

Stormwater Systems in Your Neighborhood

Stormwater Systems

A stormwater system is designed to collect and manage runoff from rainwater. They are specifically designed to help prevent flooding and remove pollutants from the water, and they are required for most new development since the 1980s. When rainwater lands on rooftops, parking lots, streets, driveways and other hard surfaces, the rainfall that doesn't soak into the ground is called stormwater runoff. Stormwater runoff carries pollutants such as litter, motor oil, gasoline, fertilizers, pesticides, pet wastes, sediments and more. Protecting natural waterbodies from these pollutants is important. There's many tips individuals can follow to help, and communities can help too through proper maintenance of their stormwater systems.

Types of Stormwater Systems

Stormwater systems come in a variety of shapes, sizes and forms, and because most systems were designed to imitate natural processes, residents may have stormwater systems on or near their property without realizing it. There are two main types of stormwater systems — retention and detention systems.

Retention System

A retention system is designed to allow water to seep through soil into the shallow groundwater aquifer. A system can be constructed, or it can be a natural depression. Grass stabilizes basin slopes and filters sediments. Retention systems are constructed so that stormwater percolates into the ground without direct discharge to natural surface water bodies.

Detention System

Detention systems (ponds) are the most recognizable stormwater system. They are designed to allow material to settle and be absorbed. After a storm, water slowly drains from the pond through a pipe in the "outflow" structure. Part of the pond, known as the permanent pool, is always below the level of the drain structure. Constructed detention systems (ponds) are required to have aquatic plants around the perimeter to help filter sediment in stormwater runoff. The owner of the pond should refer to their permit for exact specifications.

Swale

A swale is a linear retention system, such as a ditch. It is either a constructed or natural area shaped to allow water to be quickly absorbed into the ground or to allow the water to flow to other water bodies. As in a shallow ditch, a swale promotes water absorption through soils. Swales hold water during and immediately after a storm but are generally dry.

Responsibility for Stormwater Systems

In Florida, the responsibility for permitting most stormwater systems rests with the water management districts. After developers' complete construction of permitted systems in residential areas, the permit and the legal responsibility for maintaining these systems are typically passed to homeowners, condominium owners or property owners association.

The upkeep and maintenance of the system becomes the responsibility of the association, not the developer or water management district. The association is responsible for labor and expenses for keeping the system functional. This responsibility applies to every homeowner and property owner in the neighborhood, even if they do not live adjacent to a detention or retention system, as everyone's stormwater flows into the system.

Copies of an association's operation and maintenance permit, plans and maintenance guidelines should be provided to the association's representative at the time of transfer.

Stormwater System Maintenance

If properly maintained, stormwater ponds help prevent flooding and filter out pollutants before they reach streams, rivers, lakes, wetlands, estuaries and, ultimately, the gulf. Below are a few basic maintenance guidelines that can help keep stormwater systems functioning properly:

- Clear or clean inflow/outflow structures.
- Remove nuisance and excess vegetation.
- Repair eroded slopes.
- Clean up trash and yard waste in your yard and gutters and around storm drains.

How Can Residents Reduce Water Pollution?

Residents can help improve the quality of water that enters stormwater systems by following a few simple tips. The less pollutants and runoff entering a stormwater system, the less chances of pollutants making it into nearby natural waterbodies.

- Follow Florida-Friendly Fertilizing practices on your lawn.
- Use nontoxic chemical alternatives whenever possible and pull weeds by hand.
- Avoid overuse of fertilizers, especially near the water's edge.
- The University of Florida's Institute of Food and Agricultural Sciences recommends using fertilizers with a high percentage of slow-release nitrogen. The higher percentage of slow-release, the less chance of leaching into Florida's water bodies.
- Use only herbicides labeled for aquatic use when maintaining stormwater ponds.
- Wait until grass is actively growing to apply fertilizer.
- If fertilizer is spilled on the lawn or on the sidewalk or pavement, sweep it up as thoroughly as possible and put it back in the bag.
- Never dump oils and other chemicals from your home directly into stormwater drains.
- Keep vehicles in good operating condition and check for drips and repair leaks immediately to keep nuisance oils off pavement.
- Buy low- or no-phosphate cleaners and detergents. Phosphates act as a fertilizer and increase algae and aquatic weeds in stormwater ponds.

- Wash your vehicles, bicycles and home equipment with nontoxic, low-phosphate soap and use water sparingly.
- Sweep walks and driveways instead of hosing them down.
- Clean up pet wastes to avoid nutrients and bacteria from entering the stormwater drains and contaminate the water system.
- Avoid cutting your lawn too short, which reduces its effectiveness in capturing runoff. Leaving grass taller will also help it to survive dry periods.
- Never deposit lawn clippings in water bodies and storm drains as this can increase oxygen demand in the water, which can significantly harm fish populations. Use lawn clippings for mulch or compost.
- Do not fill stormwater ponds, swales or retention systems. Stormwater systems are designed and constructed to an appropriate size and any reduction in treatment volume will interfere with the pond's ability to hold stormwater runoff.

