



RainScapes

Environmentally-Friendly Landscapes for
Healthy Watersheds

Rain Barrels and Cisterns

Why should I install a rain barrel or cistern?



One inch of rain falling on a 10-square-foot roof can produce about 6 gallons of stormwater

runoff. Roof downspouts typically direct the roof runoff directly onto hard surfaces such as driveways, streets, and sidewalks that prevent the water from soaking into the ground. When water cannot soak into the ground, it flows over the surfaces and enters storm drains that flow to streams. As it flows over hard surfaces and lawns, the stormwater picks up pollutants, such as sediment, grease and oil from cars, and pesticides and fertilizers from lawns. The stormwater is collected in storm drain pipes that direct the flow into streams, which can lead to downstream erosion, flash flooding, and water quality and stream habitat problems.

By collecting your roof runoff in rain barrels or cisterns, you can reduce stormwater runoff from your property. Stormwater runoff is reduced, because you are collecting the stormwater and allowing it to soak into the ground when you use it for irrigation. When you use the

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What are they?

Rain barrels and cisterns collect and store a portion of the rainwater from your roof. The most common type of rainwater collection system used by homeowners is a rain barrel.

Rain barrels come in a variety of sizes but typically as a 55-gallon container that collects roof runoff. Rain barrels can be added to any building with gutters and downspouts, and they have an outlet that can be connected to a garden hose so the rainwater can be used to water landscaping plants, lawns, and gardens. All rain barrels require an overflow port.

Cisterns are sealed tanks that can be located above ground, partially buried, or below ground. Cisterns are larger than rain barrels and they can collect water from several downspouts from one building's roof or from multiple roofs if they are large enough. Large cisterns may require a permit, so please check with the County's Department of Permitting Services. When cisterns or rain barrels are full, the overflow should be directed to a safe location away from the building foundation. Overflow may also connect into a dry well, rain garden, or other area where the runoff can infiltrate

into the ground on your property. To be eligible for a RainScapes rebate, a cistern must be a stand-alone system for landscape applications and non-domestic use, and there must be sufficient space on your lot to accommodate overflow.



Rain barrel



Cistern (Brookside Gardens)

(continued from page 1)

rainwater to water your gardens and landscaping, you also use less potable (tap) water for this purpose, which can lower your water bills. Since rain barrels and cisterns collect rainwater for use on site, they can reduce the harmful effects to streams caused by large and rapid stormwater runoff flows.

Water collected in rain barrels or cisterns is for non-potable, exterior uses only; the County does not currently permit hooking these devices into your home's sewer system for actions such as toilet flushing. Cisterns may be connected to existing stormdrain systems, but it is expensive to do so and a direct connection will require a permit. Cisterns may require an electric pump to empty out the water, which may require a permit from the County's DPS. Contact the County DPS to obtain information about the necessary right-of-way and other applicable permits to connect to a public storm drain system.

What are the benefits and incentives?

The RainScapes Rewards Rebate Program offers a **rebate** for rain barrels and cisterns. See rainscapes.org for rebate information. As mentioned above, you can save money on your water bills by using water from your rain barrel instead of tap water to water your plants, lawns, and gardens. However, the most important reason may be that you are doing your part to help the environment and protect your local streams and the Chesapeake Bay.

How to...

Assess Your Property

Take some time to walk around your property to assess your roof gutter and downspout system. Do this when it is raining, so you can see where the rain lands on your property and where it flows. Follow these basic steps to identify your property's drainage conditions:

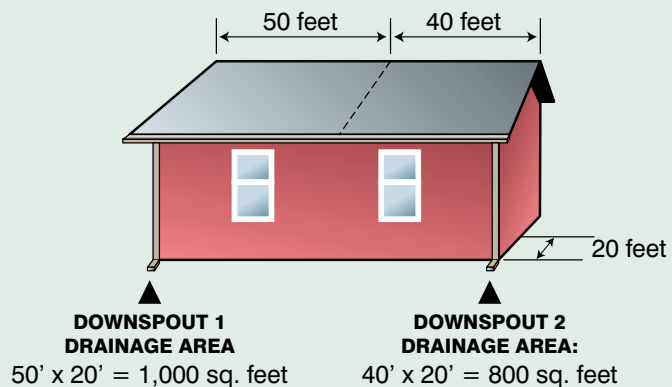
1. Locate each downspout.
2. See where rainwater from each downspout flows. You may find that your downspouts are directed to your grassy lawn, a landscaped area, a storm drain, or your driveway. If rainwater from a downspout currently flows to a grassy or landscaped area, you may not need a rain barrel because water is already soaking back into the ground. The best place for a rain barrel is where downspouts discharge onto or near a hard surface, such as a driveway, sidewalk, or patio, where the water cannot be absorbed.
3. Once you have identified downspouts for a rain barrel or cistern, you need to estimate the size of the roof area that contributes water to each downspout (see diagram). Based on your observations in Step 2 of where the rainwater flows, estimate the drainage area (square feet) to the particular downspout. Web maps such as Google® can be used to measure your roof areas (using the measuring tool) if you don't have a site plan of your lot. Then estimate what percentage of the building's total roof area this amount represents. The drainage area and percentage of the building's roof area are required for the RainScapes Rewards Rebate application. See the figure below for an example calculation.

Calculating Percentage of Building's Roof Area:

Total roof area for building: 20 ft x 90 ft x 2 sides = 3,600 sq. ft.

Downspout 1, total drainage area: 1,000 sq. ft.

Downspout 1, percentage of total roof area: $1,000 / 3,600 = 0.28$ (28%)



To submit the **RainScapes Rewards Rebate Application**, please visit www.rainscapes.org.

How to...

Design and Plan

Sizing the Rain Barrel



Determine the size of the runoff drainage area for a particular downspout, and calculate the size of the rain barrel(s) you will need.

The rain barrel volume can be calculated for any rainfall amount using this equation:

Volume (V) = Roof area for downspout x 0.083 ft (1 inch of rain) x 7.5 gals/cubic ft x 0.90 (to account for system losses).

Using downspout 1 from the illustration on the previous page, the volume of the rain barrel for 1 inch of rainfall is:

Volume (V) = 1,000 sq ft (roof area for downspout 1) x 0.083 ft (1 inch of rain) x 0.90 x 7.5 gals/cubic ft = 560 gal.

Based on this calculation, a 55-gallon rain barrel attached to downspout 1 would fill to capacity from 0.1 inch of rainfall.

Additional Guidance

The assessment of your property should guide your decision of where to place your rain barrel(s). Remember that the best place to connect a rain barrel is:

- At a downspout that would otherwise discharge rainwater on or near a hard surface that prevents the rainwater from being absorbed into the ground
- A surface such as a steep lawn area that causes the rainwater to run off before it can be absorbed

The sizing calculations should tell you how many rain barrels you need and how large the barrels should be.

Rain barrels should be placed on a secure flat surface adjacent to your house or garage and near the downspout that will be cut and connected to the rain barrel. Rain barrels rely on gravity flow, so it is important to find a location

where the rain barrel can be placed slightly higher than the area where you will use the stored water. In

some cases, you may need to create a stable elevated platform out of materials such as cinder blocks or pavers to provide enough gravity pressure at the outlet connection for adequate flow and for easier access to the hose bibb.

Rain barrels and cisterns must have an overflow outlet in case the tanks become full during a rain storm. The overflow should be directed to a safe discharge location away from the building foundation. If your downspouts currently discharge into underground pipes, extra care must be used to size the overflow port and direct overflow back into the drain pipe.

Do not drink the rainwater collected in rain barrels or cisterns, because it may contain roof debris with high levels of bacteria or other pollutants. As a precautionary measure, you may want to place a sign on your rain barrel or cistern that says “Do not drink!” Collected rainwater may be used to water vegetable gardens, but fruits and vegetables should be washed with tap water before being consumed.

In some cases, downspouts may **ALREADY** be designed to meet stormwater management requirements (i.e., they may connect to buried dry wells). Modification of a downspout that has been constructed to meet SWM plan requirements may be a violation of County SWM Code.



Rain barrel

Can I do this project myself?

