Ashfield
DISTRICT COUNCIL

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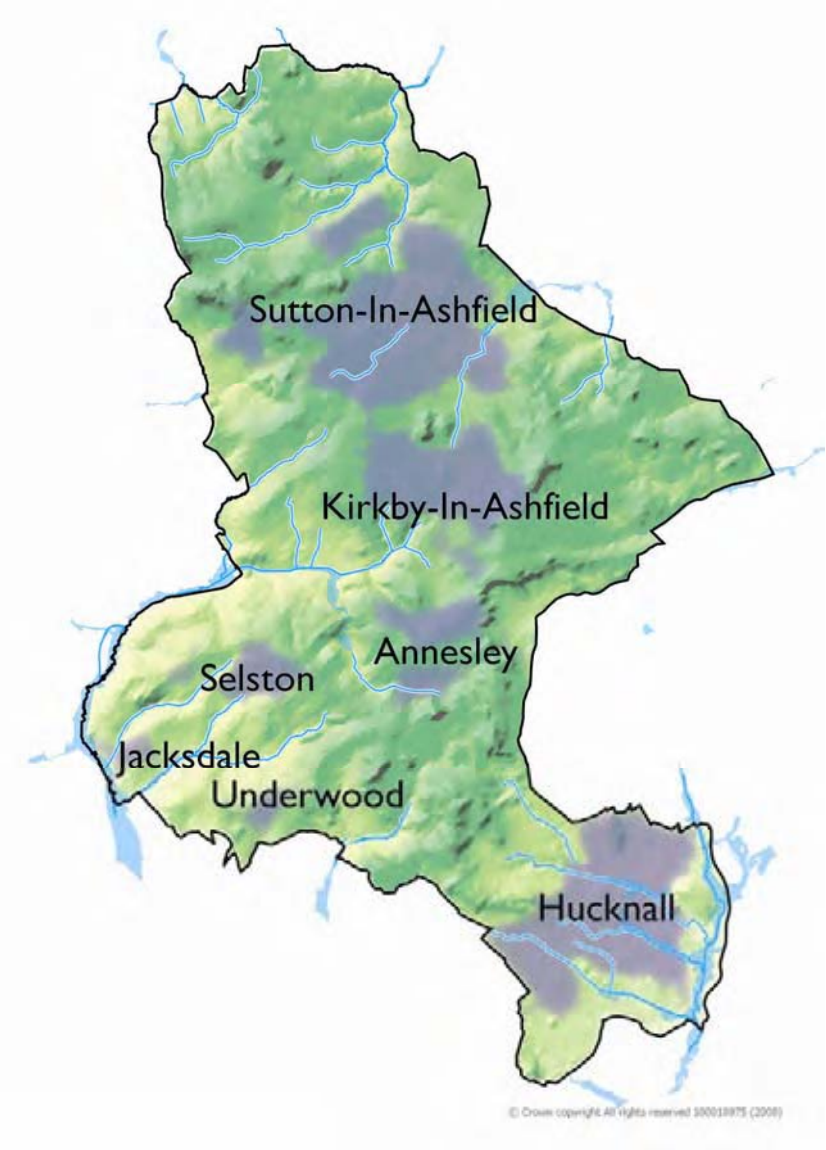
ASHFIELD DISTRICT COUNCIL

STRATEGIC FLOOD RISK ASSESSMENT LEVEL 1



The Strategic Flood Risk Assessment for Ashfield is based upon information known to the Authority and provided by consultees. It reflects a desktop study bringing together information on flooding and its potential impact. However, there may be areas in or outside the District that have flooded in the past which have not been identified.

As a desktop study the accuracy of the contents is dependent upon the information supplied by the consultees. Consequently, the Authority cannot guarantee that the information will always be accurate, complete, and up to date.

Abbreviations	
BERR	Department for Business Enterprise and Regulation Reform
CAMS	Catchment Abstraction Management Strategy
CFMP	Catchment Flood Management Plan
CIRIA	Construction Industry Research and Information Association
CLG	Department for Communities and Local Government
DEFRA	Department of the Environment Food and Rural Affairs
EA	Environment Agency
FAS	Flood Alleviation Scheme
FRA	Flood Risk Assessment
GDP	Gross Domestic Product
HPA	Health Protection Agency
LDD	Local Development Document
LDF	Local Development Framework
LPA	Local Planning Authority
MAFF	Ministry of Agriculture, Fisheries and Food (Now DEFRA)
PPS 25	Planning Policy Statement 25: Development and Flood Risk
PPG 25	Planning Policy Guidance 25: Development and Flood Risk
RFRA	Regional Flood Risk Appraisal
RLSFRA	River Leen and Day Brook Strategic Flood Risk Assessment
SFRA	Strategic Flood Risk Assessment
SPD	Supplementary Planning Document
SSSI	Site of Special Scientific Interest
SUDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plans
UK	United Kingdom
WRMU	Water Resources Management Unit

CONTENTS

References

1. Apostolaki Stella of Urban Water Technology Centre, University of Abertay, Dundee 'An Assessment of the Social Impacts of Sustainable Drainage Systems in the UK'.

2. Ashfield District Council (2007) Mill Lane Drainage Area study for Mill Lane, Huthwaite

3. Ashfield District Council (2002) Jacksdale:Bagthorpe Brook Catchment Study.

4. Ashfield District Council Serby Road

5. Babtie Group and the Centre for Ecology and Hydrology, 2002. "*Climate Change Impacts on the Safety of British Reservoirs*" defra, London.

6. CABE Space. Public space lessons Adapting public space to climate change. www.cabe.org.uk/

7. CIRIA - Balmforth, D., Digman, C., Kellagher, R., and Butler, D. (2006) Designing for exceedance in urban drainage – good practice. CIRIA C635, London.

8. CIRIA (2007) The SUDS Manuel.

9. CIRIA Model Agreements for SUDS.

10. CIRIA - Lancaster J.W. Preene.M. & Marshall C.T. (2004) Development and flood risk - guidance for the construction industry (C624) CIRIA

11. CIRIA - Lancaster.J.W. Preene.M. and Marshall.C.T. Arup (2004) "Development and flood risk for Construction Industry– guidance for the construction industry" CIRIA.

12. CIRIA – Designing for exceedence in urban drainage – good practice (C635) CIRIA

13. Communities and Local Government (Dec 2007) Planning Policy Statement: Planning and Climate Change. Supplement to Planning Policy Statement 1.

14. Communities and Local Government (Jan 2008) Impact Assessment of the Planning Policy Statement: Planning and Climate Change.

15. Communities and Local Government. (Dec 2006) Planning Policy Statement 25: Development and Flood Risk.

16. Community and Local Government (June 2008) Planning Policy Statement 25: Development and Flood Risk Practice Guide

17. Communities and Local Government. (Dec 2006) Code for Sustainable Homes. A step-change in sustainable home building practice.

18. Communities and Local Government (May 2007) Improving the flood performance of new buildings. Flood resilient construction.

19. Communities and Local Government. (Feb 2006) Development and Flood Risk: A Practice Guide Companion to PPS25 'Living Draft'.

20. Crichton, D., (2004). Flood risks in the former Grampian Region since Devolution. A Research Report for WWF.

21. DEFRA Funding and charging arrangements for sustainable urban drainage systems (May 2007)

22. DEFRA Future Water The Government's water strategy for England. February 2008.

23. DEFRA Improving Surface Water Drainage. Consultation to accompany proposals set out in the Government's Water Strategy, Future Water. (Feb 2008) www.defra.gov.uk/environ/fcd/policy/surfacewaterdrainage.htm

24. Department of Trade & Industry, 2004. *The Foresight Future Flooding Project* www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/Reports_and_Publications/Project_Outputs/Outputs.htm

25. East Midlands Regional Assemby (2006) "Draft East Midlands Regional Plan" (RSS8)

26. Environment Agency (Oct 2007) River Trent Catchment Flood Management Plan - Final Draft Report.

27. Environment Agency (December 2007) The Lower Trent and Erewash Catchment Abstraction Management Strategy. Consultation document.

28. Environment Agency (March 2007) The Idle and Torne Catchment Abstraction Management Strategy.

29. Environment Agency. (May 2005) The River Erewash SRRM Hydraulic Modelling Report, May 2005 by JBA Consulting.

30. Environment Agency. (2005) River Leen Strategy.

31. Environment Agency Don and Rother Catchment Flood Management Plan Draft main stage summary document, Environment Agency, Leeds (PARA 2.22)

32. European Commission (2000) European Union Water Framework Directive.

33. Evans.G.W. (2005) "EG Practice Flood Risk Assessment". Estates Gazette.

34. Faber Maunsell "East Midlands Regional Flood Risk Appraisal" (July 2006) for East Midlands Regional Assembly.

35. Halcrow Group Limited for the Environment Agency (January 2008) Delivery of Making Space for Water HA6 Catchment Scale Land-Use Management HA7 Land Management Practices

36. Hall, J. and Dawson, R. (2005) Systems-based risk analysis to support integrated flood risk management, Discussion Document, 3rd meeting of the urban flood risk assessment working group, Exeter, 9th June 2005.

37. Highways Agency Widening the M1 J21 -30. Environmental Statement of Contract 1 Works (J25-28)

38. Jacobs (2004) Strategy for Flood and Coastal Erosion Risk Management Groundwater Flooding Scoping Study (LDS 23) Final Report Volumes 1 & 2 May

2004 www.defra.gov.uk/environ/fcd/policy/strategy/techdocs.htm

39. J E Jacobs (Sept 2006) “Making Space for Water Groundwater flooding records collation, monitoring and risk assessment (reference HA5) Initial Statement (non-Chalk

40. Aquifers)” Final Report. DEFRA www.defra.gov.uk/environ/fcd/policy/strategy/ha5.htm

41. Jacobs UK Limited Hucknall (July 2007) Hucknall Town Centre Improvement Scheme Hydraulic Study of Baker Lane Brook.

42. Marquiss.R. (ed) (1987) “The Nature of Nottinghamshire” Pub Barracuda Books Ltd.

43. Montgomery Watson (July 1998) Bentinck Culvert. Planning Application Supporting Information for Terry Adams Ltd.

44. National SUDS Working Group (2004) Interim Code of Practice for Sustainable Drainage Systems (available from CIRIA’s SUDS website).

45. Nisbet.T.R. & Thomas.H. Forest Research (June 2008) Restoring Floodplan Woodland for Flood Alleviation”. DEFRA

46. Nottingham City Council, Environment Agency, Nottingham Regeneration Ltd, Greater Nottingham Partnership and Nottingham University Hospital NHS Trust. River Leen and Day Brook Strategic Flood Risk Assessment Summary of Key Findings – *Living Draft* July 2007.

47. Nottinghamshire County Council (1997) “Nottinghamshire Landscape Guidelines”. Pub Nottinghamshire County Council with the support of the Countryside Agency.

48. Nottinghamshire Agenda 21 “Climate Change Framework for Action in Nottinghamshire” September 2005.

49. Nottinghamshire Biodiversity Action Group. Taylor, J.K. (ed). (1998). Local Biodiversity Action Plan for Nottinghamshire. Nottinghamshire County Council (Subject to periodic review).

50. Office of the Deputy Prime Minister. Planning Policy Statement 1: Delivering Sustainable Development (2005).

51. Office of the Deputy Prime Minister. Planning Policy Statement 3: Housing.

52. Office of the Deputy Prime Minister. Planning Policy Statement 9: Biodiversity and Geological Conservation.

53. Office of the Deputy Prime Minister. Planning Policy Statement 23: Planning and Pollution Control.

54. Office of the Deputy Prime Minister. Building Regulations 2000. Approved Document H, Drainage and Waste Disposal.

55. Ove Arup & Partners (April 2002) Sutton Lawn Dam Reservoir Act 1975: Report ona Statutory Inspection Under Section 10 (2)(d) of the Act for Ashfield District Council.

56. Ove Arup & Partners - Prof.B.H.Rofe (April 2003) King’s Mill Reservoir. Reservoirs Act 1975: Report on a Statutory Inspection under Section 10 of the Act for Ashfield District Council.

57. The Pitt Review Learning Lessons from the 2007 Flood. June 2008

58. R & K Contractors and Consultants (Dec 2007) Draft Report Project 14431: Huthwaite, Mill Lane Development – Drainage Area Study for Ashfield District Council.

59. Scott-White & Hookins Rolls-Royce Science and Technology Business Park, Hucknall Flood Risk Assessment April 2007.

60. Stern.N (2006) Stern Review on the Economics of Climate Change. What is the Economics of Climate Change? H.M.Treasury.

61. HR Wallingford (2003). An Assessment of the Social Impact of Sustainable Drainge Schemes in the UK. HR Wallingford, UK

www.environment-agency.gov.uk/subjects/flood
www.dundee.ac.uk/geography/cbhe. British Hydrological Society's Chronology of British Hydrological Events
www.floodsite.net
www.Uukcip.org.uk The UK Climate Impacts Programme (UKCIP)
www.healeyhero.co.uk/rescue/mine_em.htm Mining in the East Midlands

ASHFIELD DISTRICT COUNCIL
STRATEGIC FLOOD RISK ASSESSMENT
LEVEL ONE

STRAGETIC FLOOD RISK ASSESSMENT

The Strategic Flood Risk Assessment (SFRA) for Ashfield is an overview of the flood risk for the District. It does not provide specific flood risk information for individual development sites. Its purpose is to refine information on areas of the District that may flood and to provide a risk-based approach that steers development away from areas of high flood risk. The SFRA is a non-statutory document that:

- has a key role in the evidence base for determining whether potential sites are suitable to be allocated for development;
- informs the Council's Strategic Housing Land Availability Assessments by identifying where there is a potential flood risk;
- informs policies to reduce flood risk in development plan documents;
- provides evidence regarding the risk of flooding for specific sites and areas in relation to planning applications;
- informs the need for a site specific flood risk assessment;
- Informs the Council's sustainability appraisal.
- Enables the application of the flood risk sequential test at all stages of the planning process

The SFRA sets out:

- Plans identifying the District's Main Rivers, ordinary watercourses and flood zones.
- A consideration of the implications of climate change for flood risk.
- Areas at risk of flooding from sources other than rivers.
- Locations where additional development may significantly increase flood risk elsewhere.
- Guidance on the applicability of sustainable drainage systems (SUDS) for managing surface water run-off.
- Recommendations to manage/reduce flood risk that should be reflected in planning policies and decisions.

- Guidance on the preparation of flood risk assessments (FRA) for development sites.

METHODOLOGY & DATA

The SFRA is principally a desk-top study making use of existing information which should be in sufficient detail to allow the application of the sequential test to minimise flood risk. The SFRA comprises four sections:

- Part One sets out background information on the nature of flooding.

- Part Two undertakes an analysis of the data derived from various sources to identify areas of the District that have flooded or are potentially at risk of flooding.

- Part Three examines the nature of sustainable drainage system (SUDS), their applicability to developments in Ashfield and the issues for the Council arising from the use of SUDS.

- Part Four sets out proposals to manage/reduce flood risk, which should be reflected in planning policies and decisions.

A key object of the new planning system is to strengthen community involvement. Therefore, Part 1 of the SFRA looks to explain the issues around flooding and flood risk in order to facilitate understanding and the participation of the community in this issue. Part Two and Part Three have informed the recommendations and conclusions set out in Part Four.

The SFRA has utilised information collected and reviewed from a number of sources. This has included:

- The Environment Agency including comments from their Development Control Team, Water Resources Team, Environmental Management Team and Flood Risk Mapping Team. Data on the River Erewash, the Baker Lane Brook and Ashfield District Groundwater Observation Borehole data.
- Environment Agency's Flood Maps.
- Key consultees, including neighbouring councils and the Highway Authority. Severn Trent Water Ltd declined to provide any information for the SFRA. British Waterways was not consulted as there are no canals in the District and there are no Internal Drainage Boards covering the District.
- The Coal Authority.
- Engineering, Environmental Health, and the Development Control Sections of Ashfield District Council.
- The Council's Emergency Planning Officer.
- District Councillors and County Councillors.
- Parish Councils in and adjacent to the District.
- From a public consultation over the period from 16th June to 16th July 2008.
- Flood risk assessments undertaken in relation to specific planning applications.

- Studies undertaken by Ashfield District Council relating to specific flood issues.
- The BHS Chronology of British Hydrological Events (British Hydrochronology), which sets out information from text references for hydrological facts for the years up to 1935. (A review of the Chronology reveals no references to flood events which specifically impact on towns and villages in Ashfield).

Further information on the parties consulted is set out in Appendix One.

The quality of the data collected varied and reflects the level of expertise of the consultee. However, local knowledge is a valuable asset as it can help to identify flood risk issues. Consequently, information provided by all consultees has been included in the SFRA. A number of adjacent local authorities did not formally respond to the initial enquiry or a follow-up letter. It is assumed there are no issues from development in Ashfield relating to flooding for the districts in question. Severn Trent Water Limited declined to contribute any data to the SFRA.

The information on the flood risk from rivers reflects the Environment Agency's Flood Indicator Maps. Tables and maps identify the locations of 'Other Sources of Flooding'. This includes the general location, what is believed to be the cause of the flood and the asset or area which is potentially impacted by the flood. It is stressed that this information should be treated with caution but it identifies where further investigation will be required, reflecting a precautionary approach to flood risk.

The analysis of flood risk for the District has been broken down into an area based approach reflecting the District Council's wards.

Conclusions and recommendations are based on the evidence available over the period the SFRA was undertaken and the guidance that was available at the time. Evidence and guidance may change over time and therefore any conclusions and recommendations in the SFRA will need to be updated in line with the latest information available on flood risk.

PART ONE – THE NATURE OF FLOODING

WHAT IS FLOODING

1.1 A flood is a hydrological event characterised by high discharges and/or water levels that lead to inundation of land. It is a serious environmental hazard that can lead to a loss of life and damage to land and property. It results in considerable distress for occupiers of flooded properties, has significant impact on their health and well being, affecting family life and relationships. The effects of any flooding are likely to extend beyond households potentially impacting on the extended family with the provision of accommodation for displaced family members and concern for their progress in recovering from flooding. The community may be affected by the damage and disruption of community facilities and resources. In economic terms, floods result in expensive damage to properties and their contents. The Association of British Insurers in 2005 identified that the typically cost of repairing a flooded home was between £15,000 - £30,000 but this can double where deep floodwaters persist for more than a few days. Business claims can run into millions of pounds and the whole economic life of a community can be under threat if a key employer is badly flooded and without financial protection.

FLOOD RISK

What is meant by Flood Risk

1.2 The Construction Industry Research and Information Association (CIRIA) in "Development and flood risk – guidance for the construction industry" [(10)] sets out that flood risks reflect the level of exposure to a flood hazard. A hazard does not automatically lead to a harmful outcome, but identification of a hazard does mean that there is a possibility of harm occurring. Flood risk is a combination of the probability of the flood hazard occurring and the magnitude of the potential consequences of a flood.

1.3 For development to be sustainable, planners and developers need to be able to assess flood risk and, if appropriate, identify what measures may be used to manage flood risk when considering the appropriateness of proposed developments. PPS 25[(15)] emphasises that a risk-based approach should be developed at all levels of planning using a source-pathway-receptor model. (Sometimes referred to as the Source-Pathway-Receptor-Consequence Model) Table One.

Source (a hazard, something which cause a problem) – Floodwater is generated by rivers, groundwater, sewers, surface water, or the urban infrastructure.
↓
Pathway (a route by which the source comes into contact with a receptor) – How floodwater is transported. This can be by waterways, overland flow, artificial drainage systems etc.
↓
Receptor (something or someone affected by the hazard) – Where floodwater impacts upon people, property, infrastructure, agriculture, amenity, habitats and the natural environment.
↓
Consequence (some measure of damage is caused) – flooding results in loss of life, stress, property damage, environmental degradation.

Table One: Source-Pathway-Receptor-Consequence model

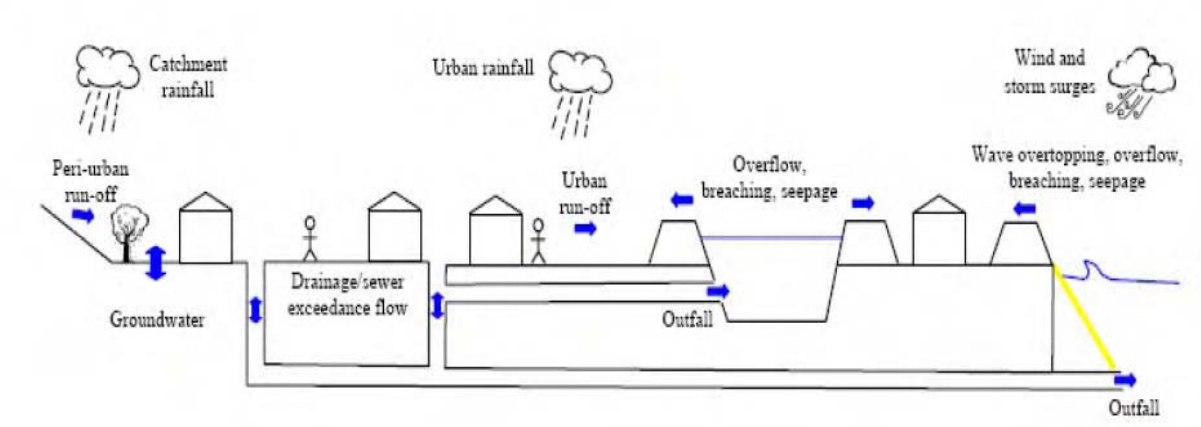


Figure One: The Relationships between Source-Pathways-Receptors in Integrated Flood Risk Management (from Hall and Dawson 2005) [36]

1.4 The consequences of flooding will depend upon the nature of the flood hazard and the vulnerability of an area. The nature of the flood hazard affects the potential for the flood to cause damage, and will be influenced by factors such as flood depth, flood velocity, rate of onset of flooding, flood duration, wave action effects and water quality. The vulnerability of the area flooded, affects the potential for damage to be caused and will be influenced by factors such as:

- The number of properties and/or size of area affected;
- The type of development (e.g. more damage would be caused during the flooding of a supermarket than during the flooding of a park);

- The nature of the population at risk (e.g. elderly or infirm people are more likely to suffer during flooding);
- The presence and reliability of mitigation measures to manage flood risk.

1.5 Consequently, risk reflects both the probability of flooding and the potential consequences. Risk will be higher in areas where damage will be more significant.

Probability and Return Period

1.6 Floods are difficult to predict because they reflect a specific combination of environmental and meteorological factors. However, floods will occur and the size of a flood can be estimated. Averages are used to describe the size of a flood and in this context there are two important terms:

- Probability - Probability is the chance that a particular event or series of events will occur. Typically, this is expressed on a scale from 0 (impossible) to 1 (certainty) or as an equivalent percentage from 0 to 100.

- Return Period - The average number of years between floods of a certain size (magnitude) is the return period**.** For example, in specifying 1 in 100 years it means the peak flood flow that on average will only be exceeded once in a 100 year period.

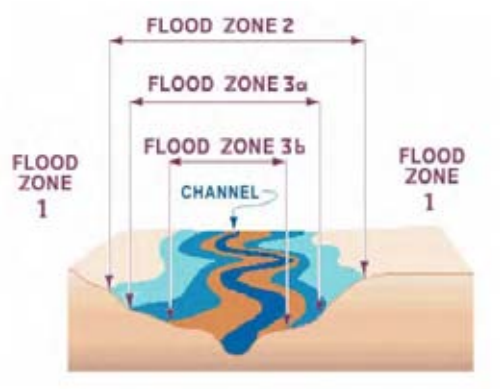
1.7 The probability of a flood of a particular size occurring in any one-year can be found by dividing 1 by the return period. For example the probability of a 1 in 100 year flood occurring in 2007 is 0.01 or 1%. Therefore, a 10-year flood has a 10% probability of occurring in any given year, a 50-year flood a 2% probability.

1.8 The term "10 year", "50 year", or "100 year" flood is used to describe the probability of a flood event happening in any given year. The use of such terminology can be misleading as it leads people to believe that a flood will only occur every 100 years (for a 1 in 100 year flood). However, the actual number of years between floods of any given size varies. The term a "100-year flood" is really a statistical designation and it is actually a 1-in-100 chance that a flood of this size will happen during any year. Consequently, it is more accurately described as the chance that it will happen in any one year. Therefore, substantial floods can happen in successive.

1.9 The Environment Agency's Flood Maps categorise flood risk into zones of risk relating to the probability of flooding from a watercourse. The Flood Maps identify the predicted extent of fluvial flooding in the absence of flood defences.

- Zone 1 has a low probability of flooding from river sources, comprising land assessed as having a less than 1 in 1000 annual probability of river flooding in any year (less than 0.1% probability)

- Zone 2 has a medium probability of flooding, comprising of land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% to 0.1%)
- Zone 3a has a high probability of flooding, comprising land assessed as having a 1 in 100 or greater probability of river flooding (more than 1% probability).
- Zone 3b is the functional floodplain where water has to flow or is stored at times of flood. Specifically, land in this location would flood with an annual probability of 1 in 20 annual probability (5%) or greater in any year or is designed to flood in an extreme flood (0.1%).



There are two different kinds of area shown on the Flood Map:

- Dark blue ■ shows Flood Zone 3
- Light blue □ shows Flood Zone 2

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements.

Further information on the Environment Agency's Flood Maps is available at www.environment-agency.gov.uk/maps/info/floodmaps/

Figure Two: Understanding the Environment Agency's Flood Maps

1.10 The information set out by the Flood Map is indicative rather than specific. The absence of Flood Zone 2 and 3 areas does not guarantee that there is little or no risk of flooding from watercourses. Small watercourse catchments i.e. less than 3 sq km may not be accurately mapped for flooding purposes. Locations by small rivers or streams may be at some risk of flooding even where the Flood Map indicates that they are in Flood Zone 1. Further, the production of flood maps is a dynamic process and maps will be amended to reflect new or improved data.

Flood Responsibilities

1.11 The land drainage system comprises rivers, streams, dykes, ditches, culverts, drains, sewers, pipes, lakes and ponds intended to drain water resulting from rainfall and water from underground sources. As is

illustrated in Table Two, responsibility for systems varies and there are a considerable number of parties involved with the drainage of land and property.

Name	Role
Government • Department for Environment, Food and Rural Affairs (DEFRA) • Communities and Local Government	The Government has no general statutory duty to protect land or property from flooding. • Overall policy responsibility for flood and coastal erosion risk in England. • Funds most of the Environment Agency's activities in this area and provides grant aid to the other flood and coastal defence operating authorities. • Responsible for planning policy, major planning decisions and the Building Regulations.
Environment Agency (Established by the Environment Act 1995 it is a Non-Departmental Public Body of DEFRA).	• Aims to protect and enhance the environment. • Is the principal flood defence operating authority in England. • Under the Water Resources Act 1991, the Environment Agency has permissive powers for the management of flood risk arising from designated Main Rivers and the sea. • Responsible for flood forecasting and flood warning dissemination. • Supports the planning system by providing information and advice on flooding issues. (Statutory consultee on all applications for development in flood risk areas, except minor development, and for any development on land exceeding 1 hectare outside flood risk areas).
Land owners	• Typically responsible for watercourses or culverts passing through or adjoining the boundaries to their land. (Riparian Owners). • Responsible for accepting flows of water. (Riparian Owners). • Responsible for ditches and dykes on their land. • Responsible for maintenance of watercourses on their land. • Responsible for private drains on or serving their land. • Responsible for reservoirs on their land. An owner who keeps on his land anything which is likely to do mischief if it escapes, will be liable if any reasonably foreseeable damages caused by its escape (Rylands v Fletcher (1868) 19 L.T.220; Cambridge Water Company v Eastern Counties Leather (1994) 1 All E.R.53).
Developers	• Private property owners, which include developers, have a right to connect into a public sewer if one is present in the area. • Developers are required to demonstrate that their development proposals are consistent with national and local planning policies on flooding. • Where the development would be potentially affected by flooding or potentially increase flooding elsewhere, the developer must demonstrate that any flood risks arising from the development will be properly managed.
Ashfield District Council • Local Planning Authority • Building Regulations	• Establishes local planning policy based on national and regional guidance, including flood risk. • Considers planning applications, including flood risk. (If the LPA is minded to approve an application for major development where there is an objection by the Environment Agency, the application must be notified to the Secretary of State who may call the application in for determination). • Considers Building Regulations applications, to ensure the health and safety of people in and around buildings, and the energy

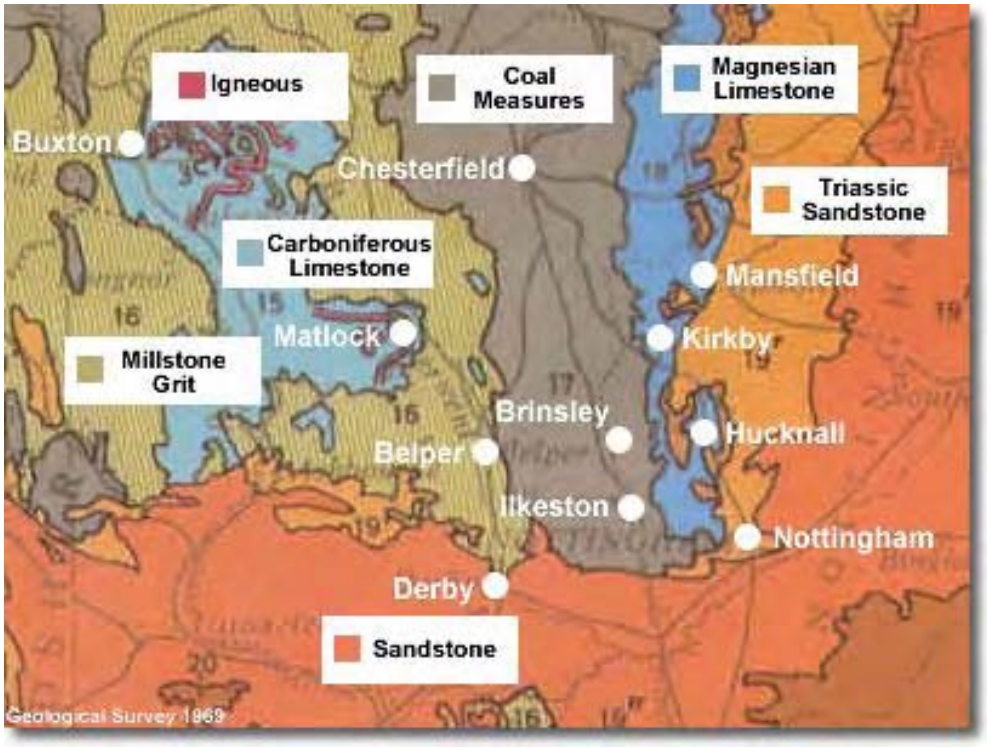
Name	Role
• Drainage	efficiency of buildings. • Local authorities 'supervise' ordinary watercourses that are not in an Internal Drainage District (it should be noted that the different tiers of Local Authorities; counties, unitary and districts have differing flood defense responsibilities). • Powers to make or maintain works for the drainage of land. (The distinction between a power and a duty is significant as there is no general liability on the Council for failing to exercise a power). • The Council may undertake flood defence works under the Land Drainage Act 1991 on watercourses which have not been designated as Main Rivers and which are not within Internal Drainage Board areas.
Highway Agency	• Responsible for managing road drainage from the motorways and trunk roads. (The M1 motorway in Ashfield).
Nottinghamshire County Council as the Highway Authority	• Responsible for highway drains. • Has powers and duties to construct, adopt and manage drainage infrastructure related to the highway. • These powers include rights to drain through, and to, land owned by other parties and to watercourses where the highway authority is not the riparian owner. (The District Council acts for the Highway Authority under an agency agreement in relation to a number of highway issues.)
Severn Trent Water Ltd	• Within Ashfield, Severn Trent Water Limited is responsible for foul and surface water drainage from adopted sewers. • New developments have a right to connect into underground public sewer system. • Design standard 1 in 40 annual probability rainfall event.
The Insurance Industry	• Generally insurance policies will cover against flood damage. • The Association of British Insurers has expressed concerns regarding maintenance of watercourses and drains as well as the long-term investment strategy for flood defence following the floods in the summer of 2007. Ultimately, properties at risk of flooding may face difficulties with the cost or availability of insurance. This, in turn, could cause problems for property buyers in obtaining mortgages and in extreme cases properties might remain unsold, leading to blight. • Key aspect for the insurance industry is to reduce the risk of exposure to flood and claims for flood damage.

Table Two: Parties Involved with Flooding and Drainage in Ashfield

Geology:

1.12 In geological terms the whole of the District of Ashfield lies on part of the Nottinghamshire, Derbyshire and Yorkshire coalfield. The Coal Measures covers approximately 33% of the District, comprising shales and layers of sandstone alternating with seams of coal outcropping along the south-western edge of Nottinghamshire. The hard sandstones and soft shales on the eastern flank of the River Erewash have been eroded to form small hills and vales. The soils in the area are stagnoley varying from clayey to loamy in texture and are frequently waterlogged. There are patches of sandy soils within the area and soils around Annesley and

Teversal tend to be stonier than around Underwood. However, open cast mining has disturbed many of the soils in the District.



