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Flood Risk

2 Flood Risk

In the study area flood risk predominantly arises from fluvial (rivers and watercourses) sources. Fluvial flooding occurs as a result of the overflowing or breaching of river or stream banks when the flow in the watercourse exceeds the capacity of the river channel to accommodate that flow.

It is also becoming increasingly important to consider flood risk from other sources. These include groundwater, (notably springs from limestone, sandstone and chalk aquifers), land drainage (low lying areas and runoff from steeply sloped areas), sewerage, and other artificial sources e.g. reservoirs and canals.

In Chesterfield, Bolsover, and North East Derbyshire there are many different types of flood risk present with the exception of tidal flooding. In some areas changes to land use patterns may be appropriate. Coordination of strategies and plans is crucial, and flood warning, appreciation of vulnerability, and a whole range of mitigation measures are essential if sustainable flood risk management is to be achieved.

As has been illustrated by recent events (e.g. in Summer 2007) flooding can occur virtually anywhere although much flooding was local, rather than strategic in origin and impact. Flooding locations depend very much on the profile and duration of the storms which cause them and on local factors such as blocked drains and culverts, breaches or failure of defences and local topography. Therefore, safety from flooding can never be guaranteed. Flooding may occur in locations which appear to be at relatively low risk compared to others.

> In the Chesterfield, Bolsover, and North East Derbyshire areas the most serious (and predictable) flooding is still usually from river systems (Main Rivers and Ordinary Watercourses – see glossary for definition).

2.1 Responsibilities

Whilst the Environment Agency is the main authority responsible for developing flood risk management strategies and policies, LPAs, Internal Drainage Boards (IDBs) and Water Companies all have a part to play in achieving the government's aims and objectives. Developers also have a responsibility to protect their land from natural hazards which includes flooding and managing land drainage. Landowners have the primary responsibility for draining their land and managing the flood risk issues associated with their property. The owners of assets such as canals and reservoirs (e.g. British Waterways Board, Chesterfield Canal Trust, Severn Trent Water and private owners) are similarly responsible for managing the flood risk issues associated with them.

2.1.1 Department for Environment, Food and Rural Affairs (Defra)

Defra has overall policy responsibility for flood and coastal erosion risk in England. It funds most of the Environment Agency's activities in this area and provides grant aid to the other flood and coastal defence operating authorities (LPAs and IDBs) to support their investment in improvement works. Improvement projects funded by Defra, including those of the Environment Agency, must meet specified economic, technical and environmental criteria and achieve an appropriate "priority score" to be eligible for funding. Defra does not build defences, nor does it direct the authorities on what specific projects to undertake.

2.1.2 The Environment Agency

The Environment Agency was established by the Environment Act 1995 and is a Non-Departmental Public Body of Defra. The Environment Agency took over the flood risk management responsibilities of the now defunct National Rivers Authority (NRA) and is the principal flood risk management operating authority in England and Wales.

The Environment Agency is empowered under the Water Resources Act 1991 to manage flood risk arising from designated main rivers and the sea. The Environment Agency is also responsible for flood forecasting and flood warning dissemination, and for exercising a general

supervision over matters relating to flood defence. The review of "Making Space for Water" is currently considering a strategic overview role for the Environment Agency for all flood and coastal erosion risk management issues.

The Environment Agency has statutory powers to manage flood risk to existing properties and assets. At a strategic level, it provides Regional Planning Bodies (RPBs) and LPAs with advice on the preparation of Regional Flood Risk Assessments (RFRAs) and SFRAs.

> The Environment Agency is a statutory consultee for Regional Spatial Strategies (RSSs), Local Development Documents (LDDs), Sustainability Appraisals (SAs), Strategic Environmental Assessments (SEAs) and for planning applications. The Environment Agency should be consulted on all proposed developments in Flood Zones 2 or 3 and any development over 1 hectare in all Flood Zones. It should also be considered for culverting issues and other known land drainage problems (reference PPS25 and the living guide).

The Environment Agency's role at the pre-application stage will generally involve provision of relevant flood risk information and advice, as well as comments on the scope of Flood Risk Assessments. The Pitt Review (June 2008) recommends a wider role for the Environment Agency in terms of oversight of flood risk management.

2.1.3 *Local Authorities*

> Local Authorities are responsible for ordinary watercourses (watercourses which have not been designated as main and which are not within internal drainage board areas) and have powers to undertake flood defence works under the Land Drainage Act 1991.

