They do more than provide shade

WASHING YOUR CAR Protect Stormwater and have a clean car

Lawn & Garden CARE 10 ways to protect your streams and rivers

# IMPACT STORM-WATER QUALITY 24<sub>PAGES</sub>

Rain Collection at HOME

# Charleston Stormwater



# Homeowner's Guide to Stormwater Managemen

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The Office of Stormwater Management Department has a vision for Charleston—"It's your water Charleston—Let's keep it clean." We want to unite the City with its water environment, creating a green legacy for future generations while incorporating a balance between ecology, economics and equity.

n order to achieve the goal of "It's your water Charleston—Let's keep it clean.," We must work together with our partners, local residents, homeowner associations, watershed associations and municipalities on managing stormwater in a manner that will protect our water and environment. We can all play a part in taking an active role in converting our streams, creeks, rivers, and surrounding green spaces into healthy systems that local residents, along with native fish and wildlife, can use as amenities, sanctuaries and habitats.

As a homeowner, your part can be as simple as maintaining your car properly or building a rain garden on your lawn. This guide provides you with the steps and actions you can take to improve storm water management on your property or in your community. These storm water management projects will not only help protect our invaluable drinking water sources, but they will help green the city, restore our waterways and improve quality of life for all residents. or more information, please visit www. charlestonstormwater.org or e-mail swm@cityofcharelston.org.





Then fertilizing lawns and using other common chemicals, such as pesticides and herbicides, remember you're not just spraying the lawn. When it rains, the rain washes the fertilizers, pesticides and herbicides along the curb and into storm drains, which ultimately carry runoff into surface waters. In addition to degrading

the water quality of our streams and rivers, pesticides can kill critters in the stream and fertilizers can cause algal blooms, which rob our waterways of oxygen that fish need to survive. If you have to use fertilizers, pesticides, and herbicides, carefully read all labels and apply these products sparingly.

Many homeowners are unaware of the actual nutrient needs of their lawns. Perform a soil test to determine if your lawn ever needs fertilization. Organic lawn care practices (no chemical pesticides and fertilizers) can also be a wise environmental choice and will save you money. Follow the below practices to reduce the need to fertilize your lawn and garden.

# **Caring for your Lawn and Garden**

Use fertilizers sparingly. Lawns and many plants do not need as much fertilizer or need it as often as you might think. Test your soil to be sure!

Consider using organic fertilizers; they release nutrients more slowly.

Never fertilize before a rain storm (the pollutants are picked up by stormwater during rain events).

keep fertilizer off of paved surfaces—off of sidewalks, driveways, etc. If granular fertilizer gets onto paved surfaces, collect it for later use or sweep it onto the lawn.

Use commercially available compost or make your own using garden waste. Mixing compost with your soil means your plants will need less chemical fertilizer and puts your waste to good use. Download "Backyard Composting" from our website, www.charlestonstormwater.org for more information.

et your grass clippings lay! Don't bag the grass. Use La mulching lawn mower to cut one-third of the blade length each week and naturally fertilize your lawn in the process.

Wash your spreader equipment on a pervious (penetrable) vegetated area, like the lawn, to allow for the natural absorption of excess fertilizer.

Never apply fertilizer to frozen ground or dormant lawns.

Maintain a buffer strip of unmowed natural vegetation bordering waterways and ponds to trap excess fertilizers and sediment from lawns/gardens.





Planters reduce impervious cover (impenetrable surfaces, such as concrete side walks, parking lots, etc.) by retaining stormwater runoff rather than allowing it to directly drain into nearby sewers and creeks. Planters offer "green space" in tightly confined urban areas by providing a soil/plant mixture suitable for storm water capture and treatment. They can be used on sidewalks, parking areas, back yards, rooftops and other impervious areas.

**Contained planters** are used for planting trees, shrubs, and ground cover. The planter is either prefabricated or permanently constructed and has a variety of shapes and sizes. Planters may range from large concrete planters to potted plants arranged on an impervious surface like the roof garden shown in the bottom photos to left. Planters can be placed on impervious surfaces like sidewalks, back yards, rooftops, or along the perimeter of a building in order to catch stormwater runoff from the roof. Contained planters may drain onto impervious surfaces

# **Creating a Contained Planter**

Purchase planters at the local hardware or landscaping store, if you are not building your own planter box.

**D**rill holes in the bottom of the planter if they are not already there.

Fill the planter with soil and leave a 12 inch area from the soil to the top of the planter.

hoose native drought and saturation tolerant plants and trees to plant in the planter.

Ccasionally turn or till the soil to improve infiltration.

through holes in their base or by an overflow structure so the plants do not drown during larger rain events.

Plants should be hardy and selfsustaining native species with little need for fertilizers or pesticides. Planters can be made of stone, concrete, brick, wood, or any other suitable material. However, treated wood should be avoided

if it leaches any toxic chemicals.

