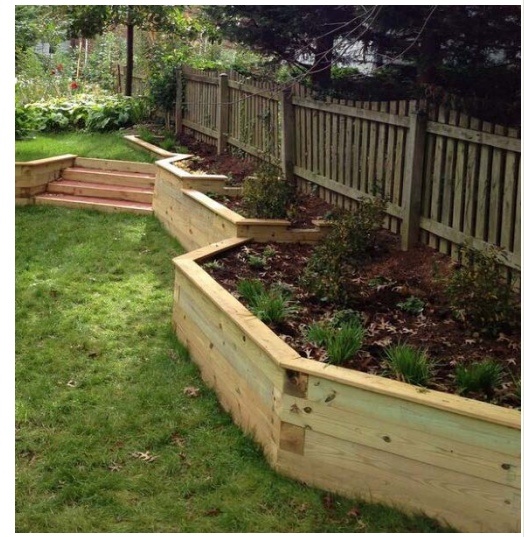


**TREE BOXES**



**GRASS  
SWALES**

# Rain Garden vs. Regular Garden



Holds Stormwater and slowly drains out within 24-72 hours  
Non-structural practice



# Bioretention Gardens

absorb rainwater and filter pollutants using soil, stone and plants.



Structural components  
Larger drainage area

Non structural  
Smaller drainage area

# Rain Gardens

absorb rainwater and filter pollutants using mulch, soil and plants.



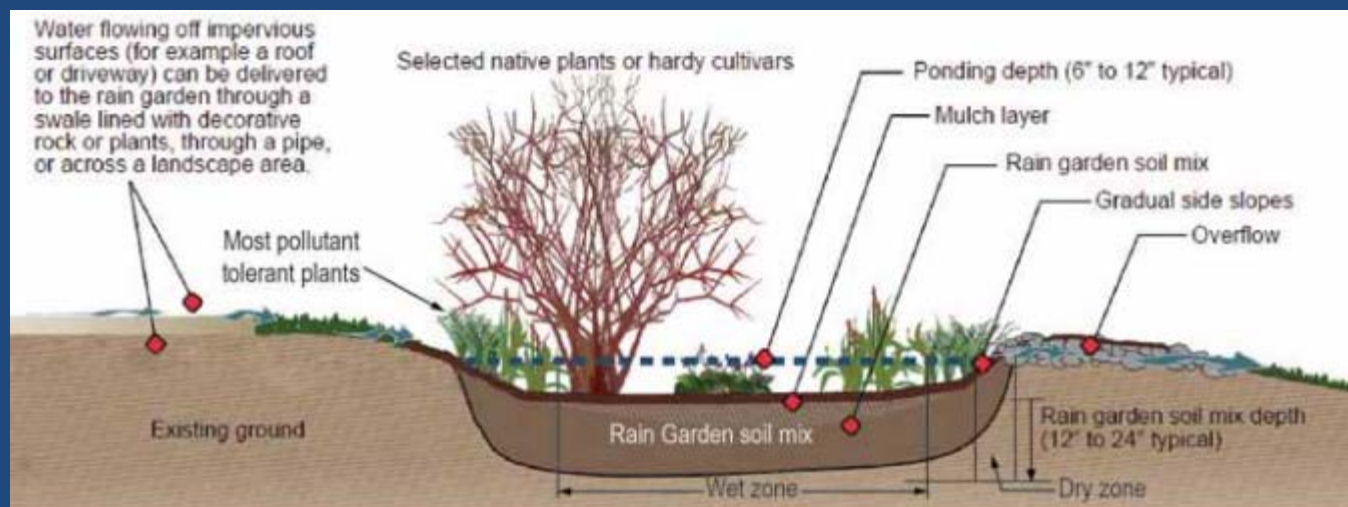
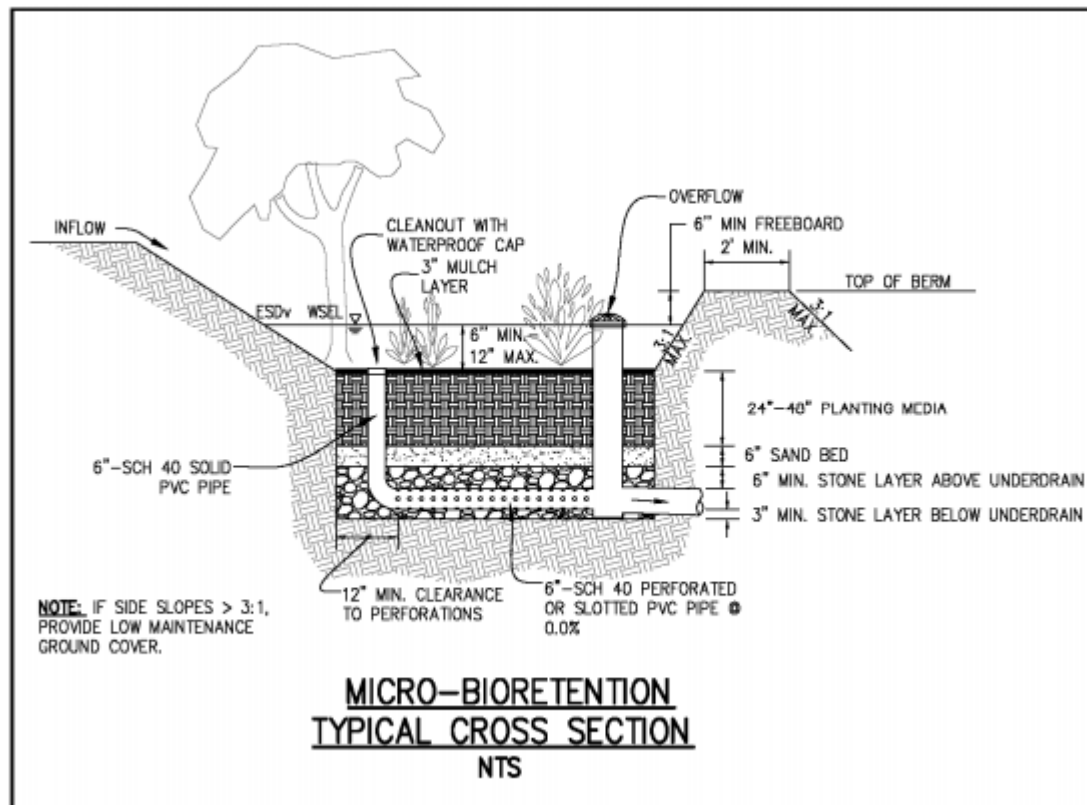


