

Storm Water BMP Monitoring & Maintenance

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Waukesha County Department of Parks & Land Use

March 16, 2011 – Waukesha County Storm Water workshop

Presentation Outline



- 1. Maintenance Needs ,Why & When ?***
- 2. Institutional Challenges***
 - BMP maintenance agreements (new)***
 - BMP maintenance ordinances (old)***
- 3. On-line BMP database – Alan Barrows***



BMP maintenance – not if, but when?



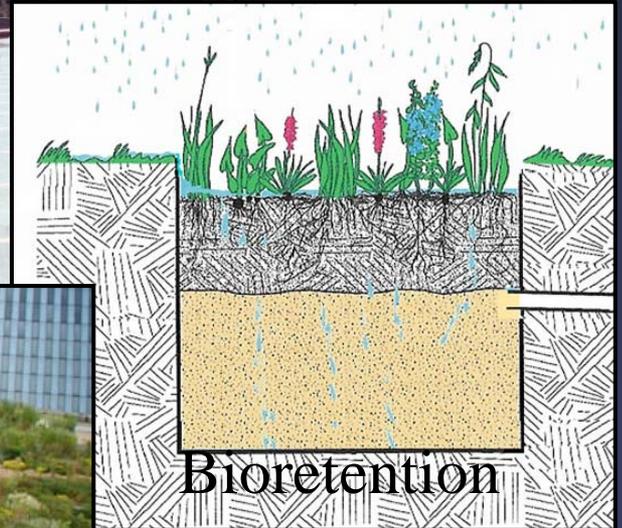
Wet
detention



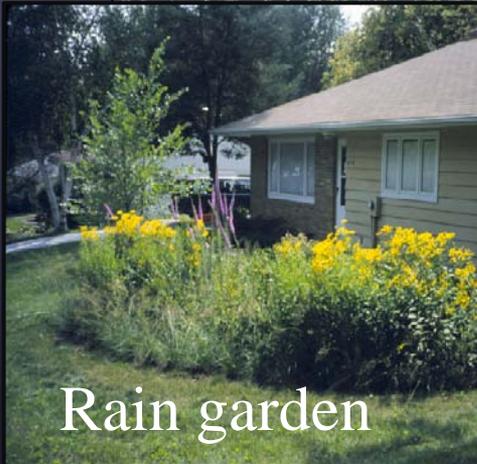
Infiltration basin



Filter strip



Bioretention

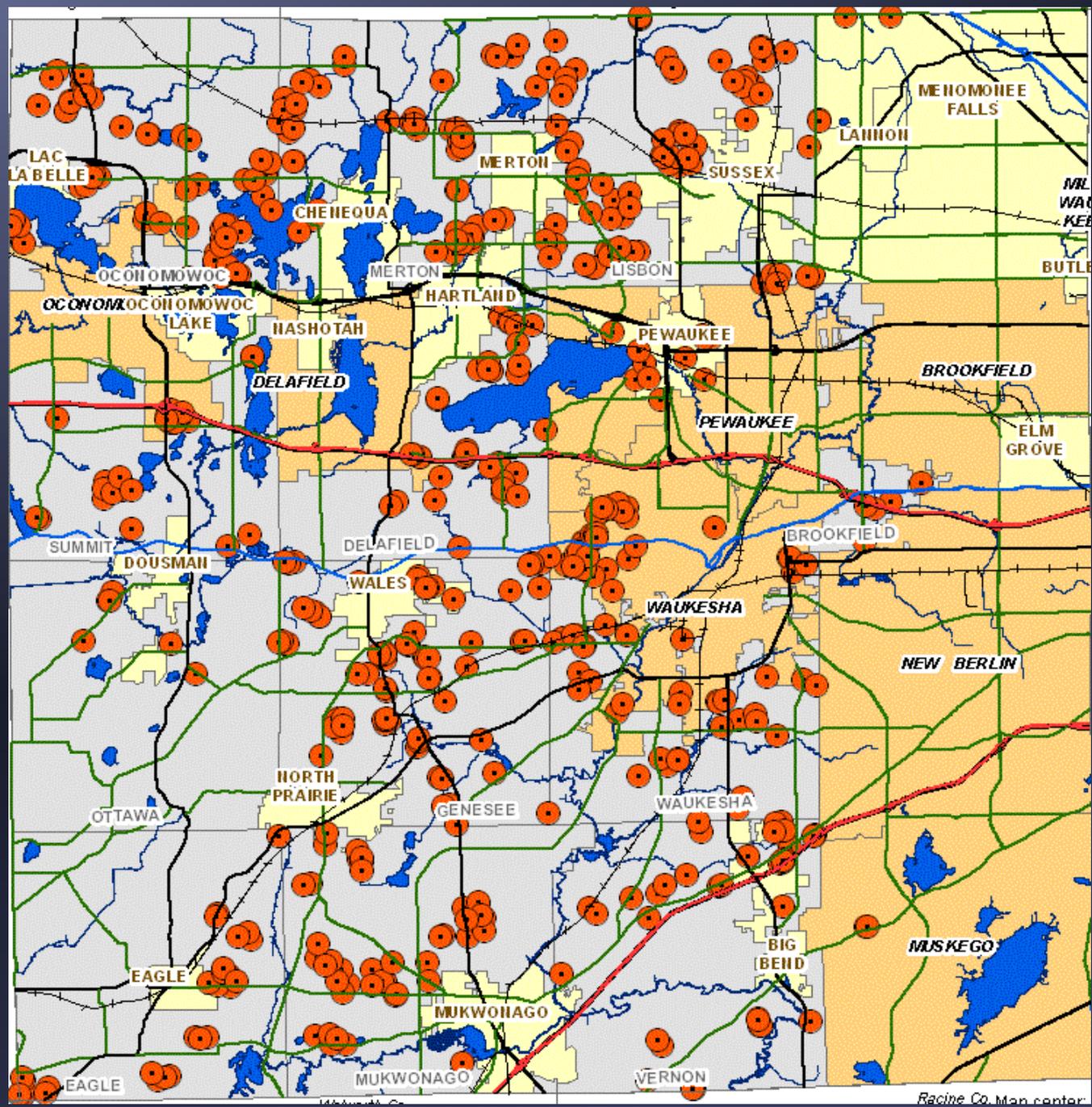


Rain garden



Green roof

Some Storm Water BMP Locations



Some BMP Lifespan Factors

- Watershed land use / impervious area
- Watershed management (pollutants)
