INFORMATION SOURCES/CREDITS

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Stormwater Management - A Guide for Floridians, Florida Department of Environmental Regulation

The Florida Development Manual: A Guide to Sound Land and Water Management, 1988, Florida Department of Environmental Regulation (Protection)

Franklin County Guide to Responsible Coastal Development, Franklin County Planning Department

Stormwater To Street Trees: Engineering Urban Forest for Stormwater Management, U.S. Environmental Protection Agency

How To Operate & Maintain Your Stormwater Management System, Southwest Florida Water Management District

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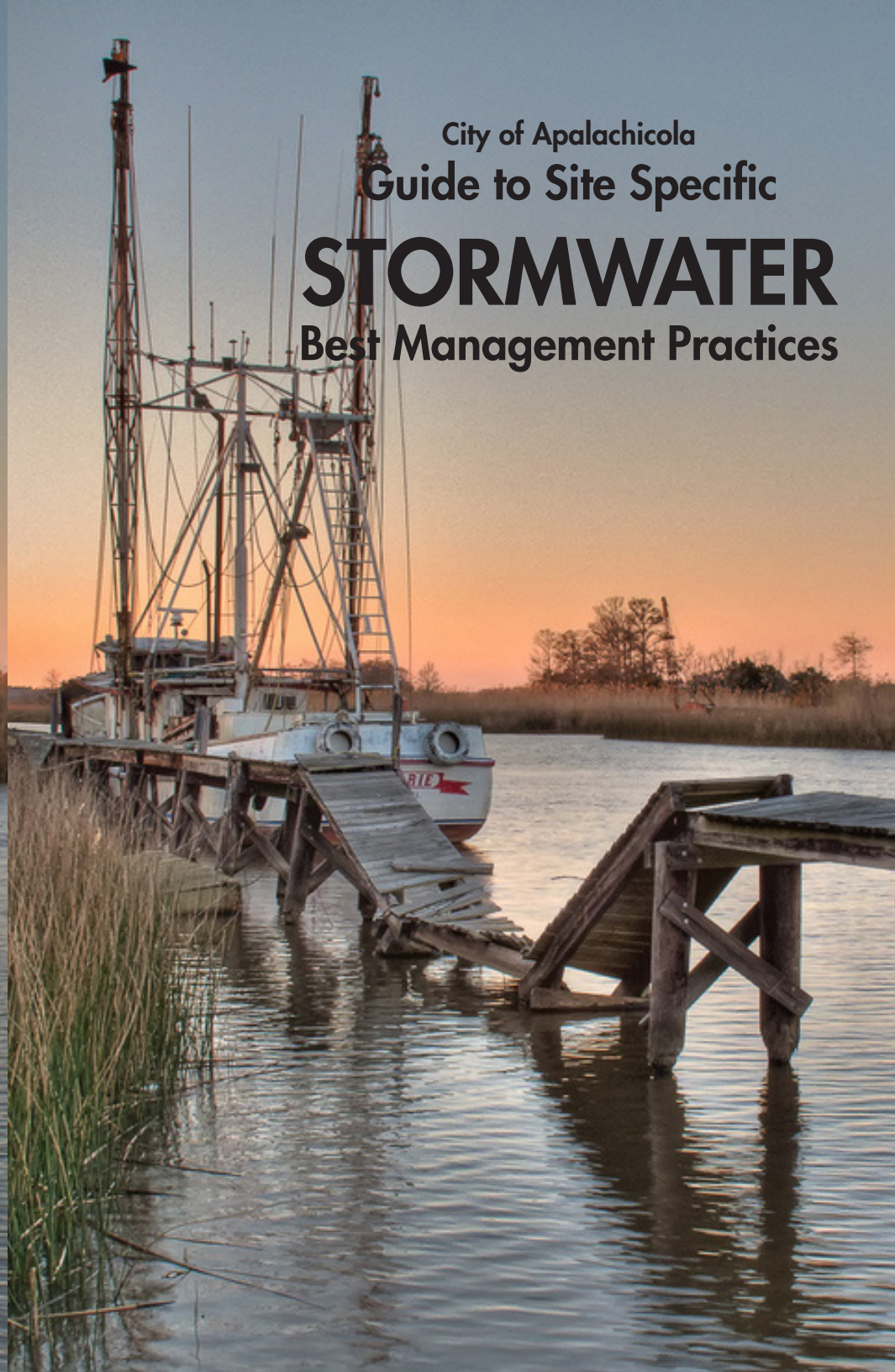

City of Apalachicola

Guide to Site Specific STORMWATER Best Management Practices

City of Apalachicola Site Specific Stormwater Best Management Practices, Apalachicola Planning Department, May 2015

