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The NorthEast Wisconsin Stormwater Consortium collaborative, member organization that provides support for entities subject to Municipal Separate Storm Sewer System Permitting.

Communities Working Together for Cost Effective Stormwater Management & Regulatory Compliance

FOR MORE INFORMATION…

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NEWSC is part of the Fox-Wolf Watershed Alliance

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Stormwater Best Management Practice (BMP) Informational Guide

Stormwater Ponds

Vegetation Management & Maintenance

Whether you work for a municipality, are an elected official tasked with making planning decisions or are the owner (or part-owner) of a private stormwater facility,

The information in this brochure can help you make educated decisions regarding the proper management, maintenance and care of the vegetation in and around your stormwater pond.

The intention of this guide is to provide individuals involved in the **Planning, Management, Maintenance and Inspections** of stormwater ponds with a general educational knowledge.

The information in this guide was compiled from various sources, but mainly from information presented at various trainings and workshops that were formulated and presented by the NorthEast Wisconsin Stormwater Consortium.

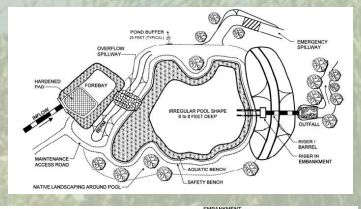
Additional information and knowledge regarding specific subjects within this guide can be obtained by contacting the NEWSC Organization or through simple internet searches.

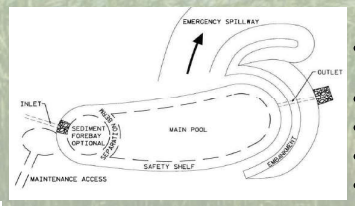
The baseline knowledge that this guide provides, will allow you to become familiar with stormwater pond features, planning considerations, management techniques, proper inspections and maintenance procedures.

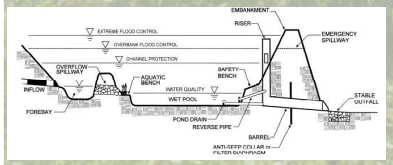
NorthEast Wisconsin Stormwater Consortium

Site Selection & Planning

Good stormwater pond vegetation starts with the planning process, before the pond is even built. Pre-planning efforts are the proper beginning to good aquatic and terrestrial vegetation. Plan development will play a crucial role in future pond maintenance activities, aesthetics and function. Here are some key considerations for planning a new pond or restructuring an existing pond.







A general knowledge of stormwater pond design and function will aid in planning, management and maintenance decision making.

Whether you are planning a new private or public stormwater detention pond or if you are upgrading, modifying or re-constructing an existing pond, knowing and considering all of the above can aid in making sure that the overall future outcome meets the needs, wants and desires of those affected.

Balancing all of the factors during stormwater pond planning efforts can be tricky, but making good, well educated decisions as well as good compromises will greatly affect the outcome and result in a project that meets its goals and priorities.

- Whether the pond will be owned **Publicly** or **Privately** may help determine the types of vegetation in and around the pond when considering maintenance activities.
- Establishment of clear **Goals** and **Priorities** while considering needs, requirements, desires, budgets and costs.
- Consideration of pond **Function** (flood control, pollutant reduction, recreation) can affect project planning decisions.
- **Evaluation of the Watershed, Hydrology and Soils** can also help determine the right types of vegetation for in and around the pond.
- Determining the ponds **permanent pool levels** can help determine the types of vegetation the pond will support.
- **Plant Establishment:** assessing how plants will become established in and around the pond should be considered during the planning stage. Will plantings be made from seed, pre-grown plugs or other methods.
- Site plan **layout and grading** can affect vegetation maintenance.
- **Initial erosion protection and/or use of riprap:** The types of vegetation chosen may affect the type of erosion protection needed after pond construction.
- The use of **Riprap** can also affect aquatic, emergent and terrestrial vegetation choices.
- When planning in-pond vegetation, consider how the pond will be **Accessed** to address vegetation maintenance.
- **Access** to the area around the pond and the overall **Pond Vegetation Operation and Maintenance Plan** should be considered when
- determining the types of vegetation in and around a stormwater pond.
- **Regulations:** are there any regulations that pertain to pond vegetation?
- **Additional Design Considerations may include:**
  - Future Pond Aestetics
  - Pond Ecology and Nuisance Animal Control
  - Maintenance Agreements
  - Construction Sequencing
  - Ecology and Habitat

Proper Planning can save on construction and maintenance costs while still providing functionality.