Plan One: Ashfield Geology

1.13 To the east, the Coal Measures are bound by the Magnesian Limestone escarpment which covers approximately 33% of the District. This ridge is up to eight kilometres (five miles) wide with a height between 153 – 183 metres stretching from Nottingham to North Yorkshire. The Magnesian Limestone ridge is closely associated with Permian rocks comprising:

- Sandy limestone (Magnesian Limestone), on which free draining calcareous brown earth soils have developed. The soils have a fine loamy texture and are productive and easy to work.
- Permian Marl, which consists predominantly of slowly permeable red clays. These soils are found at Skegby and in the area between Annesley Woodhouse and Hucknall and can remain water logged for long periods.

The western edge is defined by a steep scarp slope overlooking the Coal Measures with a number of small streams draining westwards of the scarp slope. The scarp is partly hidden at Selston by a covering of glacial drift.

1.14 To the east of the Magnesian Limestone ridge is the Sherwood Sandstone, covering the remaining part of the District. A broad belt of

Permo-Triassic sandstones runs from Castle Rock in Nottingham into the north of the County. There are two recognisable formations:

- The Lenton formation (formerly the Lower Mottled Sandstone) consisting of a fine grained sandstone with local clayey bands.
- Sherwood Sandstone formation (formerly the Bunter Pebble Beds) comprising a coarse grained sandstone with extensive beds of quartzite pebbles.

These rocks are highly porous and resting on a bed of Permian Marl they forms an importance aquifer which is a source of the Counties drinking water. The land surface is prevailingly dry and rivers such as the Maun and Meden, maintain their flow as their valleys lie just below the water table.

PART TWO - FLOOD RISK IN ASHFIELD

REGIONAL FLOOD RISK ASSESSMENT

2.1 The Regional Plan[25] identifies that in Ashfield and Mansfield, which straddle the relatively high land at the headwaters of various small rivers, the flood risk is regarded as low. Table 3

Northern Sub-Area Nottingham Outer Profiles

District	Inherent Risk	Significance	Actual Risk			
			Primary		Secondary	Residual
			Prob'ty	Consequence		
Ashfield	A 0	1	L	M	L	L
Mansfield	A 0	2	L	M	M	L
Newark & Sherwood	C 0	9	H	M	H	M

Table Three
Source: Faber Maunsell "East Midlands Regional Flood Risk Appraisal" (July 2006) for East Midlands Regional Assembly.

Notes:
Inherent Risk
A - Less than 10% of the Local Planning Authority was in a Flood Risk Zone 3
0 - No SFRA undertaken
Significance
Perception of LPA to Floor Risk in making strategic planning decisions (1 = low)
Actual Risk
H – High M – Medium L – Low

(The full methodology is available via the East Midland Regional Flood Risk Appraisal at www.emra.gov.uk/what-we-do/housing-planning-transport/rss-review/documents)

POTENTIAL FLOOD HAZARDS IN ASHFIELD

Flooding from Watercourses

2.2 The water level in rivers and streams is not constant but rises and falls according to the amount of water flowing along the channel. The geology, land use, topography and form of development will have a strong influence on the velocity and volume of water in watercourses and its direction of flow at particular points. Some watercourses respond very quickly to significant amounts of rainfall others respond more slowly. Flashy rivers tend to drain short steep catchments and are underlain by impermeable rocks, with rainwater collecting on the surface and rapidly

running into streams. In contrast, docile rivers tend to be fed by catchments on gentle slopes with deep soils or are underlain by permeable rocks.

2.3 Flooding from watercourses is associated with some extreme natural events that happen over a geographical area known as a drainage basin (a river basin, a catchment area or a watershed). The basic cause of the drainage basin flooding is heavy rainfall or rainfall/snow melt where the amount of water exceeds the flow capacity of the river channel. In times of flood, a river can be expected to flow not only through its normal channel, but also along its floodplain. Natural or agricultural land is normally able to absorb and temporarily store a considerable proportion of any rain that falls onto it. Covering the land with buildings and other hard surfaces will reduce the ability of land and vegetation to absorb water, increasing storm water run-off. This can increase river flows and cause risk of flooding down stream. Any constriction on the river channel by culverts, bridge piers or blockage by debris can have the same effect, exacerbating the problem and degree of flood risk.

2.4 Watercourses are classified as follows:-

- **Main Rivers** are watercourses designated as such on main river maps and now include watercourses which were formerly known as critical ordinary watercourses.
- **Ordinary Watercourses** are all those watercourses that are not designated as a main river.

Main rivers are designated by the Environment Agency and in Ashfield comprise the following: -

- River Erewash from Park Lane, Kirkby in Ashfield
- River Leen from Castle Mill Farm, Papplewick.
- Baker Lane Brook from the Hucknall By-pass, Hucknall.

The term main river also includes any structure in the bed or bank of the watercourse that controls or regulates the flow into or out of a main river. The Midlands Region of the EA also has Land Drainage Byelaws that require persons to obtain consent for activities in or adjacent to main rivers and their floodplains. Activities include erection of fences, tree planting, disposal of rubbish, excavation affecting the beds and banks of the river Therefore, anyone wishing to undertake work in a floodplain or in, under, over or within eight metres of a main river to should contact the EA to apply for Land Drainage Consent. Figure 3
(See EA's Living on the Edge a Guide to the Rights and Responsibilities of Riverside Occupation).

Figure 3: Main Rivers works requiring Environment Agency consent.
Source: Environment Agency

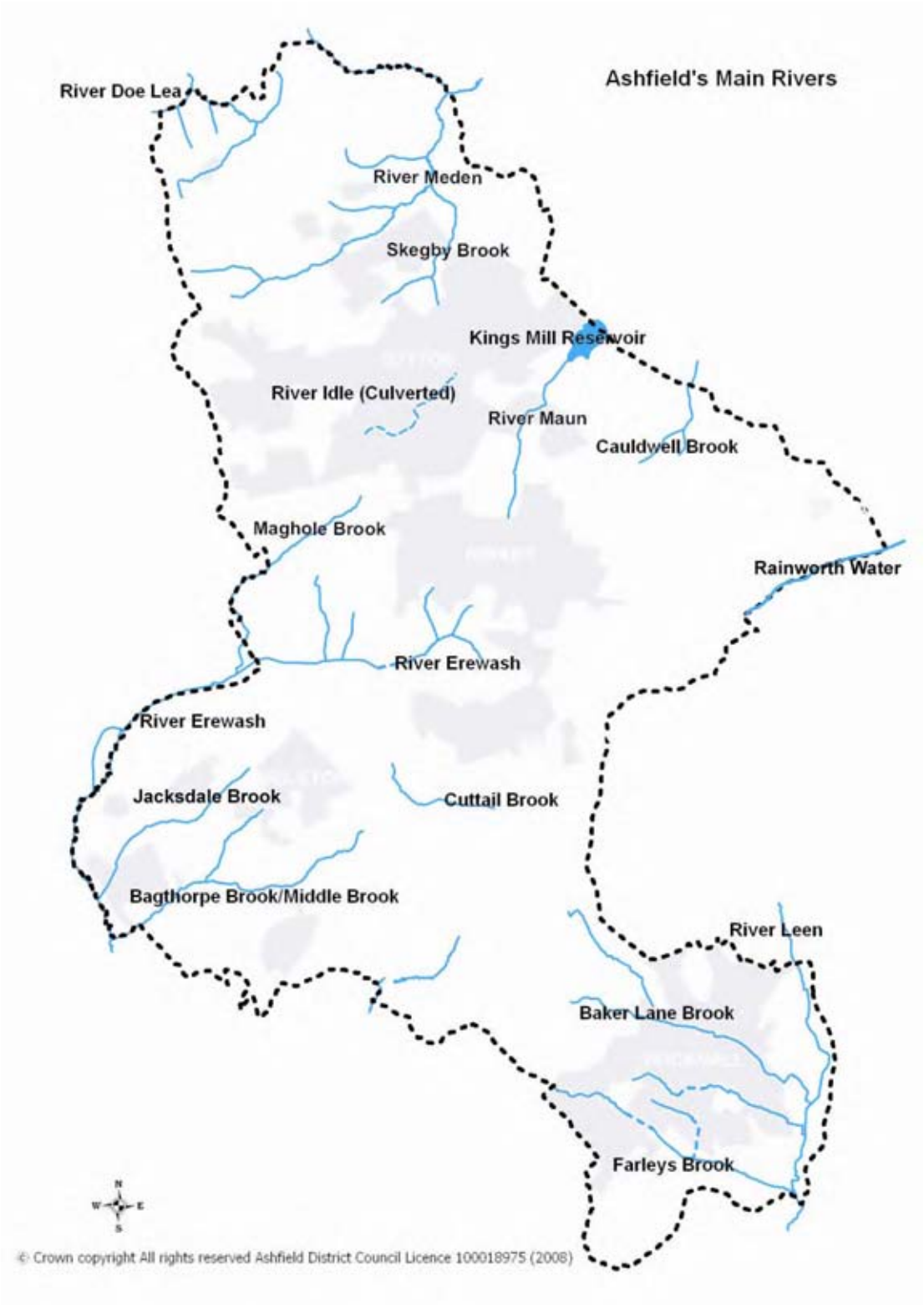
2.5 The strategic framework for managing flood risk from rivers in Ashfield is provided by The River Trent Catchment Flood Management Plan[26] (CFMP) produced by the Environment Agency. This is currently in draft format. The CFMP provides a basic policy framework beneath which more detailed assessments of flood risk can be undertaken. Modelling work on the CFMP is based primarily on the main rivers. Consequently, in Ashfield, only the upper reaches of the River Erewash are included in the modelling. Ashfield falls within two policy units in the CFMP (Plan Four)

- Policy Unit 2 - Sherwood, which applies to the River Erewash (upper reaches), River Medan, River Maun and River Idle. Future flood risk is currently assessed as low and it is not expected to rise significantly. However, the CFMA identifies that there are many small watercourses, which respond quite rapidly to heavy rainfall. Climate change predicts an increase in storminess – particularly intense storms which potentially could have an impact on the frequency of urban flooding.

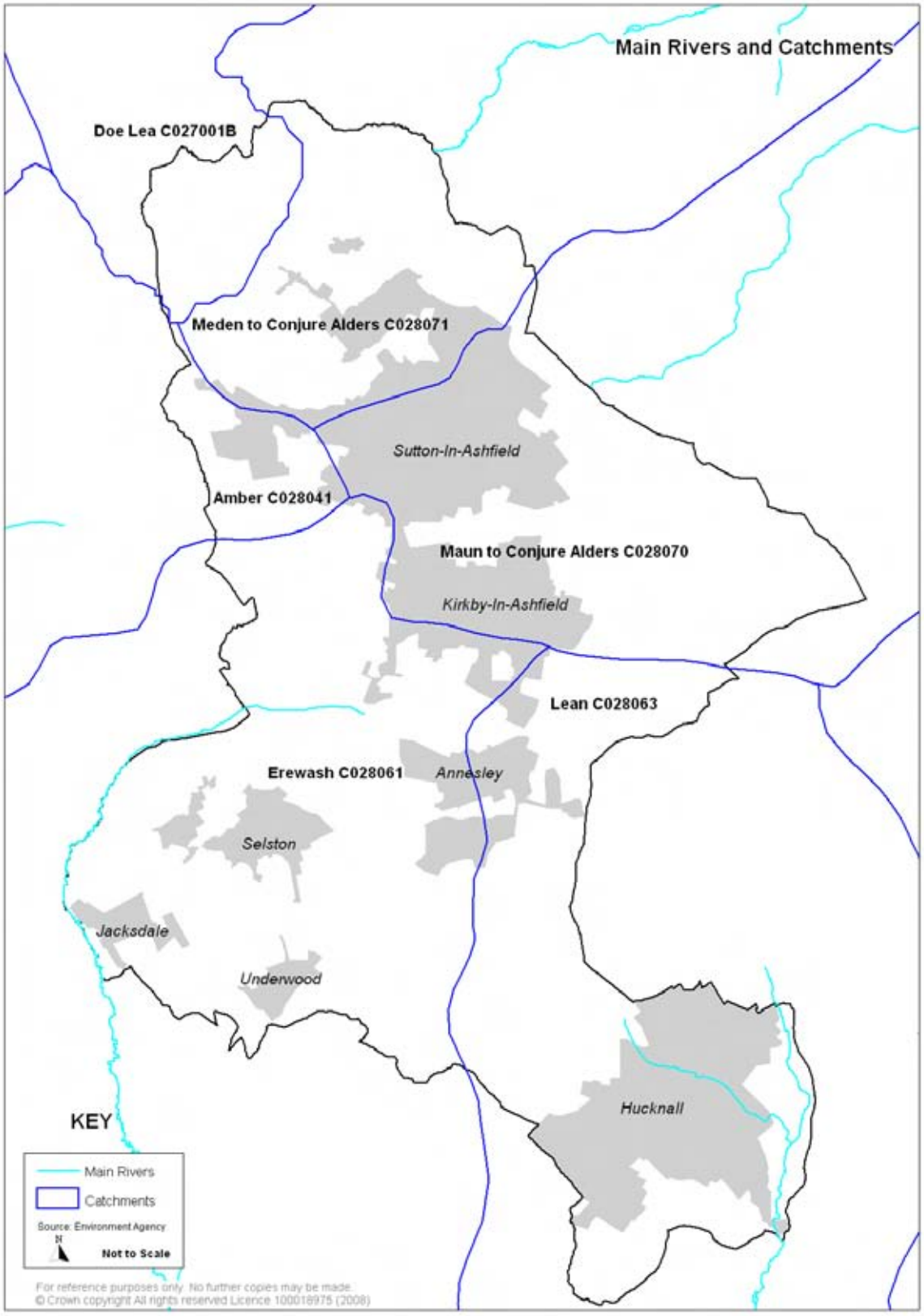
- Policy Unit 5 -Burton, Derby and Nottingham- which applies to the River Erewash (lower reaches) and the River Leen. Flood risk is assessed as high and is likely to increase both as a result of urban growth and climate change.

Appendix Two set out the respective actions proposed by the CFMP for each of the Policy Units. It is stressed that these are broad action and, for example, it does not mean that small local flood alleviation scheme will not be undertaken.

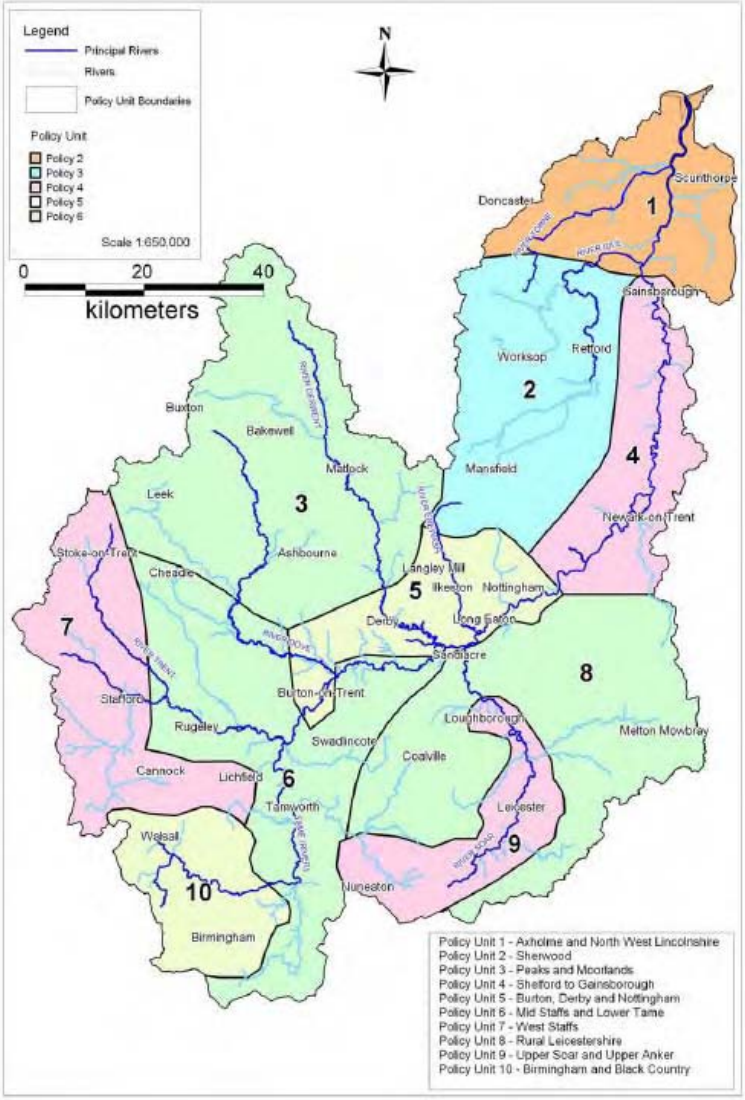
2.6 The River Doe Lea falls with the draft Don and Rother Catchment Flood Management Plan[31]. The Chesterfield & River Hipper Policy Unit includes Chesterfield urban centre, the upper River Rother corridor and the Doe Lea corridor. Therefore, a small area of the Policy Unit extends into the north of the District.



Plan Two: Principle Watercourses in Ashfield



Plan Three: Catchment Areas of Rivers in Ashfield
Source: Environment Agency



Plan Four: Policy Units and Policies River Trent Catchment Flood Plan. Source: Environment Agency - River Trent Catchment Flood Plan Consultation Draft Oct 2007

2.7 The use of water resources can be an issue as over abstraction of water from watercourses will result in low flows. The impact is to concentrate existing nutrient and chemical pollution, which threatens the survival of plants and animals in watercourses. The Environment Agency uses Catchment Abstraction Management Strategies (CAMS) to manage water resources at a local level. They provide for consultation with the local community and other interested parties in balancing the needs of abstractors and other water users with those of the water environment. CAMS set out local licensing strategies to determine whether time limited licences should be renewed and on what terms.

Surface Water Flooding (Pluvial)
(Land in the 'Other Sources of Flooding' Tables)

2.8 Surface water flooding occurs when excess water runs-off the surface of the land. Intense rainfall that is unable to soak into the ground or enter drainage systems can run-off land and result in local flooding. Due to its

nature, surface water flooding is hard to predict and the scope for providing warnings is limited. However, a number of factors will affect the likelihood of surface water flooding including:

- Intensity of rainfall - if rain falls in short intense bursts drainage systems may be overwhelmed.
- Topography - the topography of the area will impact on where flooding occurs.
- Sewerage and drainage system - the size and condition of any drains will affect how rainfall will be drained.
- The type of surface material - the more impermeable the surface material the greater the amount of run-off.
- The saturation of the ground (infiltration capacity) - water is held in the soil. If rainfall is exceptionally heavy or the soil is already saturated the infiltration capacity is exceeded and the soil will act as an impermeable surface.
- Maintenance - The regular maintenance of drainage infrastructure is important.
- Development - development will generally reduce permeable space.
- Land Management Practices – In rural areas land management practices such as the direction of ploughing can affect surface water run off.

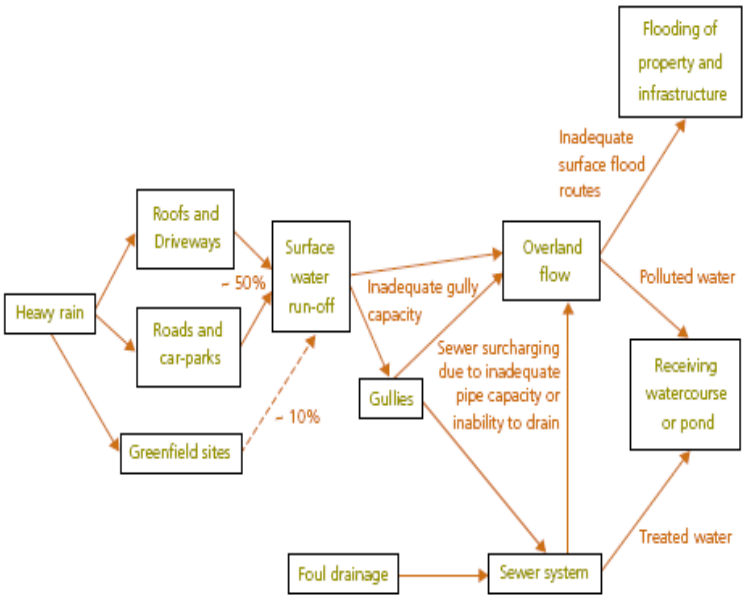


Figure Four: Surface Water Main Flood Routes

Source: Future Water the Government's water strategy for England. DEFRA

2.9 Surface water flooding is more common during long periods of rainfall in winter months, though it also occurs during intense summer rainfall. The Pitt Review[57] into the floods of the summer of 2007 revealed that around two-thirds of the flooding was down to surface water. Surface water flooding is anticipated to be an increasing problem in the future in

the District when combined with the predicted changes in climate. This reflects that:

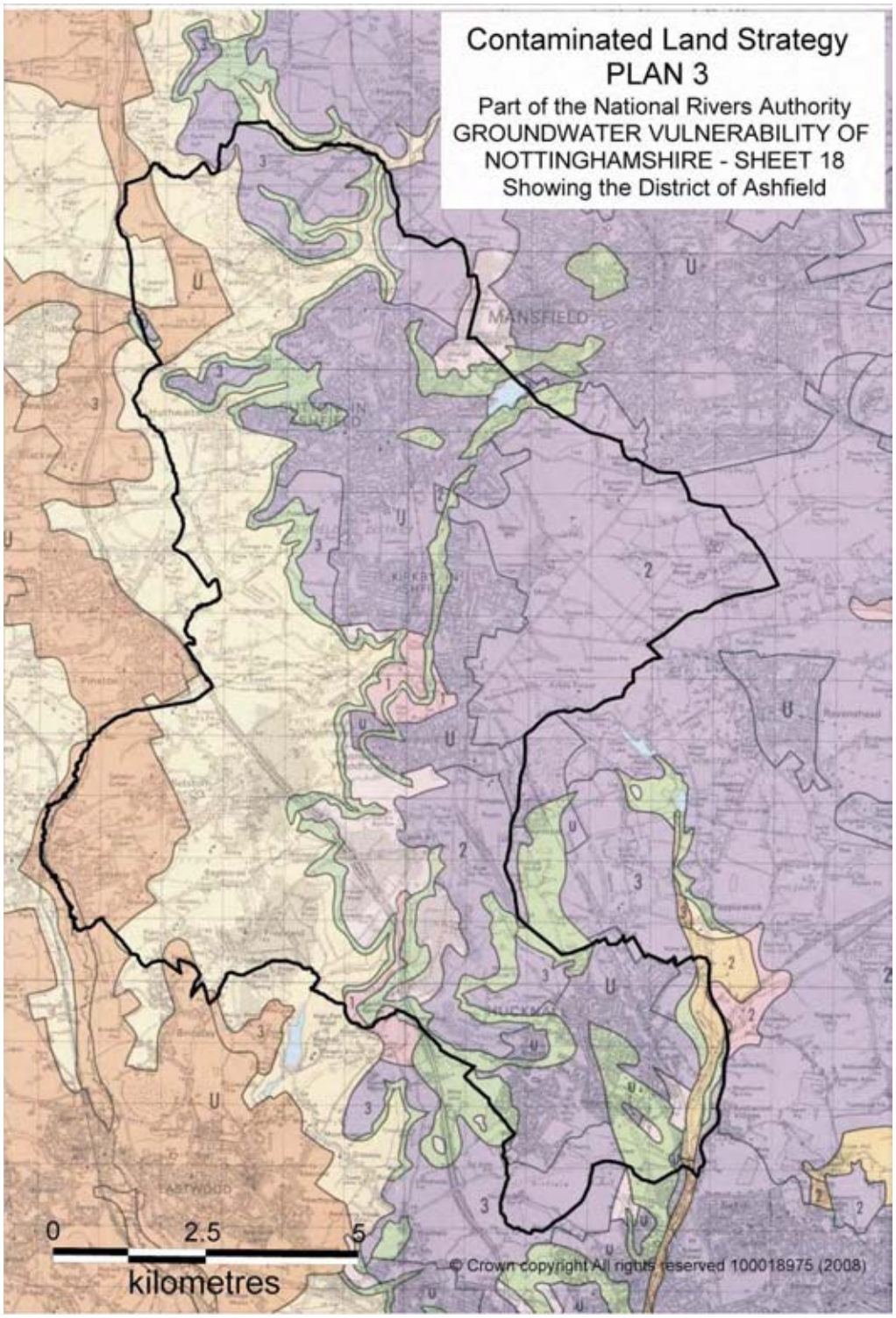
- The District has significant urbanised areas with large areas of impervious surfaces in the form of roofs, driveways, patios, roads, and car parks. Intensive storms are likely to result in potentially flooding. What area floods will be a reflection of the features of streets, drains and topography and where the storm occurs.
- Spoil heaps from old mine workings are located across the District (Table Four). Spoil heaps typically rise above the surrounding areas and the gradient of the slopes provide the potential for surface water run off.
- Low permeable soils facilitate surface water run off. Soils with high clay content or which are waterlogged will result in increased surface run off. Clayey soils can be found in a number of locations through out the District. Mansfield District Council's SFRA identifies that Middle Permian Marl formations increase the risk of surface run of on the southern and western side of Mansfield, the latter extending towards Skegby. (Plan Five identifies soils which are negligibly permeable in green).

Flooding from culverts/gullies (including Highway drains)

2.10 Culverts or drains can flood for a variety of reasons:

- Watercourses may loose material up-stream, which is in drains or gullies thereby reducing their capacity.
- Trash screens may be poorly maintained. A trash screen is designed to prevent debris entering a culvert and causing a blockage. If the screen is poorly maintained, debris builds up against the screen and impedes the flow of water.
- In urban areas, waste and inappropriately dumped rubbish can cause blockages. Urban streams and structures are subject to vandalism, to shopping trolleys, garden waste or even furniture being dumped in the watercourse.
- The frequency of flash flooding - Flood events that rise and fall rapidly can lead to culverts being blocked and this happen more frequently in urban or steep rural catchments.
- The culvert or drain may have insufficient capacity for the volume of water from an intense storm.

In these circumstances, water backs up and can flood nearby land or low-lying areas as it finds an alternative route around the culvert.



Plan Five: Groundwater Vulnerability

Flooding from Sewers

2.11 Rainwater is frequently drained into surface water sewers or sewers containing both surface and wastewater known as “combined sewers”. Flooding results when:

- The sewer is overwhelmed by heavy rainfall, becomes blocked or is of inadequate capacity.
- There is overloading of existing downstream systems, which causes them to back-up under extreme storm conditions.
- There are misconnections of surface water to the foul sewer system within developments, which creating a risk of surcharging.

When this happens to combined sewers, there is a high risk of land and property flooding with water contaminated with raw sewage as well as pollution of rivers due to discharge from combined sewer overflows.

2.12 Sewers are currently designed for a 1 in 40 year storm. However, most of the system will fall well below this standard as it was constructed in the past when design standards were lower. As no information was forthcoming from Severn Trent Water Limited the SFRA cannot identify specific locations in the District that may flood from sewers.

Infrastructure Failure

2.13 Water is retained by a variety of artificial structures. These include reservoirs, canals, and lakes. Risk of flooding arises if the water is retained above the natural ground level. Two dams are located in Sutton in Ashfield at Kings Mill Reservoir and Sutton Lawn Dam. The current legislation covering reservoirs is the Reservoirs Act 1975, but this only applies to reservoirs holding or capable of holding more than 25,000 million cubic metres of water. It should be stressed that there have been no British dam related deaths since 1925.

Flooding from Groundwater

2.14 Nearly all rocks in the upper part of the earth's crust contain pores or voids. How water moves through the rock will depend on:

- Porosity – rocks with a relatively large proportion of void space are porous.
- Permeability - how interconnected are the voids which allows water to flow through the rock.

Groundwater flooding occurs when water levels in the ground rise above surface elevations due to increases in rainfall or reductions in the amount of water taken from any of the rock aquifers. This is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). Jacobs[(39)] identifies the following sources of individual groundwater flooding events within non-Chalk:

- rise of typically high groundwater levels to extreme levels in response to extreme rainfall;
- rising groundwater levels in response to reduced groundwater abstraction in an urban area (termed groundwater rebound) or in a mining area (termed minewater rebound);
- subsidence of the ground surface below the current groundwater level;

- rise of groundwater level in aquifers in hydraulic continuity with high in-bank river levels or extreme tidal conditions;
- faulty borehole headworks or casings causing upward leakage of groundwater through confining layers driven by artesian heads;
- rise of groundwater levels due to leaking sewers, drains and water supply mains;
- increases in groundwater levels and changed flow paths due to artificial obstructions or pathways, and loss of natural storage and drainage paths; and
- inundation of trenches intercepting high groundwater levels.

2.15 The geology of an area will have a major impact on potential flooding from groundwater. The potential for groundwater flooding is greatest in low lying areas underlain by permeable rocks such as sandstone, chalk and limestone where rapid changes in the water table can occur. The Coal Measures are classed as a Minor Aquifer and Magnesian Limestone and Sandstone are classified as Major Aquifers. The Magnesium Limestone is unpredictable as an aquifer and can see rapid increases and decreases in the groundwater level in response to rainwater/recharge, which can be in the order of 10's of metres. The Sherwood Sandstone in contrast sees a gradual rise in groundwater levels with groundwater responding six month to one year following changes in rainfall. There is only a small gradual annual water level fluctuation of the order of one to three metres. However, aquifers may be more localised where sands or river gravels in valley bottoms are underlain by less permeable rocks.

2.16 The Environment Agency has indicated that shallow groundwater exists in the Sherwood Sandstone in the northeast and east of the District of Ashfield. Shallow groundwater in the Sherwood Sandstone also appears to be present in the following areas:

- in the area to the north and east of Hamilton Hill,
- a small area to the north and north-east of Sutton Parkway,
- an area to the north of Annesley, and
- an area to the east of Hucknall.

The Environment Agency has no information relating to shallow groundwater for specific areas located on the Magensian Limestone, the Coal Measures or other minor local aquifers.

Potential Flood from Mines & Spoil Heaps

2.17 Table Four identifies the collieries developed in Ashfield from the second half of the 19th century. To access these deep seams of coal, pumping was necessary to keep the mines clear of water. Following abandonment, if pumping ceases, water levels rise and there is a risk of pollution and possibly flooding. In Ashfield all coal mines have been closed and the position relating to minewater depends on their location. The North Derbyshire and Nottinghamshire coalfield is divided into two minewater regimes:

- the Northern Section, with the last two remaining working collieries in Nottinghamshire at Welbeck and Thorsby, where pumping continues, and
- the Southern Section where all collieries have closed.

SOUTH NOTTS AREA		**Spoil heaps**
Annesley (Out of production 1995)	1865 – 2000	In Gelding Borough Council's district
Bentinck	1895 – 2001	South of Park Lane & west of Mill Lane
Langton	1842 – 1968	Langton (east of M1)
Kirby (Summit)	1890-1968	Kirkby West & Kirkby East
Hucknall No 1	1861 -1943	South Watnall Rd
Hucknall No 2	1864-1986	Wigwam Lane East (golf course) & Wigwam Lane West
Lindy	1873-1988	Linby (now a park)
Pye Hill & Underwood (Pye Hill No 1 & Pye Hill No 2)	1874-1985	Pye Hill Rd No.2 & Underwood
Selston (Bull and Butcher)	1892-1956	Selston (now the par 3 golf course)
New Hucknall (Huthwaite)	1876-1982	New Hucknall
NORTH NOTTS AREA		
Teversal	1862-1980	Part of Silverhill
Sutton (Brierley)	1874-1989	Brierley (Part of Brierley Forest Park)
Silverhill	1875-1993	Silverhill (now a park)

Table Four: Ashfield Collieries from the Mid 19th Century

2.18 Pumping in the Southern Section ceased in 1999 and the Coal Authority has been monitoring minewater recovery from this date. The Coal Authority and the Environment Agency work together under a Memorandum of Understanding, to prevent polluting outbreaks of minewater from abandoned coal mines and to reduce the impact of existing discharges, through a prioritised programme of remediation. Under the memorandum, the Coal Authority will seek to agree with the Environment Agency any changes in its pumping operations. It is required to ensure that the information provided will be consistent with the Mines (Notification of Abandonment) Regulations 1998. However, the Sherwood Sandstone is an important source of drinking water. Consequently, it is understood from the Coal Authority that to prevent the potential risk of contamination of the aquifer, the Coal Authority is preparing long term plans to control minewater levels which will impact on ground water levels. This will involve the pumping and treatment of minewater at a number of locations. If all pumping were to cease, work

undertaken by the British Geological Survey suggests that minewater pollution would occur in the Yorkshire-Nottinghamshire coalfield and it may possibly pose a risk to the water supply aquifer. (S.Dumpleton. Mitigation of minewater pollution. British Geological Survey)

2.19 Mine water levels on the outcrop and western side of the coalfield are more elevated with the older mine workings flooding before overflowing to the deeper younger mine workings to the east. The Coal Authority has identified there is a small risk of minor surface discharges from the shallow mine workings to the western side of the coalfield and the potential for a higher water table once surface water can no longer drain into the flooded mine workings. However, as the plan is to control the main minewater levels at depth, a flow path and hydraulic gradient should be maintained and the Coal Authority considers flood risk should not be an issue.