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THE BIG PICTURE

Because stormwater runoff is generated from dispersed land surfaces—pavements, yards, driveways, and roofs—efforts to control stormwater pollution must consider individual, household, and public behaviors and activities that can generate pollution from these surfaces. These common individual behaviors have the potential to generate stormwater pollution:

- **Littering**
- **Disposing of trash and recyclables**
- **Disposing of pet-waste**
- **Applying lawn-chemicals**
- **Washing cars,**
- **Changing motor-oil on impervious driveways**
- **Household behaviors like disposing leftover paint and household chemicals**

COMMON SENSE TIPS

1. Use Garden and Lawn Chemicals Wisely - Follow package directions carefully, and only use pesticides, herbicides and fertilizers when other methods fail. Do not apply if rain is in the forecast. WHY? Excessive fertilizers and chemicals wash off the property and into surface and ground waters.

2. Keep irrigation water on the lawn and garden, not on paved surfaces.

3. Divert rain spouts to unpaved areas or swales, and wash vehicles where water will drain to vegetated areas. WHY? This allows runoff to soak into the soil and not wash off the property into nearby waterbodies after picking up pollutants.

4. Compost Leaves, Grass and Shrub Clippings. Use these materials as mulch to supplement fertilizers. Do not rake these materials into roadways or swales. WHY? These materials will decompose, returning nutrients to the soil so that you can use less fertilizers. If placed in roads or swales, yard debris will block drainage flows and end up in your nearest waterbodies.

5. Don't Drain Used Motor Oil Into Storm Drains. Take used motor oil and antifreeze to service stations to recycle them. WHY? These products are toxic and add pollutants to surface waters if placed or washed into storm drains.

6. Service Your Car Regularly. Have your car inspected and maintained regularly. WHY? To prevent leakage of motor oil, antifreeze and other fluids that can end up in the nearest waterbody. Well maintained vehicles reduce harmful emissions that also can contaminate surface waters.

STRUCTURAL DETENTION BMPS - PONDS

In areas with slowly percolating soils, high water tables and flat terrain, permanently wet detention systems and wetland treatments systems are likely to be the preferred BMPs. Detention systems are storage areas that maintain a planned permanent level of water even after stormwater discharge has ceased. If properly planned and constructed, wet detention areas provide multiple benefits including "lake-front" property, possibilities for recreation and wildlife habitat, water for irrigation and fire protection.

DETENTION PONDS

If your property is located in an area where the water table is near the surface, a wet detention pond may be the BMP for managing your stormwater. Although wet ponds are not commonly used on residential lots, if your property has a natural contour that forces water to drain into one or two locations, a pond may be good BMP. Detention ponds are more commonly used for to serve large areas, such as subdivisions or commercial developments.

Untreated stormwater is a source of pollution to Apalachicola Bay. Oils and petroleum from cars, asphalt from roads, chemicals and greases from businesses and even household soaps, garden fertilizers and pesticides can all harm aquatic life if washed directly into the bay. Additionally, coastal land clearing and construction activities can degrade water quality if the soil or cleared debris is allowed to wash directly into the water.

If you plan new commercial or large scale development in the City or if you own property along the Apalachicola River or Bay and you propose new construction or significant land clearing, you will need to provide a plan for how you intend to keep untreated stormwater runoff from draining into the coastal waters. (City of Apalachicola Land Use Regulations, Section VIII)

The type of development you propose will determine the design and permitting approval process for your stormwater plan. Commercial or large scale residential projects are required to receive State permitting and/or notifications from the Florida Department of Environmental Protection and the Northwest Florida Water Management District.

Small scale development adjacent to coastal waters can meet the City's stormwater standards with Green Infrastructure Low Impact Development (LID) measures to ensure that non-point pollution is treated before making its way to area coastal waters.

You can visit the Cityofapalachicola.com website to learn more about stormwater planning efforts in the city. You can also download the City of Apalachicola Stormwater Regulations by scanning the code below.

LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions.

THE FIRST FLUSH

Of primary importance to minimizing the effects of stormwater on water quality is the First Flush. This term describes the washing action that stormwater has on accumulated pollutants in a watershed. In the early stages of runoff the land surfaces, especially the impervious surfaces like streets and parking areas, are flushed clean by the stormwater. This creates a shock load of pollutants that are flushed into the nearby coastal waters.

Studies in Florida have determined that the first one inch of runoff generally carries 90% of the pollution from a storm. Treatment of the first flush is the key to proper stormwater management.

