Environmental

# KingspanWater

## Code for Sustainable Homes: Guide to SUR 1

The application of rainwater harvesting to meet the requirements of SUR 1

**NOVEMBER 2010**






*Sustainable, Reliable, Affordable*

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## Contents



KingspanWater

## Code for Sustainable Homes

The Code for Sustainable Homes contains 2 clauses which refer to water management.

## SUR 1

| Category 4 : Surface Water Run-off | | | |
|---|---|---|---|
| **Issued** | **Description** | **Number of Credit Available** | **Mandatory Elements** |
| SUR 1 | Management of surface water run-off from developments. | 2 | Yes |

**Source page 124 Code for Sustainable Homes November 2010 version 3**

**Aim**: To design housing developments which avoid, reduce and delay the discharge of rainfall to public sewers and water courses. This will reduce the risk of localised flooding, pollution and other environmental damage.

## WAT 1 and WAT 2

| Category 2 : Water Conservation | | | |
|---|---|---|---|
| **Issued** | **Description** | **Number of Credit Available** | **Mandatory Elements** |
| WAT 1 | Indoor water use | 5 | Yes |
| WAT 2 | External water use | 1 | No |

**Aim**: To reduce the consumption of potable water in the home from all sources, (including borehole well water), through the use of water efficiency fittings, appliances and water recycling systems.





## SUR 1 : Explained

Under SUR1, architects and developers are required 'to design housing developments in accordance with category 4: Surface water run-off SUR 1 credentials as described on page 1'. This is applicable for all levels of the code.

This aspect of the Code has been designed to align with planning policy statement PPS25: 'Development and Flood Risk' and with the CIRIA 'Interim Code of Practice for Sustainable Drainage Systems (SUDS)'.

In effect, if a development is likely to increase surface water run-off, then architects,designers and developers need to consider measures to prevent this scenario.

**Do**

**Talk to KingspanWater at the early stages of site planning to ensure best solution design.**

**Don't Ignore**

**SUR 1 for all levels of the code.**

## SUR 1 : Requirements

Under the current SUR1 requirements the additional run-off generated by the development has to be mitigated. This is dealt with under two separate assessment criteria:

1. **Peak rate of water run-off**
   To reduce the instantaneous run-off rate to the pre-development run-off rate. See appendix for illustration - Diagram 1.
2. **Volume of water run-off**
   To reduce the volume of run-off from the site to the pre-development volume discharged off the site. See appendix for illustration - Diagram 2.

**Calculation criteria**
The design criteria which is to be used is for a 1-100 year event with consideration for climate change (see pps25). To determine the volume generated by this, a duration period of 6 hours must be used.

**Planning Policy Statement PPS25 downloadable:**

www.communities.gov.uk/publications/planningandbuilding/pps25floodrisk

**More Information on CIRIA:**

www.ciria.org.uk/suds

**The KingspanWater Guide to BS 8515:2009 Rainwater Harvesting, is downloadable from: www.kingspanwater.com**




## SUR 1 : Solutions

### Peak Rate of Water Run-off

The rate of run-off is addressed by the installation of an attenuation system which absorbs the peak run-off rate and meters out the stormflow through a flow regulator device. This restricts the outflow from the site to the pre-development run-off rate. The factors which affect the sizing of this system are as follows:

1. The pre-development site status:- i.e. green field, brown field etc. (to determine the difference between pre-development and post-development run-off rates.)
2. The rainfall data for the region:- this may vary considerably across the UK from 800-1200mm approx.
3. The quantity of impermeable surfaces and roofed areas. (This will determine the post-development run-off rate).
4. The level of the storm sewer network to connect to. (This will determine the depth of fall that can be accommodated and the footprint size of the attenuation tanks when the volume is sized).

## SUR 1 : Solutions

### Volume of Water Run-off

**Infiltration**
One approach to address the excess storm flow from the development is to infiltrate the water into the ground. This will require attenuation / percolation areas to be installed on the site.