Image courtesy of Washington State University Rain Garden Handbook

# MAINTENANCE NEEDS

- Seasonal/Monthly Maintenance for bioretention

## Recommended timeframes for typical maintenance



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





# NEEDS MAINTENANCE





# GOOD BIORETENTION MAINTENANCE



# MOSQUITO PREVENTION

- Keep inlets and outlets clear
- Correct grades and reset stones to prevent water ponding
- Facilities should drain within 24-72 hours
- Mosquito Dunks-biological mosquito control contains *Bacillus thuringiensis* (Bti) a natural mosquito larvicide (Bacterium), which kills mosquito larvae, but is harmless to birds, fish, wildlife, and pets, controls mosquito larvae for up to 30 days.



# PREVENT DAMAGE – DON'T PLOW SNOW OR PILE LEAVES



# LEAF REMOVAL

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





# SEDIMENT, DEBRIS REMOVAL

- Clear sediment and debris from inlets, and from approximately 5-10 feet upstream of inlet, within the inlet, and forebay.
- Remove sediment when voids between stones are approximately 50% filled.
- Must be removed from site and disposed of legally (i.e. trash or compost)





# INLETS THAT NEED CLEANING

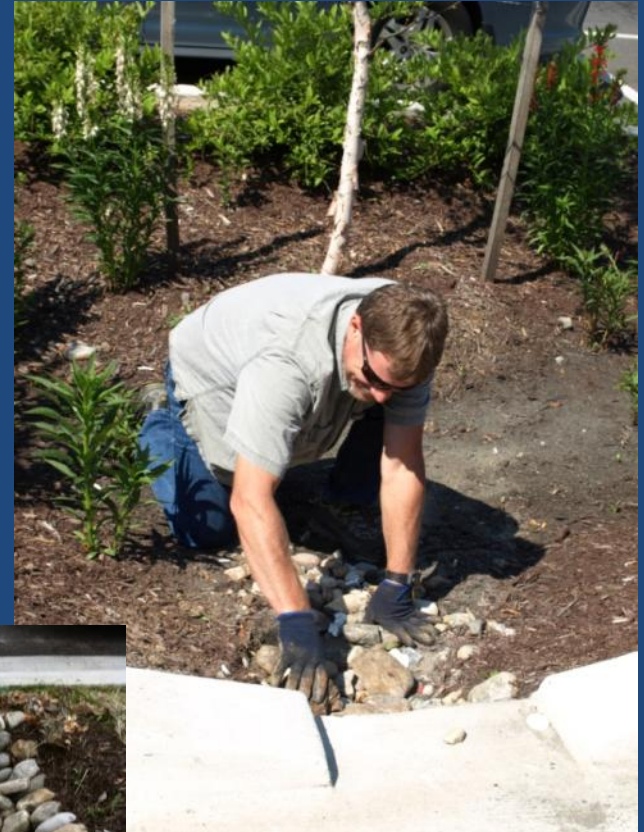




# CLEANING VOIDS AND RESETTling COBBLE



Voids over 50%  
filled



Voids clean



Without frequent maintenance:

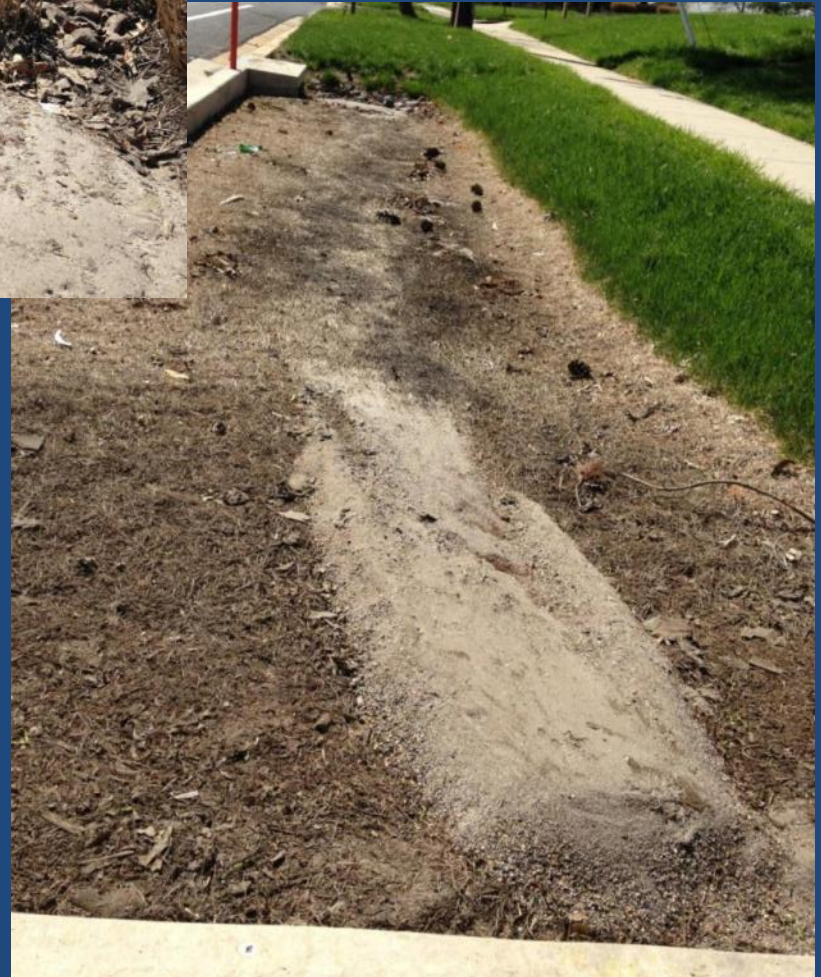


With frequent maintenance:





Sediment can  
move past  
forebay:



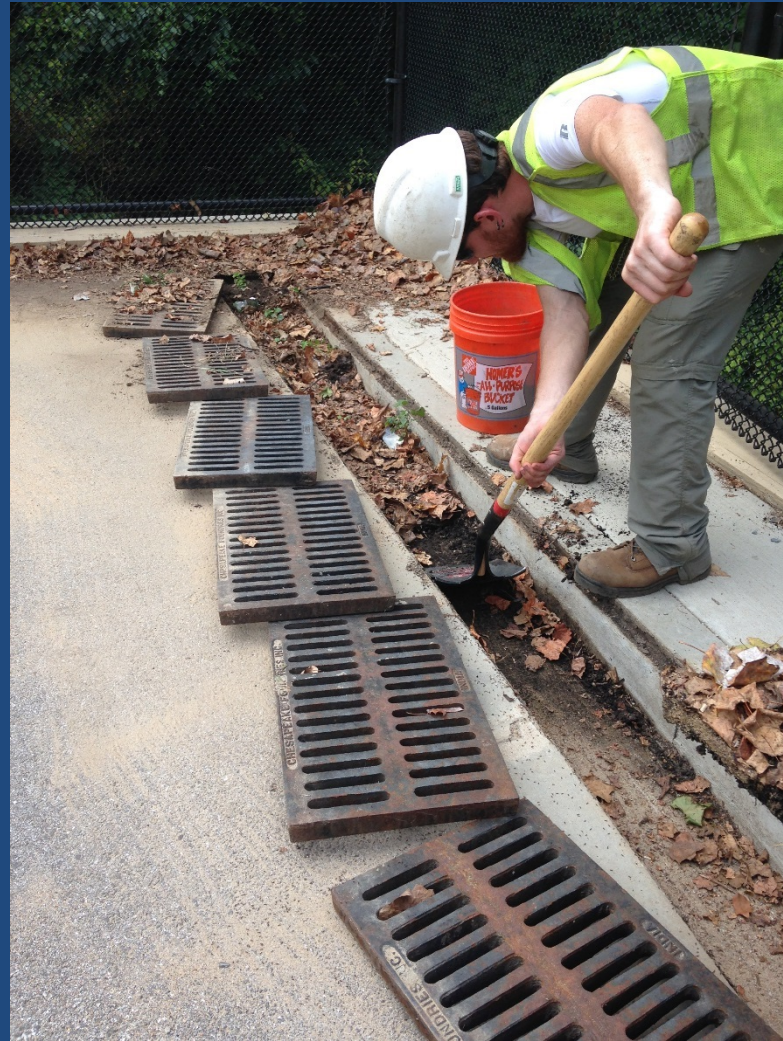


# Sediment in snow piles





# Trench Drains need cleaning, too!





# PATCH EROSION

- Patch small areas of erosion from water flow or human activity with either topsoil or bioretention media (topsoil usually only on side slopes) **you may need to add more stone if needed**
- Reset cobble or riprap displaced by water or human activity.





# SHEET FLOW

EROSION



SEDIMENT



# SAFETY/VISIBILITY

- Safety Vests
- Company Identification on trucks
- Road Signage/Cones



Permitted:

Biomedia mix vs topsoil

--Biomedia-is specified by design, always used on basin surface

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

Voluntary (RainScapes)

Rain Gardens may be constructed using existing native soil and amended if passed the perk test. Test hole drains within 24-36 hours filled 2 times.



# Mowing



Adjust mower blade height to avoid  
Scalping which leads to erosion

# Mowing

Always avoid/remove grass clippings in bios—can clog surface or add excess nutrients





# EDGING

Keeps mowers out and defines facility, mulch fresh edges for weed /grass encroachment and aesthetics.