Sometimes the riparian owners have the responsibility for works which would be identified by the LA. The LA has permissive powers to maintain ordinary watercourses but, as for main rivers, responsibilities to do so rest with the riparian owner. A LA may have responsibilities for coastal erosion and flood risk management if it has been assigned as a Maritime District Council under the Coastal Protection Act 1949.

The LPA has a responsibility for considering and minimising flood risk in developing planning policies/proposals and in determining planning applications in line with PPS25 (further details are contained in 1.3.2).

2.1.4 *Water and Sewerage Undertakers*

> Water Companies and sewerage undertakers are responsible for surface water drainage from development via adopted sewers (adopted under the requirements of the Water Industry Act 1991) and in some instances Sustainable Drainage Systems (SuDS).

The Water Companies covering the three Districts are Severn Trent and Yorkshire Water.

They prepare Asset Management Plans (AMPs) approved by the water regulator, Ofwat, which include investment programmes to manage the flood risk from sewers. Water companies are not responsible for the maintenance of highway drainage systems. Responsibility for the maintenance of private drainage systems lies with the highway authority wherever these are not privately owned.

Water Companies should ensure that their plans for urban drainage reflect the appropriate Regional Spatial Strategies (RSSs) and Local Development Documents (LDDs) in line with their obligations in the current legislation and their AMPs.

LPAs should consult sewerage undertakers in developing their spatial plans, as soon as possible in the LDF process so that their SFRA takes account of any specific capacity problems and of the undertaker's Urban Drainage Plans. Developers should consult their local sewerage undertaker on surface water disposal issues.

2.1.5 *Internal Drainage Boards*

Internal Drainage Boards (IDBs) are independent bodies, created under statute to manage land drainage in areas of special drainage need and are empowered under the Land Drainage Act 1991. There are some 170 boards in England, concentrated in the lowland areas of East Anglia, Somerset, Yorkshire and Lincolnshire.

Each board operates within a defined area in which they undertake flood defence works on watercourses that have not been designated as "main". IDB membership includes elected members representing the occupiers of the land in the district and members nominated by LPAs to represent other interests.

There are no areas in Chesterfield, Bolsover or North East Derbyshire that are covered by an IDB.

2.1.6 *Highways Authorities*

Local highways authorities have responsibility for managing road drainage from roads on the local road network, in so far as ensuring that drains which are their responsibility are maintained. The Highways Agency is responsible for managing road drainage from the trunk road network in England, including the slip roads to and from trunk roads.

Section 41 of the Highways Act 1980 imposes a duty upon the Highway Authority to maintain those roads which are maintainable at public expense. Section 100 of the Highways Act 1980 empowers the Highway Authority to construct, maintain or cleanse drainage systems in the highway or on adjoining/nearby land, for the purpose of drainage or prevention of surface water on the highway.

2.1.7 *Reservoir Undertakers*

Under the Reservoirs Act 1975, reservoirs impounding over 25,000m^3 of water above natural ground level are categorised on a risk basis according to the consequences (in terms of potential for loss of life and/or damage to property) of a structural failure occurring. LPAs should discuss their potential future development sites with reservoir undertakers to:

- avoid an intensification of development within areas at risk from reservoir failure
- ensure that reservoir undertakers can assess the cost implications of any reservoir safety improvements required due to changes in land use downstream of their assets.

Certain reservoir undertakers will be required to produce emergency contingency plans (Flood Plans), following direction by the Secretary of State under the Reservoirs Act 1975, as amended. This requirement will be introduced following consultation by Defra. The presence of reservoirs and implications for flood risk should be recognised in Regional Flood Risk Assessments (RFRAs), SFRAs and Flood Risk Assessments (FRAs).

FRAs should take into account information received from the reservoir undertakers and flood plans when they are available and relevant. Where the consequences of dam failure could endanger life, a reservoir has to be designed to cope with floods of greater severity than those where the consequences of failure would have negligible risk to life. It follows that proposed development downstream could have cost implications if it required upgrading works for the reservoir.

There are a number of reservoirs in the CBC, BDC, and NEDDC area. A few of them are upstream of potential development sites and therefore there is a flood risk to future properties should development take place.

