

A Citizen's Guide to Maintaining Stormwater Best Management Practices For Homeowners Associations and Property Owners



Types of BMPs • Signs of a Degraded BMP • Who Should Carry Out Maintenance

Inspecting Your BMP • BMP Inspection Schedule • Maintenance Costs

Putting Together Your Own Maintenance Plan



STORMWATER MANAGEMENT COMMISSION

A Citizen's Guide to Maintaining Stormwater Best Management Practices (BMPs) For Homeowners Associations and Property Owners

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Do You Have a Stormwater BMP?

The term “Best Management Practices,” or BMP, was introduced and defined by the U.S. Environmental Protection Agency as a practice or combination of practices that is an effective, practicable means of preventing or reducing the amount of pollution generated by non-point sources.

What is non-point source pollution? Sources of non-point pollution include sediment, nutrients, motor oil, and lawn care products that run off hard surfaces and yards into storm drains. Storm drains typically empty into nearby water bodies and wetlands. Fortunately for Lake County that has thousands of acres of water bodies and wetlands, there are BMPs in place. A variety of local, state and federal laws, including the Lake County Watershed Development Ordinance (WDO) and the federal Clean Water Act, encourage or require the control of non-point source pollutants using BMPs.

Do you have a BMP on your property or in your neighborhood? Ponds, ditches and depressions that you see every day may actually be engineered stormwater facilities designed to reduce flooding and improve water quality. As development occurs, land is covered by roads, driveways, rooftops and other hard surfaces that do not allow stormwater to infiltrate (or soak) into the ground. Without BMPs, the end result of development may be flooding and poor water quality in streams and lakes.

The five most common BMPs in Lake County are wet detention basins, dry detention basins, vegetated swales, vegetated buffers, and stormwater wetlands. The long-term benefits of BMPs only work if they are maintained to sustain their effectiveness. Maintaining your BMP is an important part of Lake County’s flood reduction and environmental protection efforts.



(Photo courtesy of USDA NRCS)

Meet on-site with members of your homeowner's association to find out where your BMPs are located.

BMP Lingo

Best Management Practice (BMP) - A practice or combination of practices that is an effective, practicable means of preventing or reducing the amount of pollution generated by non-point sources. Examples of BMPs include detention ponds, buffers and vegetated swales.

Bio-Infiltration - Vegetated depressional areas, such as engineered channels, vegetated swales or rain gardens, that are used to collect and filter urban stormwater.

Buffer - An area of vegetated land, preferably non-mowed native vegetation, left open adjacent to drainageways, streams, wetlands, lakes, ponds and other surface waters for the purpose of minimizing the impacts of point and non-point source pollution.

Deed or Plat Restricted Areas - Easements, covenants, deed restricted open spaces, reserved plant areas, conservation easements, or public road right-of-ways that contain any part of the stormwater management system of a development.

Detention Basin - Temporarily stores water before discharging to river or lake; primarily used to reduce peak discharges, but does not reduce runoff volumes. Can be classified into two groups:

Dry Detention Basin - Stores stormwater runoff but dries up following a rainstorm or snow melt. Typically not effective at removing pollutants.

Wet Detention Basin - Also stores stormwater runoff, but contains a permanent pool of water that will more effectively remove nutrients in addition to other pollutants than other BMPs like a dry pond.

Filter Strip - A vegetated area designed to slow runoff velocities and filter out sediment and other non-point pollution.

Mitigated Wetland - Created or restored wetlands are intended to replace the beneficial functions of wetlands lost due to development activities.

Native Vegetation - Native vegetation species that provide long root systems that can help stabilize stream banks, and can provide pollutant filtering capabilities.

Non-Native Vegetation - Plant species not native to an area that tend to out-compete and crowd out native species and dominate the area. Also called invasive species.

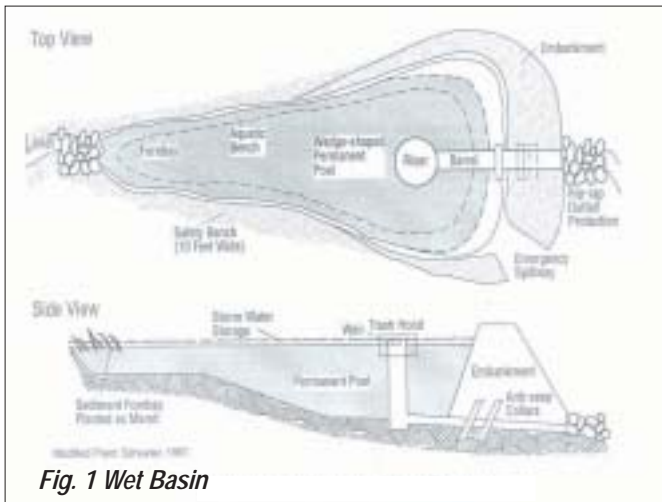
Non-Point Source Pollution - Also known as polluted runoff, comes from diffuse or scattered sources in the environment rather than from a defined outlet such as a pipe. As water moves across and through the land it picks up and carries away natural and human-made pollutants, depositing them into lakes, rivers and even underground sources of drinking water.

Vegetated Swale - An open channel drainageway used along residential streets and highways to convey stormwater and filter pollutants in lieu of conventional storm sewers.

Watershed Development Ordinance (WDO) - Regulations implemented in 1992 to set consistent, countywide standards for new development in Lake County. The WDO includes standards for detention, wetlands, soil erosion and sediment control.

Stormwater Wetland - A shallow, constructed pool that captures stormwater and allows wetland vegetation to grow.

Type of BMPs



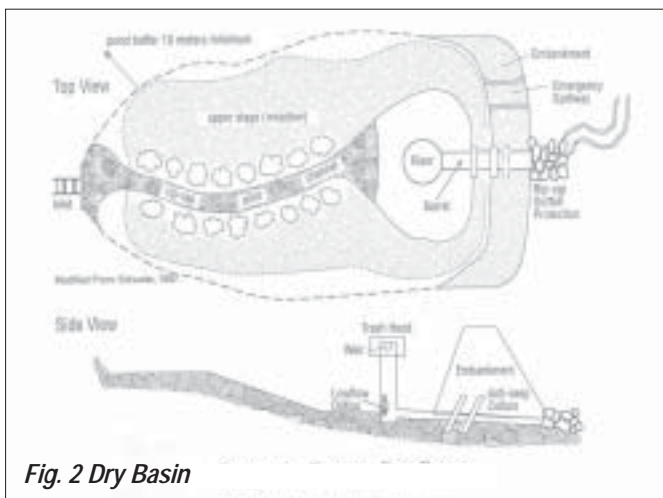
WET DETENTION - "WET BASINS" (Fig. 1)

Wet basins are man-made with permanent pools of water that function much like natural ponds. Excess runoff is stored above the permanent pool and is discharged at a controlled rate through an outlet. A wet basin can be more effective when native plants are added to the slopes and bottom. Adding wetland plants around a wet basin is also known as a stormwater wetland detention facility.

