# Category 4: Surface Water Run-off

| Issue ID | Description | No. of credits available | Mandatory Elements |
|---|---|---|---|
| Sur 1 | Management of Surface Water Run-off from developments | 2 | Yes |

## Aim

To design housing developments which avoid, reduce and delay the discharge of rainfall to public sewers and watercourses. This will protect watercourses and reduce the risk of localised flooding, pollution and other environmental damage.

## Assessment Criteria

Mandatory Elements must be achieved. Up to 2 credits are available for further improving management of rainfall runoff.

| Criteria | Credits | Mandatory Elements |
|---|---|---|
| **1) Peak Rate of Runoff**<br>Ensure that the peak rate of runoff 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.<br>Calculation Criteria:<br>• For sites of **less than 200ha**, the calculation of Greenfield runoff rates should be in accordance with Flood estimation for small catchments (Marshall and Bayliss, 1994) and any subsequent updates.<br>• For sites of **200ha and more**, the calculation of Greenfield runoff rates should be in accordance with the Flood Estimation Handbook (Centre for Ecology and Hydrology, 1999) and any subsequent updates.<br>• An **allowance for climate change** should be made in accordance with current best practice (PPS25, 2006).<br>**2) Volume of Runoff**<br>Ensure that the **additional** 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:<br>• infiltration | None | All Levels |

| | | |
|---|---|---|
| AND / OR<br>• 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.<br>Any residual additional rainwater volume that 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):<br>**A**: the pre-development site's estimated mean annual flood flow rate (Qbar); or<br>**B**: 2l/s/ha; or<br>**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;<br>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.<br>Note; reasons for discounting any of the options above must be provided with supporting evidence. | | |
| 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:<br>1. 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).<br>**OR**<br>2. Establish agreements for the ownership, long term operation and maintenance of all sustainable drainage elements used | 2 | |
| **Default Cases:**<br>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. | | |

# Information required to demonstrate compliance

| **Schedule of Evidence Required**<br>**To be read in conjunction with the *Definitions* and *Calculations* Sections** | |
|---|---|
| **Design Stage** | **Post Construction Stage** |
| Mandatory Elements<br>Confirmation of the appointment of an appropriately qualified engineer or consultant to carry out the calculations and provide design criteria for all relevant elements. | Mandatory Elements<br>Confirmation that the solutions designed have been implemented;<br>Or provision of As Built drawings, specifications, designs and calculations. |

| | |
|---|---|
| Copy of the consultant's or engineer's report and Flood Risk Assessment (see definition), containing all information necessary to meet the mandatory requirements.<br>Copies of any drawings and specification text necessary to support the claims made. | Significant time may have passed since the flood risk assessment was carried out, so where necessary, confirm that the basis of the Flood Risk Assessment has not changed.<br>*For information: Where SUDS have been implemented, the location and brief explanation of their purpose should be included in the Home User Guide (in Code Category 8: Man 1) where supplied.* |
| Where credits are sought:<br>Copy of the consultant's report detailing the design specifications, calculations and drawings to support the additional credits.<br>Where detailed designs are not available at this stage, the specifications need to clearly state the essential design criteria.<br>Proposed operation and maintenance plans. (Agreements do not need to be complete at this stage). | Where credits are sought:<br>Confirmation from the consultant that the requirements of this credit have been achieved.<br>Where different from the Design stage: copies of as-built designs and calculations and drawings to support the credits.<br>Manufacturers' data covering details of any devices used.<br>Where this credit is sought, copies of SUDS agreements established for on going operation and maintenance. |

## Definitions

**Annual flood probability**
The estimated probability of a flood of given magnitude occurring or being exceeded in any year. Expressed as a chance of 1-in-100 or 1 per cent.

**Annual flow rate probability**
The estimated probability of a flow rate of a given magnitude occurring or; being exceeded in any year. Expressed as, for example a chance of 1-in-100, or 1 per cent.

