A large, abstract watercolor splash in shades of blue and purple, with the word 'joy' written in a large, white, serif font. Below 'joy' are the words 'OF' and 'WATER' in a smaller, white, serif font.

joy.

OF
WATER

A HOMEOWNER'S GUIDE
TO BECOMING WATER WISE

THE JOY OF WATER

A Homeowner's Guide to Becoming Water Wise



By Jennifer Roberts, Annabeth McCall, and Miriam Belblidia

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I. INTRODUCTION

Recipes for water management

The *Joy of Water* is designed to provide an easy guide to managing water on residential property. Inspired by cookbooks, with their step-by-step instructions for preparing meals at home, this guide lays out a variety of “recipes” you can use on your property to reduce water pollution and small-scale flooding. It is designed to allow *everyone* to understand steps you can personally take to improve water management in our region.

The water management projects detailed here have been tested to ensure that the installation and maintenance requirements can be completed by a committed homeowner in an afternoon or over a weekend. These are small-scale measures that you can install and maintain on your own. However, each individual has different abilities, resources, and levels of experience; you may feel the need to enlist help or hire professionals to perform the selection, design, and/or installation.

This guide provides a variety of options, depending on time, resources, and property conditions. Your steps towards becoming **Water Wise** include:

Getting Started: begin by understanding how water flows on your property, how this water connects with the larger drainage system, and potential sources of pollution

Home Projects: ranging from simple downspout disconnections to rain gardens, all of which can help slow, hold, and allow water to infiltrate into the ground

Caring for Your Community: additional measures you can take, including expanding efforts in your neighborhood and becoming a Water Wise champion for better water management practices across the city

Together, all of these measures will help us become more aware of the value of water and the role we each play in making sure our water is clean and safe!

VOCABULARY

Learn the lingo

Bioretention: *utilizes soils and plants to remove pollutants from stormwater runoff*

Downspout: *pipe that directs stormwater runoff from the roof of a house to the ground*

Filtration: *the process by which plants help absorb pollution*

Gravel Trench (French Drain): *a long, narrow, gravel-filled ditch that catches and treats stormwater runoff*

Green Infrastructure: *practices that use or mimic natural processes to soak up and hold water*

Hydrology: *the way water moves over the land and through the ground*

Infiltration: *the process by which water is soaked into the soil, balancing the water table*

Impervious (Non-permeable): *does not allow water to be absorbed into or through the surface*

Low Impact Development (LID): *a stormwater management and land development strategy that works with nature to manage stormwater as close to the source as possible*

Pervious (Permeable): *allows water to be absorbed into or through the surface*

Planter Box: *a bioretention structure comprised of plants, soil, gravel, and sand that can receive rainwater from a downspout*

Rain Barrel: *a catchment system that collects runoff from a roof for reuse*

Rain Garden: *a planted depression that allows rainwater runoff from impervious urban areas like roofs, driveways, walkways and compacted lawn areas to be absorbed into the earth*

Stormwater Best Management Practices (BMPs): *techniques, measures or structural controls used to manage the quantity and improve the quality of stormwater runoff*

Stormwater runoff: *rainwater that does not soak into the ground but flows over impervious areas or areas already saturated with water*



II. BACKGROUND



UNTREATED STORMWATER

1. Overview of Water Management in our Region

The Greater New Orleans region is defined by our relationship with water, which brings economic and recreational opportunities. However, small-scale flooding from rainfall can cause damage to property and stormwater runoff carries pollution into our surrounding water bodies. We receive an average of 64 inches of rain every year and due to the topography of our land, much of this untreated stormwater must be pumped, into our surrounding water bodies, such as Lake Pontchartrain. When our drainage system of pipes, canals, and pumps is overwhelmed by excessive rainfall, water can back up and cause localized flooding.

Green infrastructure and low impact development allow individuals to actively help reduce localized flooding and pollution. Implementing measures that slow water down, hold it temporarily, allow plants to filter out pollutants, and infiltrate water back into the soil provide direct benefits to our homes and city. Such approaches reduce the amount of stormwater trying to enter into the city's system of pipes until after the peak rains have passed, which reduces the frequency of street flooding during small-scale storm events and improves water quality in Lake Pontchartrain and other surrounding water bodies.



POLLUTES OUR LAKES

2. Why Worry About Stormwater: Quality & Quantity

Stormwater picks up pollutants, such as trash, dirt, road grime, oil, pesticides, fertilizers, and metals, and pulls them into our drainage system. These hitchhiking pollutants are then pumped untreated into our surrounding water bodies, degrading the quality of our natural water resources. We rely on our surrounding water bodies for fishing and recreation, so allowing pollution to run into our lakes and rivers affects our health and quality of life. The amount of stormwater and pollutants released into local water bodies is minimized when stormwater is retained and treated using [green infrastructure and low impact development](#).

Measures that slow water down, hold it, and allow it to soak into the ground can also help protect against small scale flooding, when heavy rainfall overwhelms our drainage infrastructure. While these measures may not be able to keep up with all the rainfall we receive in Southeast Louisiana, they can help ease the burden on our system of pipes and canals when used widely throughout our neighborhoods.



MINIMIZE CONCRETE MAXIMIZE GREEN SPACE

3. **Good Practices: Letting Plants & Soil Work for You**

Plants and soil may not look active but they are work horses. Gardens and lawns can be quite effective at removing pollutants: soil traps pollutants and plant roots break down pollutants into food or fertilizer. For this reason, it is important to minimize the amount of impervious (non-permeable) area on your property. Impervious areas, such as your house's roof and concrete driveways, do not allow water to be absorbed into the ground. Avoiding unnecessary paving on your property and allowing for areas which can capture runoff from your roof are good practices when becoming Water Wise.