Stormwater Management System FAQ's

Q: What are stormwater ponds and why do we need them?

A: A stormwater pond is designed to collect and manage runoff from rainwater. When rainwater lands on rooftops, parking lots, streets, driveways and other hard surfaces, the rainfall that doesn't soak into the ground (stormwater runoff) flows into your neighborhood stormwater pond through grates, pipes, shallow swales or ditches. Stormwater ponds are required for most new development (since the 1980s) and are specifically designed to help prevent flooding and remove pollutants from the water. Without these ponds, excess stormwater would flood downstream to adjacent systems and properties. It would also carry pollutants like litter, motor oil, gasoline, fertilizers, pesticides, pet wastes, sediments and anything else that can float or dissolve in water, into nearby streams, rivers, lakes, wetlands, estuaries and the Gulf of Mexico.

Q: Why don't I see any stormwater ponds in my neighborhood?

A: Some neighborhoods that have been experiencing flooding during the summer months were built without ponds before the District's stormwater regulations went into effect. The District typically does not have jurisdiction in those areas. If you are experiencing flooding at your home, your first contact should be your local government as they bear much of the responsibility when it comes to local flood protection.

Q: How do stormwater ponds affect water quality?

A: Stormwater runoff can enter neighborhood streams, ponds, lakes, bays, wetlands and oceans and eventually make its way into our groundwater (water beneath the earth's surface.) If that runoff is contaminated with things like oil from your driveway, too much fertilizer on your lawn or even pet waste, it can cause pollution and damage to the ecosystem. Stormwater ponds collect and filter these pollutants from the water before they are discharged into our watershed.

Q: Who is responsible for maintenance of stormwater ponds in my neighborhood?

A: Once the developer has completed construction of the roads and drainage system in a neighborhood, the property owner's association (or in some cases, a community development district (CDD)) is typically

responsible for maintaining the neighborhood drainage system, including the stormwater ponds. The long-term upkeep and maintenance of the ponds becomes the responsibility of the association or CDD, including labor and expenses for keeping the system functional.

Q: Can I remove vegetation from my stormwater pond?

A: Many stormwater ponds are designed and required to include native aquatic vegetation. Native vegetation will filter polluted runoff, trap sediments, control the growth of nuisance vegetation and help make the pond aesthetically pleasing. Aquatic plants pump oxygen into the water and create habitat by providing cover and nurseries for fish and other organisms. Pond owners often request approval to remove vegetation that becomes overgrown in stormwater ponds. Removal of exotic, nuisance and excess vegetation is allowed. Just make sure to consult your association or CDD and the District before removing any significant amount of vegetation. The District recommends selective maintenance and removal by hand rather than mass removal of native wetland vegetation that becomes established in a stormwater pond. The District does not recommend cutting, mowing, using herbicides or introducing grass carp to remove native vegetation. In addition, if using herbicides, use only herbicides labeled for aquatic use. Herbicides not labeled for aquatic use may harm fish and other aquatic life, and their application to aquatic sites is prohibited by state and federal law.

Q: Is it OK to use stormwater ponds for recreational purposes such as fishing, swimming, kayaking or stand-up paddle boarding?

A: Recreational use of stormwater ponds is potentially hazardous to your health and is not recommended. Stormwater ponds are designed to capture and retain stormwater runoff, which may contain many different types of pollution, including sediments, oils, greases, trash, nutrients, heavy metals, pesticides, herbicides and pathogens.

Q: What can residents do to help prevent pollution and flooding in stormwater ponds?

A: Never fill or obstruct stormwater ponds, swales and retention systems, as that will potentially keep the stormwater pond from working as designed. Never dump excess oils and other chemicals from your home or yard, including grass clippings, into stormwater drains or ponds. Also, be sure to clean up pet waste so nutrients and bacteria don't enter stormwater drains.

Q: What is Stratification in a pond?

A: Stratification occurs when the sun heats the surface water while deeper water remains cool. The warm and cool layers do not mix. This disrupts the circulation of oxygenated water from the surface of the pond to the bottom. Stratification can be a significant threat to fish health in small ponds because it increases the potential for a "turnover."

Q: How do you prevent turnover?

A: Proper pond construction, aquatic weed control, nutrient and algae growth control and mechanical circulation of water are all strategies that can be implemented to reduce the chances for pond "turnover".

Q: What is the best way to circulate water?

A: The primary goal of a circulation system should be to bring deep water to the surface and expose it to the atmosphere. By far, diffusion systems circulate water most efficiently. Diffusion systems are a lot like

air stones in an aquarium. They use an air compressor to pump air into the bottom of the pond. The diffuser breaks the air into tiny bubbles which expand as they rise. The rising of the bubbles pushes water and forms a current that lifts bottom water up to the surface. The resulting current mixes the entire water column and prevents stratification in the pond.

Q: Are there other ways to circulate water?