Planters can be permanently fixed in place or easily moved around to enable you to change the look of the planter garden that you have created. Numerous manufactured pots and planters are available at your local hardware or landscaping store. You can create a "do-it-yourself" planter or use recycled items to create planters. Homemade planters may be constructed by stacking and fastening wood beams or laying and mortaring stones.



Homeowner's Guide to Stormwater Management



**B** stablish a streamside (riparian) buffer—a vegetated area along the edge of the stream that protects it from pollution and erosion. This buffer zone absorbs pollutants and nutrients that would otherwise end up running directly into the stream. Plant material slows runoff and filters out pollutants and sediments. Well-planted

streamside buffers are also a great low-cost way to control erosion. While plants slow runoff, filter pollutants, and help control erosion, trees cast shade on the stream, cooling the water, reducing algae growth and improving fish habitat. A buffer with trees and shrubs also becomes a home to birds, butterflies and other creatures. Trees and plants that grow in the buffer play a critical role in keeping streams healthy.

# **Caring for Your Stream**

Begin with a "no mow" or zone along your stream banks. Make your buffer as wide as possible.

Plant trees and shrubs in your buffer zone. They provide many long-lasting benefits and can be quite inexpensive to establish and maintain.

Use shrubs that will give your buffer a quick start; many reach full size in just a few years.

Set your mower blades at least three inches high. Taller grass slows runoff, resists drought and needs less fertilizer

Use hay bales or a special silt fence to prevent soil from washing off your site into the stream while stream buffer grows. **Over** piles of soil with tarp to protect them from **Over** rain.

Use good farm practices by not cultivating the soil and planting winter cover crops to conserve soil.

Contact the City's Stormwater Department if you see soil runoff in the stream from a nearby construction site.

Limit your overall use Lof pesticides and herbicides, and use extreme caution when using them near streams.

Compost yard waste. Don't bag lawn trimmings or throw them into the stream; leave them in place for effective recycling of nutrients.

Store firewood, trash and other materials well away from streams.



Trees are not only a beautiful addition to the landscape, but they also provide invaluable benefits to cities. They reduce heat by cooling and shading homes during the hot summer months, decreasing the amount of energy required to cool a home and its electric bills. Mature trees can actually cut summer cooling costs by 40% and tree-lined blocks can even decrease local temperatures.

Trees also improve storm water management, reducing the amount of polluted stormwater that normally would go directly into storm drains. Tree roots also allow rainwater to filter back into the soil, recharging the often thirsty water table.

# **Planting a Tree**

Select a site appropriate for your tree.

Dig the hole at least 1 1/2 to 2 times the width of the root ball (container) to be installed, and no deeper than the height of the root ball so that the root flare (the top of the root mass) is flush with the existing ground. The planting pit should be dug so the walls of the pit are angled like a bowl or sloping outward in heavy soils.

Break up the walls of the pit after digging, so that fine roots can penetrate the soil. The soil that you dig out of the hole is what you will use to backfill around the root ball. Soil amendments are not recommended when planting a tree; therefore, no compost, moss, or shredded pine bark should be added to the backfill.

Remove all debris from the pit and gently pack the loose soil in the bottom of the pit by hand.

ut and remove the rope and burlap from around the trunk and check for root flare. Remove all nails. Drop the burlap down to the bottom of the hole. O not handle the plant by the branches, leaves or stem. Place the plant straight in the center of the planting pit, carrying the plant by the root ball. Never carry a plant by the trunk or branches.

A fter the tree is in the pit, carefully cut and remove the top third of the wire basket and as much burlap as possible using the least amount of disturbance.

Backfill planting pit with existing soil and pack it in there tightly to fill all voids and air pockets. Do not over compact soil. Make sure plant remains straight during backfilling/packing procedure.

The top of the root mass (root flare) of the tree should be flush with the final grade. Do not cover stem with soil. If your tree has soil over the trunk flare it can cause the bark to rot preventing proper growth. Remove the soil from the root ball if the flare is buried by it.

Water plant thoroughly and slowly, immediately after planting to saturate backfill. For the first year after planting, water the tree with 15 gallons per week. Use your index finger to check the soil moisture



under the mulch. If the soil is cool to the touch, do not water. If it is warm and dry, then water. A layer of mulch (i.e. shredded bark, compost) should be placed around the tree, at a depth between 3 to 4 inches and with a radius of approximately 2 to 4 inches from the tree stem. Do not rest the mulch directly against the tree stem. The mulch makes it easier to water the tree and reduces weed competition. Remove all tags, labels, strings and wire form the plant material.



# **Plant a Tree**

### **Recommended Street Tree List for Charleston**

The City of Charleston recommends the below list of approved trees which will thrive in an urban setting, have a good track record, and won't interfere with overhead wires in Charleston.

