

Resilient Building Toolkit Adaptation Measures Factsheet

Name and description of measure: Rainwater and grey water harvesting

Rainwater harvesting is the accumulation and deposition of rainwater for reuse before it reaches the aquifer. Tanks and filtration systems are installed on the roof of buildings to catch and cleanse water, filtration tanks can also be installed underground. Harvested rainwater can be used for WC flushing, irrigation and cooling. Costs of installing rainwater harvesting systems vary depending on the size of the building and system required. However, it will be cheaper to install a system during the building process, rather than retrofitting. Payback periods also vary, however, in some cases it can be as short as 3 – 5 years, particularly in larger commercial buildings. The formula to assess out how much water a building may collect per year from a rainwater system $\text{Roof area (m}^2\text{)} \times \text{drainage area} \times \text{filter efficiency} \times \text{annual rainfall (mm)} = \text{Amount collected in a year in litres (divide by 1,000 to get cubic metres)}$. Drainage varies from 0.9 on a steep pitched roof, to 0.4 on a flat roof with gravel. Filter efficiency is generally estimated at 0.9 Annual rainfall averages are available from the Met Office.

Grey water harvesting involves recycling wastewater generated from washing (including laundry and dishwashers), for uses such as WC flushing, landscape irrigation and constructed wetlands. Ideal buildings for grey water recycling are hotels, student accommodation or high rise structures with living accommodation. These buildings provide high system efficiency as the bath and shower water provides a constant supply that is reused for WC flushing. Information in payback periods for grey water recycling are difficult to source, as these are not as popular as rainwater systems. In addition, in many cases the rise in water efficiency measures being fitted in buildings means that there is less grey water available for recycling.

Cost of measure (high, medium or low):

High. Costs of installing rainwater harvesting systems vary depending on the size of the building and system required. However, it will be cheaper to install a system during the building process, rather than retrofitting. Payback periods also vary, however, in some cases it can be as short as 3 – 5 years. Information in payback periods for grey water recycling is more difficult to source.

Pros and Cons:

Rainwater Harvesting:

Pros:

As well as saving water, they can also reduce incidence of localised flooding and soil erosion.

Cons:

Unpredictable supply of rainwater.

Initial high cost for installation (particularly if retrofitting).

Need regular maintenance to ensure quality of water and prevent blockages etc.

Grey water harvesting:

Pros:

Reduced environmental impact.

Cost effective compared to some rainwater harvesting systems.

Cons:

High initial installation costs.

Health standards of the water and quality concerns. Grey water may contain fats, oils, grease, hair, lint, soaps, cleansers, fabric softeners, and other harmful chemicals so if the water is not filtered properly these can cause disease or contamination. Most cleaning agents contain sodium salts which can create an alkaline condition and damage the soil structure. Grey water cannot be stored for more than 24 hours. Even biodegradable soaps and detergents can present a problem over a period of time when grey water is used for irrigation.

Regular maintenance required.

Both rainwater and grey water recycling. Grey water recycling and rainwater harvesting can also be used together to maximise the amount of available water.

Pros:

Storage capacity required will be less than with just a rainfall system saving space and cost. Rainwater harvesting & grey water recycling will allow the building to demonstrate its environmental credentials with the general public.

Cons:

See lists for each technology above.

Effectiveness of measure (high, medium or low):

Medium

Photos:



Underground rainwater tanks



Above ground water tanks

Product review site:

The Environment Agency produced this guide to grey water harvesting in 2008:

<http://www.highland.gov.uk/NR/rdonlyres/4F44CF29-5BC5-43FD-A68F-EF390F972B45/0/GreywaterRecyclingInfoGuide.pdf>

United Kingdom Rainwater Harvesting Association provides a list of products and manufactures:

<http://www.ukrha.org/tag/system-manufacturers-suppliers/>

Case study and contact:

Hampshire Fire and Rescue have installed rainwater harvesting on their Winchester Fire Headquarters. Contact David Mallard, Central Services Manager, david.mallard@hantsfire.gov.uk

Aquaco have implemented grey water harvesting in their own buildings as well as other organisations, links to case studies here:

<http://www.aquaco.co.uk/Grey-Water/Grey-Water-Recycling-Commercial>

Additional information:

It is worth noting that as the efficiency of appliances improves, the amount of grey water produced will reduce.

Guide publications - <http://www.ukrha.org/uk-rha-briefing-notes/>