2.1.8 *British Waterways*

British Waterways should be consulted by the LPA and developers in relation to sites adjacent to canals, especially where these are impounded above natural ground level. This is stated in Section 1.62 of PPS25 Practice Guide (PPS25)

2.1.9 *Emergency Services and Multi-agency Emergency Planning*

The Civil Contingencies Act 2004 and associated Regulations sets out an emergency preparedness framework, including planning for and response to emergencies. Local Resilience Forums, which include representatives from the Emergency Services, LPAs and the

Environment Agency, should ensure that risks from flooding are fully considered, including the resilience of emergency infrastructure that will have to operate during floods.

Emergency Services should be consulted during the preparation of LDDs. In some cases, it may be appropriate for the LPA to consult the emergency services themselves on specific emergency planning issues related to new developments.

2.1.10 *The Developer*

PPS25 states that it is the responsibility of developers to consider carefully the flood risk issues at a site as early as possible. The Environment Agency on-line Flood Maps and the SFRA should provide some indication of whether a site is at risk of flooding. However developers should make independent checks prior to purchasing sites.

A developer is not required to apply the Sequential Test if a proposed development is located on a site which has been allocated for that type of development in a LDD that has been sequentially tested and supported by a SFRA. However, the developer should still apply the sequential approach to any flood risk within the site itself when determining the location of appropriate land uses.

In any areas where flood risk has been identified as an issue, developers should liaise with the LPA to agree on who should be consulted. The scope of any FRA should be agreed with the LPA, and if necessary, in consultation with the Environment Agency. This SFRA provides guidance on who needs to be consulted for a specific set of circumstances (see Section 8.6 and Appendix C).

2.2 Planning Policy Statement 25

Planning Policy Statement 25 (PPS25) defines four zones of flood risk. These zones are based on the quantified degree of flood risk to which an area of land and buildings is subject at the time at which a land allocation decision is made or a planning application submitted. The PPS25 flood risk zones and their associated fluvial flood risk characterisations are summarised in Table 2 below:

Table 2: PPS25 Flood Zones (taken from PPS25)

Zone 1 Low Probability This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
Zone 2 Medium Probability This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
Zone 3a High Probability This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Zone 3b The Functional Floodplain This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).

The PPS25 flood risk zones give a broad indication of flood risk. However, most areas which fall within the high risk zone (Zone 3) are on flood plains and many such areas already enjoy some degree of protection from established flood defences. The actual degree of flood risk to which these areas are subject may well be significantly less than that implied by their PPS25 classification, provided of course that those defences are maintained.

PPS25 requires LPAs to adopt a risk-based approach to development in areas at risk of flooding, and to apply a "Sequential Test" to such areas (see Figure 4). This means that, other factors being equal, the LPA would favour development in areas with a lower flood risk. It is clear that study areas within the PPS25 "high risk" zone may be at very different risks of flooding. For example, whereas the probability of flooding in one area may be as high as 10% (1 in10 years) the probability in a neighbouring area may be as little as 2% (1 in 50 years), yet both are within PPS25 Zone 3. The LPA must therefore be able to rank study areas according to actual flood risk (based on a knowledge of Standards of Protection (SoP – see glossary) and condition of the defences).

As shown in Table 2, PPS25 Zone 3 is subdivided into two areas, 3a and 3b. Zone 3b is classed as functional floodplain and is defined as being at risk from the 1 in 20 year flood or greater. PPS25 also states that the following types of development may be allowed.

- 3a: Water-compatible and less vulnerable uses of land in Table D.2 of PPS25 are appropriate in this zone. More vulnerable development is allowed subject to the Exception Test. Table 3 describes the types of development.
- 3b: Only the water-compatible uses and the essential infrastructure listed in Table 3 that has to be there should be permitted in this zone. Essential infrastructure in this zone should pass the Exception Test.

The Practice Guide Companion to PPS25 gives further guidance on the definition of Flood Zone 3b and allows flexibility to subjective interpretation. More specifically it states that areas, which would be subject to flooding in the 5% (1 in 20 year) annual exceedence probability flood event but where the flow of flood water is prevented by existing infrastructure or by solid buildings or other solid barriers, will not normally defined as Flood Zone 3b.

Based on the above guidance, specific brownfield sites can be designated as Flood Zone 3a (high risk) and not part of the functional floodplain (Flood Zone 3b) if agreed between the EA and LPA.

All types of development may be acceptable in Flood Zones 1 and 2 apart from highly vulnerable development in Flood Zone 2 for which the Exception Test is required.

2.2.1 *The Sequential and Exception Tests*

Annex D of PPS25 provides clear guidance on application of the sequential approach in relation to flood risk. This approach is a simple decision-making tool designed to ensure that sites at little or no risk of flooding are developed in preference to areas at higher risk. It can be applied at all levels and scales of the planning process, both between and within Flood Zones.

