KingspanWater

Integrated Rainwater Harvesting Systems






Sustainable, Reliable, Affordable

Kingspan®

Often the simplest of methods can be the most effective…

Harvesting rainwater is one of the oldest and most elemental of ways in which we can live sustainably with nature. Only now is the value of water being recognised as it becomes an increasingly precious resource.

Here at Kingspan Environmental, we have been designing and installing rainwater harvesting systems for over a decade. While we continue to follow the principles of rainwater harvesting, our systems have evolved through our knowledge, experience and the latest technology.

The result?

An advanced range of systems, bringing intelligent sustainability to all modern buildings.

What is Rainwater Harvesting?

Rainwater Harvesting is not a new concept. Since earliest times, mankind has captured rain in order to provide a simple and accessible supply of fresh water.

With the introduction of mains water supply, harvesting methods in the developed world have been largely reduced to the use of garden waterbutts. In most buildings naturally clean rainwater is left to wash away while expensive purified water is used for all applications with only a fraction being used for potable-use. In recent years it has become harder to ignore this illogical way of using our natural resources.

Water has become a valuable commodity. Increased awareness of the environmental issues surrounding water reserves, drainage and a cultural shift towards sustainability have also meant that Rainwater Harvesting is more effective and significant than ever before.

The Basic Principles

The principles behind Rainwater Harvesting are simple.

Any system has a method of **collection** (e,g a roof), a **storage** vessel (tank) and a **delivery** facility (be it a simple on/off tap or pipework system).

Integrated rainwater systems still adhere to these elementary steps, but use modern technology to refine the process with automation and filtration.

