

MAINTAINING THE BMP



SESSION OVERVIEW

- TRANSITIONING TO THE “MANY BMP” MODEL
- MAINTENANCE ISSUES THAT ARE REALLY DESIGN ISSUES
- BMP MAINTENANCE FORENSICS
- MAINTENANCE PROGRAM TOOLS
- BMP PERFORMANCE VERIFICATION FOR BAY MODEL



**Maintenance
Access Award!**



WATERWAY BUFFER ZONE
VEGETATION PROTECTED
BY COUNTY CODE

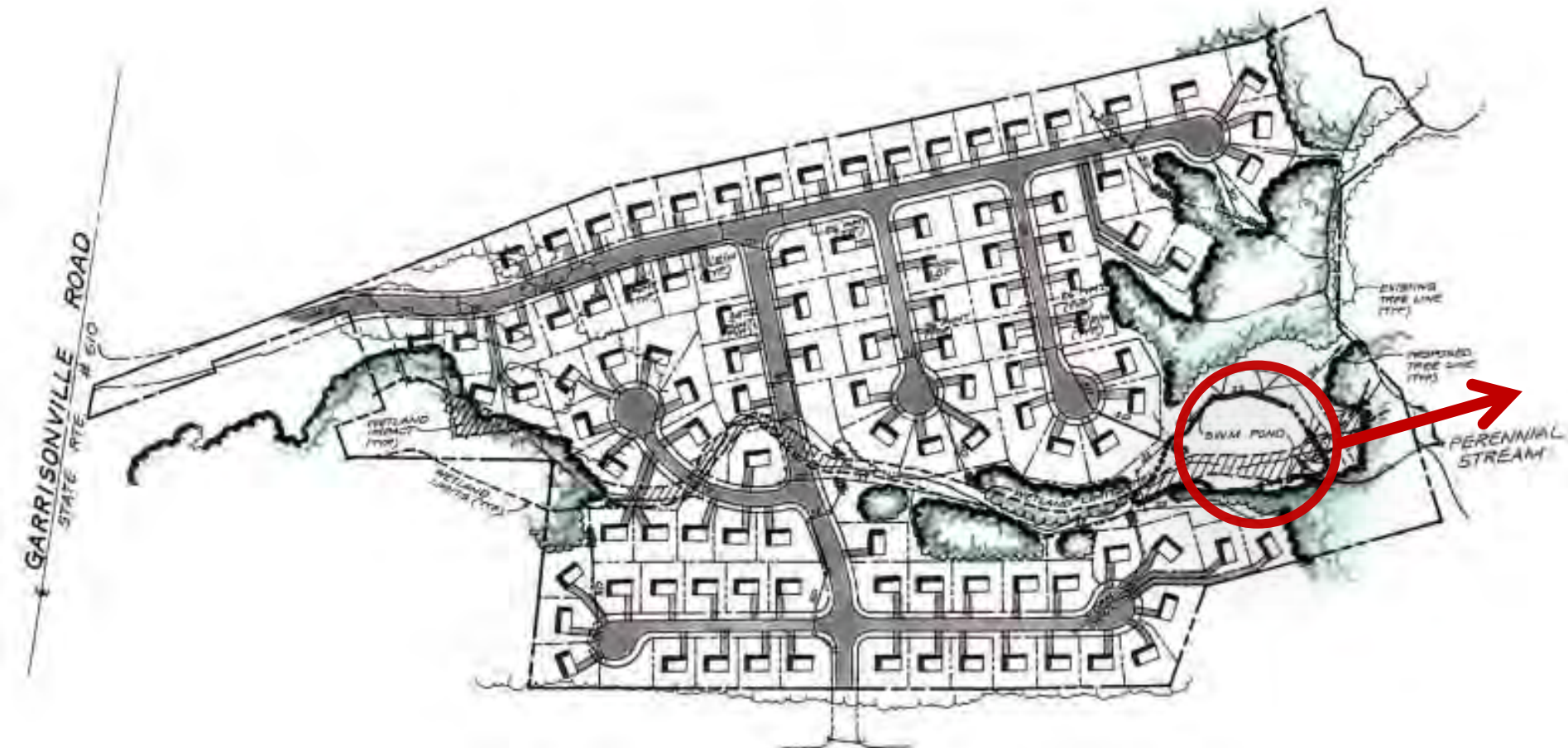
Approved by
[illegible]
[illegible]

2016-2017

30 1:35 PM

THE OLD POND MAINTENANCE MODEL

ONE BIG POND



1-800-564-4111 ©2017 Simoes-Pere CAS Library & Publishing Parameters (Wileyonlinelibrary.com) 152 Sample Size 20