The advantages of a wet basin over a dry basin include higher pollutant removal and less chance that pollutants will be re-suspended during a storm. Wet basins can also serve as an aesthetic or recreational amenity as well as a habitat for some wildlife and aquatic species. Unmowed native vegetated buffers on the perimeter makes the basin less attractive to geese.

EXTENDED DRY DETENTION - "DRY BASINS" (Fig. 2)

Dry basins temporarily hold stormwater but are not effective at pollutant filtering because they are typically planted with turf grass. Dry basins can be used for recreational areas like soccer fields. Prior to the mid-1980s, dry basins were the most common type of stormwater management facility. The WDO includes language that encourages the retrofitting of dry basins to improve water quality. For more on retrofitting, see p. 13.



VEGETATED SWALES (Fig. 3)

Swales are one of the most commonly used stormwater practices. For many years they have been used along highways, parking lots, along residential streets and in between homes to convey water. Today, swales are designed to infiltrate and treat stormwater runoff.



VEGETATED BUFFERS (Fig. 4)

Buffers are vegetated areas that surround wet basins and wetlands, and run parallel to streams and lakes. Buffers can be effective in filtering out non-point pollution before it reaches a water body. Buffers are required by the WDO and depending on the size of the water body they protect, minimum buffers widths can range from 20 feet to 100 feet wide (for high quality streams and wetlands).

STORMWATER WETLAND DETENTION (Fig. 5)

A stormwater wetland detention facility typically includes a small permanent pool of water. The bottom and the slopes are planted with

native wetland plants that provide pollutant-filtering capabilities. The WDO encourages stormwater wetland detention. See p. 16 for more on wetlands.



A Plan for Maintaining Your BMPs

IF A PLAN ALREADY EXISTS

Since 1992, the Lake County Watershed Development Ordinance (WDO) requires a stormwater facility maintenance plan to address water quality. If your subdivision was permitted in 1992 (those built in 1992-93 were likely grandfathered) or after, a maintenance plan should be available through the permitting agency, usually the community. The plan typically includes:

- A description of inspection intervals and maintenance tasks required for each BMP.
- The party responsible for performing the maintenance tasks.

Before a Homeowner's Association takes ownership of stormwater facilities:

- If you don't already have one, get a copy of the site plan and as-built drawings that include all stormwater facility locations and types, easements, deed restrictions, and stormwater facility maintenance plans.
- Meet with the permitting agency (usually your local municipality) and the developer on-site to discuss the stormwater facilities, including the current condition and near-term and long-term maintenance of each facility.

IF A PLAN DOES NOT ALREADY EXIST

You will want to consider creating a maintenance plan if one does not already exist. There are many advantages to having a plan. It provides a historical record of each facility, can be used in policy creation for the next association board, and can include a long-term maintenance budget. While the needs of your neighborhood may differ from those of the next, there are elements of a BMP maintenance plan that are universal.

Elements of a Maintenance Plan



■ Inventory Types of Facilities

The permitted site plan will show components of the stormwater system including basins, wetlands and swales. Consult with the site designer or permitting agency to identify below-ground features like storm sewers or above ground features like wetland and native vegetated areas.

■ Identify Facility Characteristics and Maintenance Needs

Spend a day with your BMP! With site plan in hand, walk the site with the developer and a representative from the permitting agency. For older BMPs, particularly basins, consider taking along someone from your village engineering department or a consulting engineer. Take note of the physical and design characteristics of each drainage component and drainage easements. From there, some basic maintenance needs should become obvious. For example, vegetation may not have been sufficiently established around the perimeter of a basin or the outlet structure may contain a debris jam.

■ Create Inspection Checklists

Checklists are essential to ensure that all system components are functioning as originally constructed. They are important not only during inspection, but checklists provide a historical status of facility functionality. Consider tailoring the checklists to your site and facility types.

SAMPLE INSPECTION LOG

ROUTINE MAINTENANCE

Wet and Dry Basins (with or without stormwater wetlands)

TASK: Remove accumulated debris and litter, especially around the inlet and outlet areas.

INLET LOCATION: Inspect wet basin inlets and outlets at Lincoln and Main Streets.

SCHEDULE: monthly

LAST INSPECTION: 11/03/03

CURRENT INSPECTION: 5/02/04

OBSERVATIONS: Removed litter from inlet/outlets. Some erosion will need to be stabilized.

COMMENTS: Outlets need to be checked after snow melts during the winter. Vegetation around inlet area should be reviewed by landscaping company in the late summer to prevent/improve erosion problem.

INSPECTOR INITIALS: Ima Reed

It's not important how you set up your inspection log. What is important is that you follow the BMP Maintenance Quick Guide on pp. 10-11.

■ **Establish Record Keeping Procedures**

Tracking and recording can be logged in a computerized database. This allows homeowner’s associations, facility managers or inspectors to schedule inspections, and to check off observations. A database could include identification numbers for each BMP, BMP type and location, data from previous inspections, special maintenance needs and pictures of your facilities.

RECORD-KEEPING TOOLS
 Computer
 Map files
 Inspection logs
 Important phone numbers
 Site map/plans

■ **Identify Costs and Allocate Resources**

This task is typically the most difficult task for an association or facility manager. A good rule of thumb is to increase a routine maintenance budget by an average of 3-4 percent each year for inflation. For long-term maintenance needs, consult your local government or work with a consulting engineer to estimate the cost of the needed work.

■ **Create a Written Plan**

A written plan should include the following:

- Name, location of site.
- Name, address and phone number of current owner(s) and previous owner(s).
- History of the site including a copy of the permitted site plan and as-built drawings, and maintenance plan (if required at time of permitting), copy of natural resource inventory (if one was conducted), other pertinent information and documentation including wetland permits, mitigated wetland monitoring requirements, professional evaluation of the drainage system prior to handing over ownership to the association, etc.
- Identify regulatory and legal requirements (including legal implications of ownership, with regard to facility maintenance and the legal impacts of neglect).
- Maintenance for both on-going and periodic maintenance requires record-keeping policies, and an equipment inventory.
- Funding mechanism, collection, distribution of funds, yearly budget approval process, evaluation of services and policies.



Get your homeowner's association involved. Educate members on the maintenance plan, and train volunteers to be inspectors.

■ **Conduct Periodic Program Reviews**

On a yearly basis, review your inspection program, checklists, and contracts with landscaping companies and other contractors. Other items to check:

- Is your computerized tracking system working and does it need updating?
- Does your inspection checklist need to be evaluated for more detailed inspection or other information?
- Are you satisfied with professional services currently under contract, and are you getting what you paid for?
- Is the association fee covering maintenance costs or is there a need to increase it?
- Take time to update information such as phone numbers and addresses of inspectors and other support personnel. Update your inventory of equipment, if applicable.