DEVELOP plans for construction and maintenance
CONSULT the plan before, during and after construction
MODIFY plans, when necessary

Remember! It is just a plan. Plans can change as priorities, goals, objectives, regulations and various other reasons change.

Additional Resources

WISCONSIN DNR: SEARCH Technical Standard 1001
WISCONSIN NRCS: SEARCH Structure for Water Control, 587 Or Pond, 378
UNITED STATES EPA: SEARCH Stormwater

Pond Vegetation: Inspections

Routine inspections of stormwater ponds are not only required for municipal separate storm sewer system permit compliance, they are also valuable for pond vegetation management and maintenance. The types of aquatic and terrestrial vegetation can affect pond function and ecology. In addition, routine inspections drive management & maintenance decisions for safety, longevity and effectiveness of the facility.

A few tips and tricks before heading out…

Read and understand the Operations & Maintenance Plan.

Be able to identify aquatic and terrestrial vegetation.

Find, develop or prepare inspection assessment tools.

- Knowing the stormwater ponds overall management plan should aid with vegetation inspections. The type of aquatic and terrestrial vegetation being managed on-site should have an affect on inspections. In
- addition, the type of vegetation management utilized can also aid during inspections.
- Using assessment and tracking tools will help in long term management and maintenance activities.
- Consider creating a site specific checklist, database or other tool to utilize for routine inspections. GIS mapping tools can also be utilized. Some things to consider during development, include:
  - Be quantitative
  - Be specific and concise
  - Identify problems and provide recommended
  - actions
- The ability to identify native, non-native and invasive aquatic, emergent, wetland and terrestrial species is needed in order to property inspect, manage and maintain stormwater pond vegetation. Some identification resources that can help include:
  - WDNR publication: A Field Guide to Terrestrial Invasive Plants in Wisconsin"

It can be noted that no two ponds will be the same when it comes to vegetation management inspections. A pond that is being managed for certain in-pond, near -shore and upland prairie plants is not the same as a pond that is being maintained for recreational uses. Stormwater ponds can also have riprapped banks without any near-shore or upland plant species. In addition, some ponds have mowed lawns as near-shore and upland vegetation.

Pond inspections will need to account for the individual pond sites, management plans and varying degree of complexities.

Indications of Vegetative problems may include:

- Standing water
- Lack of vegetation or poor plant growth
- Wet or Soggy areas
- Excessive sedimentation
- Areas of erosion, rilling, channels, etc.
- Woody vegetation growth
- Illegal dumping
- Growth/Establishment of Invasive species
- Vegetative growth of plants not identified in the management plan
- Presence of nuisance animals
- Overabundance of aquatic vegetation
- Excessive Algal Growth

Ponds with infrequent inspections can become problematic and costly if vegetation has not been properly maintained.

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Additional Resources

GOOGLE SEARCHES FOR THE FOLLOWING WILL PROVIDE RESULTS
"STORMWATER POND VEGETATION"
"STORMWATER POND INSPECTIONS"

Pond Vegetation: Maintenance

Proper pond vegetation maintenance activities play an important role in pond aesthetics, pond function, pond and near pond ecosystems, erosion control and invasive species prevention. The overall pond Operations and Maintenance plan should provide details on the desired aquatic and terrestrial vegetation. Inspections reports should also be utilized to determine the maintenance activities for the site.

Terrestrial Vegetation Management Activities

MOWING is one of the most widely used vegetation management activities. Many ponds located in parks, subdivisions and other areas use traditionally mowed lawns in terrestrial vegetated areas. Mowing can also be utilized as a vegetation management tool in other plantings such as planted prairies. Mowing can also be used to control some types of invasive species.

PRESCRIBED BURNS can be a successful tool for managing certain upland pond plantings. Many prairie plantings do very well after burning. Additionally, burning can help control woody vegetation while also providing great habitat for various species.