2.20 There are a number of former colliery spoil heaps within the District, Table Four. They consist mainly of waste shales and mudstones derived from the underground workings, which have been historically tipped above surrounding ground levels. Nearly all of these spoil heaps have now been restored to use as parkland, agriculture or golf courses. The exception is Bentinck Tip which remains exposed. The application of limited thicknesses of subsoils and topsoils of varying nature enables vegetation to become established on such tips. This in itself assists in the absorption of moderate amounts of rainfall but the tips often continue to be a potential source of flooding within the District. Drainage ditches around the perimeter of such tips are used to collect water run-off during periods of heavier rainfall. These ditches often drain into balancing ponds to allow sediments to settle out before the water enters local watercourses. The tips themselves tend to be of low permeability and do not rapidly absorb large amounts of water during periods of heavy rainfall. During such events (which may become more frequent in the future due to climate change), the run-off may overload the perimeter drains and balancing ponds and adversely affect land adjacent to the tip or downstream of the receiving watercourse.

Combined Sources

2.21 Flooding typically arises from a combination of sources rather than a single source. A severe storm may result in the local drainage channel capacity being exceeded. Figure Five. It can also occur where there is adequate drainage channel capacity but flow cannot enter the channel at the necessary rate. An example can be seen in highway flooding caused by a lack of gully capacity.

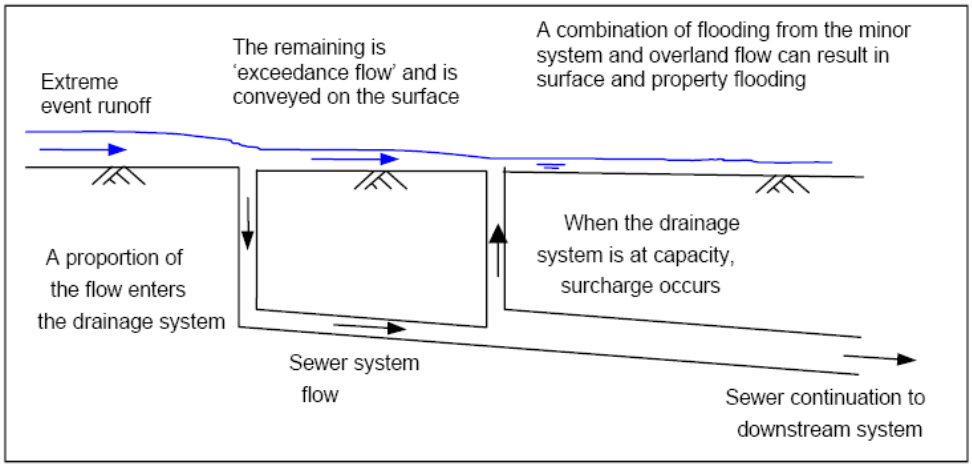


Figure Five: Interaction between the flow above ground and the below ground drainage system (adapted from Balmforth *et al* 2006) [(7)]

CLIMATE CHANGE

2.22 The term 'climate change' refers to the average weather experienced in a region over a long period of time, typically 30 years. It includes wind and rainfall patterns as well as changes in temperature. The latest report from the United Nations Intergovernmental Panel on Climate Change (IPCC) suggests that global temperatures are likely to rise between 1.1°C and 6.4°C above 1990 levels by the end of this century, depending on world emissions. This will result in a significant sea level rise and changes in rainfall patterns. The principal effects of climate change in the United Kingdom (UK) are likely to be seen in hotter, drier summers and warmer, wetter, stormier winters. Extreme rainfall events may happen twice as often by the 2080s. It should be noted that there will be changes to both the average and extreme weather conditions, and that not all years will fit a clear trend as the weather becomes more variable in a changing climate. The anticipated impact in the East Midlands is set out in Figure Six.

2.23 Climate change will have economic, social and environmental impacts. The Stern Review[(60)] estimates that if we don't act now, the overall costs and risks of climate change will be equivalent to losing at least 5% of global Gross Domestic Product (GDP) each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more. The Foresight Programme[(24)] studied the risk of flooding in the UK, considering a number of factors, including climate change. The project found that, using the UKCIP02 climate change projections, together with scenarios of potential economic and social changes, annual damage from flooding may rise from around £100 million to between £460 million (under the community orientated *Local Stewardship scenario*) and £2,500 million (under the more consumerist *World Markets scenario*) by 2080.

THE FUTURE CLIMATE OF THE EAST MIDLANDS

The headline conclusions for the potential future climate scenarios in the region are:

Temperature

- For all emission scenarios, in the 2020s, average annual temperature and seasonal temperatures increase by about 0.5°C to 1°C, except all summer averages and autumn averages for Medium-High and High scenarios which increase by nearer 1.5 °C.
- The spread widens in future years. By the 2080s, the annual average increase is 2.5 to 3.0 °C for Low emissions to 3.5 to 4.5 °C for High. Winter increases in averages are from 1.5 to 2.0 °C (Low) to 2.5 to 3.5 °C (High) and summer from 2.0 to 3.0 °C (Low) to more than 4.5 °C (High).

Precipitation

- Annual rainfall averages show little change over the whole range of emission scenarios and timescales.
- Winter rainfall shows increases across all scenarios with time, with the biggest increase of +30% towards the end of the century for High emissions.
- Summer rainfall shows similar decreases with time. The biggest decrease being over 50% for High emissions towards the end of the century.

Figure Six: Future Climate of the East Midlands
Source: Waters.B. (OCTOBER 2004) Climate Change in Nottinghamshire Impacts and Options for Mitigation and Adoption Final Report. A Report Commission by the Nottinghamshire Agenda 21 Forum.

2.24 In terms of water resources and water quality the SUDS Manual[8] identifies the main outcomes arising from climate change as:

- Reducing the availability of fresh water, leading to reduced dilution of pollutants at low flows and increased consequences (e.g.eutropication).
- Increased evaporation from water bodies and increased frequency of algal blooms.
- Lengthening of the growing season, combined with wetter weather. This may increase the impact of nutrient leeching, soil compaction and rapid runoff.
- Reduced availability of water for groundwater with consequential effects on water supplies and aquatic ecosystems dependent on groundwater.
- Lengthening the season for recreation and leisure activities involving water.

More frequent periods of intense rainfall are likely to result in:

- Increase runoff from urban and agricultural land and increase the input of pollutants to the water environment, particularly following periods of drought when the land is slow to absorb water.
- Erode topsoil, increasing input of sediment to surface water runoff, which may harm some fish species and increase contaminant concentrations.
- Increase flooding and the frequency of sewer overflows discharging untreated sewerage into the water environment.
- Increase input of pollutants from contaminated returning floodwater.

BIODIVERSITY

2.25 In looking at the issue of flood risk and the use of Sustainable Drainage Systems (SUDS) there are opportunities to enhance local bio-diversity. Taken in the context of Ashfield, the Nottinghamshire Biodiversity Action Plan[(49)] identifies the following main concerns in relation to water:

- Loss of and damage to wetland habitat and species diversity due to over- abstraction of water, especially during prolonged periods of low rainfall.
- Loss of species diversity due to pollution arising from sources such as sewage works, run-off of agricultural chemicals, or industrial processes.
- The loss of wetland habitats through drainage and flood alleviation schemes and the straightening and canalisation of watercourses.

There are water related Sites of Special Scientific Interest in Ashfield at Bagthorpe Meadows, Bog Farm Quarry and Friezeland Grassland. The Council has designated Local Nature Reserves at Portland Park, Kirkby in Ashfield, the Teversal to Pleasley Railway, Bentinck Banks, (Part) and Brierley Forest Park. It is proposed that Kings Mill Reservoir, Jacksdale Nature Reserve and the area around Sutton Lawn Dam will also be designated as Local Nature Reserves. In addition, there are a significant number of Sites of Interest for Nature Conservation (SINC) which are water related, Appendix Three. However, up to date information on SINC sites should be obtained from the Authority or the Nottinghamshire Biological and Geological Records Centre.

2.26 Planning policy set out in the development plan documents and decisions on planning applications will take into account the impact on local biodiversity of surface water disposal**.**

KIRKBY IN ASHFIELD - FLOOD RISK

(The wards of Kirkby in Ashfield Central, Kirkby in Ashfield West and Kirkby in Ashfield East)

River Erewash (Principally a Main River)

2.27 The River Erewash is a major tributary of the River Trent. It rises on the Magnesium Limestone at Kirkby in Ashfield flowing west over Kirkby Park

to the village of Pinxton where it turns south. The River was diverted during the operational life of the Smotherfly Opencast Mine. However, it has been restored to its former position as it forms the county boundary between Nottinghamshire and Derbyshire. Between Pinxton and Ilkeston, the river follows a meandering course across its floodplain.

2.28 The catchment of the river is fairly steeply sloping in its upper reaches but flattens out towards the River Trent. It has a total catchment area of 206 km^2 with an average annual rainfall of 709mm. The draft River Trent Catchment Flood Management Plan [(26)] sets out that the River Erewash is a relatively fast flowing river, which responds quite quickly to rainfall. Using the time-to-peak parameter, which indicates catchment response time, it can be seen that Erewash response is 7 hours.

2.29 The River Erewash SRRM Hydraulic Modelling Report May 2005[(29)] by JBA Consulting identified that approximately 200 residential, commercial and industrial properties were at risk of flooding in a 1 in 100 year flood. Locally, there were 17 properties at Pinxton, and 2 at Pye Bridge, which would flood. The draft CFMP identifies that the flood pathway for Langley Mill, Ilkeston, Stapleford and Sandiacre is overtopping of raised embankments and overland flow. A breach or overtopping of defences would result in rapid inundation with deep, locally fast flowing water resulting in risk to life or serious injury. A large flood event could affect the main Erewash Valley railway line causing considerable disruption. Consequently, the risk of flooding outside the District needs to be taken into account.

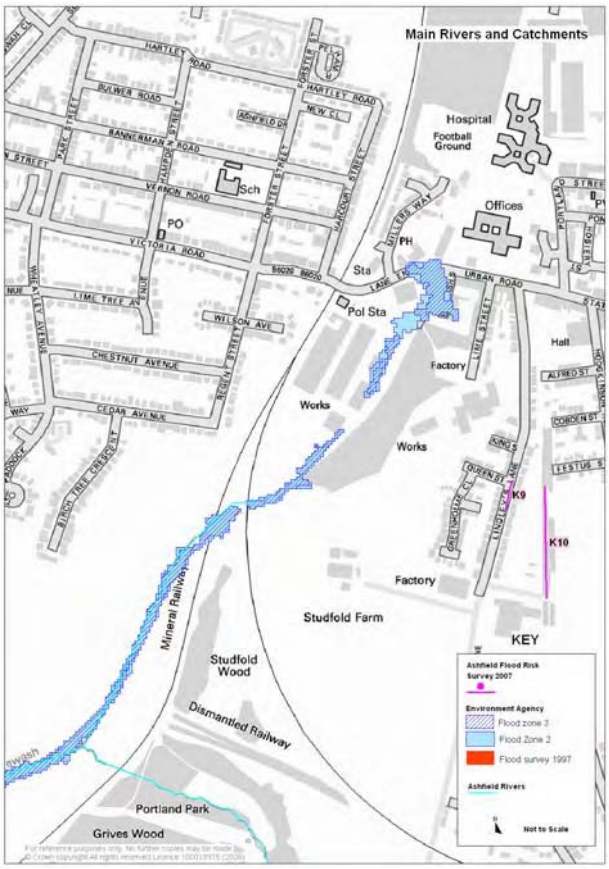
2.30 The River provides a Level 2 or Level 3 Flood Risk at Lane End. Plan Six. Approximately, eight residential properties and nine commercial properties are identified as being located in Flood Zone 2 or Flood Zone 3. A significant part of the upper reach of the river is culverted and receives surface water from urban and industrial areas off Lane End, and Park Lane.

2.31 Known flooding sources from the River Erewash and its tributaries are identified below:

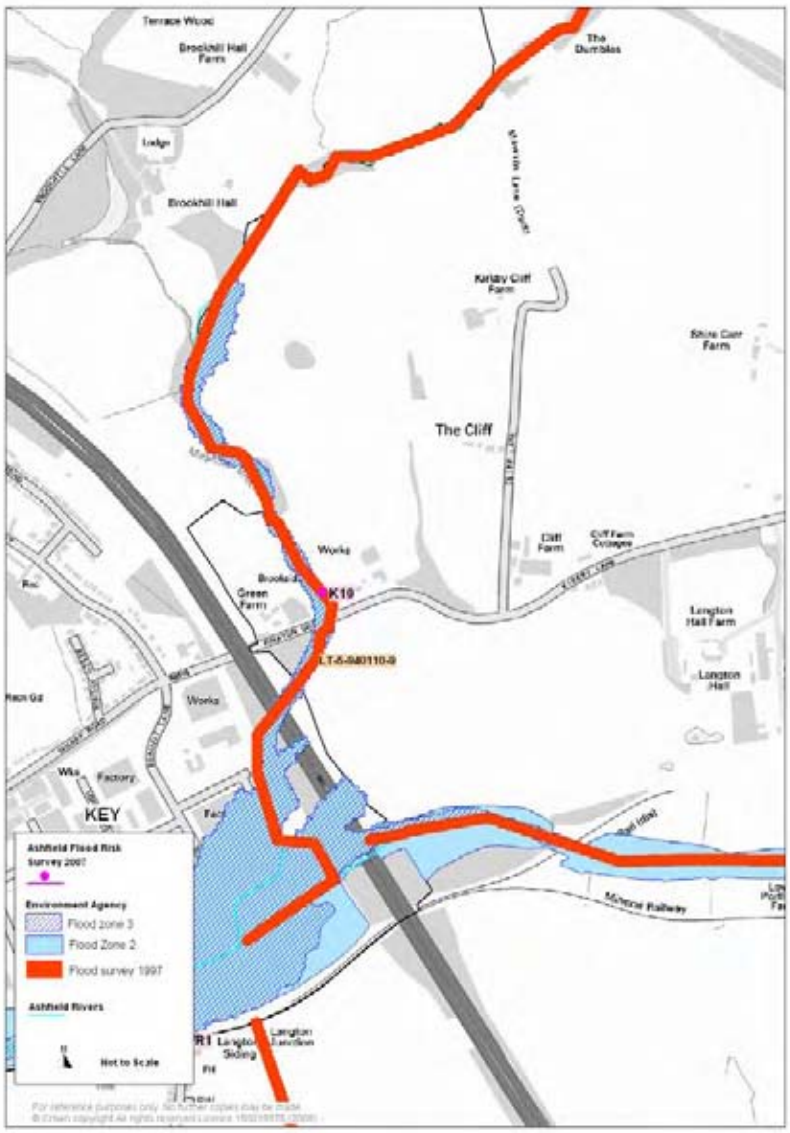
- Since the flood in 2000, the stepped structure on the River Erewash near Portland Park, Kirkby in Ashfield has been destroyed by erosion. High water flows continue to erode exposed channels and banks and silt is carried down stream. This is a natural process but it can raise the bed of the channel and reduce the capacity of the channel for floodwaters. Potentially in-stream features such as bars can be formed.
- Tributary of the River Erewash off Mill Lane, Kirkby in Ashfield - Mill Lane has been known to flood. The Erewash enters a culvert at this point which is guarded by screen/guard at the upstream end.
- Castle Hill Brook – minor tributary of the River Erewash. The Environment Agency's Flood Survey in 2007 identified that the watercourse should be improved by channel enlargement and partial regrading over a length of 1 kilometre. However, MAFF did not

anticipate any benefits to agricultural land from any improvements. (5-94-110-11)

- Meadow Farm Brook, Kirkby in Ashfield – Minor tributary with inadequate capacity.(5-94-111-10)
- Kirkby Park Brook, Kirkby Park – This is a small watercourse which causes minor flooding of agricultural land. (5-94-110-6)
- Maghole Brook – The Environment Agency's Flood Survey 2007 identifies that some 4.2 kilometres of the channel will require some work to ensure that future development does not lead to any worsening of land drainage. In the higher reaches this is identified as removal of tree growth and debris. In the lower reaches it requires cleaning out and possibly regrading. The Brook has flooded at the culvert with Kirkby Lane/Pinxton Green with four properties flooding in the summer of 2007. (5-94-110-9).



Plan Six: Flood Risk River Erewash, Urban Road, Kirkby in Ashfield.



Plan Seven: Maghole Brook & River Erewash, Kirkby Lane

2.32 Water abstraction is not identified as an issue for the Erewash as the Water Resource Management Unit for the Lower Trent and Erewash CAMS[27] specifies 'water available.' New licences could be issued with a flow restriction to prevent abstraction in low flows.

'Other Sources of Flooding'

2.33 Table Six, and Plan Eight set out other areas that have been identified as flooding in the past.

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
			N.B. The comments set out below reflect Council officers local knowledge of the believed cause of flooding. No detailed survey work has been undertaken to verify the specific cause (s) of the flooding at these locations.	Residential	Industry/ Commercial	Highway	Park/field	Other Transport	Infrastructure	Other
SFRA -K1	Sutton Road	Highway	The main highway drain at the exit and entrance to Ashfield Comprehensive School is anticipated to be the causes flooding of the area.	√		√				
SFRA - K2	Cherry Avenue	Land	Surface water is believed to run off from the playing field.	√						
SFRA - K3	Junction Banks Ave, Greenwood Drive, Sutton Middle Lane	Sewer	Believed the area floods due to an insufficient capacity in the drainage system.	Not Known						
SFRA - K4	Lowmoor Road south of Mary Street	Land	Believed the area floods due to surface water running off an adjacent plot of land onto highway.	√		√				
SFRA - K5	Edward Street	Land	Believed the area floods due to surface water running off an adjacent plot of land onto highway.	√						
SFRA - K6	Beacon Drive	Sewer	No information available	Not Known						
SFRA - K7	Lowmoor Road between approximately Milton Street and Gladstone Street.	Sewer	Believed the area floods due to insufficient gully capacity.	Not Known						
SFRA	Cowpasture Lane	Land	Believed the area floods when the culvert / field dyke							√

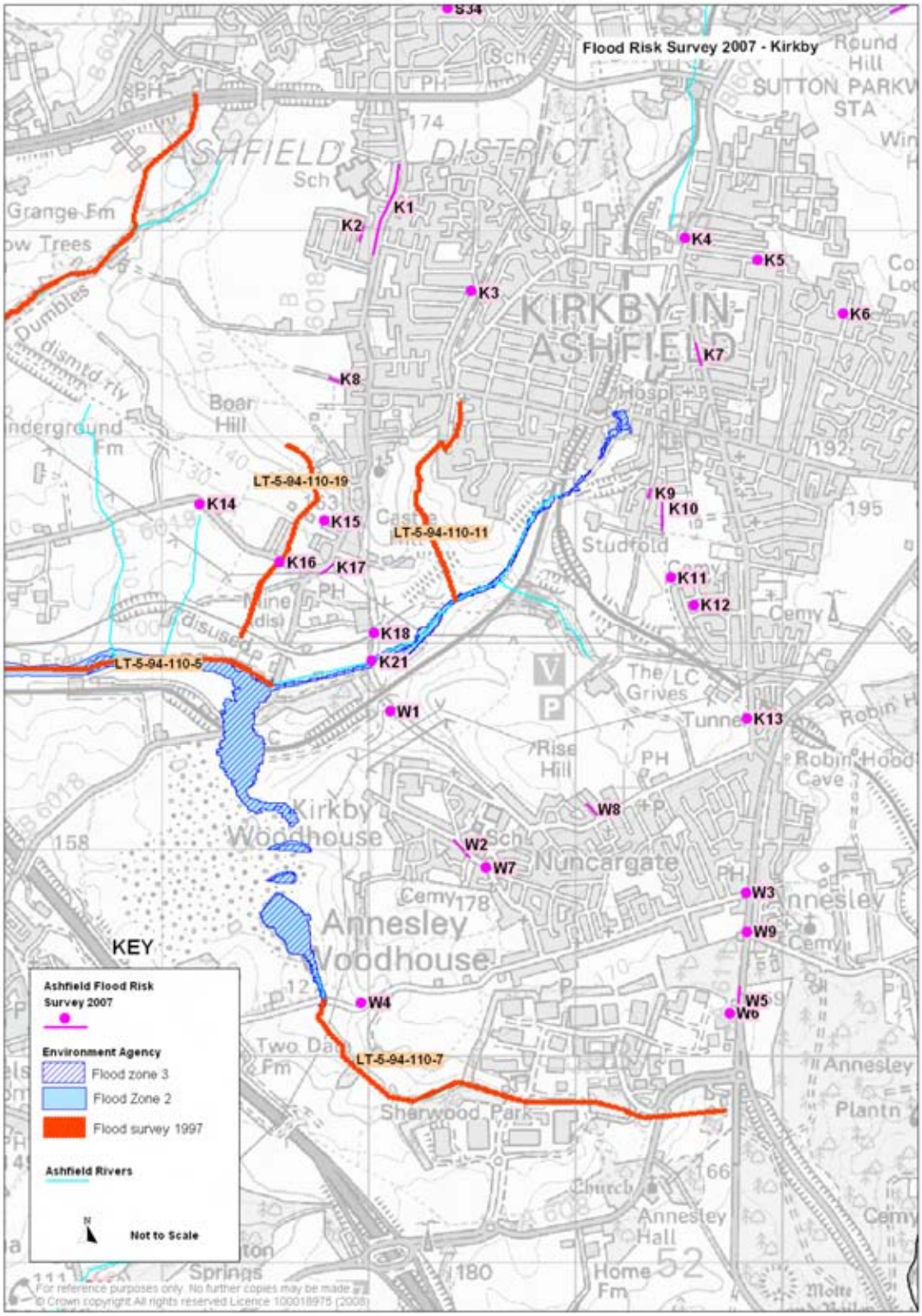
Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
- K8			is blocked.							
SFRA - K9	Lindleys Lane	Sewer	No information available	Not Known						
SFRA - K10	Old railway line east of Lindleys Lane	Land	Believed the area floods due to surface water run off from Kingsway Park.	√						
SFRA - K11	Land off Kingsway Park/Half Moon Drive	Land	Believed the area floods due to surface water run off from Kingsway Park.	√			√			
SFRA - K12	Track between Fairhaven and Western Avenue	Land	Believed the track has no proper drainage system which results in run off.	√		√				
SFRA - K13	Nottingham Road	Highway	Believed the area floods due to an insufficient drainage system.			√				
SFRA - K14	Pinxton Lane	Land	Believed the area floods due to surrounding gullies and ditches becoming blocked. Works have been carried out to the above in Aug 2008.			√				
SFRA - K15	Land off St Wilfrids Park	Watercourse	Believed that floods result from blockages in small watercourse / culvert in private land.			√				√
SFRA - K16	Old railway line east of Mayfield Street	Land	Believed the area floods due the act of vandalism blocking the outlet of the culvert.			√	√			
SFRA - K17	Land opposite Junction Pinxton Lane/Park Lane	Land	No information available			√	√			
SFRA - K18	Mill Lane	Land	Believed the area floods due to surrounding grids and culverts becoming blocked.			√	√			
SFRA - K19	Kirkby Lane	Watercourse & Land	Believed that the substantial cause of flooding is the watercourse. Gullies and ditches have been cleared to facilitate drainage off the highway in August 2008.	4		√	√			
SFRA – K20	Park Lane	Land	Believed that water runs off from land onto highway			√				

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
SFRA – K21	Mill Lane	Watercourse	Highway Grid on River Erewash. Grid inspected on a regular basis and works actioned accordingly.			√				

Notes

- Potential Sources of Flooding - Identifies the believed source of the flooding. However, further investigation is likely to be necessary.
- Approximate Location – identifies the broad location.
- Potential Source of Flooding – see 'Potential Flood Hazards in Ashfield'.
- Sewer - No information was provided by Severn Tent Water Ltd. Therefore, further investigation with Severn Trent Water is required before development is undertaken.
- Area or Asset understood to be affected - Identifies what is believed to be the impact of flooding. However, it may impact on other areas or assets.
- Residential – This related to flooding of the curtilage and possible the dwelling. A number identifies the properties known to have flooded internally in the summer of 2007.
- Industrial/commercial – This related to the flooding of the curtilage and possibly buildings.
- Other - relates largely to private roads.

Table 6: Other Sources of Flooding Kirkby in Ashfield
Source: Ashfield District Council



Plan Eight: Flood Risk Kirkby in Ashfield
Source: Ashfield District Council

WOODHOUSE – FLOOD RISK

(The ward of Woodhouse).

Watercourses

2.34 There are significant flood risks from the River Erewash to the east of Park Lane and Flood Map identifies that the Cuttail Brook as presents a Level 2 and 3 flood risk off Park Lane.

2.35 The Cuttail Brook rises from springs to the south of Annesley Woodhouse. The Brook has seen a high degree of industrial development in its upper reaches with the expansion of the Kodak Works into Sherwood Park from the early 1990s. The Brook at this point forms several ponds and is culverted beneath car parks. Its lower reaches have been substantial impacted by the open cast works at Bentinck Void.

2.36 There are two main areas where issues relating to flooding can be identified on the Cuttail Brook, off Derby Road and the Bentick Void.

- Derby Road - The Environmental Agency's Flooding Survey 2007 identifies that the Brook's channel is hydraulically inadequate and should be enlarged and regraded over a distance of 1.21 kilometres downstream of Salmon Lane.

- Bentinck Void - The Brook is culverted beneath the old colliery spoil heap (the Bentinck Void culvert). The 1100 m long culvert eads from an inlet headwall at the Bentinck Void before discharging into the River Erewash. The supporting information by Montgomery Watson [(36)], attached to the Bentinck Void planning application, identifies that the culvert is in good condition and is very unlikely to collapse in the next 100 years, subject to regular maintenance being carried out. However, the old spoil heap acts as a dam over the Cuttail Brook with the culvert allowing water to flow under the spoil heap. If the culvert fails and no measures were immediately taken, water would accumulate and flood back along the valley of the Cuttail Brook. The potential impact of a failure of the culvert should be taken into account if there are any proposals to undertaken development of the valley in which the Cuttail Brook flows.

'Other Sources of Flooding'

2.37 Table Seven and Plan Eight sets out other areas that have been identified as flooding in the past.

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
			N.B. The comments set out below reflect Council officers local knowledge of the believed cause of flooding. No detailed survey work has been undertaken to verify the specific cause (s) of the flooding at these locations.	Residential	Industry/ Commercial	Highway	Park/field	Other Transport	Infrastructure	Other
SFRA - W1	Mill Lane	Land	Believed the area floods due to grids and culverts becoming blocked.			√	√			
SFRA - W2	Skegby Road,	Highway	Believed the area floods due to insufficient drainage. Kerb drainage was installed in July 08.	√		√				
SFRA - W3	Junction Derby Road and Forest Road	Sewer	Believed the area flooded to a pump station failing.	Not Known						
SFRA - W4	Salmon Lane	Land	Believed the area floods due to insufficient drainage. Drainage and carriageway work is scheduled for Oct 08.			√	√			
SFRA - W5	Derby Road opposite Sherwood Park	Highway	Believed the area floods due to insufficient drainage in the surrounding area. Some soakaway work was undertaken in March 08.			√	√			
SFRA - W6	Derby Road opposite Sherwood Park	Watercourse	Believed the area floods when the grid is blocked on the drainage ditch.			√				
SFRA - W7	Skegby Road	Land	No information available.			√				
SFRA - W8	Mattley Avenue	Sewer	No information available.	Not Known						
SFRA - W9	Annesley Cutting/A611	Sewer	No information available.	Not Known						

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected

Notes

- Potential Sources of Flooding - Identifies the believed source of the flooding. However, further investigation is likely to be necessary.
- Approximate Location – identifies the broad location.
- Potential Source of Flooding – see 'Potential Flood Hazards in Ashfield'.
- Sewer - No information was provided by Severn Tent Water Ltd. Therefore, further investigation with Severn Trent Water is required before development is undertaken.
- Area or Asset understood to be affected - Identifies what is believed to be the impact of flooding. However, it may impact on other areas or assets.
- Residential – This related to flooding of the curtilage and possible the dwelling. A number identifies the properties known to have flooded internally in the summer of 2007.
- Industrial/commercial – This related to the flooding of the curtilage and possibly buildings.
- Other - relates largely to private roads.

Table Seven: Other Sources of Flooding Woodhouse
Source: Ashfield District Council

SUTTON IN ASHFIELD – FLOOD RISK

(The wards of Sutton North, Sutton Central, Sutton West and Sutton East)

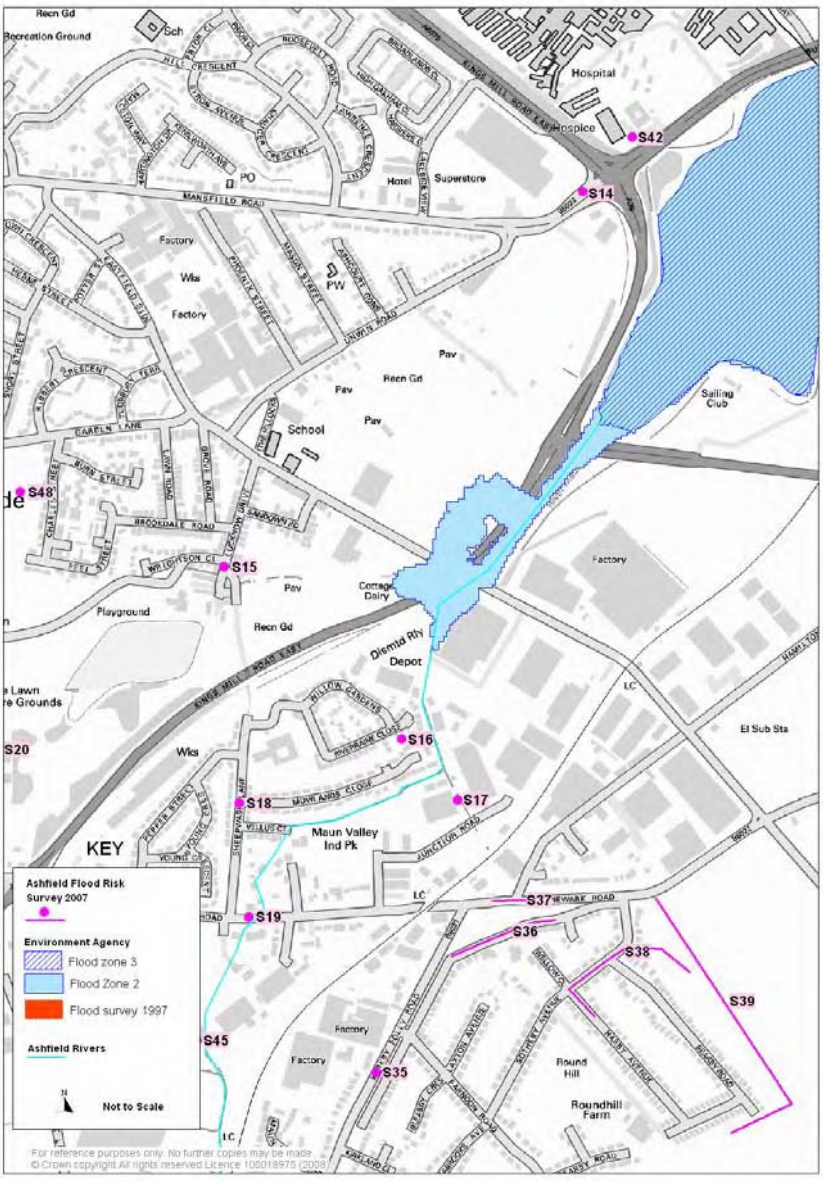
2.38 The rivers and streams in Sutton in Ashfield have the potential to cause flooding problems in localised areas, however, the substantive issue in the northern part of the District is low water flow. Water needs to be retained in the watercourses during the summer months. This is reflected in the Environment Agency's Idle and Torne Catchment Abstraction Management Strategy(28) which sets out a policy not to issue any new abstraction licences in the catchment area. The Nottinghamshire Local Biodiversity Action Plan(49) identifies that one of the main local concerns in relation to water, is loss of and damage to wetland habitat and species diversity due to over- abstraction of water, especially during prolonged periods of low rainfall.

River Maun (Ordinary watercourse in Ashfield)

2.39 The River Maun has a low relief flat catchment, which drains the urban areas of Sutton in Ashfield and Mansfield (approximately covering 30 km^2 The Flood Maps do not identified the river as a flood risk until it reaches the junction of the A38/Coxmoor Road. (Plan Nine). However, flooding has occurred off Mowlands Close and there are problems associated with insufficient capacity for additional surface water run-off. Therefore, the Environment Agency has recommend that new developments draining into the River Maun incorporate surface water balancing or Sustainable Drainage Systems. Mansfield District Council's Strategic Flood Risk Assessment identifies that Kings Mill Reservoir provides some attenuation of peak flows on the River Maun.