■ **Identify Inspection Personnel**

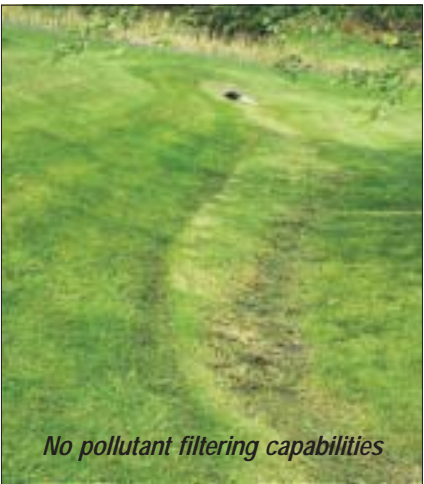
Your landscaping company can alert you to maintenance needs on occasion. Inspections on the other hand can monitor and identify on a regular schedule. Inspections can be done by anyone interested in the task. Volunteer inspectors should be reliable, detail-oriented and willing to train others. A job description and training session should be written up and become part of the maintenance plan.

■ **Educate The Neighborhood or Community**

Last, but not least, it is imperative that those who live near a basin or another system component understand the purpose of the facility and the practices that keep the facility operating. For example, a native vegetative buffer is often viewed as a “mosquito haven” and aesthetically unpleasant. The preferred view is a manicured lawn mowed up to the banks of a wet basin with little or no vegetation on the perimeter. Use your newsletter or a neighborhood gathering to talk about and show the merits of native vegetated buffers. For more on educating your community, see p. 8.

<p>Sycamore Tree Subdivision Homeowners Association Sycamore, IL</p> <p>Stormwater Facility Maintenance Plan Adopted 10/01/04</p>	<p style="text-align: center;">Table of Contents</p> <p>Association Structure Inventory of Facilities Map, pictures of facilities Maintenance Schedule Inspection Log Form and Directions Lawn Care Contract Info Maintenance Budget Equipment Inventory Inspection Schedule</p>
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Signs of a Degraded BMP



Who Should Carry Out Maintenance?

Cost, safety and effectiveness are key factors in determining who will carry out your maintenance needs. Some of the more routine maintenance tasks can be done by a BMP facility owner. Those tasks may include landscaping, educating the neighborhood, and litter removal.

It is recommended that a professional landscaping company be hired for the more difficult routine work. Mowing, burning, working around sloping embankments, stabilizing eroded areas, and replanting vegetation are tasks a professional landscaping company might best manage. Trained professionals can also identify problems early on saving expensive repairs later.

TIPS FOR WORKING WITH LAWN CARE COMPANIES

Your BMP is a water treatment system and requires special attention. Sit down with your landscaping company manager and discuss your BMP maintenance needs. Objectives might include:

- Communicate that the facility is a water quality device.
- Communicate mowing practices; for instance, mowing at a

higher level and perhaps not as frequently, or not at all especially in the buffer areas. You also can request that use of heavy equipment be avoided where possible particularly in vegetated areas.

- Communicate the need to keep the BMP facility clear of grass clippings and leaf piles (convey this to the residents as well).
- Ask whether the company follows an integrated pest management (IPM) plan and minimize the application of pesticides and fertilizers. An IPM plan can include:
 - Use of pesticides only as needed and only in trouble spots
 - Use of alternatives to pest control or no control at all
 - Policy of not applying chemicals when there is a heavy rainfall in the forecast
 - Testing the soil before applying low-phosphorous fertilizer if needed.

TIP: The key is communication. If the company cannot agree or is not willing to agree to your needs, find another company that will.

Involving the Whole Community in Maintenance Responsibilities

Consider starting a public education program for your neighborhood. Even if day-to-day maintenance is left to a professional, involving the community in on-going BMP maintenance activities is a cost-effective way to prolong the life of the BMP and to prevent pollution.

Most of the time people are unaware that their activities contribute to pollution. Through education, people become aware of how their activities impact water quality and flooding, and they become a stakeholder in protecting their environment. Consider the following questions for your education program:

- What are the pollution and flooding problems that need to be addressed?
- What activity or activities are responsible for the pollution or flooding? Encourage residents to change their habits to reduce pollution.



Educate your neighbors about your BMPs.

Join Your Neighbors for a BMP Clean Up Day!

What's a BMP? A BMP, or Best Management Practice, is a facility designed to trap pollutants from our neighborhood before entering Bull Creek.

Sat., October 5, 2003
9 a.m. at the south pond

Even if you can't make it, there are simple things you can do to protect our community's water quality. Following the suggestions on the attached brochure can help!
For more information call 555-2233.



Storm drain stenciling is a good community project to encourage clean water.



- Who can help implement a community education program? Boy/Girl scouts, environmental group, local school or chamber of commerce?
- How will the message reach the targeted audience? Options could include public meetings, bulletin boards, local newspaper, and signage.
- How can alternatives to pollution be encouraged? Recycling and hazardous waste days are a good start.

Inspecting Your BMPs

Maintenance Program Components

- Regular Inspections
- Vegetation Management
- Embankment and Outlet Stabilization
- Debris and Litter Control
- Mechanical Components/Inlet/Outlet Replacement
- Insect Control
- Maintenance of Access Route to BMP
- Overall Pond Maintenance
- Sediment/Pollutant Removal

REGULAR INSPECTIONS

This section outlines the maintenance needs for the most common types of BMPs found in Lake County. It is important to remember that while general maintenance tasks can be outlined, actual maintenance needs will vary according to specific site conditions. Many BMP inspections are conducted on an annual or semi-annual inspection schedule.

VEGETATION MANAGEMENT

Most BMPs heavily rely on vegetation to filter out nonpoint source pollution and to prevent erosion on embankments and slopes. The following is a quick reference on how to keep your vegetation healthy.

■ **Mowing.** Short grass (Kentucky blue grass, etc.) may look nice, but doesn't have a deep root system and is ineffective as a pollutant filter. Cut grass no shorter than 6-8 inches, particularly grass near basin embankments and slopes. Never mow down to the water's edge. In fact, replace your grass around wet basins with native vegetated buffers. See p. 15 for the benefits of native vegetation.

■ **Weed and Pest Control.** More is not better when it comes to fertilizing and pesticide use, especially near basins, swales, lakes and streams. Excess fertilizer can flow off your lawn and into storm sewers that eventually drain into nearby water bodies.

■ **Non-Native Vegetation.** Non-native species like buckthorn and purple loosestrife can impact a BMP's effectiveness by blocking out the more effective long-rooted native vegetation. Short-rooted non-native species can actually destabilize a BMP's embankment or slope, and reduce the

Factors Affecting Type and Frequency of Maintenance

Function of the BMP Facility. Inspections will vary depending on the type of BMP.

Visibility of the BMP Facility. The needs and preferences of the surrounding community will determine to a large extent the amount of maintenance for aesthetics and BMP facility effectiveness.

Landscaping. Maintenance needs will vary depending on the types of vegetation used in landscaping. Native vegetation needs less care and less mowing than turf grass.

Upstream Conditions. The conditions of the watershed upstream from your BMP can significantly impact the amount of sediment and other pollutants entering your BMP facility. Upstream commercial areas or roads may result in an increased need for litter and sediment removal, and other maintenance tasks.

