

# Storm Water BMP Maintenance

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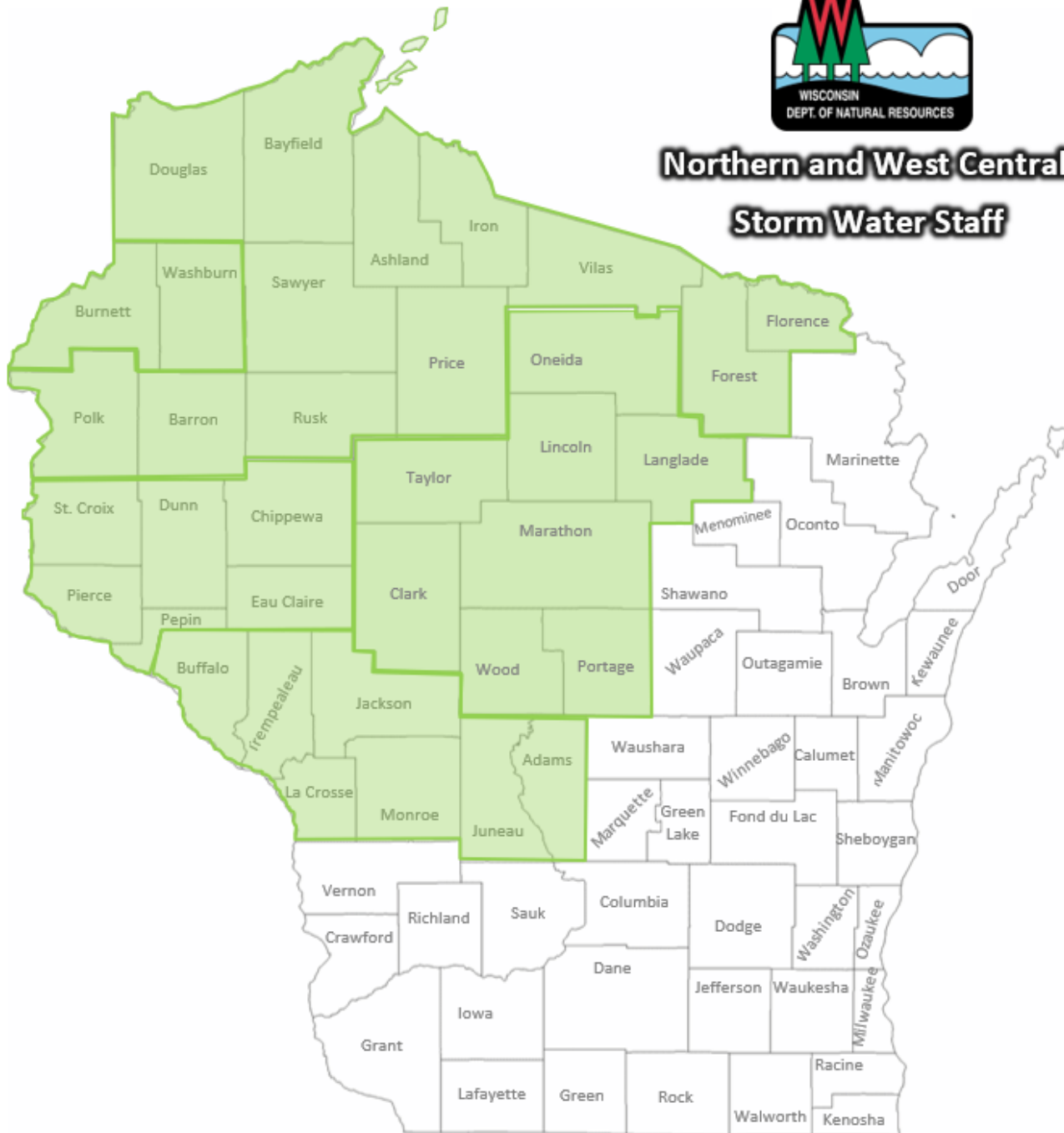
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## Northern and West Central Storm Water Staff





# Agenda



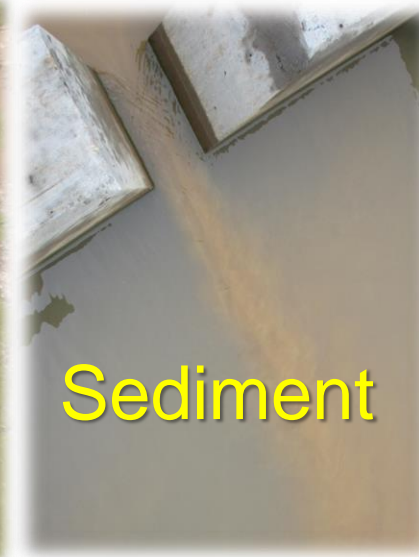
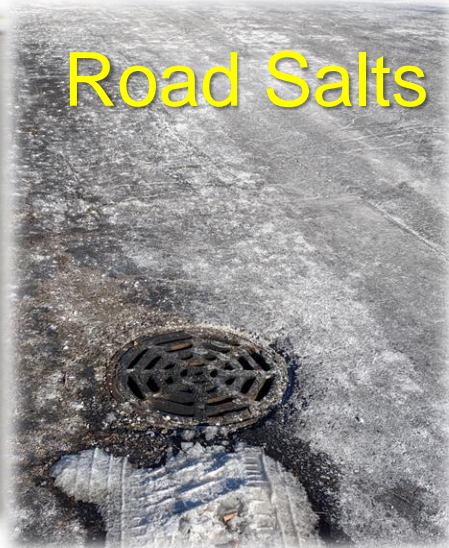
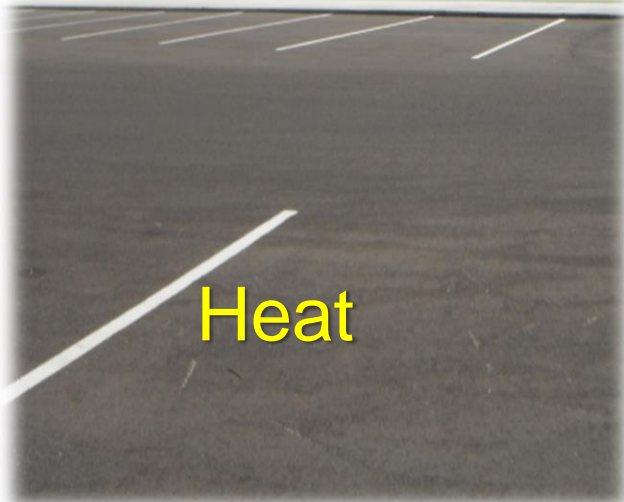
Importance of Maintenance