BEST MANAGEMENT PRACTICES (BMPS)

Best Management Practices (BMPs) are methods used to reduce stormwater pollution. BMPs are classified into two categories - Nonstructural and Structural. Nonstructural measures are preventative in nature and include such concepts as Green Infrastructure (GI) site planning, good housekeeping techniques and landscape planning. Nonstructural BMPs are considered the first line of defense and are the easiest methods for homeowners to use. Structural controls include traditional facilities such as detention ponds, retentions basins, trenches, pervious paving and filters. Structural BMPs are generally used for commercial or large scale residential subdivisions and require engineering to implement. The Florida Land Development Manual - Guide to Sound Land and Water Management contains specific information on such BMPs. You can download that manual at www.dep.state.fl.us or call the Florida Department of Environmental Protection at (850) 245-7508 for more information.

STRUCTURAL RETENTION BMPS - BASINS AND SWALES

Retention BMPs retain stormwater onsite, allowing it to infiltrate into the ground or to evaporate. These practices reduce the volume of stormwater and are the most effective for reducing stormwater pollution since the the first flush is not discharged to surface waters. Commonly used retention BMPs include retention basins and grassed swales.

RETENTION BASINS

If you live in an area with sandy soils or where the water table is deep, you can create retention areas to treat stormwater. Retention areas are simply small depressions in your landscape where the water can pond for a short time before soaking into the ground or evaporating. These areas can be planted with appropriate native vegetation that helps maintain soil permeability, filter runoff and use less fertilizers/pesticides. These types of landscaped retention areas are also called "bioretention" practices.

GRASSED SWALES

Swales, also called grassed waterways, are one of the oldest stormwater BMPs, and have been used along streets and highways for years. A swale is a man-made depression in the land which should run parallel to the area to be treated and the wetland. Proper placement of a swale and berm system slows down the rapid flow of stormwater runoff entering water bodies. After the swale catches the flow, it is held back by the berm. Impurities sink to the bottom and the cleaner water lining the surface spills over when the swale becomes full. Slowly the stormwater evaporates and percolates through the soil. The percolation process cleanses stormwater runoff and helps recharge underground aquifers.

Swales are most effective in areas with good drainage and sufficient land to allow for adequate percolation. A swale should have gently sloping sides of at least three (3) feet horizontal to each one (1) foot vertical. These dimensions allow for easier maintenance which should only require mowing and periodic removal of trash and other debris.

Maintenance requirements for swales are not significantly greater than those for a normal lawn. However public education is essential, especially for residents who live in developments served by swales. Residents need to be informed about the benefits provided by their swale so they take pride in maintaining it and do not fill it in. Leaves, limbs and other vegetation, along with debris and oil should not be disposed of in the swale.

VEGETATION IS IMPORTANT TO STORMWATER MANAGEMENT

Vegetation provides several benefits in managing stormwater. It absorbs the energy of rain, prevents erosion, maintains the soil's capacity to absorb water, promotes infiltration. Vegetation also slows the velocity of runoff, reducing peak discharge rate. Vegetation is especially important in reducing erosion and sedimentation during construction, By phasing and limiting the removal of vegetation, and by decreasing the area that is cleared and limiting the time bare land is exposed to rainfall, sedimentation at construction sites can be reduced by up to 90%.

VEGETATED BUFFERS

If you own a medium to large size parcel of waterfront property, you may wish to consider a vegetated buffer between your property and the water as a filter for runoff. This vegetation helps reduce pollutants in surface and ground waters flowing into a waterbody.

RESHAPE OR CONTOUR

Contouring or reshaping your property allows you to provide areas where water can pond temporarily and soak into the ground.

TERRACING

If your property is steeply sloped, you may wish to incorporate the technique of terracing to minimize stormwater runoff from cascading down a steep yard. Terracing your yard can help slow down the water, minimizing the potential for erosion. Terracing can create dramatic views and broaden your yard's use for landscaping or gardening.

SITE SPECIFIC STORMWATER BMPS FOR HOMEOWNERS

Depending on the lot size and lot coverage, there are several effective nonstructural and simple structural stormwater BMPs that can be built and used by property owners. Some of the most popular methods include Guttering into Rain Barrels, Cisterns or Rain Gardens, Porous Paving, Vegetated Buffers, Contouring and Terracing.

GUTTERING

One of the easiest methods of managing residential stormwater is through the use of guttering which is directed by down spouts to either your lawn or flower bed rather than to your driveway. Another variation on that method is to set up a rain barrel or cistern to capture your roof runoff and use it to irrigate your yard. This method of treatment is best used for small to medium residential lots where space is at a premium.

The Apalachicola National Estuarine Research Reserve offers classes periodically on how to build Rain Barrels and other Green Infrastructure BMPs. Contact them at 850-670-7708 to learn more.