- Watershed size / peak flow / conveyance
- BMP use / abuse / vandalism / wildlife
- Soil types / compaction / management
- Groundwater fluctuation / mounding
- Initial construction, maintenance, etc.

Murphy's Law: If anything can go wrong, it will!

Why BMP maintenance?

(What may trigger the need?)

1. Reaction: Citizen complaints (legitimate)
2. Regulations: State permit or local ordin.
3. Prevention:
 - Avoid public safety or nuisance issues
 - Make sure they are working as designed
 - Prevent failure, downstream damage or environmental issues (ounce of prevention....)

Common / Expected Maintenance (annual)

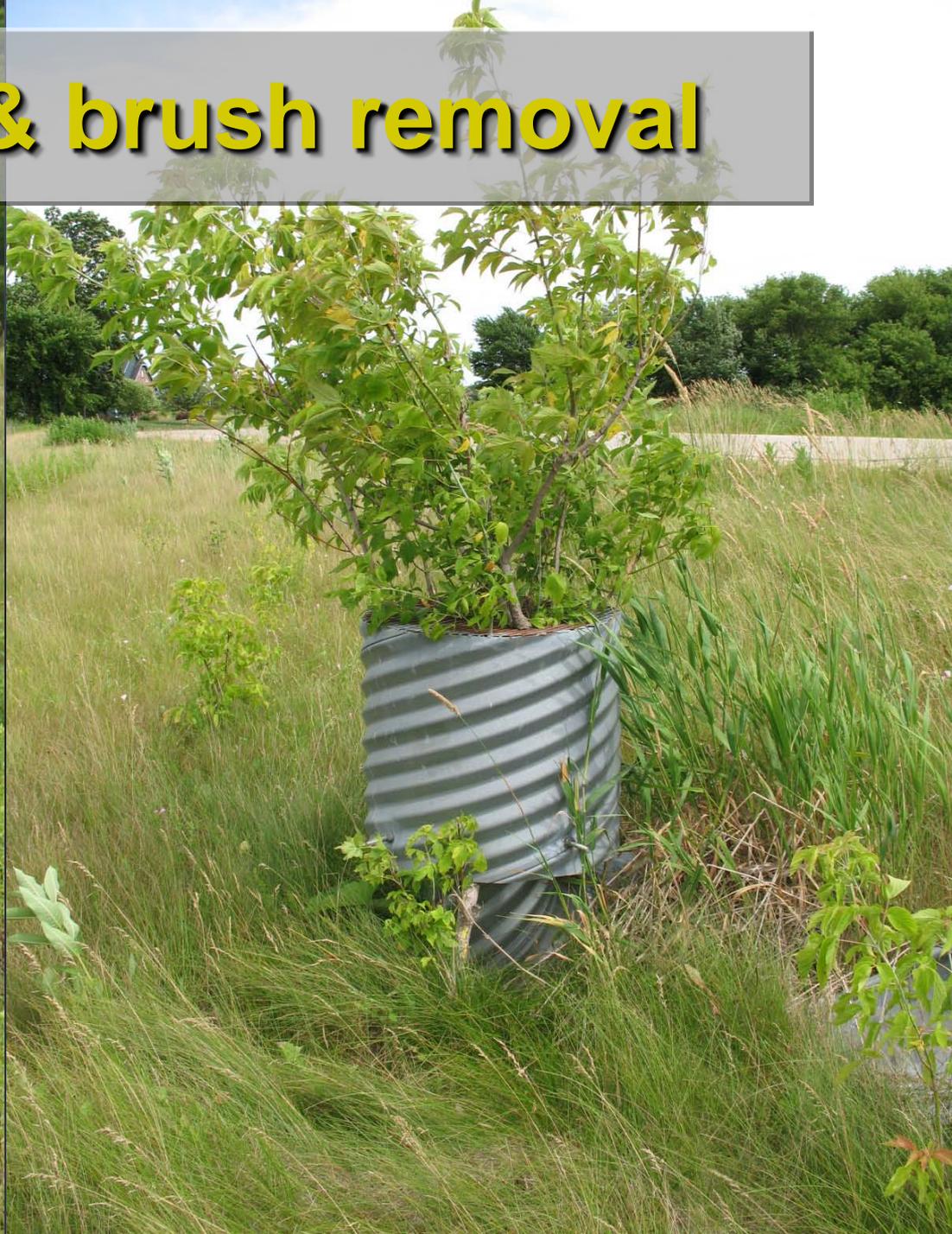
- Mowing / revegetation
- Outlet cleaning / unplugging
- Tree / weed removal
- Erosion / riprap repair
- Sediment removal