**Appropriately qualified consultant or engineer**
A hydrological consultant or engineer.

The appropriate level of qualification required will depend on the complexity, size and density of build on the site

**Catchment**
The area contributing surface water flow to a point on a drainage or water course. It can be divided into sub-catchments.

| | |
|---|---|
| **Flood probability** | The estimated probability of a flood of given magnitude occurring or being exceeded in any specified time period. For example, the 100-year flood has a 1% chance of occurring in any given year. |
| **Flood risk** | An expression of the combination of the flood probability and the magnitude of the potential consequences of the flood. |
| **Flood risk Assessment (FRA)** | A study to assess the risk of a site flooding, and to assess the impact that any changes or development on the site will have on flood risk on the site and elsewhere. A flood risk assessment should be prepared according to good practice guidance as outlined in *Development and Flood Risk: A practice guide companion to PPS25.* Available from www.communities.gov.uk. For developments of less than 1ha (10 000m²) the level of detail required in an acceptable FRA (for Sur 1) will depend on the size and density of build. This will range from a brief report for small, low density developments, to a more detailed assessment for a high density development 2000–10 000m² in size. For example: For very small developments (2000m² and less), an acceptable FRA could be a brief report done by the contractor's engineer, including information obtained from; the environment agency, water company/sewerage undertaker, other relevant statutory authorities, site investigation and local knowledge. |
| **Flood risk management Hierarchy** | The hierarchy of flood risk management measures and the role of the planning process in reducing flood risk. (see Practice guide Companion to PPS25). |
| **Flood storage** | The temporary storage of excess runoff or river flow in ponds, basins, reservoirs or on the flood plain during a flood. |
| **Flood Zones** | These zones relate to flooding from the sea and rivers only and do not take into account flood defences. These are defined in PPS25.<br><br>Zone 1 Low annual probability of flooding<br><br>Zone 2 Medium probability of flooding<br><br>Zone 3a High probability of flooding<br><br>Zone 3b Functional Flood plain (water is stored here in times of flooding) |
| **Greenfield** | A site which has either never been built on, or one which has lain undisturbed for five years or more. |

| | |
|---|---|
| **Greenfield runoff rate** | The rate of runoff that would occur from the site in its undeveloped (and therefore undisturbed) state. |
| **Groundwater flooding** | Flooding caused by groundwater escaping from the ground when the water table rises to or above ground level. |
| **ICoP (SUDS)** | The Interim Code of Practice for Sustainable Drainage Systems (SUDS) aims to facilitate the implementation of sustainable drainage in developments in England and Wales by providing model maintenance agreements and advice on their use. It provides a set of agreements between those public organisations with statutory or regulatory responsibilities relating to SUDS. Available to download from www.ciria.org.uk/suds/icop.htm |
| **Impervious surfaces** | Often referred to as impermeable or hard surfaces, are surfaces which do not allow water to pass through. |
| **Infiltration** | The passage of water into a permeable surface, such as soil, permeable paving, soakaways and so on. |
| **NaFRA** | National flood risk assessment – This was completed in 2005 and used ground levels, predicted flood levels, information on flood defences, and local knowledge. The likelihood of flooding is described in one of three categories, low, moderate or significant, as used by the insurance industry. When clicking on the EA flood map (more information) these categories are used and explained further |
| **Peak runoff rate** | Referred to as Qp [$m^3$/sec]<br><br>is the highest rate of flow from a defined catchment area assuming that rainfall is uniformly distributed over the drainage area, considering the entire drainage area as a single unit and estimation of flow at the most downstream point only |
| **Pervious surfaces** | Surfaces which allow water to pass through and include some surfaces which are thought of as 'hard' such as pervious asphalt on roads, block paving (the gaps between the blocks are pervious). |
| **Percentage runoff** | The proportion of rainfall that runs off a surface. |
| **Pre-development** | The state of a site immediately before the development under assessment i.e. brownfield or greenfield. |

