

Rainwater Harvesting for Outdoor Use

Overview

Rainwater harvesting is defined as collection, conveyance, storage and use of roof runoff for domestic, irrigation, and outdoor uses. A home installation of a collection system includes components such as a catchment area (typically a roof), gutters and downspouts, an above or below-ground cistern, a pump or gravity feed, possibly filtration, and in some cases treatment. On a 1,000 square foot roof, one inch of precipitation will yield almost 650 gallons of water. That's 25,000 gallons per year in a typical King County location, which is more than 50 percent of the annual consumption of a family of four!

Outdoor use of captured rainwater can reduce the use of potable water for outdoor activities. Below are some ideas on when and why to use this free and abundant resource, as well as helpful guidance for best practices associated with rainwater harvesting for outdoor use.

Definitions

Potable Water - Water safe enough to be consumed by humans.

Indoor Use (*NOT covered in this document*):

Rainwater may be used indoors after obtaining a permit from [Seattle-King County Department of Public Health](#). For indoor uses other than toilets or clothes washers, the water must also meet drinking water standards. For sites where groundwater is very deep and well development costs are preclusive, rainwater



Rain barrels and cisterns provide an easy option for collecting rainwater to use within your landscaping. Source: [King County](#).

When is This Applicable?

Outdoor Use: Rainwater harvesting can be integrated on almost any residential (or commercial) project - existing or new construction - that has an appropriate roof area for collecting water and a space for a storage tank or cistern. Collected rainwater can be used for landscape or garden irrigation, and potentially for outdoor washing needs such as for cars, home exterior, or garage exterior. Rainwater harvesting is one of the approved BMPs for meeting King County's surface water management requirements. A water rights permit may be needed for commercial collection of rainwater but not for residential collection. See Permit Tips below for more details.



harvesting may be a cost-effective off-grid alternative water supply.

What Makes it Green?

Rainwater harvesting for outdoor use provides numerous benefits, including the following:

- Protects salmon and water quality by reducing or eliminating the rapid runoff of storm water from your roofprint;
- Protects against flooding by reducing your site's stormwater runoff;
- Protects valuable water resources by supplying an on-site source of non-potable water for irrigation or other outdoor uses; and
- Saves money by reducing pumping from your well and reducing water/sewer fees.

During emergencies, such as contaminated water or extended power outages, rainwater catchment may also be a back-up source of water (which must be sterilized before consumption). Additionally, capturing and using rainwater may earn you points toward Built Green or LEED certification.

Best Practices

In order to optimize the benefits of rainwater harvesting, consider the following best practices.

Catchment Design

- Determine how you will use the water before designing your system - this will affect the size of your catchment and cistern, how you will move the water to your cistern and from it to the point of use, and

determine what treatment you will need.

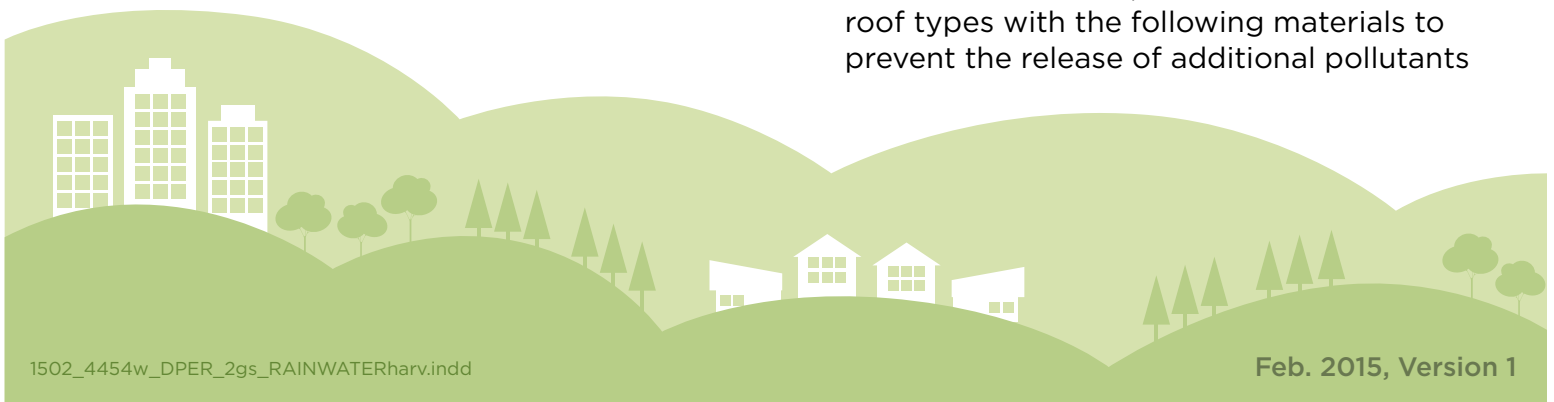
- Select a catchment area that is high up and, if possible, store your water above the point of use - make gravity work for you.
- Select a catchment that is unsheltered from prevailing wet season winds and, if possible away from trees to limit leaf contamination.
- Make your cistern dark - to inhibit algal growth - and bug-tight to prevent mosquitoes.