The Changing Maintenance Paradigm

	Conventional Practices	LID Practices
Example of Practice	Pond	Disconnects/rain garden
Number of practices?	A few at each site	Dozens
Size of practices?	Large drainage area	Micro-drainage area
When to construct?	During site construction	After site is stabilized
Who is responsible?	Homeowner association	Homeowner
Who does inspection?	Public sector engineer	Trained contractor
Who does maintenance	Specialized contractor	Landscape contractor
How long does it take?	Hour or more	10 minutes
What is the goal?	Prevent dam failure and and public nuisances	Maintain hydrologic function and landscaping
Sediment cleanouts?	On a 30 to 50 year cycle (if ever)	Annual cleanouts at pretreatment devices
Maintenance Triggers	After catastrophic failure	When it looks like crap

Technical Report

Stormwater BMPs in Virginia's James River Basin: An Assessment of Field Conditions & Programs

(part of the *Extreme BMP Makeover* project)



June 2009

Final Draft

CENTER FOR
**WATERSHED
PROTECTION**

8390 Main Street, 2nd Floor
Ellicott City, MD 21043

PHONE 410.461.8323

FAX 410.461.8324

www.cwp.org

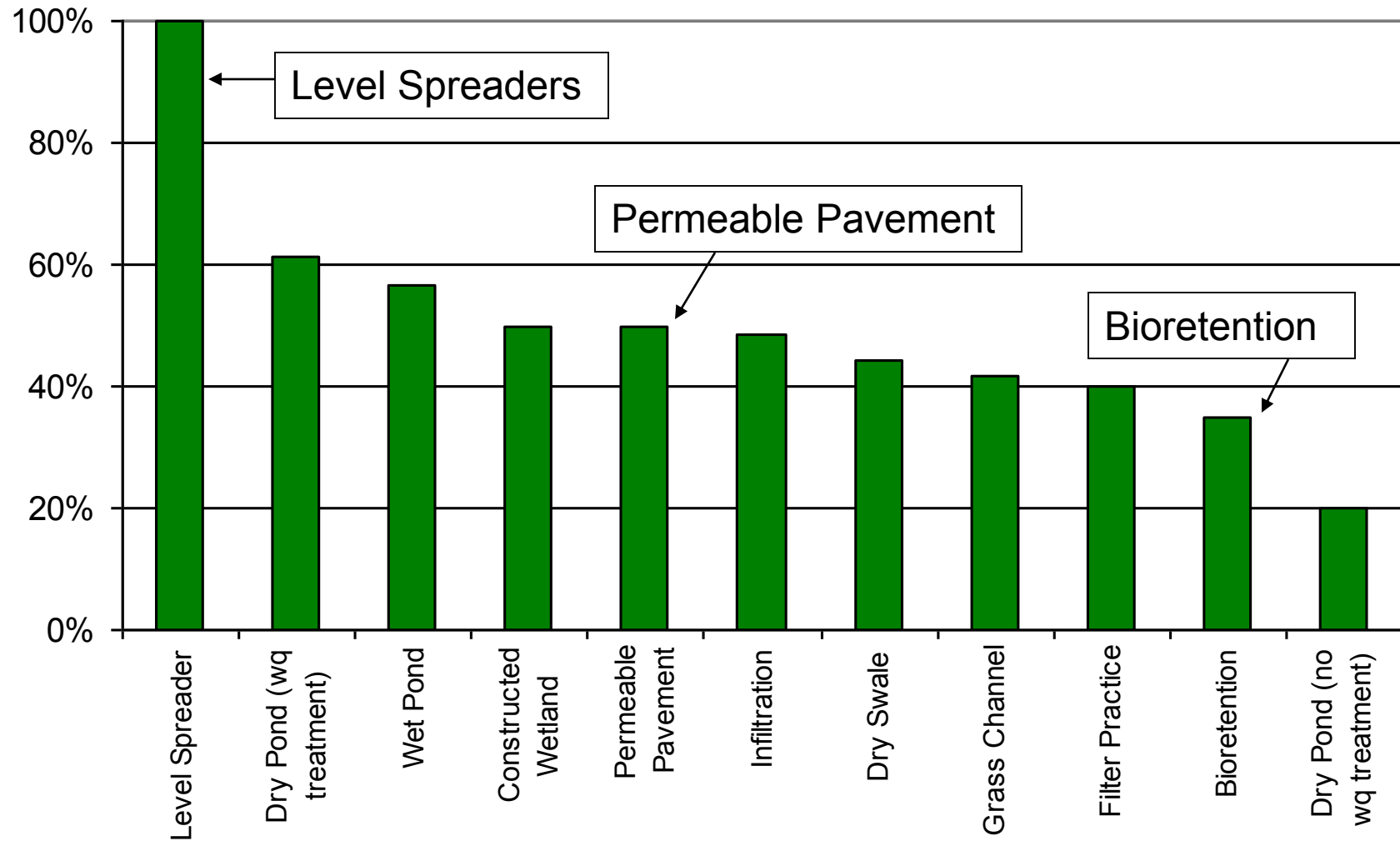
www.stormwatercenter.net

- Design
- Installation
- Maintenance

Maintenance Issues



Percent of BMPs Surveyed with Maintenance Issues



BMPs Surveyed with Maintenance Issues

Sediment Deposition

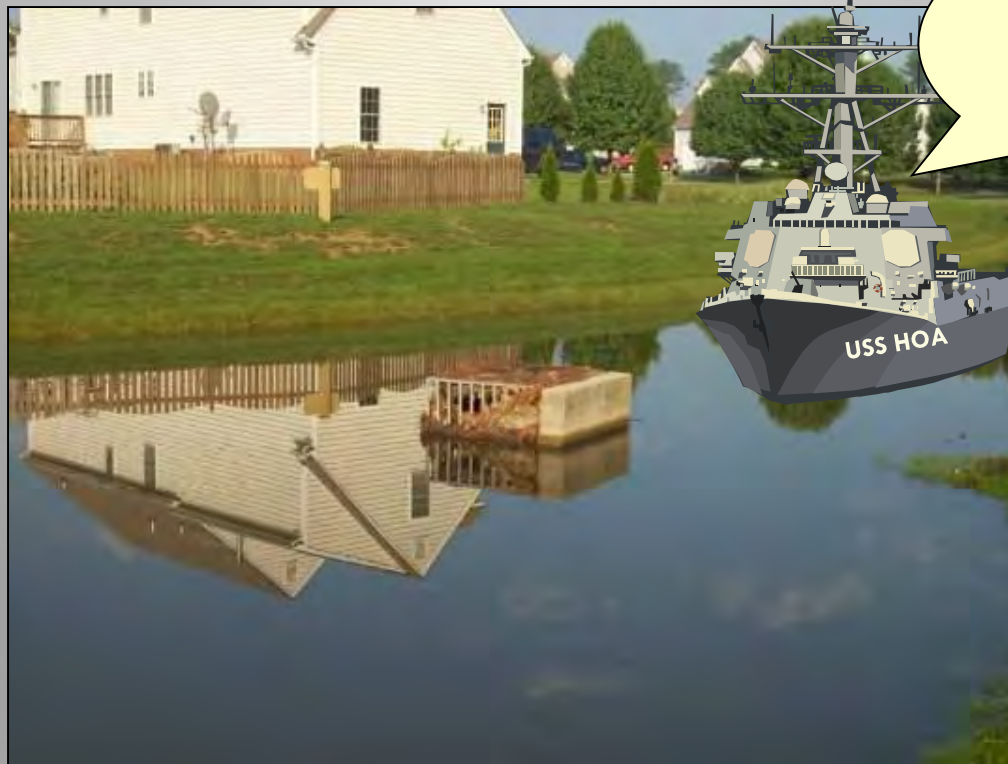


Maintenance Access



Are YOUR inspectors this adventurous?

Difficult to Maintain



**Don't worry
homeowners,
here we come!**

**Severe inlet
erosion into
bioretention**



Erosion



**Poor maintenance
of vegetation =
bank erosion**



**Wooded
detention pond**

**Flow channelized
through detention area**

Vegetation: Too much, too little – what's the intended palette?





Owner Awareness





What are some solutions?



CONSIDER MAINTENANCE DURING DESIGN

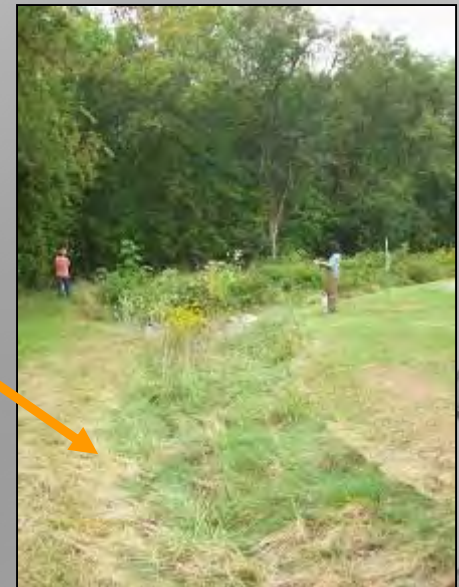
- PUT RISER NEAR EDGE OF POND
- MAINTENANCE ACCESS TO FOREBAY & RISER
- GENTLE SLOPE ON EMBANKMENTS
- RODS TO SHOW SEDIMENT ACCUMULATION
- PROTECT LOW-FLOW ORIFICE FROM CLOGGING
- VEGETATION MAINTENANCE PLAN & TARGET COMMUNITIES THROUGH TIME: 1-YEAR, 2-YEAR, 5-YEAR, 10-YEAR, ETC.
- INTEGRATE BMPS AESTHETICALLY WITH SITE AND “COMMON” USES