| | |
|---|---|
| **Probability of flooding – Low – Zone 1** | This does not take into account other sources of flooding or defences. These are defined in PPS25.<br><br>Low annual probability of flooding is an area where the chance of both river and sea flooding each year is <0.1% (1 in 1000) or less. |
| **Probability of flooding – Medium – Zone 2** | An area where the chance of river flooding in any year is 1% (1 in 100) or less but greater than 0.1% (1 in 1000) and between a 1 in 200 and 1 in 1000 chance of sea flooding (0.5% – 0.1%). |
| **Probability of flooding – High – Zone 3a** | An area where the chance of river flooding in any year is > 1% (1 in 100) and a 1 in 200 or greater chance of flooding from the sea (>0.5%). |
| **Qbar** | An estimation of the mean annual flood flow rate from a catchment. (see Report IH124 Flood Estimations for small catchments) |
| **Rainfall intensity** | Depth of rain falling in unit or specified time, i.e. volume of rain falling in unit or specified time per unit area. |
| **Rainwater discharge** | Rainwater discharge is the rain water which flows from the development site to watercourses and sewers. It is also referred to as runoff. |
| **Relevant Statutory Body** | This will, in most cases, be the Environment Agency. |
| **Runoff** | This is usually rainwater, but can also be groundwater or overspill from sewers and other sources. |
| **Runoff rate** | The rate of discharge of water from a surface. |
| **Section 102 or 104** | A section within the Water Industry Act 1991 permitting the adoption of a sewer, lateral drain or sewage disposal works by a sewerage undertaker. Sometimes referred to as S102 or S104. |
| **Section 106 TCPA 1990** | A section within the Town and Country Planning Act 1990 that allows a planning obligation to a local planning authority to be legally binding. |
| **Section 106 WIA 1991** | A key section of the Water Industry Act 1991, relating to the right of connection to a public sewer. |
| **Sewerage undertaker.** | This is a water company with statutory responsibility for provision of sewerage for disposal of sewage and also surface water from roofs and yards of premises. |

**Sewers for adoption**

A guide agreed between sewerage undertakers and developers (through the House Builders Federation) specifying the standards to which private sewers need to be constructed to facilitate adoption.

**Shoreline management plan (SMP)**

An **SMP** is a high level document that forms an important element of the strategy for flood and coastal erosion risk management.

**Sources of flooding and flood risk**

Fluvial (Rivers):

Tidal:

Groundwater: (most common in low-lying areas underlain by permeable rock (aquifers)

Sewers: combined, foul or surface water sewers

Surface water: sheet runoff from adjacent land (urban or rural)

Infrastructure failure: Canals, reservoirs, Industrial processes, burst water mains, blocked sewers or failed pumping stations

**SSSI**

Site of Special scientific interest

**SUDS**

Sustainable drainage systems or sustainable (urban) drainage systems: a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques (may also be referred to as SUDS).

**SUDS devices**

Include:

- holding ponds
- swales
- reed beds
- permeable paving – in areas where local geological and

hydrological conditions allow this to function, e.g. block paved surface on permeable sub-base over gravel bed to store the water and allow it to seep into the soil. For less permeable soils the gravel layer might be deeper and the water taken to a soakaway although this is not an option in some areas.

- Local or centralised soakaways either as full systems or as 'overflow' or 'holding' systems, in areas where local geological and hydrological conditions allow them to function.

- Run-off from roofs collected as a part of a rainwater harvesting system ~~(see additional guidance on water butts below).~~
- Run-off from hard surfaces directed to a local soakaway or other holding facility such as tanks, ponds, swales etc.
- Green roofs.

**SUDS management train**

The staged management of rainwater as it discharges from a site. The SUDS management train starts with prevention, or good housekeeping measures, for individual premises; and progresses through local source controls to larger downstream site and regional controls. Runoff need not pass through all the stages in the management train. It could flow straight to a site control, but as a general principle it is better to deal with runoff locally, returning the water to the natural drainage system as near to the source as possible. Only if the water cannot be managed on site should it be conveyed elsewhere. This may be due to the water requiring additional treatment before disposal or the quantities of runoff generated being greater than the capacity of the natural drainage system at that point. Excess flows would therefore need to be routed off site. Further details available from www.ciria.org.uk/suds

**SUDS model agreements**

A legal document that can be completed to form the basis of an agreement between two or more parties regarding the maintenance and operation of sustainable water management systems.

ICoP SUDS MA1

Planning obligation – incorporating SUDS provisions

Implementation and maintenance of SUDS either as a planning obligation under Section 106 of the Town and Country Planning Act, 1990 or as a condition attached to planning permission.

ICoP SUDS MA2

Legal framework that defines which body takes over and maintains the SUDS.