Safety. Since BMPs can often involve the impoundment of water, the safety of nearby residents must be considered.

Need for Professional Judgment. BMPs are water treatment as well as storage facilities. While some routine maintenance can be undertaken by a non-professional, the judgment of a professional should be consulted regularly.

Financing. The costs associated with non-routine BMP maintenance tasks can be considerable. A fund should be established to provide for the costs of long-term needs such as sediment removal. (see *Non-Routine Maintenance*)

Source: Northern Virginia Planning District, Division of Environmental Services.

BMP's pollutant filtering capabilities. Monitoring, mowing and prescribed burning can help control unwanted, non-native species.

■ **No Mow Zones.** In Lake County, higher quality wetland areas are required to have native vegetated buffers up to 100 feet in accordance with the WDO. At the same time, buffer requirements vary in size along streams, lakes and rivers, and wet basins. It is recommended that any native vegetated buffer remain as "no mow" areas. An alternative to mowing are prescribed burns. For more on prescribed burns, see p. 14.

BMP MAINTENANCE QUICK GUIDE

Wet and Dry Basins

ROUTINE MAINTENANCE

- Remove accumulated debris and litter, especially around the inlet and outlet areas.
- Mow routinely, unless there is native vegetation. If native vegetation exists, consider periodic burns on a bi-annual schedule or yearly in early spring or late fall.
- Remove woody vegetation from all embankment areas.
- Stabilize/revegetate side and bottom areas.
- Stabilize/revegetate contributing areas to reduce incoming sediments.
- Implement a pollution prevention program.

INSPECTION SCHEDULE

- Monthly
- Bi-Annually or Yearly Early Spring or Late Fall
- As Needed
- As Needed
- As Needed
- As Needed

NON-ROUTINE MAINTENANCE

- De-thatch grass to remove accumulated sediment and debris
- Aerate compacted areas to promote infiltration
- Monitor sediment accumulations, and remove sediment when the pool volume has become reduced significantly (roughly 15-20% of the basin), or when the basin becomes stagnant
- Replace BMP mechanical components, reconstruct embankments and spillways

- < Every 2 Yrs.
- Every 2-3 Yrs.
- Semi-Annual Inspection
- 2-10 Yrs. for Dry Basins
- 5-15 Yrs. for Wet Basins
- > 20 Yrs. if Maintained

Tips for When Non-Routine Maintenance is Required for Wet Basins

- Visible signs of sediment accumulation.
- Insects and/or odor become problems.
- Algae blooms occur in the summer months or ponded areas become dominated by a single aquatic plant species.
- Visible damage to the embankment or mechanical components.

Tips for When Non-Routine Maintenance is Required for Dry Basins

- Standing water is visible in inappropriate areas after 48 hrs.
- Insects and/or odor become problems.
- Emergence of non-native wetland vegetation.
- Visible damage to the embankment (such as sinkholes) or to mechanical components.

ROUTINE MAINTENANCE OF VEGETATED SWALES, BUFFERS

- Remove accumulated debris, litter and sediment.
- Mow routinely unless there is native vegetation. If native vegetation exists, consider periodic burns on a bi-annual schedule or yearly in early spring or late fall.
- Replace non-native vegetation, like purple loosestrife, with native vegetation.
- Remove woody vegetation and stabilize and revegetate side and bottom areas with

INSPECTION SCHEDULE

- As Needed
- Bi-Annually, or Yearly Early Spring or Late Fall
- As Needed
- As Needed

& Buffers

Vegetated Swales

- ☑ native vegetation.
- ☑ Replant wetland plants (for wet swale) if not sufficiently established.

NON-ROUTINE MAINTENANCE

- ☑ Remove accumulated sediment/pollutants.

Tips for When Non-Routine Maintenance is Required

- Standing water is visible after 48 hrs.
- Insects and/or odor become problems.
- Wetland vegetation emerges where not intended.
- Visible erosion or undercutting of swale banks is apparent.

As Needed
As Needed

Semi-Annual Inspection

Stormwater Wetland (see also Wet Basins)

ROUTINE MAINTENANCE

- ☑ Remove accumulated debris and litter.
- ☑ Supplement wetland plants if not well established.
- ☑ Inspect for invasive species and remove where possible.
- ☑ Hire a professional for periodic prescribed burns to encourage native plant growth and discourage non-natives.

NON-ROUTINE MAINTENANCE

- ☑ Remove accumulated sediment/pollutants.
- ☑ Stabilize/replace inlet/outlet structures.

INSPECTION SCHEDULE

Monthly
Annually
Monthly
Bi-Annual, or Yearly Early Spring
or Late Fall

Semi-Annual Inspection
Annual Inspection
20 Yrs. if Maintained

SPRING

- Non-native vegetation removal/control
- Vegetation planting
- Rain garden installation
- Debris removal
- Post-winter inspection of structures, embankments and outlets
- Embankment stabilization
- Prescribed burning
- Structural component replacement
- Clear storm grates of leaves, debris

SUMMER

- Non-native vegetation removal/control
- Vegetation planting
- Rain garden installation
- Debris removal
- Non-native vegetation removal/control
- Embankment stabilization
- Monitor/remove sediment
- Check for odors, standing water
- Structural component replacement
- Clear storm grates of leaves, debris

FALL

- Non-native vegetation removal/control
- Debris removal
- Non-native vegetation removal/control
- Check for odors, standing water
- Structural component replacement
- Prescribed burning
- Clear storm grates of leaves

WINTER

- Debris removal
- Clear storm grates of leaves, snow, debris
- Monitor structures and outlets

Inspecting Your BMPs

EMBANKMENT AND OUTLET STABILIZATION

Finding the source of erosion and stabilizing it can improve the effectiveness of a wet basin or swale. Left unchecked, an erosion problem can necessitate dredging, replacement of an entire embankment or slope, or even an inlet structure.

A prime cause of erosion is a lack of deep-rooted vegetation that holds soil in place. There are several techniques to stabilize banks including the combination of environmentally-favorable structural products, like lunkers and A-Jacks, that are combined with deep-rooted plants. The combination of structural and natural is known as bio-engineering.

In addition to erosion, problems like sink holes, a rusty, broken or crushed pipe, odor, or algae blooms are all clear indications to call a consulting engineer.

Animal burrows also will deteriorate embankment integrity. Take steps to control animal burrowing by quickly filling existing holes.



(Photo courtesy of Integrated Lakes Management, Inc.)

Native vegetation was used on this wet basin bank stabilization project in Lake County.

DEBRIS AND LITTER CONTROL

Regularly check for litter, debris and floating debris. Floating debris can clog basin inlets and outlets and swales. If dumping is a problem, outreach to the neighborhood can help.

MECHANICAL COMPONENT, INLET/OUTLET REPLACEMENT

Erosion, corrosion, improper design, and lack of maintenance can all contribute to component loss of function. Valves, sluice gates, pumps, locks and access hatches are some of the mechanical components of wet and dry basins that may eventually need replacing. Call a consulting engineer for an inspection and replacement cost estimates.

