

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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> | 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 01296 633 000

> Appendix

Table 2 - Surface Water Run-Off - (Extract from the Code for Sustainable Homes).

Criteria	Credits	Mandatory Levels
<p>1) Peak Rate of Run-off</p> <p>Ensure that the peak rate of run-off into watercourses (see definition) is no greater for the developed site than it was for the pre-development site. This should comply with the Interim Code of Practice for Sustainable Drainage systems (SUDS) (CIRIA, 2004) or for at least the 1 year and 100 year return period events.</p> <p>Calculation Criteria:</p> <ul style="list-style-type: none"> For sites less than 200ha, the calculation of Greenfield run-off rates should be in accordance with Flood estimation for small catchments (Marshall and Bayliss, 1994) and any subsequent updates. For sites of 200h and more, the calculation of Greenfield run-off rates should be in accordance with the Flood Estimation Handbook (Centre for Ecology and Hydrology, 1999) and any subsequent updates. An allowance for climate change should be made in accordance with current best practice (PPS25, 2006). 	None	All Levels
<p>2) Peak Rate of Run-off</p> <p>Ensure that the predicted volume of rainwater discharge caused by the new development, for a 1 in 100 year event of 6 hour duration including an allowance for climate change (PPS25, 2006), is entirely reduced using:</p> <ul style="list-style-type: none"> Infiltration <p>AND/OR</p> <ul style="list-style-type: none"> Is made available for use in the dwelling as a replacement for potable water use in non-potable applications such as WC flushing or washing machine operation. <p>Any residential additional rainwater volume cannot be prevented from being discharged (reasons must be provided with supporting evidence), for all events up to the 100 year return period, the peak discharge rate from the site should be reduced to (in order of priority):</p> <p>A: the pre-development site's estimated mean annual flood flow rate (Qbar); or</p> <p>B: 2l/s/ha; or</p> <p>C: a minimum flow rate (litres per second), based on good practice guidelines to prevent easy blockage, by ensuring the outlet throttle is not too small.</p> <p>Unless rainwater is being discharged to a public sewer or adopted surface water sewer, and there is a specific minimum requirement defined by the Sewerage Undertaker.</p> <p>Note; reasons for discounting any of the options above must be provided with supporting evidence.</p>		
<p>2 credits are available for using SUDS to improve water quality of the rainwater discharged or for protecting the quality of the receiving waters by:</p> <ol style="list-style-type: none"> Ensuring no discharge to the watercourse for rainfall depths up to 5mm. Follow guidance in the Interim Code of Practice for Sustainable Drainage systems (SUDS), (CIRIA, 2004). <p>OR</p> <ol style="list-style-type: none"> Establish agreements for the ownership, long term operation and maintenance of all sustainable drainage elements used. 	2	
<p>Default Cases:</p> <p>Credits can be awarded by default if the site discharges rainwater directly to a tidal estuary or the sea, because compliance with discharge flow rate requirements will not be required.</p>		

See overleaf for diagram explanation.



➤ SUR 1 : Peak Rate of Run-off

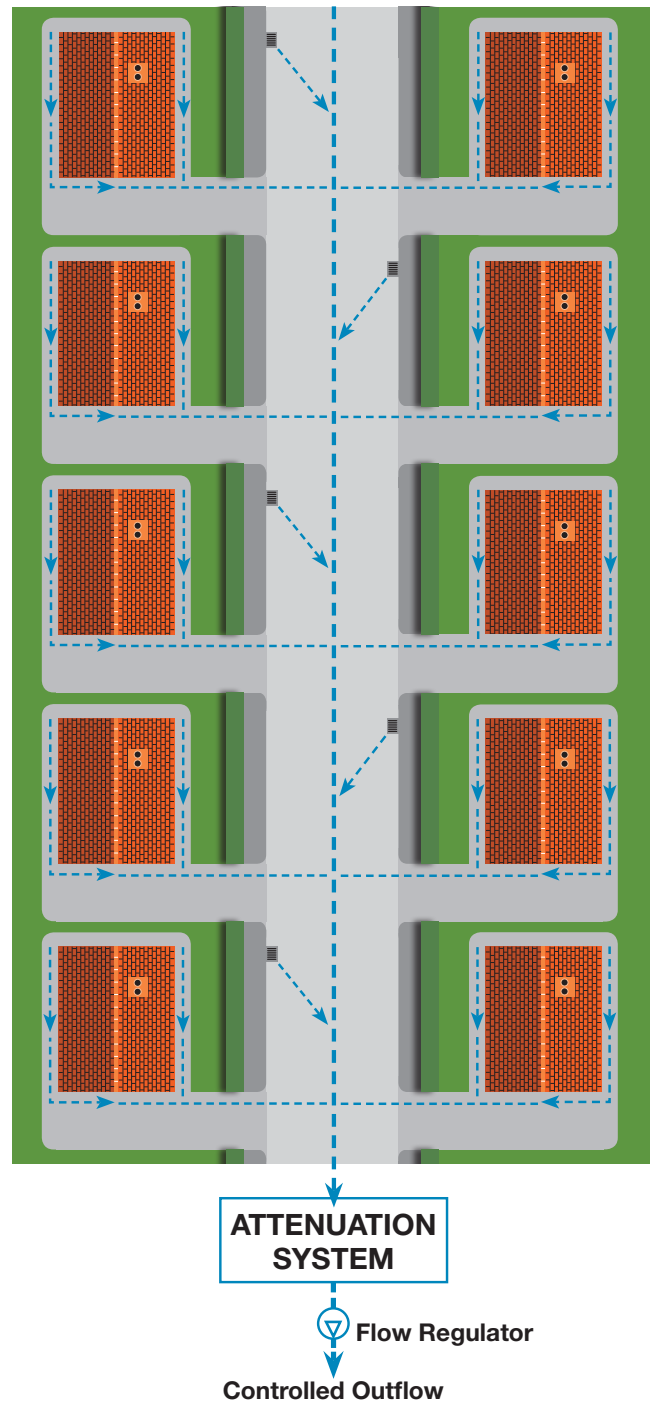
Category 4 : Management of surface water run-off from developments

