

below  
the  
surface  
an in-depth  
look at...



# Managing Flood Water Before and After the Storm

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*Southern Florida's geography and climate dictate that we may occasionally experience flooding. South Florida Water Management District; federal, state, and local governments; developers; and homeowners' associations share the responsibility for managing excess water. Residents can help by learning about our regional drainage system and reporting or correcting problems both before and after a storm.*

Southern Florida's terrain is flat—low and flat. From Lake Okeechobee south to Florida Bay, the slope of the land is only one inch per mile. Our climate is hot and wet with seasonal rains of 50 to 60 inches falling per year, mostly in the summer. Marshes and swamps once covered much of the southern portion of the peninsula. Then, with the creation of a regional flood control system, the area was opened for agriculture and development. More than 7.5 million people now call southern Florida home and depend on the South Florida Water Management District to oversee the operation and maintenance of our regional flood control system.





*The South Florida Water Management District operates the major canals, or drainage superhighways, for our region. These primary canals are the first tier in our three-tiered drainage system.*



### **A Three-Tiered System**

Flooding may happen in our area when large amounts of rain occur over a short period of time or from a single, heavy storm, tropical system, or hurricane. After these storms, we rely on a man-made flood control system to drain excess water from the low, flat lands.

Flood control is achieved through an interconnected drainage system. Our three-tiered system can be compared to a roadway system. Small streets in neighborhoods and towns carry traffic to larger, secondary highways. Secondary highways, in turn, connect and carry traffic to turnpikes and superhighways, or our primary vehicle transport system.

Similarly, neighborhood ditches, swales, and conduits, referred to as our tertiary system, carry excess stormwater to secondary canals. In turn, secondary canals operated by water control districts, cities, or counties connect and carry excess water to our primary canal system. Primary canals operated by the South Florida Water Management District are the drainage superhighways for our region.

### **Drainage Components and Connections**

Large and small structures, culverts, gates, weirs, pumps, and levees, even street grates are all components of our drainage system. Water bodies such as ponds, lakes, and lagoons also play a role in water management. While they do provide a beautiful view, their real function is to hold excess rainwater or to carry it off to regional storage areas or to the ocean.

Swales and grassed water storage areas are important features in water management systems. In addition to storing and conveying water, they help recharge water in the underground aquifer and

improve water quality by catching sediment and filtering nutrients.

Our interconnected system achieves maximum benefit when all components are well maintained and kept in good working order. As in a chain of dominoes, each component must properly function and connect to the next to allow for optimum drainage conditions. However, even with well-engineered systems, flooding may still occur during and after extreme rain events.

### **Factors Affecting Drainage**

Existing levels in surface waters and groundwater affect the ability of drainage systems to receive or store new rainfall. If surface waters such as canals, lakes and rivers are already full, they cannot receive or transport additional water. Just like our highways, when they cannot receive more cars from feeder roads because they are jammed or have reached their carrying capacity, water cannot flow into primary canals if they are full or if the flow has become blocked. Additionally, if the underground water table is already high, water cannot soak into the saturated ground. After a heavy rain, water in streets, swales, yards, and low-lying areas is expected and normal.

During and after storms, excess rainwater is typically discharged through canals and structures to the ocean. However, tides, winds, and even the phase of the moon can affect discharge to the sea. When tides are high, the same floodgates that allow for the flow of excess freshwater to the ocean become salinity barriers preventing saltwater from entering, or intruding into our underground, freshwater aquifers.

### **Protection through Permitting**

Development activities that affect how much rain soaks into the ground, how much water leaves a property, and where it will go must be permitted by water management districts. Permits protect the water resources of the state and provide for adequate drainage while ensuring that other people or properties are not adversely affected.

Permits also address water quality issues and protect wetlands. Water leaving a



*A road storm produces 4 to 6 inches of rainfall in a 24-hour period. Due to our unique climate and geography, standing water is normal and can be expected after a heavy rainfall.*

property can transport excess nutrients from fertilizers or animal wastes, herbicides, pesticides, oil, gasoline or other substances that can pollute water and cause problems downstream. Wetlands are vital natural resources protected by the state. They provide for wildlife habitat, flood protection, groundwater recharge, and water quality benefits.