REMEMBER:



In Southeast Louisiana, we also face tropical storms and hurricanes. These small scale measures are not intended to reduce our risk of flooding and pollution from larger storm events. The benefits of green infrastructure come in dealing with the rainfall we get during smaller events throughout the year.



4. The Cumulative Effect of Small-scale Measures

On an individual property, the impact of green infrastructure and low impact development on water quality and quantity may be small, but cumulatively, the benefits can be significant when many people take these measures across their neighborhoods. Most importantly, individual measures help raise awareness about the importance of reducing stormwater runoff and pollution.

Some of the major benefits of green infrastructure include:

- Less stormwater leaves the property
- Stormwater can be captured, stored and reused for irrigation
- More water is absorbed into the ground to recharge our aquifer (groundwater)
- Less pollutants go to our canals, bayous, lakes, estuaries and wetlands



III. GETTING STARTED



BECOMING WATER WISE BEGINS AT HOME

1. Assessing Your Property: Know Where Water Enters & Leaves

The following process will help you evaluate your property to select the appropriate water management measure and best location for this measure. You should first assess your property to identify potential pollutant sources and to identify existing water drainage and runoff patterns. Before jumping into construction any measures, it is critical to know where the water goes when it falls on your lot. This will help you to determine the best location(s) and most suitable type(s) of green infrastructure for your property. Next, you can evaluate practical limitations and cost considerations.

Steps to Assess Your Property:

1

Sketch your property: begin with a sketch showing a general outline of the property, structures (e.g., house, garage and deck), and other hard surfaces (e.g., driveway, patio and pavements). Note where your downspouts and storm drains are located, and any high and low points on your property.

2

Locate sources of stormwater runoff and pollutants: locate points where stormwater is concentrated and where it runs off hard surfaces. Identify areas where pollutants can be exposed to rainwater, such as areas lacking vegetation, oil stains, dirt piles, and leaf litter.

3

Determine how water drains and where it goes: determine the direction stormwater flows off your property. Water will flow from the high points, such as the peak of the roof, to the low points, such as down the gutter downspout or driveway. You may also want to observe the stormwater runoff pattern on your property during a rain event, or watch the way water flows when you water the lawn. Identify any low points (e.g., low lying areas, potholes, sinkholes) and high points that may collect rainwater or alter its flow off of your property.

4

Identify possible locations for green infrastructure: locate sites that will support a water management features. During your property assessment, consider limitations that affect the types of measures you can install.

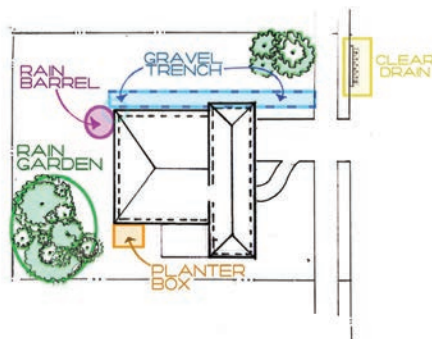
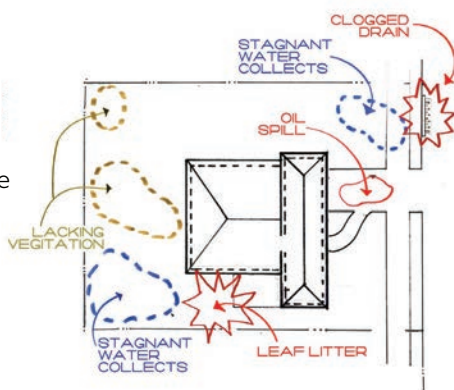
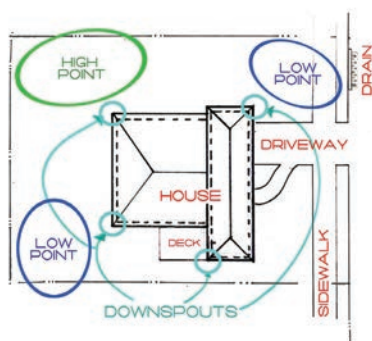
Remember: Recognize Limitations

Space: Consider to the space between the green infrastructure you want to install and physical features of your property, such as your house or your neighbor's property. It is a good idea to keep areas that collect and detain stormwater runoff away from both your house and your neighbor's property. Low areas that pond can increase the chance of flooding and, if the drainage is poor, may cause structural damage to your house.

Slope/elevation: The steeper the slope, the faster water travels. Steep slopes or elevation are not common in New Orleans unless engineered, but remember that slopes may not be appropriate for some types of green infrastructure.

Existing structures: Not all types of green infrastructure can easily be adapted to existing structures.

Poorly draining soil: Poorly draining soils limit the amount of stormwater a site can handle, so certain types of green infrastructure may not be effective or appropriate. There are four major types of soils: gravel, sand, silt, and clay. Gravel and sand allow runoff to infiltrate quickly. Alternatively, silt and clay drain much more slowly. New Orleans soils tend to be high in clay content, but our soils are a reflection of local geography and there are regions of the city that have sand and silt layers.





Soil Infiltration Exercise:

To see how fast your soil drains, dig a hole, pour in water, and watch it drain. This exercise measures the soil infiltration rate at the location you plan to use for your green infrastructure. You will need a shovel, water, timer, pen, and paper.

Directions:

1. Dig a minimum 6-inch diameter hole at least 12-inches deep at your proposed location for the rain garden or green infrastructure that will need to have rainwater soak into the ground.
2. Fill the hole with water from a bucket or hose, record the time, and see how long it takes to drain completely.
3. Fill the hole with water again and start keeping time.
4. If the water on the second fill does not drop at least two inches in one hour, your soils may not drain well enough without modifying or replacing some soil with a more porous (permeable) material.