Cauldwell Brook

2.40 The Cauldwell Brook is not identified by the Environment Agency as forming a flood risk in Ashfield. It is currently in open countryside and there have been no identified reports of flooding from the Brook in Ashfield. However, Sherwood Way South (The Mansfield Ashfield Regeneration Route) is identified by various policy documents as having potential for development towards the regeneration of Ashfield/Mansfield. Mansfield District Council has expressed concerns over the potential flood risk associated with any development along Sherwood Way South between Kings Mill and the A60. Consequently, it is anticipated that developments along Sherwood Way South will include attenuation measures to ensure the risk of flooding is minimised.



Plan Nine: Flood Risk River Maun, A38/Coxmoor Road, Sutton in Ashfield

River Idle (ordinary watercourse)

2.41 The River Idle is a small river that rises in the area off Calladine Lane (now known as the Ashfields Estate). The river is largely culverted through the town centre of Sutton in Ashfield but it follows a course through Brook St, Low St, Portland Square, and The Lawn before feeding into the River Maun near Kings Mill Reservoir. The river can be seen above ground at the back of the Wilkinson Store off Portland Square/Outram Street for a short distance and off Sheepwash Lane to Coxmoor Road.

The Environment Agency's Flood Maps identify that a small part of the River Idle is within the Flood Zone 2 & 3 off Coxmoor Road/Kings Mill Road East. (Plan Nine). A hotel is currently being undertaken on a site off Coxmoor Road. A site specific FRA was been undertaken and the

grant of planning permission will reduce flood risk, will take into account the impact of climate change and open new channel sections currently culverted.

River Meden (ordinary watercourse)

2.42 The River Meden has cut back through the Limestone Escarpment and its headwaters now lie on the Coal Measures to the west of Teversal. It is largely located in the rural part of the District to the north of Sutton in Ashfield and is fed from a number of drains and streams. The Meden does not appear on the Environment Agency's flood indicator maps until the river is north east of River Bank Farm. However, the River has cause localised flooding problems, which are not identified on the E.A. Flood Maps. (See other sources of flooding)

Upper Meden tributaries

2.43 A number of brooks flow into the River Meden. Gradual development has resulted in increased runoff and enhanced peak discharges in a number of these watercourses including the Stanton Brook and the Skegby Brook. Skegby Brook is a fast flowing shallow watercourse which is identified on the flood indicator maps as providing a flood risk from Skegby Hall Gardens to the point it joins the River Meden (Plan Ten). However, once the Brook has passed through Skegby it flows in open countryside with few properties at risk from flooding. The Environment Agency's Flooding Survey 2007 indicates that channel improvements of Skegby Brook need to be continued to include the reach of approximately 3 kilometres downstream of Newbound Mill Bridge. Regrading and/or channel clearance should be carried out on the Meden arm, upstream of the Skegby Brook confluence for an estimated length of 2 kilometres and for about 700 metres on Stanton Brook.

2.44 A stream meets the River Meden at Newboundmill Bridge. The stream forms the northern boundary of the district and although identified as being a flood risk no properties are located in the potential flood area.

River Doe Lea

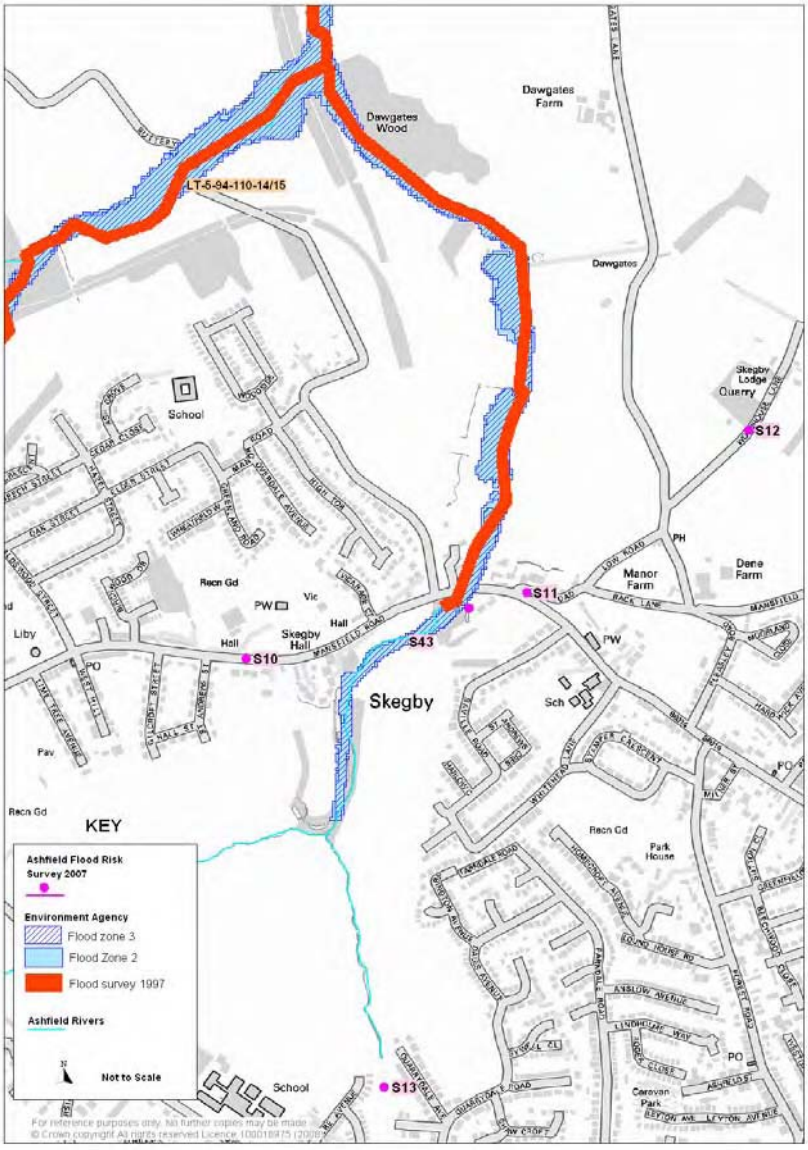
2.45 The River Doe Lea, a tributary of the River Rother, forms part of the northwestern district boundary with Bolsover District Council. The river off Stanley Lane and the stream flowing from Dovedale Wood to the river are identified as forming an area of flood risk. However, the river is located in a rural part of the District where significant development is unlikely.

Rainworth Water

2.46 Rainworth Water is on the District boundary with Ravenshead can flood which impacting on two major road providing access into Ashfield, Kirkby Road to the south of Little Normanshill Wood and Coxmoor Road to the south of Thieves Wood.

The Idle and Torne Catchment Abstraction Management Strategy[28]

- The Idle and Torne CAMS relates to the northern part of the District comprising, in the context of the SFRA, Sutton in Ashfield and parts of Kirkby in Ashfield. The CAMS policy is not to issue any new abstraction licences in this catchment as it suffers from a long history of over abstraction and rivers can suffer from low flow problems in dry summer months.



Plan Ten: Flood Risk River Meden/Skegby Brook, Skegby, Sutton in Ashfield

'Other Sources of Flooding'

Table Eight, Plan Twelve and Plan Thirteen sets out other areas that have been identified as flooding in the past.

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
			N.B. The comments set out below reflect Council officers local knowledge of the believed cause of flooding. No detailed survey work has been undertaken to verify the specific cause (s) of the flooding at these locations.	Residential	Industry/ Commercial	Highway	Park/field	Other Transport	Infrastructure	Other
SFRA - S1	Silverhill Lane/Stanley Lane, Stanley	Land/ Watercourse	Believed the drainage channels get blocked.			√				
SFRA - S2	Shepherd's Lane,Stanley	Land/ Watercourse / Highway	Grip constructed to direct water into brook.	√		√				
SFRA - S3	Wild Hill (B6014) to the west of Chesterfield Road,	Highway	Believed the area floods regularly due to insufficient ditching in surrounding area.			√				
SFRA - S4	Junction Shepherd's Lane & Wild Hill	Highway	Believed that work is required to a highway culvert.	√		√				
SFRA - S5	Junction with Tibshelf Road and Silverhill Lane, Fackley	Highway/ Watercourse	Works have been undertaken to repair the highway culvert.			√				
SFRA - S6	Pleasley Road, Teversal adjacent old railway line	Land	Believed that the highway culvert gets blocked.			√				
SFRA - S7	South West of Fackley Road, opposite Carnarvon Street, Fackley.	Watercourse	Believed that a stream flowing into the River Meden requires regular maintenance by landowner (s).	√		√				
SFRA - S8	Junction of Fackley Road and Coppywood Close	Highway	Believed there is inadequate capacity in main sewer in times of heavy rain.			√				

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
SFRA - S9	Field adjacent Fackley Road, and River Meden	Watercourse	Low lying fields flood flooding from watercourse.			√				
SFRA - S10	South of Mansfield Road opposite St. Andrew's Church, Skegby	Watercourse	No information available.			√				
SFRA - S11	Junction Old Road Mansfield Road, Skegby	Highway	Believed the area floods due to insufficient highway drainage capacity.	√		√				
SFRA - S12	Woodhouse Lane, Skegby	Land	Believed the area floods due to culvert in surrounding area becoming blocked. Highway ditching works carried out recently.				√			√
SFRA - S13	Land to the rear of Quarrydale Avenue/Quarrydale Drive	Land	Believed to be due to a lack of watercourse maintenance downstream.	√		√				
SFRA - S14	Mansfield Road, Sutton in Ashfield adjacent B & Q	Sewer	No information available.	Not Known						
SFRA - S15	Junction Lucknow Drive, and Sheepwash Lane	Watercourse	Believed the area floods due to insufficient highway drainage capacity.	√	√					
SFRA - S16	Land to the rear of Riveraine Close,	Land	Land drainage installed by adj. developer.	√						
SFRA - S17	North of Junction Road	Watercourse	Believed a contributing factor is lack of maintenance by adj. landowner (s).		√					
SFRA - S18	Sheepwash Lane, to the north of the junction with Vellus Court,	Highway	No information available.	√						
SFRA	Junction Station	Watercourse	Apart from the watercourse it is believed that the	2	√					

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
- S19	Road/Shepwash Lane.		highway culvert may be also a factor.							
SFRA - S20	Land north of Bathwood Drive	Land	Believed to result from run off from Station Road and Sutton Lawn.	√						
SFRA - S21	Spring Road to the south of the junction with Beeley Avenue	Sewer	Believed that flooding results from surcharging sewer and watercourse due to lack of capacity in storm conditions.	Not Known						
SFRA - S22	Land to the north of Meden Crescent,	Land	No information available.	√						
SFRA - S23	Land to the south of Columbia Avenue,	Land	No information available.				√			
SFRA - S24	Land off Maycroft Gardens	Land	No information available.				√			
SFRA - S25	Land to the north of North Street, Huthwaite	Watercourse	Believed to be from watercourse in Brierley Forest Park.				√			
SFRA - S26	Land to the north of Skegby Street, Huthwaite	?					√			
SFRA - S27	Mill Lane north of Cross Lane, Huthwaite	Land					√			
SFRA - S28	Land to the east of Mill Lane, Huthwaite	Land/drains	STW sewer	6						
SFRA - S29	Land to the south Mill Lane, Huthwaite	Land			√					
SFRA - S30	Mill Lane to the east of Common Road Junction, Huthwaite	Watercourse & Severn Trent	Highway grids inspected on a regular basis and works actioned accordingly.	√			√			√
SFRA - S31	Land at Blackwell Road, Huthwaite	Watercourse & Land	Believed that flooding is from watercourse with additional issues of grid maintenance.	2		√				
SFRA - S32	Land to the South Blackwell Road and East of Nunn Brook	Land	Believed to result from run off from land. Highway grids on brook inspected on a regular basis and works actioned accordingly.	√		√	√			

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
	Road, Huthwaite									
SFRA - S33	Coronation Street	Land	Believed that water is running off land into rear gardens of residential properties	√						
SFRA - S34	James William Turner Avenue	Sewer		Not known						
SFRA - S35	Kirkby Folly Road	Sewer	STW sewer	Not known						
SFRA - S36	Estate road Kirkby Folly Road/ Newark Road	Land		√		√				
SFRA - S37	Junction Newark Road/Hamilton Road	Land	Believed the area floods due to insufficient highway drainage capacity.			√				
SFRA - S38 & 39	Searby Road/Sotheby Avenue	Land	Believed the flooding results from run off from adjacent land. Grids on land drainage ditches inspected on a regular basis and works actioned accordingly.	8		√	√			
SFRA - S40	Land opposite Hacienda, Coxmoor Road, Sutton in Ashfield	Sewer		Not Known						
SFRA - S41	Rear Wilkinsons, Outram Street (car park)	Watercourse	Believed the River Idle grid occasionally gets blocked by debris. However, the grid is inspected on a regular basis and works actioned accordingly.							√
SFRA - S42	A38 o/s John Eastwood Hospice	Highway	Believed the area floods regularly due to insufficient cleansing of ACO drainage. Highway grid inspected on a regular basis and works actioned accordingly.			√				
SFRA - S43	Mansfield Road, Skegby	Watercourse	Believed a contributing factor is the grids in surrounding area being blocked. Grid on Skegby Brook at Pond Cottages and upstream in field inspected on a regular basis and works actioned accordingly.	3						
SFRA	Common Road,	Watercourse	Highway grid on Brook inspected on a regular basis							

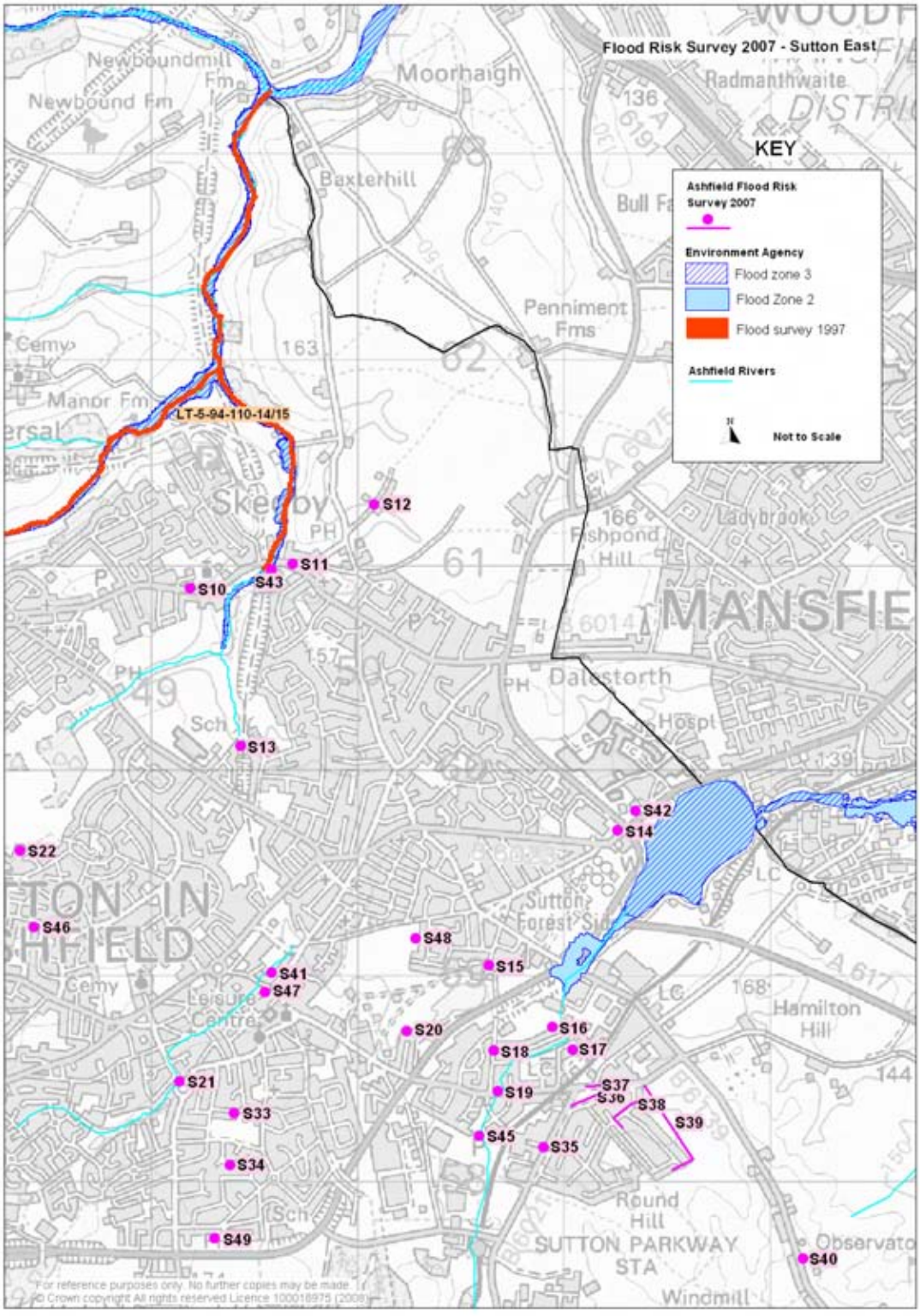
Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
– S44	Huthwaite		and works actioned accordingly.							
SFRA – S45	Rear of ADC Depot, Station Road	Watercourse	Grid on River Maun balancing pond inspected on a regular basis and works actioned accordingly.	√						
SFRA - S46	Riley Avenue/ Westbounre Road	Surface Water	Believed that flooding resulted from exceptional circumstances. Hailstones are believed to have blocked or partially blocked gully grates to the drainage system. The combination of hailstones, the intensity of the storm, the local topography and run-off from hard surfacing of residential dwellings resulted in the flooding.	√		√				
SFRA - S47	Low Street/Portland Square	Surface water/ Watercourse	Believed that the flooding may result from inadequate highway drainage / sewer capacity.		√	√				
SFRA - S48	Charles Street	Land	Believed water running off The Lawn onto the gardens of residential properties.	√						
SFRA - S49	Leamington Drive	Highway	Believed that in heavy storms water flows off the highway onto the adjacent gardens of residential property.	√		√				

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected

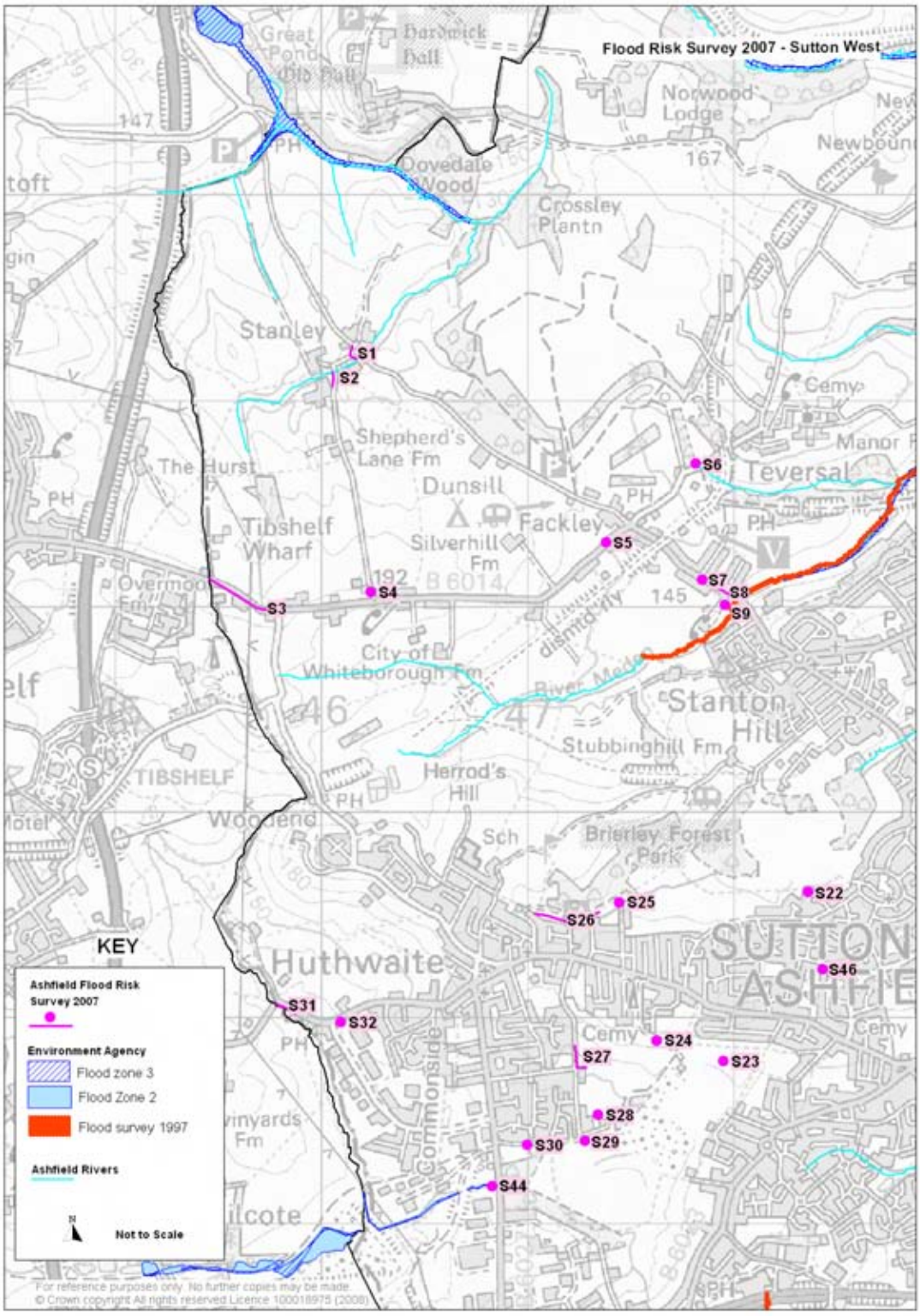
Notes

- Potential Sources of Flooding - Identifies the believed source of the flooding. However, further investigation is likely to be necessary.
- Approximate Location – identifies the broad location.
- Potential Source of Flooding – see 'Potential Flood Hazards in Ashfield'.
- Sewer - No information was provided by Severn Tent Water Ltd. Therefore, further investigation with Severn Trent Water is required before development is undertaken.
- Area or Asset understood to be affected - Identifies what is believed to be the impact of flooding. However, it may impact on other areas or assets.
- Residential – This related to flooding of the curtilage and possible the dwelling. A number identifies the properties known to have flooded internally in the summer of 2007.
- Industrial/commercial – This related to the flooding of the curtilage and possibly buildings.
- Other - relates largely to private roads.

Table Eight: Other Sources of Flooding Sutton in Ashfield
Source: Ashfield District Council



Plan Eleven: Flood Risk, Sutton in Ashfield East.



Plan Twelve: Flood Risk, Sutton in Ashfield West.

2.47 Regular flood problems have been experienced on Mill Lane at Huthwaite. R & K Contractors and Consultants[58] were commissioned by Ashfield District Council to undertake a drainage area study for Mill Lane to identify the cause of flooding. The Study concluded that the cause of the surface water flooding is the lack of an effective outfall for

the surface water flows generated by the development at Mill Lane. This is exacerbated by the overtopping of the open watercourse adjacent to the former colliery office buildings, causing flows to run onto the road and overload the surface water sewer system via the highway drainage system. In addition, flooding from the foul/combined sewer is also predicted by the model and this is considered to be due to the overloading of the sewer in Mill Lane as a result of the impermeable area (paved and roof) within the former colliery office complex. It is exacerbated by the overtopping of the open watercourse nearby causing additional flows to run onto paved areas adjacent to the former colliery site. In summary, the analysis by R & K has shown that the cause of the flooding is due to:

a) The lack of an adequate outfall for the surface water drainage system and in particular the culverted watercourse at the front of No's 7 to 23 Mill Lane.
b) The under capacity of the open watercourse discharging to the reed bed system.
c) The overloading of the foul / combined sewer in Mill Lane with surface water flows from the former colliery offices.

2.48 Brierley Forest Park - A small stream located in Brierley Forest Park flows into a culvert to the north of Ashlands Road West. The culvert carries the water beneath the soil heap before emerging in the small valley to the south of Brierley Park Industrial Estate. The spoil heap is in the Authority's ownership but no information is available on the condition of the culvert. As at Bentinck Void, if the culvert fails and no action is taken it will result in water flooding back into Brierley Forest Park and the adjacent land. The spoil heap is on the boundary of the main urban area identified in the Ashfield Local Plan Review November 2002. If any development is proposed in this area further research will be necessary to identify the specific flood risk implications if the culvert was to fail.

Reservoirs

2.49 Section 2.13 identified that infrastructure failure is a potential sources of flooding and in Ashfield this relates to reservoirs where the dams could be breached or over topped.

2.50 Kings Mill Reservoir is situated approximately 2.4 km north east of Sutton in Ashfield town centre. The reservoir is formed by an earth fill embankment across the valley of the River Maun approximately 69m long and 9.5 m high. The maximum depth of water is said to be 5.3 m and the estimated capacity is 410,000m^3. The present reservoir was constructed for the 4th Duke of Portland between 1835 and 1839. It is currently used for amenity and leisure purposes and will act, to some extent, as a regulator of the River Maun. The reservoir is inspected on a regular basis by an independent supervising engineer and a further inspection is undertaken by a member of the All Reservoir Panel in accordance with Section 10 of the Reservoirs Act 1975. The last inspection was on 23rd April 2003(56). As part of this inspection a flood assessment was undertaken. The report advised the following:

a) The dam falls in Category A of the "Floods and Reservoir Safety" published by the Institution of Civil Engineers in 1996 as there are inhabited areas down stream which could be inundated if the dam was to fail. (See below)

Risk category	Notes (Reference: Floods and Reservoir Safety; ICE 1996)
A	At least 10 lives at risk and extensive property damage
B	Fewer than10 lives at risk but extensive property damage
C	Negligible risk to human life but property damage
D	No significant risk to life or property

b) At the Design Flood of 1 in 10,000 year return period there would be a freeboard of 0.78m to the wave wall crest, which is acceptable

c) In the event of a full summer Probable Maximum Precipitation occurring the wave wall would be overtopped but this, in the opinion of the engineer, would not cause failure of the dam. However, this would cause flooding to the adjacent fields, the Sailing Club and the Adventure Base. There is also the possibility of the adjacent railway line being flooded.

Mansfield District Council's Strategic Flood Risk Assessment identifies that the reservoir providing some attenuation of peak flows on the River Maun.

2.51 Sutton Lawn Dam is retained by an earth fill embankment, approximately 6m high and 280m long. The Lawn Dam has a stated capacity of 37,690 cubic metres and a surface area of 21,660 sq m. The reservoir is said to contain some 24,900 cubic meters of sill and an average depth of 1.7 m. The valley downstream of the dam runs in an easterly direction towards Kings Mill Reservoir. The valley is very shallow in slope but contains a major road (Kings Mill Road East), housing and retail/industrial development. The last inspection of the dam was on 24th April 2002. In terms of flood assessment the report advised the following:

a) The dam falls in Category A of the "Floods and Reservoir Safety" published by the Institution of Civil Engineers in 1996 because of the presence of the old peoples home and new development in the Old Mill complex.
b) The reservoir is adequately maintained and generally in good condition.
c) The Flood analysis identified that static flood water is retained by the embankment but that a proportion of the waves generated would overtop the dam. However, it was considered that the site is very sheltered and it was unlikely that a wave of the required height to overtop the dam would be generated.

HUCKNALL – FLOOD RISK

(The wards of Hucknall North, Hucknall Central, Hucknall West and Hucknall East)

River Leen (Main River)

2.52 The Robin Hood Hills form the watershed for the River Leen. A number of springs issue on the south side of these hills and when joined with the waters from Hollin Well they form the River Leen. The river flows between Papplewick and Hucknall before entering the outskirts of Nottingham. The river discharges into the River Trent in the centre of the city. The Leen drains an area of approximately 130km^2, which is split equally between a predominantly rural catchment in its upper reaches and a heavily urbanised catchment as it flows through Nottingham. (30)

2.53 The River Leen provides a flood risk to a number of properties in Hucknall at Moor Road, Papplewick Grange, Shelton Avenue and Mill Lane. However, it is the small streams that flow into the Leen which provide a risk of flooding to a larger number of properties including the Baker Lane Brook, an unnamed stream to the south of the Baker Lane Brook which flows into the lakes at Leen Valley Country Park and Farley's Brook.

Baker Lane Brook (Main River from Hucknall By-pass)

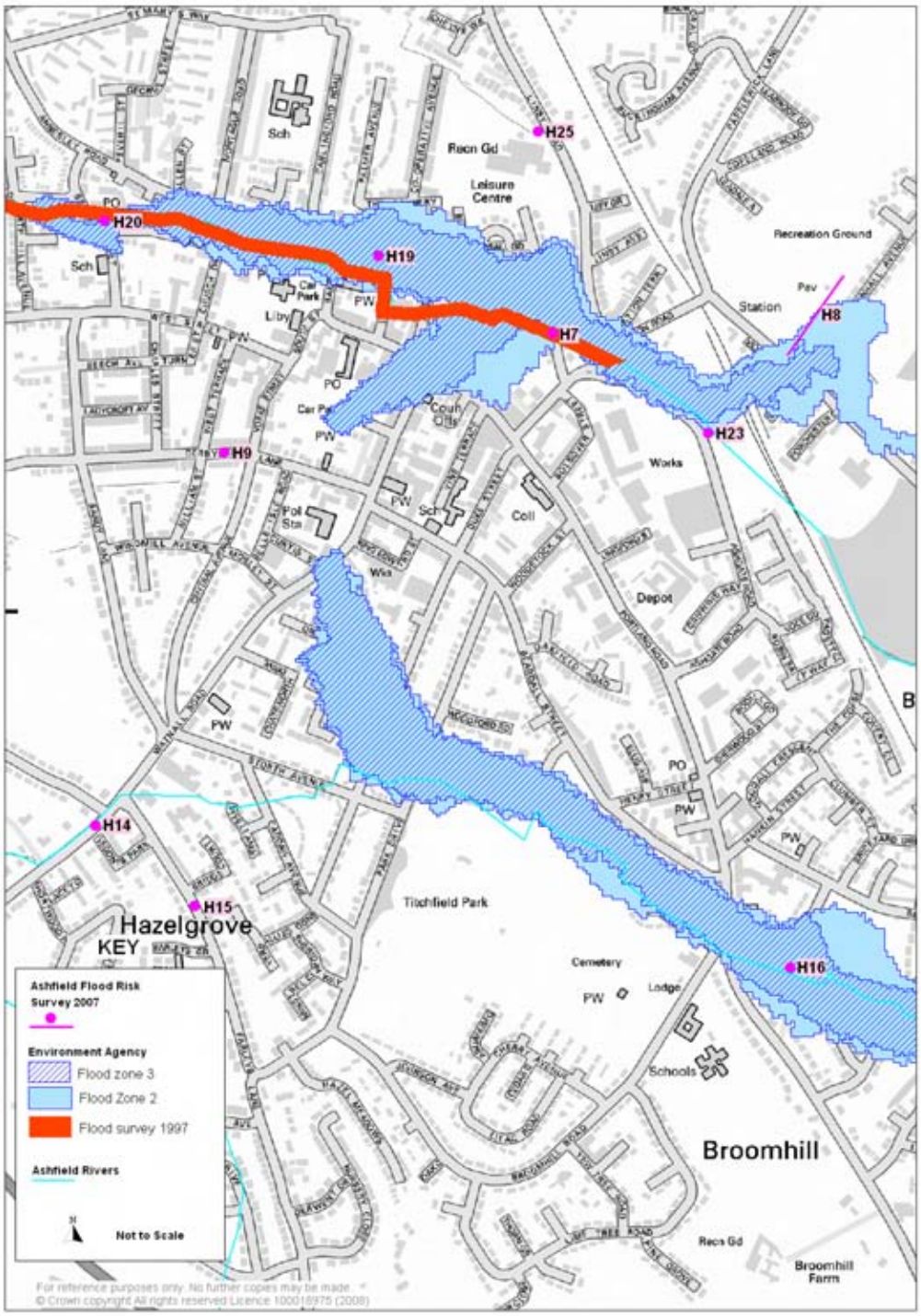
2.54 The Baker Lane Brook catchment is underlain by carboniferous bedrock and soils are dominated by shallow, well-drained fine loamy soils. These characteristics allow the catchment a slightly greater than average permeability. Much of the Baker Lane Brook has been culverted through the urban area of Hucknall. The Environment Agency's Flood Survey 2007 identifies that the culverts and channels would need to be increased considerably to pass the necessary flood flow. The position has been helped by the construction of a storage lagoon upstream of the Hucknall bypass which helps reduce flood flows downstream. 42 properties are identified as being potentially at risk of flooding from a 100 year storm.

2.55 The County Council is proposing to undertake improvements to the town centre highways system to facilitate the regeneration of the town, reduce congestion, improve pedestrian movements, improve cycle facilities and enhance public transport. The engineering proposals for the scheme involve the modification, by culverting, Baker Lane Brook at Perlethorpe Drive and culverting the unnamed brook that runs parallel with Ashgate Road. Hydrodynamic modelling of the proposals has been undertaken and they will not have any adverse impact affecting flood conditions in the watercourse.