Yes. For rain barrels, you can use this module as a guide.

You can construct the rain barrel yourself or you can order one that is already constructed and simply install it.

If I want to hire a contractor, what should I ask?

- What experience do you have installing rain barrels or cisterns?
- Are you accredited by any nationally recognized organizations such as the American Rainwater Catchment Systems Association?
- Can you supply references from previous clients?
- Are you insured/bonded?
- What is included in your services?
- What type of system would you recommend for my property?
- Do you have experience linking multiple rain barrels in series?
- Will you work with subcontractors such as electricians if needed for cistern installation?
- How long do you expect the project to take?
- Do you offer a guarantee for your work?



Step B



Overflow assembly

How to... Build and Install



While pre-assembled rain barrels can be purchased, rain barrels are also fairly

easy to construct from common materials you can find at local hardware and plumbing stores.

The Montgomery County DEP has compiled a generic list of hardware you will need if you decide to construct your own rain barrel at home.

Materials Checklist

- Downspout and diverter
- Overflow pipe and port
- Debris filter (optional)
- Lawn hose connection/full flow valve
- Blocks for the base
- Silicone sealer or teflon tape

Specific types of rain barrels require specific parts, so check the manufacturer's instructions for details.

Building Instructions

Step A

Cut a hole in the top of your barrel for the inlet drain. The hole should only be large enough to allow the diverter connector to fit. Cut the hole using either a drill or carefully measure and mark the area to be cut, start a pilot hole, and cut out the marked area with a jigsaw.

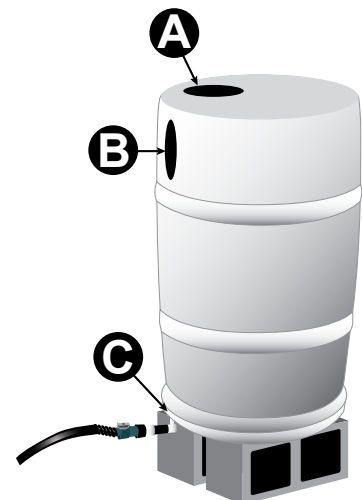
Step B

Cut a hole to accommodate the overflow adapter. You may need to sand the hole somewhat larger to screw in the adapter. Expect a snug fit. The diameter of the hole will vary based on your

overflow pipe size. This hole is not needed if you use the in-line diverter option.

Step C

Use a $1\frac{5}{16}$ -inch drill bit to cut a hole for the $\frac{3}{4}$ -inch brass hose bibb.





Downspout diverter and overflow adapter (on side)



Downspout connection using flexible extender



Hose connection



Hose connection

Step D

Insert the threaded end of the overflow adapter into the overflow hole. Keep the adapter straight as you prepare to screw it into the locking ring, inside the barrel/fullflow valve.

Step E

Insert the threaded hose bibb into the already drilled hole. Keep the hose bibb straight as you screw it into the barrel. Apply a bead of silicone caulk or wrap teflon tape around the bibb before inserting it to ensure a tight, drip-free connection.

Step F

If you are using a filter on the inlet, insert it between the diverter pipe and the barrel.

Step G

Attach the overflow pipe to the adapter and caulk as necessary.

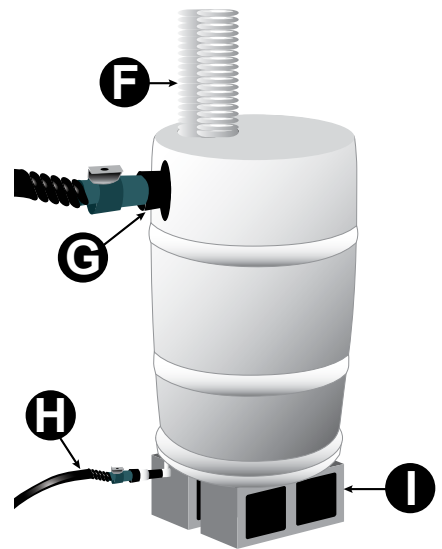
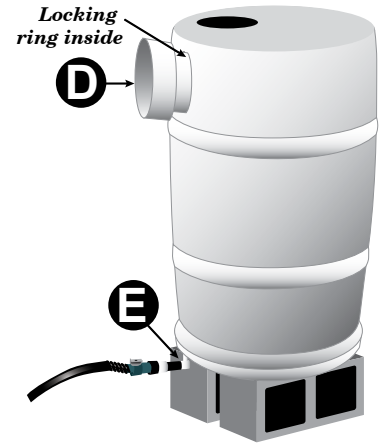
Step H

Attach a garden hose or soaker hose to your hose bibb.