Notes from Mosquito Control:

Prevent water from standing for 7 days as a mosquito could complete its life span within that time frame when temperatures are high. If water is left to stand longer, it should be screened, enclosed, larvicides added or fish used.

CLEAR DRAINS, CLEAN LAKES, CAN'T LOSE.



2. Cleaning Storm Drains

Storm drain cleaning is relatively easy and should be done consistently to remove litter, dirt, and debris, so that water can enter into the system without carrying with it harmful pollutants.

- Sweep, instead of hosing off the driveway, street, or sidewalk.
- Remove all grass, leaves, dirt and debris. Do not wash, sweep, or blow grass or yard waste it into the storm drain. This material can be the basis of new rich soil if it is composted, or can be deposited in the trash.
- Keep drains clean and cleared of debris, leaves, and trash. In the fall, this may mean removing fallen leaves weekly.
- Use pesticides and fertilizers sparingly and follow the directions recommended by the manufacturer. Do not apply chemicals just before a rainstorm.



It is a good idea to mark storm drains with a pre-printed marker, tile, stickler, or stencil, such as “Dump No Waste - Drains to Lake” or “Drains to Wetlands.” These markers can be requested locally through the Bayou Land RC&D Council, the Sewerage and Water Board of New Orleans, or the Jefferson Parish Department of Environmental Affairs.

3. Managing Materials On Site

How we manage materials on our property can affect the water quality in our local waterways. Debris from home improvement projects is easily pulled into the stormwater system if materials are not secured before a rainstorm. To protect our watershed remember the following tips:

- Cover piles of dirt and mulch being used in landscaping projects to prevent these pollutants from blowing or washing off your yard and into local waterbodies. Vegetate bare spots in your yard to prevent soil erosion.
- Pick up pet waste.
- Before beginning an outdoor project, locate the nearest storm drains and protect them from debris and other materials.
- Sweep up and properly dispose of construction debris such as concrete and mortar.
- Clean paint brushes in a sink, not outdoors. Filter and reuse paint thinner when using oil-based paints. Properly dispose of excess paints through a household hazardous waste collection program, or donate unused latex paint to local organizations, such as The Green Project.
- Use a commercial car wash or wash your car on a lawn or other unpaved surface to minimize the amount of dirty, soapy water flowing into the storm drain and eventually into our local waterbody.
- Recycle used oil and other automotive fluids at a local participating service station. DO NOT dump these chemicals down the storm drain or dispose of them in your trash.



IV. HOME PROJECTS

Please review instructions and materials before starting each project, as each site will be slightly different and may call for minor alterations to the projects.



REDIRECT RAINWATER

1. Disconnect the Downspout

A simple Water Wise measure is to disconnect your downspouts from existing standpipes and let the water flow over landscaped areas or lawns. Disconnection can be a low-maintenance option to help move water away from building foundations and allow it to soak into the ground. By disconnecting your downspouts from pipes that run the water immediately into the drainage system, your property will be reducing demand on the stormwater pumping system and allowing an opportunity for infiltration.

Time required: 1 hour

Intensity of construction: Easy

Estimated cost: under \$30

Materials:

- downspout elbow
- downspout extension
- m-pipe plug or over-the-pipe cap
- splash block
- sheet metal screws

Tools:

- tape measure
- hacksaw
- drill
- needle-nose pliers or crimpers
- screwdriver

Site Considerations:

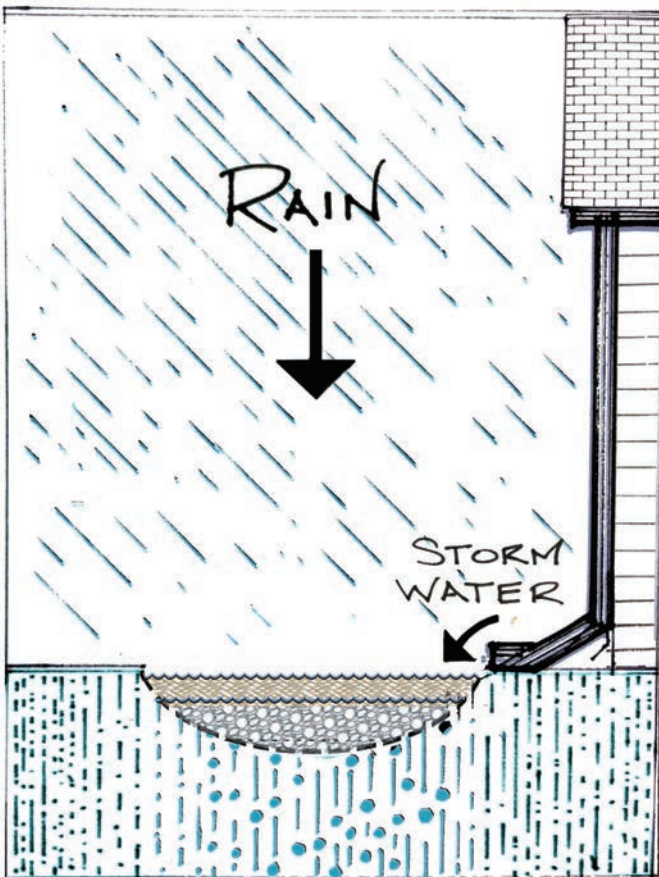
1. Start by assessing your current layout and make sure that the stormwater can soak into the ground without causing damage to your structures or neighboring structure. Determine if your downspouts are draining to your lawn or are connected to the stormwater sewer system. Downspouts that drain into standpipes (pipes) may drain into the public stormwater system via a pipe or curb cut (a hole in the curb at the sidewalk).
2. Sketch your site or use the sketch that you made earlier to identify best opportunities to disconnect. You can also print an aerial view of your property from many publicly available free mapping sites and use this as a starting point.
3. Mark the locations of downspouts and roof line and estimate the square footage of your roof area. Map out areas in your yard down slope of structures where you might disconnect downspouts.