Additional Resources

GOOGLE SEARCHES FOR THE FOLLOWING WILL PROVIDE RESULTS
"STORMWATER POND VEGETATION MAINTENANCE"

Invasive Species Management and Control Activities

TERRESTRIAL Invasive Species control activities will vary depending on the type and amount of infestation. **Chemical treatments** can be sprayed on large areas or with backpack sprayers on small areas. Handwicking herbicides on individual plans is also an option. Hand pulling can be used as well.

WETLAND Invasives can be treated similarly to terrestrial species. However, some wetland plants such as purple loosestrife have additional options. In the case of purple loosestrife, beetles can be used.

AQUATIC Invasive Species can be controlled through chemical treatments and handpulling. Additional tools to consider involve mechanical means and the unique method of Diver Assisted Suction Harvesting (DASH).

Certain invasive species present unique problems and challenges and may require specialized treatments. Additional research should be done in order to provide cost-effective and efficient control and maintenance.

Aquatic Vegetation Management Activities

DREDGING can be considered an aquatic vegetation management activity, especially for older ponds. As ponds perform one of their main functions of removing sediment and other solids in stormwater, pond levels will fluctuate and can have an effect on pond vegetation.

ADDITIONAL aquatic vegetation management activities can include wetland plant harvesting, pond draining or drawdowns, mechanical harvesting, handpulling and in some cases, chemical controls.

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Excessive Algal Growth can be controlled...

By promoting the establishment of desirable aquatic plants and eliminating nutrient sources. Pond aeration can also help reduce algae. In some cases, algaecides will need to be utilized.

Speakers & Presenters

Jon Gumtow: PWS, PSS, Senior Wetland Ecologist—Stantec
Kevin Kimmes: PE, Senior Water Resource Engineer—Stantec
Aaron Volkening: PE, Senior Project Engineer—Stantec
James Havel: Senior Ecologist—Robert E Lee/NES Ecological Services
Levi Koski: Restoration Ecologist & Burn Boss—Robert E Lee/NES Ecological Services
Ashley VandeVoort: Restoration Ecologist—Robert E Lee/NES Ecological Services
Zach Haas: Senior Aquatic Biologist—WI Lake & Pond Resources, LLC
Scott Koehnke: Water Regulations & Zoning Specialist—WDNR
Amy Minser: Water Resources Engineer—WDNR
Brenda Nordin: Water Resources Manager—WDNR
Mike Murray: Pesticide Program Manager—DATCP

Panel Discussion

City of Madison—**Carissa Wegner** (Landscape Architect)
City of Madison —**Jeff Benedict** (Engineer)
Town of Grafton—**Kevin Kimmes** (PE Senior Water Resource Engineer—Stantec)
City of Sun Prairie—**Lee Igl** (Director of Public Works)
City of Sun Prairie—**Greg Dustin** (Streets & Stormwater Superintendent)
Waukesha County—**Leif Haug** (Sr Civil Engineer/Hydrologist)

Thank You!

NEWSC would like to thank the following workshop organizational workgroup
Jeff Mazanec—raSmith
Karen Heyrman—Town of Grand Chute
Sue Olson—City of Appleton
Pete Neuberger—City of Appleton
Hanna Moscho—Winnebago County
Jon Gumtow—Stantec
James Havel—Robert E Lee/NES Ecological Services

Thank you to our Workshop Exhibitors!

Stantec
Robert E. Lee & Associates, Inc.
NES ECOLOGICAL SERVICES
Engineering, Surveying, Environmental Services

PDH CREDITS: please have one of the workshop organizers stamp your program here.