Step I

Use cinderblocks or similar pavers to elevate the completed rain barrel off the ground to ensure easier access to the hose bibb and facilitate gravity-fed drainage.

To install the barrel, you will need to cut the downspout above the top of the barrel with a hack saw, attach a flexible downspout elbow over the downspout, and position the elbow above the rain barrel inlet. Make sure your base is level. For added security, the rain barrel can be secured to the building with a strap to prevent it from being tipped over.



Your rain barrels or cisterns can be left on slow drip to the designated receiving area to promote infiltration.

Note: Be sure to drain your rain barrel at regular intervals, and before the winter season. Keep rain gutters clean of debris to prevent mosquito eggs and larvae from entering your barrel. Check connections routinely; clean debris from the grate assembly as needed.

Costs

Basic do-it-yourself rain barrels can cost less than \$50. Commercial 55-gallon rain barrels may cost less than \$100, but some systems may cost as much as \$250. Commercially available rain barrels that come in colors to blend with your landscaping or that are designed to look like wooden barrels, terra cotta urns, and other containers. Other low-cost workshops are now being offered in the area. Check the www.rainscapes.org site for rain barrel “make and take” opportunities.

Cisterns are more expensive because they are more complex systems. Small cistern systems can cost hundreds of dollars and larger systems can cost thousands of dollars, but they may allow you to completely eliminate tap water use for landscaping needs and will more effectively control roof runoff.

Maintenance

Rain barrels require basic maintenance:

- Empty the barrel between rain events
- Regularly check the overflow area for clogs or other problems that could prevent water from flowing freely
- Keep gutters clean
- Remove leaves and other debris from the screen at the top of the barrel

- Periodically clean the barrel
- Check for leaks
- Ensure the filter screen is intact and securely fastened to keep out mosquitoes and mosquito eggs

Unless the rain barrel is made of a material specifically designed for freezing temperatures, it should be disconnected during the winter to avoid damage. Before the season’s first frost, disconnect the rain barrel from your downspouts, empty the barrel, wash out the barrel, and store it upside down in a protected location. We recommend that the piece of downspout that was removed be saved and reconnected with a suitable fastener for the winter, or use an in-line diverter. Hook up the barrel in mid-April and disconnect it in mid-November. Also remember to open the rain barrel spigot if you expect to be away from your home for an extended period of time.

Different Applications

Multi-Barrel Systems

Rainwater storage capacity can be increased by connecting multiple rain barrels in a series. The barrels can be linked with a PVC pipe, rubber tubing, or hose to allow overflow from the first barrel to discharge into the next barrel. You may also link them near the bottom, allowing the barrels to fill simultaneously.

Multi-System Approach with Other RainScapes Techniques

Rain barrel overflow can be directed to other RainScapes techniques such as rain gardens, dry wells, or conservation landscaping.



Rain barrel using in-line overflow adapter



Linked rain boxes



Aboveground small cistern with solar pump

The Charles River Watershed Association’s Smart Storm Rainwater Recovery System is an example of a multi-system approach using rain barrels that discharge into a dry well: <http://www.crwa.org/projects/smartstorm/mainpage2.html>.

For More Information

The Maryland Green Building Program provides a vendor list for ready-made rain barrels in Maryland: <http://www.dnr.state.md.us/ed/rainbarrel.html>

To view the Fine Gardening 5-minute video *How to Build a Rain Barrel*, visit <http://www.taunton.com/finegardening/how-to/videos/build-a-rain-barrel.aspx>

A rain barrel calculator is available from <http://www.greatergoods.com/rainbarrelcalc.html>