How to disconnect your downspout at the surface:

1. Measure the existing downspout from the top of the standpipe and mark it at about 9 inches above the standpipe. You may need to cut the downspout higher depending on the length of your extension.
2. Cut the existing downspout with a hacksaw at the mark. Remove the cut piece.
3. Plug or cap the standpipe using an in-pipe test plug or an over-the-pipe cap secured by a hose clamp. Do not use concrete to seal your standpipe.
4. Attach the elbow. Be sure to attach the elbow over the downspout. Do not insert the elbow up inside the downspout or it will leak. If the elbow does not fit over the downspout, use crimpers or needle-nose pliers to crimp the end of the cut downspout so it slides inside the elbow.
5. Measure and cut the downspout extension to the desired

length. Attach the extension to the elbow by slipping the extension over the end of the elbow. Do not install the elbow over the extension or it will leak. The length of the extension will depend on site conditions and where you want the downspout to drain.

6. Secure the pieces with sheet metal screws at each joint where the downspout, elbow, and extension connect. It helps to pre-drill holes for the screws.
7. Use a plastic or concrete splash blocks, rocks, flagstone, or boulders at the end of downspouts to control erosion, help direct runoff, and add visual interest.



Stormwater rolls off the roof, through the gutter and nourishes the soil.

Safety Measures:

- Downspout extensions and surrounding landscape surface must drain water away from any structures. Disconnected downspouts must be extended to discharge water at least 2 feet from a structure's crawl space, slab foundation, porch steps, garages or walkways; 6 feet from a basement and retaining wall; at least 5 feet from the property line. You may need more room if your yard slopes towards your neighbor or the sidewalk.
- Avoid disconnecting downspouts in an area too small for good drainage. You must have enough landscaped area for rain to soak safely into the ground. The ground area must be at least 10% of the roof area that drains to the disconnected downspout. For example, to drain 1500 square feet of rooftop, there should be at least 150 square feet of landscape.
- Avoid disconnecting downspouts or adding downspout extensions across a high traffic area. Do not add extensions across a footpath, patio, driveway, or in front of a gate because of possible tripping hazards.
- Some downspouts are attached only to the gutter and the sewer standpipe. If so, you may need to secure your downspout to your house with a bracket or strap to keep it in place when you disconnect. Use durable, gutter-grade materials such as aluminum, steel, copper, vinyl, and plastic. Black ABS SCH 40 plastic is a durable option found in most hardware stores. Do not use corrugated black plastic (ADS), roll-out-hose, PVC pipe, dryer hose, swivel or open-trough materials because of their limited durability.



DECLUTTER THE GUTTER

Gutter Maintenance:

Spillover from clogged gutters and downspouts can rot siding, shingles and eaves, and can erode the ground below. Simple maintenance of your system can avoid many of these problems.

- Clean gutters and downspouts at least twice a year (more often if you have nearby or overhanging trees)
- Make sure gutters are tilted to direct water to downspouts
- Standing water can rust gutters, create breeding grounds for mosquitoes, and cause spill over
- Caulk leaks and holes
- Make sure roof flashing directs water into the gutter
- Look for low spots or sagging areas along the gutter line and repair with spikes or place new hangers as needed

2. Planter Box

A planter box is a bioretention structure composed of vegetation, soil, gravel, and sand that can hold rainwater from a downspout. The structure can be made of a variety of recycled materials, such as old wooden barrels, durable containers, bath tubs, etc. Within the planter box are layers of materials that help absorb and clean water. These layers include gravel on the bottom, followed by a layer of sand and layer of soil media on top with native vegetation.

As water drains from the downspout, it is directed into the planter box instead of into a storm drain, the street, sidewalk, or urban site. If the amount of incoming water reaches the maximum capacity to which the planter box can hold, an underdrain system will alleviate local flooding in the box. The ultimate goal is to allow the water to soak through the layers and allow the plants to absorb as much as possible, using the outflow as a mitigation measure for extreme quantities. As stormwater passes through the planting soil, pollutants are filtered, absorbed, and biodegraded.



Time required: 1 day

Intensity of construction: Moderate

Estimated cost: Under \$150.00

Materials:

Amount of materials will depend on planter box dimensions

- One whiskey barrel (half size) available at Home Depot (or other structure of choice)
- Permeable membrane
- Impermeable liner (optional)
- Depending on downspout and amount of water capturing:
 - One inline downspout diverter (Save the Rain Water Metal Diverter or Inline Y-Downspout Diverter + Zig-Zag Leg + Flexible Downspout Extension models are recommended; see Step 3), OR
 - One flexible downspout extension (check shape of downspout to match extension)
- Sand
- Potting soil
- 2.5" - 3" gravel or crushed concrete
- One 3" diameter PVC pipe (at least 3' in length)
- One 3" diameter elbow
- Two cinder blocks (recommended) or bricks
- Splash block (optional)

Tools:

- Electric drill
- 3" Hole saw
- Handsaw and/or electric saw
- Scissors
- Staple gun (optional)
- Pen/pencil
- Level (recommended)
- Safety goggles

How to Build a Planter Box:

1. **Assess your site:** Measure the square footage of your rooftop or area draining rainwater, and determine the appropriate spot to place your planter box. There are multiple methods to obtain these measurements. Site plans for your building provide accurate square footage and usually display downspout locations. Observing your building and downspouts also works. *Note: Roof drainage may not be evenly dispersed per downspout. Observing the slope of your roof and location of downspouts can help determine where rainwater drains.*

If the downspout collects water from an area 100 square feet or less, it is possible for the planter to handle all of the rooftop runoff. If the square footage is greater than 100 square feet, an inline downspout diverter will need to be installed in the selected downspout. There are many types of inline downspout diverters available that fit most downspouts, including:

- Save the Rain Water Metal Diverter (2x3" or 3x4") is available at Wal-Mart and online through Amazon, eBay, and Hayneedle.
- Y-Downspout Diverter (2x3" or 3x4") is available at most major hardware stores. This diverter also calls for a flexible downspout extension.