MS4 Permit Requirements

Maintenance Components and  
Expectations

Potential Applicable Permits

# Storm Water Composition



# Importance of Maintenance

Best Management Practices (BMPs) **improve water quality, protect downstream water bodies, reduce flooding,** and can be **aesthetically pleasing.**





# Importance of Maintenance

*Improper maintenance of BMPs not only **decreases their efficiency for removing pollutants**, but can also create environmental hazards such as **flooding** and **contamination** and can be **costly to repair**.*



# Importance of Maintenance

## **NR 216.005 Long-term storm water maintenance requirements.**

The long-term storm water management practices installed by the landowner in accordance with a storm water management plan shall be maintained in accordance with the long-term maintenance agreement submitted to the department pursuant to s. [NR 216.47 \(5\)](#).

NR 216.005 Note: Pursuant to the requirements to maintain the long-term storm water management practices in accordance with ss. [NR 151.12](#) to [151.128](#) and [151.24](#) to [151.249](#), the department may take enforcement action under this section and s. [281.98](#), Stats., against a land owner for not maintaining long-term storm water management practices.

# Importance of Maintenance

The pollutant removal and flood control capabilities of ponds will decrease if:



- Debris blocks the outlet structure
- Pipes or risers are damaged
- Invasive plants out-compete wetland plants
- Sediment accumulates in the pond, reducing the storage volume
- Slope stabilizing vegetation is lost
- The structural integrity of the embankment is compromised





# Importance of Maintenance & Mosquitoes

- **If designed and maintained properly, stormwater structures should not promote mosquito breeding.**
- Infiltration/filtration BMPs within 24 or 48 hours



# MS4 Permit Requirements





# Permit Requirements-Private

## **2.5.4 Long-term maintenance, inspections and enforcement.**

Written procedures...to, at a minimum, track and enforce the long-term maintenance of storm water management facilities implemented to meet the applicable post-construction performance standards...The procedures shall include:

- a.** A mechanism for tracking regulated sites.
- b.** At a minimum, long-term maintenance inspections shall occur once per permit term.
- c.** Inspection documentation.
- d.** Follow up enforcement with timeframes for corrective maintenance.



# Permit Requirements-Public

**2.6.1 Storm water management facilities.** Update and maintain an inventory of municipally owned or operated storm water BMPs such as wet detention ponds, bioretention devices, infiltration basins and trenches, permeable pavement, proprietary sedimentation devices, vegetated swales, or any similar practices or devices used to meet a water quality requirement under this permit...

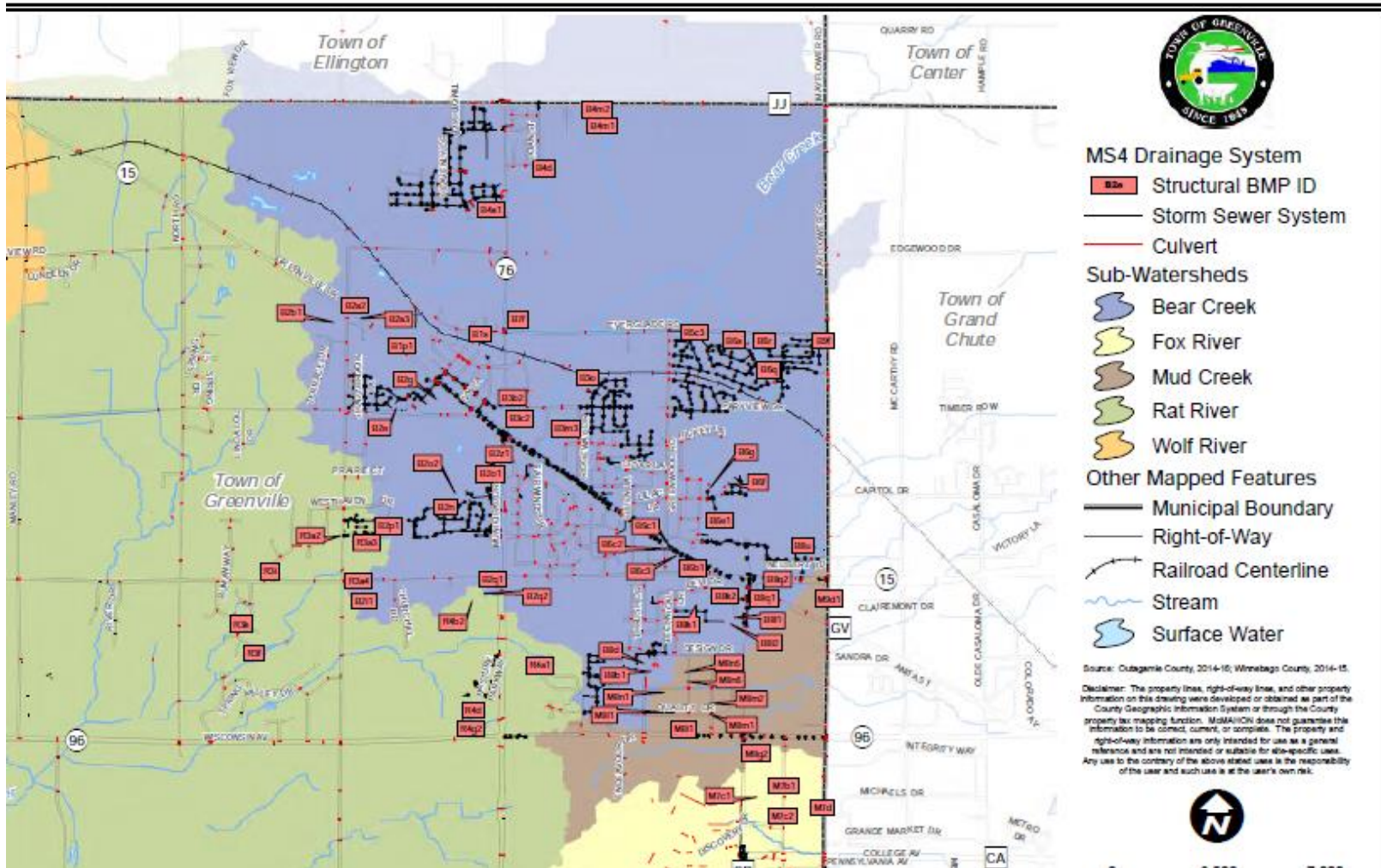
**2.6.2** For each BMP inventoried under section 2.6.1, the permittee shall develop and implement a maintenance plan with inspection procedures and schedule to maintain the pollutant removal operating efficiency of the practice in compliance with any water quality requirement under this permit.  
Documentation of inspections and maintenance activities shall be maintained.