PLAN FOR SEDIMENTATION

- “OVERBUILD” FOR LOSS OF DEPTH OVER TIME
- PLAN FOR ACCUMULATION AT INLETS
- SEDIMENTATION RODS IN PRETREATMENT AREAS
- MAKE SEDIMENT REMOVAL SIMPLE



Good access to
forebays for
sediment removal



MAINTAINING ON-LOT PRACTICES



- Local program policies/alternative inspection schedule
- Role of lot owner vs. homeowners' assoc.
- Consider BMPs on-lot vs. in expanded right-of-way or drainage easement



The background of the slide is a light gray gradient, decorated with numerous water droplets of various sizes. Some droplets are large and prominent, while others are small and scattered. They are primarily located in the top-left and bottom-right corners, with a few smaller ones in the center and along the edges.

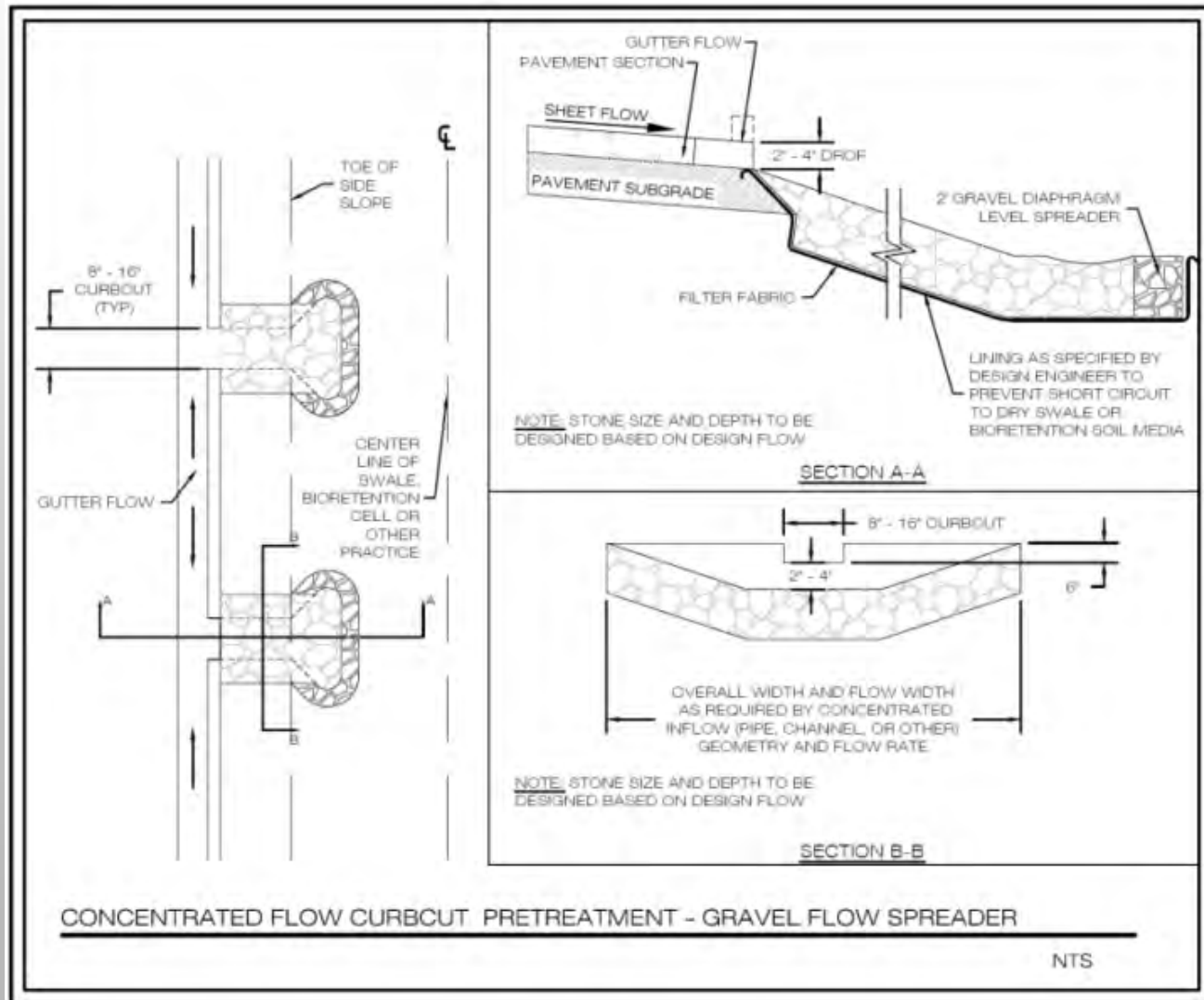
YOUR TURN: BMP MAINTENANCE FORENSICS

HOW DOES MAINTENANCE RELATE TO
DESIGN CHOICES?