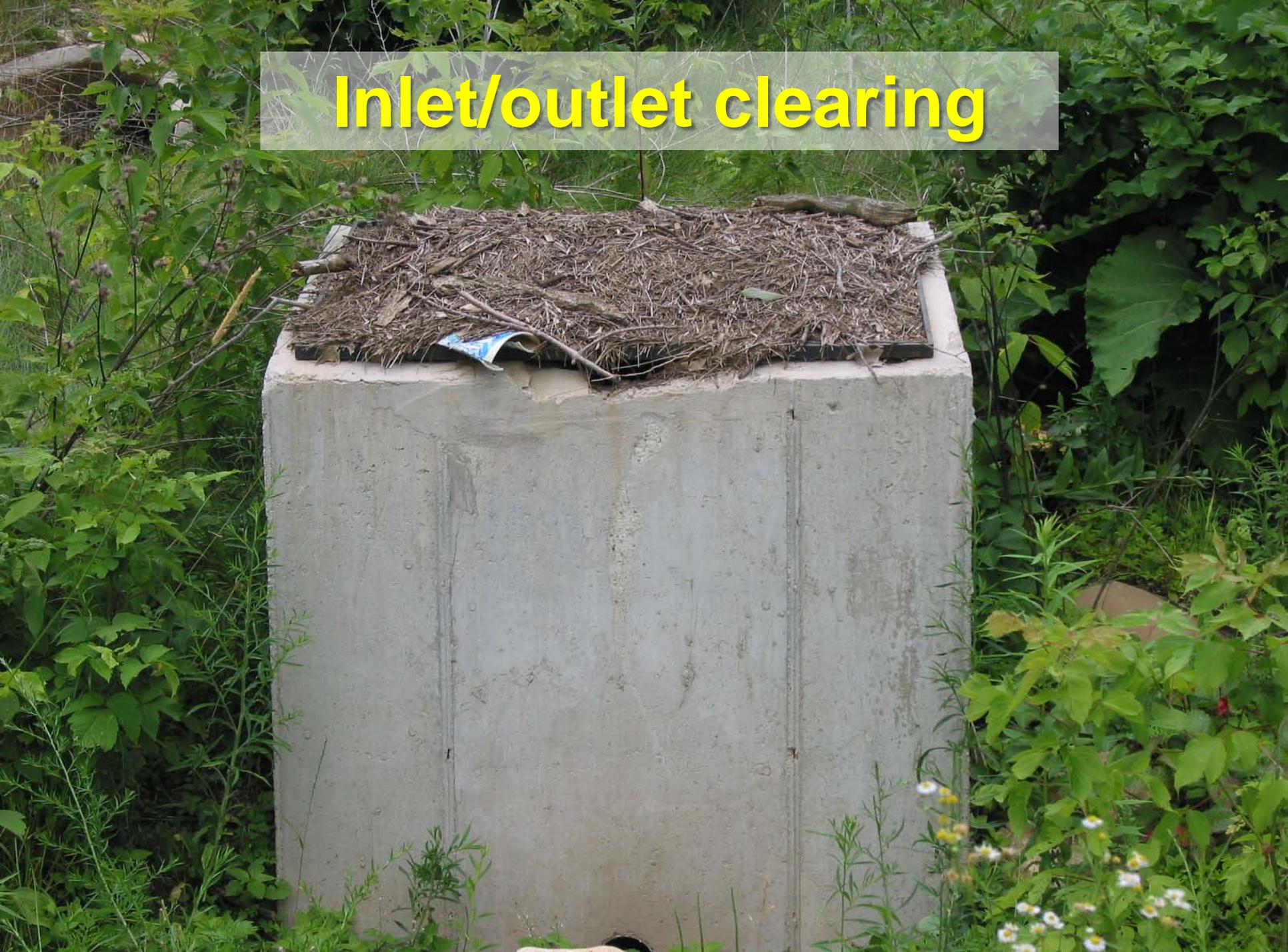
Mowing & Burning



Minor tree & brush removal



Inlet/outlet clearing



Minor erosion & sedimentation





Junk removal?