'Inermis'—Thornless

Hawthorn, tree form

King Hawthorne

tree form

Plum

Crabapple

Crataegus phaenopyrum—

*Crataegus viridis*—Winter

Prunus triloba—Flowering

Malus (selected varieties)—

*Syringa reticulata*—Japanese

Washington Hawthorn,

### Small Trees—Under 30 feet

Acer campestre—Hedge Maple Acer ginnala—Amur Maple



Acer campestre - Hedge Maple

Tree Lilac

### Medium Trees 30–46 feet

Aesculus x carnea 'Briotii'—Ruby Red Horsechestnut Cercidiphyllum japonica—Katsura tree Cladrastis lutea—Yellowwood Koelreuteria paniculata—Golden Rain Tree

Malus (selected *varieties*)—Crabapple

Ostrya virginiana-Hop Hornbeam

Prunus x vedoensis-Yoshino Cherry Ulmus parvifolia—

Chinese Elm

Quercus acutissima-Sawtooth Oak



Prunus x yedoensis - Yoshino Cherry

### Large Trees Over 47 feet

Acer rubrum (selected cultivars)—Red Maple Celtis occidentalis—Hackberry Corylus colurna—Turkish Filbert Fraxinus pennsylvanica 'Patmore'—Patmore Green Ash Gleditsia triacanthos (selected cultivars)—Honey Locust,

Shademaster Ginkgo biloba

(male selections only)—Ginkgo Liquidambar styraciflua-Sweetgum

Quercus rubra-Red Oak Quercus

palustris—Pin Oak

Sophora japonica— Japanese Pagoda Tree



Prunus triloba - Flowing Plum

Tilia cordata — Little Leaf Linden

Zelkova serrata (selected cultivars)—Japanese Zelkova—a) Green Vase, b) Village Green

### **Columnar Trees for Narrow** Streets

Acer rubrum 'Armstrong'—Armstrong Columnar Red Maple

Carpinus betulus fastigiata— Pyramidal European Hornbeam

Ginkgo biloba 'Princeton Sentry'-Princeton Sentry Ginkgo Grafted Male Variety

Prunus sargentii 'Columnaris'-Columnar Sargent Cherry

Quercus robur 'Rose Hill'—Rose Hill English Oak

Many homeowners ask how a newly planted tree can affect the sewer, water lines, sidewalk and/or building's foundation? If you choose the correct tree, site, and planting conditions, your tree shouldn't interfere with your sewer, waterline, etc. Most tree roots grow in the soil's top 12 inches and spread well beyond the tree's canopy in search of water and nutrients. They don't "attack" underground mains, unless these are already damaged, providing entrances for developing roots. An adequate and generous tree pit, or long, narrow continuous "tree lawn" will provide the best conditions for establishing and maintaining a "well behaved" tree with the environment needed to survive in the city.



rain barrel collects and stores stormwater runoff from rooftops. By detaining (temporarily holding) stormwater during a rain event, you can help add capacity to the city's sewer system and reduce sewer overflows to our creeks and rivers; our drinking water source. Also, the collected rain wa-

ter can be reused for irrigation to water lawns, gardens, window boxes or street trees. Rain barrels can be purchased or they can be built. Whether you buy or build a rain barrel, the most important thing to remember is that they are only effective at stormwater management when the stored water is emptied in between storms, making room in the barrel for the next storm.

# **Building a Rain Barrel**

ain barrels help lower water costs when the stored Kwater is recycled for lawn irrigation, for example. Rain barrels help reduce water pollution by reducing stormwater runoff, which oftentimes picks up pollutants in its path, such as oil, grease and animal waste, and transports these pollutants to the nearest creek, river or storm drain.

C toring rainwater for garden and lawn use helps **O**recharge groundwater naturally.



# Materials List

- One 55 gallon drum
- One 5 foot section vinyl garden hose
- One 1<sup>1</sup>/<sub>4</sub> inch male threaded coupling
- One 4 foot diameter atrium grate (basket used in garden ponds and pool skimmers)ne <sup>1</sup>/<sub>2</sub> inch PVC male adapter
- One  $\frac{3}{4}$  inch x  $\frac{1}{2}$ inch PVC male adapter
- One 5 foot section of drain hose, drain line, or sump pump line  $(1\frac{1}{4} \text{ inch})$
- One  $1\frac{1}{4}$  inch female barbed fitting and

- One vinyl gutter elbow
- Drill (or a hole saw) Router, jig saw or coping saw
- Measuring tape **Optional:**
- Waterproof sealant (silicone caulk, PVC glue)
- Teflon tape
- Fiberglass window screen material or mosquito netting
- Cinder blocks or wooden crate

### **INSTRUCTIONS FOR BUILDING A RAIN BARREL:**

### Step 1. Cut Holes in Rain Barrel:

• Cut lower drain hole: Measure about 1 inch above the bottom of the barrel (55 gallon drum) where the barrel side begins to rise toward the top. Using a <sup>3</sup>/<sub>4</sub> inch bit (or



hole saw), drill a hole through the barrel.