How To Build A Rain Barrel

It's pretty easy to build your own rain barrels from plastic drums or trash cans. Start with a plastic 55-gallon drum with a cover. Place the drum near a downspout, drill a hole in the side near the bottom and screw in a drain valve. This installation will work if you plan to run a soaker hose to your garden. If you want to use a wand or a spray nozzle, you'll need to elevate the barrel on a stand for more water pressure. Water is heavy (55 gallons weighs 440 lbs.), so use 4x4 treated lumber for the legs and secure everything with construction screws or stainless steel lags. If you have large gardens and want to store more water, double-size the stand and add a second barrel.

Cut holes in the bottoms of the barrels with a 2-1/4-in. hole saw. Then screw in a 2-in. male threaded electrical conduit adapter. Squirt a thin bead of silicone caulk around the opening and screw on a threaded electrical PVC coupler to cinch the barrel between the two fittings Next, glue together sections of 2-in. PVC pipe, unions, reducers and valves. As long as you're at it, install an overflow pipe so you can direct the excess where you want it. Finally, cut a hole in one of the covers and mount a screen to filter out leaves and debris.

You can download complete instructions for how to build a rain barrel at http://www.epa.gov/region3/p2/make-rainbarrel.pdf

RAIN GARDENS

A rain garden is a good option for homeowners with a medium to large lot with plenty of open space. You will want to gutter the rain at least 10 feet away from the house as this is a wet-detention form of stormwater management.

A rain garden is basically a plant pond - a garden bed that you plant with special deep-rooted species. These plants help the water rapidly seep into the soil. You direct the rainwater from the downspouts to the garden via a swale (a stone channel) or plastic piping. The garden captures the water and, when properly designed, drains it into the soil within a day. If there's an especially heavy rainfall, excess water may overflow the rain garden and run into the storm sewer system. Even so, the rain garden will have done its job. It will have channeled water away from your foundation and reduced the load on the sewer system. A rain garden also reduces the amount of lawn chemicals and pet wastes that may otherwise run off into local waters.

Create the rain garden by building a berm in a low spot in the yard, then build swales to channel runoff from the gutters and higher parts of the yard. The water is then absorbed into the soil through the network of deep plant roots. Use a mix of plants adapted to your area and to the different water depths.

Learn more about how to build a rain garden by visiting: www.familyhandyman.com/garden/how-to-build-a-rain-garden-in-your-yard/view-all.

How Big Should My Rain Garden Be?

To determine the best size for your garden, estimate the volume of water that would flow off the roof and down the spout that feeds it during a 1-in. rainfall (the rainfall from an average storm). To do this, calculate the rough area of the roof that drains down the spout. For example, in a 2,400-sq.-ft. rectangular home with a downspout at each corner, you'd have approximately 600 sq. ft. of runoff going to each downspout. Multiply by rainfall depth (1 in., or 1/12 ft.) to get the volume of water—50 cu. ft. in this case. If your soil porosity can handle a 6-in.-deep (that is, 1/2 ft.) garden bed, dividing by 1/2 ft. gives you a 100-sq.-ft. (10 x 10 ft.) garden size.

POROUS PAVING

Porous paving blocks (or other pervious material such as uncompacted rock or shell) can be an effective stormwater management option for patios, driveways and pathways. As its name implies, this is a highly porous form of concrete. It's made from aggregate (small stones) and cement, which binds the aggregate together. However, unlike conventional concrete, pervious concrete contains little, if any, sand. This results in a substantial number of open spaces in the concrete, basically a lot of holes through which water can flow into the ground.

The purpose of porous concrete is to allow rain to soak into these areas rather than run off your property. Porous concrete is particularly suitable for driveways or patios. Properly installed, a driveway constructed with porous concrete can remain pervious and act as a retention area, thereby reducing stormwater volume and pollution load. However, porous concrete is only feasible and cost effective on sites with gentle slopes, permeable soils and relatively deep water tables.

PERMEABLE CONCRETE PAVERS

For patios or walkways, permeable concrete pavers may be a suitable option. The pavers are solid, but if they're spaced correctly, water drains between them. Pavers are placed over a bed of sand or gravel, which filters water before it percolates into the soil. Permeable pavers are made from concrete or cut stone and are available in several styles.

Most permeable paver blocks are designed to support vehicles, but are sufficiently open to allow water to drain through them. The spaces are filled with gravel or sand. Grass or low ground cover can grow in the open spaces, which helps reduce heat buildup.

Note: Pervious paving is considered lot coverage and is subject to the lot coverage restrictions identified in the zoning code district standards.