Less Often / More Costly BMP Maintenance

- Major tree/brush removal
- Dredging/replacing engineered soil
- Drainage system repair or replacement
- Replacement of native vegetation
- Spillway or outlet replacement
- Berm/shelf repair or reconstruction

Trees on the waters edge? (6 years)



Where's the basin? Yard debris?



Replacing engineered soils (bioretention)



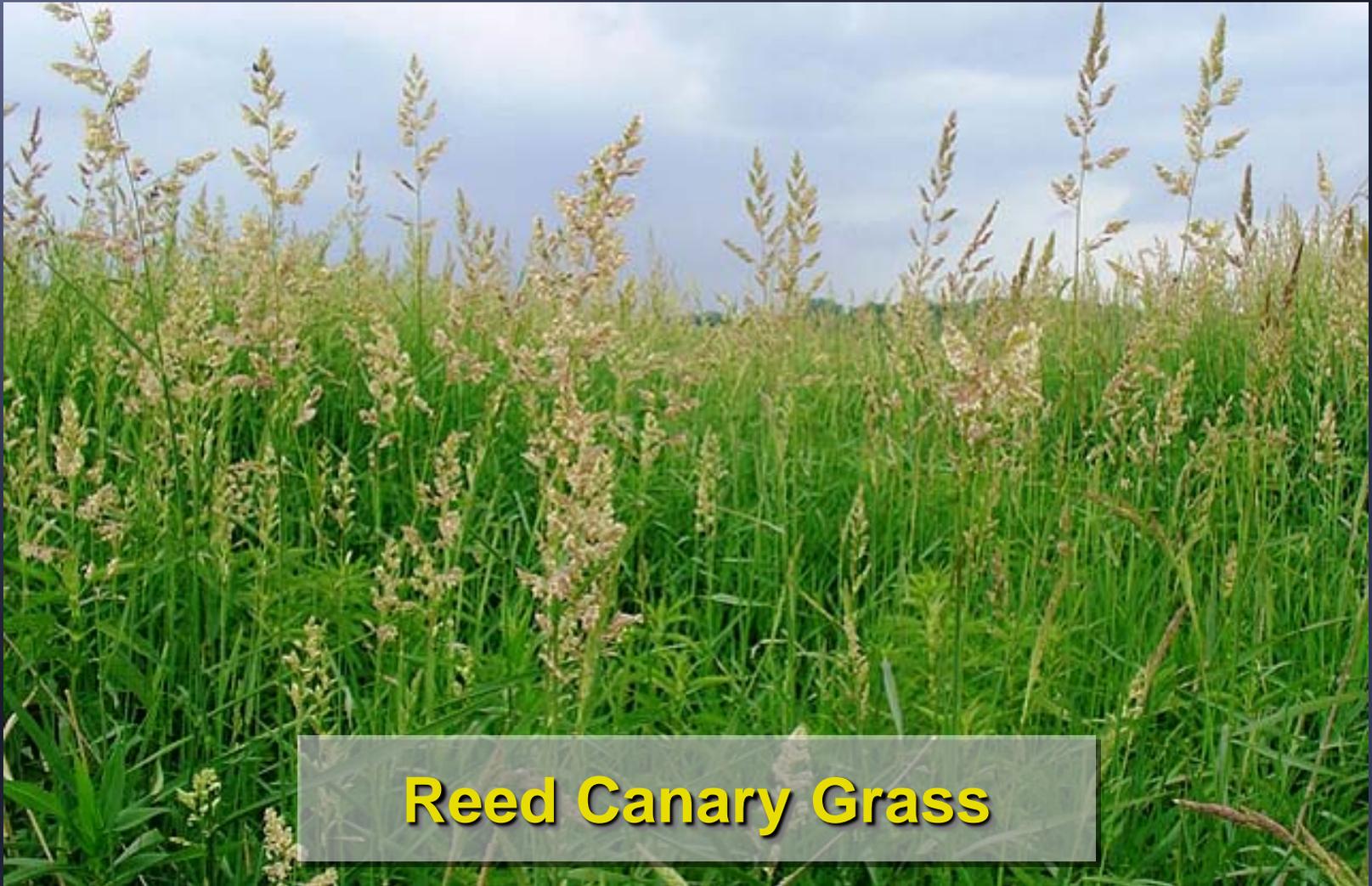


Compacted Soil



**Compacted Soil
Deep Tilled**

Invasive species have taken over?