- Cut upper drain hole: Mark the upper drain hole according to where you want the overflow to be in the upper region of the barrel and in relationship to the lower drain. Use a 15/8 inch hole saw to cut out the overflow hole.
- Cut top hole for atrium grate (filter): Using the atrium grate as a template for size, mark a circle at the center of the top of the drum (locating the rainwater inlet in the center of the barrel lets you pivot the barrel without moving the downspout). Drill a <sup>1</sup>/<sub>2</sub> inch hole inside of the marked circle. Use a router, jigsaw or coping saw to cut until the hole is large enough to accommodate the atrium grate, which filters out large debris. Don't make the hole too big-you want the rim of the atrium grate to fit securely on the top of the barrel without falling in.

inch bit or hole

Barrel

Spigot

Downspout

Aulti-barre

Screen

Valve

• Cut notch to hold hose: Using a <sup>1</sup>/<sub>2</sub> saw, cut out a notch at the top of the barrel rim (aligned so that it is above the lower drain hole). The notch should be large enough so that the end of the hose with the adapter will firmly snap into place.

### Step 2. Set Up Barrel and Modify Downspout:

• Set up barrel: Since water will only flow from the garden hose when the hose is below the barrel, place the barrel on high ground or up

on cinder blocks or a sturdy wooden crate underneath your downspout, making sure the barrel is level.

Modify your downspout: Cut your existing downspout using a saw so that the downspout's end can be placed over the top of your rain barrel. Use a vinyl downspout elbow

that fits the size of your downspout (usually 3 inch or 4 inch) to aim the storm water into the rain barrel or just simply place the barrel right under the downspout.

### Step 3. Assemble Parts:

Attach garden hose to lower drain hole: Screw in the 1/2 inch PVC male adapter to the lower drain hole. The hard PVC threads cut matching grooves into the soft plastic of the barrel. Unscrew the <sup>1</sup>/<sub>2</sub> inch PVC male adapter from the hole. Wrap threads tightly with teflon tape (optional).

Coat the threads of the coupler with waterproof sealant (optional). Screw the coated adapter back into the hole and let it sit and dry for 24 hours (optional). Attach 5 foot garden hose to the PVC male adapter. Attach the <sup>3</sup>/<sub>4</sub> inch x  $\frac{1}{2}$  inch PVC male adapter to the other end of the hose (this can be readily adapted to fit a standard garden hose).



Attach drain hose (overflow hose) to upper drain hole: Put the 1<sup>1</sup>/<sub>4</sub> inch male threaded coupling inside the barrel with the threads through the hole. From the outside, screw the 1¼ inch female barbed fitting onto the threaded coupling. Use silicone on the threads (optional). Attach 5 foot section of drain hose to upper fitting and connect it to where the original downspout was connected (sewer riser) in order to transport the overflow into the sewer.

The overflow must be conveyed safely away overflow from your property and your neighbor's property. If your downspout was not originally connected to the sewer, place a splash pad on the ground under the overflow hose to direct the flow away from the foundation of your home.

> Place atrium grate and screen in top hole: Using PVC glue, secure a piece of fine mesh window screen inside or outside of the atrium grate to filter out debris and control mosquitoes. Place the atrium grate into the hole (basket down).

> Position the downspout: Position the end of your downspout so it drains onto the atrium

grate on the rain barrel http://dep.wv.gov/insidedep/ Documents/instructions%20parts.pdf.



A rain garden uses native plants and landscaping to soak up rain water (storm water) that flows from downspouts or simply flows over land during a rain event. The center of the rain garden holds several inches of water, allowing the storm water to slowly seep into the ground instead of flow directly from your roof, yard or driveway into the nearest storm drain, creek or river.

A rain garden allows 30% more water to seep into the ground than a conventional lawn. This increase helps replenish the groundwater supply (important during a drought!), and also helps hold back storm water from contributing to the storm-water and sewage overflows into nearby creeks and

rivers.

**Creating a Rain Garden** 

A rain garden reduces the amount of water pollution that would otherwise eventually reach the streams and rivers through storm water runoff. Scientific studies have demonstrated that the first inch of rainfall is responsible for the bulk of the pollutants in storm water runoff. A rain garden is designed to temporarily hold this one-inch of rainfall and slowly filter out many of the common pollutants in the water, such as oil, grease, and animal waste, that would otherwise flow into the waterways via the nearest storm drain or storm water runoff.

