

Rainwater Harvesting and Greywater Recycling

CIBSE
Sustainable Development Conference
Bury St Edmunds
6th Feb 2007

Cath Hassell

ech₂o

As part of a sustainable water strategy reduce demand at point of use before installing a rainwater harvesting or greywater recycling system

ech₂o

Compliance with Current Regulations

- Under the Water Supply (Water Fittings) Regulations 1999, rainwater and greywater are classified as Fluid Category 5 as bacterial contamination is seen as a concern, and cannot connect directly to a mains supply. Ensure systems have at type AA or AB air gap, or conform to EN1717
- Under the Building Regulations Part H 2002, all pipework carrying rainwater or greywater must be identified.

ech₂o

GREYWATER RECYCLING



ech₂o

Greywater Recycling 1



- Is the reuse of waste water from baths, basins, showers. Usually used for WC flush only
- Earlier greywater systems used chlorine or bromine to disinfect the greywater, suffered from high maintenance requirements and poor quality design.
- Biological systems such as the Pontos Aquacycle 900 provide good quality water but require power for pumps and UV disinfection. Water is saved but energy use is increased
- Without treatment there is an issue of poor water quality

ech₂o

Greywater Recycling 2



- Is useful for many industrial processes, e.g. commercial vehicle washing where quality of the used water is high
- Removing greywater from the foul water stream reduces strain on off mains sewage systems and can be used for subsurface landscape irrigation.
- Disinfecting the water used to flush WCs is not environmentally sensible if alternatives exist

ech₂o

RAINWATER HARVESTING



ech₂o

Rainwater harvesting addresses both localised storm water problems and reduces demand for potable water



ech₂o

Rainwater Harvesting



- Wide variety of system size and design. As part of a sustainable water strategy reduce demand at point of use and take rainwater out of the stormwater stream using the simplest design solution for any particular situation

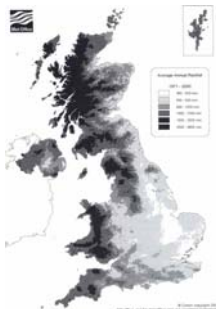


Rainwater Harvesting in the UK 1

- Best practice is to use rainwater for non potable purposes only.
- The UK RWH industry is still small (1200 systems installed in 2006) but is growing rapidly. Recognised products receive Enhanced Capital Allowance from the UK Govt and get back £300 for every £1000 cost.
- The UKRHA (www.ukrha.org) is the industry body.
- Training is required to improve the standard of systems, both in design and installation
- PPS 25 recognizes that RWH can be a first line of a SUDS strategy

ech₂o

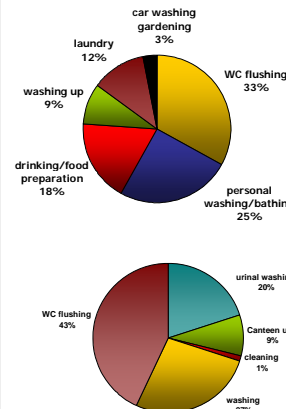
Rainwater Harvesting in the UK 2



- Average UK rainfall is 1000 mm/year
- Most areas receive between 600 – 800mm spread pretty evenly across 12 months
- East of England has less than 600mm/year in places
- Collecting rainfall during the winter months for garden use in the growing season reduces strain on the mains during summer

ech₂o

RWH to reduce potable water demand



- Our water supplies are under increasing stress
- Average water use is 150 litres a day and still rising
- Rainwater can displace 50% and more of potable water demand

ech₂o

DESIGN CONSIDERATIONS

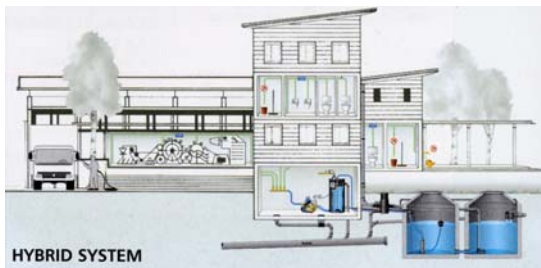
ech₂o

Where to install rainwater harvesting

- Generally, rainwater harvesting is better suited to larger buildings, agricultural, commercial or industrial. It can be used for blocks of flats if a centralised plant room is available.
- Retrofitting rainwater harvesting is more complicated than in new build as downpipe filters and basement for tank usually necessary. Also existing pipework may be unsuitable and need to be replaced

ech₂o

Commercial Rainwater Harvesting System



ech₂o

Design considerations 1

- Collect from hard roof surfaces only to maximise quality of rainwater
- Ensure that supply and demand match, the design uses correct rainfall figures and that storage provides optimum use of rainwater with minimal pumping demands
- Ensure an expert overview of drainage design
- Ensure design is followed correctly during installation

ech₂o

Design considerations 2

- Pre-filtration of the rainwater to 1250 microns (1.25mm) maximum reduce organic matter in storage tanks. Ensure filters conform to DIN 1989
- Automatic mains back up supply with no possible cross contamination into mains is essential.
- Copper pipework not recommended

ech₂o

To ensure quality of rainwater

- Fine filter the rainwater from the roof. This removes many pathogens. The low organic content of water means pathogens do not multiply
- Protect the stored rainwater from surcharging of the drains and ingress by rodents
- Temperatures of rainwater stored underground are less than 20 degrees C and aerosols are not a problem in WC flushing so legionella is not a concern
- If pumping directly to point of use in a multi-user system for WC flushing UV disinfection of the rainwater is not necessary

ech₂o

Maintenance of a RWH System



- Maintenance is minimal
- Filters need periodic cleaning (every 3 months recommended)
- Roof area and gutters must be kept clean
- Visually inspect storage tank once a year
- Check condition of floating filter
- Check correct operation of mains back up
- UV if fitted needs 6 monthly maintenance and replacement of the bulbs

ech₂o

Payback



- Payback varies between areas due to amount of rainfall and cost of mains water
- Varies between systems depending on treatment of rainwater and reduction in attenuation storage
- Enhanced capital allowances for approved systems will improve payback periods

ech₂o

Relevant Documentation

- WRAS Information and Guidance Notes available from www.wras.co.uk
- Rainwater and greywater use in buildings CIRIA best practice guidance C539
- Model Agreements for Sustainable Water Management Systems CIRIA Document
- CIBSE guide to rainwater and greywater

ech₂o

ech₂o environmental consultancy

ech₂o is an environmental consultancy offering design advice and seminars on all aspects of sustainable water use, low carbon energy systems, carbon literacy and environmental choice of materials. Clients include private individuals, community groups, architects, engineers, FE Colleges, Universities, Housing Associations and Local Authorities.

110 Elmore Street London N1 3AH 020 7288 0444
www.ech2o.co.uk cath.hassell@ech2o.co.uk

ech₂o