INSECT CONTROL

Mosquitoes and other insect breeding grounds can be created in shallow ponds of standing water. The development of a mosquito problem, particularly in dry ponds, is usually an early indication of a maintenance problem. It is likely the infiltration capacity of the BMP needs to be increased or sediment needs to be removed. It takes only 72 hours for larvae to hatch in standing water.

SEDIMENT REMOVAL FREQUENCY	
BMP	Sediment Removal Frequency
Wet Basin	5-15 years
Dry Basin	2-10 years
Vegetated Swale	2 years

Other insect control options include larger wet basins that maintain a stock of fish to feed on mosquito larvae. In addition, natural vegetated buffers can provide shelter for mosquito predators.

MAINTENANCE OF ACCESS ROUTE TO BMP

Access to BMPs for routine and non-routine maintenance is critical. For more on easements, see p. 16.

OVERALL WET BASIN MAINTENANCE

A healthy aquatic ecosystem has many benefits that are often overlooked. A healthy wet basin should require little maintenance. However, a good indicator of an unhealthy ecosystem is excessive algae growth. This could be caused by nutrients from fertilization practices by a landscape company or surrounding neighbors, upstream activities or by excess sediment.

Steps should be taken to reduce nutrients at their source and to encourage the growth of more desirable aquatic and emergent vegetation in a wet basin.

SEDIMENT/POLLUTION REMOVAL

Since the primary purpose of a BMP is to remove sediment and other pollutants from stormwater runoff, sediment will eventually accumulate in a BMP and needs to be removed. There are no specific rules governing the timing of sediment removal because facility maintenance varies. However some general guidelines on sediment removal frequency are listed above.

Note that your wet basin may have been designed with stilling basins to collect settled sediment. Stilling basins are designed for sediment removal access, and sediment may need to be removed sooner than a BMP without a settling basin.

BMP COMPONENT REPLACEMENT

Eventually, like most infrastructure, some BMP components may need replacing and should be part of a BMP replacement fund. Components may include:

- inflow, outflow devices
- trash racks
- valves, orifices
- pumps and switches
- earthwork such as embankments and side slope stabilization
- mulches and vegetation.

Maintenance Costs

ROUTINE MAINTENANCE COST CONSIDERATIONS

Routine maintenance costs can vary based on the type of BMPs you have. Costs for mowing, weed control, fertilization and debris removal are typically calculated per acre, per year. Cost estimates can be obtained from lawn care companies and a general rule of thumb is to increase your yearly maintenance budget by 3-4 percent for these activities.

TIP: The non-routine maintenance needs of a BMP, while infrequent, can be a major undertaking in terms of funding and logistics, and should always be performed by a consulting engineer.

NON-ROUTINE MAINTENANCE COST CONSIDERATIONS

Non-routine costs are often the most expensive and usually are not budgeted. It is advised that a BMP maintenance fund, with annual contributions, be established. You may want to consider hiring a consulting engineer to conduct a replacement fund study. When a fund is started, the primary non-routine maintenance cost is typically related to wet basin pollutant and sediment removal, or dredging.

Wet Basin Dredging

Associations should have a copy of the “as built” drawings of their wet basin(s) depth contours. It is recommended that depth contours be checked about every two years unless there is a significant change in the basin’s functions. Seek a consulting engineer or basin management company to determine if the depths of the basin have changed to the point that they no longer resemble what was designed and built.

A major cause of depth reduction includes high sediments loads from upstream construction site erosion, shoreline erosion, agricultural runoff and decaying aquatic plants. Ideally, you would want to correct these types of problems prior to dredging.

If dredging is the last option, a dredging feasibility study would be performed to determine areas to be dredged and to estimate dredging costs. The cost depends on the volume of sediment removed based on cubic yards, and sediment disposal. Don't forget that permits may be needed from local, state and federal agencies.

Your cost considerations should include:

Mobilization and Demobilization. Depending on the size of the basin, equipment will either be waterborne or on the perimeter of the basin. Additional costs for the construction of access roads and heavy equipment may be required if not already provided in the cost.

Disposal. The primary determinant of disposal costs is whether on-site disposal is an option. If on-site disposal is not available, landfill and transportation costs can be high.

Source: Integrated Lakes Management, Inc.

Benefits of Dredging. Dredging restores the BMP to its original intent and will likely improve it by:

- Removing excessive sediments
- Removing nutrient rich or toxic sediments
- Removing rooted aquatic plants
- Preventing fish kills
- Creating better habitat for fish



(Photo courtesy of Integrated Lakes Management, Inc.)

Dredging is an eventual cost. Plan ahead and set funds aside.

Need a Retrofit?

Retrofits are stormwater treatment practices put into place after development has occurred to improve water quality, protect downstream BMPs and water resources, reduce flooding, or meet other watershed restoration goals. Several types of retrofit opportunities exist including:

Create a wet or stormwater wetland basin: Dry basins can be converted to wetland basins by excavating portions of the basin bottom to create wetland pockets and/or redesigning the outlet to allow for some water retention. Wetland and native prairie vegetation is then planted on the bottom and on banks.

Stabilize shorelines and improve buffers: Shorelines of wet basins with erosion problems could be stabilized using native vegetation. Native vegetation buffers should be established around the perimeter of all basins where possible to stabilize shorelines, filter pollutants and to discourage nuisance geese.

Replace turf grass with native vegetation: Turf grass is relatively intolerant of water level fluctuations and is maintenance-intensive. It also is not as effective as native vegetation for filtering pollutants. Turf grass should be replaced with native vegetation.

Seek a consulting engineer to retrofit your BMP.

Source: Watershed Management Institute.

What You Can Do To Prevent Pollution

Whether you live in the city or the country...whether your home is large or small, there is something you can do to improve water quality.

- Collect oil and other automotive products preferably for recycling, or tightly seal and wrap them for proper disposal through the Solid Waste Agency of Lake County.
- Wash cars on the lawn, where soapy water can't quickly run toward the nearest storm sewer, picking up other pollutants as it goes. Wash your car with non-toxic, low phosphate soap and use water sparingly. Ideally, take your car to a car wash where water goes to a wastewater treatment plant.
- Keep cars tuned up and in good operating condition. Check for drips and repair leaks immediately to keep nuisance oils off pavement. Better yet, walk, bike or take the bus.
- Monitor fuel use from any underground gas and oil tanks to make sure they are not leaking.
- Clean up pet wastes from which nutrients and bacteria could be washed into BMPS, lakes and streams.
- Direct downspouts away from foundations to planting beds and lawns where water can safely soak into the ground. Install a rain garden.
- Conservatively use salt in winter. Substitute with sand, or chip ice away.
- Sweep your walks and driveways instead of hosing them down.
- Buy no-phosphate cleaners and detergents. Phosphates act as a fertilizer and increases algae and aquatic weeds in wet basins. When these plants die, they rob the water of oxygen and fish may die.

Source: Washington State Department of Ecology, and University of Wisconsin Extension.