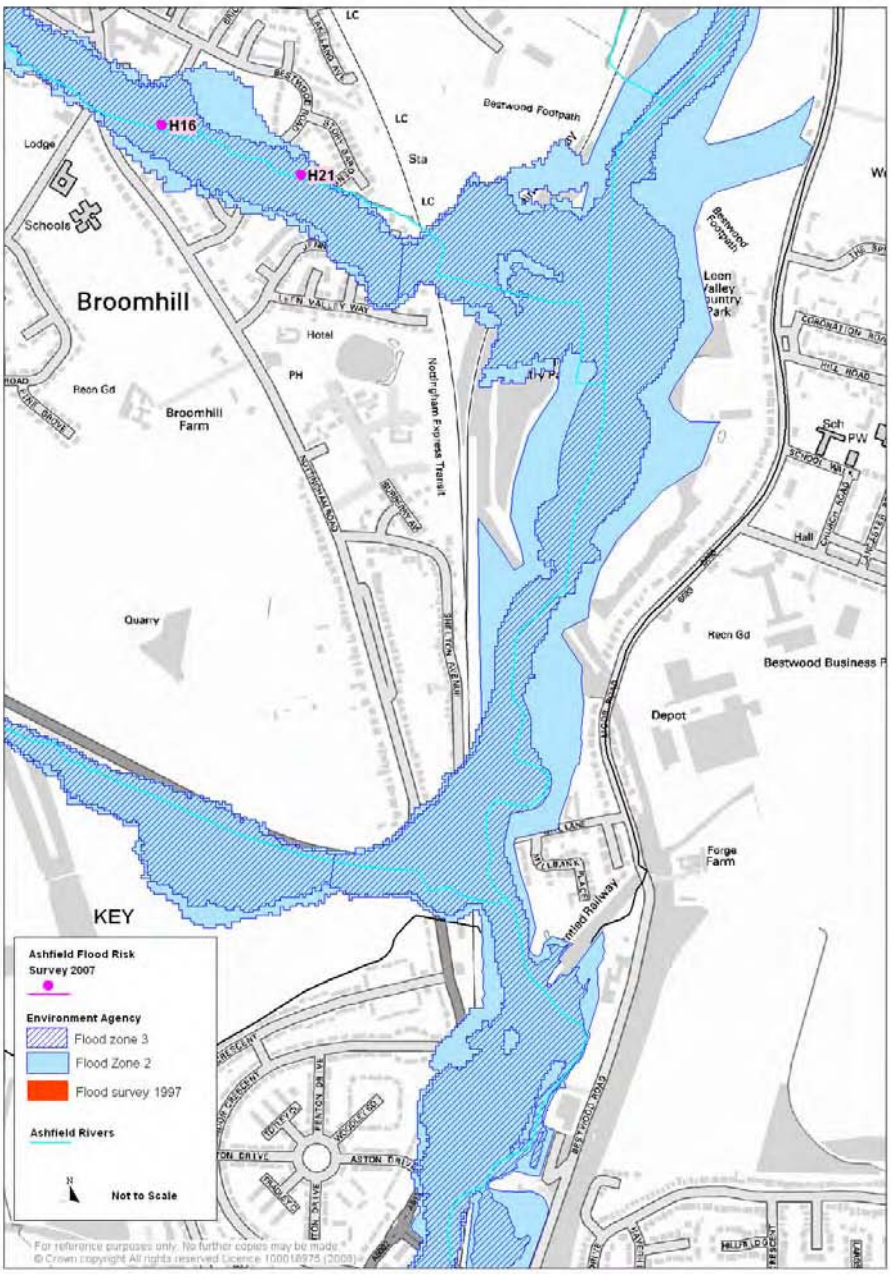
Farley's Brook

2.56 Farley's Brook (Plan Fourteen) presents a flood risk but it is largely located outside the urban area. Land to the south of Rolls Royce has been put forward as a potential strategic high quality development site. The site is located within the catchment area of the River Leen which is

located approximately 1 mile to the east of the site. However, it is within an area of low flood risk, Flood Zone 1, as shown on the Environment Agency Flood Zone Map. A Flood Risk Assessment by Scott-White & Hookins in April 2007[59] identifies that the local risk of flood from Farley's Brook is low. However, in order to avoid increasing flood risks downstream of the site the Environment Agency has advised that surface water discharge from the site is limited to 5 litres per second per hectare.



Plan Thirteen: Flood Risk, Baker Lane Brook, Hucknall.



Plan Fourteen: Flood Risk, River Leen/Farleys Brook, Hucknall

2.57 Approximately 917 houses/flats and 100 commercial properties are identified as falling in Flood Zone 2 or Flood Zone 3.

River Leen and Day Brook Strategic Flood Risk Assessment(46)

2.58 The River Leen and Day Brook Strategic Flood Assessment (RLSFRA) by Nottingham City Council et al sets out substantial implications for development in Hucknall. The RLSFRA identified that, generally, the River Leen defences in the City of Nottingham provide protection for up to a 1 in 25 year standard and major overtopping occurs during a 1 in 100 year flood event at Bulwell, Basford, Bobbers Mill and Sherwood. However, flooding is predicted to start in a 1 in 5 year flood event north of

Moor Bridge at Bulwell, Southwark Street meander, the Day Brook confluence in Basford and along the length of Day Brook. There are a total of 630 properties which flood during a 1 in 100 event on the River Leen and Day Brook. Much of the flooding experienced on the River Leen and Day Brook is attributed to a legacy of unattenuated surface water run-off generated by historic urban development within Nottingham and elsewhere.

2.59 The RLSFRA suggests that even maintaining the status quo in terms of surface water volumes and peak run-off rates may no longer be acceptable. In order to improve the flooding situation downstream it recommends the starting point for discussions with developers of land in the River Leen and Day Brook catchments should, where possible, be pre-developed greenfield rates (average taken to be around 5 l/s/ha).

2.60 The RLSFRA has identified that the rural catchments outside Nottingham City Council's boundary currently do not contribute significant volumes of floodwater to the River Leen and Day Brook. However, it stresses it is important that even small increases do not exacerbate the existing flooding situation to the detriment of people and property in Nottingham. Consequently, it is essential that any urban expansion and major development proposals within the District of Ashfield or the Borough of Gedling assess the impact of additional surface water run-off on the receiving watercourse. The SFRA advises that where possible, major development proposals within the catchment area of the River Leen and Day Brook should seek to reduce volumes and peak flow rates of surface water generated by a development to pre-developed greenfield rates.

2.61 Consequently, policies in Ashfield's Local Development Framework and development control decisions will need to take into account the impact of surface water from developments in Hucknall in order to reduce flood risk in the city of Nottingham.

The Lower Trent and Erewash Catchment Abstraction Management Strategy[(27)]

2.62 For the River Leen the water resource availability status of this Water Resource Management Unit is 'no water available'. It is proposed that the policy will be that new licences could be issued subject to a flow restriction that would limit new abstractions to the winter period or whenever flows in the Leen are relatively high.

'Other Sources of Flooding'

2.63 Table Nine and Plan Fifteen sets out other areas that have been identified as flooding in the past.

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
			N.B. The comments set out below reflect Council officers local knowledge of the believed cause of flooding. No detailed survey work has been undertaken to verify the specific cause (s) of the flooding at these locations.	Residential	Industry/ Commercial	Highway	Park/field	Other Transport	Infrastructure	Other
SFRA - H1	Wighay Road to the west of Ward Avenue	Land & highway	Run off of water from agricultural land. Works have been undertaken on highway ditches / gullies and private ditches to try to alleviate this problem. Highway grids inspected on a regular basis and works actioned accordingly.	√		√				
SFRA - H2	Ward Avenue	Severn Trent, Highway, Land, Watercourse	Combination of factors including run off of water from agricultural land.	16		√	√			
SFRA - H3	Land of Linby Walk	Land	Believed that water is run off from the area near pond.			√				
SFRA - H4	6 Linby Walk	Watercourse	Apart from the watercourse flooding may also result from adjacent ditch overflowing.	√						
SFRA - H5	Greenwood Avenue	Sewer	Believed to be a lack of capacity on STW surface water sewer.	Not Know						
SFRA - H6	Coniston Road west of the junction with Crasmere Close	Watercourse	Adjacent watercourse.			√				
SFRA - H7	Thoresby Dale	Watercourse /Sewer	Adjacent watercourse. Also there is a lack of capacity on the sewer. It is understood Severn Trent Water are to carry out works to upgrade the sewer.	6		√				

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
			Grid on Baker Lane Brook & STW overflow grid on Ashgate Road inspected on a regular basis and works actioned accordingly.							
SFRA - H8	Oakenhall Avenue	Land	Believed that it results from run off from existing playing fields. Development of land is anticipate to reduce the problem.	√		√				
SFRA - H9	Derbyshire Lane	Sewer		Not Known						
SFRA - H10	Open space off Polperro Way	Watercourse	Watercourse. Grids on brook inspected on a regular basis and works actioned accordingly.			√	√			
SFRA - H11	Junction Nabbs Lane & Polperro Way	Watercourse	Watercourse. The highway culvert grid in poor condition and is to be replaced shortly by the Highway Authority. Grids on brook inspected on a regular basis and works actioned accordingly.	√		√				
SFRA - H12	Nabbs Lane opposite Briar Close	Watercourse	Watercourse. Grid in school grounds further downstream often blocks with debris.	√		√				
SFRA - H13	Watnall Road to the south of Meadowcroft Gardens	Land & Highway	A contributory factor can be the highway culvert becoming blocked.			√				
SFRA - H14	Watnall Road south west of Long Hill Rise	Watercourse & Highways	Watercourse. The current highway headwall & manhole adj. 184 Watnall Road is in poor condition and blocks regularly. Works are programmed to be carried out before April 09.	√		√				
SFRA - H15	Farleys Lane south of Bridge Court	Highway	Contributory factor is the adjacent footways and carriageways having poor gradients and limited outlets. Alterations to road levels/drainage is likely to be carried out in year 2009/2010.	√		√				
SFRA - H16	St John's Crescent	Sewer/ Watercourse	Watercourse.	√		√				
SFRA - H17	Field to the north west Conway Road	Land	Believed that flooding results from run off from adj. fields.	√						
SFRA	Watnall Road between	Sewer/	Existing highway drain in Watnall Road / Aerodrome		√	√				

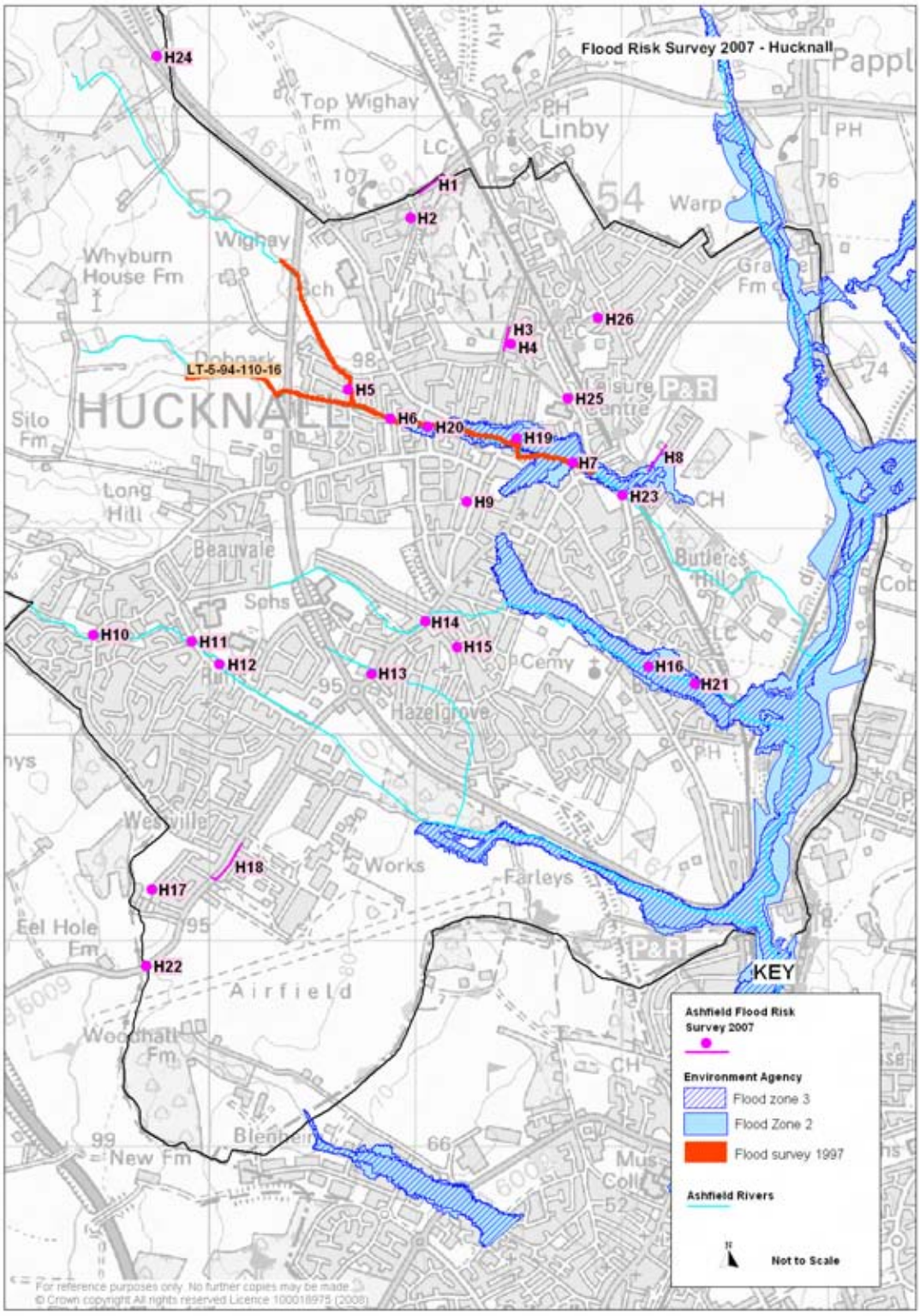
Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
- H18	Trent Drive and Westville Drive	Highway	was damaged and full of roots. Drain has since been cleansed and repaired.	√						
SFRA - H19	Titchfield Street	Watercourse	Grid on Baker Lane Brook inspected on a regular basis and works actioned accordingly.	2						
SFRA - H20	Spring Street	Watercourse	Watercourse. The highway culvert occasionally becomes blocked but the grid on Baker Lane Brook is inspected on a regular basis and works actioned accordingly.	4						
SFRA - H21	Arden Close	Watercourse /Sewer	Watercourse. It is believed the STW trunk sewer surcharging and flooding. STW overflow and grid at Storey Gardens inspected on a regular basis and works actioned accordingly.	4						
SFRA - H22	Watnall Road (boundary with Broxtowe B.C.)	Watercourse	Watercourse. Highway grid inspected on a regular basis and works actioned accordingly. Several gullies on the highway are not currently working. Works are scheduled for 2009/2010.			√				
SFRA – H23	Ashgate Road	Watercourse	Grid on Baker Lane Brook inspected on a regular basis and works action accordingly.			√				
SFRA – H24	A611/Newstead Lane (physically in Annesley. Treated as Hucknall for management purposes)	Highway	Believed the area floods from overflows from ditch adjacent to the road.			√				
SFRA – H25	Lindy Road, (Leisure Centre)	Watercourse	Grid on Brook inspected on a regular basis and works action accordingly.			√				
SFRA - H26	Leen Mills Way	?				√				

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected

Notes

- Potential Sources of Flooding - Identifies the believed source of the flooding. However, further investigation is likely to be necessary.
- Approximate Location – identifies the broad location.
- Potential Source of Flooding – see 'Potential Flood Hazards in Ashfield'.
- Sewer - No information was provided by Severn Tent Water Ltd. Therefore, further investigation with Severn Trent Water is required before development is undertaken.
- Area or Asset understood to be affected - Identifies what is believed to be the impact of flooding. However, it may impact on other areas or assets.
- Residential – This related to flooding of the curtilage and possible the dwelling. A number identifies the properties known to have flooded internally in the summer of 2007.
- Industrial/commercial – This related to the flooding of the curtilage and possibly buildings.
- Other - relates largely to private roads.

Table Nine: Other Sources of Flooding Hucknall
Source: Ashfield District Council



Plan Fifteen: Flood Risk, Hucknall

RURAL AREAS – FLOOD RISK

(The wards of Selston, Jacksdale and Underwood)

River Erewash (Main River)

2.64 The River Erewash flows from north to south on the eastern edge of the District following a meandering course across its floodplain. A number of properties at Jacksdale are identified as falling within the Flood Zones 2 and 3 on the Environment Agency's Flood Maps. Plan Sixteen.

Bagthorpe Brook

2.65 The Bagthorpe Brook drains a fairly steep catchment in a mainly rural location which is fringed by the villages of Bagthorpe and Jacksdale. The Brook's source is adjacent to Junction 27 of the M1 motorway from where it flows in a westerly direction through Bagthorpe to its outfall into the River Erewash to the south of Jacksdale. The Brook is designated a Site of Importance for Nature Conservation where it runs through Bagthorpe and Bagthorpe is designated as a Conservation Area. The Brook discharges into a series of SINCs by the Cromford Canal and River Erewash.

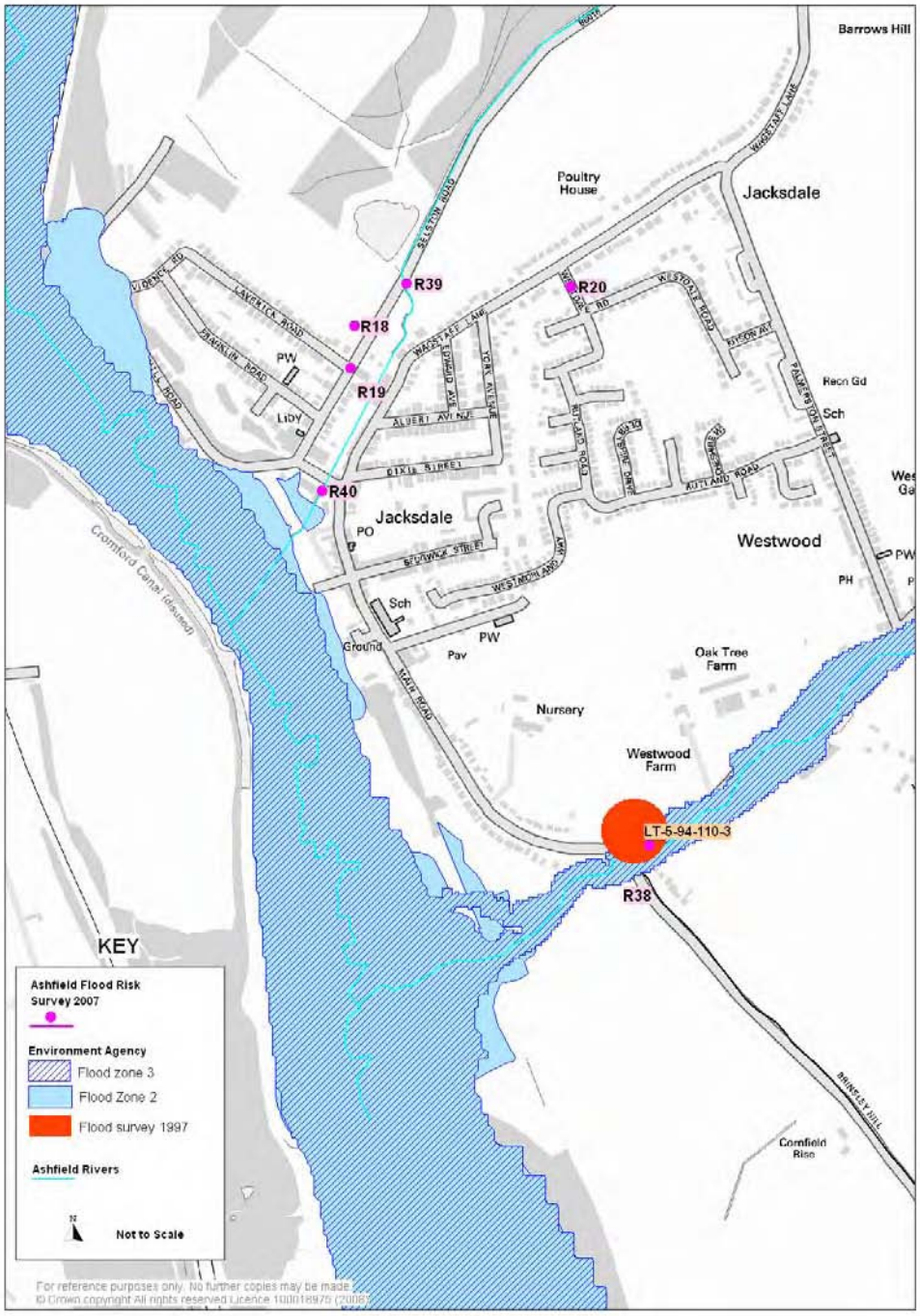
2.66 The downstream reaches of the Brook will be affected by backwater influence from the River Erewash to some degree. The Brook has flooded in the past and works have been undertaken to increase the capacity of the channel. Nevertheless, a small number of properties are at risk from flooding in a more that 1 in 100 year storm. A flooding problem at the bottom of Brinsley Hill appears to have been reduced by annually desilting the road culvert.

2.67 The stream that flows passed Felly Priory into Moorgreen Reservoir is subject to flooding but it location in the open countryside present little risk to property.

2.68 Other known flooding incidents from watercourses are as follows:

- Jacksdale Brook, Jacksdale – Flooding has occurred in the past in the area off Selston Road/Wagstaff Lane. However, the stream was culverted at this point and it is understood the problem has been alleviated.
- Brinsley Brook, Underwood – The Brook runs to the east of Cordy Lane and is culverted for a length of 105 metres. Two properties were flooded in 1977 but improvements to road drainage appear to have alleviated the problem. The Environment Agency's Flood Survey 2007 identifies that the culvert is inadequate, but as no properties are likely to be affected by flooding, it is considered uneconomic to carry out improvements.

2.69 Approximately 32 residential properties and 14 commercial properties are identified as falling within Flood Zone 2 or Flood Zone 3.



Plan Sixteen: Flood Risk, River Erewash & Bagthorpe Brook, Jacksdale

The M1 Widening

2.70 A major transport scheme running through the District is the widening of the M1. The works runs from Junction 25 to Junction 28 and under the contract the hard shoulder will be converted into a lane and a new hard shoulder will be added wherever possible. There will be an increase of approximately 33% in hard standing as a result of the scheme, which would result in an increase in surface run-off and the surface run-off may contain potential contaminants. It is anticipated from the Environmental Statement for the Scheme that the works will include the following mitigation measures:

- Pollution control has been provided within the design for many outfalls. Spillage containment will be provided at those sites where there is an unacceptable risk of a spillage event.
- Run off from additional hard standing areas will be attenuated so that the flow into watercourses does not increase in volume or rate. This will be achieved through the use of oversized pipes, open ditches and ponds/tanks.

2.71 The majority of drainage discharges from the M1 will eventually discharge into the River Erewash. It is anticipated that:

- the introduction of mitigation measures is likely to result in an improvement in water quality within these watercourses, and
- the flow control features should ensure there will be no increase in flood risk associated with water draining from the road.

'Other Sources of Flooding'

2.72 Table Ten and Plan Eighteen sets out other areas that have been identified as flooding in the past.

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
			N.B. The comments set out below reflect Council officers local knowledge of the believed cause of flooding. No detailed survey work has been undertaken to verify the specific cause (s) of the flooding at these locations.	Residential	Industry/ Commercial	Highway	Park/field	Other Transport	Infrastructure	Other
SFRA - R1	Station Road, junction with the railway, Selston	Watercourse	Watercourse. Flooding to highway would be potentially reduced by improvement works to road gullies.	√		√				
SFRA - R2	Station Road, Selston	Watercourse & land	Watercourse. Highway grid inspected on a regular basis and works actioned accordingly. Flooding to highway would be potentially reduced by gullies/grips to discharge into the ditch. The ditch was cleaned out June 2008.	4		√				
SFRA - R3	Junction Church Lane and Station Road, Selston	Highway	Improvements required to gullies on the highway.			√				
SFRA - R4	Common Side adjacent to Hill bank Farm access	Land	Believed that flood results from run of from land and adjacent ditch being blocked. Landowner is to clean out ditch to divert water from highway.			√				
SFRA - R5	South of Mansfield Road at junction with Common Side, Selston	Watercourse	Watercourse. Believed that a contributing factor may be run-off from adj. land and the culvert running through the land being of insufficient capacity to carry water from intensive storms.	√						
SFRA - R6	Land north Columbia Close, Selston	Land	No information available.			√				
SFRA - R7	Top of Union Street, Selston	Land	Believed to be caused by run off from adj. land. Probably due to the land now being a housing estate rather than an undulating field as in the past.			√				
SFRA	Land east of Portland	Land	Believed the flooding results from run off from adj			√				

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
- R8	Road, Selston		land.							
SFRA - R9	Mansfield Road at junction with Victoria Rd and Holly Hill Road, Selston	Highway	Believed to be due to the capacity of the sewer being insufficient. Surface water drainage enters the foul sewer. STW are investigating.	√		√				
SFRA - R10	Junction Mansfield Road and Nottingham Road, Selston	Highway	Highway drainage has been improved recently going into Sperry Brook.		√					
SFRA - R11	Lea Lane adjacent to recreation ground, Selston	Land	Believed the area floods due to surface water run off from the adjacent field.			√	√			
SFRA - R12	Hanstubbin Road, Selston	Watercourse	Watercourse. Believed that a contributory factor is the culvert having insufficient capacity for intense storms.			√				
SFRA - R13	Fields off Lea Lane, Selston	Watercourse and Land	Watercourse and run off from land.				√			
SFRA - R14	Nottingham Road, Selston	Highway	Highway drain in need of repair. Works currently being undertaken.	√		√				
SFRA - R15	Alfreton Road between Selston and Jubilee	Land	This area floods regularly due to insufficient drainage. Work is believed to be required to highway culvert.			√				
SFRA - R16	Walters Crescent, Selston	Highway	Works have been undertaken which it is believed will resolve the flooding to the highway.	√		√				
SFRA - R17	Junction of Alfreton Road and Langton Hollow, Selston	Highway	The highway grid and culvert requires regular maintenance. Highway grid inspected on a regular basis and works actioned accordingly. Extra highway lateral drainage was installed recently.	√		√				
SFRA - R18	Land to the rear Laverick Road, Jacksdale	Land	Believed the area floods due to run off from land.			√				
SFRA - R19	Junction Laverick Road and Selston	Highway	Main to be investigated	4		√				

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
	Road, Jacksdale									
SFRA - R20	Westdale Road between Barker Avenue and Wagstaff Lane	Highway	Work carried out to highway culvert in March 08. Believed additional works are required to culvert in adjacent land.			√				
SFRA - R21	Barrow Hill Lane, New Westwood	Highway	Believed to flood due to insufficient drainage capacity.	√						
SFRA - R22	Allotments to the rear New Westwood	Land (drainage)	Believed that a contributing factory is inadequate culvert capacity.	√		√	√			
SFRA - R23	Main Road, Jacksdale	Watercourse & Highway	Believed to flood from run off from adj. land.	4		√				
SFRA - R24	Bagthorpe Brook, Lower Bagthorpe	Watercourse & Highway	Watercourse. This area floods due to the watercourse being at the same level as the highway.			√	√			
SFRA - R25	West of Dixies Arms, Lower Bagthorpe	Watercourse & Highway	Watercourse. This area floods due to the watercourse being at the same level as the highway.			√	√			
SFRA - R26	Land adjacent Middlebrook Bridge, Nottingham Road, Bagthorpe	Highway	No information is available.	√		√				
SFRA - R27	Alfreton Road, before School Road, junction, Underwood	Highway	No information is available.			√				
SFRA - R28	Adjacent football ground, Mansfield Road, Underwood	Highway	Believed the floods due to insufficient drainage in the area. A ditch was excavated in land to divert water around football pitch in 2006.				√			
SFRA - R29	Recreation Ground off B600 Alfreton Road, Underwood	?	Believed that water runs off the recreation ground.				√			
SFRA - R30	Cricket Ground, Alfreton Road, Underwood	?	No information is available.				√			
SFRA	Smeath Road,	Land &	Believed the area floods due to surface water run off	√		√				

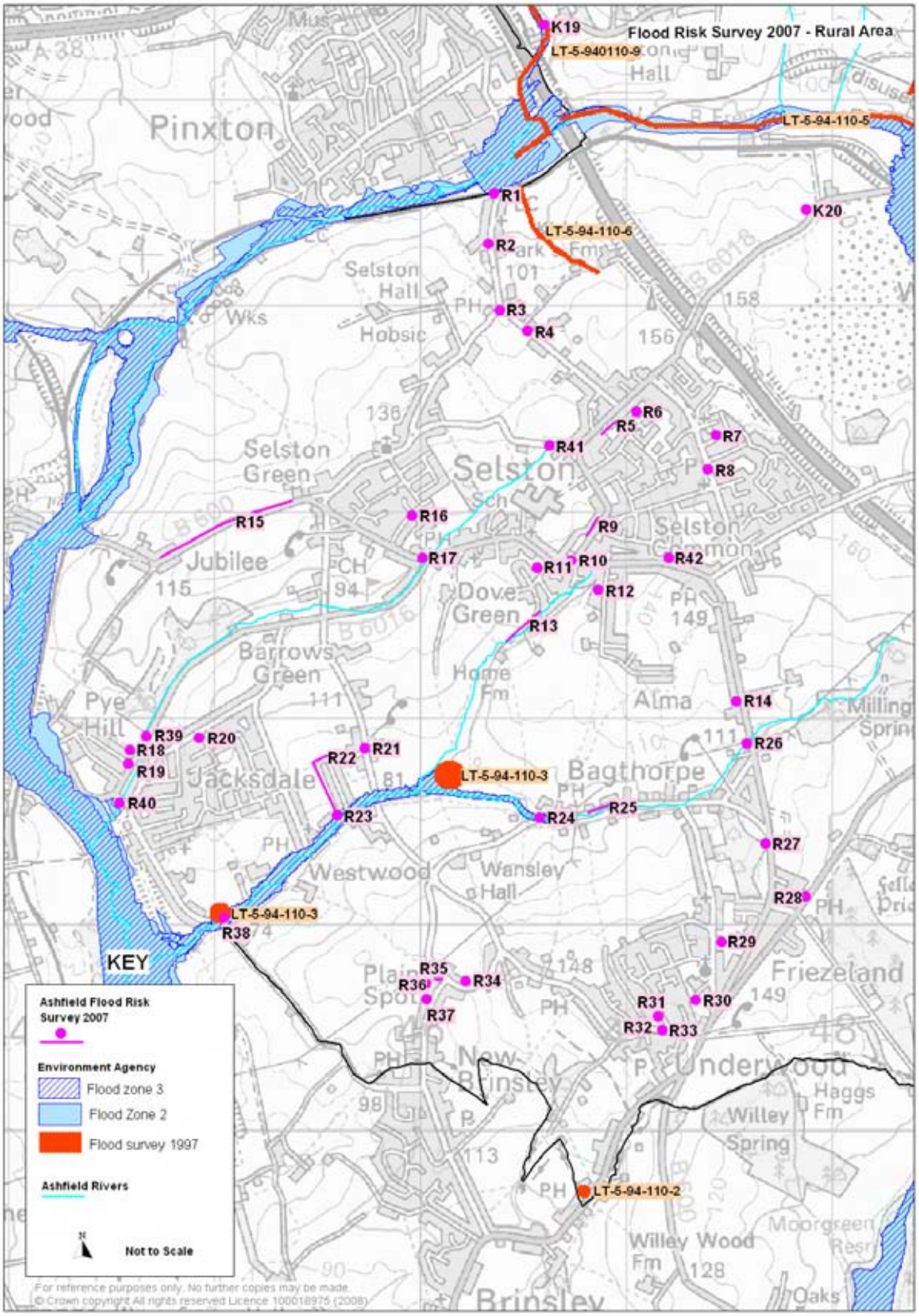
Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected						
- R31	Underwood	Highway	from adjacent land. Work carried out June 08 to stop water running onto footway.							
SFRA - R32	Junction Main Road and Palmerston Street, Underwood	Highway	Believed the area floods due to damage to drainage system. Under investigation.	√		√				
SFRA - R33	Junction Main Road, & Smeath Road, Underwood	Watercourse	No information is available.	√		√				
SFRA - R34	Field to the rear of Wilhallow Lane, Underwood	Land	Believed to result from run off from adj. field.				√			
SFRA - R35	Junction of Wilhallow Lane and Plainspot Road, Underwood	Highway	Believed that in storm conditions the highway culvert is under capacity.			√				
SFRA - R36	Field west of Plainspot Road, Underwood	Land	Believed to result from run off from higher land.	√			√			
SFRA - R37	Plainspot Road, Underwood	Highway	Believed to be intense highway run off during storms.	√						
SFRA - R38	Brinsley Hill, Jacksdale	Watercourse & highway	Highway Bridge on Bagthorpe Brook	2		√				
SFRA - 39	Selston Road, Jacksdale	Watercourse & highway	Watercourse. Jacksdale Brook grids inspected on a regular basis and works actioned accordingly.	√	√					
SFRA – R40	Main Road, Jacksdale	Watercourse & highway	Grid on Jacksdale Brook inspected on a regular basis and works actioned accordingly.	√		√				
SFRA – R41	Stoney Lane, Selston	Watercourse & highway	Highway grid inspected on a regular basis and works actioned accordingly.	√		√				
SFRA – R42	Nottingham Road (B600), Selston (adj 191)	Watercourse & highway	Highway grid inspected on a regular basis and works actioned accordingly.			√				

Plan Ref	Approximate Location	Potential Source of Flooding	Comments	Area or Asset understood to be affected

Notes

- Potential Sources of Flooding - Identifies the believed source of the flooding. However, further investigation is likely to be necessary.
- Approximate Location – identifies the broad location.
- Potential Source of Flooding – see 'Potential Flood Hazards in Ashfield'.
- Sewer - No information was provided by Severn Tent Water Ltd. Therefore, further investigation with Severn Trent Water is required before development is undertaken.
- Area or Asset understood to be affected - Identifies what is believed to be the impact of flooding. However, it may impact on other areas or assets.
- Residential – This related to flooding of the curtilage and possible the dwelling. A number identifies the properties known to have flooded internally in the summer of 2007.
- Industrial/commercial – This related to the flooding of the curtilage and possibly buildings.
- Other - relates largely to private roads.

