

RAINWATER HARVESTING

It is strongly advised that any club refers to BS 8515:2009 and appoints a suitably qualified and experienced consultant in planning and executing any work of this type. The reader should note that this advice is for the production of water for irrigation only and not for drinking. In any case the water produced should be routinely tested for water quality for irrigation purposes.

What is Rainwater Harvesting?



Rainwater Harvesting collects rainwater from roofs using standard guttering, filters it to remove debris and then stores it in an underground tank. The stored water is then pumped to the square to be used in irrigation. Where supply is sufficient (areas of high rainfall) harvested rainwater can also be used to flush lavatories, supply washing machines and clean vehicles.

Once the collection system has been installed, the water supply is free and the only on-going costs are pumping the water to the square, regular maintenance and system depreciation.

The suitability of rainwater harvesting will depend on a number of things:

1. The amount of water you use, both in terms of annual requirement and peak demand;
2. The amount and intensity of rainfall in your area;
3. The area of roof that you have to collect the rain from (including the pavilion roof and any outbuildings such as grounds sheds).

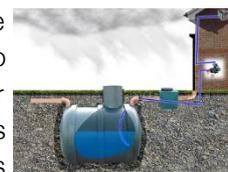
It is important to look at how much water you will need, how much can be collected and when it will be available very early on when considering rainwater harvesting. It might be that at some facilities with small roof area and low rainfall, rainwater harvesting will not be suitable.

It is also possible to collect rainwater from paved areas but this can become contaminated with hydrocarbons and other pollutants from cars and animals, all of which need to be removed by filtering and treatment, so is generally less suitable than water collected from roofs.

The quality of water should be checked regularly to ensure it will not endanger players during or after pitch watering. The microbial quality of water should be checked, particularly where large bird populations, can foul roofs and cause contamination.

It is possible to put a back-up supply of water from the public mains water supply to top up the tank in dry periods but this must be compliant with the Water Supply (Water Fittings) Regulations 1999 in its prevention of backflow of rainwater in the public mains water system and can mean that the system cannot be used during water restriction periods (see below).

The storage tank is usually underground to insulate it from heating and light from the sun, which limits the growth of algae and bacteria that can harm water quality. It also means that the drainage levels to the tank are easy to manage. It might be cheaper however to have an aboveground tank, where site conditions allow. The tank is equipped with an overflow device so that when the tank is full, excess water is diverted into either a soakaway or a sewer.



Designing and Installing a Rainwater Harvesting System

Using an experienced rainwater harvesting consultant is essential in the design and installation of a rainwater harvesting system, as the following issues must be considered:

1. Planning permission might be required, particularly where underground tanks are being installed. You should consult your Local Planning Authority as soon as possible to determine whether this is the case.
2. The specification of storage tank size and pumping system can be complicated and require specialist data and analysis. The design of a rainwater harvesting system needs to consider the demand for water from irrigation (and other potential uses such as lavatory flushing) and the supply of water from rainfall. Those calculations should consider any potential effects of climate change on both rainwater supply and irrigation demand;
3. The plumbing of rain water and public mains water must be kept separate, in line with the Water Supply (Water Fittings) Regulations 1999. The pipework should not be blue and preferably green in accordance with BS 8515:2009 (NB this includes a code of practice on rainwater harvesting systems and a copy should be available via your local library ;
4. The tank must be installed so that it isn't loaded or floated by groundwater variations, or crushed by vehicle traffic – but it must be adequately and safely vented;
5. The pumping and control system needs to function properly;
6. The system needs to be designed so that filters and tanks are accessible for maintenance but not by unauthorised persons as confined spaces and stagnant water can be a risk;
7. Design needs to consider water quality for safe irrigation;
8. Excavation of soil at depth can result in subsidence and collapse that can cause death – all excavations need to be conducted in a safe manner by experienced personnel.