These will be sized to cater for the outflow and the permeable factor of the ground.

## SUR 1 : Rainwater Harvesting Option

Where the ground is impermeable or a high water table exists, then infiltration may not be possible. In this case other SUDS techniques should be employed. To provide a commercially viable solution which minimises the land usage while providing an efficient volume reduction, rainwater harvesting provides the optimum way in which to address this design requirement.

The rainwater harvesting system design should be sized to BS 8515:2009.

The rainwater harvesting system will take out a specific volume of water from the storm sewer network and discharge through the foul sewer network - thus reducing the volume of outflow through the storm sewer.

If this discharge rate is still likely to be greater than before the development (even when infiltration or rainwater harvesting measures are adopted) then an attenuation system for the site may have to be considered so that any water should be reduced to:

The limiting discharge is the pre-development flow rate equivalent to the one year peak flow rate, mean annual flood flow rate (Q bar) or 2 litres/second/ha whichever is the highest flow rate. Where the limiting discharge flow rate would require a flow rate of less than 5 litres/second at the discharge point, a flow rate of up to 5 litres/second may be required to reduce the risk of blockage.

Rainwater tanks are often not designed to have an additional storage volume therefore separate attenuation system for the site may have to accommodate the full attenuation volume requirement.

**KingspanWater have the expertise to advise on all types of applications.**







# WAT 1 : Water Conservation

Reduction in consumption to achieve conservation of water stocks has now become a priority for designers, architects, builders and developers in order to achieve an excellence rating against criteria set by BREEAM and The Code for Sustainable Homes.

In the public sector, Level 3 of the Code became mandatory in 2007*. It will become mandatory for the private sector in 2010*.

( *For those projects being built to code standards)

The higher levels are being more gradually phased in over the next few years: all new code compliant homes, must be Level 6 by 2016.

The significance for rainwater harvesting is that achieving this kind of rating requires a reduction in mains water consumption in a property from an average of 160 litres per person per day, to as little as 80 litres at Code level 5 and 6.

**(See table 1)**

| Criteria | | |
|---|---|---|
| **Water consumption ( Litres / person / day )** | **Credits** | **Mandatory Levels** |
| ≤ 120 l/p/day | 1 | Levels 1 and 2 |
| ≤ 110 l/p/day | 2 | |
| ≤ 105 l/p/day | 3 | Levels 3 and 4 |
| ≤ 90 l/p/day | 4 | |
| ≤ 80 l/p/day | 5 | Levels 5 and 6 |

**Table 1 - Water conservation targets (Extract from the Code for Sustainable Homes)**

# KingspanWater Solutions

KingspanWater offers a full range of domestic and commercial rainwater harvesting systems, attenuation solutions and bespoke designed solutions to satisfy the requirement of SUR 1 and WAT 1 specifications.

KingspanWater have a team of technical advisers on hand to guide you through your options from the design to installation.

**Call us today on 0800 0234 325**



# Appendix

**Table 2 - Hydraulic Control Criteria - (Extract from the Code for Sustainable Homes)**
The SuDS Management Train should be used as a guide to achieve the following:

| Criteria | Credits | Mandatory Levels |
|---|---|---|
| **1) Peak Rate of Run-off**<br>If there is no increase in the man-made impermeable area as a result of the new development, then the peak rate of run-off criterion does not apply.<br>Where there is an increase in the impermeable area, ensure that the peak rate of run-off over the development lifetime, allowing for climate change, will be no greater for the developed site than it was for the *pre-development* site. This should comply at the 1 year[1] and 100 year[2] return period events (see Calculation Procedures).<br>Where the pre-development peak rate of run-off for the site would result in a requirement for the post-development flow rate (referred to as the *limiting discharge*) to be less than 5 l/s at a discharge point, a flow rate of up to 5 l/s may be used where required to reduce the risk of blockage.<br>**Note:** If as a result of the new development there is an increase in the volume of run-off discharged for the 100 year 6 hour event and section 2A cannot be met (see section 2 below), these run-off rates do not apply. | **None** | **All Levels** |
| **2) Volume of Run-off**<br>If there is no increase in the man-made impermeable area as a result of the new development, then the volume of run-off criteria does not apply.<br>If the developed site would otherwise discharge, over the development lifetime allowing for climate change, a greater volume of rainwater run-off than the pre-development site for the 100 year 6 hour event, (see Calculation Procedures) then Criterion A applies. If A cannot be satisfied then B applies.<br>**A:** Ensure that the post development volume of run-off, allowing for climate change over the development lifetime, is no greater than it would of been before the development.<br>The additional predicted volume of run-off for the 100 year 6 hour event must be prevented from leaving the site by using infiltration or other *SuDs techniques* (see Definitions).<br>**OR**<br>**B:** If A cannot be satisfied (full justification must be provided) then reduce the post development peak rate of run-off to the limiting discharge.<br>The limiting discharge is the pre-development flow rate equivalent to the 1-year peak flow rate, mean annual flood flow rate (Qbar) or 2 l/s/ha, whichever is the highest flow rate.<br>For the 1-year peak flow rate the 1 year return period event criterion in section 1 above, applies. For all other events up to the 100 year return period event, the peak rate of run-off for the developed site must not exceed the limiting discharge.<br>Where the limiting discharge flow rate would require a flow rate of less than 51/s at a discharge point, a flow rate of up to 5 l/s may be used where required to reduce the risk of blockage.<br>**Note:** Criterion B generally results in more storage than compliance with criterion A. | | |
| **3) Designing for local drainage system failure**<br>Demonstrate that the flooding of property would not occur in the event of local drainage system failure (caused either by extreme rainfall or a lack of maintenance).<br>**Note:** Where the run-off is being discharged into an existing drainage system, the responsible body may stipulate a more stringent set of hydraulic flow rate criterion which will therefore take precedence. | | |
| **Water Quality criteria**<br>**1.** One credit can be awarded by ensuring there is no discharge from the developed site for rainfall depths up to 5 mm (see Calculation Procedures).<br>**2.** One credit can be awarded by ensuring that:<br>• The run-off from all hard surfaces shall receive an appropriate *level of treatment* in accordance with the SuDS Manual to minimise the risk of pollution.<br>**Note:** The SuDS Manual best practice recommendations should be followed where there is a risk to groundwater from infiltration (for example contaminated land, developments with high risk of pollution incidents). | **1**<br>**1** | |
| **Default Cases:**<br>The mandatory criteria can be deemed to be met by default if the site discharges rainwater directly to a tidal estuary on the sea. Credits cannot be awarded unless the relevant water criteria are met. | | |

**See overleaf for diagram explanation.**





# SUR 1 : Peak Rate of Run-off

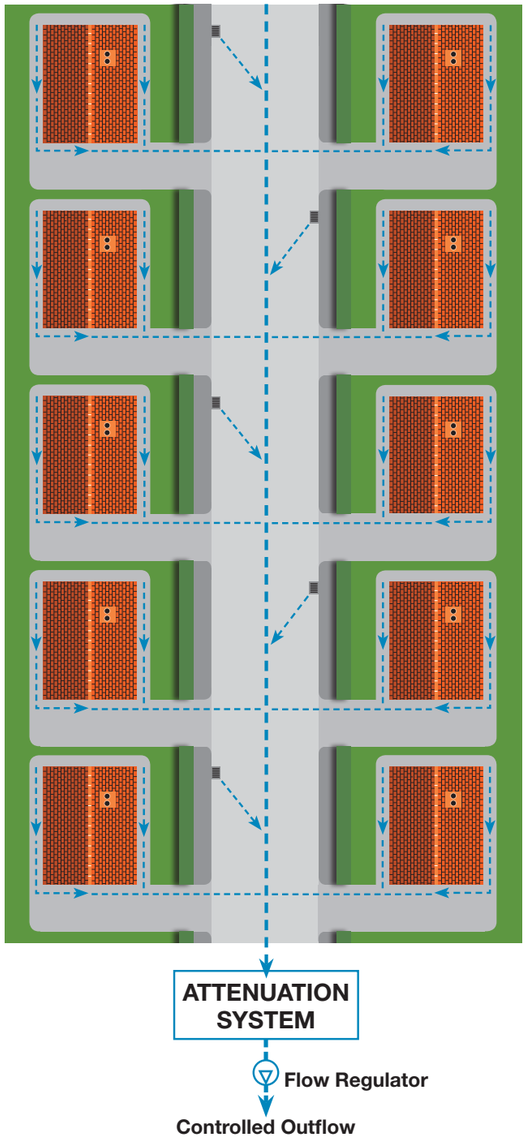
**Category 4 :** Management of surface water run-off from developments