The native plants used in rain gardens require less water and less fertilizer than conventional lawns. They also require less maintenance and provide habitat for birds and other wildlife.



optional)



# **Rain Gardens**

# Instructions

Before starting this project, please conduct an Infiltration Test (page 22) to determine if your soil conditions are adequate for a rain garden.

### Step 1. Size and Locate your Rain Garden:

1. First, measure the footprint of your house by getting the area (length x width) of your house and then determine how much of your rooftop area drains to the downspout you are disconnecting to your garden (for gutters with a downspout at each end, assume that half the water goes to each downspout). Refer to the sizing example



for guidance. Be sure you measure the house footprint only, but include the area of any driveway or patio areas

that will drain to the rain garden (do not take the roof slope into account). The surface area of your rain garden should be between 20% and 30% of the roof area that will drain into the rain garden.

- 2. Locate the garden at least 10 feet away from your house and your neighbor's house (to prevent water leakage), and create the garden in the lowest point of this section of your lawn, maintaining a minimum 1% slope from the house down to the rain garden. If your yard drain is also located in this section of the lawn, you can build the rain garden around the drain. The bottom of the rain garden would be a few inches lower than the drain and the overflow would actually be in the middle of the rain garden.
- 3. If you build the rain garden around your



yard drain, when it fills up with water, the water that overflows from the garden will be conveyed safely to the yard drain. If you are

not building around the yard drain, it is imperative that the overflow is safely conveyed to a drain nearby to prevent it from flowing into your neighbor's property. Make sure the drain is in a suitable location in relation to the rain garden in order to effectively manage the garden's overflow.

- 4. When finding the right spot for your rain garden, keep in mind that you will want to create a shallow ditch or swale that carries the stormwater runoff from the disconnected downspout to the rain garden. The swale will help slow the runoff before it reaches the rain garden.
- 5. Finally, lay out the boundary of the garden with a rope.

### Step 2. Dig the Rain Garden:

- 1. To enable the rain garden to hold several inches of water during a storm, you'll have to dig a hole 3 to 4 inches deep across the entire surface of the rain garden. If the soil lacks organic material, you can improve it by digging the hole 5 to 6 inches deep, and adding 2 to 3 inches of humus or other organic material. Make sure the bottom is level, but gently slopes from the bottom to the ground level around the edges. If the drop at the edge is too steep, you might get some erosion around the edges.
- 2. Next, test how the garden will hold water during a storm by letting water flow into the rain garden from a hose placed at the downspout. Based on this test, make any



necessary adjustments (e.g., create a berm on the lower side of the garden using the diggings—the soil that was excavated).

# **Rain Gardens**

### **Step 3.** Add Plants to the Rain Garden:

- 1. Choose native plants that won't require much watering, but make sure they can withstand wet soils for up to 24 hours. (Refer to the list of native plants below.)
- 2. Also, take into account how much sun your garden receives. It's often helpful to draw out a planting plan before you start, and mark planting areas within the garden with string. After planting, weeding may be required until the plants become established. You may also need to periodically prune some of the plants to let others grow. In the winter, leave dead or dormant plants standing and cut back in the spring.
- 3. Your garden may need a bit more maintenance than a lawn in the beginning, but in the long run it will be easier to care for and provide many added benefits!



### **Native Plants Recommended for Rain Gardens**

### Perennials

Bee-balm-Monarda didyma Black-eyed Susan—Rudbeckia hirta Blazing star—Liatris spicata Blue flag iris—Iris versicolor Boneset—Eupatorium perfoliatum Butterfly weed—Asclepias tuberosa Cardinal flower—Lobelia cardinalis Early goldenrod—Solidago bicolor Golden alexander—Zizia aurea Joe-pye weed—Eupatorium purpureum New England aster—Aster novae-angliae New York ironweed-Veronia novaborescensis Obedient plant—Physostegia virginiana

Ox-eye—Heliopsis helianthoides Solomon's seal—Polygonatum biflorum White snakeroot—Eupatorium rugosum **Grasses and Grass-like plants** Big bluestem—Andropogon gerardii Bottle brush grass—Elymus hystrix Canada wild rye—Elymus canadensis Path rush—Juncus tenuis Purple-top—Tridens flavus Soft rush—Juncus effusus Switch-grass—Panicum virgatum Virginia wild rye—Elymus virginicus Ferns Christmas fern—Polystichum acrostichoides

Hay-scented fern— Dennstaedtia punctilobula Rattlesnake fern—Botrychium virginianum Sensitive fern—Onoclea sensibilis

### Shrubs

Gray dogwood—Cornus racemosa Highbush blueberry— Vaccinium corymbosm Mountain laurel—Kalmia latifolia Ninebark—Physocarpus opulifolius Pasture rose—Rosa carolina Red osier dogwood—Cornus sericea Spicebush—Lindera benzoin Sweet pepperbush—Clethra alnifolia

When purchasing plants, pay close attention to the scientific names to ensure the correct species are selected.



