

GREENHOUSE INFORMATION SHEET

RAINWATER

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WATER and climate change

Climate change is already impacting on the UK water industry. Key impacts include:

- ◆ *An increase in the intensity, severity and frequency of extreme weather events such as droughts, storms and floods*
 - ◆ *Reduced availability of water in rivers, reservoirs and aquifers, which also means lower quality in some cases due to reduced dilution of pollutants*
 - ◆ *More treatment of water supplies due to lower quality of water in the environment, which will cost more money and burn more energy*
 - ◆ *Effects on existing sewerage systems, which were not designed to take climate change into account; more intense rainfall is likely to exceed the capacity of parts of the network and cause local flooding*
 - ◆ *Water quality problems caused by run-off taking nutrients and pesticides from agricultural land, for example, and transferring them into rivers and lakes*
 - ◆ *Effects on the structure and operation of dams and reservoirs, for example from increased siltation and slippage*
 - ◆ *Pipe systems for both drinking water supply and sewage becoming more prone to cracking as climate changes lead to greater soil movement as a consequence of wetting and drying cycles*
 - ◆ *Increased risk to assets on the coast or in flood plains from flooding, storm damage, coastal erosion and a rise in sea level*
 - ◆ *Discolouration and odour problems resulting from higher temperatures and more intense rainfall events*
 - ◆ *Likely increased demand for water, particularly at times of reduced availability, exacerbating supply issues*
 - ◆ *Financial and economic impacts as well as environmental and social consequences*
- (Data from Water UK: www.water.org.uk)*

In the UK, all mains water is purified to drinking water standards. Harvesting rainwater can significantly reduce the use of mains water, saving the energy wasted on processing water. We really don't need drinking water piped in from miles away to water the garden, fill the washing machine or flush the toilet. And plants much prefer nutrient enriched rainwater, rather than drinking water.

WATER IS LIFE

Nearly three quarters of the surface of the planet is covered with water. 97.5% of water on the Earth is salt water, leaving only 2.5% as fresh water of which over two thirds is frozen in glaciers and polar ice caps. The remaining unfrozen freshwater is mainly found as groundwater, with only a small fraction present above ground or in the air.

In rural Mozambique or Ethiopia, people use what women and young girls can carry back from rivers and lakes: around 5-10 litres a day for each person. Compare this with the UK where we take fresh water for granted. Turn on the tap - and there it is.

It is easy to forget how precious water is. The average person in the UK now washes away a staggering 1000 litres a week. Domestic water use in the UK has doubled from 75 litres per person per day in 1960 to 150 litres per person per day in 2006.

The Greenhouse Story

From the start, the Greenhouse used rainwater from water butts for all plastering, building repairs and construction. In September 2004, the Greenhouse installed a rainwater harvesting system. The rainwater is collected from the back roof and filtered through a (Wisy) filter. The water is stored in four separate tanks, ranging in size from 750 litres to 1000 litres, giving a total storage capacity of 3550 litres.



The historic building design limits the availability to collect rainwater.

Rainwater is:

- ✓ Free
- ✓ A sustainable resource
- ✓ Soft and free of limescale
- ✓ Available locally across the UK
- ✓ Can help control the risk of localised flooding

Mains water is:

- ◆ Increasingly more expensive
- ◆ Not unlimited
- ◆ Being consumed at a higher rate than it can be supplied
- ◆ A high user of both energy and chlorine*
- ◆ A contributor to carbon emissions

*Chlorine is the most commonly used method for water disinfection. One disadvantage is that chlorination of residual organic material can generate chlorinated-organic compounds that may be carcinogenic (cancer causing) or harmful to the environment. Using rainwater helps reduce the amount of chlorine used in water treatment.

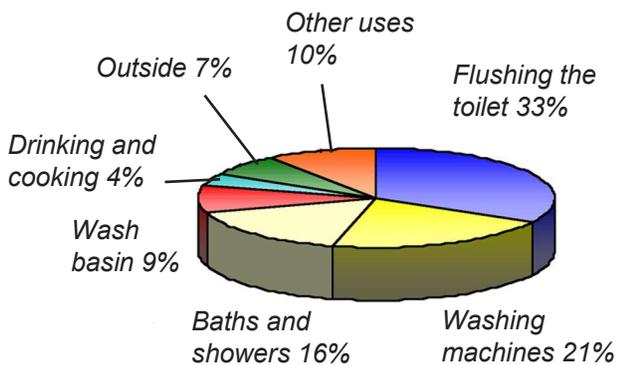


The water is pumped by a 'Hya-Rain 800' pump to supply 3 public toilets (including 1 special needs) and 2 hand wash basins on the ground floor.