Day 1	Day 2

Name:

ADDENDUM R - PAGE 1

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Stormwater Pond Vegetation Management & Maintenance Workshop

Gruenhagen Conference Center
Oshkosh, WI
November 14-15, 2017

TUESDAY, NOVEMBER 14, 2017

8:00 – 8:30am	**Registration**
8:30 – 8:45am	**Welcome & Introduction** *Jeff Mazanec – raSmith, Inc*
8:45 – 9:00am	**Why are we here?** *Pete Neuberger – City of Appleton*
9:00 – 10:15am	**Establishing Goals & Priorities** *Jon Gumtow & Aaron Volkening – Stantec*
10:15 – 10:30am	**Break & Refreshments**
10:30 – 11:30am	**WDNR: Codes, Regulations & Permitting Q & A** Scott Koehnke, Brenda Nordin & Amy Minser Wisconsin Department of Natural Resources
11:30am – 12:00pm	**Communication Strategies** *Jon Gumtow & Kevin Kimmes &* *Aaron Volkening – Stantec*
12:00 – 12:45pm	**Lunch (Provided)**
12:45 – 1:00pm	**Q & A Session** *Jon Gumtow & Kevin Kimmes &* *Aaron Volkening – Stantec*
1:00pm – 2:30pm	**Panel Discussion** *Carissa Wegner—City of Madison* *Jeff Benedict—City of Madison* *Lee Igl & Greg Dustin—City of Sun Prairie* *Leif Hauge—Waukesha County* *Kevin Kimmes—Town of Grafton*
2:30 – 2:45pm	**Break & Refreshments**
2:45 – 3:45pm	***Other Considerations*** *Jon Gumtow, Kevin Kimmes &* *Aaron Volkening– Stantec*
3:45 – 4:15pm	**Q & A, Review & Preview** *Pete Nueberger—City of Appleton* *Jon Gumtow—Stantec*

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WEDNESDAY, NOVEMBER 15, 2017

8:00 – 8:30am	**Registration**
8:30 – 8:45am	**Welcome, Introductions & Day 1 Recap** *Jeff Mazanec – raSmith, Inc*
8:45 – 10:00am	**Ecological Considerations** James *Havel—Robert E Lee/NES Ecological Services*
10:00 – 10:15am	**Break & Refreshments**
10:15 – 10:45am	**Plant Identification** James *Havel & Ashley Vande Voort* *Robert E Lee/NES Ecological Services*
10:45am – 12:00pm	**Rules, Regulations & Permitting Q & A** *Michael Murray – DATCP* *Brenda Nordin—WDNR*
12:00 – 12:45pm	**Lunch (Provided)**
12:45 – 1:45pm	**Aquatic & Emergent Vegetation Management** *James Havel & Ashley Vande Voort* *Robert E Lee/NES Ecological Services* *Zachary Haas—WI Lake & Pond Resources, LLC*
1:45 – 2:00pm	**Break & Refreshments**
2:00 – 3:00pm	**Terrestrial Vegetation Management** *James Havel & Levi Koski* *Robert E Lee/NES Ecological Services*
3:00 – 3:30pm	**Q & A Session** *Pete Neuberger—City of Appleton* *James Havel—Robert E Lee/NES Ecological Services*
3:30 – 4:00pm	**Workshop Wrap-up**

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Stormwater Pond Vegetation Management & Maintenance Field Day

Appleton Memorial Park
Scheig Center
July 25th, 2018

ADDENDUM 5 - PAGE 1

Speakers & Presenters

Jon Gumtow: PWS, PSS, Senior Wetland Ecologist—Stantec

Aaron Feggestad: PWS, Senior Associate Ecologist—Stantec

James Havel: Senior Ecologist—Robert E Lee/NES Ecological Services

Pete Neuberger: Project Engineer, City of Appleton Dept. of Public Works

Thank you to our Workshop Partners!!!

NES ECOLOGICAL SERVICES

Appleton

Robert E. Lee & Associates, Inc.

Engineering, Surveying, Environmental Services

Stantec

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Stormwater Pond Vegetation Management & Maintenance Field Day

Agenda

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8:00am—8:30am	Registration
8:30am—9:00am	Field Day Overview
9:00am—9:10am	Travel to Thrivent Pond—Park at Park and Ride off Ballard Road
	SE Corner of Ballard & E Evergreen Drive
	(Next to Shopko Express: 2101 E Evergreen Dr, Appleton, WI)
9:10am—10:20am	Thrivent Pond Tour
10:20am—10:30am	Travel to Memorial Park—Appleton Family Ice Center
	1717 E Witzke Blvd, Appleton, WI
10:30am—12:20am	Memorial Park Pond Tour
12:20pm—12:30pm	Travel back to Scheig Center
12:30pm—2:30pm	Lunch, Review and Q & A with Presenters