# Step 1: Inventory BMPs

- Swales by Street or Subdivision
- Catch basins with sumps by street or subdivision
- Permeable Pavement
- Proprietary Devices
- Filter Strips
- Ponds & Biofilters

# Inventory Map



## MS4 Drainage System

- 02a Structural BMP ID
- Storm Sewer System
- Culvert

## Sub-Watersheds

- Bear Creek
- Fox River
- Mud Creek
- Rat River
- Wolf River

## Other Mapped Features

- Municipal Boundary
- Right-of-Way
- Railroad Centerline
- Stream
- Surface Water

Source: Outagamie County, 2014-16; Winnebago County, 2014-15.

Disclaimer: The property lines, right-of-way lines, and other property information on this drawing were developed or obtained as part of the County Geographic Information System or through the County property tax mapping function. MDA/AGI does not guarantee this information to be correct, current, or complete. The property and right-of-way information are only intended for use as a general reference and are not intended or suitable for site-specific uses. Any use to the contrary of the above stated uses is the responsibility of the user and such use is at the user's own risk.





# Step 2: Clarify Responsibilities

<b>Property Owner</b>	<b>Public Easement for Maintenance</b>	<b>Maintenance Agreement</b>	<b>Responsible Party</b>	<b>Include in Pollution Control Models</b>
Municipality	N/A	N/A	Municipality	Yes
Other unit of government	N/A	Yes	Per agreement	Yes
Private	Yes	Recommended	Municipality	Yes
Private	No	Yes	Private	Yes
Private	No	No	Private	No



# Additional Considerations

- Shared regional ponds-agreements should clarify who is responsible for maintenance, how it will be paid for
- Working with condo and homeowner associations can present unique challenges





## Step 3: Develop and Implement a Plan

- Condition Inspections
- Maintenance Work Orders
- Special considerations:
  - Airport Areas-Maintain wildlife deterrents
  - Adopt-a-Pond programs
  - Site-specific needs (in park, near wetland, etc.)



# Approaches for Privately Owned BMPs

- Municipal inspection-private entity maintenance
- Municipal inspection-municipal maintenance-bill to private entity
- Owner required to submit Engineer Certification that BMPs have been inspected, maintained, and are functional



# No Maintenance Agreement

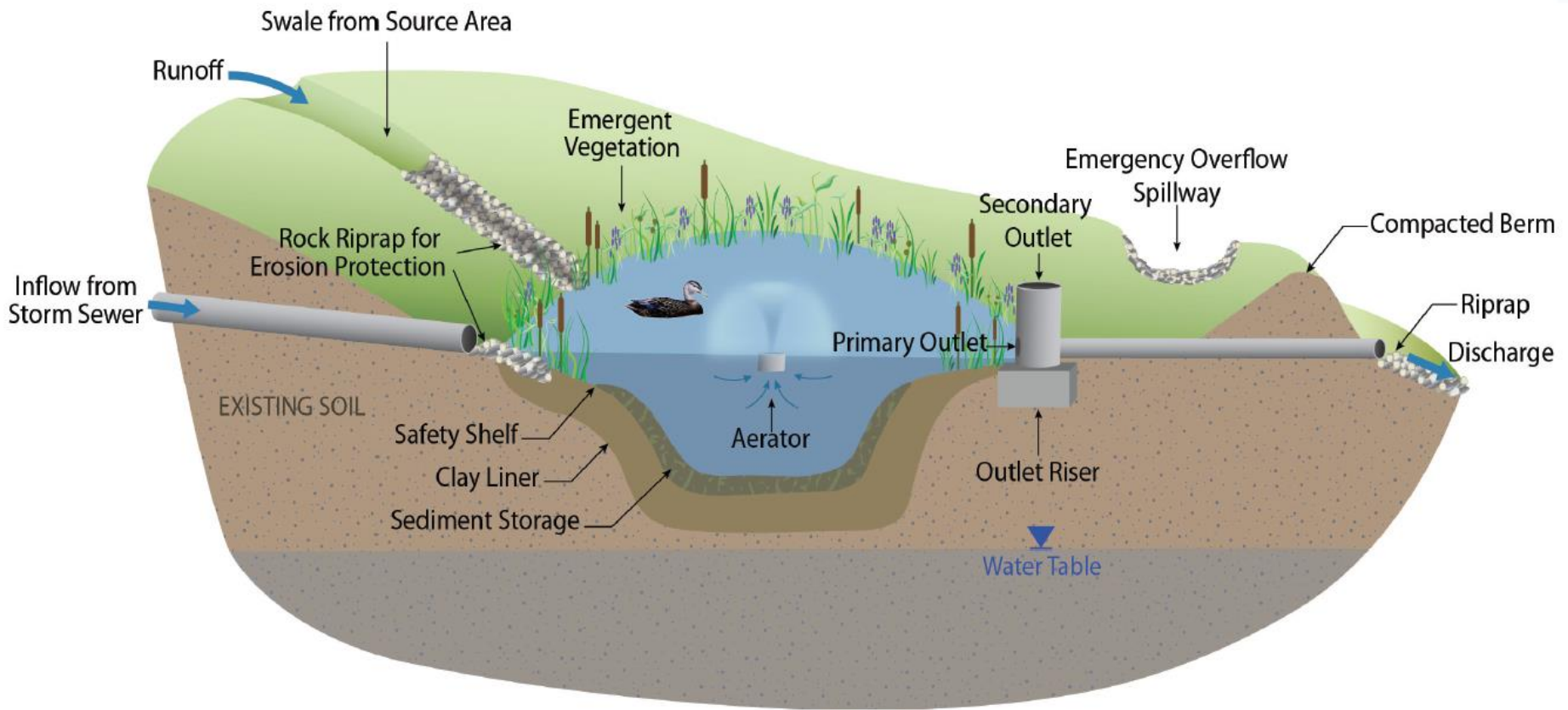
## Options

- Overarching ordinance that requires maintenance for any storm water BMP
- Negotiate maintenance agreement
- Buy property BMP is on
- Offer incentive for maintenance agreement



# Minimum Maintenance Expectations

# Wet Ponds





# Wet Pond Tech Std 1001

in wet detention ponds with less than a 5 ft. permanent pool designed depth.

