

Design Considerations

When installing Rain Barrels, the following criteria should be considered unless otherwise instructed by the [Name of Municipality].

- ❑ Leaves, pebbles and other debris can clog gutters and pipes, decreasing your system's efficiency. It is good to install a fine mesh gutter guard to protect the barrel plumbing.
- ❑ Between storms, soot, dust, and animal waste may be deposited on your roof. These materials will ruin water quality in a rain barrel. Installing a first flush device is recommended to bypass the first few gallons of contaminated water, allowing only clean water to enter the barrel.
- ❑ Before installing your system, inspect the installation site and make sure you have a level and secure platform to hold the rain barrel. As a barrel fills, bare soil may shift under the weight of the water, creating a unsafe conditions.
- ❑ Plumbers tape or other strapping may be useful to secure the barrel(s) to your structure for added security.
- ❑ Plan your overflow system in advance. In big storms your rain barrel *will* overflow. A modest 1,000 square foot roof will produce ~600 gallons of run off in a 1-inch storm. Discharging overflow to an adjacent landscape or a rain garden is an excellent way to maximize stormwater retention on your property.
- ❑ Make sure to use smooth pipes instead of flexible piping (a food grade material is preferred). This will maintain water quality and prevent mosquitoes from taking advantage of pooled water in flexible pipes.
- ❑ When installed properly, rainwater catchment systems will not allow mosquitoes to breed. All barrels should have a screen to ensure mosquitoes cannot enter the barrel and all overflow systems are designed to prevent water from standing for more than 48-hours.

Operations and Maintenance

Once a rain barrel is installed, the following recommendations should be followed to ensure the long term safety and functionality of your system.

- ❑ Property owners should regularly check their gutters and gutter guards to make sure debris is not entering the pipe plumbing systems.
- ❑ The screen on the top of the barrel should be inspected at least once a year to make sure debris is not collecting on the surface and that there are not holes allowing mosquitoes to enter the barrel. This should be done more regularly for properties with trees that drop debris on the roof.
- ❑ The inside of the barrel should be cleaned out once a year (preferably at the end of the dry season when the barrel has been fully drained) to prevent buildup of organic debris. Vinegar or another non-toxic cleaner should be used. Avoid actually entering the barrel. A large scrub brush on a long stick should provide the needed access.



Daisy chained system of metal barrels
Courtesy of Sunset Magazine

STORMWATER CONTROL FOR SMALL SCALE PROJECTS

RAINWATER HARVESTING AND USE



Bay Area Stormwater
Management Agencies
Association



Daisy chained system of 205 gallon barrels
Courtesy of The City of Oakland

Rain barrels and cisterns are simple structures that can be installed to capture and store rainwater from impervious surfaces during storm events for later use. They are low-cost, effective, and easily maintained systems that allow property owners to build their own sustainable water supply and preserve local watersheds by detaining rainfall on their property. Retained water may be used for landscape irrigation, other outdoor non-potable uses, and in some cases, may be used indoors for flushing toilets (special permits may apply contact [Enter municipality name] for more information).

Rain barrels are small to medium sized structures, typically store between 50 and 200 gallons. They are very easy to install and maintain and come in a wide variety of shapes, colors, and designs. They typically require very little space and can be connected or "daisy chained" to increase total storage capacity.

Cisterns are larger storage containers that can store 200 to over 10,000 gallons. These too come in all sorts of shapes, sizes, and materials. They can even be installed underground to save space.

How Much Storage is Recommended?

The number of rain barrels recommended to capture runoff from a given roof or impervious area is shown in the following table.

Is Rainwater Harvesting and Use Feasible for My Project?

Rain barrels are appropriate where the following site characteristics are present:

- Roof areas that drain to downspouts.
- A level, firm surface for support of the rain barrel(s) is necessary to prevent the barrel from shifting or falling over. Rain barrels should only be elevated with solid construction materials and kept away from retaining walls, as a full 55-gallon rain barrel will weigh over 400 lbs.
- An area where the captured water can be used should be present within a reasonable distance from the rain barrel(s).
- Design of an appropriate area for overflow from the barrel is necessary

For sites within, immediately adjacent to or discharging to an environmentally sensitive area, see the LID Manual for applicable criteria.

Roof or Impervious Area (sq. ft.)	Number of 55 Gallon Rain Barrels*
500 – 1,000	4
1,001 – 1,500	8
1,501 – 2,000	10
2,001 – 2,500**	14

* Or equivalent capture using larger rain barrels or a cistern.