ICoP SUDS MA3

Model discharge agreement

A model deed in relation to owners of SUDS facilities granting sewerage undertakers rights in perpetuity to discharge, flood and maintain in default

| | |
|---|---|
| **SUDS Operations manual** | A manual describing the design of a particular device and how it should be operated and maintained over its lifecycle. |
| **Surface Water Runoff** | Water flow over the ground surface to a drainage system. This occurs if the ground is impermeable, is saturated or if the rainfall is particularly intense. |
| **Functional Floodplain – Zone 3b** | This land is where water flows or is stored in times of flood. |
| **Treatment** | Improving the quality of water by physical, chemical and/or biological means. |
| **Watercourses** | A term including rivers, streams, ditches, drains, cuts, culverts, dykes, sluices, sewers and passages through which water flows. |

# Assessment Methodology

### *Design Stage*

- Check that an appropriately qualified consultant or engineer has been appointed
- Check that an appropriate Flood Risk Assessment (FRA) has been carried out (see definition) and that the consultant's or engineer's report contains all information necessary to satisfy the mandatory requirements.
- Where credits are sought: Check that the FRA and consultants reports contain all information needed to comply with either 1. Ensuring there is no discharge to the watercourse for rainfall depths up to 5mm; or 2. Treating rainwater using SUDS to improve its quality before discharge, and establish agreements for the ownership, long term operation and maintenance of all the sustainable drainage elements.
- Where design and build or similar contracts are used, detailed designs may not be available at this stage. Due to the nature of this issue, it is critical in all cases that the design criteria are clearly stated at this stage and that either the specification reflects this or other written confirmation is provided to show intent.
- The assessor is not required to perform any calculations as these will be provided by the design team.

### *Post Construction Stage*

- Check that the design stage solutions have been implemented or that all evidence has been supplied showing the As Built design and construction. The exact evidence required will vary according to the site.
- It is not feasible to list specific evidence requirements for all variations of solutions, so a site specific approach needs to be adopted.

- Check the time elapsed since the FRA was carried out. Where this is significant for example, more than five years, (unless major SWR changes have occurred during this period) or it doesn't include an allowance for climate change, ask the consultant to confirm that the design basis has not changed.
- Check that the agreements for any SUDS elements present include all necessary devices and are completed.

## Calculation Procedures

None

## Common Cases of Non-Compliance

None of the credits can be awarded where the assessed development has proceeded against the recommendation of the Environment Agency on the basis that the flooding implications are too great.

## Special Cases

For derelict sites which have no runoff to sewers or watercourses, provided the site has derelict for five years or less, the pre-development discharge can be calculated for the previous site's use.

If the site has been derelict for over five years, then the undeveloped site must be treated as a greenfield site in order to award credits.

## Background

Around five million people, in two million properties, live in flood risk areas in England and Wales. The Government's Foresight report estimated that currently 80,000 properties also have a very high likelihood of flooding from surface water runoff (10% annual chance), causing on average £270 million of damage each year. Changes in climate, such as more severe storms will increase these risks (Environment Agency website www.environment-agency.gov.uk/yourenv/eff) meaning the associated costs could increase to several billion.

The main intention of this issue is to reduce the overall discharge of rainwater from impervious hard landscaped surfaces and roofs within the development. In housing developments, this can be usually be done by designing Sustainable Drainage Systems (SUDS), which might include specifying rainwater recycling, pervious paving for all hard surfaces in the development, the use of green roofs, soakaways or other systems that help reduce surface water loads.

| Issue ID | Description | No. of credits available | Mandatory Elements |
|---|---|---|---|
| Sur 2 | Flood Risk | 2 | No |

## Aim

To encourage housing development in low flood risk areas, or to take measures to reduce the impact of flooding on houses built in areas with a medium or high risk of flooding.