- iv. Configure the pump intake to draw water primarily from a horizontal plane so as to minimize the creation of a circulatory pattern from bottom to top throughout the pond.

## VI. Operation and Maintenance

Develop an operation and maintenance plan that is consistent with the purposes of this practice, the wet detention pond's intended life, safety requirements and the criteria for its design. The operation and maintenance plan will:

- A. Identify the responsible party for operation, maintenance and documentation of the plan.
- B. Require sediment removal once the average depth of the permanent pool is 3.5 ft. At a minimum, include details in the plan on inspecting sediment depths, frequency of accumulated sediment removal, and disposal locations for accumulated sediment (NR 500, Wis. Adm. Code).
- C. Include inlet and outlet maintenance, keeping embankments clear of woody vegetation, and providing access to perform the operation and maintenance activities.
- D. Identify how to reach any forebay, safety shelf, inlet and outlet structures.
- E. Address weed or algae growth and removal, insect and wildlife control and any landscaping practices.

- F. If a liner is used, show how the liner will be protected from damage during sediment removal or when the liner is undergoing repair.
- G. Prohibit excavation below the original design depth unless geotechnical analysis is completed in accordance with V.A.1.b & c.

## VII. Considerations

Consider the following items for all applications of this standard:

- A. Additional conservation practices should be considered if the receiving water body is sensitive to temperature fluctuations, oxygen depletion, excess toxins or nutrients.
- B. To prevent nuisance from geese, consider not mowing around the pond perimeter. To maximize safety and pollutant removal, consider spreading topsoil along the safety shelf to promote plant growth.
- C. For ease of maintenance, a sediment forebay should be located at each inlet (unless inlet is < 10% of total inflow or an equivalent upstream pretreatment device exists) to trap large particles such as road sand. The storage volume of the sediment forebay should be consistent with the maintenance plan, with a goal of 5%-15% of the permanent pool surface area. The sediment forebay should be a minimum depth of 3 ft. plus the depth for sediment storage.
- D. The length to width ratio of the flow path should be maximized with a goal of 3:1 or greater. The flow path is considered the general direction of water flow within the pond, including the permanent pool and forebay.
- E. Consider providing additional length to the safety shelf, above or below the wet pool elevation, to enhance safety.
- F. To prevent damage or failure due to ice, all risers extending above the pond surface should be incorporated into the pond embankment.
- G. The use of underwater outlets should be considered to minimize ice damage, accumulation of floating trash or vortex control.
- H. If a liner is used, show how the liner will be protected from damage during sediment removal or when the liner is undergoing repair.
- I. Prohibit excavation below the original design depth unless geotechnical analysis is completed in accordance with V.A.1.b & c.
- J. If downstream flood management or erosion is a concern, consider conducting a watershed study to determine the appropriate location and design of management structures, including consideration of potential downstream impacts of practices and other land uses.
- K. For wet detention ponds with surface area greater than 2 acres or where the fetch is greater than 500 feet, consider reinforcing bank with a safety shelf, vegetating the safety shelf, and other measures to prevent erosion of the embankment due to wave action.
- L. To prevent failure, consider reinforced emergency spillways constructed of concrete or stone material to protect against erosion.
- M. All flow channels draining to the pond should be stable to minimize sediment delivery.
- N. Baffles may be used to artificially alter the flow path in the pond. In some cases, a circular flow path is set up in a pond where the inlet and outlet are next to each other and baffles are used. Then the flow path is calculated using the circular path.
- O. Consider using low fertilizer input on pond embankments and collecting the fertilizer runoff.
- P. Consider providing a method to facilitate dewatering during accumulated sediment removal.
- Q. Consider using backflow preventers to prevent fish entrapment.
- R. Consider providing a terrestrial buffer zone of 10-15 feet around the pond if it has no embankments.
- S. Consider a hard surface for the bottom of the forebay to ease sediment removal.
- T. Use of algacides, herbicides or pesticides to control nuisance growths or to enhance sedimentation must receive a permit from NR 107, Wis. Adm. Code. Contact an appropriate DNR specialist.
- U. Consider additional safety features such as a safety shelf where conditions warrant.

# Wet Pond Maintenance-Minimum

- Routine Maintenance Check Items
  - Trash Control
  - Vegetation Management/Woody Vegetation
  - Animal Damage & Erosion
  - General Condition
  - Inlet and outlet integrity
  - Sediment Depth  
(less frequent ~5 year cycle)