These diverters call for manually switching the flow of water either to the planter box or continuing down the downspout.

2. **Set up a base:** Position cinder blocks in place to provide a flat, sturdy base to hold the planter box (a level can help here). Bricks may also be used, but cinder blocks ensure evenness. You may not need a base if the site is already flat and even. Test the sturdiness of the base with the unfilled box -- this will also allow you to visualize where you will need to alter the downspout.

3. **Alter the downspout:** While the planter box is in place, measure where to cut the downspout and add the inline diverter and/or flexible extension.
 - a. **Inline downspout diverter:** Mark on your downspout where you will be installing the diverter (approximately 9" above planter box). Cut the downspout and attach the diverter by setting it into the downspout at the bottom and overlapping the downspout at the top. You can crimp the sides of the downspout so that the diverter fits tightly if necessary.
 - b. **Inline Y-shaped diverter:** This calls for the same technique with measuring and cutting the downspout. Additionally though, use the zig-zag component to reconnect to the main downspout and the flexible extension to direct path to planter box. Additional component pieces are available to construct downspout diversion if necessary.
 - c. **Flexible downspout extension:** Rain water should be able to flow into the planter box without major splash. Use the extension to guide where you need to alter the downspout. Then, using safety goggles and a helping hand, cut the downspout. The flexible downspout extension can fit over the cut line and can be directed as preferred into the planter box. Be careful of sharp edges!
4. **Construct the planter box:** First, drill the hole for the outflow pipe on the empty box. Wearing safety goggles, use a 3" hole saw and a helping hand to drill a hole from the outside. The hole should be roughly 4" from the bottom of the box. This outflow will allow excess rainwater to drain out and should be positioned on the box and at the site where water can flow either into a grassy area or rock bed. A splash guard can be used to dissipate energy from the outflow water and prevent any local erosion.
5. **Line the planter box (Optional):** Depending on the material of the box, an impermeable liner may be needed as a waterproof lining. Some wood materials may be treated and do not call for additional lining. Line the inside with the membrane, cut to size, and fasten using nails or a staple gun.

6. **Install overflow pipe:** The 3" PVC piping may need to be cut down to fit into the planter box. The overflow will ultimately take an "L" shape in the box. First measure the horizontal pipe and alter it using a saw. Fit it through the outflow hole, attach the elbow and connect the vertical pipe. This pipe may also need to be cut down. It should rise up just below the brim of the box, allowing water to drain out through the pipe before spilling over the edge in a heavy rain event. Once the overflow pipe is installed you can start filling in the planter box.
7. **Fill the box:** Position the planter box in place - it will become extremely heavy and difficult to move once filled. Add the layer of rock or crushed concrete to fill 30% of the barrel. Add a layer of permeable membrane (this will prevent smaller particles of sand and debris from clogging the pore spaces). Continue layering with sand (20% of barrel) and another layer of permeable liner with soil (30% of barrel) as the top layer. Finish with vegetation, preferably native, water loving plants.



3. Rain Barrel

A rain barrel is a rainwater capturing container that collects and stores water for non-potable usage. Rainwater is collected as it drains from rooftops via a downspout or sheet flow and captured before entering storm drains. Rain barrels are an easy and efficient way to recycle water and save money.

Time required: Half day

Intensity of construction: Easy - some lifting; 2 person job

Estimated Cost: Under \$100

Material:

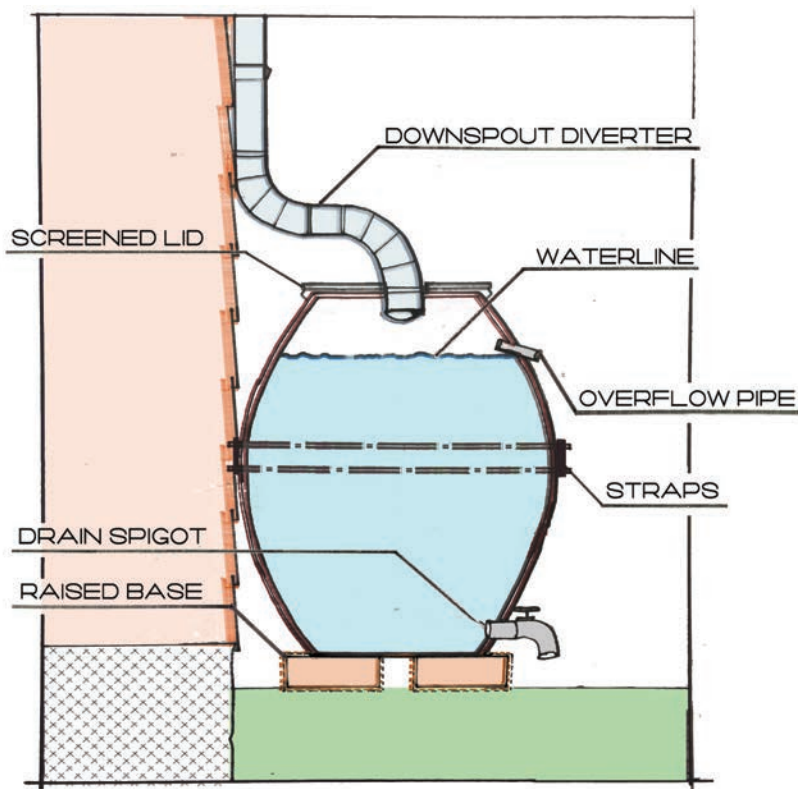
- One 55 to 90-gallon food grade plastic barrel
- One 1/2" or 3/4" faucet
- Flexible downspout converter
- Two-4 concrete cinder blocks (recommended) or bricks
- Window screen mesh
- Silicon adhesive or outdoor caulking (optional)
- Rope or Strap (5' rope length)
- Waterproof/outdoor use spray paint (approximately 2 bottles) if barrel is white or translucent
- Two screws
- 3/4" male hose bibb
- Teflon plumber's tape
- One 2-in PVC electric male coupling
- One 2-in PVC electric female coupling
- One 10-in nylon cable tie
- One 6-in x 6-in mosquito screen
- One 2-in x 6-ft PVC pipe (piecing female coupling and elbows together and extending overflow to ground)
- Two 2-in PVC 90 degree elbow
- One 2-in PVC 45 degree elbow
- PVC primer and cement (glue)
- Zip tie