** Projects adding roof or impervious areas in excess of 2,500 sq. ft. shall add 3 rain barrels per every 500 sq. ft. of additional area.

Types of Materials & Applications

Catchment surface



Wood shingle roof with a "Gutter Glove" leaf and debris screen
Courtesy of Gutter Glove

Technically, any impervious surface can be used for harvesting rainwater; however, the catchment surface plays a big role in the quality of captured rainwater, which in turn has implications for the recommended uses.

Parking lots, patios, and walkways can all technically be harvested as long as the water can be conveyed to the rain barrel or cistern; however, there are typically greater levels of debris and contaminants that would have to be filtered out before entering the storage system. Surface catchments also require a subterranean cistern or a pump to move the water into an above ground cistern. Due to these complexities, roof top catchments are more common.

When designing your system, it is important to consider the roofing material on your property. Many materials such as asphalt or wooden shingles have petroleum or other chemicals that can leech out into the rain water, making it potentially harmful for potable uses or even for vegetable gardens. Roofs with these surfaces should try to keep the water use limited to landscaping applications unless they plan on treating the water first. Roofs with cement, clay, or metal shingles are ideal for harvesting water for more diverse uses.

Gutters and Downspouts

Properly sized and maintained gutters and downspouts are essential components in any rainwater harvesting system. Most existing homes and commercial buildings will have gutters and downspouts already installed, but for those who do not, installation is fairly simple. It is important however to ensure that the gutters and downspout are appropriately sized to manage the quantity of water that may be coming off of your roof surface. While installing, it is important to slope the gutters toward the downspouts to achieve proper drainage and it may be a good idea to seal seams between gutter segments to prevent leaking. It may be wise to consult a professional to aid in gutter and downspout installation.

If installing a new downspout, try to strategically locate it in an area where your barrel or cistern will be most useful. Also take time to consider the height of the barrel and the first flush device when designing your system. Those with existing downspouts may have to shorten the piping to make room for your barrel and flush device.

Gutter guards are a highly recommended accessory you may also want to consider installing to prohibit leaves and other debris from entering and clogging the gutters. This small added expense will reduce the amount of time spent cleaning gutters and the barrel or cistern.



Asphalt shingle roof with Aluminum gutter and downspout
Courtesy of Sonoma County

Types of Materials & Applications

First flush, filtration, and screening



First flush and downspout diverter installation
Courtesy of The City of Oakland

First flush diverters, filters, and screens are highly recommended accessories that help preserve harvested water quality and reduce overall project maintenance. Leaves, twigs, sediment, and animal waste are common in roof runoff, especially in the first storm of the year. In a rain barrel, they can cause a lot of problem by encouraging bacterial growth.

A first flush device (see to the left) helps remove a large portion of that debris by creating a bypass for the first few gallons of water flowing off your roof. The first flush diverter should be installed directly under your downspout. You may have to cut your downspout to redirect flow to the connection at the top of your barrel. When designing your system, it is important to make sure the piping diameter for the first flush, the plumbing, and the fastening to the barrel are all compatible. It is important to avoid changing diameters of pipes to prevent the system from backing up.

Additional filters and screens at the opening of the barrel or above the first flush device will also go a long way to help improve the water quality in your system and can provide protection from mosquitoes and other animals from entering.

Foundation and Overflow

Before installing a rain barrel or cistern, it is important to do the necessary preparation work to keep your system functioning safely.

First, inspect your site to find or build a level site near your downspout for your barrel (s) to sit. A cement or paver stone foundation may be appropriate for smaller rain barrels; however, depending on the local building codes, a more substantial foundation will likely be required for large cisterns. In addition to a sturdy base, wall strapping may be advisable to prevent tipping in the case of an earthquake. It is important to design your foundation with consideration to the design of the barrel or cistern. Take special precaution to avoid building any structure that may cover any outlets or cleaning access points on the storage tank.

Once your foundation design is set, it is important to design your overflow system. Unless you design your cistern to capture 100% of your rainfall, your barrel *will* overflow. However, overflow is another opportunity to tie in your landscape for stormwater management. Excess water can be directed towards rain gardens, swales, or other vegetated surfaces to maintain rainwater onsite. It is important to direct all over flow away from the barrel and building foundation as well as any neighboring properties where excess water is problematic or not invited.