## Assessment Criteria

Up to 2 credits are awarded where the assessed dwelling is located either in an area of low annual probability of flooding, or where a Flood Risk Assessment (FRA) shows that appropriate measures have been taken to ensure safe access and escape routes and flood resilient and resistant construction.

| Criteria | |
|---|---|
| | Credits |
| **EITHER**<br>2 credits are available for developments situated in Zone 1 – low annual probability of flooding (as defined in PPS25 – 'Planning and Flood Risk') and where the site specific Flood Risk Assessment (FRA) indicates that there is low risk of flooding from all sources. | 2 |
| **OR**<br>1 credit is available for developments situated in Zones 2 and 3a – medium and high annual probability of flooding where the finished ground floor level of all habitable parts of dwellings and access routes to the ground level and the site, are placed at least 600mm above the design flood level of the flood zone.<br>The Flood Risk Assessment (FRA) accompanying the planning application must demonstrate to the satisfaction of the local planning authority and statutory body that the development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed. | 1 |
| **Default Cases**<br>None | |

# Information required to demonstrate compliance

| **Schedule of Evidence Required**<br>**To be read in conjunction with the *Definitions* and *Calculations* Sections** | |
|---|---|
| **Design Stage** | **Post Construction Stage** |
| **For developments situated in Zone 1**<br><br>A Flood Risk Assessment (prepared according to good practice guidance as outlined in Development and Flood Risk: A practice guide companion to PPS25) which shows that there is a low risk of flooding from all sources.<br><br>**For medium (Zone 2) or high (Zone 3) flood risk areas:**<br><br>A Flood Risk Assessment (prepared according to good practice guidance as outlined in Development and Flood Risk: A practice guide companion to PPS25)<br><br>Where applicable<br><br>written confirmation from the Environment Agency of the reduction in flood risk category of the site if under the protection of existing/maintained flood defences*.<br><br>supporting manufacturer's data covering details of any flood protection measures for the dwelling.<br><br>AND EITHER<br><br>Site plans indicating the design flood level, the range of ground levels of the dwellings, car parking areas and site access (lowest to highest), showing that the criteria (finished floor levels of all habitable rooms and access routes being at least 600mm above the design flood level) are met, along with any notes required to explain the function of any areas lying below the design flood level. | **For developments situated in Zone 1**<br><br>For low flood risk areas, no further evidence is needed, provided the basis on which the Flood Risk Assessment provided at design stage has not changed. This should be confirmed by the developer, or As Built details need to be supplied.<br><br>**For medium (Zone 2) or high (Zone 3) flood risk areas:**<br><br>As for design stage and if significant time has passed since the Flood Risk Assessment was carried out, confirmation that the basis of the Flood Risk Assessment has not changed.<br><br>Confirmation that no changes have occurred to the specifications or plans, or As Built details need to be supplied. |

| | |
|---|---|
| OR<br><br>Drawings showing the location and details of any flood protection measures for the dwelling or assessment of risk and specification of flood resilient construction.<br><br>*Note: There are many defences, owned by third parties, which due to their location act as a defence by default. E.g. motorway and railway embankments, walls. Confirmation that these defences will remain in place for the lifetime of the development is required if a significant risk is predicted. | |

# Definitions

Also see definitions in SUR 1

| | |
|---|---|
| **Design flood level** | The maximum estimated water level during the design storm event. The design flood level for a site can be determined through either known historical data or modelled for the specific site. |
| **Flood probability** | The estimated probability of a flood of given magnitude occurring or being exceeded in any specified time period. For example, the 100-year flood has a 1% chance of occurring in any given year. |
| **Flood protection measures** | This covers the range of flood protection measures which can be employed to protect individual dwellings and developments from the effects of flooding. |
| **Flood resilient construction** | Buildings that are designed to reduce the consequences of flooding and facilitate recovery from the effects of flooding sooner than conventional buildings. |
| **Flood resistant construction** | Buildings that prevent the entry of water or minimise the amount of water that may enter a building where there is flooding outside. |
| **Flood risk assessment** | Refer to Sur 1 |

| | |
|---|---|
| **High annual probability of flooding (Zone 3a)** | An area where the chance of river flooding in any year is > 1% (1 in 100) and a 1 in 200 or greater chance of flooding from the sea (>0.5%). |
| **Low annual probability of flooding (Zone 1)** | Low annual probability of flooding is an area where the chance of both river and sea flooding each year is <0.1% (1 in 1000) or less. |
| **Medium annual probability of flooding (Zone 2)** | An area where the chance of river flooding in any year is 1% (1 in 100) or less but greater than 0.1% (1 in 1000) and between a 1 in 200 and 1 in 1000 chance of sea flooding (0.5% – 0.1%). |
| **Residual Risk** | The risk which remains after all risk avoidance, reduction and mitigation measures have been implemented. |