Reed Canary Grass

Repair/replace inlets or outlets

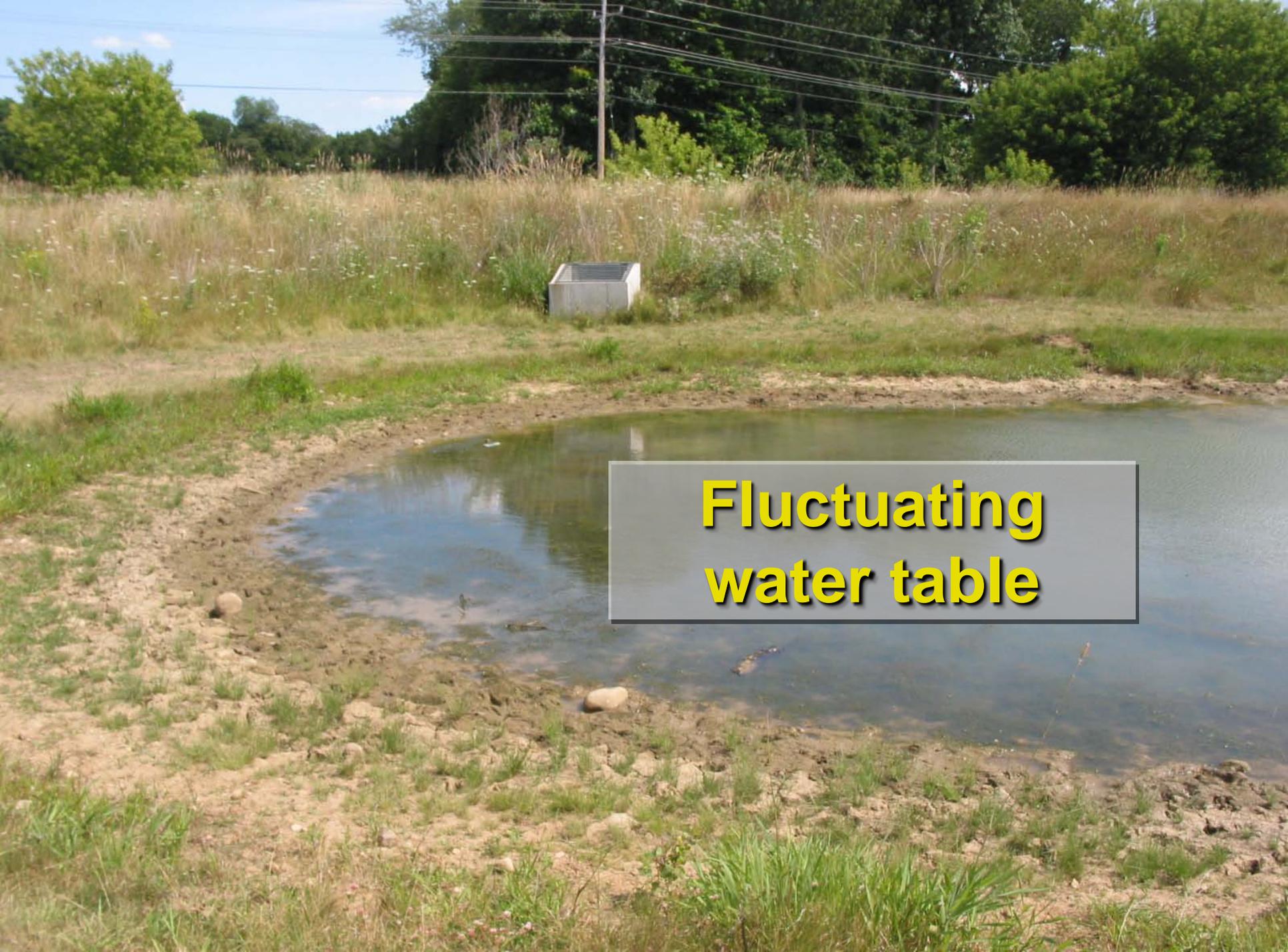




**Settling over
pipes**

**Repair/replace
inlets or outlets**



A photograph of a pond in a rural setting. The pond is surrounded by tall grasses and a concrete box is visible on the bank. The water is calm and reflects the sky. A text overlay in the center reads "Fluctuating water table".

**Fluctuating
water table**



Muskrat damage



Vandalism?

**Enforcing BMP
Maintenance has many
“Institutional” Challenges**

Examples: Institutional challenges

- What initiates a BMP inspection? (form?)
- What is the BMP design?
- Was it built right? How old is it?
- Who built it? Who oversaw construction?
- **Do we have legal access to the site?**
 - **To inspect or do repair & maintenance**
- Who decides if it's working right? How do they decide this (and document it)?

Examples: Institutional challenges

(continued)

- How do you go about fixing a BMP?
- What permits are needed? Who applies?
- Who hires who?
 - Write specifications, complete work, oversee & verify work?
- Who pays for the work?
 - Who owns the BMP? Is it fair to make one property owner pay for others runoff?
 - Can the community pay & charge back?