Tools Needed:

- | | |
|-----------------------|---------------------------|
| • Electric drill | • Safety glasses |
| • One 1" Hole saw | • Handsaw or electric saw |
| • 1" hole saw bit | • Tape measure |
| • 2-1/4" hole saw bit | • Screwdriver |
| • Scissors | • Level (optional) |
| • Wrench (optional) | • PVC cutter or saw |

How to Build a Rain Barrel:

1. **Select a location:** Decide where you want to place your rain barrel. Select a downspout easy for you to access and near the area you will use the water to be collected. Note: If you don't have gutters/downspouts on your house, you can still position the rain barrel height at a point that helps with gravity feed water off the roof.
2. **Create the base:** Create a raised, stable, and level base for the rain barrel to sit on using by positioning the cinder blocks. This will allow you to easily collect water from the barrel. It is helpful to be able to fit a large watering can or 5-gallon bucket under the faucet. Also, the water pressure increases with the height of the barrel, since the flow of gravity is fed. It is important to make sure the barrel sits securely on top of it's base for safety measures. Test stability by filling the rain barrel with some water while positioned on base. *Note: A level may be helpful.*



3. **Alter the downspout:** Determine where to cut the downspout to direct the flow of water into the barrel. Using a handsaw or an electric saw, cut the downspout so that the flexible downspout diverter will sit just above the rain barrel inlet. Attach the diverter over the downspout with two screws. You may also need to secure the downspout to the house or building again. This can be done using a strap or tie. *Note: See planter box section for more detailed notes on altering the downspout.*
4. **Paint the barrel (optional):** If your barrel is white or translucent, a layer of darker, outdoor paint is needed to keep sunlight from aiding in algae growth. Paint the barrel before construction of the barrel. Outdoor use (waterproof) spray paint works. Decorative painting encouraged!
5. **Construct the barrel:** Using the screen and scissors, measure out the screen so that it fits over the top of the entire barrel (with extra slack to keep it secured). This will help keep debris and mosquitoes from entering the barrel. Using the holesaw, drill a number of holes into the lid of the barrel to allow water to drain in that catches around the main inlet. Place the screening over the barrel top and replace the lid. *Note: Screening will call for replacement over time.*
6. **Attach the drain faucet:** Drill a hole approximately 6 inches from the bottom (or where barrel side is flat and does not taper from the top) of the barrel with a 1 inch hole saw. The spigot should sit securely into the hole and can be threaded directly into the barrel opening, working it in by hand. If the spigot appears loose and unsecure, silicon caulking can be used around the edges can help ensure a tight, waterproof seal.
7. **Overflow Piping:** Determine which side of barrel you want to attach the overflow pipe to, making sure it is pointing away from the building's foundation. Using the 2 1/4" hole saw bit, cut hole in side of barrel a few inches from the top. Insert male adapter into hole, and use the female adapter as a nut on the inside to tighten. Wrap piece of mosquito screen around the female coupling and fasten with a zip tie. *Note: this will have to be cleaned on occasion, as algae may grow and clog the screen.*

Cut two 1.5" pieces of PVC pipe. These will be used to insert between fittings to hold them together. Place one 1.5" pipe section into exterior overflow valve and attach the 45 degree elbow. Use the second 1.5" piece of PVC and attach the 90 degree elbow.

Twist the sections together so that the second elbow opening is facing the ground. Place the barrel on the stand to measure the distance between the elbow and the ground. Cut the remaining pipe to this measurement and push into the elbow. (The pipe will now be about 1/2" off the ground.) Insert remaining 90 degree elbow to end of pipe at ground to direct excess water away from home foundation. Now, starting at joint between first two elbows, disassemble PVC pieces and bond using two-step PVC primer and cement. Do not use PVC cement to attach the first elbow at male coupling. In order to clean and maintain the barrel, it may be best that this be easily removed.

- 8. Final installation:** Set the rain barrel securely on its base by attaching it to the house or building. This can be done using a rope or strap.

Additional Notes:

Mosquitoes: for added precaution with mosquitoes, a nontoxic bacterium that kills mosquito larvae called “mosquito dunks” can be put in the barrel.

Hurricane preparedness: in the event of a hurricane or tropical storm, you should empty your barrel and store it in a shed or garage.

Cleaning and maintaining: your rain barrel will need to be cleaned about once a year. Drain and disconnect the barrel, then rinse it out using a hose to remove any debris. A long handled brush and vinegar solution can be used to scrub the interior. If needed, replace the screen.

Special thanks: this section was guided with the help of Hilairie Schackai, a 2010 Audubon TogetherGreen fellow, who used her conservation action grant for a rain barrel initiative -- the Gentilly Rainwater Harvesting Program -- to address flooding in Pontchartrain Park at the Dwyer Canal.