## - Trash Control



**Figure M2.2: Clogged low flow orifice (before maintenance).**



**Figure M2.3: After clog is removed.**



# -Vegetation Management/Woody Vegetation



**Figure M4.1: Bare soils on embankment and slopes.**



**Figure M4.2: Excessive vegetation near an outfall.**

# -Animal Damage & Erosion



**Figure M8.1: Animal burrow in pond embankment.**



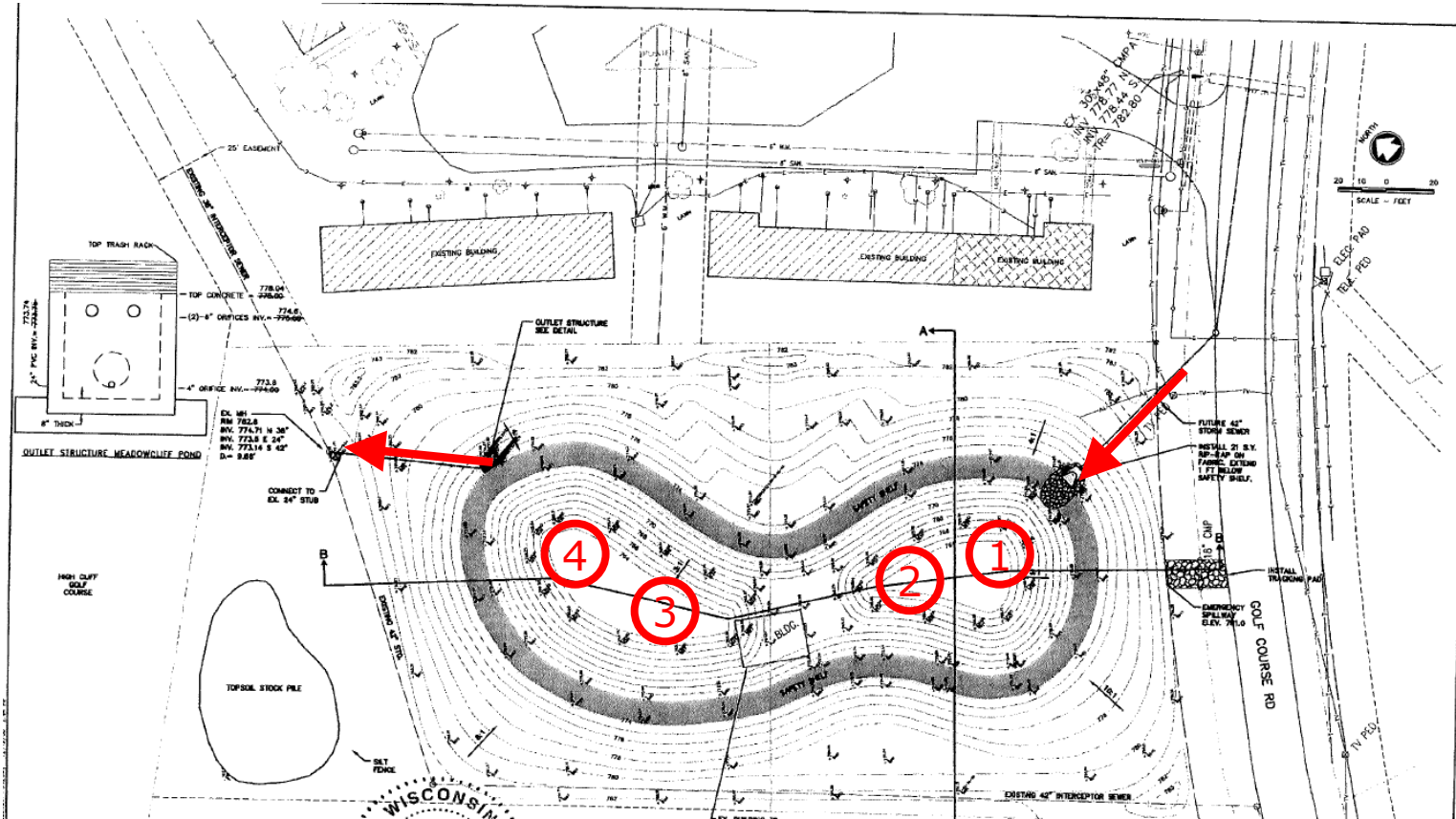
**Figure M4.4: Vegetated buffer.**

## - Sediment Depth

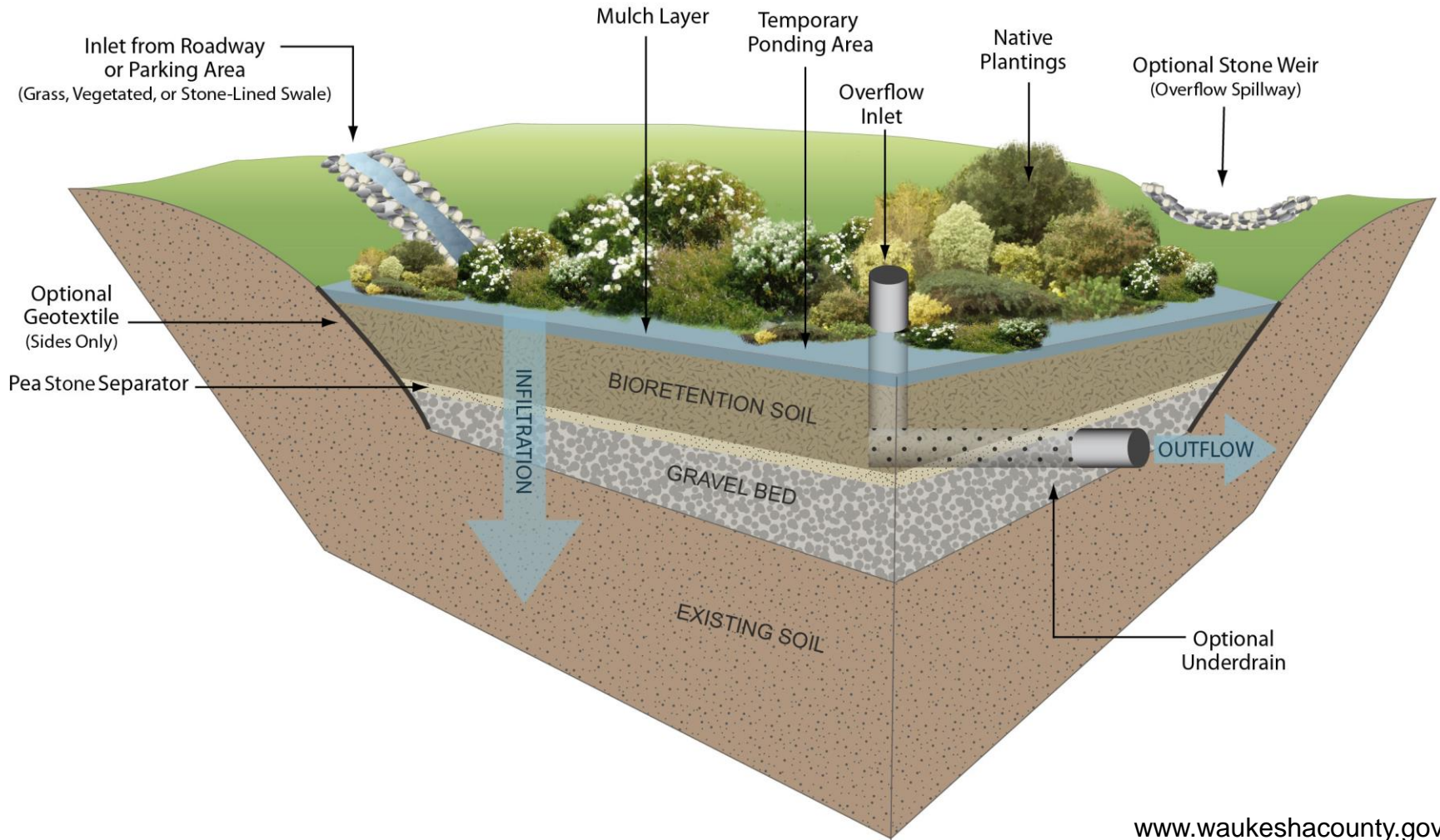


**Figure M5.2: Measuring pond depth from canoe.**

# Where to measure sediment?



# Bioretention



# Biofilter Maintenance-Minimum

- Trash control
- Vegetation establishment and mulch
- Clogging of underdrain/signs of ponding > 24 hrs on surface
- General Condition
- Inlet and outlet condition





# Tech Standard

Longevity of engineered soil is decreased by clogging, and accumulation of sodium.

