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Addressing flood risk in new development

Good practice note 1



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It's our job to make sure that air, land and water are looked after by everyone in today's society, so that tomorrow's generations inherit a cleaner, healthier world.

Our work includes tackling flooding and pollution incidents; reducing industry's impacts on the environment; cleaning up rivers, coastal waters and contaminated land; and improving wildlife habitats.

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Addressing flood risk in new development

Flooding can damage property and, in extreme cases, cause loss of life. It is a natural feature of river and tidal systems. However, the risk of flooding is increasing because of changes in land management and our climate, including increasingly severe summer storms and wetter winters.

New development must be safe from flooding and must not increase the risk of flooding elsewhere.

The Government has produced guidance on how flood risk should be considered in the planning and development process to reduce future damage to property and loss of life. This is set out in *Planning Policy Guidance Note 25: Development and Flood Risk (PPG25)*.

Local planning authorities are advised to carry out a sequential test when determining planning applications. This means that sites with a lower risk of flooding should be developed before sites with a higher risk. Developers should take this into account when selecting a site for development.

Planning permission will not normally be granted for housing on sites within our flood zone 3 (risk of flooding 1% fluvial or 0.5% tidal) until a satisfactory flood risk assessment has been carried out for the proposed development.

The following practical steps should assist developers in considering flood risk when selecting a development site and when deciding the mix of uses, layout and design of their development.

Step 1 – Where possible, select a development site with little or no risk of flooding.

Good practice

1. Ensure the site is outside the Environment Agency flood zone 3, which can be seen as liable to flooding on our website www.environment-agency.gov.uk. Alternatively, request an Environment Agency Search on the property from your Area Environment Agency Office.
2. Ensure there are no drainage constraints, such as culverted (piped) watercourses, possible high ground-water levels, an insufficient foul and surface-water capacity drain, on or near the site. If the drainage system is insufficient, seek advice from the Area Environment Agency Office and local sewerage undertaker (generally a water company).

Step 2 – For the following sites and proposals carry out a Flood Risk Assessment (FRA). This is summarised in Steps 2.1-2.3, for sites:

- within our flood zone 3 for residential development or 2 or 3 for major infrastructure;
- within or adjacent to any watercourse;
- adjacent to or including any flood-control structure;
- within an area where the Environment Agency has indicated that there may be drainage problems, such as possible high ground-water levels;
- where proposals are likely to involve culverting or diverting any watercourse;
- where proposals are of such a size or nature that there could be a significant increase in surface water run-off from the area. This in turn could cause flooding problems downstream due to inadequate pipes, culverts or bridges.

Step 2.1 – Estimate the risk and select an appropriate use.

Good practice

1. Consult the Area Environment Agency Office, the local council, the local sewerage undertakers and local residents for information on:

- any history of flooding;
 - flood levels;
 - probability of flooding;
 - standard of any flood defences, foul and surface-water drains;
 - any existing reports.
2. Carry out a site-level survey to Ordnance Datum Newlyn and a cross-section of the site to identify the nearest watercourse. Determine if safe access for emergency vehicles can be achieved during extreme flooding.
 3. Select a use that is appropriate to the risk of flooding. **Do not increase residential density on the site if safe access cannot be achieved.**

Refer to Table 1 of PPG25 for a guide on appropriate uses relative to the level of flood risk.

Level of risk:	Appropriate use	Flood zones	On internet
Little or no risk Annual probability < 0.1 %	No constraints due to river, tidal or coastal flooding.	Zone 1	
Low - medium risk Annual probability River: 0.1-1 % Tidal: 0.1-0.5 %	Suitable for most development if there are no site-specific constraints. Not suitable for essential civil infrastructure.	Zone 2	Extent of extreme flood
High risk Annual probability River: > 1 % Tidal: > 0.5 %	<p>a) Developed areas: May be suitable for residential, commercial or industrial development subject to FRA.</p> <p>b) Undeveloped areas: Generally not suitable for residential development unless essential.</p> <p>c) Functional flood plains: Maybe suitable for sport, amenity or conservation.</p>	Zone 3	Flooding from rivers or sea

Summary of Table 1, Planning Policy Guidance Note 25.