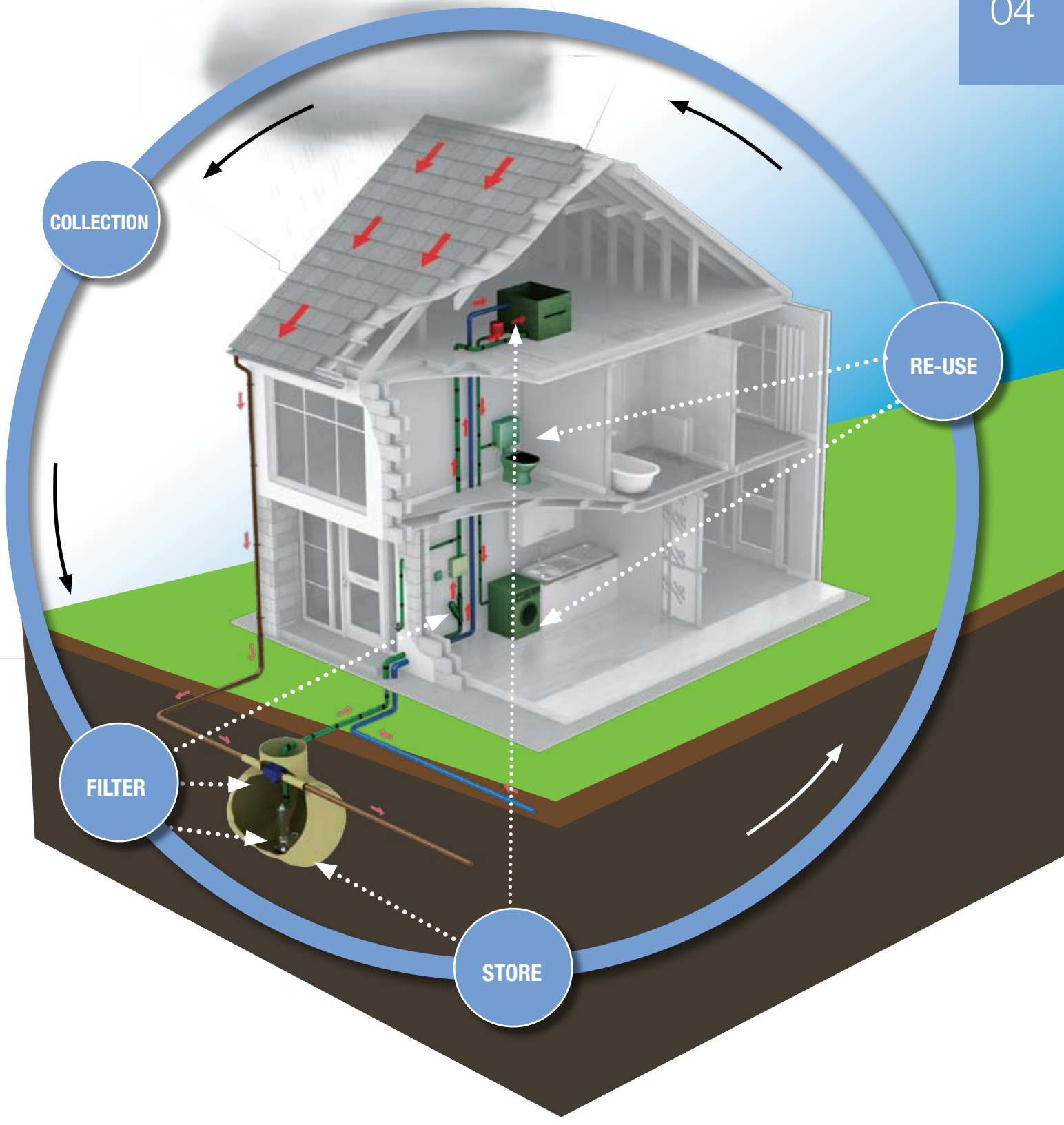
Integrated Rainwater Harvesting Systems

The rainwater that falls onto a building's roof is channelled through standard guttering and pipework. Rather than going into the drain, the water passes through a mesh filter (to remove leaves or debris) before entering a storage tank.

When needed, this water is then automatically pumped back into the building and, (after further filtration), is put to use in non-potable applications, such as toilet flushing, laundry or commercial washdown areas.

Float level switches within the tank alert an electronic control device to divert to mains supply should the storage tank run empty. The system will always draw on harvested water first.

System variations include the use of a header tank and booster sets, but in essence any integrated Rainwater Harvesting system follows the same process in its operation.


COLLECTION
RE-USE
FILTER
STORE

The Situation

05

Whether it falls from the sky or comes out of a tap, our relationship with water has fundamentally changed. There is more pressure than ever before to ensure that every drop of water is accounted for and controlled.

On one hand, water has become a valuable commodity. On the other, climate change has altered the pattern of rainfall – leading to shorter heavier bursts of rain that pose major risks to the current drainage infrastructure.

Environmental issues are becoming increasingly important and there is a growing public awareness of the contribution that good building design can make to reducing pollution and improving the environment.

Water Stress Areas

As this map shows, the South of the country is susceptible to falling to near critical levels of water shortage in relation to population. As these areas become even more densely populated, the demands on the existing water supply infrastructure continues to increase at a rate that is clearly unsustainable.

Reservoir storage is finite regardless of rainfall, thus the most effective solution to this imminent water supply crisis is widespread use of Rainwater Harvesting.

Water Availability

England and Wales: about 1,334 cubic metres (m^3) per person
South-east England: about 921 m^3 per person.
Thames Valley: just 266 m^3 per person.