> All opportunities to locate new water-incompatible developments in reasonably available areas of little or no flood risk should be explored, prior to any decision to locate them in areas of higher risk. Potential sites for new housing can be considered 'reasonably available' if the 'available' part of the criteria set out in *Housing Land Availability Assessments: Identifying land for residential development* (ODPM; 2005) is, or is reasonably expected to be met within five years of the LDD or planning application submission.

2.2.2 *The Sequential Test*

The sequential test is applied by the LPA to ensure that any potential development sites are compatible with the level of flood risk in that location and the vulnerability of the proposed development. It aims to ensure that more and highly vulnerable development types (such as residential housing) will not be allocated at areas of high risk of flooding. Through the LDF development site process, development should be directed to Flood Zone 1 wherever possible, and then sequentially to Flood Zones 2 and 3, and to the areas of least flood risk within Flood Zones 2 and 3, as identified by the SFRA. It is recognised that some applications for development will still be made on sites that have not been allocated (i.e. windfall sites). Such windfall sites will also be subject to the sequential test and/or exceptions test to steer the proposed development away from areas most at risk of flooding.

Table 3: Flood Risk Vulnerability Classification from PPS25 (taken from PPS25)

Essential Infrastructure	▪ Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	▪ Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. ▪ Emergency dispersal points. ▪ Basement dwellings. ▪ Caravans, mobile homes and park homes intended for permanent residential use. ▪ Installations requiring hazardous substances consent.
More Vulnerable	▪ Hospitals. ▪ Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. ▪ Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. ▪ Non–residential uses for health services, nurseries and educational establishments. ▪ Landfill and sites used for waste management facilities for hazardous waste. ▪ Sites used for holiday or short-let caravans and camping, **subject to a specific warning and evacuation plan**.
Less Vulnerable	▪ Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non–residential institutions not included in 'more vulnerable'; and assembly and leisure. ▪ Land and buildings used for agriculture and forestry. ▪ Waste treatment (except landfill and hazardous waste facilities). ▪ Minerals working and processing (except for sand and gravel working). ▪ Water treatment plants. ▪ Sewage treatment plants (if adequate pollution control measures are in place) ▪
Water-compatible Development	▪ Flood control infrastructure. ▪ Water transmission infrastructure and pumping stations. ▪ Sewage transmission infrastructure and pumping stations. ▪ Sand and gravel workings. ▪ Docks, marinas and wharves. ▪ Navigation facilities. ▪ MOD defence installations. ▪ Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. ▪ Water-based recreation (excluding sleeping accommodation). ▪ Lifeguard and coastguard stations. ▪ Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. ▪ Essential ancillary sleeping or residential accommodation for staff required by uses in this category, **subject to a specific warning and evacuation plan**.

Some adopted CBC, BDC, and NEDDC Local Plan policies/allocations may not have been subject to the sequential test under PPS25, as these policies pre-date the publication of PPS25. In such instances, the sequential test should also be considered in the determination of planning applications. This applies both in the site location and the sequential approach to development within the site itself. In these instances, it is the responsibility of the developer to provide the relevant evidence to be considered by the LPA in the determination of the planning application.

2.2.3 *The Exception Test*

Following the application of the sequential test, in exceptional circumstances, there may be valid reasons for a development type which is not entirely compatible with the level of flood risk at a particular site to nevertheless be considered as it would deliver wider sustainability benefits. To meet the Exception Test the developer should demonstrate the wider sustainability benefits that outweigh the flood risk implications of developing the site (see below). It is recommended that the LPA develop a sustainability checklist to assess such sustainability benefits. This should be based on the aims and objectives of their SA Framework used in assessing the LDD.

The Exception Test should only be applied following application of the Sequential Test. There are three stringent conditions, **all of which must be fulfilled** before the Exception Test can be passed. These conditions are as follows:

a) it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared. If the Development Plan Document (DPD) has reached the 'submission' stage (see Figure 4.1 of PPS12: *Local Development Frameworks)* the benefits of the development should contribute to the Core Strategy's Sustainability Appraisal (SA);

b) the development should be on developable previously-developed land or, if it is not on previously-developed land, that there are no reasonable alternative sites on developable previously-developed land; and

c) a site-specific Flood Risk Assessment must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Figure 5 shows whether the Sequential or Exception Test will be required for a development type in a Flood Zone.