Prescribed Burns

Prescribed burns are an effective way to "fertilize" native vegetation and keep non-native species in check in buffer areas and in stormwater and natural wetlands. Prescribed burns should only be done by trained burn professionals.

Permits will likely be required from the Illinois Environmental Protection Agency, and possibly from your local municipality or fire department. Don't forget to notify all affected neighbors. See "Prescribed Burn Consultants" on p. 18.

MOSQUITOS AND WATER

Prevent Mosquito Breeding

Wet and dry basins traditionally are not mosquito breeding grounds. In fact, mosquito larvae or "wigglers" must live in still water for five or more days to complete their growth cycle before becoming adult mosquitos capable of transmitting disease. Often the number of mosquitoes in an area can be reduced by removing sources of standing water.

- Discard old tires, buckets, drums and any water holding containers.
- Keep roof gutters and downspouts clear of debris.
- Keep trash containers covered.
- Empty plastic wading pools at least once a week and store indoors when not in use.
- Drain unused swimming pools.
- Fill in tree rot holes and hollow stumps that hold water
- Change the water in the bird baths and plant urns at least once a week.
- Store boats upside down or drain rainwater weekly.
- Try bat houses, or "mosquito magnets" that run on propane for your backyard and open areas.

Source: Lake County Health Department and Community Health Center

CONSIDER A RAIN GARDEN

Rain gardens are just what they sound like... gardens that soak up rain water, mainly from your roof, but also from your driveway and lawn. They are landscaped areas planted with wildflowers and other native vegetation to replace areas of lawn. The gardens fill with a few inches of water and allow the water to slowly filter into the ground rather than running off to storm sewers. Compared to a patch of

conventional lawn, a rain garden allows about 30 percent more water to soak into the ground.

Holding back the runoff helps prevent pollutants such as fertilizers from washing off your yard, into storm sewers and eventually into nearby streams and lakes. By reducing the amount of water



that enters the local storm drain systems, rain gardens also can reduce the chances for local flooding, as well as bank and shoreline damage where storm drains empty into streams and lakes.

For a brochure on rain gardens, see p. 17, for the University of Wisconsin-Extension Service and Wisconsin Department of Natural Resources. Also check out the Illinois Lt. Governor's rain garden initiative at <http://raingarden.il.gov>.

Benefits of Native Vegetation

In its guide, "Planting With Native Plants," the U.S. Environmental Protection Agency - Region V (USEPA) outlines the benefits of native plants.

Site designers, developers and individual homeowners continue to realize the benefits of native vegetation used in wet basins, vegetated buffers and rain gardens. What is native vegetation?

Native plants are plants that have evolved over thousands of years in a particular region. They have adapted to the geography, hydrology, and climate of that region. Native plants occur in communities, that is, they have evolved together with other plants. As a result, a community of native plants provides habitat for a variety of native wildlife species such as songbirds and butterflies. Native plants save time and money by eliminating or significantly reducing the need for fertilizers, pesticides, water and lawn equipment. Native plants, through their deep root systems, help absorb stormwater pollutants, and assist in embankment and slope stabilization.

Native plants do not require fertilizers. Vast amounts of fertilizers are applied to lawns. Excess phosphorous and nitrogen (the main component of fertilizers) run off into wet basins, swales, and nearby water bodies like wetlands and lakes, which harms aquatic life and interferes with recreational uses.

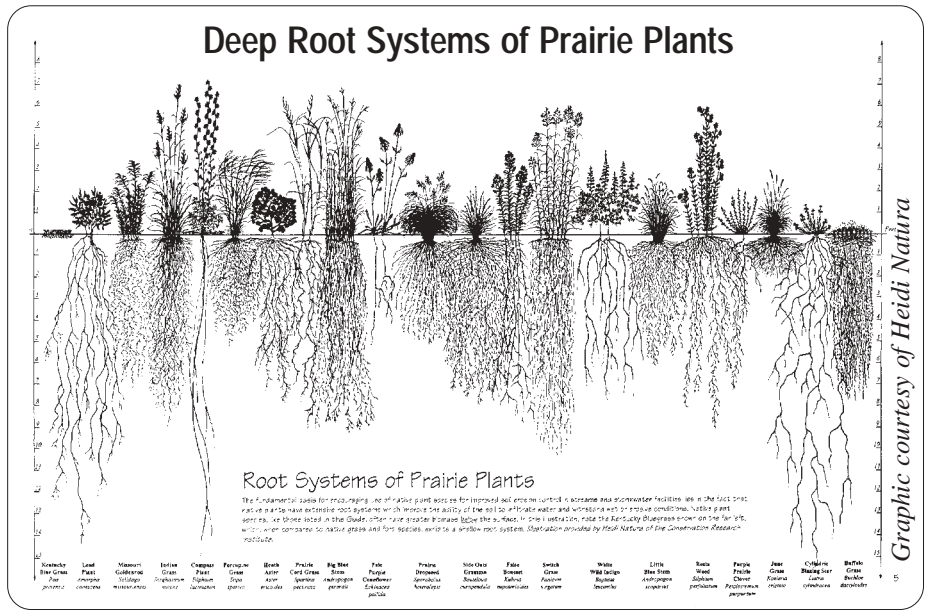
Native plants require less water than lawns. The modern lawn requires significant amounts of water to thrive. The deep root systems of many native Midwestern plants increase the soil's capacity to store water. Native plants can significantly reduce water runoff and, consequently, flooding.

Native plants help reduce air pollution. Natural landscapes do not require mowing. Lawns, however, must be mowed regularly. One gas-powered lawn mower emits 11 times the air pollution of a new car for each hour of operation. Native plants sequester, or remove, carbon from the air.

The USEPA's guide includes other benefits like providing shelter for wildlife, promoting biodiversity and stewardship of the land, and the economic savings of native plants. To view the guide, see www.epa.gov/glnpo/greenacres/nativeplants/factsht.html

In Lake County and in the Midwest in general, some of the more invasive species include purple loosestrife and buckthorn. The list to the right is a short list but you can view the USDA-Natural Resource Conservation Service's native plant guide. See NRCS' website address on p. 17.

TIP: If you are looking to remove a non-native tree, check your community tree ordinance.



TIP: Watch for local native plant and tree sales, and fish sales. The Lake County Soil and Water Conservation District and Lake County Forest Preserve District sponsor sales usually in the Spring and Fall.

Desirable Plant Species Trees *	
Common Name	Genus/species
Red Maple	Acer rubrum
Swamp White Oak	Quercus bicolor
Bu Oak	Quercus macrocarpa
Basswood	Tilia americana

Shrubs *	
Common Name	Genus/species
Buttonbush	Cephalanthus occidentalis
Red-Osier Dogwood	Cornus stolonifera
Elderberry	Sambucus canadensis
Arrowwood Viburnum	Viburnum dentatum

Shoreline Flowers *	
Common Name	Genus/species
Blue Flag Iris	Iris virginica
Yellow Coneflower	Ratibida pinnata
Black-Eyed Susan	Rudbeckia hirta

Shoreline Grasses *	
Common Name	Genus/species
Big Bluestem	Andropogon gerardii
Bluejoint Grass	Calamagrostis canadensis
Switch Grass	Panicum virgatum
Prairie Cord Grass	Spartina pectinata

*Refer to NRCS' "Native Plant Guide" for more native species.