Note: University of Rhode Island's Cooperative Extension, Food Safety Education Program have advised not to use water collected in rain barrels to water edibles such as vegetables or for washing fruits or vegetables before consumption.





INFILTRATION ROCKS

4. Gravel Trench

A gravel trench, also known as a French Drain, is a long, narrow, gravel-filled ditch that catches and treats stormwater runoff. This measure is ideal for narrow spaces, often found alongside buildings and driveways, and for receiving water from downspouts. A gravel trench works by allowing for natural infiltration of runoff into subsurface soils, while trapping pollutants and sediment and reducing peak flows. The majority of runoff is stored in the void spaces within the gravel and eventually released into subsurface soils or through an underdrain. A major advantage of implementing a gravel trench around your home is that it can be easily integrated into existing developments and require little maintenance.

Time required: 1 day

Intensity of construction: Moderate - some heavy lifting and excavating

Estimated cost: Under \$100.00

Materials:

Amount of materials will depend on gravel trench dimensions

- Permeable membrane (16 square ft)
- 3" size gravel or recycled/crushed concrete
- 4" diameter of Polyethylene perforated pipe (for underdrain)

Tools:

- Shovel
- Gloves
- Scissors or knife
- Handsaw

How to Build a Gravel Trench:

1. **Survey site:** Using a hose or string, mark out the path or area for your trench.
2. **Dig your trench:** Dig the ditch approximately 2-3 feet deep and at least 6 inches wide. The larger the surface area, the more drainage you will achieve; however, the depth must be greater than the width. The receiving end needs to be shallower than the terminal end to allow water to slowly flow the length of the trench.
3. **Fill in the trench:** Lay the liner down, covering the entire surface area of the trench, with plenty of excess along the sides to lap over the gravel. Add a thin layer (4-6 inches deep) of gravel along the entire length of the trench, being sure to maintain the slope. Lay the perforated pipe in along the entire length of the trench. Once the pipe is in, the remaining crushed stone can be added, covering the pipe. Fold the liner back over the surface of the crushed stone (similar to a burrito) making sure to cover the entire surface area. This will help keep the pore spaces within the large stone open and not clogged with pea gravel, debris, or sediment. Add a layer of pea gravel, soil, or stone of your choosing over the liner. Note: Pea gravel is not necessary, and the trench can be comprised of all larger, crushed stone, depending on preferred aesthetics.

Additional Notes:

Removing trash and debris from gravel is a routine maintenance check to help keep the feature from clogging. As with all these water management features, it is a good idea to observe the gravel trench in action during a rain event. Check the condition of the permeable membrane every so often - if holes in the liner are present, repair is recommended. If the damage is excessive, the membrane should be replaced. (*Referenced from: Bayou Land RC&D and Louisiana DEQ Stormwater BMP Guidance Tool*)



RETAIN THE RAIN

5. Rain Garden

A rain garden is a landscape feature designed to collect, retain, and infiltrate rainwater runoff. Rain gardens allow water to percolate back into the ground, recharging the water table, and reduce the amount of water entering storm drains. By allowing water to flow through layers of porous, permeable material such as sand, gravel, and soil, pollutants, heavy metals, oil and grease are filtered out. *Note: The rain garden build instructed below is for small-scale, residential use only. Any large scale landscape feature should be advised and guided by a certified landscape architect or landscape designer.*

Time required: 2 days (weekend project)

Intensity of construction: Moderate - heavy lifting and excavating

Estimated Cost: Under \$500.00 (depending on size, plants, and soil excavation)

Materials:

- Amount of materials will depend on rain garden dimensions
- 3" size gravel or crushed concrete
- Sand
- Planting soil
- Mulch
- String/paint (optional)
- Plant material
- Permeable membrane

Tools:

- Shovel
- Gloves
- Tape measure
- Scissors/knife



How to Build a Rain Garden:

1. **Locate and assess site.** Note nearby downspouts, natural pooling, and flow of rainwater.
2. **Calculate the drainage area:** This can be measured multiple ways. Site plans for your building provide accurate square footage and usually display downspout locations. Google Earth's Ruler tool is a useful application to obtain these measurements. Observing your building and downspouts also works. Be sure to capture the square footage of the roof draining towards your garden, along with additional yard space and/or pervious surfaces such as driveways, sidewalks, porches, etc. Note: Roof drainage may not be evenly dispersed per downspout. Observing the slope of your roof and location of downspouts can help determine where rainwater drains.

Soil Type	Garden > 30' from downspout	Garden < 30' from downspout
	Depth (8-12" garden)	Depth (8-12" garden)
Sandy soil	.03	.08
Silty soil	.06	.16
Clayey soil	.10	.20

Referenced from Wisconsin's Dept. of Natural Resources 'How To Manual for Homeowners'

Using the square footage of the drainage area, multiply it by the appropriate size factor found in Table 1 based on your soil type and distance from downspouts. This will give you the approximate surface area of your rain garden.

Example: Rain Garden Size Calculation

Drainage Area (ft2) x Size Factor = Area of Rain Garden (ft2)

3. **Mark perimeter of rain garden:** Use string & stakes or paint. Dig out the rain garden site according to measurements calculated. For this guide, 12" is the recommended depth. Note: This step can be very intensive. Keep excavated soil nearby, as it can be used later.

4. Fill the rain garden:

Sand layer. The first layer to lay down into your excavation site is the sand. For a 12" depth, fill the site 3.5" of sand, or about 30% of excavation, making sure to have a level surface once the sand is added. Lay the permeable membrane over the sand layer, allowing excess along the sides to be folded over the gravel layer. This will help keep the porous spaces free of debris and sediment.