- Ensure the peak rate of run-off is no greater for the developed site than it was for the pre-developed site.

**Design criteria:** 1 - 100 year event with allowance for climate change. (+30%).

- Excess flow to be attenuated and metered off site through a flow regulator to the pre-development run-off rate.
- Shallow falls through system may require shallow attenuation systems with large footprint.

**Diagram 1 - Peak Rate of Run-off illustration**




Key to illustrations

- House roof
- Patio/Driveway
- Garden
- Footpath
- Road
- Drain
- Flow of rainwater
- Rainwater harvesting tank



# SUR 1 : Volume of Run-off

**Category 4 :** Management of surface water run-off from developments

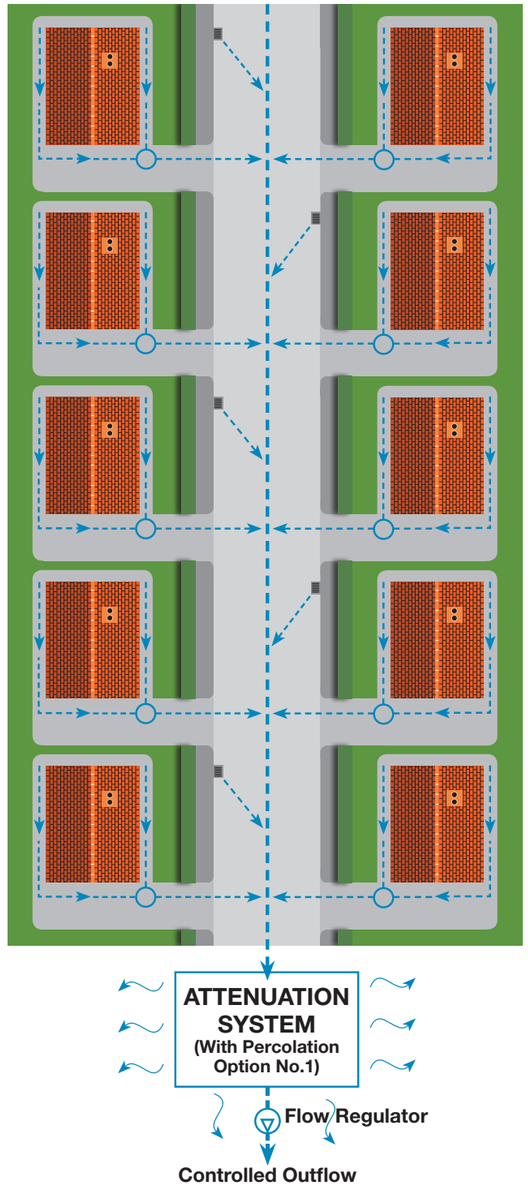
- Ensure that the additional predicted volume of rainwater discharge caused by the new development is entirely reduced using:

**1.** Infiltration **and/or**

**2.** Other SUDS techniques.

- **Design criteria:** 1 - 100 year event of 6 hour duration with allowance for climate change ( +30% ).
- Attenuation system with percolation - possible large footprint based on percolation value of ground.
- For option 2, the most commercially viable solution is rainwater harvesting as a SUDS technique.