A Few Words About Stormwater and Mitigated Wetlands

In recent years there has been a national movement towards introducing wetlands where none currently exist, and replacing wetlands that have been impacted, to improve water quality, reduce flooding and to retain natural habitat.

STORMWATER WETLANDS

Stormwater wetlands, or constructed wetlands, are incorporated into the shallow pools of wet basins. These "naturalized basins" are designed primarily to treat stormwater runoff. They also provide a natural method of shoreline protection against wave action compared to the placement of rock riprap.

While stormwater wetlands usually have less biodiversity than natural wetlands in terms of plant and animal life, they do offer water quality benefits and natural habitat, and can support macro- and micro- invertebrates.

Stormwater wetlands are not required under the Lake County Watershed Development Ordinance (WDO), but are highly recommended as a BMP to meet the water quality provisions of the WDO. Stormwater wetlands also offer aesthetic value and require less maintenance than mitigated wetlands.

It is well worth the time to include stormwater wetlands in your routine maintenance schedule. Watch for invasive plant species and sediment accumulation.

MITIGATED WETLANDS

Mitigated wetlands are created on a site to replace lost wetland functions due to fill or other negative impacts. Mitigated wetlands are usually placed on a site independent of a wet basin.

The WDO requires that wetlands be replaced at certain ratios depending on the quality of the impacted wetland. The mitigated wetlands can either be replaced on site or in a



A typical stormwater wetland at the edge of a wet basin.

wetland bank within the same watershed in Lake County. The goal is ensure that more wetlands are replaced rather than destroyed.

Since mitigated wetlands are designed to replace the inherent features of a natural wetland, mitigated wetlands are required to meet strict performance standards established by the U.S. Army Corps of Engineers and adopted by SMC. Those standards require mitigated wetlands to be monitored for at least 5 years. The developer is responsible for developing and implementing the monitoring and management plan until the performance standards are met. SMC follows up with inspections on a regular basis to ensure plan implementation.

Once SMC determines the developer has met the 5-year monitoring and maintenance standards in the plan, the homeowner's association takes "ownership" of the wetlands. The association should then monitor the wetlands for invasive species and other negative impacts, and implement an annual maintenance program to keep the wetland thriving.

Easements on Your Property

If you have a BMP in your subdivision or on your property, a deed restriction or easement is required. These legally binding agreements noted on the plat and in your purchasing agreement for your home allows access to stormwater facilities, and requires the property owner to maintain the access point.

BMPs that typically need a dedicated easement include detention basins, overland flow paths, swales, wetlands and buffers.

Here are some common sense guidelines for easement maintenance.

Source: Charlotte-Mecklenburg County, NC Stormwater Services

EASEMENT DO'S AND DON'TS

Recommended

- Plant trees and shrubs at the top of the embankments or berms to avoid blocking the flow of water. Native, water tolerant grasses and wetlands plants however can be planted at the base of a basin or swale.
- Plant non-woody trees, shrubs and flowers away from outlets and inlets to avoid root blockages.

Not Recommended

- Do not erect any permanent structures like buildings, walls or fences made of blocks or bricks.
- Do not install tennis courts, swimming pools, dams or anything that might block the flow of water.

Agency Resources

Lake County Stormwater Management Commission (SMC)

Tel: (847) 918-5260

www.co.lake.il.us/smc/default.asp

Lake County Health Department and Community Health Center Lakes Management Unit

Tel: (847) 360-6747

www.co.lake.il.us/health/ehs/lakes.asp

Lake Soil and Water Conservation District (LCSWCD)

Tel: (847) 223-1056

www.lcswcd.org

Northeastern Illinois Planning Commission (NIPC)

Tel: (312) 454-0400

www.nipc.cog.il.us

USDA - Natural Resource Conservation Service (NRCS) - Lake County

Tel: (847) 223-1056 (same as LCSWCD)

www.il.nrcs.usda.gov/

U.S. Environmental Protection Agency - Nonpoint Source Pollution Best Management Practices (USEPA)

www.epa.gov/owow/nps/bestnpsdocs.html

Publications and Websites

Native Plant Guide. USDA-Natural Resource Conservation Service

Tel: (847) 223-1056

www.il.nrcs.usda.gov/technical/plants/npg/NPG-toc.html

The guide provides scientific and common names for plants native to the Northeastern Illinois region.

Living With Wetlands: A Handbook for Homeowners in Northeastern Illinois. The Wetlands Initiative.

Tel: (312) 922-0777

www.wetlands-initiative.org

Excellent guide for understanding and managing wetlands on or near your property. Other topics include managing wildlife.

Riparian Area Management: A Citizen's Guide

Lake County Stormwater Management Commission.

Tel: (847) 918-5260

www.co.lake.il.us/smc/bmps

The guide includes easy homeowner tips for protecting riparian areas and water quality.

Rain Gardens: A Household Way to Improve Water Quality in Your Community. University of Wisconsin Extension Service and Wisconsin Department of Natural Resources

Tel: (608) 262-3346

<http://clean-water.uwex.edu/pubs/raingarden/>

Streambank and Shoreline Protection Manual

A county/federal agency publication.

www.co.lake.il.us/smc/publications.asp

Includes bioengineering and structural erosion control, streambank stabilization techniques.

Stormdrain Stenciling Information

There are several on-line sources for community stormdrain stenciling projects. Here are just three examples:

- <http://www.bae.ncsu.edu/bae/programs/extension/wqg/smp-18/stormdrain/localgov.html>
- <http://clean-water.uwex.edu/pubs/stormie/index.html>
- <http://www.chattanooga.gov/STORMWATER/CCOtter/index.htm>

Chicago Botanic Garden

1000 Lake Cook Road, Glencoe, IL 60022

Tel: (847) 835-8440

<http://bestplants.chicago-botanic.org/toc.htm>

Inventory/search of plants appropriate for northern Illinois.

Solid Waste Agency of Lake County

1311 N. Estes Street

Gurnee, IL 60031

Tel: (847) 336-9340

www.co.lake.il.us/swalco

Local household chemical waste days are scheduled to protect local natural resources.

Stormwater Manager's Resource Center

Link to various fact sheets on stormwater, BMPs and other useful information.

<http://www.stormwatercenter.net/>

University of Illinois Extension Service

100 South US Highway 45

Grayslake, IL 60030

Tel: 847-223-8627

<http://web.extension.uiuc.edu/extension/hort.asp>

Extensive publications list on yard care, appropriate plants, pest management. Check out the Master Gardener program.

Illinois Department of Natural Resources

IDNR has an extensive publications list on several topics through its "Clearinghouse" link. Also check out the exotic species list, which includes the non-native Purple Loosestrife plant, at the link below:

<http://dnr.state.il.us/lands/education/ExoticSpecies/Purpleloosestrife.htm>

USEPA's Wetlands Website

The value of wetlands, why they need protection and your role as a homeowner and landowner are included on this website.

