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STORMWATER PONDS: INSPECTION AND MAINTENANCE CONSIDERATIONS

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Maintenance of a Stormwater Pond for Long-Term Performance

Maintenance of stormwater pond systems is not only critical to maintaining their benefits to the community, but also to reduce impact on downstream waterways. Some studies have found that poorly performing or maintained pond systems can act as sources of pollution in South Carolina waterways (Lewitus et al., 2003). As the owner of a stormwater pond system, the entire community plays a role in successful pond management.

Frequently Asked Questions

"Who owns the stormwater pond in our community? Who is responsible for maintenance?"
In many South Carolina residential communities, the pond owner is most often the homeowner association (HOA) or neighborhood. Rarely are these ponds owned by the city or county government. The pond owner is responsible for maintenance and, therefore, should be taking the necessary steps to plan for regular inspection and maintenance.

"What inspection and maintenance regulations apply to our pond system?"

Requirements for pond inspection and maintenance can vary depending on when the pond was built, the municipality, design considerations, and more. A good first step is to determine requirements that apply to the pond by contacting the city or county Stormwater or Public Services Department to find more information on applicable regulations, local guidance, and inspection and maintenance resources.

"I want to plan ahead and prepare my community financially for some of the larger maintenance actions required. What should I do?"

Consider establishing a capital reserve fund for the community that prepares it for some of the larger expenses, like dredging or infrastructure, that will one day be required for the stormwater pond's function and performance. Discuss anticipated costs with pond management, property management, or engineering professionals to determine how much money may be needed for large projects. Be sure to also factor in smaller, more routine, maintenance actions, like aquatic plant management, in planning.

"How often should maintenance be performed?"

Inspect the pond at least twice a year and following large storm events. If concerns are noted, take corrective action as soon as possible. The local or county government may have a recommended form that can be used to guide the inspection and maintenance process. Additional resources are available through the ***Clemson Extension Service*** and the ***Low Impact Development in Coastal South Carolina: A Planning and Design Guide*** (Ellis et al., 2014).

Common Maintenance Concerns and Solutions

These common maintenance concerns and suggested maintenance actions will help to maintain a healthy, functioning pond system. Recommendations included are based on guidance from the ***South Carolina DHEC Storm Water BMP Field Manual*** (2005), the ***Low Impact Development in Coastal South Carolina: A Planning and Design Guide*** (Ellis et al., 2014), and the Clemson University Cooperative Extension Service.

Blocked inlets and outlets: It is critical to maintain the flow into and out of the stormwater pond to avoid flooding in the community. Oftentimes cattails, other vegetation, sediment, and debris can block the discharge of stormwater pipes, or inlets and outlets, as they discharge to or drain the pond. Perform regular (semi-annual and after storm events) inspections of these stormwater pipes to check for overgrowth of vegetation, accumulated trash and leaf litter, pipe blockage or collapse, and signs of erosion. Document concerns, keep a photo log, and take corrective maintenance measures as soon as possible. Maintenance may include removal of accumulated debris and leaf litter, control of vegetation within a 10-15 foot radius of infrastructure, and stabilization of the area around inlets and outlets using rip-rap, turf reinforcement matting, or a combination of erosion control methods.

Accumulated debris at this outlet could impede flow leaving the pond, impacting its ability to manage large rain events. Once noted, the pond owner should clear as soon as possible to avoid clogging.
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Eroding shorelines: Turfgrass along shorelines is not ideal for withstanding the erosive nature of pond systems as a result of wind and wave action. Additionally, turf does not thrive when planted in areas with consistently wet soils. Ideally, a wide, planted buffer using a variety of native perennial flowering plants and shrubs with deep root systems can help protect the shoreline from erosion and also slows runoff to the pond, capturing sediment and other pollutants. Buffers can even incorporate trails, birdhouses, and benches for passive recreation and wildlife viewing along the shoreline. A low-cost alternative to a planted buffer is a reduced-mow zone, which helps support the growth of beneficial native plants that can outcompete annual weeds. To implement, every other year, alternate mowing this zone in spring and fall; in between mowing, remove any woody vegetation that emerges to keep tree growth in check. Lastly, if there is not enough space to support a wide buffer, a narrower buffer incorporating native, aquatic-type transplants along the pond's edge can help protect the most erosive zone of the pond. For more information on how to establish a buffer at a pond, review the following resources:

Erosion and the undercut of pond banks are common pond maintenance concerns. These issues can often be attributed to the presence of turfgrass along the shoreline, which lacks the tolerance to moist soil conditions and erosive wave energy

- **HGIC 1855, *Shorescaping Freshwater Shorelines*,** and **HGIC 1856, *Life Along the Salt Marsh: Protecting Tidal***

needed to protect shorelines.
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Creeks with Vegetative Buffers offer plant lists and best practices for establishing healthy riparian zones along both freshwater and saltwater shorelines.

- Clemson Public Service and Agriculture's ***Life at the Water's Edge*** (2004) is available for purchase and provides in-depth guidance and instruction on protecting shorelines, designing a buffer, water quality testing, aquatic invasive plant identification and more.

Nuisance aquatic plant and algae growth: Though some consider the control of nuisance plants a maintenance priority because of aesthetic concerns, aquatic plant control of certain species can also be an important step for protecting water quality, fish health, and reducing nuisance insects in the pond and downstream. Invasive vegetation, which can aggressively spread in and along waterways, can replace native, beneficial plant species. The occurrence of harmful algal blooms, which may result in the release of toxins into a waterbody, can impact the health of a pond system and, ultimately, the community and downstream waters.