Figure 5: Flood Risk Vulnerability and Flood Zone 'Compatibility (taken from PPS25[1])

Flood Risk Vulnerability classification (see Table D2 PPS25 Annex D)		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1 PPS25 Annex D	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b 'Functional Floodplain'	Exception Test required	✓	×	×	×

✓ Development is appropriate

× Development should not be permitted

Chapter 3 of PPS25's practical guide (PPS25[2]) provides more details of the Sequential and Exception Tests.

2.3 Flood Mapping

Only two forms of flood maps are currently available: Flood Zone maps and flood maps. The differences between these is highlighted in the following table and described more fully in the following sections.

Table 4: Flood Map Types

Map Type	Description	Prospective Use
Flood Zone ('FZ')Maps	These were prepared using nationally consistent methodologies for the determination of flood risk zones for fluvial flooding. The FZ maps show both PPG25 Flood Risk Zones 2 and 3. The FZ maps also exclude the effect of existing flood defences. The FZ maps are not limited to Main River floodplains but include the floodplains of all watercourses with a catchment area of more than 3 sq.km.	Flood Zone maps are not readily accessible to the general public or those wishing to undertake detailed flood risk assessments. Access to the FZ maps for a specific area must be sought by way of the relevant LPA.
Flood Maps	Available on the internet and issued at 1/50,000 scale these maps are intended for use by the general public.	They are not intended, at this stage, to supersede the larger scale and more detailed Flood Zone maps issued to LPAs but to be used in conjunction with them. Note: See discussion in 2.3.2 paragraph

2.3.1 *Flood Zone Maps*

Following a comprehensive fluvial flood risk mapping exercise carried out across the country, the Environment Agency issued a set of Flood Zone Maps to each LPA in England and Wales during Summer 2004 covering the whole of that authority's area in electronic format. The CBC, BDC, and NEDDC Flood Zone Maps were made available to Faber Maunsell by the LPAs.

The Flood Zone (FZ) maps were prepared using nationally consistent methodologies for the determination of flood risk zones for fluvial flooding. The FZ maps show both PPG25 Flood Risk Zones 2 and 3. The FZ maps also exclude the effect of existing flood defences.

The Flood Zone maps, are based on OS 1/10,000 scale maps and include the floodplains of all watercourses with a catchment area of more than 3 sq.km.

Flood Zone maps are not readily accessible to the general public or those wishing to undertake detailed flood risk assessments. Those wishing to consult the FZ map for a specific area must do so through the relevant LPA or the EA. FZ maps are not made available by the Environment Agency other than through LPAs if they are asked by a developer for specific information on a site.

2.3.2 *Flood Maps*

In October 2004 the Environment Agency issued a further set of flood risk maps covering all of England and Wales. These maps, issued only at 1/50,000 scale, were intended for use by the general public and are available on the internet. They are not intended, at this stage, to supersede the larger scale and more detailed Flood Zone maps issued to LPAs but to be used in conjunction with them.

These Flood Maps show two flood risk zones; a dark blue zone in which annual flood risk probabilities are defined as greater than 1% for fluvial flooding, and a light blue zone in which the annual flood risk probability is greater than 0.1%. Like the FZ maps, the dark and light blue areas show the potential extent of flooding without defences. Flood defences (and defended areas) are shown where those defences are less than five years old and give a 1% fluvial standard of protection.

If the user clicks on a dark blue or light blue area an assessment of flood risks is provided, as follows:

"Significant"	annual probability >1.3% (once in less than 75 years)
"Moderate"	annual probability between 1.3% and 0.5% (1 in 75 to 200 years)
"Low"	annual probability (1 in >200 years) or less.

This provides an indication of the likelihood of flooding in the user's area. This came from a national flood risk assessment completed in 2005, which used ground levels, predicted flood levels, information on flood defences, and the EA's local knowledge. The likelihood is described in one of three categories, low, moderate or significant, as used by the insurance industry. This assessment should not be used for preparing a flood risk assessment. It should be noted that the 1.3% (1 in 75 years) and 0.5% (1 in 200 years) annual probability levels for this classification correspond to levels currently adopted by the British Insurance Association and not that used in PPS25.

The Environment Agency proposes to update the Flood Maps on a three-monthly basis in order to ensure that the maps reflect the latest assessments of flood risk and to remove anomalies. At some locations, for example, it is possible to "click on" to a dark blue area on the map where no flood defences exist and where flooding is known to occur and obtain a "Low" flood risk classification.