<http://www.epa.gov/OWOW/wetlands/>

NEMO: Nonpoint Education for Municipal Officials

Coordinated by the University of Connecticut, NEMO is an educational program for land use decision makers that addresses the relationship between land use to natural resource protection. This link is to NEMO's nonpoint source pollution runoff pages.

<http://nemo.uconn.edu/reducing.runoff/index.htm>

Native Plant/Aquatic Plant Vendors and Installers

Applied Ecological Services, Inc.

120 West Main Street, West Dundee, Illinois 60118
Tel: (847) 844-9385
www.appliedeco.com

Environmental Concepts

P.O. Box 969, Twin Lakes, WI 53181
Tel: (262) 877-8760

J.F. New

722 West Exchange Suite 4, Crete, IL 60417
Tel: (708) 367-1130
<http://www.jfnew.com/>

J & J Tranzplant Aquatic Nursery

P.O. Box 227, Wild Rose, WI 54984-0227
Tel: (800) 662-5055
<http://store.yahoo.com/tranzplant/>
Offers woodland wetland and prairie plants and seeds local to Wisconsin and Illinois.

McGinty Bros., Inc.

3744 RFD Cuba Road, Long Grove, IL 60047-7958
Tel: (847) 438-5161
Tree care, hydroseeding, wildflowers, vegetation control

Marshland Transplant Aquatic Nursery

P.O. 1, Berlin, WI 54923
Tel: (920) 361-4200
www.mtan.net

The Natural Garden, Inc.

38 IL Route 64, St. Charles, IL 60175
Tel: (630) 584-0150
www.thenaturalgardeninc.com/
Offers seeds of prairie grasses and forbs, perennials, and woodland wildflowers.

Pizzo & Associates, Ltd.

10729 Pine Road, Leland, IL 60531
Tel: (815) 498-9988
www.pizzo1.com/
Nursery, restoration, prescribed burns, plantings, invasive plant removal, erosion control

Possibility Place Nursery

7548 W. Monee-Manhattan Road, Monee, IL 60449
Tel: (708) 534-3988
info@possibilityplace.com
Offers trees, shrubs, grasses and forbs native to northern Illinois.

Prairie Nursery

W255n9286 Tomahawk Drive, Sussex WI 53089-1048
Tel: (414) 820-0221

Taylor Creek Nursery

Route 3, Smith Road, P.O. Box 256, Brodhead, WI 53520
Tel: (608) 897-8641
www.appliedeco.com/tcrn/
Offers prairie, woodland, and wetland plants.



(Photo courtesy of Applied Ecological Services, Inc.)

Prescribed Burn Consultants

Applied Ecological Services, Inc.

120 West Main Street, West Dundee, Illinois 60118
Tel: (847) 844-9385
www.appliedeco.com

Christopher B. Burke Engineering Ltd.

9575 W. Higgins Road, Suite 600, Rosemont, IL 60018
Tel: (847) 823-0500
www.cbbel.com

Conservation Land Stewardship, Inc.

375 W. First Street, Elmhurst, IL 60126
Tel: (630) 559-2039
www.cdfinc.com/index.html

Eubanks & Associates, Inc.

10350 Dearlove Road, Unit D, Glenview, Illinois 60025
Phone: (847) 824-8325
www.eubanksinc.com

Genesis Nursery, Inc.

23200 Hurd Road, Tampico, IL 61283
Tel: (815) 438-2220

Integrated Lakes Management, Inc.

83 Ambrogio Dr., Suite K, Gurnee, IL 60031
Tel: (847) 244-6662
Installs seed, forbs, wetland emergent plants, shoreline buffers.

J.F. New

722 West Exchange Suite 4, Crete, IL 60417
Tel: (708) 367-1130
<http://www.jfnew.com>

LaFayette Home Nursery, Inc.

1 Nursery Lane, LaFayette, IL 61449
Tel: (309) 995-3311

McGinty Brothers

3744 Cuba Road, Long Grove, IL 60047-7958
Tel: (847) 438-5161
www.McGintyBros.com

Basin Plant Control Companies

Applied Ecological Services, Inc.

120 West Main Street, West Dundee, Illinois 60118
Tel: (847) 844-9385
www.appliedeco.com

Aquatic EcoSystems Management, Inc.

P.O. Box 82, Golf, IL 60029-0082
Tel: (847) 724-0646
Herbicide and Algicide treatments, aeration, pond consulting mainly.

Aquatic Weed Control

P.O. Box 325, Syracuse, IN 46567
Tel: (574) 533-2597
Herbicide and Algicide treatments.

Aquatic Weed Technology

P.O. Box 72197, Roselle, IL 60172
Tel: (800) 323-5727
Herbicide and Algicide treatments, aeration.

Environmental Aquatic Management

P.O. Box 7239, Algonquin, IL 60102
Tel: (847) 960-7252
Lakes management services, herbicide applicator, pond shocking, aquatic plant supplier.

Integrated Lakes Management, Inc.

83 Ambrogio Dr., Suite K, Gurnee, IL 60031
Tel: (847) 244-6662
Lakes Management, water quality testing, dredging feasibilities, Herbicides, and Hydrological budgets.

J.F. New

722 West Exchange Suite 4, Crete, IL 60417
Tel: (708) 367-1130
www.jfnew.com/

Marine Biochemists

809 Hicks Dr., Suite A, Elburn, IL 60119
Tel: (630) 365-1721
Lakes management services, herbicide applicator.

McCloud: Pest Control and Specialists

1011A W. Lunt Ave., Schaumburg, IL 60193
Tel: (847) 891-7063
Herbicide and Algicide treatments

Professional Lake Management

P.O. Box 672, Brainerd, MN 56401
Tel: (218) 825-3773
Herbicide application, EWM weevil, lake and pond management

Richmond Fisheries

8609 N. Clark, Richmond, IL 60071
Tel: (815) 675-6545
Electrofishing Surveys and Fisheries Consultations, Fish dealers and transporters, fisheries assessments, electro shocking. Biological Aquatic Weed Control

Scientific Aquatic Weed Control

16525 Orchard Valley, Gurnee, IL 60031
Tel: (847) 662-5370
Herbicide and algaecide applications

Source: Lake County Health Department Lakes Management Unit

NOTE: The lists of consultants and vendors is provided as a public service and does not constitute a recommendation, endorsement or certification of their qualifications or performance record, nor does the absence of a consultant or vendor from the list constitute a negative endorsement. While an effort has been made to provide a complete and accurate listing, omissions, or other errors may occur and, therefore, other available sources of information should be consulted. Those seeking professional services are advised to use independent judgement in evaluating the credentials of any consultants and vendors appearing on these lists.

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A Citizen's Guide to Maintaining
Stormwater Best Management Practices
For Homeowners Associations and Property Owners



STORMWATER MANAGEMENT COMMISSION