Gravel/crushed concrete layer. Fill the next layer with 3.5" of gravel, or 30% of the garden depth with gravel or crushed concrete with a level surface. Wrap excess permeable membrane over the gravel layer, covering entire surface area. Again, level the gravel layer.

Soil layer. Depending on the soil condition excavated earlier (stray away from re-using clay soil), you can recycle the soil and use for the garden or use store bought topsoil. Fill in the remaining site with soil, 3.5" or about 30% of garden depth, leaving a slight depression among the site to allow water to flow into the garden.

5. **Plant vegetation:** Finish your garden by adding plants (native vegetation is recommended). After vegetation is added, a layer of mulch can be added to help improve soil productivity and keep weeds down.

(Referenced from: Bayou Land RC&D and Louisiana DEQ Stormwater BMP Guidance Tool and Bayou Rebirth's Rain Garden program)

A large, abstract watercolor splash in shades of blue and purple, starting from the top left and flowing towards the right. The colors are vibrant and blend into each other, creating a textured, organic shape. The text is centered within this splash.

V. CARING FOR YOUR COMMUNITY

1. Organize neighborhood storm drain cleaning & marking

In addition to caring for the storm drain on your own block, you can organize neighborhood storm drain cleaning and marking. Cleaning storm drains is relatively easy and is something that should be done consistently to capture litter, dirt, and debris and to ensure flow from our streets can enter into the system without carrying with it harmful pollutants. The build up of materials, such as trash, leaves, and dirt can obstruct storm drain and lead to localized flooding during routine storm events. In rainy Southeast Louisiana, this can be a serious concern. Keeping drains clear of debris can make a difference in street and lot-level flooding.

Storm drain marking is labeling a storm drain inlet with a pre-printed marker, tile, sticker, or stencil, such as “Dump No Waste - Drains to Lake” or “Drains to Wetlands.” There are numerous organizations that can assist you in organizing a neighborhood storm drain cleaning and marking even. Locally storm drain markers can be requested through the Bayou Land RC&D Council, the Sewerage and Water Board, and the Jefferson Parish Department of Environmental Affairs.

Neighborhood storm drain cleaning and marking events are a great opportunity to share information. Consider the following simple tips you can share with your neighbors:

- Sweep, instead of hosing off the driveway, street, or sidewalk. Water runoff from driveways or sidewalks carries contaminants, such as dirt, motor oil, fertilizers, and animal waste, through storm drains and into waterways.
- Use pesticides and fertilizers sparingly and follow the directions recommended by the manufacturer. Do not apply fertilizers or pesticides before a rain event.



- Safely dispose of household cleaners and motor oil. Many automotive and cleaning products found in homes or garages are too dangerous to be disposed of in the trash or down the drain. Products should be recycled or taken to a community hazardous waste center.
- Compost or mulch yard waste. Sweep (do not wash) leaves or grass clippings that accumulate on your driveway, sidewalk, or in the street. Do not sweep or blow them into the drain.
- Clean up after your pet. Pick up pet wastes. Dispose of pet wastes properly, such as placing in a trash receptacle or flushing down the toilet.
- Do not wash your car in the driveway. Use a commercial car wash or wash your car on the lawn or other unpaved surface to minimize the amount of dirty soapy water flowing through a storm drain and into waterways.

2. Report Problem Areas

Preventing stormwater pollution is everyone's responsibility. If you notice anything other than rain flowing into the street or down a storm drain, it could be a stormwater violation.

If you think that you or a neighbor are causing stormwater pollution:

1. Identify the source of the problem
(leaking car, spill, wash water, etc).
2. Prevent further damage
(catch the leak, clean up the spill, stop washing, etc.)
3. Report the violation to the local stormwater hotline
(all calls can be kept confidential)
In New Orleans: dial (504) 52-WATER or 504-529-2837
In Jefferson Parish: dial (504) 731-4612

- For large spills in non-residential settings, call the Louisiana Department of Environmental Quality Single Point of Contact (LD-EQ-SPOC) hotline: (225) 342-1234.
- The DEQ-SPOC phone line is manned during working hours (M - F, 8:00 am - 4:30 pm).
- The DEQ-SPOC office line is (225) 219-3640. You may leave a voice-mail if you are calling after 4:30 pm.



3. Be Engaged

The purpose of *The Joy of Water* is to provide the knowledge and tools to motivate individuals to improve drainage at their homes and reduce negative impacts of pollution and flooding to our community. These recipes for improved water management can lead the way towards collective impact on small scale flooding and water quality in our region. In addition to individual actions, we can support and encourage measures taken by our city agencies to improve water management. Water management in our region is a complex task, and by being engaged you are supporting the health, safety, and resilience of our community and watershed.

NOTES:



A large grid of small blue dots arranged in 20 rows and 30 columns, intended for writing notes.

This image shows a full page of dot grid paper. The background is a very light blue color. Overlaid on this background is a precise grid of small, medium-blue dots. The dots are arranged in straight horizontal and vertical rows, creating a guide for writing or drawing. In the upper right-hand area of the page, there is a subtle, larger-scale decorative element consisting of overlapping light blue shapes that resemble waves or soft-edged circles. The overall appearance is clean, modern, and functional, typical of stationery used for planners or sketchbooks.

This image shows a full page of dot grid paper. The background is a very light blue color. Overlaid on this background is a precise grid of small, dark blue dots. The dots are arranged in straight horizontal and vertical rows, creating a guide for writing or drawing. In the upper right-hand corner of the page, there is a subtle, decorative graphic element consisting of several overlapping, rounded shapes in slightly different shades of light blue, giving it a soft, cloud-like appearance. The rest of the page is completely blank except for the dot pattern.

SPECIAL THANKS