- Clogging problems can be reduced by limiting input of sediment
- Sodium accumulation can be countered by adding gypsum to the soil and/or by allowing 1" of clean water to percolate through the planting bed 3-4 times in spring.



**Table 6. Typical Maintenance Activities for Bioretention Areas**

<b>ACTIVITY</b>	<b>FREQUENCY</b>
Water Plants	As necessary during first growing season
Water as necessary during dry periods	As needed after first growing season
Re-mulch void areas	As needed
Treat diseased trees and shrubs	As needed
Inspect soil and repair eroded areas	Monthly
Remove liter and debris	Monthly
Add additional mulch	Once per year



# Swale Maintenance-Minimum

## Routine Maintenance Check Items

- Rutting or compaction
- Standing water, woody vegetation, and trash
- Sediment accumulation or erosion
- Vegetation height





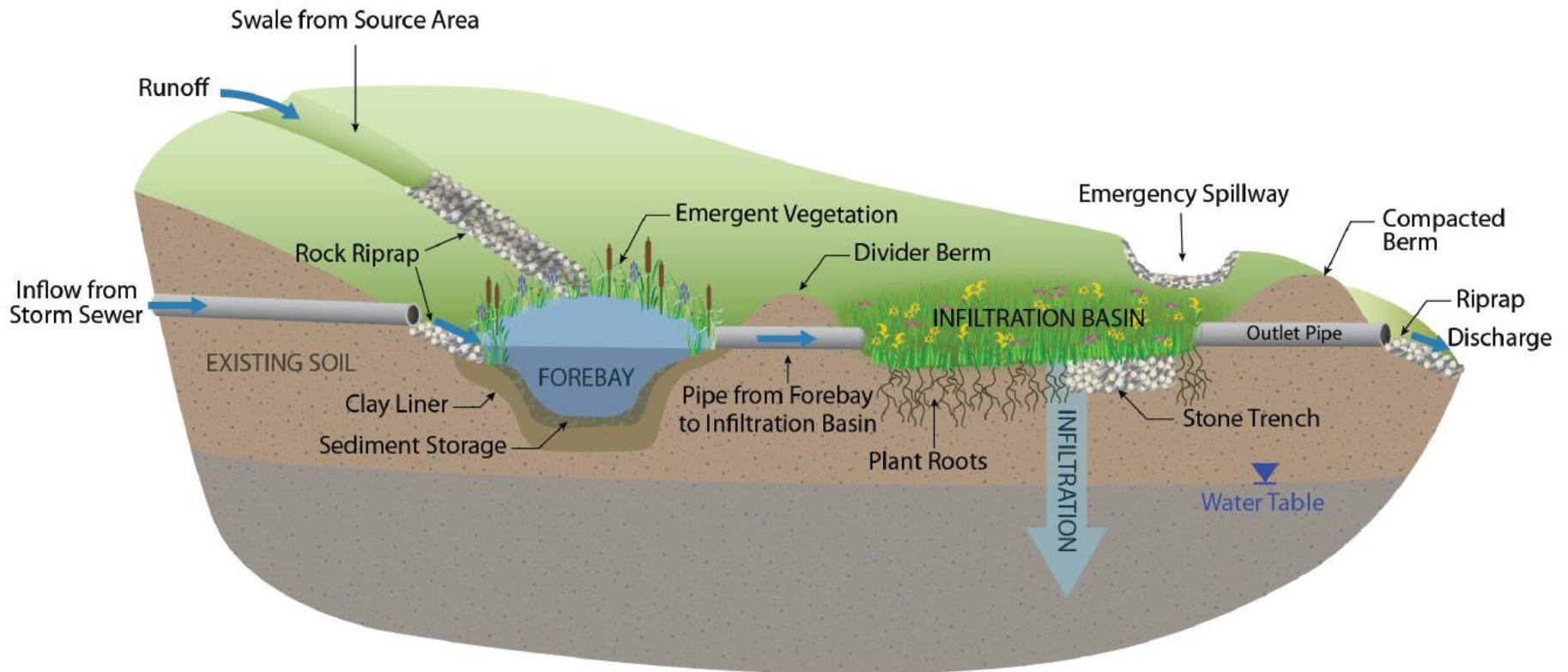
# Tech Standard

## VIII. OPERATION AND MAINTENANCE

Prepare a site-specific annual inspection and maintenance plan for the swales that addresses the following:

- A. Identify the responsible party.
- B. Limit off-street parking or other activities that may cause rutting or soil compaction in swales and repair as needed.
- C. Inspect swales annually to detect and remedy nuisance conditions such as standing water, weeds, woody growth, and trash dumping. Limit the use of pesticides and fertilizer if swale is used for water quality control.
- D. State the proper vegetation type and design height for dense vegetation in the maintenance plan, and maintain the specified height when mowing or cutting.
- E. Remove sediment when infiltration rates are impeded, sediment accumulation is visible, or if standing water exists for 48 hours after a rainfall/runoff event. Avoid compaction of the soil in the swale during the sediment removal process. After sediment removal, repair any damaged or eroded areas by filling with topsoil that meets appropriate infiltration requirements. If compaction occurs, restore the swale infiltration capacity by mitigating for compaction as described in V.G.6.b. Mitigation practices can include subsoiling or chisel plowing as described in V.G.6.b. Reseed as needed to reestablish vegetation.
- F. Implement erosion control measures if erosion during construction or maintenance becomes severe enough to prevent establishment of vegetation. Refer to WDNR Technical Standards “Channel Erosion Mat” (1053), “Mulching for Construction Sites” (1058), and “Seeding for Construction Site Erosion Control” (1059) for further guidance.