Northeast Wisconsin Stormwater Consortium

Filtration Systems Workshop Thurs. Dec 6th, 2018 (8am - 3pm)

Workshop Agenda

8:00 – 8:30am	**Registration**
8:30 – 8:45am	**Welcome & Introduction**……..*Jeff Mazanec – raSmith, Inc*
8:45 – 8:50am	**Why are we here?**…….*Pete Neuberger: Project Engineer, City of Appleton Department of Public Works*
8:50 – 9:05am	**Overview of State Regulations for Filtration Systems** *Amy Minser: Stormwater Engineer, Wisconsin Department of Natural Resources*
9:05 – 9:35am	**Technical Standard 1002: Site Evaluation for Infiltration** *Jan Kucher: Water Resources Engineer, Wisconsin Department of Natural Resources* - Guidance on considering an Infiltration System)
9:35 – 10:15am	**Site Considerations & Systems Design** *Gary Raasch: Senior Water Resources Project Manager, raSmith* *Amy Minser: Stormwater Engineer, Wisconsin Department of Natural Resources* - Airport Overlay Districts, Shallow Groundwater, Shallow Soils/Bedrock, Size, Costs - System Options, Proprietary vs non-Proprietary, Water Quality & Quantity, Lifecyle Costs & other cost factors
10:15 – 10:30am	**Break & Refreshments**
10:30 – 10:45am	**Morning Topics….Q & A Session**
10:45 – 12:15pm	**Non-Proprietary Devices - Panel Discussion** *Gary Raasch: Senior Water Resources Project Manager, raSmith* *Amy Minser: Stormwater Engineer, Wisconsin Department of Natural Resources* *Tom Duffey: Horticulturalist, City of Appleton* *Pete Neuberger: Project Engineer, City of Appleton Department of Public Works* *- Overview, Design, Installation/Construction, Inspections/Maintenance, Case Studies, Problems, Solutions & Costs for Technical Standards:* *1004-Bioretention for Infiltration* *1007-Infiltration Trench* *1003-Infiltration Basins* *1008-Permeable/Porous Systems* *1005-Vegetated Swales & Filtration Strips* *100?-Raingardens*

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Northeast Wisconsin Stormwater Consortium

Filtration Systems Workshop Thurs. Dec 6th, 2018 (8am - 3pm)

Workshop Agenda

12:15 – 1:00pm	**Lunch (Provided)**
1:00 – 1:35pm	**Proprietary Devices: ADS Pipe & Hydro-International** *Jake Brunoehler - Regional Engineer* - Stormtech Chambers, Upflow Filters, Inlet Filters
1:35 – 1:45pm	**Changeover Break**
1:45 – 2:20pm	**Proprietary Devices: Contech Engineered Solutions** *Kevin Klein-Stormwater Consultant* - Stormfilter, Jellyfish Filter, Filterra Filter & More
2:20 – 2:30pm	**Break**
2:30 – 3:00pm	***Proprietary Devices Q & A Panel Discussion*** *Jake Brunoehler, Keith Johnson & Kevin Klein*
3:00 – 3:05pm	***Workshop Wrap-up***

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Thank You Workshop Partners!

Hydro International

ADS

raSmith

Appleton

CONTECH ENGINEERED SOLUTIONS A QUIKRETE COMPANY

WISCONSIN DEPT. OF NATURAL RESOURCES

Speakers & Presenters

Jeff Mazanec, raSmith

Pete Neuberger, City of Appleton

Amy Minser, Wisconsin Department of Natural Resources

Jan Kucher, Wisconsin Department of Natural Resources

Gary Raasch, raSmith

Tom Duffey, City of Appleton

Jake Brunoehler, ADS Pipe

Kevin Klein, Contech Engineered Solutions

Workshop Planning Team

NEWSC Municipal Committee Members:

Jeff Mazanec - Chair (raSmith)

John Neumeier (City of Kaukauna)

Karen Heyrman (Town of Grand Chute)

Bob Schmeichel (Town of Neenah)

Matt Smits (City of Manitowoc)

Scott Ahl (City of Two Rivers)

Chris Pagels (Town of Greenville)