Do not create moats= sheet flow may need ground cover stabilization





# Weeding and Edging

NO  
HERBICIDE





# WEEDING—DONE BY HAND

- Keeping up with it as it grows will reduce the overall effort required
- More dense planting will reduce problem
- Carefully select mulch source (no compost)

Mile-a-minute



Thistle



Prickly Lettuce



Plantain





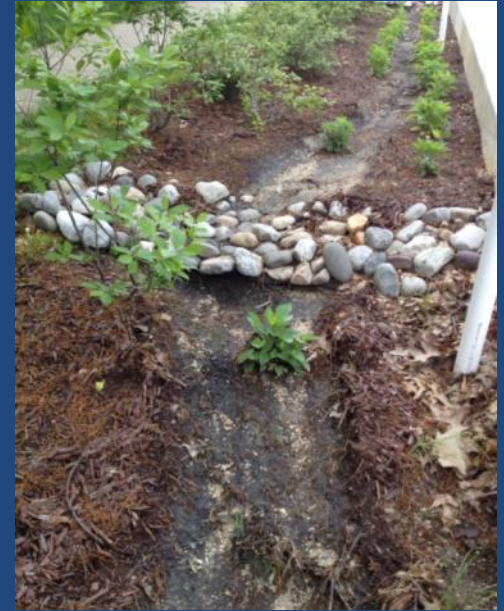
# MULCH TIMING MATTERS



Sligo Rec Center Rain Garden

# MULCH

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





# Planting plans can drive maintenance

## PLANT GRADE SPARSE PLANTINGS

Dogwood  
Twig ?



## DEER PRESSURE





# GROUND COVER LAYER

## Reduce maintenance costs!!

Less mulch

Less weeds



# 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





# WHY NO FALL PRUNING?

- Plants slow erosive water flows
- Winter aesthetics
- Wildlife habitat, overwintering insects



# PLANTS - WATERING

- Newly installed plants water until established
  - 6 weeks -3 x's a week for 2 weeks
    - 2 x's a week for 2 weeks
    - 1 x a week for 2 weeks
- After established, only water if drought stressed





# PLANTS – CAN DIVIDE PERENNIALS ALWAYS MAINTAIN GOOD PLANT COVERAGE



# PLANTS - REPLANTING

- Natives (dwarf cultivars?)
- Deer resistant
- Flood tolerant
- Drought tolerant
- Salt tolerant