Some Solutions (new sites):

- BMP construction regulations (SW Ordin.)
 - Require construction as-builts
 - Require PE design, oversight & construction verification
 - Require BMP maintenance agreements recorded on the property (permanent/ROD)

Why BMP as-builts?

- Because otherwise they rarely get built right
 - If not built right, they don't work right
 - If they don't work right, what was the point?
 - Program credibility suffers (compliance!)
- So WHEN they need maintenance, you know what you are dealing with

Can't see it once it's buried



Hard to change the elevation later



Secondary outlet 0.9 ft
lower than on plans

Underground Storage



Why Construction Verification?

- The as-builts are just data, survey shots, construction notes and drawings
 - They may or may not verify compliance
 - Burden is on the government to verify compliance (interpret the data & decide)
- Making a P.E. sign a statement verifying compliance shifts the burden on them
 - Govt. still needs to review and “accept”

BMP Maintenance Agreement Basics

- Record on lot at time of land division
- Ownership/maintenance responsibilities
- Access rights/restrictions (easements)
- Inspection plan/authority to order it
- Maintenance plan for each BMP
- Enforcement/special charge rights
- Permanent (runs with the land)



Plat/CSM Language – M.A.

- Must be recorded before a land transfer occurs
 - Certification of compliance (new CSM/plat)
- Must mandate recording future addendums and identify what the addendums will include
 - Otherwise owner is not legally responsible unless they (and mortgage holder) agree to all conditions

Maintenance Agreement Exhibits: (Waukesha County)

A – Legal Description

B – BMP Locations

C – Maintenance Plan

D – Design Documentation

E – As-built Survey

F – Construction Verification

G – Permit Termination

Up-front
(plat/CSM)

Addendum
(after constr.)

Financial Assurance (a must)

- Conditions for Permit Termination/release:
 - As-built survey (certified)
 - P.E. construction verification (planting too!)
 - Maintenance agreement addenda recorded
 - Final inspection by LRD
- Standard language req'd



Examples of Maintenance Agreement Addendums

BMP Design Summary (D)

- Future reference for repairs or proposed modifications

Data Summary Sheet for Wet Detention Basin Design

Design Element	Design Data
Site assessment data: (see attached maps)	
Contributing drainage area to basin (subwatershed A)	120 acres
Distance to nearest private well (including off-site wells)	> 100 feet
Distance to municipal well (including off-site wells)	> 1200 feet
Wellhead protection area involved?	No
Ground slope at site of proposed basin	average 3%
Any buried or overhead utilities in the area?	No
Proposed outfall conveyance system/discharge (w/ distances)	35 ft. to CTH "U" Road ditch 1000 ft. to wetland
Any downstream roads or other structures? (describe) Floodplain, shoreland or wetlands?	Yes - 36" cmp road culvert No
Soil investigation data (see attached map & soil logs):	
Number of soil investigations completed	3 (in basin area)
Do elevations of test holes extend 3 ft. below proposed bottom?	Yes (see map)
Average soil texture at pond bottom elevation (USDA)	Clay loam
Distance from pond bottom to bedrock	> 5 feet
Distance from pond bottom to seasonal water table	Pond bottom 2 below mottling No water observed in test holes
General basin design data (see attached detailed drawings):	
Permanent pool surface area	1.5 acres
Design permanent pool water surface elevation	elev. 900.0
Top of berm elevation (after settling) and width	elev. 905.0 / 10 feet wide
Length/width (dimensions/ratio)	445 ft. (L) x 145 ft. (W) = 3:1
Safety shelf design (length, grade, max. depth)	10 ft. @ 10% slope/1.5' deepest
Ave. water depth (minus safety shelf/sediment)	5 ft. (in center)
Sediment forebay size & depth	.16 acres (13% pool size)/5 feet
Sediment storage depth & design maintenance	2 ft. depth for forebay & pool 15 year maintenance schedule

Design Basin Inflow, Outflow & Storage Data

(see attached hydrographs and detail drawings)

Inflow Peak/Volume	Maximum Outflow Rate	Max. Water Elevation	Storage Volume at Max. Elev. (above perm. pool)	Outflow Control Structures*
1-yr./24 hr. (volume)	.7 cfs (34 hr. drawdown)	901.3 ft.	2 acre feet	#1
24.3 cfs (Post 2-yr./24 hr. peak)	11 cfs	902.0 ft.	3.1 acre feet	#1 and #2
72 cfs (Post 10-yr./24 hr. peak)	35 cfs	903.0 ft.	4.5 acre feet	#3
171 cfs (Post 100-yr./24 hr. peak)	143 cfs	904.0 ft.	6.0 acre feet	#3 and #4

* The controlling elements are summarized below (See attached detail drawing of outlet structure):

#1 = 6 inch orifice in water level control weir plate - flow line elev. @ 900.0 (1.3 ft. max. head)

#2 = 2 foot wide rectangular weir - flow line elev. @ 901.3 (.7 ft. hydraulic head)