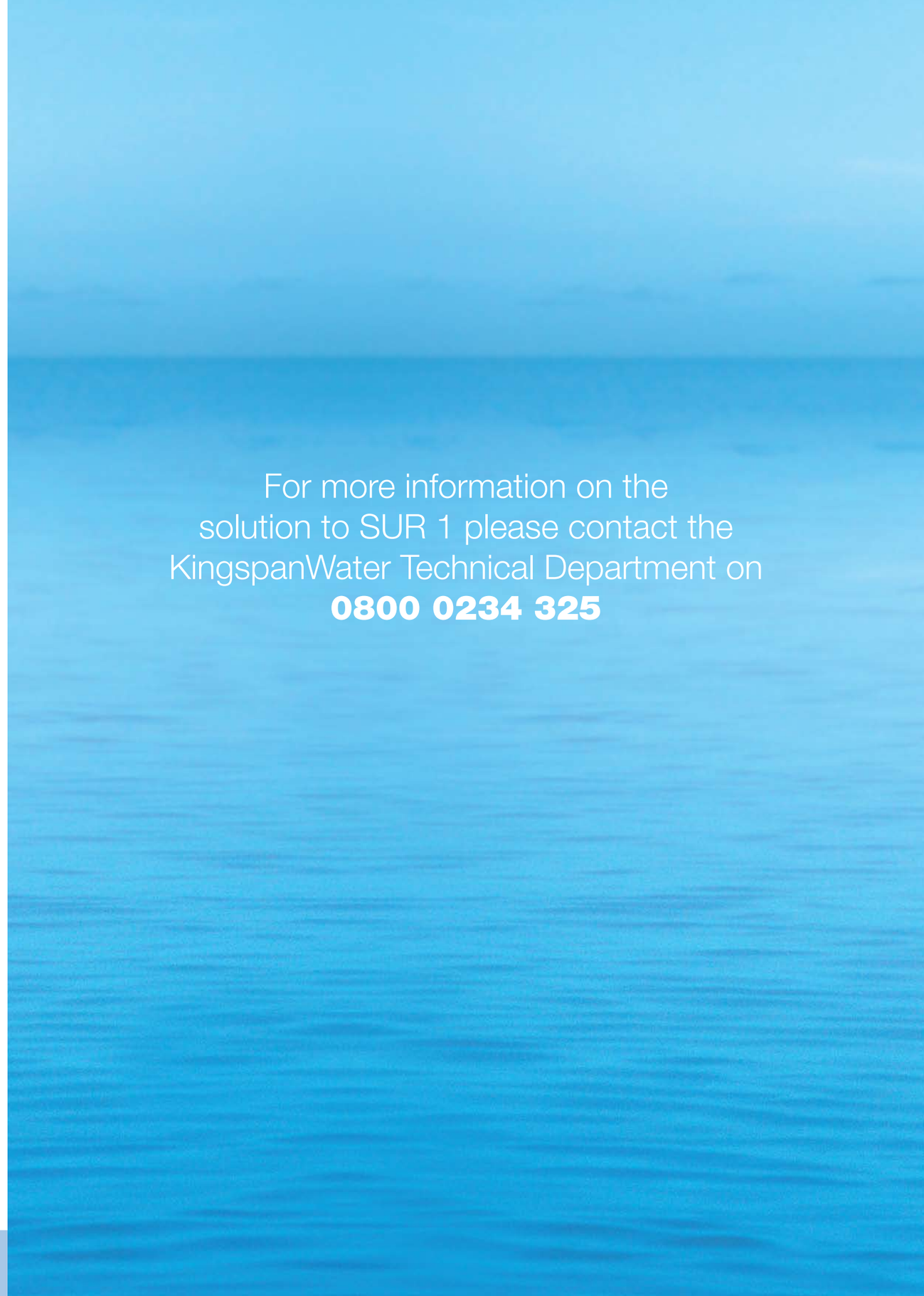
**Diagram 2 - Volume of Run-off illustration**








## Notes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