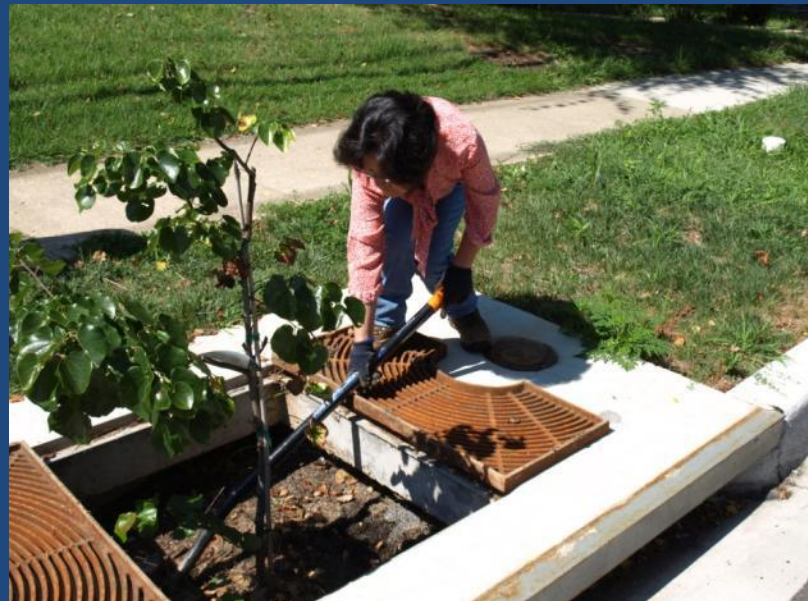
# Grass Swales



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

# TREE BOXES

- 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





# Maintenance of Non-Vegetated Stormwater Practices

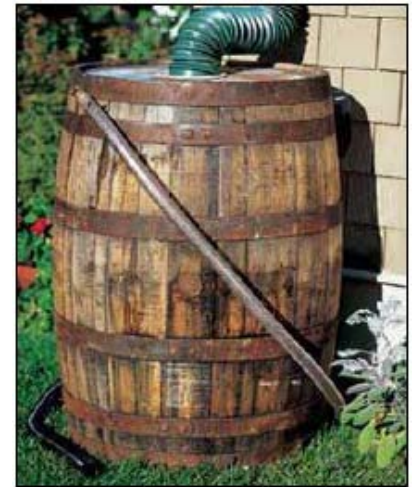
## NON-PLANT BASED PRACTICES



**PERMEABLE  
PAVEMENT**



**DRY WELLS**

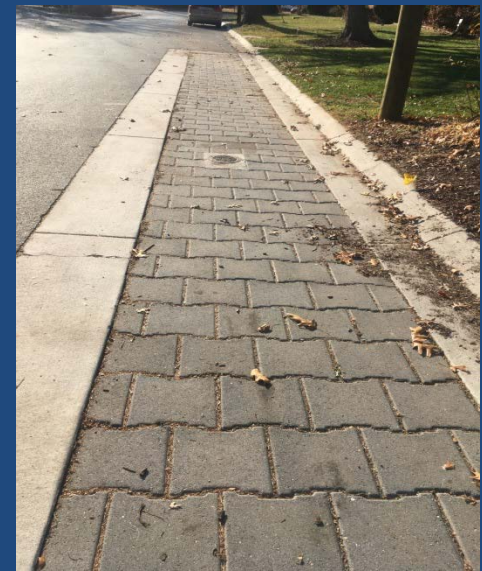


**RAIN  
BARREL**

# Permeable Pavement Maintenance



- Blow off leaves and debris or vacuum
- Street sweepers/  
Regenerative Vacuum
- *If clogged, may need power washing to loosen debris using a combination power washer and vacuum truck*





# POROUS PAVEMENT IN WINTER

- Use snow blowers and rubber tip shovels/plow blades
- Remove snow to 1 inch, insulation from air space of below grade stone layer keeps surface temperature high so snow melts and no ice forms
- De icing chemicals should not be used, degrades concrete and adds chemicals to local aquifers



# Dry Well/Micro-Infiltration Maintenance

**TYPICALLY  
LOCATED 20 FT  
FROM HOUSE**





# DRYWELL MAINTENANCE—CAPS AND DOWNSPOUTS



*Dry well downspout overflow for large storms*



*Clean gutters will help keep debris from clogging your dry well*

- Keep pipes, gutters, downspouts cleaned



# 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
- Replace if brittle



*Rain barrels with "planter tops"*



# 2-PG MAINTENANCE FACT SHEETS



# WATER QUALITY PROTECTION CHARGE (WQPC) CREDIT

Reduced Fee for **maintained** practices up to 80%  
for ESD/LID on Nonresidential, Multifamily and  
Single Family Residential

Creates More Contractor Opportunities for  
Maintenance



# RainScapes Program Contractor Trainings



## Green Roof

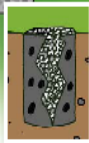
\*.623 gallons of water falls on each sq. ft. of roof during the during a normal rainstorm of 1". A 1000 sq. ft conventional roof can shed 623 gallons when there is an inch of rain. Green roofs reduce and clean this stormwater runoff before it hits the ground.

## Conservation Landscape

Loosened and improved soil, planted with easy-to-maintain native plants that soak up the rain.

## Dry Well

collects stormwater from rooftops or driveways and filters the rainwater through a small stone-filled pit, then into the underlying soils



## Cistern

Larger than a rain barrel, cisterns perform the same water harvesting benefits and are no more aesthetically intrusive than an air conditioner.

## Canopy Trees

Leaves intercept raindrops and retain them, thus reducing stormwater runoff

## Pavement Removal

allows more water to soak into the ground when you plant native plants.

## Rain Gardens

A spoon-like, concave area filled with a special soil mix that collects rainfall and allows it to filter into the ground

## Rain Barrels

collects and stores rain water from rooftops

## Permeable Surfaces

allow rainwater to rapidly infiltrate and enter the ground where it is naturally filtered

## Treatment Trains

# Questions?



[WWW.MONTGOMERYCOUNTYMD.GOV/STORMWATER](http://WWW.MONTGOMERYCOUNTYMD.GOV/STORMWATER)

