



LINCS BUILDING
CONSULTANCY

Guidance Note No. 56

Rain Water Harvesting

Introduction

This guidance document is about rainwater harvesting systems for non-potable domestic uses in houses and contains general information about the benefits of these systems. It also contains an example of housing schemes where these systems are already in use.

Why rainwater harvesting system?

Despite the fact that we appear to have plenty of rain, our growing population and the changing climate mean that our water resources are under pressure. The large number of new homes to be built over the next few years will increase the competition for available water between the environment and people. Reducing demand for mains water can help to reconcile these competing needs. One way of reducing demand is to use a rainwater harvesting system to provide water for domestic uses that do not require water treated to drinking water quality.

Rainwater harvesting systems can be used for all purposes except drinking (unless treatment to a potable quality is provided).

If properly collected and stored it can be used for non-potable purposes such as toilet flushing, harvested rainwater need not undergo any additional treatment such as chemical disinfection. Washing machines can also be fed by rainwater without disinfection, but occasionally colour and odour may cause a problem if the quality of the collected water is poor. When rainwater is used to supply a garden tap or rain water butt, care needs to be taken to ensure that the water cannot be accidentally drunk.

The potential savings that can be made from rainwater harvesting depend on both the demand for non-potable water and the amount of rainwater that can be supplied. In England, Planning Policy Statement 25 (PPS25) on development and flood risk requires that planning authorities consider the effects of surface water drainage. This will result in increasingly strict controls on runoff from sites.

Rainwater harvesting systems are not yet common in England and Wales, for two main reasons:

- The high cost of the systems compared to the low cost of water.
- Concern that the quality of the water may pose a health risk.

Additionally, only metered customers will benefit financially by using these systems. The majority of domestic customers, who don't pay for water by volume, have no immediate financial incentive to install rainwater harvesting systems.

2 Design considerations

Rainwater can be harvested from roofs and areas of hard standing, such as driveways. The most common method is to collect rainwater exclusively from roofs, as this avoids potential water quality issues from collecting water from more contaminated surfaces such as driveways, which can introduce oil and additional faecal material into the system.

System Design

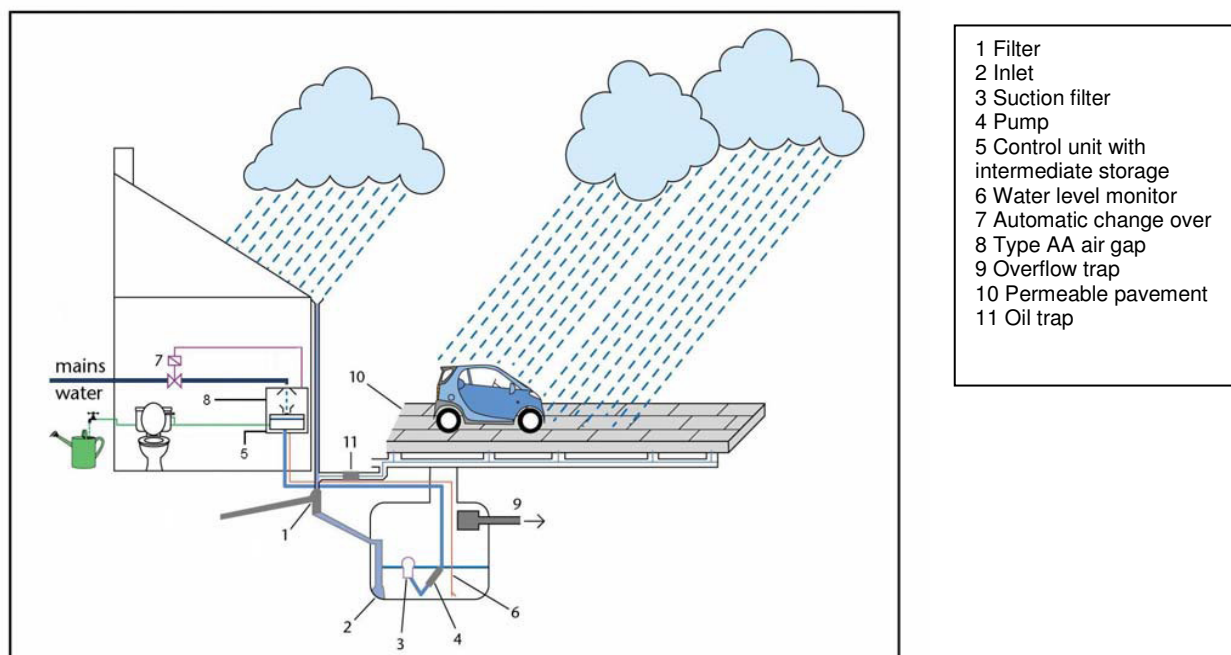


Figure 1 shows a diagram of one example of a system.

Direct feed or header tank

Systems can either supply water using appliances directly with rainwater (direct feed systems). Or supply rainwater to a header tank in the loft (header tank systems). Where a header tank is used, the mains back up will feed directly into the header tank. In direct systems the approach to mains backup differs.

Mains backup

Direct feed systems can either add mains water as required into the large storage tank which is usually underground or into a smaller, intermediate tank or cistern – as shown in Figure 1. Some dual feed toilet cisterns are also available which makes mains top up within the rainwater harvesting system itself unnecessary. Locating the mains backup in the underground storage tank is often cheaper than using an intermediate storage tank, but using an intermediate storage tank allows mains water top-up closer to where it is required and therefore reduces the distance it has to be pumped. An intermediate cistern can also be smaller, allowing a smaller volume of mains back up each time it is topped up.

Tank

Tanks vary in size from a small water butt to large underground tanks that contain many thousands of litres of water. A wide range of water butts are now available, made from a wide range of materials, from re-used, wooden wine barrels to imitation boulders and of course the familiar green plastic model. In the UK, larger tanks tend to be constructed from Glass Reinforced Plastic, Polyethylene or Concrete. Different tank materials suit different installations, and advice should be sought from a reputable rainwater harvesting supplier.

A tank should be located in a place that will moderate the water temperature, reducing bacterial growth in summer and frost damage in winter. The tank should also be

shielded from direct sunlight, to avoid overheating and the development of algae. Usually the best solution is to house the tank underground.

As the tank is often the most expensive part of a rainwater system, costs can be reduced by carefully considering how large it needs to be. The size of a rainwater holding tank must match the demand for water with its availability as closely as possible. The tank size chosen should be a balance between cost, storage capacity, and the need to enable an overflow at least twice a year, to flush out floating debris.

A rule of thumb for household water use is to size the tank at 5% of the annual rainwater supply, or of the annual demand, using the lowest figure of the two. The tank size is calculated from the collection area drainage coefficient, filter efficiency and rainfall.

Demand

On average, a person uses around 150 litres of water per day, but this varies according to many factors. Metered water bills will show individual household consumption more accurately. Harvested rainwater is typically used to flush toilets and can also be used to supply the washing machine and water the garden.

Where to use your Harvested water

- WC
- Basin
- Shower
- Bath
- Kitchen sink
- Washing Machine
- Dish Washer
- Outdoor

If you think rainwater harvesting is right for your project then just search online for further information, just type "Rain water harvesting system" into your search engine.



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