# Infiltration Basin





# Infiltration Basin Maintenance- Minimum

- Trash control
- Inlet and outlet integrity and energy dissipation
- Embankment integrity
- Erosion, animal damage, woody vegetation
- Sedimentation
- Standing water



# Tech Standard

A. Inspection Intervals – At minimum, quarterly inspections shall occur. Inspection shall include spreader and overflow spillway for indication of failure. Note the condition of vegetation as part of inspection. **If standing water is observed over 50% of the basin floor 3 days after rainfall, the basin is clogged and measures should be undertaken to unclog it.**



# Tech Standard

## **B. Native Vegetation - Maintenance of Native Vegetation – Mowing (cutting) or burning shall be used to maintain the vegetation.**

1. Establishment - The first mowing of newly planted seed shall occur once it reaches a height of 10 to 12 inches.

### 2. Mowing

a. Mowing shall reduce the height of plants to 5 to 6 inches.

b. After establishment, if burning cannot be accommodated, mowing shall occur once in the fall (after November 1). The area shall be mowed to a height of 5 to 6 inches.

### 3. Burning

a. Routine Maintenance – Beginning the second year, burning shall occur in the early spring (prior to May 1st) or in the late fall (after November 1st)

b. Burning shall be done two consecutive years and then up to three years can pass before the next burning.

c. Under no circumstances shall burning occur every other year.



# Tech Standard

**C. Restoration Procedures** –removing the top 2 to 3 inches, chisel plowing and adding topsoil and compost. If deep tilling is used, the basin shall be drained and the soils dried to a depth of 8 inches.

If the basin was planted in turf grass and clogging again occurs after these restoration procedures have been used, the owner /operator shall replant with prairie vegetation using the soil preparation method recommended by a local native nursery

**D. Trash shall be removed as quickly as possible once observed.**

**F. Winter Maintenance** – All draw down devices in the pond shall be opened during winter months to discourage infiltration of runoff water containing high levels of chlorides. If this practice is an enclosed basin, the use of chloride deicers shall be limited in the area draining to the basin to reduce the chance of exceeding the limits in ch. NR 140.



# Potential Applicable DNR Permits



# WHOSE POND IS IT ANYWAY?

*A quick reference guide on maintaining your community's storm water pond and where to get more information.*

- **What is a storm water pond?** Storm water ponds are one of several best management practices developers may choose to use for water quality and storm water capacity control, as mandated by state and local ordinances. Storm water ponds are typically part of the overall development plan and must be maintained in perpetuity.



Pond with landscaping. DNR Photo.

- **Maintaining your storm water pond**
  - Start by gathering information.
  - Determine who is responsible for maintaining the pond. This may be spelled out in a maintenance agreement between the owner and local municipality, however, this may not be the case with all ponds.
  - Obtain a copy of the engineering plans and any "as-built" surveys that exist. The local municipality or design engineer should be able to provide you this.
  - Inspect the pond: This may require hiring someone with experience in certifying storm water

Storm Water Runoff Permits
Construction Permits
Industrial Permits
Municipal Permits
Technical Standards and BMPs
Publications & Guidance

Related Links
<a href="#">What is Storm Water Runoff?</a>
<a href="#">Nonpoint Source Pollution</a>
<a href="#">Water ePermitting System</a>



# Accumulated Sediment Removal

- Sediment sampling and disposal= NR 528 Rule for Accumulated Sediment from Storm Water Management Ponds (**Solid Waste**)
- Dewatering= Pit Trench Dewatering General WPDES Permit (**Wastewater**)
- Dredging Operations= Carriage and Interstitial Water General WPDES permit (**Wastewater**)
- Construction Site Storm Water Discharge General Permit for Land disturbing activities of 1 acre or more (**Storm Water**)
- Near waterways or wetlands (**Waterways & Wetlands**)  
Information #: **(608)-267-3125**



# NR528

1. Evaluate the land uses around the pond to determine whether sediment sampling is necessary.
2. If required, contract with an environmental professional to sample the sediment and analyze it for contaminants.
3. Have an environmental professional conduct a risk analysis based on any contaminants found in the sediment and the proposed end use
4. Based on the risk analysis and available resources, determine the appropriate end use, which may include landfilling if the risk levels are too high for other uses