#3 = 30 inch diameter smooth wall pvc pipe - flow line elev. @ 900.0 (3.0 ft. max. hydraulic head)

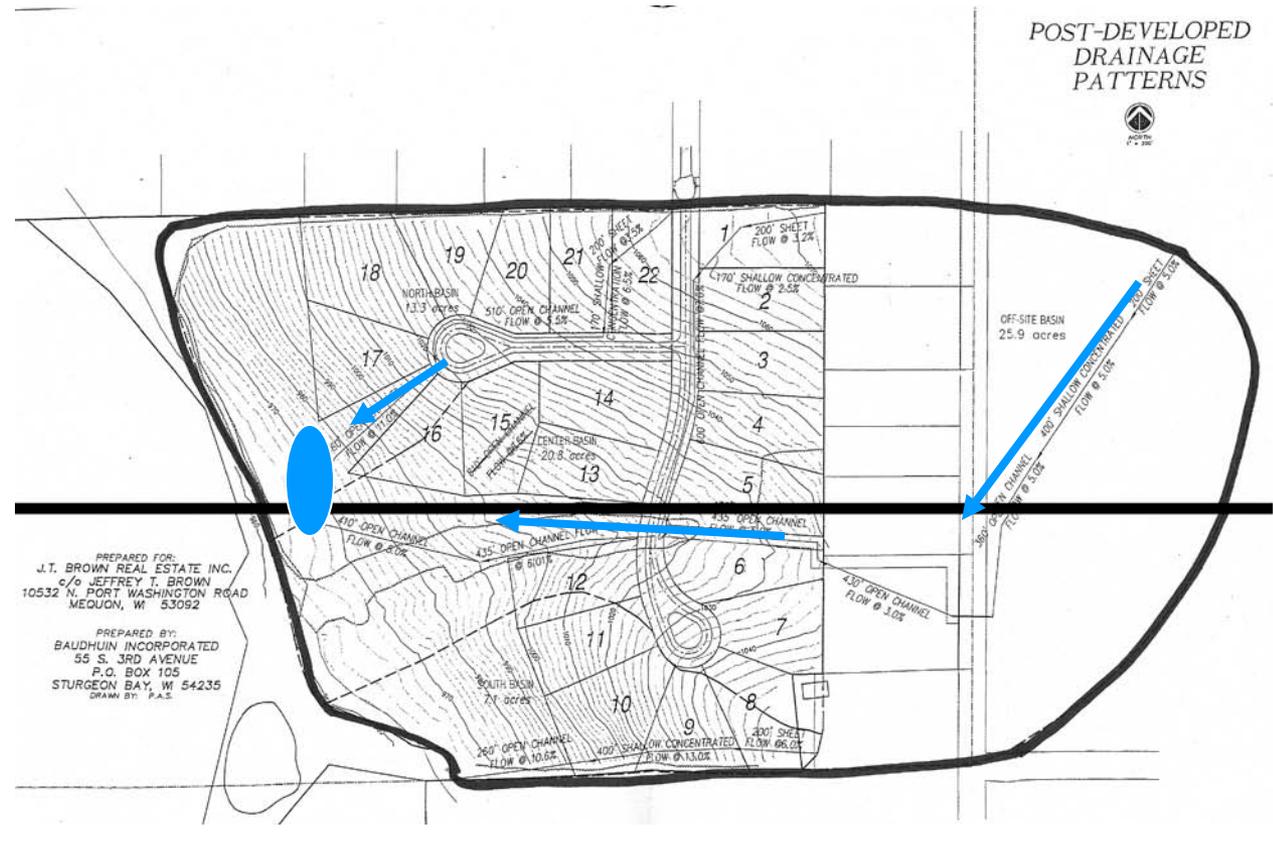
#4 = 30 foot wide earthen/grass emergency spillway - flow line elev. @ 903.0 (1.0 ft. max. depth)

Watershed Map (D)

Exhibit D (continued)

Watershed Map. The watershed map shown below was used to determine the post-development data contained in this exhibit. The post-developed watershed areas are the same as the pre-development watershed areas for this project.

[Map scale must be sufficiently large enough to show necessary details, but page size should not exceed 11" x 17".]



Construction Verification (F)

- Shows compliance with approved plans

Exhibit "F" Engineering/Construction Verification

DATE: _____

TO: Land Resources Division
Waukesha County Department of Parks and Land Use

FROM: _____, [Project Engineer's Name/Company]

RE: Engineering/Construction Verification for the following project:
Project Name: _____
Section _____, Town of _____
Storm Water Permit # _____
Storm Water Management Practices: _____

For the above-referenced project and storm water management practices, this correspondence shall serve as verification that: 1) all site inspections outlined in approved inspection plans have been successfully completed; and 2) the storm water management practice design data presented in Exhibit D, and the "as-built" construction documentation presented in Exhibit E comply with all applicable state and local technical standards, in accordance with the Waukesha County Storm Water Management and Erosion Control Ordinance.