PRE-TREATMENT DETAILS (EXAMPLE: VA, CURB INLETS, CONCENTRATED FLOW)





VEGETATION OPTIONS



PERENNIAL GARDEN



TREE – TURF



PERENNIAL - SHRUB



TREE – SHRUB – MULCH

DYNAMIC VEGETATION MANAGEMENT



Year 1



Year 3



Year 10

SITE INTEGRATION







Soil Media

The image shows a construction site for a drainage system. A large area of light-colored pea gravel is laid out, with a white PVC pipe standing vertically in the center-left. To the right, a darker brown soil media is being added, forming a mound. A yellow CAT excavator is partially visible in the top left corner, and a white cylindrical object with a wooden stick is on the right. The text 'Soil Media' is overlaid in white at the top center.

**Pea Gravel Over
Underdrain Stone**





08/27/2008



RUN-ON RATIO, PRE-TREATMENT





WHO IS RESPONSIBLE FOR MAINTENANCE?

REGULATORY CONTEXT

- MS4 PERMIT:
 - PRIVATE: INSPECT EVERY 5 YEARS, POLICIES TO ENSURE MAINTENANCE, SCHEDULE, MAINTENANCE AGREEMENTS, ALTERNATIVE
 - PUBLIC: INSPECT ANNUALLY, CONDUCT MAINTENANCE
 - TRACKING & REPORTING
- VSMP:
 - LOCAL ORDINANCE, POLICIES & PROCEDURES, RECORDED INSTRUMENT FOR MAINTENANCE
- WIP/TMDL
 - VERIFICATION OF PERFORMANCE EVERY 9-10 YEARS

INSPECTION/MAINTENANCE PROGRAM TOOLS

- TB# 10 BIORETENTION ILLUSTRATED!
 - COMPLETE VISUAL INDICATORS FOR LID PRACTICES
- CONSTRUCTION, INSPECTION AND MAINTENANCE **VIDEOS** FOR LID PRACTICES ON CSN WEBSITE
 - IN ENGLISH AND SPANISH
- TABLET/SMARTPHONE APP THAT USES VISUAL INDICATORS TO RAPIDLY INSPECT AND DEVELOP MAINTENANCE PUNCH-LIST FOR EACH SITE

www.chesapeakestormwater.net



Chesapeake Bay Stormwater Training Partnership

Visit: www.chesapeakestormwater.net

To learn how you can have access to:

Discounted Webcasts

Free One-day design workshops

Intensive master stormwater design seminars

Direct On-site technical assistance

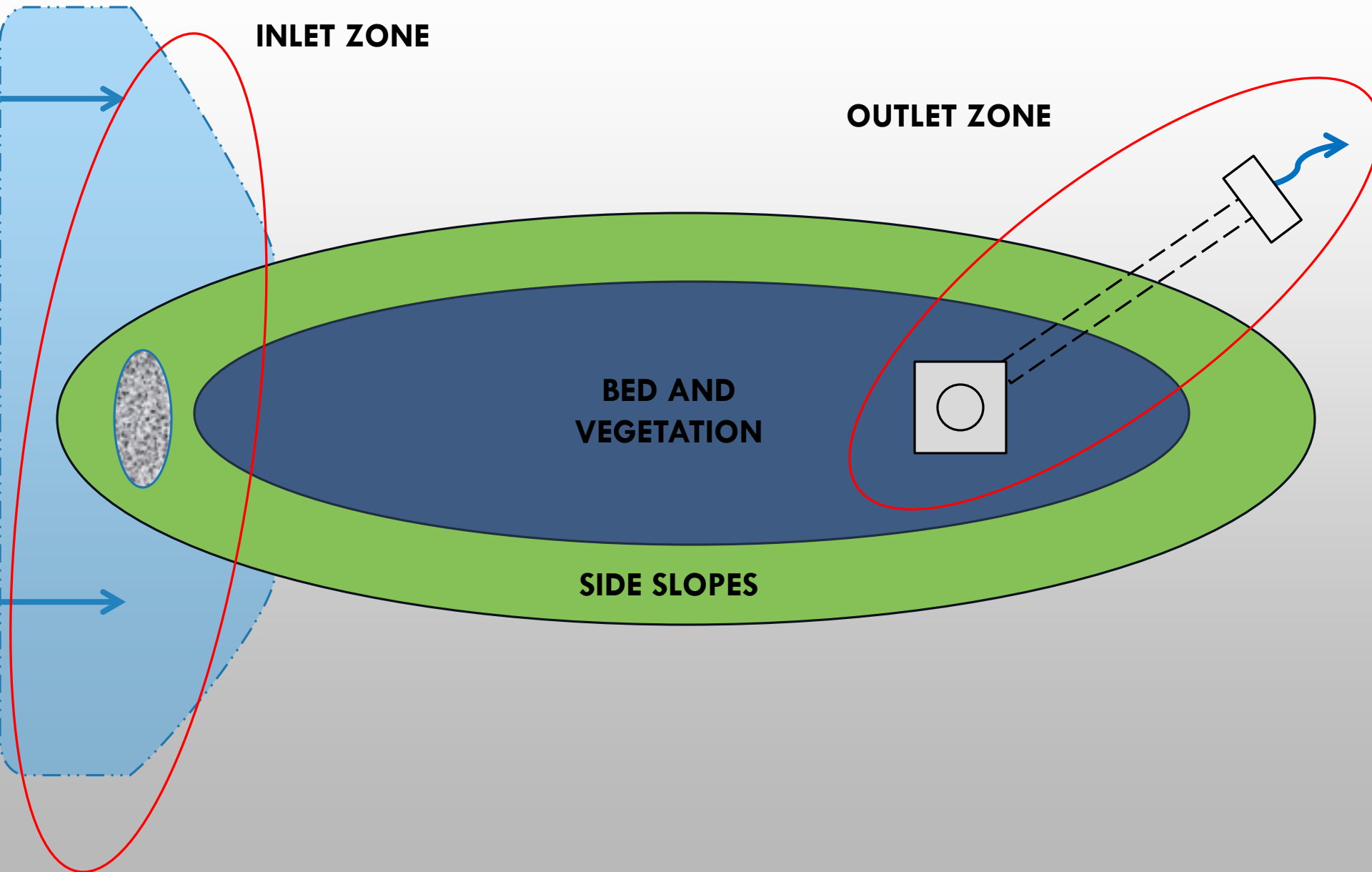
Self guided web-based learning modules



Bioretention Illustrated: Visual Indicator Approach for Inspection



Bioretention from above



Inlet Obstruction

INLET
ZONE



Good condition



Remove sediment, debris