Then animal waste is left on the ground, rainwater or melting snow washes the pet waste into our storm drains or directly into our local creeks. The diseasecausing bacteria found in pet waste eventually flows into surface waters. In addition to contaminating waterways with disease-carrying bacteria, animal waste

acts like a fertilizer in the water, just as it does on land. This promotes excessive aquatic plant growth that can choke waterways and promote algae blooms, robbing the water of vital oxygen.

# Scoop the Poop

Bag it! When going for dog walks, take a shopping bag or sandwich bag. When doggy makes a deposit, turn the baggie inside out over your hand and use it as a glove to pick up the waste.

Flush the pet waste down the toilet because then it is treated at a sewage treatment plant.



If flushing down the toilet is not a viable option, put the pet waste in the trash, but never put waste into storm drains.

Encourage your neighbors to provide pet waste stations for collection and disposal of waste. Check to see if the parks in your neighborhood have them.

Dig a small trench in your yard where your pets tend to defecate and toss the waste in the trench, cover with a layer of leaves, grass clippings, and dirt.



If he can do it... So can YOU!



Gar washing is a common routine for residents and a popular way for organizations, such as scout troops, schools, and sports teams to raise funds. However, most of the time, cars are washed in driveways and parking lots which allow wash water (dirty water) to finds its way to the nearest storm drain, ultimately draining into

our surface waters. The wash water often contains pollutants, such as oils and grease, phosphates (from the soap), and heavy metals—all of which are unhealthy for people and fish of vital oxygen.

# Washing Your Car Properly

The best action is to take your vehicle to a commercial car wash, especially if you plan to clean the engine or the bottom of the car. Most car washes reuse water several times before sending it for treatment at a sewage treatment plant.

# If you still want to wash your car at home...

Wash your car on gravel, grass or another permeable surface, so the ground can filter the water naturally.

Use soap sparingly. Try to use non-phosphate detergents. Phosphates are nutrients that can cause problems for nearby waterways.

Use a hose that is high pressure, low volume. Use a hose with a nozzle that automatically turns off when left unattended or one that has a pistol grip or trigger nozzle to save water. Wash one section of the car at a time and rinse it quickly.

When you're finished, empty your bucket of soapy water down the sink, not the street.

Block off the storm drain during charity car wash events or use an insert with a vacuum pump to catch wash water and empty it into the sink, not the street.



*s* snow piles up in the winter, we oftentimes turn to salt to melt snow and ice. Salt, however, causes adverse environmental impacts, especially on our streams and rivers. Excess salt can saturate and destroy a soil's natural structure and result in more erosion to our waterways. High concentrations of salt can damage and

kill vegetation. Salt poses the greatest danger to fresh water ecosystems and fish. Studies have shown that as salt concentrations increase in a stream, biodiversity decreases. Excess salt can seep into groundwater and Storm water runoff. Effective ice control can help prevent excess salt runoff to our waterways.

# De-iding in winter

There are many alternatives to salt including potassium chloride, calcium chloride and magnesium chloride, corn processing by-products, and calcium magnesium acetate (CMA). Most can be found in your local hardware stores under various trade names, so check the labels for chemical content. While these alternatives can be spread in a dry form or sprayed as a liquid, their best use occurs when they are used with salt. They tend to increase the efficiency of salt thereby reducing the amount that needs to be applied. When over-applied, all chloride compounds can be harmful to the environment. Because all de-icers can be harmful to the environment when applied in excess, the best strategy is to reduce the use of these chemicals as much as possible.

The first line of defense should simply be to shovel sidewalks and pathways to keep them clear and to prevent ice from forming. Also, consider that salt and

de-icers are not effective when more than 3 inches of snow have accumulated.

Onsider the temperature. Salt and calcium magnesium acetate (CMA) have a much slower effect on melting snow and ice at temperatures below 25° Fahrenheit.

Track winter weather and only use salt and de-icers when a storm is about to come

through. If a winter storm does not occur, sweep up any unused material, store, and reuse for the next big storm.

pply de-icing products sparely focusing on high-use areas and slopes where traction is critical. Apply the least amount necessary to get the job done.

Reduce salt and other chemicals by adding Sand for traction.

Plant native vegetation that is salt tolerant in storm water drainage swales and ponds that may receive salt-laden runoff. Not only will these native species have a greater chance for survival, but they will continue to act as an effective buffer for our local waterways.

# Wehicle Maintenance

By maintaining your car properly you can prevent oil leaks, heavy metals and toxic materials from traveling from your car onto the street. Rain washes oil and other hazardous chemicals from the street into the nearest storm drain, ultimately draining into surface waters. Just imagine the number of cars in our region

and the amount of oil that finds its way into our local waterways! It has been estimated that each year over 180 million gallons of used oil is disposed of improperly and that a single quart of oil can pollute 250,000 gallons of drinking water. Please follow proper automotive maintenance.