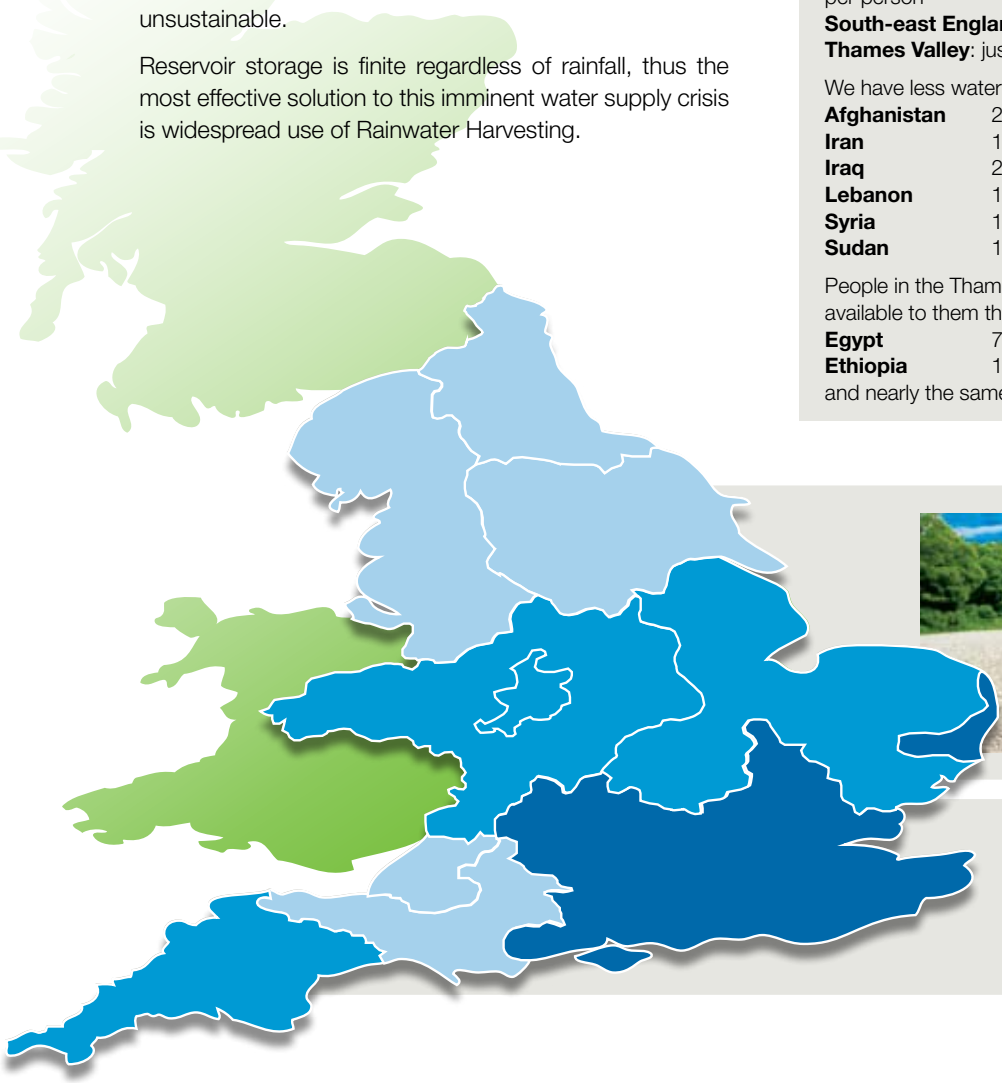
We have less water available per person than:

Afghanistan	2,608 m^3
Iran	1,970 m^3
Iraq	2,917 m^3
Lebanon	1,189 m^3
Syria	1,441 m^3
Sudan	1,879 m^3

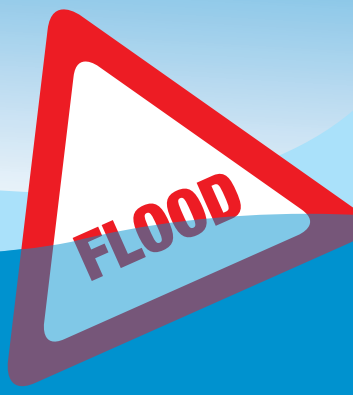
People in the Thames Valley have less water available to them than:

Egypt	794 m^3
Ethiopia	1,519 m^3

and nearly the same as **Israel**: 255 m^3



Managing the Stormwater Challenge



As more river valleys become developed with hard surfaces (paths, roads and roofed areas) the speed at which the rainwater runs off the land increases.

This can have a severe effect on a watercourse where flash floods can occur downstream where the volume of water entering the system can be extremely high due to a cumulative effect of development upstream.

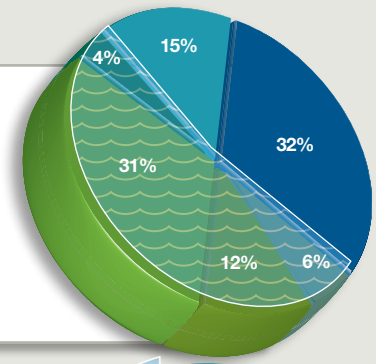
- Global warming has also had an impact on the level of rainfall, which has gradually increased over the past few decades. This has accentuated the problem of stormwater entering waterways.
- Flash floods along with rising sea levels have been responsible for some severe flooding in the UK in recent years. This has led to rising insurance claims and leaving some areas as blackspots where insurance against flood damage cannot be obtained.

Typical Domestic and Commercial Water Use

Residential Water Usages

The Kingspan Environmental Rainwater Harvesting package can satisfy approximately **53%** of the demand in a typical residential house.