Drainage factors considered when issuing permits are based on historical rainfall data and generally address the following three levels of storm conditions:

- A Road Storm – 4 to 6 inches of rainfall in a 24-hour period. Water remains standing in yards, swales and ditches, but the crowns of roads remain passable.
- A Design Storm – 7 to 10 inches of rainfall in a 72-hour period. Roads, as well as swales, ditches and yards flood, but buildings usually remain dry.
- A Hundred-Year Storm – 10 to 20 inches or more of rainfall in a 72-hour period. Many houses and businesses can be expected to flood.

In every county, some areas remain prone to flooding. Most are in older neighborhoods where drainage systems were in place before surface water permitting requirements were established.

### Helping to Maintain the System

To function properly, stormwater drainage systems must be kept in good working order. Homeowners' Associations, CDD's, property managers, and residents all play a role in managing flood situations by becoming familiar with the drainage system in their own area and taking action when needed.

Just as northerners check their heating systems prior to winter, those who reside in southern Florida should inspect, maintain and repair drainage systems before the rainy season. Inspections should be repeated when a major storm threatens. This is what you should do:

- Find out if your neighborhood system is inspected regularly and check to see if trash, dead vegetation and sediments are being removed.
- Become familiar with the permits that authorize drainage in your area and note changes that may go beyond the specifics or intent of the permit.
- Keep a record of the names, addresses and phone numbers of your Homeowners' Association, CDD or property manager, the local drainage district, and the South Florida Water Management District to report potential problems.

### Recognizing Drainage Problems

Residents, property managers, or contractors should periodically check

Drainage system components such as pipes, culverts, swales, and grassy areas need regular maintenance. Taking action to report or correct potential problems, especially before the rainy season, is an effective way in which you can help keep our interconnected system in working order.



the components of the drainage system to ensure peak performance. Inspections should include:

• **Stormwater inlets, pipes and culverts:** Grates should be unobstructed and sediment under the grate should be removed. Pipe openings and connections to culverts should be free of sediment, trash, and debris.

• **Swales and grassed water storage areas:** Swales may need to be regraded or replanted. It is a good idea to compare the existing slope to the permitted design plan before the work begins. All heights, depths, and lengths of side slopes must meet permit specifications. Grassed swales also require regular mowing, and undesirable exotic vegetation should be removed.

• **Ditches or canals:** Trash, sediment, and dead vegetation should be completely removed and properly disposed of so it won't affect any other water conveyance system or water storage area. Right-of-way clearances should remain open and unobstructed.

• **Lake systems:** Trash and dead vegetation should be cleared from the shoreline. Shoreline grasses should be mowed, unless it is a wetland preserve. Side slope erosion or washouts on the banks should be repaired and replanted. Pipe or culvert connections between lakes should be clear and open.

• **Weirs or other discharge control structures:** Check for obstructions.

Anything that hinders water flow should be removed. The structure should have a "baffle" or trash collector to prevent flow blockage and hold back floating oils and debris from moving downstream.

• **Dikes and berms:** Worn-down berms and rainfall-created washouts should be immediately repaired, compacted and replanted in compliance with the permit.

### Our Wet Way of Life

Understanding our way of life is knowing we live in a region where seasonal rains fall over low, flat lands that offer little natural drainage. Most drainage is through interconnected waterways and structures. Our three-tiered system requires ongoing maintenance and repair for optimal performance. Action should be taken before the rainy season.

You can help to lessen the odds that your home or community will flood by learning about our regional flood control system and reporting or correcting problems. Flood management is a shared responsibility and you can make a difference.



### DID YOU KNOW?

- Maintenance and upkeep of community drainage facilities are typically the responsibility of the CDD Homeowners' Associations.
- Standing water in streets and yards is not considered unusual, but rather a critical component of your neighborhood drainage facilities.
- Weather conditions and water levels are monitored around the clock, 365 days a year, and floodgates are opened if heavy rains are expected.
- If you live in an area serviced by a local drainage or water control district, it is noted on your county property tax bill.
- A portion of the property taxes you pay to the South Florida Water Management District is for regional flood protection.
- "Freddy," the friendly alligator, appears on canal signs located near all primary canals operated by the South Florida Water Management District.

**The South Florida Water Management District** is a regional, governmental agency that oversees the water resources in the southern half of the state. It is the oldest and largest of the state's five water management districts.

Our Mission is to manage and protect water resources of the region by balancing and improving water quality, flood control, natural systems, and water supply.



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