Removal of sediment, obstruction



Sediment staining = entry problem



FBI

#10

Standing Water

BED
ZONE



None



Saturated soils



<3" of standing water after 72 hrs



Severe

Proceed to pump down and test pit

Vegetative Cover



Good cover



Few bare spots

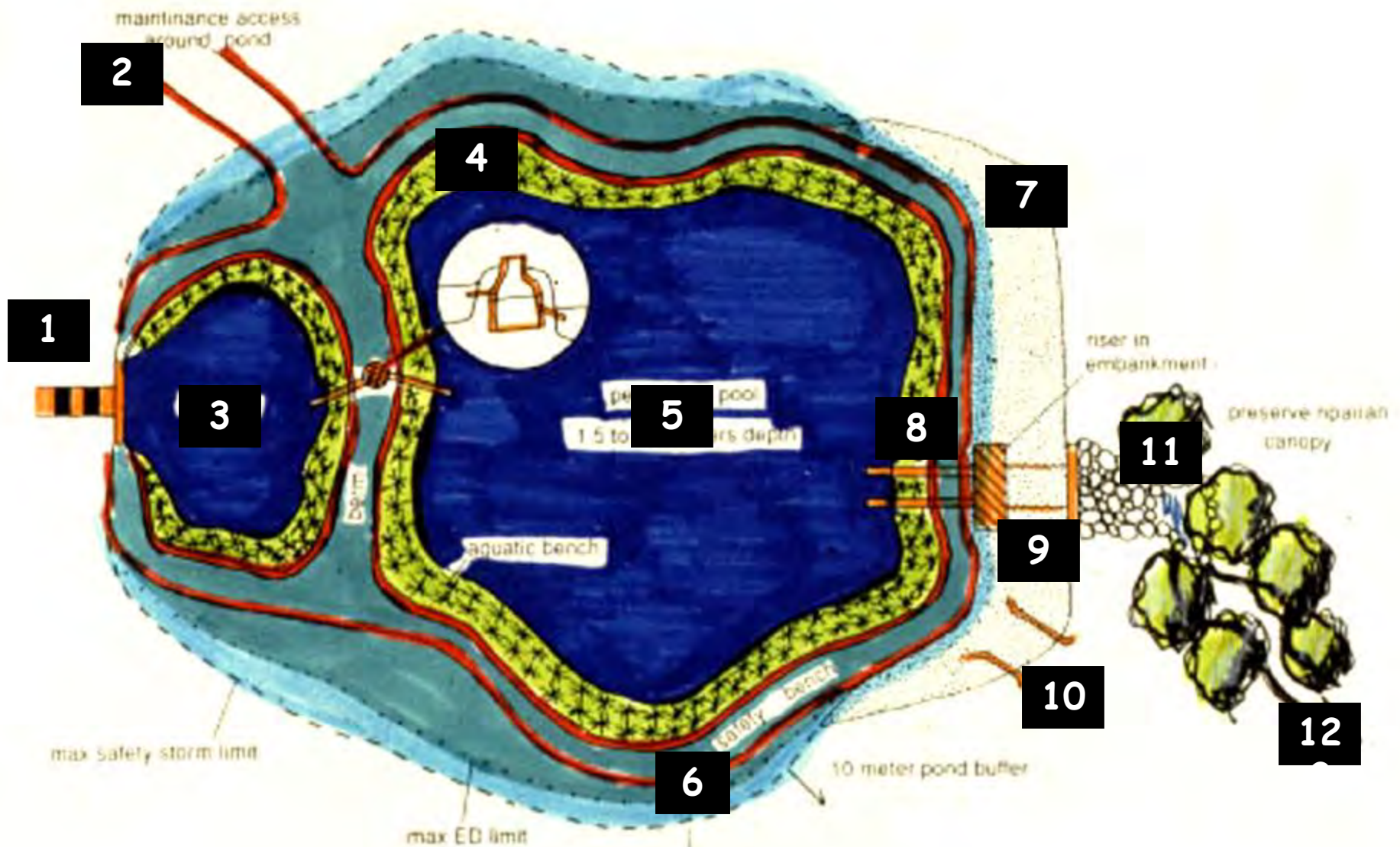
Tip: more mulch area
exposed = more
maintenance cost