A: Yes. Water pumps such as centrifugal irrigation pumps and sump pumps can be used to push water, but they must be designed correctly to work. The goal of a circulation system should be to prevent stratification. Irrigation pumps can be mounted on land as long as they draw water through pipes from near the bottom and shoot it over the surface to create a current. Unlike diffuser systems, which are self-cleaning, water pumps are prone to becoming clogged by vegetation and debris and require frequent maintenance, especially when submerged plant growth is not controlled. Water pumps also consume more energy than air compressors.

Q: Do fountains work to circulate water?

A: Surface fountains are the least efficient ways to circulate ponds, and they do very little to prevent stratification. They move water, but typically fountains are floating devices that draw surface water into a shallow pump and spray it above the surface. Functionally speaking, they are circulating surface water that is already oxygenated and are not preventing stratification. As a result, fountains are often deployed more for aesthetic reasons than functional circulation and aeration. That being said, surface fountains do provide for limited circulation that is beneficial to fish and other aquatic species. The amount of circulation they create is dependent on the size of the motor and the shape of the sprayer.

Q: Will circulation systems control aquatic weeds?

A: No, not necessarily. Circulation systems will not control existing aquatic weed problems, except for some blue-green algae (cyanobacteria) which thrive in still water. Some cyanobacteria require stagnant waters to grow large blooms. Circulation systems can disrupt these harmful algae blooms from growing out of control. Also, in ponds that are overloaded with nutrients (eutrophic) and consistently low in oxygen, circulation system may improve water chemistry and make dissolved nutrients less available to algae and weeds. By reducing the availability of nutrients, circulation systems potentially can slow but not prevent the growth of aquatic weeds. If the pond is consistently loaded with new nutrients, then a circulation system will have little or no effect on reducing weed growth.

Q: How large does the system need to be?

A: A general rule is that one diffuser unit can circulate a one to two acre pond, but sizing diffuser systems has a lot to do with surface area, depth, and the shape of the pond. Diffusers are less efficient in shallow ponds because the bubbles travel a shorter distance and create less current, so more diffusers may be needed. Also, ponds with odd shapes, bottlenecks, and narrow canals may need several diffusers to adequately circulate water in each of the sections of the pond. The same goes for fountains and water pumps. For water pumps, it is suggested that 1 horsepower of pump be used for each surface acre of pond. You should always consult with the circulation system manufacturer or professional installer for guidance on sizing and designing your system.

Q: What are some strategies to control mosquito growth in ponds?

A:

- Do not dump grass clippings or other organic debris into a SWMS — decaying grass clippings and other decomposing vegetation create ideal conditions for breeding mosquitoes.
- Clean out any obstructions that get into the system. Debris can obstruct flow and harbor mosquito eggs and larvae.
- Remove water lettuce and water hyacinth, which nourish and shelter mosquito larvae.
- Stock ponds with predatory “mosquito fish” – *Gambusia minnows*, which may be collected from other ponds and ditches and introduced into your SWMS. Remember, the introduction of grass carp into your SWMS will require District approval.

Q: What are some general maintenance processes for stormwater ponds?

A:

- All stormwater pipes, inlets, catch basins, manholes, flumes, pond inflow and outfall structures (including oil skimmers), and discharge pipes should be inspected on a regular basis (monthly or quarterly) and after major rainfalls. They should be maintained by removing buildup debris and vegetation and repairing deteriorating structures.
- Chemicals, oils, greases or similar wastes are NOT to be disposed of directly to the stormwater facility or through storm sewers. Treatment ponds are designed to treat normal road, parking lot, roof and yard runoff only. Some chemicals may interfere with a treatment pond’s functions or kill vegetation and wildlife. Dispose of these potentially dangerous materials properly by taking them to recycling facilities or to collection locations sponsored by many local governments. Also, do not dispose of grass clippings in a SWMS. Grass clippings pose problems by smothering desirable vegetation, clogging outfall structures and, when they decompose, may cause unsightly algae blooms that can kill fish.
- Accumulated pond sediments may contain heavy metals such as lead, cadmium and mercury, as well as other potentially hazardous materials. Therefore, sediments removed from storm sewers, inlets, pipes and ponds should be disposed of at an approved facility (check with your county Solid Waste Department or the Florida Department of Environmental Protection for disposal facilities approved to accept treatment pond sediment).
- During any repair or maintenance activity, use care to avoid causing erosion or siltation to adjacent or off-site areas.
- Alterations (filling, enlarging, etc.) of any part of the stormwater facility is not permitted without prior approval from all applicable governing agencies.
- General Maintenance
- The approved Operation and Maintenance Permit and asbuilt drawings are available at your local District service office. Refer to those plans and permits or additional restrictions, instructions and conditions.
- It is usually more cost-effective to monitor and perform routine maintenance on a SWMS, rather than let it fail and have to reconstruct the entire system.

Information provided from The Southwest Florida Water Management District, The University of Florida IFAS & The University of Clemson Water Resources.