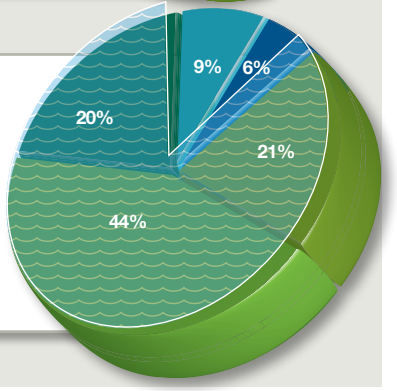
- Dish Washer
- WC Flushing
- Washing Machine
- External Use
- Personal Washing and Bathing
- Drinking and Food Preparation
- Applications where RainWater Harvesting can be used



Commercial Water Usages

The Kingspan Environmental Rainwater Harvesting package can satisfy approximately **85%** of the demand in a typical commercial application.

- Urinals
- WC Flushing
- Non-potable Processes
- Potable Processes
- Canteen Sinks
- Applications where RainWater Harvesting can be used



Legislation, Initiatives and the Future

The Code for Sustainable Homes

Definition: Government owned environmental assessment method for certifying and rating new homes in England. It was launched in December 2006.

The CSH measures the sustainability of a new home against categories of sustainable design, rating the 'whole home' as a complete package rather than on a single characteristic.

The CSH uses a one to six star rating system to communicate the overall sustainability performance of a new home. The CSH sets minimum standards for energy and water use, set at incremental levels.

From 1st May 2008 it is mandatory for a Code sustainability certificate or a nil rated Certificate (where an assessment has not taken place) to be included in the Home Information Pack as information to prospective purchasers of properties in England.

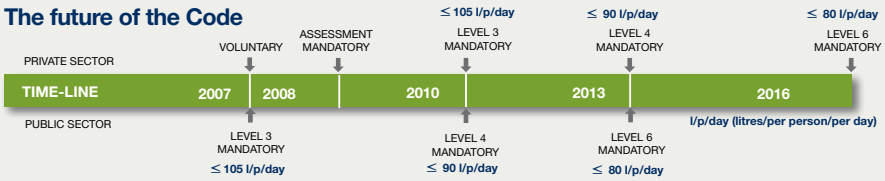
Implications – the countdown to 2016

The Government has detailed a timeline for the adoption of the CSH which concludes with net-zero carbon Level 6 homes by 2016.

The Government's ambition for the Code is that it becomes the single national standard for the design and construction of sustainable homes, and that it drives improvements in home building practice.

Currently the average water use is 150 litres per person per day. To achieve ratings at the higher end of the Code the developer will have to install more water-friendly fittings and appliances to dramatically reduce this water consumption figure.

To reach Code Level 6 (80 litres per day) a form of rainwater harvesting will have to be adopted.



Comment

New homes need to adopt water-efficient devices such as limited depth baths or shallow cisterns. These devices invariably compromise user comfort for the sake of water efficiency. An integrated rainwater harvesting system reduces the need for compromises and reliance on such water-efficient devices.

The UK Government has stated its commitment to tackling both the causes and consequences of climate change. To this end it has started to introduce a clear, credible, long-term framework for the UK to achieve its goals of reducing carbon dioxide emissions and ensure steps are taken towards adapting to the impacts of climate change.

Sustainable Drainage Systems (SUDS)

As more river valleys become developed with hard surfaces (paths, roads and roofed areas) the volume of rainwater that runs off the land increases.

This can have a severe effect in a watercourse where flash floods can occur downstream where the volume of water entering the system can be extremely high due to a cumulative effect of development upstream.

To address this problem, the drainage systems of towns, cities and developments have been surveyed and a policy of Sustainable Drainage Systems (SUDS) has been developed to counteract the problems being encountered.

- SUDS addresses issues of the quantity and quality of the water run-off from sites.

Attenuation systems (tanks and rainwater harvesting systems) and separators (to remove oil contaminants from discharges) are required.

Comment

Rainwater Harvesting can form such a key integral part of a well designed sustainable drainage scheme, it is often regarded as the first SUDS solution to be investigated.

BREEAM

Definition: Building **R**esearch **E**stablishment **E**nvironmental **A**ssessment **M**ethod. A suite of environmental assessment rating tools designed, operated and owned by BRE, first launched in 1990.

BREEAM is the world's longest established and most widely used environmental assessment method for buildings. It sets the standards for best practice in sustainable development and demonstrates a level of achievement.

Predominantly a design-stage assessment, BREEAM assesses buildings against a set criteria and provides an overall score which will fall within a band providing either a; PASS, GOOD, VERY GOOD, EXCELLENT or OUTSTANDING rating.

BREEAM is applied across the building spectrum through various packaged forms, created to suit individual types of building – for example common types of buildings can be measured under packages including BREEAM Education, BREEAM Prisons, BREEAM Offices, BREEAM Multi-residential and others.