## Assessment Methodology

### *Design Stage*

- The assessor should confirm that a Flood Risk Assessment has been carried out. This is necessary to ensure that other sources of flooding (other than river and sea) are also a low risk. For small developments in low flood risk areas, this will be a relatively brief report.
- If the development is in Zone 1 and the Flood Risk Assessment shows low risk overall, 2 credits can be awarded. It should be noted that the Flood map accessible from the Environment Agency website only gives a rough estimation of flood risk and isn't used for planning submission. A Flood Risk Assessment requires contact with the local planning authority to discuss the site and benefit from information available.
- If the development is in Zone 2 or 3, the assessor should check that the Flood Risk Assessment submitted with the planning application has demonstrated to the relevant authorities that the development is appropriately designed as detailed in the criteria. If the evidence shows the finished floor levels and all access routes comply with the criteria and that any residual risks can be safely managed, one credit can be awarded.

### *Post Construction Stage*

- For developments in Zone 1, the assessor should simply check that the Flood Risk Assessment submitted at design stage (or if no design stage report completed, the Flood Risk Assessment used to gain planning consent) still represents an accurate assessment of flood risk. Whilst this can be assumed in most cases, some sites can take 10 years to build out and during this time many factors can change. In the case where the time lapse since the original report is greater than say 5 years, or doesn't include an allowance for climate change, ask for confirmation from the consultant that the basis on which the design was done has not changed.

- For developments in Zones 2 and 3, the assessor should check the Flood Risk Assessment as above and check to see that the As Built plans confirm the correct levels of the floors and access routes above the design flood levels.
- Where applicable, check that the specified flood protection measures have been designed and built according to the recommendations of the consultant.

## Calculation Procedures

None

## Common Cases of Non-Compliance

None of the credits can be awarded where the assessed development has proceeded against the recommendation of the Environment Agency on the basis that the flooding implications are too great.

Credits will also be withheld if flood defence schemes considered for this issue would reduce the performance of functional flood plains elsewhere.

## Special Cases

The flood risk for a site may be downgraded to a lower flood risk category as a result of flood defence installations. This may occur in the following circumstances:

[1] Where permanent new flood defences are planned* to minimise the risk of flooding to the site and its locality.

* mentioned in formal planning documents with budgets allocated

**OR**

[2] The development is located on a site benefiting from existing maintained flood defences.

Where these circumstances arise and flood risk is downgraded from medium to low flood risk, as defined in PPS25, two credits can be awarded. The following evidence will be needed to demonstrate compliance;

a. Confirmation from the flood defence agency (e.g. Environment Agency) that the flood risk level for the site will be reduced to less than 0.1% probability of flooding in any one year.

**AND**

b. Confirmation from the flood defence agency that there are plans to maintain the defences for the lifetime of the development. (In the case of private flood

defences, evidence must be provided that there is a contractual agreement to cover the maintenance of the defences for the lifetime of the development.)

**AND**

c. The Flood Risk Assessment clearly demonstrates that the residual risks have been identified and will be managed appropriately.

Where sites are downgraded from high to medium flood risk as a result of flood defences, they can only achieve a maximum of one credit. To award that credit, the criteria must be met as specified in the criteria table.

## Background

Flooding in the United Kingdom is increasing due to development on areas prone to flooding and more extreme weather patterns brought about by global warming. Other reasons have to do with increased rainwater discharge from hard surfaces and from some agricultural land.

Coastal flooding is increasing as sea levels rise as a result of global warming. Other sources of flooding include rivers, land/overland flow, groundwater aquifers and sewers. Sewer flooding is a major cause of flooding in urban areas.

Floods are now on average nearly twice as frequent as they were 100 years ago. Over seven percent of the land area of England and Wales is at risk from flooding and around five million people, in two million properties, live in flood risk areas in England and Wales (Environment Agency website www.environment–agency.gov.uk/yourenv/eff).

The Meteorological Office predicts a very significant increase in rainfall over the next century as a result of climate change. This will lead to increased incidences of flooding unless action is taken to reduce the impact. New developments can play a significant role by designing to reduce their own impact on flooding and by going beyond this to assist in reducing the overall flood risk.

The public are becoming increasingly aware of the devastating effects of flooding and so will demand more information from developers about flood risk and protection when purchasing homes.