LIMITATIONS OF THE GREENHOUSE SITE

- ◆ The existing site has a substantial concrete base, which we did not want to disturb. Storage is therefore restricted to above ground. We have installed two tanks in the garden to illustrate how the collection system works. A 1 tonne tank has been built into the roof space directly above the toilets.
- ◆ Collecting rainwater from the front of the building would involve running the water along the passageway, to get to the rear of the building.

However, the Greenhouse demonstrates that the vast majority of buildings could reuse rainwater successfully.



Domestic water use by activity in the UK



To date the rainwater collection system at the Greenhouse has captured over 297 cubic metres of rainwater (approximately 100 cubic metres per year). This is around 40% of the total volume of water used in this busy public building. It is estimated that a further 50 cubic metres is collected and used on the garden per year.



'Wisy' (filter) directs rainwater to the storage tank. The filter can be maintained easily via a 1st floor window.



In September 2004 the Trust connected the drainage to a rainwater harvesting system.



Monitoring the rainwater collected and mains water used.

Economics & the environment

Historically the Greenhouse is three Victorian houses converted into one residence (then used as a light industrial unit). The Trust's conversion and restoration of the site, involved replacing and redesigning all of the plumbing on site. The total cost for the rainwater system supplied at the Greenhouse was approximately £5,500, including plumbing, installment, and labour costs.

Currently the price of a cubic metre of water from Anglia Water is approximately £1.29. The financial value of 297 cubic metres of water used in the building is £383. The cost of the 50 cubic metres used on the garden is £65. This means that the payback on the investment will be around eleven years. However, the economic cost of water will continue to increase and, of course, the environmental value of the water is priceless. There is an additional saving to the environment created by the absence of energy and chemicals not used to process the 347 cubic metres of water collected on-site.

The average household bill for water and sewerage in England and Wales is projected to be £342 for 2009-10 (Ofwat). This calculation works on the presumption that an average household's use is in the region of 265 cubic metres of water per year. Using a system similar to the one at the Greenhouse, it is clear that a similar system applied to a domestic system could reduce the bill and water use to essential drinking water needs/costs.

WATER CHECKLIST

- ✓ Reduce the amount of water you flush down the toilet. Dual flush toilets can reduce water use by 25%.
- ✓ Alternatively, placing a sealed bottle of water or Water Hippo (contact your local water company) or any other water-displacing device in the cistern to reduce the volume of water in each flush.
- ✓ Do you always need to flush?
- ✓ Use full loads in your washing machine
- ✓ Don't leave taps running when washing your hands or cleaning your teeth
- ✓ Fix leaking taps - losses from a tap dripping at 30 drips per minute adds up to 250 litres per month
- ✓ Refrigerate cold water so you aren't running the tap for long periods waiting for it to get cold
- ✓ Wash dishes by hand, using a bowl. This uses less water than filling the sink
- ✓ Shower instead of having a bath - or if you do have a bath, think about how to use the wastewater. The water can be used directly in the garden or for applications such as pre soaking your washing.

Reuse or Recycle

- ✓ Start small - Connect one water butt on your down pipe
- ✓ Use your washing-up and bathwater on the garden. Use an ecological washing-up liquid to avoid harming the plants.

Almost all the water in the home apart from toilet flush water can be re-used to some degree. Think about the resource you are letting run away.

Calculate how much rainwater you can harvest:

- ✓ A fairly simple calculation can tell you how much rainwater you can harvest.

You need to know the area covered by the roof to be collected from, and the annual rainfall for your area see Met office: www.metoffice.gov.uk

- ✓ A company called Rainwater Harvesting offers a service which estimates this and can be found on:
http://www.rainharvesting.co.uk/pages/forms/quote_dom.html

REGIONAL WATER COMPANY

Anglian Water Services Ltd
Head Office Address:
Anglian House
Ambury Road
Huntingdon PE29 3NZ
Tel: 01480 323 000

<http://www.anglianwater.co.uk>

Information And Suppliers

The Green Shop
Cheltenham Road, Bisley, Stroud,
Gloucestershire, GL6 7BX
Tel: 01452 770629
Web: <http://www.greenshopgroup.co.uk/>

PHP – Rainwater Systems
Unite 5, Brickfields Business Park, Woolpit, Bury
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