The original BREEAM Eco-homes was created to tackle domestic homes. In April 2007 the Code for Sustainable Homes replaced Ecohomes for the assessment of new housing in England. EcoHomes 2006 will continue to be used for refurbished housing in England and for all housing in Scotland and Wales.

Comment

Rainwater Harvesting is recognised across the various BREEAM building packages and scores high-creditation under the Water Efficiency sector.

It is also apparent that such frameworks are top of the agenda for the Government in Ireland.

Building sustainable homes requires all sorts of environmental impacts to be minimised in addition to carbon dioxide emissions, such as water use, waste generated, and materials for building.

Building Regulations Part H

Definition: Within the Building Regulations 2002, part H3 sets out guidance and requirements for rainwater drainage.

Building regulations are specific to particular building procedures and components. Part H3 has increased the responsibility of developers and contractors to ensure that buildings are designed with demonstrable methods of sustainable drainage.

Rainwater carried from the roof of the building has to be managed while paved areas around the building should be constructed so that they are suitably drained. Piping the flow into the mains is no longer the immediate solution.

Provision for managed disposal follows a hierarchy of discharge options:

1st **An adequate soak-away or some other adequate infiltration system** (e.g swales, filter drains, infiltration basins etc). Not always a practicable option, requiring a designated and secure land area.

2nd **A watercourse** - This is dependent on consent granted, e.g the Environment Agency or applicable authority.

3rd **A sewer** - Consent is only given if capacity is deemed available. If there is not enough capacity a separate system should be put in place - an often prohibitive cost.

Comment

The Building Regulations place firm emphasis on the requirements of the developer/contractor to deal with the rainwater drainage on site. The use of a soak-away (or some other adequate infiltration system) is the primary solution, but if this can be proved to be not possible, the rainwater must be discharged into a watercourse.

Only in the final instance could a site discharge into public sewer.

A Rainwater Harvesting system provides developers & contractors with an effective infiltration system as a means of reducing the impact of the rainwater discharge on site. In so doing, many of the site drainage requirements of building regulations can be satisfied, and thus ease the process of gaining planning permission.

Understanding your system - factors to consider

Whatever the design of covered structure or building, a Rainwater Harvesting system can be designed and installed to capture the rain that falls upon it.

As a starting point, it is worth considering the fundamentals that govern the design and thinking behind each individual installation.

There are Five basic factors to consider:

FACTOR 1

Water-use Application

Harvested rainwater can be used to replace mains water in nearly all non-potable applications.

The most popular role for rainwater is to serve a building's facilities such as toilet flushing, washing, or garden irrigation – each requiring a continual and sizeable consumption of water.

Commercial applications also include these uses, but can be more varied. Past installations have seen rainwater put to use in a diverse range of functions including vehicle washdown, heating and cooling applications, materials manufacturing, farming and livestock and scientific applications.

FACTOR 2

New Build or Retrofit?

Putting the rainwater storage tank into the ground is the biggest task on any harvesting system's installation agenda. Logically, the prime time to install the tank is at the ground-working stage of the project's construction schedule.

This poses little problem for new-builds as the foundations and drainage will need to be dug and excavation plant will be on site. However, for retrofit installations, careful thought should be paid to both physical restrictions (e.g access to proposed tank location), plus any preparation work that may be required after the install.

See page 15 for more details of tank location options.

FACTOR 3

Roofing Area and Drainage

A building's roof area is its rainwater catch net. The larger the roof, the larger the volume of water that can be collected.

It is very much down to the application that decides just how much rain (and thus diverted roof area) may be required, but there are also many other advantages in using the system as an intrinsic part of the building's overall sustainable drainage (SUDS) scheme.

FACTOR 4

Scale of Use

On larger building schemes it may be more practical to adopt a multiple-tank layout to cater for the expanse of roof space. This places localised reserves of water exactly where needed, rather than one large tank requiring a number of lengthy supply pipes.

Alternatively, a single tank can feed many outlets – an arrangement common to domestic house developments where each dwelling draws off one collective tank.

FACTOR 5

Available Internal Tank Space

Most rainwater systems supply water direct from the underground rainwater tank, but it may be desirable to have an elevated header tank (usually located in a loft area or roof cavity) to store filtered water after the main tank.

This has an advantage that in the event of a power cut or if electricity is being rationalised, the building continues to receive a supply of harvested water.

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