Table Ten: Other Sources of Flooding Rural Areas
Source: Ashfield District Council



Plan Seventeen: Flood Risk, Rural Areas.

FLOOD DEFENCES

2.73 Flood defences are typically raised structures that alter natural flow patterns and prevent floodwater from entering property in times of flooding. They are generally categorised as either ‘formal’ or ‘informal’ defences. A ‘formal’ flood defence is a structure that was built specifically for the purpose of flood defence, and is maintained by its respective owner, which could be the Environment Agency, Local Authority, or an individual. An ‘informal’ flood defence is a structure that has not been specifically built to retain floodwater, and is not maintained for this specific purpose, but may afford some protection against flooding. These can include boundary walls, industrial buildings, railway embankments and road embankments situated immediately adjacent to rivers.

2.74 No formal raised flood defences providing protection from flooding have been identified in Ashfield as part of the SFRA process. Informal defences can be provided by local roads and/or rail lines that have been constructed on raised embankments. These embankments will alter overland flow routes and as such may have a localised effect upon the risk of flooding. This should be carefully reviewed in a local context as part of any detailed site based Flood Risk Assessment

CONCLUSIONS ON FLOOD RISK IN ASHFIELD

(a) Flood risk for the District of Ashfield is relatively low compared to many districts. However, a number of properties in the District have flooded which has a major impact on the lives of the occupiers of those properties.

(b) Any development needs to take account of the potential risk of flooding to area outside the District. Additional water into the River Leen at Hucknall has major implications for flooding in Nottingham. Flooding on the River Erewash can also be seen outside the District boundary.

(c) The Main Rivers in Ashfield are the River Erewash from Park Lane, Kirkby in Ashfield, the River Leen from Castle Mill Farm, Papplewick and the Baker Lane Brook from Hucknall By-pass. Both the main rivers and a number of small water courses are associated with Flood Zones 2 and 3. However, areas have been identified as flooding from watercourses which are not identified on the Environment Agency's Flood Maps.

(d) There are a number of other potential causes of flooding in the District. With climate change it is anticipated that surface water flooding will be an increasing source of flooding in Ashfield.

(e) There is not anticipated to be a significant risk of groundwater flood, including flooding from mine water rebound, in the District. However, there are areas in the District where the EA has identified that groundwater may be an issue.

(f) No information was forthcoming from Severn Trent Water Ltd therefore the SFRA cannot identify specific locations in the District which may flood from sewers.

(g) The substantial highway works to the M1 are anticipated to increase the water quality in the River Erewash and other minor watercourses with no increase in the flood risk.

(h) There are opportunities in the District to enhance local biodiversity in relation to meeting flood risk and through the use of SUDS.

(i) Kirkby in Ashfield:

- The River Erewash presents a minor flood risk in a small area Kirkby in Ashfield off Lane End but past flooding has generally been in Pinxton (outside the district) Jacksdale and downstream of the District boundary.
- The Maghole Brook has flooded in the past results in a number of properties being flooded off Kirkby Lane.
- A number of 'Other Sources of Flooding' have been identified and need to be taken into account in relation to any future development in those areas.

(j) Woodhouse:

- The River Erewash presents a significant flood risk to the east of Park Lane.
- The Cuttail Brook is culverted beneath the Bentinck Void spoil heap. If the culvert were to collapse the spoil heap would act as a dam. This could result in a substantial build up of water if action was not readily taken to solve any blockage.
- A number of 'Other Sources of Flooding' have been identified and need to be taken into account in relation to any allocations or planning applications for development in those areas.

(k) Sutton in Ashfield

- Low flows in watercourses have been identified as a problem which has

detrimental impacts on biodiversity.

- The River Maun has caused localised flooding problems in the past.
- Various policy documents identify the Mansfield Ashfield Regeneration Route as having potential for development. Development will need to take account of increasing flows into watercourses such as the Cauldwell Brook and the River Maun. (Mansfield District Council SFRA)
- The River Idle is substantially culverted but no information is available on the impact on increased flows into the river.
- The River Meden has cause localised flooding problems which are not identified on the Flood Maps.
- Tributary streams into the River Meden such as the Skegby Brook are identified as flood risks on the Flood Maps and this should be reflected in any allocation proposals for the District.
- Kings Mill Reservoir and Sutton Lawn Dam are regularly inspected and are not anticipated to be a flood issue. However, both dam falls into Category A of the "Floods and Reservoir Safety" published by the Institution of Civil Engineers in 1996 because of the presence of the residential developments below the dams.
- Mill Lane suffers from substantial local flood problems, which require remedial works to prevent the regular flooding of the area.
- A culvert runs beneath the old Sutton Colliery spoil heap. Additional work is required to identify the condition of the culvert and the necessary steps to take if a blockage occurs.
- A number of 'Other Sources of Flooding' have been identified and need to be taken into account in relation to any allocations or planning applications for development in those areas.

(l) Hucknall

- The River Leen, Baker Lane Brook an unnamed stream and Farleys Brook all present a flood risk to properties in Hucknall.
- The River Leen and Day Brook Strategic Flood Assessment by Nottingham City Council et al has identified that there are substantial flood risks for Nottingham from development within Ashfield which results in additional surface water flows into the River Leen and its tributaries.
- A number of 'Other Sources of Flooding' have been identified and need to be taken into account in relation to any allocations or planning applications for development in those areas.

(m) Rural Areas

- A number of properties at Jacksdale are identified as falling within Flood Zones 2 and 3 for the River Erewash and parts of the Bagthorpe Brook.
- The Bagthorpe Brook has flooded in the past and despite works to increase the capacity of the channel a number of properties are still at risk from flooding.
- The Jacksdale Brook, at Jacksdale has experienced flooding in the past at Selston Road/Wagstaff Lane. However, the stream was culverted at this point and it is understood the problem has been alleviated.
- The Brinsley Brook, at Underwood has flooded in the past and the Environment Agency's Flood Survey 2007 identifies that the culvert is inadequate.
- A number of 'Other Sources of Flooding' have been identified and need to be taken into account in relation to any allocations or planning applications for development in those areas.

PART THREE - SUSTAINABLE DRAINAGE SYSTEMS (SUDS)

THE NATURE OF SUDS

3.1 The conventional method of draining excess surface water from built-up areas has been via underground pipe systems. In the past, surface water would have been combined with foul water from toilets, wash hand basins and sinks into a single combined sewer. Since the 1950s foul water has been taken to a treatment plant and surface water has, typically, been piped directly into local watercourses through a separate pipe system. This system was principally concern with surface water disposal away from the individual property.

3.2 Draining surface water using conventional drainage techniques has lead to problems and there are issues, particularly at Hucknall, for increased surface water run-off into watercourses. Natural and agricultural land is normally able to absorb and temporarily store a considerable proportion of any rainfall. When land is developed, it interferes with water seeping into the ground as the area of impervious surfaces increases due to roofs, roads, car parks and yards that make up the urban landscape. The underground piped system typically incorporated into developments results in surface water run-off being rapidly transported into watercourses and increases flood risks. Any underground piped system has a finite capacity. Today systems are typical designed for a 1 in 40 year storm but the vast majority of the system is considerable older and therefore is constructed to a lower standard. It is not economic to build systems to cope with extreme events, which puts increased emphasis upon above ground pathways or SUDS to manage exceedence.

3.3 Rainwater mobilises the pollutants on the surfaces of car parks, roads, from roofs and yard areas, which are carried into rivers. The pollutant load includes sediment and grit, hydrocarbons bound to the fine sediments, metals, salts, pathogens and litter. Because traditional drainage systems are designed to carry water away quickly without treatment, they cannot easily control poor run-off quality.

3.4 Over the past 20 years a different emphasis on water management has been gradually developing in the form of source control of water or sustainable drainage systems (SUDS). Sustainable drainage is a non-traditional, environmentally friendly, way of dealing with surface water run-off by providing a drainage system that:

- Manages surface water run-off as close to the source as possible;
- Seeks to mimic natural drainage; and
- Minimises pollution and flood risk resulting from new development.

However, SUDS go beyond drainage as an issue as it includes taking into account long term environmental and social factors in decision making about drainage, Figure Seven. The variety of SUDS components and design options enables designers and planners to consider local

land use, land take, future management scenarios, the needs of local people and enhancements for wildlife when undertaking drainage design.

3.5 It is anticipated through climate change that rainfall will be more intense and there will be more winter rainfall in the East Midlands. SUDS provide a starting point to deal with extreme rainfall events by providing ways of managing rainwater at source and helping to keep surface water run-off at green field rates. This can be achieved by:

- infiltrate water into the ground;
- either storing or diverting storm water for release at a later stage when floodwaters have receded (attenuation);
- intercept floodwater from uphill, thereby reducing the risk of flooding;
- reduce pollution into watercourses;
- reducing carbon emissions by mimicking natural drainage which uses less energy and other resources compared to the conventional forms of drainage. (Conventional drainage may need to pump surface water through pipes to treatment plants).

Table Eleven set out the main variety of SUDS components that can be utilised on development sites.

Figure Seven: Factors in Determining the nature of Sustainable Urban Drainage Systems.

3.6 SUDS also have advantages for developers for:

- SUDS are strongly emphasised by statutory consultees, such as the Environment Agency, and, from the developers aspect, the use of SUDS meets planning objectives and thereby aids in obtaining planning permission.
- In terms of construction, above ground engineering is cheaper than below ground drainage structures for storing water and there may well be benefits of reduced construction costs.

- In larger housing developments it is likely that SUDS can be integrated with open space so that the land lost for development is minimised.

Filter Strips	These are wide, gently sloping areas of grass or other dense vegetation that treat run-off from adjacent impermeable areas.
Swales	Swales are broad, shallow channels covered by grass or other suitable vegetation. They are designed to convey and/or store run-off, and can infiltrate the water into the ground (if ground conditions allow).
Infiltration basins	Infiltration basins are depressions in the surface that are designed to store runoff and infiltrate the water to the ground. They may also be landscaped to provide aesthetic and amenity value.
Wet ponds	Wet ponds are basins that have a permanent pool of water for water quality treatment. They provide temporary storage for additional storm run-off above the permanent water level. They may also be landscaped to provide aesthetic and amenity value.
Extended detention basins	Extended detention basins are normally dry though they may have small permanent pools at outlets and inlets. They are designed to detain a certain volume of run-off as well as providing water quality treatment.
Constructed wetlands	Ponds with shallow areas and wetland vegetation to improve pollutant removal and enhance wildlife habitat.
Filter drains and perforated pipes	Filter drains are trenches that are filled with permeable material. Surface water from the edges of paved areas flows into the trenches, is filtered and conveyed to other parts of the site. A slotted or perforated pipe may be built into the base of the trench to collect and convey the water.
Infiltration devices	Infiltration devices temporary store run-off from a development and allow it to percolate into the ground.
Pervious surfaces	Allow rainwater to infiltrate through the surface into an underlying storage layer, where water is stored before infiltration to the ground, reuse, or release to surface water.
Green roofs	Systems which cover a building's roof with vegetation. They are laid over a drainage layer, with other layers providing protection, waterproofing and insulation.
Reed Beds: Absorbing Waterborne Waste	Planting beds of wetland reeds is an effective way to treat or de-water various types of noxious effluents, More than a dozen types of waste can be treated by means of reed beds.
Bioretention area	A depressed landscaping area that is allowed to collect run-off designed to collect and treat water before discharge via a piped system or infiltration to the ground.
Wetland	A pond that has a high proportion of emergent vegetation in relation to open water.

Table Eleven: Potential SUDS techniques
Source SUDS Manual/Interim Code of Practice for Drainage Systems

SUDS GUIDANCE

3.7 The European Union Water Framework Directive was transposed into United Kingdom legislation in 2003 and encourages a more sustainable approach to drainage. This is reflected in PPS 25[(15)], which stresses regional planning bodies, and local authorities should:

- promote the use of SUDS for the management of run-off;
- ensure that policies and decisions on applications support and complement the Building Regulations(54) on sustainable rainwater drainage. The Building Regulations give priority in surface water disposal to the use of infiltration drainage systems over watercourses and sewers;
- adopt policies for incorporating SUDS requirements in Local Development Documents;
- encourage developers to utilise SUDS wherever practicable through planning conditions or by planning agreement;
- develop joint strategies with sewerage undertakers and the Environment Agency to further encourage the use of SUDS as an aid to mitigate the rate and volume of surface water flows; and
- promote the use of SUDS to achieve wider benefits such as sustainable development, water quality, biodiversity and local amenity.

SUDS IN ASHFIELD

3.8 The Council has sought to utilise SUDS positively in developments where these techniques have been considered to be appropriate. The Council is not aware of any reason why SUDS should not be used at any location in the District. However, the type and effectiveness of the SUDS component will depend on the soil and geology of the specific location. Where there are relatively permeable soils and geology, infiltration techniques can be utilised. In areas where there are impermeable soils, or high water tables other SUDS techniques such as basins and ponds will need to used. The SFRA sets out a description of the geology of the area and the Council's Environment Health Section holds geological maps for the District. However, the information on these maps is indicative and for a more accurate classification of soil type a detailed site investigation would be required by the developer. Additional information on geology and soils may be available through the Council's Environment Health or Building Control Sections. Groundwater is generally not an issue in Ashfield although there are some areas of the District where the Environment Agency has identified that water tables are high.

3.9 SUDS have the potential to support and improve biodiversity but they need to be considered holistically with each detention basin, retention pond and swale forming part of a network of habitats and wildlife corridors. To maximise their potential for biodiversity, SUDS designers need to take account of the ecological context of the site. In an urban area, wetland SUDS have the potential to create species networks and act as stepping stones for species dispersal. If the Council is to consider adopting SUDS, the opportunity to enhance amenity or ecology should be a prime consideration rather than an 'add-on'. It is anticipated that any SUDS scheme should take into account the Nottinghamshire Biodiversity Action Plan(49), the Council's Green Infrastructure Strategy (once completed) and the Council's Green Space Strategy. Further

advice on SUDS and ecology is available on the CIRIA SUDS website www.ciria.org/suds/index.html in 'The SUDS Manual' and in 'Maximising the Ecological Benefits of Sustainable Drainage Systems' (SR 625)

3.10 The Council anticipate that SUDS should be utilised on three levels to effectively manage surface water:

a) Individual Property Level (Source control) – Management of surface water starts with individual properties and can be seen in techniques to capture and reuse water and to allow water to run into the ground. The overall impact will be to reduce the amount of excess run-off in urban areas. "Future Water the Government's water strategy for England" [23] illustrates how new housing can be more efficient in the use of water. The Code for Sustainable Homes[17] has been developed to facilitate sustainable building practice for new homes. It provides a standard for both water consumption and surface water run-off. A similar standard, such as an appropriate BREAM rating, should be adopted for new commercial and industrial buildings

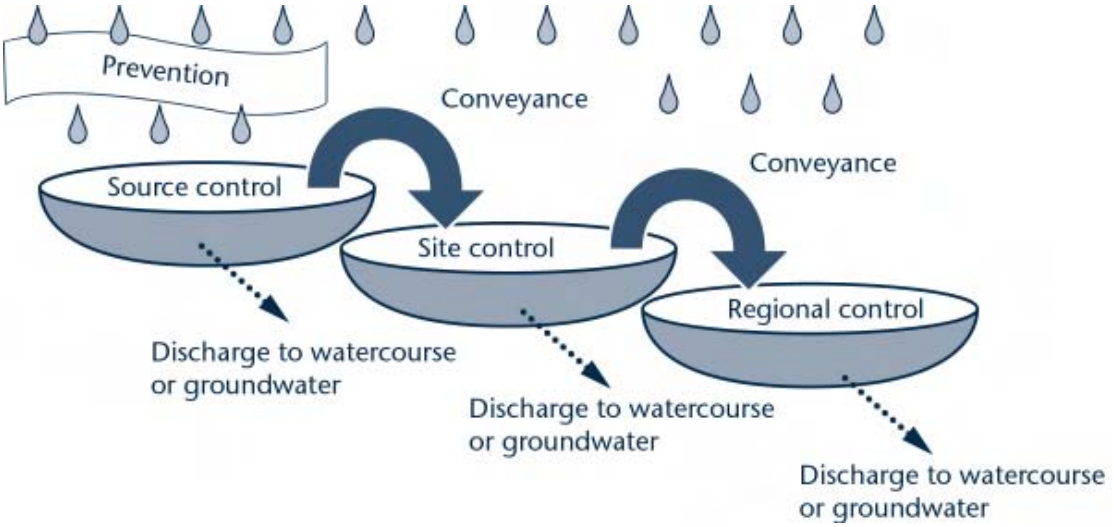
SUDS COMPONENT – Green Roof. Soakaway, Water Butts, Rainwater harvesting, Permeable surfaces (porous paving, gravel, and grass), Filter drains.

b) Community Level (Site Control) – Site control techniques can be seen as the next stage of surface water management. These techniques are designed to minimise the quantity of water being discharged into local watercourses. The SUDS components work by storing the water until it infiltrates into the ground, which mimics natural drainage.

SUDS COMPONENTS – Filter strip/drain, Infiltration basin, Infiltration pond, Permeable surfaces, grass swales, Soakaways, Rainwater harvesting

c) Regional Level (Neighbourhood Control) – It may not be possible to accommodate surface water on individual sites. In these circumstances, it is anticipated that SUDS will take the form of attenuation and they are likely to be designed as part of the open space/landscaping of the development.

SUDS COMPONENTS – Detention Ponds, Detention Basins, Infiltration components, Reed beds, Wetlands



SUDS Management of Surface Water

3.11 In Sutton in Ashfield there is a problem of low flows in watercourses and in Hucknall the emphasis is upon reducing flows into the River Leen. Advice from the Environment Agency specifies that clean surface water should be discharged to the ground via a soakaway. The discharge of surface water to the ground can increase the groundwater level and lead to an increase baseflow in watercourses. This would result in a slow increase in the release of water to a watercourse over time rather than the sharp rise and fall resulting from direct discharge. However, this has to be balance against the requirements of specific areas in relation to:

- Biodiversity requirements.
- Amenity requirements.
- Green SUDS (see para 3.12).
- Any contaminant issues.

3.12 Mansfield District Council's SFRA identifies priority areas for Green SUDS. This includes areas adjacent to the Caudwell Brook since the habitat is likely to be of significant value to white-clawed crayfish. Further, the introduction of appropriate SUDS might provide a link between existing fragmented water vole populations in this area. In this context Green SUDS are considered to be systems which have a notable ecological benefit through the creation of wildlife habitats. This will exclude sub-surface systems such as soakaways and storage tanks which have a low ecological significance. Retention ponds and wetlands would be prioritised with a lesser benefit achieved through infiltration basins and swales.

3.13 Within Ashfield the following SUDS systems have been identified as currently in place or for which development has commenced:

Sutton in Ashfield

- Basin, located off Sudbury Drive, Huthwaite.
- Balancing Lagoon, located off Castlewood Grove, Ashlands Estate, Sutton in Ashfield.
- Basin located on the West of Fulwood Employment allocation off Export Drive, Huthwaite.
- Basin off River Maun to the south of Ashfield District Council's Depot, Station Road, Sutton in Ashfield.

Hucknall

- Basin, located adjacent to 39 and 41 Stainsborough Road
- Basin, located off Polperro Way opposite Common Lane junction.
- Balancing lagoon, Butlers Hill, Baker Brook Close.
- Broomhill Park, off Nottingham Road.

3.14 Based upon the housing and employment allocations in the Ashfield Local Plan Review 2002 and the Housing Land Monitoring Report April 2007 it is anticipated that the sites set out in Table Twelve have the potential to incorporate above ground SUDS components. However, this has to be seen within the context of the following:

- The Council's Council Green Space Strategy (once completed).
- The Council's proposed Green Infrastructure Strategy (once completed).
- The site at Annesley Colliery, as a former colliery, will have contamination issues.
- The site at Welsh Croft Close/ Portland Industrial Estate has both contamination issues and is allocated as a SINC site.
- The specific nature of the soil and geology of the individual sites.

ALPR Site Ref.	Site	Location	Net Hsg Area (Ha)	Gross employment area Ha
		Hucknall		
HG1Ha	Housing	East of Nottingham Road	4.9	
HG1Hb	Housing	Broomhill Farm (remainder of allocation)	10.6	
HG1Hc	Housing	Lime Tree Ave/Farleys Lane	2.8	
HG1Ho	Housing	South of Papplewick Lane (part with planning permission)	22.1	
HG1Ho	Housing	South of Papplewick Lane (remainder of allocation)	1.2	
EM1Ha	Employment	Rolls Royce Watnall Road		13.0
		Kirkby		
HG1Ki	Housing	Diamond Avenue	2.1	
EM1Kc	Employment	Welsh Croft Close/Portland Industrial Estate		4.1
EM1Rc	Mixed Use Site	Annesley Colliery (Housing/employment site)		9.0
		Sutton		
HG1Se	Housing	Hillsborough Avenue (off Brandon Walk/Lynton Drive)	4.8	
EM1RE	Employment	South West Oakham		23.5*
EM1Sa	Employment	Pinxton Lane		28.0*
* Site area is net following deduction of proposed structural landscape.				

Table Twelve: Potential sites on which surface SUDS component could be utilised.

ADOPTION?

3.15 The biggest issue facing the use of SUDS is not the design or construction but who takes responsibility for the maintenance of the SUDS system? One of the conclusions of the Pitt Review[57] is that the Government, as part of its Water Strategy, should resolve the issue of which organisations should be responsible for the ownership and maintenance of sustainable drainage. DEFRA has issued a consultation document "Improving Surface Water Drainage" [23] which sets out the

case for any one of three bodies to adopt SUDS, local authorities, water undertakers or a new SUDS undertaker or company. A further research document "Funding and charging arrangements for SUDS" [21] looks at how SUDS may be financed.

3.16 Currently, water undertakers are generally constrained to adopting only pipe systems that have a proper outfall and fall within the legal definition of a "sewer" (as defined in the Water Industry Act 1991). Therefore, there are components of SUDS, which the water undertaker cannot adopt under current legislation. Consequently, the current options in relation to the SUDS are:

a) Adoption by the Council – The developer constructs/installs the system, and hands over the system with a commuted sum to the Council, who takes responsibility for future maintenance.
b) Retention of ownership by the developer or adoption by an independent management company. This requires a contingency plan to provide for the potential insolvency of the developer or Management Company as it is important that continuity in relation to the maintenance of the system is retained.

3.17 Planning Policy Statement 25[15] emphasises that it is essential that:

a) the ownership and responsibility for maintenance of every element of SUDS is clear and this requirement is reflected in the Draft East Midlands Regional Plan.
b) Where the surface water system is provided solely to serve any particular development, the construction and on-going maintenance costs should be fully funded by the developer. A Section 106 agreement under the Town and Country Planning Act is identified as the appropriate means to secure this, Figure Eight.

3.18 The Interim Code of Practice for Sustainable Drainage Systems[44] produced by the National SUDS Working Group provides that:

"There are currently no legally binding obligations relating to the provision and maintenance of SUDS as opposed to conventional foul and surface water drainage systems. Until this position changes, the most appropriate method of achieving implementation and long-term maintenance of SUDS is an agreement under Section 106 of the Town and Country Planning Act".

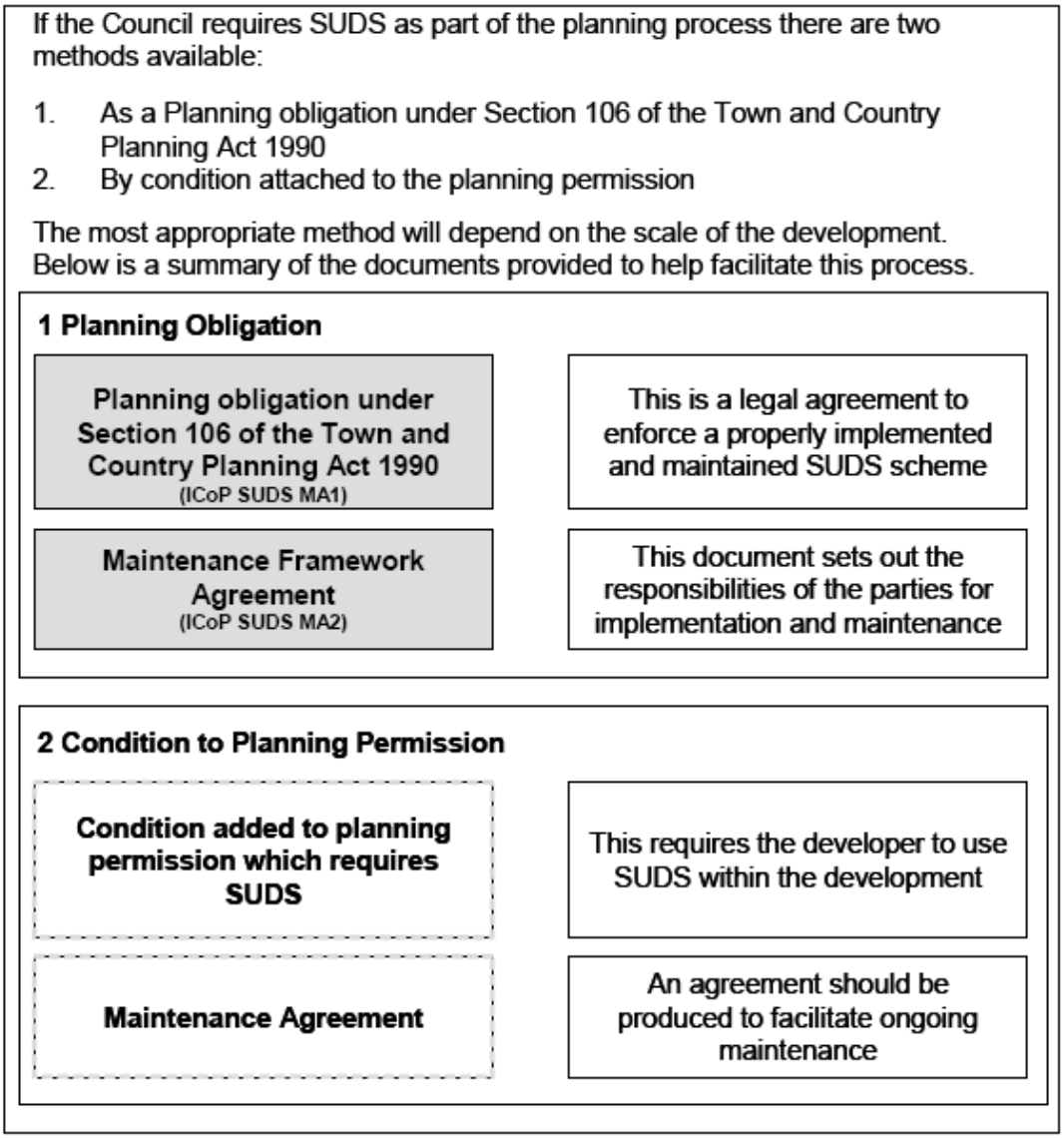


Figure Eight: Summary of planning documents providing SUDS
Source: Interim Code of Practice for Sustainable Drainage Systems

3.19 Currently, the Council has no policy approach to SUDS systems and provides no guidance to developers on whether SUDS systems will be adopted by the Council. Setting out a policy approach will provide developers with greater certainty in using SUDS on development sites and reassure developers that monies will be ring-fenced for SUDS maintenance on specific sites.

3.20 SUDS systems are not limited to open space areas. Oxfordshire County Council has had an active approach to SUDS, adopting SUDS systems as part of the highway drainage network. In Nottinghamshire the County Council has no policy approach to this issue and a continuing problem is that SUDS are looked at on a scheme by scheme basis without any guidance on SUDS to officers.

3.21 Education and engagement form an important part of introducing SUDS systems. This can be seen in relation to:

- Developers understanding the basis of the system.
- The construction workforce on the ground being aware of the principles of SUDS.
- Public utilities being aware of potential problems of interfering with SUDS systems, which can be avoided by good planning and communication.
- The local community in promoting a positive response from both the existing community and the new residents.

The introduction of SUDS entails a different approach to managing water relating to individual properties as well as the wider area. Consequently, it is important to engage with residents and potential occupiers regarding the implementation of SUDS drainage systems and the use of such systems. Research by HR Wallingford 2003[53] identified that a lack of knowledge was considered to be one of the main factors that can generate negative attitudes towards SUDS. Consequently, engaging with the public can have a critical role in influencing the acceptability of SUDS within residential areas.

CONCLUSIONS ON SUDS

a) SUDS is a non-traditional drainage system that mimics nature, manages surface water close to source and takes into account long term environmental and social factors in decision making about drainage.

b) Traditional drainage systems have been unable to cope with the volume of rainwater and flooding from watercourses. SUDS provide a starting point to deal with extreme rainfall events which can be anticipate through climate change and helps to keep surface water run-off at green field rates.

c) The use of SUDS is emphasised in national planning policy guidance which provides that local authorities should:

- promote the use of SUDS for the management of run-off;
- ensure that policies and decisions on planning applications support and complement the Building Regulations on sustainable rainwater drainage;
- adopt policies for incorporating SUDS requirements in Local Development Documents;

d) Advice from the Environment Agency specifies that clean surface water should be discharged to the ground via a soakaway. The discharge of surface water to the ground can increase groundwater level and lead to an increase in baseflow in watercourses. However, this has to be balance against the requirements of specific areas in relation to:

- Biodiversity requirements.
- Amenity requirements.
- Green SUDS.
- Any contaminant issues.

e) Mansfield District Council's SFRA identifies priority areas for Green SUDS which includes areas adjacent to Caudwell Brook since the habitat in this catchment is likely to be of significant value to white-clawed crayfish. Retention ponds and wetlands would be prioritised in this area with a lesser benefit achieved through infiltration basins and swales.

f) A number of developments in Ashfield already incorporate SUDS components. Housing and employment allocations under the Ashfield Local Plan Review 2002 offer opportunities to utilise SUDS.

g) Where possible opportunities should be taken to enhancing biodiversity through SUDS. Any SUDS scheme should take into account the Nottinghamshire Biodiversity Action Plan, the Council's Green Infrastructure Strategy (once completed) and the Council's Green Space Strategy.

g) A key aspect for SUDS is who takes responsibility for future maintenance. Maintenance responsibilities should be identified at an early stage of any development. The Council does not have a policy approach to SUDS. It is important that this issue is considered by the Council at an early date to provide developers with guidance on whether SUDS systems will be adopted by the Authority and, if adopted, on what terms.

h) Where the surface water system is provided solely to serve any particular development, the construction and on-going maintenance costs should be fully funded by the developer. A Section 106 agreement under the Town and Country Planning Act is an appropriate means to secure developer funding.

i) Developers and the Council should engage with the local community and potential occupiers in relation to the use and function of SUDS on proposed developments.

PART FOUR – MANAGING AND REDUCING FLOOD RISK

PLANNING

4.1 The management and reduction of flood risk covers a wide spectrum and falls on all parties from individual property owners to large organisations and the government. However, land use planning has a major role to play in managing flood risk through the allocation of land, the formulation of policies and the control of development. Planning Policy Statement 25: Development and Flood Risk Practice Guide sets out how the spatial planning process should take account of flood risk management which is reflected in Table Thirteen.

RISK - BASED SEQUENTIAL APPROACH

STEP 1	STEP 2	STEP 3	STEP 4	Step 5
Assess	**Avoid**	**Substitute**	**Control**	**Mitigation**
Study flood risk Regional Flood Risk Assessments SFRA FRA	Allocations Sequential Test Exception Test. Sustainable Appraisal of flood risk against other sustainability criteria	Substitute less vulnerable development types Sequential test	SUDS Design SWMP Flood Risk Management Strategies Flood Defences	Flood resilience measures Emergency Plans

Table Thirteen: Spatial Planning and the Management of Flood Risk.
Source: Developed from PPS25 and PPS 25 Development & Flood Risk Practice Guide

4.2 Planning at a local level has the ability to shaping the nature of District and achieving sustainable development through integrating economic, social and environmental issues. In relation to flooding, the key local objectives are to:

- minimise flood risk to people and property both inside and outside the District;
- ensure that flood risks identified in the SFRA are taken into account in both local development plans and individual planning applications;
- take into account specific area issues identified in the SFRA;
- avoiding inappropriate development in relation to flood risk;

- provide guidance on the need for site specific flood risk assessments (FRA);
- where appropriate, utilise development as an opportunity to reduce flood risk to the local community;
- enhance 'green space' and achieve improvements to biodiversity;
- promote the use of sustainable drainage systems within the District;
- ensuring that new development takes climate change into account.