< 75% coverage

Tip: Routinely split and
replant
Herbaceous material to
reduce mulch area

Key Inspection Zones in a Stormwater Pond



EQUIPMENT ACCESS

ABILITY TO GET ACCESS TO POND WITH
HEAVY EQUIPMENT

- EASEMENT WIDTH
- VEGETATION GROWTH IN
EASEMENT
- SLOPE
- FENCES
- LOCKS



INSPECTION APP: GIVE ME YOUR EMAIL

AT&T 5:45 PM 55%

Chesapeake Stormwater Network Bioretention Inspection

Close Save

Project Information

Client Name
City of Richmond.

Site Name
14th Street Planters

Site Address
1300 E Main St
Richmond, VA 23219
US



Facility ID
N/A

Inspection Date
2013-10-09

Inspector Name
Ted

Overview Photos of Facility

Overview of facility

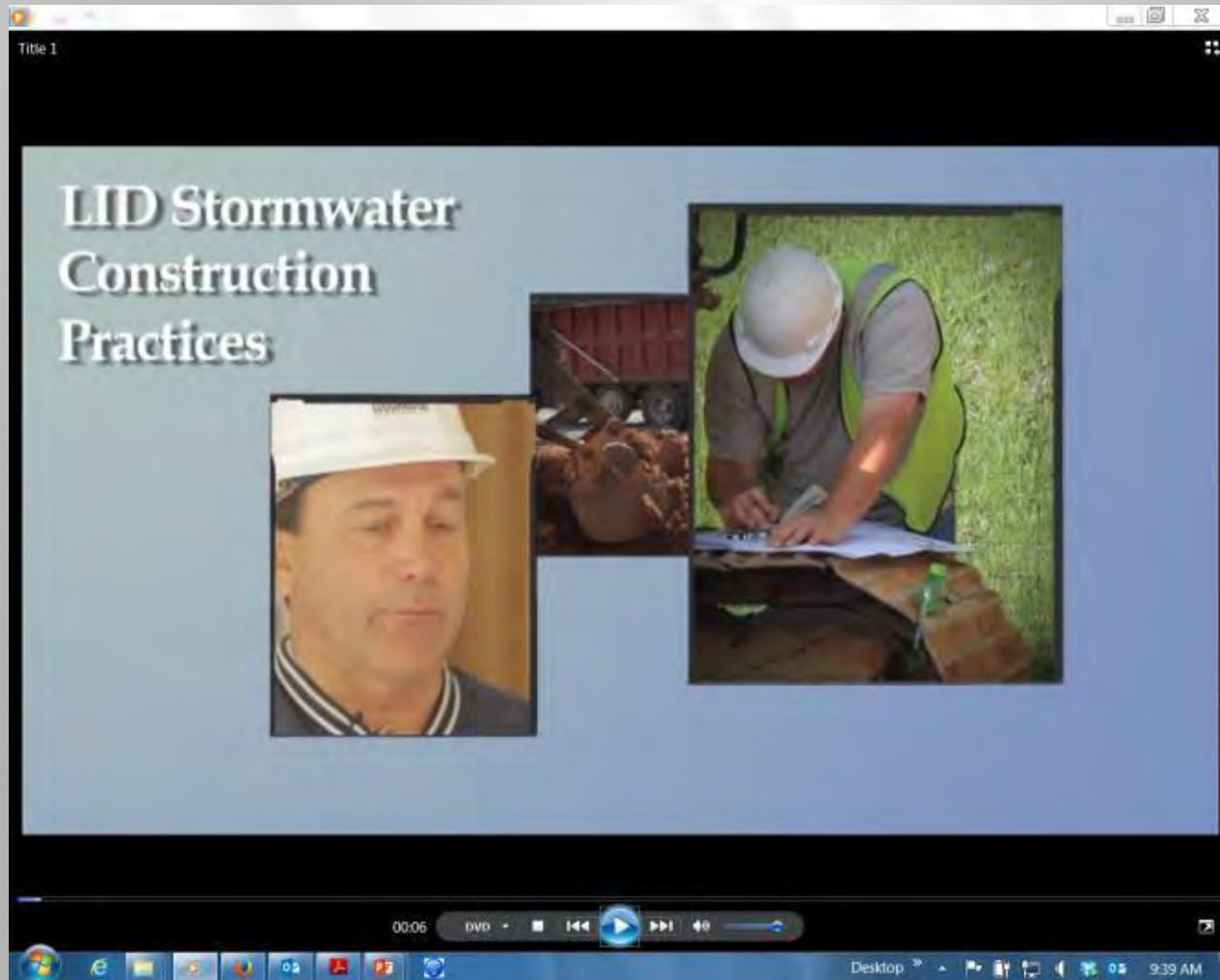
 

Inlets

1. Inlet obstruction?

Map background showing streets: Broadmoor, BEAVER DAM RD, 13th Street, 14th Street, 15th Street, 16th Street, 17th Street, 18th Street, 19th Street, 20th Street, 21st Street, 22nd Street, 23rd Street, 24th Street, 25th Street, 26th Street, 27th Street, 28th Street, 29th Street, 30th Street, 31st Street, 32nd Street, 33rd Street, 34th Street, 35th Street, 36th Street, 37th Street, 38th Street, 39th Street, 40th Street, 41st Street, 42nd Street, 43rd Street, 44th Street, 45th Street, 46th Street, 47th Street, 48th Street, 49th Street, 50th Street, 51st Street, 52nd Street, 53rd Street, 54th Street, 55th Street, 56th Street, 57th Street, 58th Street, 59th Street, 60th Street, 61st Street, 62nd Street, 63rd Street, 64th Street, 65th Street, 66th Street, 67th Street, 68th Street, 69th Street, 70th Street, 71st Street, 72nd Street, 73rd Street, 74th Street, 75th Street, 76th Street, 77th Street, 78th Street, 79th Street, 80th Street, 81st Street, 82nd Street, 83rd Street, 84th Street, 85th Street, 86th Street, 87th Street, 88th Street, 89th Street, 90th Street, 91st Street, 92nd Street, 93rd Street, 94th Street, 95th Street, 96th Street, 97th Street, 98th Street, 99th Street, 100th Street.

VIDEOS: INSTALLATION, MAINTENANCE (FINISH)



<http://www.youtube.com/user/CenterforWatershed>

THE BRAVE NEW WORLD OF BMP PERFORMANCE VERIFICATION



http://www.hsc.csu.edu.au/english/extension1/genre/elect3/3726/brave_new_world.htm

URBAN BMP VERIFICATION AND THE BAY POLLUTION DIET

- BMP VERIFICATION A PRIORITY FOR ALL SECTORS IN THE CHESAPEAKE BAY PROGRAM
- URBAN STORMWATER WORKGROUP ADOPTED ITS VERIFICATION PROTOCOL IN NOVEMBER 2012, REVISED IN JUNE 2013, MAY BE REVISED AGAIN
- STATES WILL IMPLEMENT THEM THRU THEIR EXISTING MS4 BMP REPORTING EFFORTS



Performance Verification

Ensure BMP still exists and is providing the pollutant removal it was designed to achieve or if it requires major restoration

MS-4 Permit/
Bay TMDL

Once every
9 -10 years

Trained
evaluator

State
BMP
Reporting for
Bay TMDL

Local
BMP
Inventory



THREE PART TEST: PASS/FAIL

1. DOES IT STILL PHYSICALLY EXIST ?
2. IS IT STILL OPERATING TO TREAT AND REDUCE RUNOFF AS IT WAS ORIGINALLY DESIGNED ?
3. IS IT'S MAINTENANCE CONDITION SUFFICIENT TO STILL SUPPORT ITS POLLUTANT REDUCTION FUNCTIONS ?

SUMMARY

- MANY BMPS? HAVE A MAINTENANCE PLAN
- BMP DESIGN – USE MAINTENANCE REDUCTION FEATURES
- NEW SPECS – LOTS OF DETAILS, E.G. PRETREATMENT
- STRATEGIC APPROACH FOR VEGETATION
- AVAILABLE MAINTENANCE PROGRAM TOOLS