Catchment systems are available in numerous shapes and sizes, including a cube-shaped tank as pictured here. Source: [Batt + Lear](#).

Roof Materials

- Water quality is an important consideration. Coated metal roofs make the best catchments. Concrete and terracotta tile work reasonably well. Asphalt is not favorable because of the particulates that can wash off.
- Based on a recent Department of Ecology collaborative study with King County and Roof Manufacturers, it's best to avoid roof types with the following materials to prevent the release of additional pollutants



in runoff:

- Treated wood panels - copper and arsenic
- PVC panels - arsenic
- Copper panels - high copper concentrations
- Zincolume® and EPDM roof - zinc

Also see “Roofing Materials” Green Sheet Number 4.

Filtration

- Filter the water sufficiently on the way into the cistern to prevent sediment build-up inside the cistern.
- If for indoor use, “polish” the water on the way to the point of use, with fine filters (sand, activated carbon) and sterilize with UV light, if necessary.

Maintenance

- Inspect the collection area for debris and other material that could impede the entrance and/or exit of surface flows.
- Inspect periodically the effectiveness of the filtering system and replace or replenish filters as recommended by the manufacturer.
- Utilize the captured water for irrigation during the dry season. Be sure the storage tank is empty by the beginning of the wet season (usually around early October) in order to provide the needed capacity for an entire wet season.
- Keep a maintenance log on site with the dates of maintenance performed. King County inspection staff may request to view the maintenance log at any time.

Applicable References/ Standards

[2009 King County Surface Water Design Manual](#) - In particular, Appendix C: C.2.7 RAINWATER HARVESTING.

[King County Public Health Document Code No. Product/Method #10-004 Effective January 25, 2011](#)- This document provides an explanation of code requirements for outdoor use of rainwater.

Resources

For the complete King County Green Building Handbook and individual Green Sheet PDF files, please visit our website at: <http://kingcounty.gov/property/permits/publications/greenbuild.aspx>. For additional information, please email dperwebinquiries@kingcounty.gov or call 206-296-6600.

See these related DPER Green Sheets (GS):

- Roofing Materials, GS Number 4
- Amended Soils, GS Number 1
- Permeable Surfaces and Driveways, GS Number 3
- Routine Maintenance, GS Number 5

[WA Department of Ecology, Investigation of Toxic Chemicals in Roof Runoff](#) - This report summarizes findings from a roof study related to toxics in roof runoff.

[Eastside Harvest House Case Study](#) - This King County GreenTools Case Study showcases a recent Built Green 5 star home that incorporated rainwater harvesting.



[King County Rain Barrel Information and Sources](#) – This website provides do it yourself instructions, resources for buying barrels, and numerous links to related resources and information.

[EPA Green Infrastructure](#) – This website covers rainwater harvesting and rain gardens and provides examples, benefits, fact sheets, and links to more resources related to these topics.

Permit Tips

Will you need a permit? For small-scale collection systems such as rain barrels, you do not need a permit. However, if you are installing a large cistern and/or using rainwater catchment as a Best Management Practice (BMP) for surface water management, you will need a permit.

To qualify as a BMP for surface water management, the system must be designed to collect and use at least 95 percent of the average annual runoff from the impervious roof area you are targeting. The size of your cistern will depend on the size of your catchment area and the rate of water use over an annual cycle:

- If you plan to use the cistern for summer irrigation, it will have to be large enough to accommodate 95 percent of the annual runoff from your roof area, because you'll use very little water off for irrigation during the wet season;

- If you plan to use the cistern for domestic use – such as laundry or toilet flushing – your cistern can be smaller because you will continually draw water out for indoor use, freeing up storage capacity for more rain (indoor use is not addressed in this document).

To demonstrate compliance with the requirement, the system designer must perform a water balance calculation and indicate on the plans and permit submittal that the cistern is large enough to prevent overflowing during the wettest time of the year, when the storm water management is most important.

DPER will inspect the system for consistency with plans and calculations. The inspector will also verify system specific maintenance and operations instructions from the manufacturer, or installer, are included with the system.

A common challenge to implementing rainwater harvesting is property size. In some cases, the property is not large enough to deal with overflow, or the code requirement for a five foot setback prohibits system installation.