Parrotfeather (Myriophyllum aquaticum) is an example of a non-native, invasive emergent plant that can quickly cover ditches, streams, and pond shorelines.
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For control of problem species, use an integrated plant management (IPM) plan that incorporates two or more aspects of mechanical, biological, and chemical control, as well as prevention. The first step in developing an effective IPM plan for a pond is proper plant identification. Contact the local Clemson Extension office for assistance and management recommendations. If considering chemical treatment, a South Carolina licensed Category Five aquatic commercial pesticide applicator will have the appropriate credentials to perform the application. Don't forget: ***the label is the law*** when it comes to the application and storage of pesticides. Follow the label to minimize the environmental impacts of any pesticide treatment. A licensed applicator is required when the pond has multiple owners or multiple residences, or when the applicator is paid. For more information on integrated aquatic plant control, see **HGIC 1714*, Aquatic Weed Control Overview;* HGIC 1720, *Chemical Control of Aquatic Weeds***; **HGIC 1715, *Biological Control of Aquatic Weeds***; and ***Herbicide Application: The Label Is the Law***.

Lastly, because excess nutrients in runoff can promote or exacerbate aquatic plant growth, an effective aquatic management plan should also include steps to control excess nutrients in the landscape before they reach the pond. Clemson Extension's Carolina Yards program is just one resource to guide nutrient management in a community. More information on the Carolina Yards program can be found at **www.clemson.edu/cy**.

Sediment accumulation: Sediment that is carried with runoff into the pond or pipes can cause problems for a neighborhood's drainage and pond health. Stormwater ponds are engineered to hold a certain volume of stormwater; accumulated sediment can impede flow into and through infrastructure and contribute to flooding. If unchecked, excess sediment carried into the pond will also cause the pond to fill more quickly, reducing its ability to manage flooding during storms, and requiring the pond to be dredged more frequently. Perform regular cleaning of HOA- or privately-owned infrastructure to remove any accumulated sediment. If the flow becomes obstructed or flood volume has been displaced by debris, act quickly to remove these potential hazards. A significant contributor to sediment in many ponds includes sediment loss from

shoreline erosion, so consider incorporating buffers around the pond to stabilize the shoreline. Also, take note of upland areas in the community and upstream to make sure that exposed soils around or upstream of infrastructure are stabilized using mulch, plantings, or turfgrass. Additional help for these “hot spots” can include the use of an erosion control blanket to provide quick control until vegetation is established. For more tips on actions in these upland zones, see **HGIC 1851, *Carolina Yards: An Overview of Sustainable Landscaping Practices***.

As sediment accumulates in ponds, it can allow for the growth of emergent vegetation.
Photo courtesy Chuck Jarman

Because stormwater pond systems are designed to trap and retain sediment, the pond will need to be dredged at some point to maintain its benefits to the community. Pond dredging is typically determined by measuring the amount of sediment that has accumulated in the pond system. If necessary, seek the assistance of a pond management professional or engineer to determine accumulated sediment levels. The South Carolina Department of Health and Environmental Control recommends that stormwater ponds should be dredged when 25% of the pond’s permanent pool has been filled (SCDHEC, 2005). If provided on the pond’s design plans or “as-built” drawings, follow the maintenance schedule and recommendations included for the depth of accumulated sediment and time to dredge. If considering the disposal of sediment as fill in the community, work with a private laboratory to have sediment analyzed for pollutants (Ellis et al. 2014).

Water quality concerns (including fish kills): Water quality, habitat, and a diverse animal and plant community all play a part in a healthy and attractive pond ecosystem and reduction or prevention of problems like fish kills, noxious odors, and more. Take action to support a healthy ecosystem by:

1. Reducing polluted runoff to the pond through upland best management (pet waste disposal, reducing excess fertilizers, adopting integrated pest management, composting, or bagging lawn debris).
2. Supporting the habitat through shoreline plantings and the use of native plants in the landscape.
3. Deterring over-populations of Canada geese by discouraging feeding wildlife.
4. Maintaining healthy levels of dissolved oxygen in the pond for a healthy fish population.
5. Picking up dog waste, whether in the yard or during a walk, and disposing of it in the trash.

The amount of dissolved oxygen present in the water is an important component of water quality in a pond and is critical to the survival of aquatic life. The amount of dissolved oxygen in pond systems is influenced by decomposition of organic matter, respiration, fluctuations in weather and water temperature, and pond design, among other factors. When dissolved oxygen levels are too low, aquatic life suffocates, which may result in a “fish kill”.

If the pond has experienced “fish kills” that are the result of low dissolved oxygen, which can be common in deeper pond systems, consider adding an aeration system to maintain healthy dissolved oxygen levels for aquatic life. Work with a pond management professional to select a

system that is appropriate for the pond design and depth. While fountain aerator systems may work well to oxygenate water within shallow or and smaller ponds, a bottom diffuser, which circulates the entire water column, will be more effective for deeper ponds to prevent thermal stratification and low dissolved oxygen zones.

A bottom diffuser is used in this stormwater pond to help circulate the water column, preventing stratification and dissolved oxygen concerns in the pond. Photo courtesy The Lake Doctors, Inc.
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References

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3. South Carolina Department of Health and Environmental Control (SC DHEC). 2005. *South Carolina DHEC Storm Water Management BMP Field Manual*.

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If this document didn't answer your questions, please contact HGIC at **hgic@clemson.edu** or 1-888-656-9988.

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