# Maintaining your Vehicle

Maintain your car and always recycle used motor oil.

Check your car or truck for drips and oil leaks and fix them promptly. Keep your vehicle tuned to reduce oil use.

Use ground cloths or drip pans under your vehicle if you have leaks or if you are doing engine work. Clean up spills immediately and properly dispose of clean up materials.

Collect all used oil in containers with tight-fitting lids. Old plastic jugs are excellent for this purpose.

Recycle used motor oil. Many auto supply stores, car care centers, and

gas stations will accept used oil. Do not pour liquid waste down floor drains, sinks or storm drains. Check out our website for a list of businesses that recycle used oils, www.charlestonstormwater.org Do not mix waste oil with gasoline, solvents, or other engine fluids. This contaminates the oil which may be reused, increases the volume of the

waste, and may form a more hazardous chemical.

Never dump motor oil, antifreeze, transmission fluid or other engine fluids into road gutters, down the storm drain or catch basin, onto the ground, or into a ditch.

Recycling just one gallon of used oil can generate enough electricity to run the average household for almost 24 hours.

Try to use drain mats to cover drains in case of a spill.

Store cracked batteries in leak proof secondary containers. For a list of businesses that recycle batteries check out our website at www. charlestonstormwater.org



dding an addition or repairing a driveway is common to the average homeowner. When designing or planning an addition or repair it is very important to incorporate stormwater runoff and your impact on the environment. Remodeling and repairs can add harmful items into our storm drain

system. It is important to look at the impact of erosion sediment, painting materials, waste associated with masonry, excavation and landscaping projects. By volume, sediment is the greatest pollutant entering our surface waters, and causes multiple problems. Sediment buries plant and animal habitat critical to healthy streams, lakes, and wetlands. Loss of habitat reduces the number, diversity, and productivity of plants and animals living in aquatic environments.

# **Guidelines for Home Repairs and Remodeling**

# **General** Construction

Keep all construction debris away from the street, gutter, and storm drain.

During cleanup, check the street and gutters for sediment, refuse, or debris. Look around the corner or downstream for material that may have already traveled away from your property. Clean and dispose of the material properly.

Be sure to securely cover any dumpsters or stockpiles at your site with a lid or tarp when they are not in use.

Place portable toilets away from storm drains. Make sure toilets are in working order. Check frequently for and repair any leaks.

lean up all spills when they happen. Do not flush spills into storm drains.



# **Home Remodeling**

# **Landscaping & Foundation Work**

**T**ntensive gardening, landscaping, and all excavation projects such as foundation repair or pool construction expose soils and increase the likelihood that garden chemicals and earth will wash into the storm drains

e careful to control erosion Dand minimize runoff to all driveways, gutters, and storm drains.



**D**rotect storm drains with a filter sock or other control measure to prevent contaminants from entering during construction.

C weep any fertilizer off driveways and Sidewalks. Excessive fertilizer contributes to green algae bloom, reducing oxygen levels in the river killing aquatic life.

# **Concrete, Asphalt, Masonry and Tile**

on't mix up more fresh concrete or cement than you need for each project.

**T**f rain is predicted, cover asphalt mixing equipment with L tarps or a simple structure to avoid rain contact.

**Nover and protect bags of cement and plaster after they** are open. Be sure to keep windblown cement powder away from gutters, storm drains, rainfall, and runoff.



Tash down exposed aggregate concrete and equipment only when wash water can flow onto a dirt area, or be collected, pumped, and disposed of properly to a process water treatment system. Make sure runoff does not reach gutters or storm drains.

properly contain and collect any discarded concrete **F**slurry.

Tever wash excess material from bricklaying or patio or driveway construction into a street or storm drain.



pmpty mixing container onto a dirt area, or allow material to dry and put in trash.

ispose of small amounts of excess dry concrete, grout, and mortar in the trash. Call your local refuse hauler for weight and size limits.

Ollect and reuse excess abrasive gravel and sand. Recycle broken concrete and asphalt.

Tever hose down driveways, sidewalks, or streets. Dry sweep or shovel and collect for proper disposal instead.

# Painting

All paints, solvents, and adhesives contain chemicals that are harmful to aquatic animals and other wildlife in our creeks, wetlands, and rivers. Toxic chemicals may come from liquid or solid products or from cleaning residues on rags.

# **Paint Cleanup**



Then they are thoroughly dry, empty paint cans, spent brushes, rags, and drop cloths may be disposed of as trash. Ad kitty litter or sawdust to old paint and let dry before placing into trash. Leave the

lids off paint cans so the refuse collector can see that they are empty.

ispose of empty aerosol paint cans as household hazardous waste.