- 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

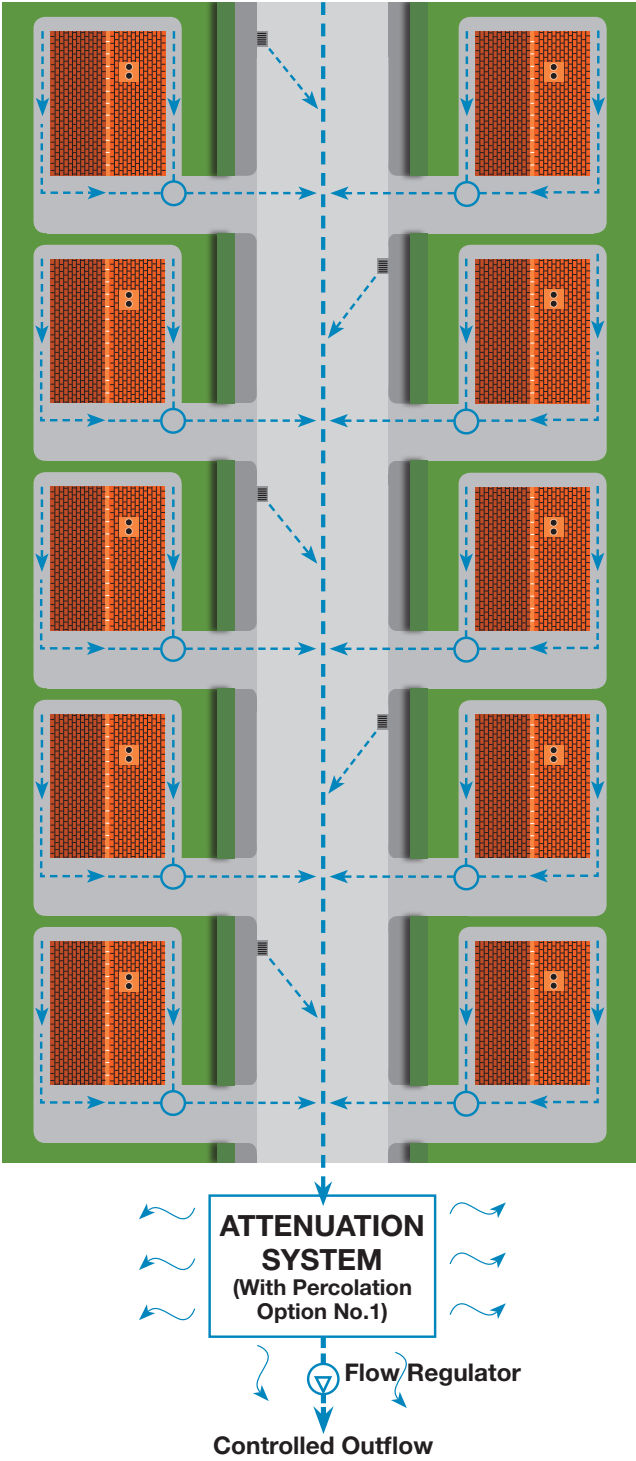
- Ensure that the additional predicted volume of rainwater discharge caused by the new development is entirely reduced using:

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



For more information on the
solution to SUR 1 please contact the
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