4.3 The overall conclusion from the SFRA is that the risk of flooding in Ashfield is relatively low as limited areas of the District are identified as being at risk from fluvial flooding. Therefore, it is not anticipated that flood risk will have a significant effect upon the potential location of development in the District. Nevertheless:

- A number of properties in Ashfield flooded in the summer of 2007 and any flooding has a major impact on people's well being through the loss of treasured possessions and the loss of a secure environment.
- Additional water into the River Leen has major implications for flooding in Nottingham.
- Additional waters into the River Erewash needs to take into account the potential impact down stream.
- The SFRA has identified a number of other sources of flooding which are typically outside Flood Zones 2 and 3.

Consequently, flood risk from all sources should be addressed in allocations and individual planning applications.

4.4 It is not considered that a Level 2 SFRA is necessary within the District but additional appraisal of specific areas of land may be required dependent on where land is allocated for development.

4.5 In determining planning applications the Council should:

- Have regard to guidance/policies in PPS 25 and the East Midlands Regional Plan in relation to flooding as a material considerations which may supersede the policies in the Ashfield Local Plan Review 2002.
- Have regard to the findings of the SFRA and any updates as a material consideration.
- Ensure that planning applications are supported by site-specific flood risk assessments as appropriate;
- Give priority to the use of SUDS; and
- Ensure that all new development in flood risk areas is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed.

PPS 25 provides that a site specific FRA should accompany any planning application for development proposals of 1 hectare or greater in Flood Zone 1 and all proposals in Flood Zone 2 and 3. However, paragraph 8 of PPS25 requires that "planning applications are supported

by site specific flood risk assessments as appropriate" and paragraph E8 specifies that "at the planning application stage, an appropriate FRA will be required to demonstrate how flood risk from all sources of flooding to the development itself and flood risk to others will be managed now and taking climate change into account." Therefore, site specific FRA will be required on:

- all developments of 1 hectare or greater in Flood Zone 1;
- all applications in Flood Zone 2 or 3
- any site where a flood risk issue has been identified by the SFRA or any other sources and the LPA considers that a FRA is necessary to take account of the flood risk. This reflects the objective of PPS25 of taking flood risk into account at all stages in the planning process and the local objectives in relation to flood risk assessment set out above.

4.6 Recommendations in relation to the approach to allocating land for development and for planning policies/ planning applications are set out in the text boxes and summarised in Table Fourteen. They reflect:

a) The provisions of PPS25;
b) Draft policies in the East Midlands Regional Plan;
c) The findings and conclusions from Part 2 and Part 3 of the SFRA which inform and set the context for planning and flood risk in Ashfield.

	Flood Zone 3a	Flood Zone 2	Flood Zone 1
SPATIAL PLANNING RECOMMENDATIONS			
Allocations	No allocations within Flood Zones 2 or 3 except in exceptional circumstances	No allocations within Flood Zones 2 or 3 except in exceptional circumstances	Utilise SFRA to identify flooding from other sources. Further research as necessary.
Land use (from PPS25 Table D.2	Water compatible & less vulnerable uses. More vulnerable and essential infrastructure only if Sequential and Exception Test are passed	Water compatible, less vulnerable and more vulnerable uses. Highly vulnerable uses only if Sequential Test and Exception Test are passed	No restriction on land use but subject to taking into account local flood issues identified any the SFRA or any amendments.
Climate Change	If exceptional circumstances apply, a site specific flood risk assessment taking into account the impact of climate change will be required on any site proposed to be allocated in FZ3a. The benefits of the development must clearly outweigh the potential flood risk and demonstrate that the risk of flooding can be mitigated and, where possible, reduced.	If exceptional circumstances apply, a site specific flood risk assessment taking into account the impact of climate change will be required on any site proposed to be allocated in FZ2. The benefits of the development must clearly outweigh the potential flood risk and demonstrate that the risk of flooding can be mitigated and, where possible, reduced.	Allocations to be in Flood Zone 1.
SUDS	To be incorporated in all future developments unless the developer can demonstrate the use of SUDS is inappropriate for the site.		
S 106 Obligations	Required to cover the impact of the development in relation to flood defences or the adoption of SUDS	Required to cover the impact of the development in relation to flood defences or the adoption of SUDS	Not generally required except for the adoption of SUDS.
SUDS sites	To be protected from future development		
Code for Sustainable Homes	LDF documents to reflect the Code and set out the minimum sustainable standard for homes that should be achieved in the District.		
DEVELOPMENT CONTROL RECOMMENDATIONS			
FRA • See Table setting out FRA requirements • PPS25 para F10 volume & peak flow rates no greater than the rates prior to the proposed development.	• Required • Hucknall River Leen & Baker Lane Brook main rivers • Impact of additional water into catchment of River Leen on flooding in Nottm. • Low flow issues in Sutton in Ashfield.	• Required • Hucknall River Leen & Baker Lane Brook main rivers • Impact of additional water into catchment of River Leen on flooding in Nottm. • Low flow issues in Sutton in Ashfield.	• Required all sites greater than 1 ha. • May be required elsewhere. All sites should assess localised flood issues using SFRA as a baseline. • Impact of additional water into catchment of

	Flood Zone 3a	Flood Zone 2	Flood Zone 1
	• Rural areas flooding from River Erewash & associated watercourses. • Impact of additional water into River Erewash on areas outside District.	• Rural areas flooding from River Erewash & associated watercourses. • Impact of additional water into River Erewash on areas outside District.	River Leen on flooding in Nottm. • Impact of additional water into River Erewash on areas outside District.
Greenfield sites in floodplain	Protect from development	Protect from development	N/A
Climate Change	Any FRA should reflect climate change over life of the development (PPS 25 Table B.2)	Any FRA should reflect climate change over life of the development (PPS 25 Table B.2)	Any FRA should consider climate changes, particularly the potential to increase surface water runoff from rainfall events.
SUDS	• Should be incorporated in developments unless the developer can demonstrate the use of SUDS is inappropriate for the site. • Manage run off and flood "pathways" to reduce flood risk> • Take account of areas of low flow in Sutton in Ashfield and the flood risk to Nottingham from the River Leen. • Where appropriate, should enhance biodiversity and amenity. E.g. Green SUDS Caldwell Brook.		
Permeable Surfaces	Encourage the use of permeable surfaces in development. Only grant planning permission for impermeable surfaces in exceptional circumstances requiring the applicant to justify why such a surface should be used.		
Culverts	Where appropriate renaturalise culverted watercourses as part of future developments		

Table Fourteen: Summary of Planning Requirements in relation to Flood Risk

Development and Flooding

4.7 It is considered that within the District sufficient land is available in areas of low flood risk to avoid the need to develop within Flood Zones 2 or 3. Greenfield sites, which form part of the floodplain of any river in Ashfield, should be protected from development unless the overall planning benefits of the allocation or development clearly outweigh the potential flood risk. Consequently, development in areas of Flood Zones 2 or 3 should be the exception. (See PPS25 Practice Guide June 2008 para 4.33 to 4.37 for examples). If following application of the flood risk sequential test, it is not possible to locate development in areas of lower flood risk, PPS 25 allows for an Exceptions Test to be applied. Tables Fifteen and Sixteen illustrates the flood risk vulnerability and flood zone compatibility of different types of property based on Table D2 and D3 in PPS25. If the benefit of the development clearly outweighs the potential

flood risk then it should be demonstrated through preparation of a flood risk assessment that the risk of flooding can be mitigated and that, where possible, there should be a net reduction in flooding.

4.8 In Flood Zone 1 flooding is typically not an issue for development. Nevertheless, the SFRA has identified a number of sites where flooding has occurred in the past. Therefore, where the SFRA or other information identifies there may be a potential risk of flooding, the developer will need to demonstrate how the risk from all sources of flooding to the development and the risk of flooding of others has been taken into account.

	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Essential Infrastructure				
Highly vulnerable				
More vulnerable				
Less vulnerable				
Water compatible				

Key	
Advice from Table D1 & D2 - PPS 25	
	Appropriate.
	Should only be permitted if the Exception Test is passed.
	Should not be permitted

Table Fifteen: Flood Risk Vulnerability and Flood Zone Compatibility
Source: Based on Planning Policy Statement 25 Table D.3

Table D.2: Flood Risk Vulnerability Classification

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.[19]
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.[20] • 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).

Table Sixteen: Flood Zone classifications.
Source: Planning Policy Statement 25

4.9 If the Exceptions Test is satisfied and planning permission is to be granted in Flood Zones 2 or 3 flood risk should be minimised by:

i) Good design such as is reflect in CIRIA's "Development and flood risk – guidance for the construction industry"(10), which provides advice on mitigation measures for flood risk management.

ii) Ensure buildings are flood resilient. "Improving the Flood Performance of New Buildings – Flood Resilient Construction", 2007(18) identifies how buildings could be made flood resilient. Research undertaken by DEFRA, indicates that the cost for a single property can range from £3,000 to £10,000 per property. However, this could pay for its self in a single flood event as well as significantly reducing the potential impact on the occupier in terms of disruption and health, which is not quantified.

4.10 Unlike fluvial flooding, the location of flooding from other sources can be difficult to identify. Nevertheless, it can be recognised that flood risks are increased by an urbanised environment, by impervious soils, from potential infrastructure failure, from groundwater located near the surface and from steep gradients often associated with old soil heaps. Part Two of the SFRA identifies areas where potential flood risk may arise. However, there is a degree of uncertainty in the risk of localised flooding from other sources of flooding relating both to how frequently flooding

can be expected to occur, and the potential damage that it may cause. Developers of land where the SFRA has identified there is a potential flooding issue will need to demonstrate that any development proposal has taken into account flooding. Where appropriate, a site specific flood risk assessment will be required by the Council to assess the flood risk, to determine whether the development should proceed or what measures are necessary to reduce the flood risk.

4.11 PPS 25 (Annex F) [(15)] emphasises the need to manage surface water. The impact of development is typically to reduce the permeability of at least part of the site. Without specific measures the volume of water run off is likely to increase. Paragraph F10 of PPS25 provides that the surface water arrangements for any development site should be such that the volume and peak flow rates of surface water leaving a development site is no greater than the rates prior to the proposed development, unless specific off-site arrangements are made and result in the same net affect.

4.12 The Interim Code of Practice for Sustainable Drainage Systems July 2004[(44)] has been set out by the National SUDS Working Group which includes representatives of the House Builders Federation, Local Government Association, Severn Trent and the Environment Agency. The Interim Code sets out “Procedures for rainfall run-off management for development” (6.2.8) which should be applied by developers in relation to specific sites.

4.13 Issues were identified in Part Two of the SFRA on specific locations where further investigations may be necessary. No development should take place until potential flood issues have been resolved in relation to:

- The valley of the Cuttail Brook to the south of Salmon Lane until the issue of the culvert under the Bentick Void has been resolved.
- The valley below Sutton Lawn Dam where the level of potential flood risk from the dam should be identified.
- Mill Lane, Huthwaite until the substantial local flood problem, have been resolved or it is identified that further development will assist in resolving existing flooding problems.
- Land to the north of Ashlands Road until the impact of the culvert beneath Sutton Colliery spoil heap is resolved.

Allocations

1) Land should not be allocated within Flood Zones 2 or 3 unless the flood risk Sequential Test has been undertaken and passed and the overall planning benefits of the allocation clearly outweigh the potential flood risk. Where an exception is proposed:

   - the reasons for the exception should be identified and justified;
   - the allocation should identify that any development should be designed to alleviate flood risks and buildings should be flood resilient.

2) If allocations are proposed on any land where the SFRA identifies potential flood risk issues a determination should be made whether the allocation is appropriate or alternatively what action is necessary to alleviate the flood risk.

Planning policies and consideration of planning applications

1) Planning permission should not be granted for development in Flood Zones 2 or 3 unless there are exceptional circumstances. The applicant should set out in a site specific FRA a detailed justification why an exception is considered to be applicable and the FRA will need to demonstrate:
   - that the Sequential Test and Exception Test have been correctly applied;
   - how the development passes the Exception Test;
   - that the development is safe for its anticipated lifetime taking into account evidence on the impact of climate change;
   - that the development will not increase the flood risk elsewhere.

   Any development on such a site should be designed and constructed to be flood resilient.

2) A Screening Study should be undertaken where development is proposed on, adjacent to or in the vicinity of:

   - the locations of 'other sources of flooding' identified in the SFRA or any update of the SFRA,
   - areas of potential groundwater',
   - area of impermeable clay soils,
   - the areas of land specifically identified in paragraph 4.12
   - where Strategic Flood Risk Assessments by neighbouring authorities have identified a potential flood risk associated with Ashfield.

   If the Screening Study identifies that there is a flood risk a Level 2 or Level 3 FRA will be required.

Site Specific Flood Risk Assessments

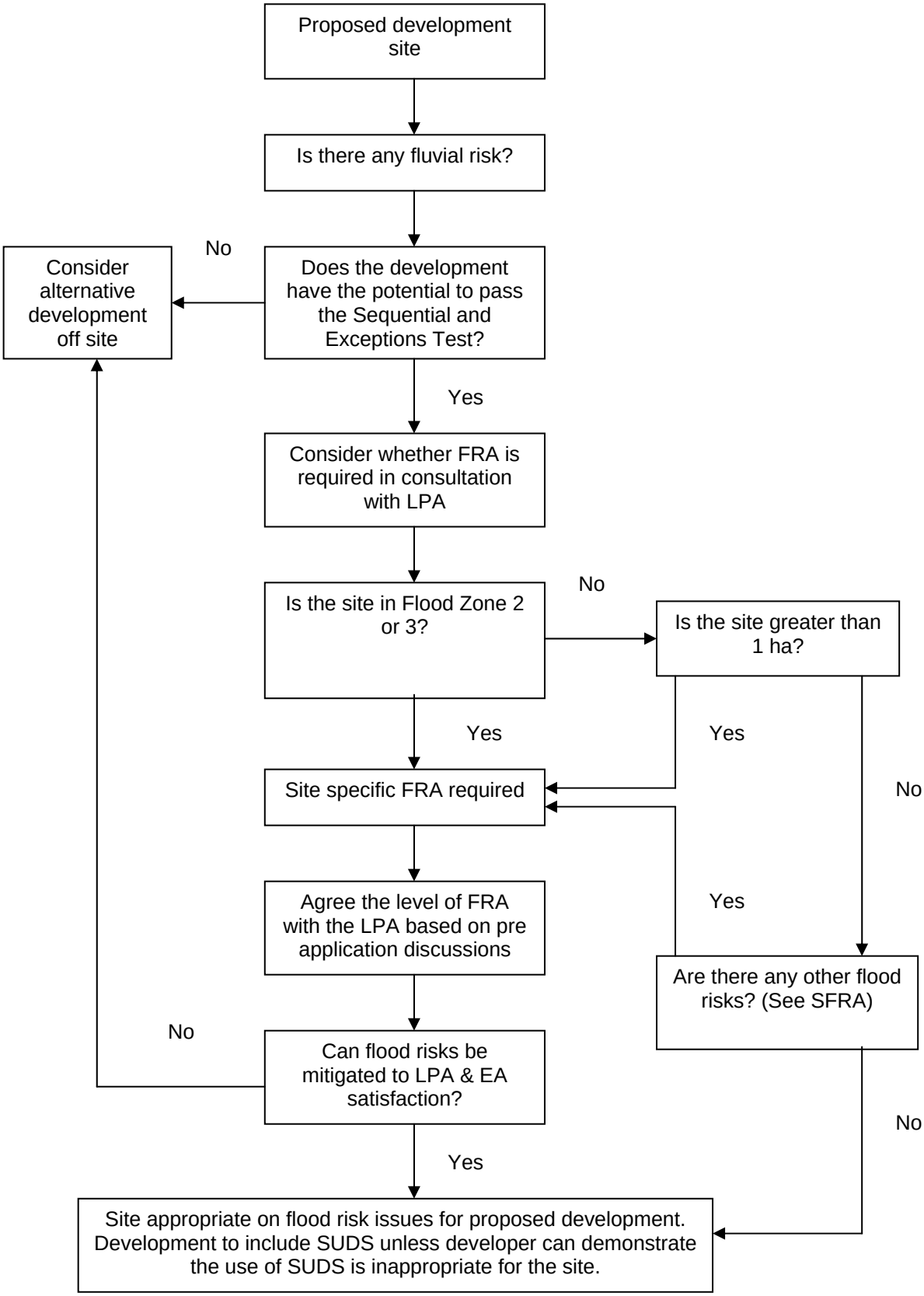
4.14 Table Seventeen sets out guidance on submitting planning applications in relation to flood risk. Pre application discussions with the Ashfield's Development Advice Control and Section should be undertaken to:

- Refer the developer to the SFRA and policies in the Local Development Documents (as documents are adopted).
- Inform the developer whether the Sequential Test or Exception Test in PPS25 applies to the site.
- Identify whether a site specific flood risk assessment will be required.
- Set out the anticipated scope of the Flood Risk Assessment. (This may require direct consultation with the Environment Agency and other key consultees).
- To consider flood issues identified in the SFRA or any update.
- Identify that the use of SUDS will be required on the development unless there are exceptional reasons why SUDS should not be utilised.
- Encourage the developer to undertake pre application consultations with identified flood risk consultees and, where appropriate, the local community.
- Encourage the developer to avoid the extensive use of impermeable surfaces on the development.

4.15 Sources of information on flood risk will include:

1. Environment Agency Flood Maps.
2. The Council's SFRA.
3. Any update on the 'other sources of flooding' in the SFRA.
4. SFRA undertaken by authorities adjacent and down stream of Ashfield.
5. Any site specific FRA (not limited to the applicant site).
6. Evidence provided by any key stakeholders including the Environment Agency, and Severn Trent Water Limited.
7. Any other source of information considered by the Council's to be applicable to flood risk.

Table Seventeen – Guidance on site specific FRA



4.16 The requirement for and the scope of any site specific FRA will depend on the level of perceived risk of flooding of the site and will reflect the following:

- **A Screening Study** (Level 1) to identify from readily available information whether there are any flooding or surface water management issues relating to a development site that may warrant further consideration. The Screening study will ascertain whether a FRA Level 2 or 3 is required.

- **A Scoping Study** (Level 2) to be undertaken if the Level 1 FRA indicates that the site may lie within an area that is at risk of flooding, or that the site may increase flood risk due to increased run-off. This study should confirm the sources of flooding which may affect the site. The study should include the following:

  - an appraisal of the availability and adequacy of existing information;
  - a qualitative appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere; and
  - an appraisal of the scope of possible measures to reduce the flood risk to acceptable levels.

  The scoping study may identify that sufficient quantitative information is already available to complete a FRA appropriate to the scale and nature of the development.

- **A Detailed Study** (Level 3) to be undertaken if the Level 2 FRA concludes that further quantitative analysis is required to assess flood risk issues related to the development site. The study should include:

  - quantitative appraisal of the potential flood risk to the development;
  - quantitative appraisal of the potential impact of the development site on flood risk elsewhere; and
  - quantitative demonstration of the effectiveness of any proposed mitigation measures.

The anticipate outputs of a Level 2 or Level 3 FRA are set out in Table Eighteen.

DEVELOPMENT DESCRIPTION & LOCATION

- The type of development proposed and where it will be located.
- The vulnerability classification (PPS25 table D.2, annex D).
- Whether the proposed development is consistent with the Local Development Documents?
- If development is proposed in Flood Risk Zone 2 or 3 the reason for the exception should be identified and justified. In these circumstances, the FRA should identify how flood resilience is reflected in the design.

DEFINITION OF THE FLOOD HAZARD

- Identify all sources of flooding that could affect the site, describing how flooding would occur, with reference to any historic records wherever these are available.
- Identify the existing surface water drainage arrangements for the site.

PROBABILITY

- The probability of the site flooding from any source.
- Setting out the existing rates and volumes of run-off generated by the site, including information on flow and rate of onset and the anticipated flow and rate from the proposed development.

CLIMATE CHANGE

- The effects of climate change on flood risk for the lifetime of the development.

DETAILED DEVELOPMENT PROPOSALS

- Details of the development layout, referring to the relevant drawings.
- Where appropriate, demonstrate that a sequential approach has been undertaken within the development site to inform the layout by locating the most vulnerable land uses to areas in the site that are at least risk of flooding (applying the Sequential Test at site level).

FLOOD RISK MANAGEMENT MEASURES

- How will the site be protected from flooding, including the potential impacts of climate change, over the development's lifetime?
- Demonstrate how the development will reduce the probability and consequence of flooding on and off site?
- Identify opportunities to reduce flood risk, enhance biodiversity and an amenity.

OFF SITE IMPACTS

- Demonstrate how the measures to protect the development from flooding are appropriate and will ensure there will be a reduction in flood risk elsewhere or as a minimum do not increased flood risk elsewhere?
- Demonstrate that the measures to prevent run-off from the completed development are appropriate and will not increase flood risk elsewhere. (This aspect is particularly relevant to development within the catchment of the River Leen and the potential to result in flooding in Nottingham)?
- Demonstrate how SUDS will be incorporate in the overall design of the development, identifying who will be responsible for long term maintenance or set out a full justification why SUDS are not suitable for the development site?
- Where the Exceptions Test applies, demonstrates that the development will be safe without increasing flood risk elsewhere, and where possible, will reduce overall flood risk.

RESIDUAL RISKS

- An assessment of the flood-related risks that remain after measures to protect the site from flooding have been implemented, taking account of what happens if the design parameters are exceeded. The design needs to consider the potential impact of overland flows from high intensity storms, which may overwhelm the drainage system and how such overland flows will be managed.
- Who will manage the risks and enforce compliance over the lifetime of the development?

Table Eighteen: Requirements of a Site Specific FRA

Source: Planning Policy Statement 25 Practice Guide. June 2008

Climate Change

4.17 Climate Change needs to be taken into account in relation to allocations and to potential development. PPS25 provides that sensitivity testing of the Flood Zone Maps produced by the Environment Agency, using the 20% from 2025 to 2115 allowances for peak flows, suggests that changes in the extent of inundation are negligible in well-defined flood plains, but can be dramatic in very flat areas. Under these circumstances, the topography of the District would indicate that climate change is unlikely to have a major impact of Flood Zones 2 or 3.

4.18 Table Nineteen and Table Twenty set out housing and employment allocations under the Ashfield Local Plan Review 2002. An analysis of these allocation identifies that:

- the vast majority of allocations are not impacted by Flood Zones 2 or 3 or by 'other sources of flooding' identified in Part 2 of the SFRA.
- In a number of cases planning permission has already been granted, typically after a site specific FRA.

The sites anticipated to be at a potential risk from climate change are as follows:

- West of Fulwood employment allocation (EM1Sb). However, outline planning permission was granted in 2002 for the development of the site, and infrastructure works have been undertaken, including an attenuation pond.
- Land off Bestwood Road employment allocation (EM1 Na).

ALPR Site Ref.	Location	Net Hsg Area (Ha)	Planning Permission	Site impacted by Flood Zone 2 or 3	Site Impacted by Other Source of Flooding
	Kirkby in Ashfield				
HG1Ka	Lindleys Lane (O/L part)	3.6	Yes	No	No
HG1Ka	Lindleys Lane (F part)	11.4	Yes	No	No
HG1Kd	Beech Avenue	0.7	No	No	No
HG1Ki	Diamond Avenue (part with planning permission)	2.0	yes	No	No
HG1Ki	Diamond Avenue (remainder of allocation)	0.1	No	No	No
	Sutton in Ashfield				
HG1Se	Hillsborough Avenue	4.8	Yes	No	No

ALPR Site Ref.	Location	Net Hsg Area (Ha)	Planning Permission	Site impacted by Flood Zone 2 or 3	Site Impacted by Other Source of Flooding
	(off Brandon Walk/Lynton Drive)				
HG1Sf	Off The Avenue (off Pendean Way)	0.4	Yes	No	No
HG1Sf	Off The Avenue (remainder of allocation)	0.3	No	No	No
HG1Sh	Alfreton Road South	1.4	No	No	No
HG1Si	Jephson Road	1.1	Yes	No	No
HG1Sl	Mowlands Close/ Sheepwash Lane	3.1	Yes	No but the River Maun forms part of eastern boundary of the allocation	Yes – S16 Land to the rear of Riveraine Close
HG1Sp	Stoney Street (alloc part)	0.7	No	No	No
HG1Ss	Stoneyford Road/Mount Pleasant	1.2	No	No	No
HG1Sag	Columbia St/Mill Lane, Huthwaite	1.3	Complete 2008	No	Yes – S27 Mill Lane
HG1Saj	Common Road - North	1.3	No	No	No
	Hucknall				
HG1Ha	East of Nottingham Road	4.9	Yes	No	No
HG1Hb	Broomhill Farm	10.6	No	No	No
HG1Hc	Lime Tree Ave/Farleys Ln	2.8	Yes	No	No
HG1Hf	Watnall Road (balance of allocation after subtracting small site PPs ref. H0085/ H0163)	0.5	No	No	No
HG1Hh	Brickyard	0.7	No	No	No
HG1Hj	Garden Road	5.5	Yes	No	No
HG1Ho	South of Papplewick Lane (part with planning permission)	22.1	Yes	Yes. FRA undertaken	Land adjacent to part of the allocation has flooded. H8 - Oakenhall Ave
HG1Ho	South of Papplewick Lane (remainder of allocation)	1.2	No	No	Land adjacent to part of the allocation has flooded. H8 - Oakenhall Ave
HG1Hp	Linby Road	0.6	No	No	Land off Lindy Walk floods. H3 & H4
	Bestwood Village				
HG1Nj	Old Mill Close (West)	0.8	Yes	Yes. FRA undertaken	No
HG1Nk	Old Mill Close (East)	1.6	Yes	Adjacent to Flood Risk area	No

ALPR Site Ref.	Location	Net Hsg Area (Ha)	Planning Permission	Site impacted by Flood Zone 2 or 3	Site Impacted by Other Source of Flooding
	Rural Areas				
	Jacksdale				
HG1Nf	Westdale Road/ Rutland Road	0.9	No	No	No
HG1Ng	Westdale Road	1.9	No	No	No
	Rural Area				
HG1Ra	Annesley Hall	1.5	Yes	No	No

Table Nineteen: Housing Allocations
Source: Ashfield District Council

ALPR Site Ref.	Location	Net Hsg Area (Ha)	Planning Permission	Site impacted by Flood Zone 2 or 3	Site Impacted by Other Source of Flooding
	Kirkby in Ashfield				
EM1Kb	Portland Industrial Estate	4.8	No	No	No
EM1Ke	Kings Mill Road East/Oddiecroft Lane	1.7	No	No	No
EM1 Rc	Annesley Colliery	3.1	Yes	No	No
EM1 Rd	Bentinck Colliery	3.6	Yes	No	No
	Sutton in Ashfield				
EM1Sf	Fulwood Rd North/Fulwood Industrial Estate	1.6	No	No	No
EM1Sc	Off Fulwood Rise/A38/Fulwood Ind.Est.	1.7	Yes	No	No
EM1Sm	Hamilton Rd/Coxmoor Rd	1.2	No	No but the River Maun is on land adjacent to the allocation	No
EM1Sn	Brierley Industrial Park	1.1	0.7 ha with permission	No	No
EM1Sb	West of Fulwood	13.3	0.3 ha with permission	The Nunn Brook forms the northern end of the site.	No
EM1Sk	Land off Coxmoor Rd/A38	3.3	1.8 ha with permission	Yes. FRI undertaken	No
EM1Sj	Midland Rd/Station Rd	0.6	No	No	Yes. S17 - north of junction Road
Em1Sa	Pinxton Lane	25.5	16.9 ha with permission	No	No
EM1Re	South West Oakham	23.5	yes	No	No

ALPR Site Ref.	Location	Net Hsg Area (Ha)	Planning Permission	Site impacted by Flood Zone 2 or 3	Site Impacted by Other Source of Flooding
	Business Park				
	Hucknall				
EM1Hj	A611/Annesley Rd	2.3	No	No	No
EM1Hg	Wigwam Lane North & Central	1.0	No	No	No
EM1Hc	Former Hucknall Colliery No1	1.9	0.4 ha with permission	No	No
EM1Hd	Watnall Rd Sports Ground	0.6	No	No	No
EM1Hb	Watnall Rd/Adj Nabbs Lane	0.8	No	No	No
EM1Na	Land at Bestwood Road	0.5	No	Yes	No
EM1Hk	Former Dowty Site, Watnall Rd	1.1	No	No	No
EM1Ra	Bleinheim Lane Industrial Estate	7.8	Yes	No but a small stream on land adjacent to the south east of the allocation is identified as a Flood Risk.	No
EM1Ha	Rolls Royce	13.0	No	No but a FRA has been undertaken.	No
EM1He	Butlers Hill	3.2	Yes	Yes FRA undertaken	No

Table Twenty: Employment Allocations
Source: Ashfield District Council

4.19 In the Local Development Framework it is not anticipated that land will be allocated for development on land subject to Flood Zones 2 or 3. Consequently, climate change in this context should not be an issue. However, all proposed allocations should be reviewed in accordance with the finds of Part Two of the SFRA. If a potential flood risks are identified additional works will be required equivalent to a Screen Study, Scooping Study or Detailed Study for a site specific FRA.

4.20 Climate change is forecast to result in an increase in the frequency and intensity of localised storms over the District. This is likely to exacerbate surface water flooding and localised drainage problems. Therefore, it is important that any site based FRA takes due consideration of climate change. Table Twenty One sets out how climate should be taken into account under these circumstances.

Parameter	1990 to 2005	2025 to 2055	2055 to 2085	2085 to 2115
Peak Rainfall Intensity	**+5%**	**+10%**	**+20%**	**+30%**
Peak River Flow	**+10%**	**+20%**		

Table Twenty One: Recommended national precautionary sensitivity ranges for peak rainfall intensities, for climate change
Source Planning Policy Statement 25: Development & Flood Risk

Notes:
1. Refer to *DEFRA FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006*, for details of the derivation of this table.
2. For deriving peak rainfall, for example, between 2025-2055 multiply the rainfall measurement (in mm/hour) by 10 per cent and between 2055-2085 multiply the rainfall measurement by 20 per cent. So, if there is a 10mm/hour event, for the 2025-2055 period this would equate to 11mm/hour; and for the 2055/2085 period, this would equate to 12mm/hour.

4.21 It is essential that developers consider the possible change in flood risk over the lifetime of the development as a result of climate change. Life time of development is set out in the practice guidance to PPS25 as 100 years for residential developments. In other cases the developer should justify why they have adopted a given lifetime for the development.

Allocations
The impact of climate change can be address by allocations of land with Flood Zone 1. Where an issue relating to flood risk has been identified by the SFRA additional research should be undertaken before land is allocated identify whether the allocation is appropriate or what steps are necessary to take account of the flood risk, including climate change.

Planning policies/planning applications
Any site specific FRA should:

- Provide that within Flood Zones 2 or 3 all floor levels, access routes, drainage systems and flood mitigation measures be designed with an allowance for climate change over the lifetime of the proposed development.
- For development proposed in or near the boundaries of Flood Zones 2 or 3 make an allowance for climate change over the lifetime of the development.
- Consider climate change in the context of its potential to increase surface water runoff from intensive rainfall events.

Sustainable Drainage Systems

4.22 The Council anticipate that development in the District will utilise SUDS and guidance is provided on their application in Table Twenty Two. It is anticipated The Interim Code of Practice for Sustainable Drainage Systems July 2004 will form the basis for standard practice in the area until the Government provides further guidance on which organisation should be responsible for SUDS.

3.22 Advice from the Environment Agency specifies that clean surface water should be discharged to the ground via a soakaway. The discharge of surface water to ground can increase the groundwater level and lead to an increase baseflow in the watercourse. However, the design of any SUDS system needs to reflect: biodiversity requirements, amenity requirements, green SUDS, any constrains such as high ground water levels, area related issues and any contaminant issues. A number of area related issues can be recognised:

- Sutton in Ashfield - Low flow in watercourses is identified as a problem in Sutton in Ashfield. To enhance biodiversity it is important that flows are restored to local watercourses avoiding rapid fluctuations in flows.

- Mansfield District Council's SFRA sets out a Green SUDS approach to the River Maun and Cauldwell Brook to enhance the water vole populations and increase habitat for white-clawed crayfish. The catchment of the Brook extends into Ashfield. Consequently, development within the catchment of the Cauldwell Brook will be required to utilise Green SUDS systems to protect the quality of run-off entering the Brook and to ensure that local biodiversity is maintained and enhanced.