Tever clean brushes or painting equipment (buckets, pans, hoses, etc.) in an area where paint or paint cleanup water can flow to a gutter, street, storm drain or stream.

or water-based paints, (e.g. latex) paint out brushes on scrap material to the extent possible, and rinse into a drain that goes to the sanitary sewer.

or oil-based paints, paint out brushes to the extent possible before soaking in paint thinner to clean. Filter and reuse thinner and solvents. Dispose of unwanted oil-based paint, used thinner, and paint residue at a hazardous waste collection event.

# **Home Remodeling**

# **Erosion Control**

During construction it is your responsibility to keep all sediment from leaving your job site. If your construction will disturb soil then erosion control measures must be practiced.

## **Silt Fence**



Silt fences are used as temporary perimeter controls around sites where construction activities will disturb the soil. A silt fence consists of a length of filter fabric stretched between anchoring posts spaced at regular intervals along the site at low/downslope areas. When installed correctly and inspected frequently, silt fences can be an effective barrier to sediment leaving the site in storm water runoff.

### Installation

Erect silt fence in a continuous fashion from a single roll of fabric to eliminate gaps in the fence. If a continuous roll



of fabric is not available, overlap the fabric from both directions only at stakes or posts.

Overlap at least 6 inches. Excavate a trench to bury the bottom of the fabric fence at least 6 inches below the ground surface. This helps to prevent gaps from forming near the ground surface. Gaps Inspect silt fences regularly and frequently, as well as after each rainfall event, to make sure that they are intact and that there are no gaps where the fence meets the ground or tears along the length of the fence. If you find gaps or tears, repair or replace the fabric immediately.

# **Fiber roll**



A fiber roll is a temporary erosion control and sediment control device used on construction sites to protect water quality in nearby streams and rivers. It is made of straw, coconut fiber or similar material formed into a tubular roll.

During rain storms, the rolls intercept stormwater runoff

### Installation

Install on slope or at the base of slope below the active construction area, before soil disturbance (earth moving) begins.

Install in shallow trenches (see diagram) 2 to 4 inches deep, and fastened to the ground with wooden stakes.



would make the fencing useless as a sediment barrier.



# Infiltration Test

An infiltration test will help you determine if the soil on your property is suitable for certain types of stormwater management measures, such as a dry well or rain garden. An infiltration test measures how quickly water can soak in and flow through the soil. It is important to know how your soil infiltrates water before building a dry well, rain garden or any other stormwater management structure.

# Instructions

# Step 1. Drive Ring into Soil:

- Clear the sampling area of surface residue, etc. If the site is covered with vegetation, trim it as close to the soil surface as possible.
- Using the hand sledge and block of wood, drive the 6 inch diameter ring, beveled edge down, to a depth of three inches (see Figure 1).
- If the soil contains rock fragments, and the ring cannot be inserted to the depth, gently push the ring into the soil until it hits a rock fragment.

### Step 2. Firm Soil:

• With the 6 inch diameter ring in place, use your finger to gently firm the soil surface only around the inside edges of the ring to prevent extra seepage. Minimize disturbance to the rest of the soil surface inside the ring.

### Step 3. Line Ring with Plastic Wrap:

• Line the soil surface inside the ring with a sheet of plastic wrap to completely cover the soil and ring as shown in Figure 2. This procedure prevents disturbance to the soil surface when adding water.

### Step 4. Add Water:

• Fill the plastic bottle or graduated cylinder to the 444 mL (1 inch) mark with water. Pour the 444 mL of water (1 inch of water) into the ring lined with plastic wrap as shown in Figure 2.

### Step 5. Remove Wrap and Record Time:

• Remove the plastic wrap by gently pulling it out, leaving the water in the ring (Figure 3). Note the time. Record the amount of time (in minutes) it takes for the 1 inch of water to infiltrate the soil. Stop timing when the surface is just glistening. If the soil surface is uneven inside the ring, count the time until half of the surface is exposed and just glistening. Record the time.

# Step 6. Repeat Infiltration Test:

• In the same ring, perform Steps 3, 4, & 5 with a second inch of water. Record the number of minutes elapsed for the second infiltration measurement. Repeat the test (Steps 3, 4, & 5) a few more times. All of the tests should be conducted consecutively. If the test continues to yield the same results, you will have a good idea of the saturated infiltration rate. If the soil infiltrates the water under 1 hour, your soil is ready for a dry well, rain garden or any of the other structural projects in this manual.



### Figure 1

Using the hand sledge and block of wood, give the 6 inch diameter ring, beveled edge down, to a depth of three inches.



Figure 2 Pour the 444 mL of water (1 inch of water) into the ring lined with plastic wrap.

Figure 3 Remove the plastic wrap by gently pulling it out, leaving the water in the ring.





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