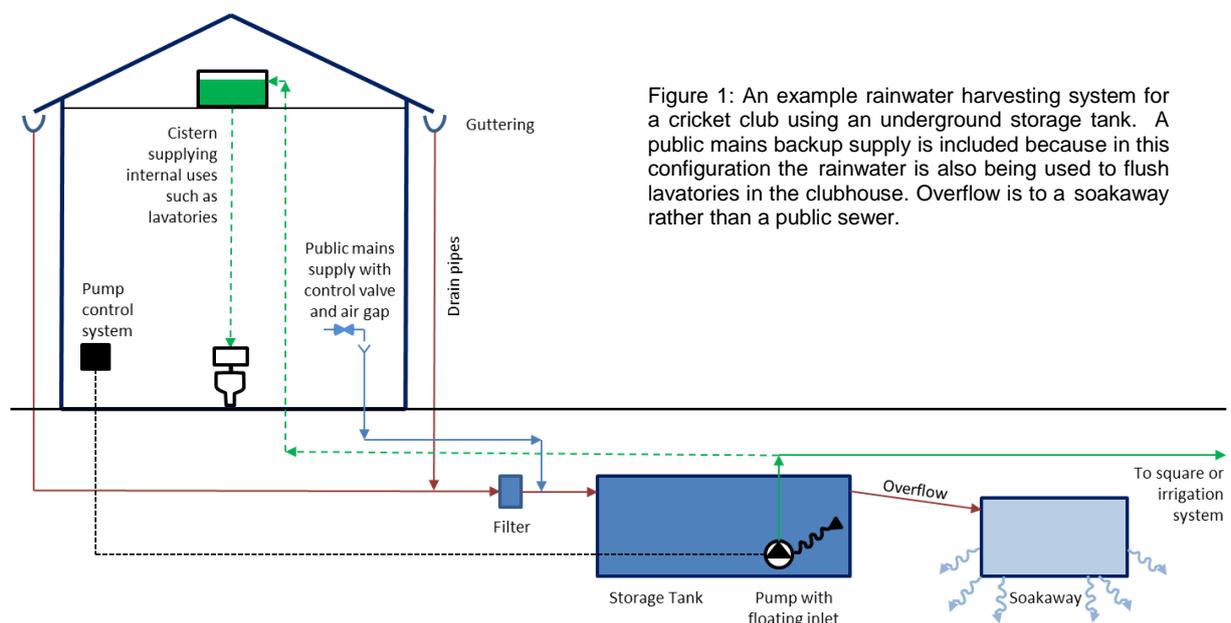


Figure 1: An example rainwater harvesting system for a cricket club using an underground storage tank. A public mains backup supply is included because in this configuration the rainwater is also being used to flush lavatories in the clubhouse. Overflow is to a soakaway rather than a public sewer.

The UK Rainwater Harvesting Association (UKRHA) are a trade body for the rain water harvesting industry and list both member suppliers and installers on their [website](#). (NB: some suppliers/installers may be able to assist with design as part of their supply service).

Experienced sports turf irrigation consultants should also be able to assist in design – both the [UK Irrigation Association](#) and the [Sports and Play Construction Association](#) have websites that identify members with expertise in this area.

Including a Backup Supply

Whether or not to include a backup supply from public mains water must be considered carefully. A backup supply is essential if a lavatory flushing system is incorporated, otherwise it will not be possible flush during extended periods of dry weather – particularly if storage is insufficient.

Public mains water back up supply must be protected from backflow of rainwater into the public mains supply – this will require the installation of a cistern with an air gap to comply with the Water Supply (Water Fittings) Regulations 1999 – you should consult an experienced plumber/fitter. The control system (that operates the pump) should be designed so that it indicates when the back-up system is in use.



Including a backup supply might mean that the system cannot be used during certain water restrictions (e.g. a hose pipe ban) because the system could be running on the back up supply only during very dry periods. If the water is to be used for irrigation only, it might be preferable to install the rainwater harvesting supply in parallel with any existing public mains supply (ensuring there is no chance of back flow into the public mains supply). You should speak to your system designer/installer about this.

Overflow

Storage tanks should be fitted with an overflow so that the roof drainage system does not back up when the tank is full. It is essential that the bore of the overflow is larger than the bore of the inflow but there is a choice of where the overflow should connect to.

It might be possible to connect the overflow to the stormwater sewer on site but this puts load on the stormwater system during high intensity rainfall events and your water company could charge you for stormwater drainage.

A preferred option would be to divert the overflow into a soakaway system which allows the excess rainwater to infiltrate into the soil at depth over time – ultimately this water is used by plants or becomes groundwater. This has the benefits of reducing load on the sewer system during high intensity rainfall events and reduces the area of impermeable drainage into the public sewer, reducing any surface drainage charges the club might be liable for. Soakaways should be designed as per BS EN 752. It is preferable to locate soakaways outside the playing area and away from routes used by maintenance machinery including mowers and rollers.

Benefits of Rainwater Harvesting

- Rainwater Harvesting is a highly sustainable source of water for irrigation because water is diverted from stormwater drains and used on site.
- The issues related to water resource supply and protection associated with surface water abstraction, are not applicable to rainwater harvesting.
- The source of water is free. The rain is not owned by water companies, and they will not charge for its use in this way.
- As well as saving public mains water on grounds maintenance, harvested rainwater can also be used to reduce water consumption in the clubhouse by using it to flush lavatories for example.
- When tank capacity is large relative to rain supply and/or overflow is diverted to a soakaway, the system can help attenuate stormwater, reducing flooding risk.

Disadvantages of Rainwater Harvesting

- System design must consider supply versus demand. If there is insufficient rainfall, roof space and/or storage the system will run out of water during dry periods. Appropriate design is critical.