[Must include one of the following two statements:]

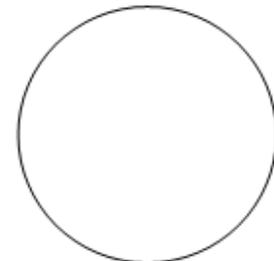
1. Any variations from the originally approved construction plans are noted in Exhibit E. These variations are considered to be within the tolerances of standard construction techniques and do not affect the original design as presented in Exhibit D in any way.

[Note: The County may request additional documentation to support this statement depending on the extent of deviations from the approved plans.]

Or

2. Any design or construction changes from the originally approved construction plans are documented in Exhibits D and E and have been approved by Waukesha County.

[Note: If warm season and wetland planting verification is required, it may be included in this exhibit.]



Permit Termination (G)

- Transfers BMP maintenance from permit holder to other entity (M.A.)
- After recording this, return the financial assurance & close project file

Exhibit G Storm Water Permit Termination

Project Identifier: Highland Preserve Subdivision

Location: All that part of the Southwest Quarter (SW ¼) of Section 4, Township 8N, Range 19E (Town of Lisbon)

Storm Water Permit Holder's Name: _____

Storm Water Permit #: _____

Chapter 14 – Article VIII of the Waukesha County Code of Ordinances (“Storm Water Ordinance”) requires that all newly constructed storm water management practices be maintained by the Storm Water Permit Holder until permit termination, after which maintenance responsibilities shall be transferred to the responsible party identified on the subdivision plat [or CSM] and referenced in this Maintenance Agreement.

Upon execution below, this exhibit shall serve to certify that the Storm Water Permit Holder has satisfied all requirements of the Storm Water Ordinance and that Waukesha County has terminated the Storm Water Permit for the property covered by this Maintenance Agreement.

Dated this ___ day of _____, 200_.

Waukesha County representative:

(Signature)

(Typed Name and Title)

Acknowledgements

State of Wisconsin
County of Waukesha

Personally came before me this ___ day of _____, 200_, the above named [Owners name] to me known to be the person who executed the foregoing instrument and acknowledged the same.

[Name]
Notary Public, Waukesha County, WI
My commission expires: _____

A solution for Old BMPs:

A BMP Maintenance Ordinance

Note: Can be added to
an existing storm
water ordinance

Why a BMP Maintenance Ordinance?

- Consistent method BMP maintenance enforcement, not just complaint driven
- Deal with old BMPs without maintenance agreements
- Sets process for:
 - Ordering inspections
 - Reporting
 - Ordering maintenance
 - Cost recovery
 - Enforcement



**Model Storm Water Ordinance Insert Language to Address
Long-term Storm Water Management Practice Maintenance**
(Waukesha County Land Resources Division)

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Legal Issues Involved (old BMPs)

- Can't fix deed problems with an ordinance
 - Changing deed language requires approval of by all affected property owners and their mortgage holders
 - Lack of access easements or easement definitions
 - Need landowner(s) permission, or inspection warrant
 - Conflicting or unclear deed language on BMP maintenance
 - Voluntary resolution/mediation; or court order

Example: Missing deed language

- SW pond with “drainage easement” on 14 lots
- Undefined easement restrictions and access authorities
- Undefined maintenance responsibilities
- Many more lots drain to the pond



A good Inspection form:



- Is specific to BMP type
 - Checklist of what to look for
 - Rates the condition of major components
- Lists any repair & maintenance needs
- Has a section for inspector notes
- Includes photos

Summary

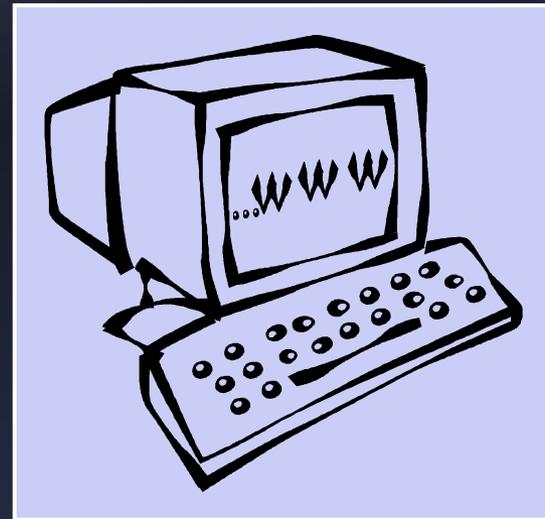
- Enforcing BMP maintenance is easier said than done
 - Maintenance Agreements work best for new sites (recorded during CSM/plat process)
 - Maintenance ordinances may be needed to deal with old BMPs (Pick your battles carefully)
- Be consistent (use checklists)!
- We are always learning!



On the Web

Search: “Waukesha County Storm Water”

- Sample ordinances
- Forms
- Check lists
- As-built standards
- Sample maintenance agreements



Thank You