Step 2.2 – Ensure that the proposed development does not increase the risk of flooding elsewhere.

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1. Building in the floodplain will reduce the amount of flood storage. Consult the Environment Agency on the desirability of providing flood storage compensation.
2. Do not increase the amount of surface water run-off from the site. Follow steps A-D below.
 - A. Calculate the 'Greenfield' rate of surface water run-off to determine what the surface-water drainage system should achieve post-development.
 - B. Identify opportunities for source control to reduce run-off, for example by:
 - minimising directly connected impermeable areas such as roads, roofs, car parking;
 - collecting rainwater for use elsewhere on the property, such as in the garden.

Example of Greenfield development site



- C. Carry out soil tests to identify the most appropriate surface-water drainage method for excess surface water: infiltration, attenuation or conveyance. See general guide opposite.
- D. Consult the sewerage undertaker on the capacity of any existing piped systems. Consult the Environment Agency on the feasibility and desirability of using infiltration and attenuation methods, and on the impacts of discharges into watercourses.

See also Good Practice Note 2 **Drainage**

General guide to surface-water drainage methods

Infiltration: Enhance the natural ground capacity to store/drain water.
A swale at Fairoak



Attenuation: Store water at the ground surface temporarily or permanently. Balancing pond at Cherque Farm, Gosport.



Conveyance: Allow the transportation of surface water run-off from the site. Infiltration trench at Winchester.



Step 2.3 – Investigate suitable flood-resistant construction techniques and flood-warning and evacuation procedures.

Good practice

1. Flood-proofing measures to reduce damage to property during extreme flooding include:
 - bringing all electrical services down from ceilings;
 - raising slab levels;
 - covers for doors/airbricks;
 - solid stone/concrete floors with no voids underneath and no studwork partitions on ground floors.
2. The Environment Agency operates a flood-warning system. Enquire about registering at your Area Environment Agency Office.
3. For further information and advice on flood-resistant construction and preparing for floods, see the useful websites on the back of this leaflet.

Step 3 – Compile the relevant information and level of detail into a Flood Risk Assessment for the proposed development and submit it to the local planning authority with the planning application.

Good practice

A Flood Risk Assessment for the site should be conducted prior to a decision on the use of the site as it may determine that some uses are inappropriate.

A Flood Risk Assessment should be proportionate to the size of development and the level of risk. A full hydrological survey may be required for large developments.

The Environment Agency will provide whatever relevant information is available. However, the applicant should ensure the Flood Risk Assessment is logical, clear and addresses the risk to both people and property .

A successful Flood Risk Assessment demonstrates that a development is acceptable from a flood risk point of view.

Where to find out more

Further guidance and advice

Planning Policy Guidance Note 25: Development and Flood Risk, 2001.
Available on
www.planning.odpm.gov.uk

Learning to Live with Rivers,
Institution of Civil Engineers,
November 2001

Floods and Historic Buildings,
Technical advisory note, English
Heritage

Design Guidance on Flood Damage to Dwellings, Scottish Office 1996,
HMSO

Sustainable Urban Drainage Systems,
C522 CIRIA 2000

Development & Flood Risk, C624,
CIRIA 2004

Intrim code of practice for Sustainable Drainage Systems (SUDS), National SUDS working group, July 2004.
www.ciria.org/suds/icop.htm

Useful websites

www.environment-agency.gov.uk

Building Research Establishment
(BRE): www.bre.com

Construction Industry Research and Information Service (CIRIA):
www.ciria.org.uk/flooding
www.ciria.org.uk/suds

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Other Good Practice Notes in this series

Flooding

Practical advice on how to ensure new development is at minimal risk of flooding and does not increase the risk of flooding elsewhere.

Drainage

Practical advice for designing drainage schemes to avoid pollution and help return water to the environment naturally.

Watercourses

Practical advice on restoring and enhancing watercourses to benefit wildlife and the community.

Wise use of resources

Practical advice for resource-efficient design and construction, to conserve natural resources and reduce operational costs

Notes

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