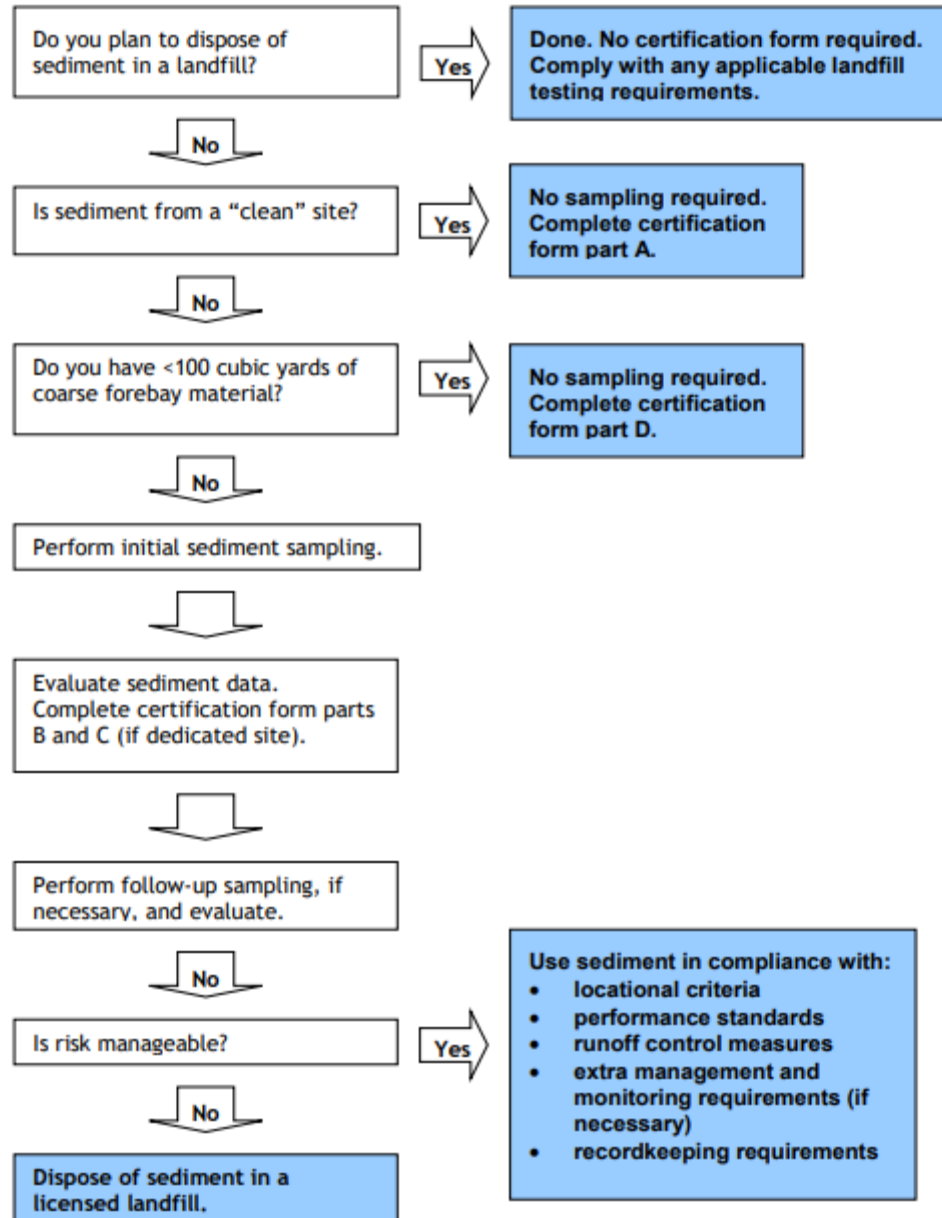


# NR528

Sampling and evaluating sediment prior to removing and disposing of it may not be necessary if the land surrounding a pond or other structure:

- has less than 15 percent non-residential (one to two family) land use;
- has no areas of suspected contamination;
- has no historical events negatively affecting sediment management; and
- has no hazardous substance spills.

## Accumulated Sediment Disposal/Use Flow Chart





**Nuisance algae growth?** Does your subdivision have lawn fertilizer guidelines? What does your lawn really need? Start with a soil test and check out these brochures:

- [Lawn and Garden Fertilizers \[PDF, Exit DNR\]](#) describes how improper fertilizer applications can degrade water quality and offers suggestions for proper fertilizer use.
- For areas over 5 acres see: [Turf Nutrient Management](#) technical standard



**Landscaping:** Landscaping and vegetation to help with water quality, aesthetics and nuisance wildlife. See [UWEX Publication GWQ045 \[PDF, exit DNR\]](#).



# Aquatic Plant Management

- Chemical control for nuisance aquatic plants require a permit.

**Please contact your local aquatic plant management coordinator before engaging in any aquatic plant management or nuisance control activities.**

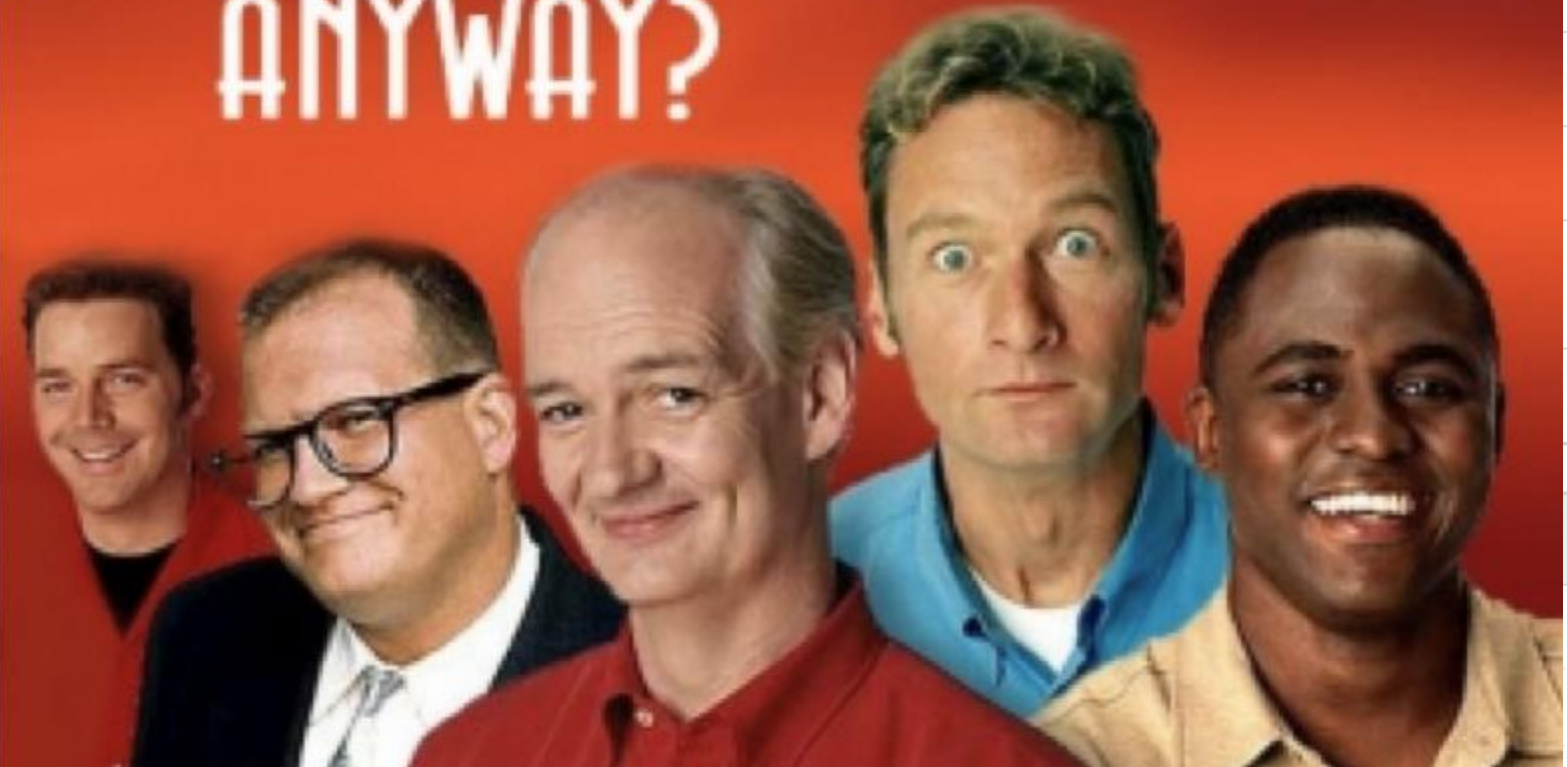


# WHOSE

A quick reference  
informational

- What is a pond?
  - Several uses for ponds
  - Mandated for certain uses
  - Typical maintenance
- Maintenance
  - Start with a plan
  - Determine maintenance needs
  - Obtain necessary permits

# WHOSE POND IS IT ANYWAY?





When in doubt, reach out!