- Hucknall – The Baker Lane Brook presents a risk of flooding to a significant number of properties in Hucknall. In addition, new development draining into the River Leen and its associated watercourses must take account of the potential impact of flooding down stream in the City of Nottingham.

- Rural Areas - Surface water from developments in Ashfield flowing into the River Erewash should take account of the potential to flooding of properties outside the District.

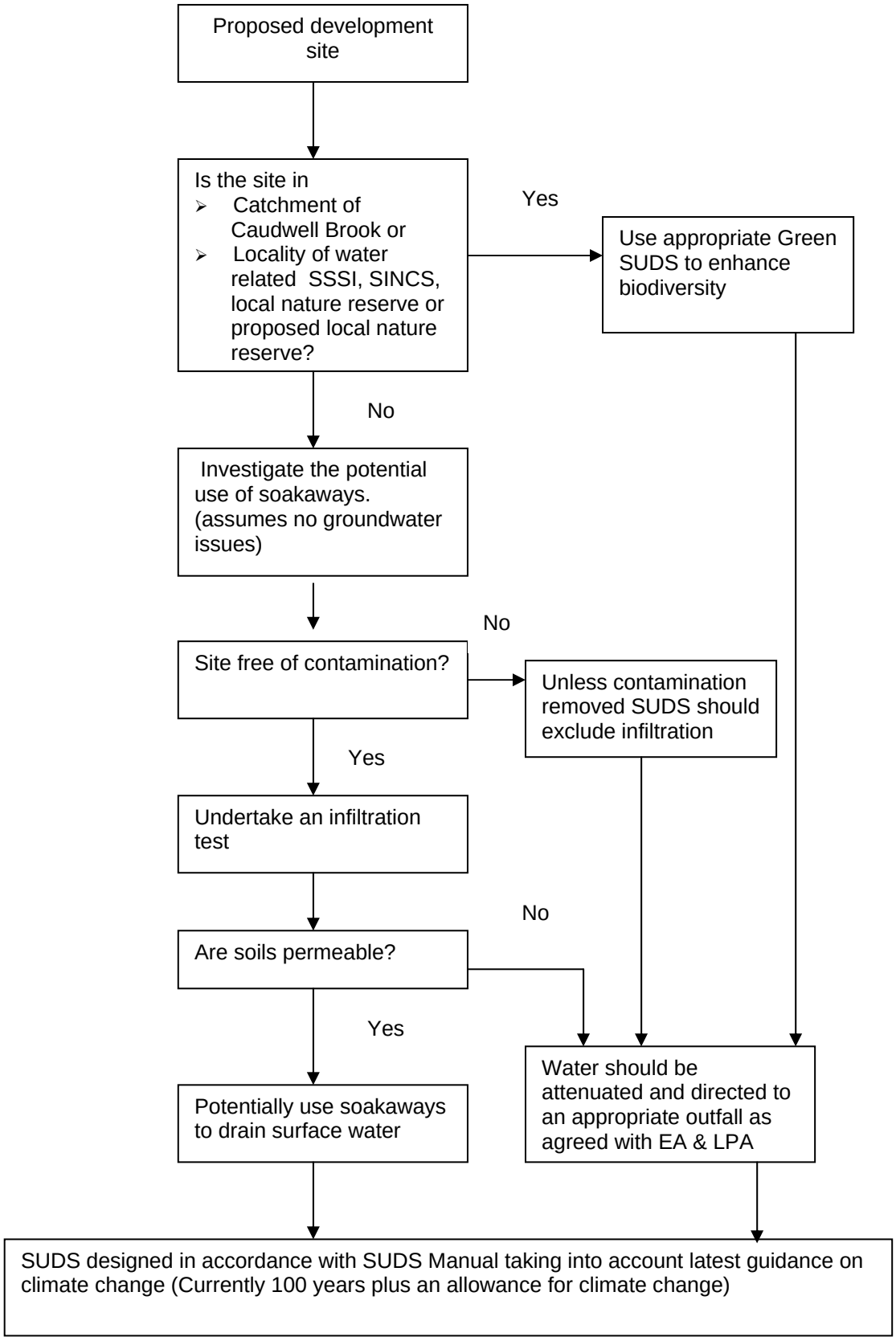
4.23 Where it is feasible both from an economic and engineering perspective development should look at the opportunities to undertake watercourse restoration, deculvert watercourses, avoid new culverts and enhance conservation and biodiversity.

4.24 Approved Document H, Building Regulation 2000, H3 provides that the order of priority for rainwater disposal is as follows:

(a) an adequate soakaway or some other adequate infiltration system; or where that is not reasonably practical,
(b) a watercourse; or, where that is not reasonably practical,
(c) a sewer.

Paragraph 3.31 to 3.35 sets out information on swales, infiltration basins, filtration drains and detention ponds. Consequently, where SUDS can be practically used on a development the Building Regulations provides that they should take priority over disposal into watercourses or sewers.

Table Twenty Two: SUDS Guidance for developers for on individual applications



Planning Policies/planning applications

1) SUDS should be utilised for developments within the District and developers should:
   - Demonstrate how the principles of Sustainable Drainage Systems have been applied to the development identifying what SUDS techniques have been used to reduce flood risk on and off site.
   - Provide a long term management plan identifying future maintenance requirements and responsibilities.
   - Follow the Interim Code of Practice for Sustainable Drainage Systems July 2004 National SUDS Working Group or any up dated Code of Practice.
   - Provide a SUDS design strategy to identify the most suitable SUDS options taking into account any site constraints and the potential sources of flooding, outlining how this affects the site layout. The design and implementation should reflect the following:

     - The range of SUDS methods from source control to Neighbourhood Control to minimize the volume of surface water entering into the adopted drainage system.
     - Any major development proposals within the catchment area of the River Leen should seek to reduce volumes and peak flow rates of surface water generated by the development to pre-developed greenfield rates (average taken to be around 5 l/s/ha).
     - Protect or enhance the quality of run-off entering watercourses and maintain or, where the opportunities allow, enhance local biodiversity
     - Utilising green SUDS in relation to:

       - SSSI, designated and proposed Local Nature Reserves and SINCS sites identified in Part Two of the SFRA
       - The catchment of the Cauldwell Brook.

     - The possibility of removing culverts from watercourses where this is economically and feasible to facilitate the extension of habitats.

   - Calculate the Greenfield discharge rate for the site and required attenuation volume for the 1 in 100 year rainfall event but also taking into account the impact of climate change.
   - In exceptional circumstances were SUDS are not proposed the developer should justify why the use of SUDS is not appropriate for the development and how the development will manage surface water drainage.

2) Land used for SUDS should be protected from future development.

Impermeable Surfaces

4.25 The Town and Country Planning (General Permitted Development) Order 1995 has been amended from 1st October 2008 so that any hard surface between the principal elevation of a dwelling house and a highway will require planning permission unless the hard surface is made of porous materials, or provision is made to direct run-off water from the hard surface to a permeable or porous area or surface within the curtilage of the dwelling house.

4.26 Water running off impermeable surface can cause problems for neighbours and it is considered that run-of from the drives of residential properties into the adjacent highway has contributed to flooding in the District in sever storms. Any application for planning permission will need to consider the topography of the land as well as the capacity of the adjacent drainage systems. However, the applicant will need to justify why an impermeable surface is required and planning permission should only be granted in exceptional circumstances.

Planning Policies/planning applications:

- Should encourage the use of permeable surfaces in developments.
- Only grant planning permission for impermeable surfaces for dwelling houses in exception circumstances.

Section 106 Contributions for Flood Risk

4.27 Given the nature of the flood risk in the District it is not anticipated that Section 106 planning obligations will be required to contribute to flood defences to manage flood risk in the District. However, if in exceptional circumstances a development is permitted in Flood Zone 2 or 3, a Section 106 planning obligation may be required to cover the impact of the development in relation to flood defences.

Reducing Flood Risk

4.28 It should be recognised that in certain circumstances, additional development could be a means to overcome existing flood issues at specific locations identified in Part 2 of the SFRA.

Site Drainage

4.29 Developers will be expected to demonstrate that any site drainage or surface water management strategy for a development will:

- Take into account of the EA's Flood Risk Maps and the vulnerability of the site from other sources of flooding identified in the SFRA and in particular surface water flooding.

- Reflect the policies set out in Ashfield's Local Development Framework (when completed) and the Regional Spatial Strategy.
- Demonstrate how SUDS will be incorporated into the development proposals, providing design information and setting out who will take responsibility for future maintenance.
- Be designed in accordance with the latest edition of Sewers for Adoption.
- Identify that no property is likely to be flooded under a 1 in 100 year storm event but taking into account the anticipated impact of climate change.
- Be designed for exceedence ensuring that, as far as possible, there is little or no residual risk of property flooding during events in excess of the return-period for which the sewer system is designed.
- Demonstrate that runoff from the site is reduced thereby reducing the surface water risk.
- Take into account the comments of key consultees.
- Maximise the opportunities to undertake watercourse restoration, deculvert watercourses, avoid new culverts and enhance conservation and biodiversity.

Sustainable Appraisal

4.30 Sustainability Appraisal (SA) is a way of ensuring that all plans and programmes which relate to land use issues are compatible with the aims of sustainable development. In Nottinghamshire, a partnership of all local planning authorities has been formed to carry out the work of the initial stage of SA. A common scoping report template was developed for use by each of the local planning authorities in the partnership. A range of SA objectives have been prepared, primarily aligned with regional SA objectives but also taking into account the context review, baseline data and key sustainability issues identified for the District. The key messages for Flood Risk and their implications for the SA are:

- Safeguard land used to manage floodwater.
- Avoid inappropriate development on floodplains.
- Ensure new development does not afford risk elsewhere.

The findings and conclusions in the SFRA will inform the Sustainable Appraisal so that flood risk if fully taken into account in the Council's land use policies.

Other Regulations

4.31 It is anticipated that the Building Regulations will be amended in the near future to reflect flood risk and building performance standards for new homes. There are also proposals for revising the Water Supply (Water Fittings) Regulations 1999 with a view to setting new performance standards for key fittings that can be installed in buildings such as toilets, urinals, washbasin and taps.

MANAGEMENT

The Pitt Review

4.32 The Pitt Review[57] identified that a much higher proportion of the flooding during the summer of 2007 was a result of poor surface water drainage rather than flooding from rivers. The Review set out the lessons from the floods of the summer of 2007 and makes 92 recommendations to address these flood issues together with a deliver plan and the lead organisations for implementing the recommendations. Specific recommendations where the local authority is the lead organisation, are identified in Appendix Four. Consequently the Council needs to review the recommendations in the Pitt Review and consider the implications for:

- individual departments and sections across the Council,
- joint working with key stakeholders and partners

4.33 One of the significant findings of the Pitt Review was that a considerable number of parties are involved in flood risk management, information is lacking and there is a need for a joined up approach, Figure Nine. In undertaking the SFRA a difficulty has been in obtaining information. In the case of one key stakeholder, no information has been forthcoming at all. The Pitt Review recommends that local authorities should lead on the management of local flood risk, with the support of the relevant organisations. However, the Review sets out it is upper tier authorities, the County Council, who should be given the new coordinating responsibilities and hence become accountable for managing local flood risk. This reflects their greater engineering capacity, their local strategic overview and their ability to manage flood risk where it crosses district boundaries. However, as the District Council is the local planning authority, there will be a requirement for a strong working partnership between the two councils over resolving flooding issues.

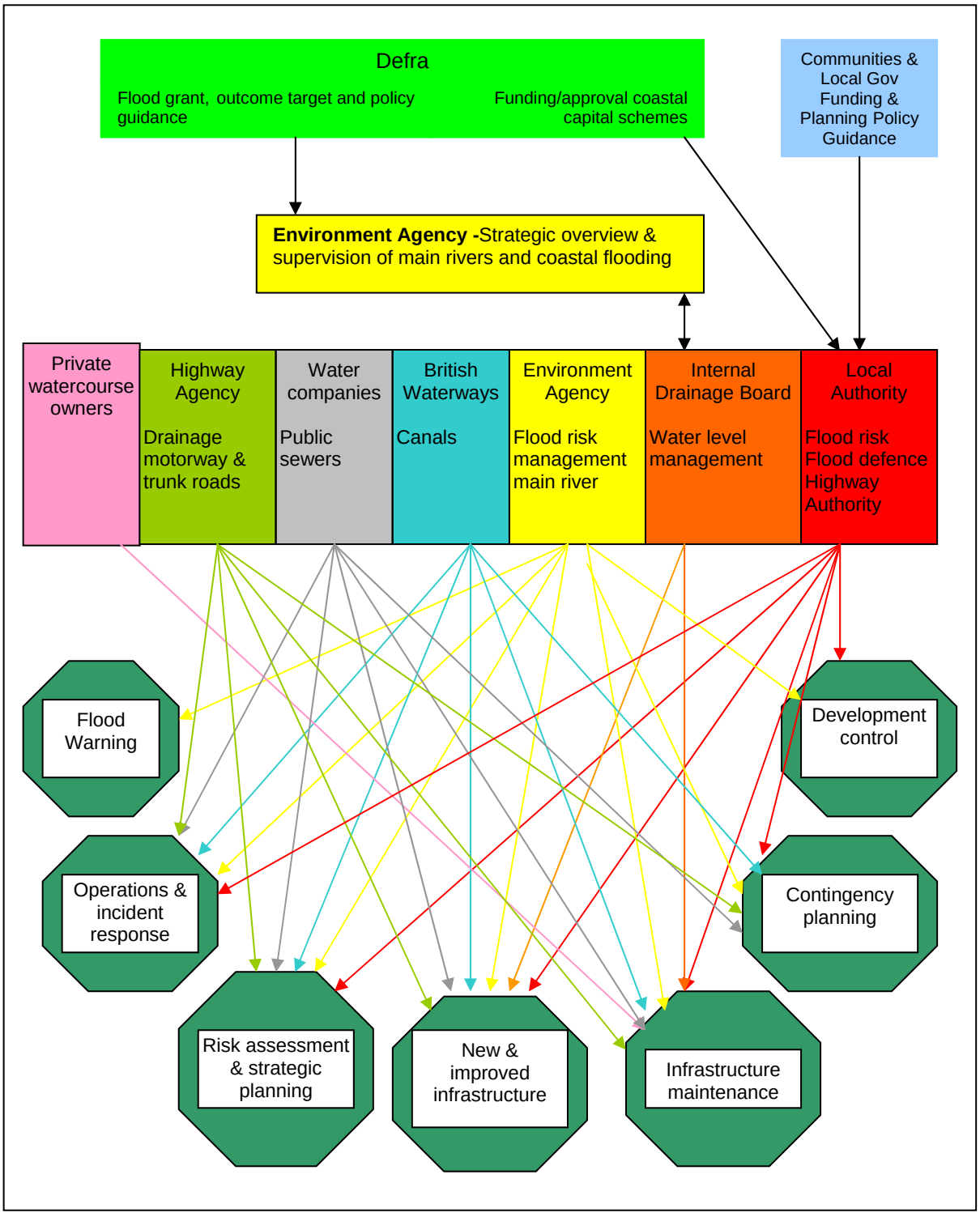


Figure Nine: The Complex Landscape of Flood Risk Management Responsibilities
Source: Learning the lessons from 2007 Floods- The Pitt Review

4.34 No organisation has responsibility for maintaining records relating to culverted watercourses and drains and Ashfield only has limited information on drainage assets and their condition. Substantial lengths of watercourses are culverted but their exact location and capacity is not known. Consequently, the impact of climate change and potential

flooding risks in relation to these culverts is unknown. Concerns were also raised that on new residential developments private drains identified on plans submitted with the planning application, do not always conform to the drains constructed and connected to the sewers on site. Consequently, if the Pitt Review recommendations are taken forward it will have resource implications for the Council. The Pitt Review puts an emphasis on local authorities building capacity in their technical departments to meet the challenge of flooding and in particularly to:

- Collate and map the main flood risk management and drainage assets.
- Investigate flooding problems working with other agencies to establish the source of problems.
- Potentially to develop Local Surface Water Management Plans, as set out under PPS25
- Assess FRA and drainage proposals on planning applications in relation to potential flooding from the site.

Substantial officer time would be required to take these proposals forward. But it should be borne in mind that flood risk management draws on a range of expertise not just engineering. It includes environmental science, land use planning, building control, emergency planning, legal and landscape architects. However, it is recognised that there is a skills gap for engineers with most local authorities relying heavily on consultants. If local authorities are to lead on flood risk management the skills gap needs to be addressed. The Review stresses that consultants will still play a major role, but that there will be real benefits in having in-house expertise, including getting maximum value out of partnerships with consultants. (Pitt Review Paragraph 6.24 to 6.36). Recommendation 19 of the Review sets out that local authorities should assess and, if appropriate, enhance their technical capabilities to deliver a wide range of responsibilities in relation to local flood risk management.

Surface Water Management Plans

4.35 One of the aspects stressed by the Pitt Review was the use of Surface Water Management Plans (SWMP)The purpose of a SWMP[(23 para 2.2)] is to:

- Map and quantify surface flows and drainage with sufficient detail to enable local as well as strategic flooding to be tackled;
- Produce a delivery plan that clarifies responsibilities and then directs resources at tackling surface water priorities at greatest risk first.
- Influence planning policy such that new development occurs primarily in areas of low surface water risk or where flood risk can be managed effectively, making use of sustainable drainage solutions where appropriate; and

- Be periodically reviewed, possibly including independent scrutiny of planning and resource decisions to gauge progress in tackling the most serious problems.

DEFRA consultation on SWMP[23] suggests they may be adopted by a voluntary code of practice or possibly a statutory obligation in areas with critical drainage problems. The anticipated cost of developing a SWMP is approximately £100,000 and thereafter the SWMP would need to be updated every three years. The SFRA does not identify that there are critical drainage issues in the District which require a SWMP. The House of Commons Environment, Food and Rural Affairs Committee on flooding raised questions on how organisations can be persuaded to fulfil their responsibilities under such plans. Given the level of risk in Ashfield, the questions on how they can be taken forward and the anticipated cost, it is difficult to see how a SWMP could be justified in the District. Nevertheless, there is a lack of detailed information on drainage systems in the District and the Authority needs to develop a central database on local drainage systems. The Council needs to consider how far the interim recommendations of the Pitt Review are applicable to the Authority and how improvements can be achieved.

Maintenance

4.36 The Pitt Review[57] identified that in areas where extensive floods occurred, one of the perceived causes of flooding by local people was lack of maintenance. The Council has identified potential locations at risk from flooding in severe conditions. As part of maintenance procedures specific locations are inspected on a monthly basis to ensure a free flow of water and action is also taken where there is early notification of severe weather. These areas are monitored during storm conditions and works are initiated to relieve flooding or provide warnings to the public. The Authority undertakes flood alleviation works on an annual basis, particularly in relation to highway issues. Drainage consultant's reports have been obtained on flood issues at Mill Lane, Huthwaite and Searby Road, Sutton in Ashfield

4.37 The majority of land drains and watercourses are in private ownership, with the land owner being responsible for maintenance. It is important that land owners undertake regular maintenance work to watercourses and drains to avoid increasing the risk of flooding. The Authority has powers, (usually under the Land Drainage Act 1991), to undertake enforcement action in relation to existing watercourses and drains. However, improvements are reliant on permissive powers, without the right to entry onto land or acquire land for undertaking drainage works. Consequently, improvements to drainage in these circumstances will typically result from informal negotiations by officers in the Authority's Engineering Section.

4.38 No evidence has been identified in preparing this SFRA that a lack of maintenance was the cause of flooding to specific properties in Ashfield. Nevertheless, the Pitt Review set out that poor maintenance is an issue in surface water flooding. A significant number of rivers and streams in

Ashfield are culverted and this provides the potential for additional flood risk. Flooding can result when trash screen openings become significantly reduced due to the build up of debris, or where water flow cannot enter the pipe because of blockages. Consequently, it is important to stress that in reducing flood risk it is necessary that the responsible parties undertake regular maintenance on drainage systems.

Reservoirs

4.39 In June 2007 at Ulley Reservoir, Rotherham the water spilled out causing significant structural damage to the masonry channel walls and the dam itself. The M1 was closed and 1,000 people were evacuated from their homes, partly because of high flood levels in the river downstream of the reservoir, and in part due to the threat of dam failure. The reservoir in question was classified Category C, and was thought to pose little risk to life and property downstream. The Council is the owner of Kings Mill Reservoir and Sutton Lawn Dam. Both these reservoirs as classed as Category A where the potential cost of failure is at least 10 lives at risk and extensive property damage. According to a report by the Babtie Group for the Government [(5)] climate change will increase the risk of failure from dams for a number of reasons. These include summer droughts resulting in subsidence of earth embankments, stronger winds increasing wave activity which could lead to overtopping/erosion and more severe rainfall events resulting in sudden loadings on embankments and spillways. In the interest of safety the Council should consider what emergency plans it should have in place in relation to the dams at Kings Mill and Sutton Lawn.

Nottingham and Nottinghamshire Local Resilience Forum

4.40 The District Council is a member of the Nottingham and Nottinghamshire Local Resilience Forum (LRF). This is a multi-agency group representing all the emergency services, local councils, NHS organisations and other agencies that exist to help, protect and advise people in the event of a major incident or emergency in Nottinghamshire, including the City of Nottingham. The LRF's main purpose is to ensure that the best possible contingency plans and procedures are in place across all agencies to deal with a major emergency in Nottinghamshire should such a situation arise. The Nottingham Flood Working Group has been established specifically to develop a network to disseminate and develop best practice in flooding resilience across Nottinghamshire. The Pitt Review makes a number of recommendations with the Local Resilience Forum as the lead organization and it is understood the LRF has already implemented a number of the recommendations.

(N.B. Further information on the LRF is available at the following website www.nottinghamcity.gov.uk/np_home/np_local_resilience_forum.htm)

Housing

4.41 The Council is a significant provided of rented housing in the District. Although the flood risk for the district is low it is possible that a number of Council houses in Hucknall are at risk from flooding based on the EA

Flood Maps. For any Council property in Flood Zone 2 of 3 the Council should consider informing the tenant of the flood risk, the details of the Environment Agency website, Floodline Warnings Direct telephone number and personal resilience advice. Further, consideration needs to be given in relation to contents insurance which may not be automatically provided. There are a number of practical measures which tenants and members of the public, can and should consider taking to prepare for a possible flood and further information is available from various sources including the EA's website. (www.environment-agency.gov.uk).

Contact Centres

4.42 71 properties flooded in the District in the summer of 2007. A number of properties at Hucknall and Jacksdale are located in Flood Zones 2 or 3 and other properties in the District have been impacted by surface water flooding. In March 2008, the Environment Agency launched three simple flooding guides, available on its website, to offer advice to the public about how to protect their homes—before, during and after flooding. (See Appendix Four) Under these circumstances, the Council should examine what information should be available in relation to flooding through its contact centres.

Land Management

4.43 Land management offers opportunities to reduce the impact of flooding both in urban and rural areas.

4.44 In the urban context green spaces provides a natural infrastructure which provides a means to make a more attractive urban environment. However, it also offers opportunities to adapt to climate change, to manage water and reduce flood risk both on existing areas and new areas created through SUDS schemes. Further information on the role of green space can be found on CABE Space website in "Public space lessons. Adapting public space to climate change".

4.45 Runoff from the rural environment is strongly influenced by a number of inherent physical characteristics, including soils, topography and the characteristics of the land cover or ground surface. Land management in terms of cultivation techniques and livestock management systems will affected the pathways by which rainfall subsequently moves over or through the soil profile and into the arterial drainage network. The Environment Agency report 'Delivery of Making Space for Water' [35] identifies the potential benefits from land management techniques in relation to flooding. However, the Report identifies that there are three mechanisms for delivering rural land management changes: regulation, incentive-based schemes and advisory initiatives. Consequently, it is considered that the Council is unlikely to be able to influence land management techniques in the District.

4.46 Research has also been undertaken by DEFRA [45] into the impact of establishing sizable areas of trees (15ha) to help reduce flood risks. Further research in this area appears to be necessary but the District

does not have extensive flood plains, which limited their applicability in Ashfield.

Monitoring

4.47 The SFRA is an important source of information, informing planning policy and development control decisions in relation to flood risk. Information in the SFRA needs to be current and therefore, Part Two of the SFRA should be reviewed and updated on a regular basis.

4.48 The Pitt Review considered implementation of its recommendations at a variety of levels. At a local level, the Pitt Review recommends that each Oversight and Scrutiny Committee should prepare an annual summary of actions taken locally to manage flood risk and implement this Review, and these reports should be public and reviewed by Government Offices and the Environment Agency. The Council's Overview and Scrutiny Committee has pre-empted the Pitt Review to some extent in that it has undertaken a review of flood prevention in Ashfield in April 2008. To further develop the Council's proactive approach to flood prevention and work more effectively with our partners on this issue the Cabinet resolved that:

- A Flooding Working Group is established to deal with flooding issues and report back to the Cabinet as and when required;
- The Council will work with the County Council to review the frequency of gully cleansing, with a view to increasing it to at least twice a year;
- an update leaflet be produced to inform residents of current preventative measures being undertaken and useful contact numbers in the event of emergencies;
- an update on the progress of the Group meetings be reported to the Overview and Scrutiny Committee in September 2008, and as and when required.

CONCLUSIONS ON MANAGING AND REDUCING FLOOD RISK

Planning

a) Recommendations in relation to the approach to allocating land for development and for planning policies/ planning applications are set out in the text boxes and summarised in Table Fourteen.

c) Land should not be allocated in specific areas until further investigations have been undertaken. These include the valley of the Cuttail Brook to the south of Salmon Lane, the valley below Sutton Lawn Dam, Mill Lane, Huthwaite and land to the north of Ashlands Road West.

d) The requirement for and the scope of any site specific FRA will depend on the level of perceived risk of flooding of the site and will reflect the following: a Screening Study, a Scoping Study or a Detailed Study

e) An analysis of sites allocation under the Ashfield Local Plan Review 2002 identifies that climate change is unlikely to be an issue in relation to fluvial flooding.

f) The effective applications of SUDS should reduce flood risk in the District. A number of area related issues can be recognised:

- Sutton in Ashfield - Low flow in watercourses is identified as a problem. Development within the catchment of the Cauldwell Brook will be required to utilise Green SUDS systems to protect the quality of run-off entering the Brook and to ensure that local biodiversity within the Brook is maintained and enhanced.
- Hucknall – The Baker Lane Brook presents a risk of flooding to a significant number of properties in Hucknall. Any new development draining into the River Leen and its associated watercourses must take account of the potential impact of flooding down stream in the City of Nottingham.
- Rural Areas - Surface water from developments in Ashfield flowing into the River Erewash should take into account the potentially flooding of properties at Jacksdale and other areas outside the District.

g) Where appropriate, development should look to undertake watercourse restoration, deculvert watercourses, avoid new culverts and enhance conservation and biodiversity.

h) Large areas of impervious hard surfaces on developments should be avoided. For dwelling houses planning permission for hard surfaces to front garden areas should only be granted in exceptional circumstances.

i) It should be recognised that additional development may be a means

to overcome existing flood issues identified in Part 2 of the SFRA.

j) Developers will be expected to demonstrate that any site drainage or surface water management strategy submitted with a planning application will take into account issues associated with flood risk.

Management.

k) The Pitt Review sets out a number of recommendations that impact on councils. If adopted they will have resource implications for the Council. In particular, Ashfield has limited information on drainage assets and their condition consequently, substantial officer time would be required to survey drainage assets.

l) One of the aspects stressed by the Pitt Review was the use of Surface Water Management Plans (SWMP). Given the level of flood risk in the District and the anticipated cost of SWMP, it is difficult to see how a SWMA could be justified in Ashfield. Nevertheless, there is a lack of detailed information on drainage systems in the District and the Authority needs to develop a central database on local drainage systems.

m) Responsibilities for flood risk are fragmented and it is important that all parties work together on an integrated approach to planning and managing surface water flooding. The Pitt Review proposed that county councils are well placed to take a lead role but this would require a close working relationship with district councils.

Maintenance

n) The Council has identified potential locations at risk from flooding in severe conditions and regular maintenance inspections are undertaken. These areas are monitored during storms and works are initiated to relieve flooding or provide warnings to the public.

o) No evidence has been identified in preparing this SFRA that a lack of maintenance was the cause of flooding to specific properties in Ashfield. However, it is important that all responsible parties undertake regular maintenance on drainage systems to avoid flooding.

p) The reservoirs at Kings Mill and Sutton Lawn are classed as Category A where the potential cost of failure is at least 10 lives at risk and extensive property damage. Consideration needs to be given to what flood risk measures should be in place.

q) As a significant provider of social housing, consideration should be given to what information should be provided to tenants potentially impacted by flooding.

r) The Council should examine what information should be available in

relation to flooding through its contact centres.

s) Land management offers opportunities to reduce the impact of flooding both in urban and rural areas. Green space can be used to manage water and reduce flood risk both on existing areas and new areas created through SUDS schemes. In rural areas, there a variety of land management techniques which reduce flood risk but the Council has a very limited ability to influence this aspect.

Monitoring

t) The Authority will need to update Part Two of the SFRA evidence base on a regular basis.

u) The Pitt Review recommends that the Council's Oversight and Scrutiny Committee should prepare an annual summary of actions taken locally to manage flood risk and these reports should be public and reviewed by Government Office and the Environment Agency.

GLOSSARY

Attenuation - This is the process of holding some water back within the catchment during a flood event. This has the effect of slowing down the rate of drainage from the catchment and it also reduces peak flows downstream.

Balancing pond - A pond designed to attenuate flows by storing runoff during the peak flow and releasing it at a controlled rate during and after the peak flow has passed. The pond always contains water. Also known as wet detention pond.

Basin - Flow control or water treatment structure that is normally dry.

Catchment -The area drained by a particular river. A surface water catchment is the area defined by the highest boundary between two catchments, whilst a groundwater catchment is the area that contributes to the groundwater part of the river flow.

Conveyance -Conveyance is a measure of how well a channel or structure, such as a bridge or culvert, allows water to pass through. It depends on the physical characteristics of the channel or structure, including its size, shape, how rough its surface is, and how twisty it is.

Discharge - The rate of flow of a stream, river or flood is measured by quantity over time. This is often referred to as **discharge**: "the rate at which a volume of water passes a given point in a given amount of time. Common units are cubic feet per second (cfs), second-day feet (sdf), and cubic meter per second (cms)."

Detention basin - A vegetated depression, normally is dry except after storm events, constructed to store water temporarily to attenuate flows.

Eutrophication – Water pollution caused by excessive plant nutrients that result in reduced oxygen levels. Algae bloom can be seen as an example of the effect.

Exceedence flow – Excess flow that emerges on the surface once the conveyance capacity of the drainage system is exceeded.

Flashy rivers - Rivers prone to flood as water quickly flows into the river.

Flood defence - A structure (s) to reduce flooding from rivers or the sea.

Flood plain - The floodplain is the relatively flat lowland that borders a watercourse, usually dry but subject to flooding under natural conditions. Floodplain soils actually are former flood deposits.

Fluvial - The activity of rivers resulting from inflows of rainfall and surface and groundwater, and including the influence of stream gradient and sinuosity, which together control the volume and flow of water.

Geographical Information System (GIS) - A GIS is a computer-based system for capturing, storing, checking, integrating, manipulating, analysing and displaying data that are spatially referenced.

Green roof - A roof with plants growing on its surface, which contributes to local biodiversity. The vegetated surface provides a degree of retention, attenuation and treatment of rainwater, and promotes evapotranspiration.

Green SUDS - Green SUDS are considered to be systems which have a notable ecological benefit through the creation of wildlife habitats. This will exclude sub-surface systems such as soakaways and storage tanks which have a low ecological significance. Retention ponds

and wetlands would be prioritised with a lesser benefit achieved through infiltration basins and swales.

Greywater - Wastewater from sinks, baths, showers and domestic appliances this water before it reaches the sewer (or septic tank system).

Groundwater - Water occurring below ground surface in natural formations (typically rocks, gravels and sands).

Hazard - A hazard is a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Highway drain - A conduit draining the highway. On a highway maintainable at the public expense it is vested in the highway authority.

Hydraulic model - A computer simulation used to estimate the water level in a river or river system for a given flow.

Hydrological model - A method of estimating the flow in a river or catchment arising from rainfall falling into the catchment. Models typically account for factors such as catchment area, topography, soils, geology and land use.

Impermeable - Will not allow water to pass through it.

Infiltration capacity – The maximum rate at which water can enter the soil. If the arrival of the water at the soil surface is less than the infiltration capacity, all of the water will infiltrate. If rainfall intensity at the soil surface occurs at a rate that exceeds the infiltration capacity, ponding begins and is followed by run-off.

Inundation -To cover with water, especially floodwaters.

Land use- How an area of land is used (for example, residential, agriculture, forestry, etc.). The term ‘land use’ is used in many contexts and is controlled by the town and country planning system.

Local Biodiversity Action Plan (LBAP) - A local agenda (produced by a local authority) with plans and targets to protect and enhance biodiversity and achieve sustainable development.

Main River - Watercourses defined on a ‘main river map’ designated by DEFRA. The Environment Agency has powers to carry out flood defence works, maintenance and operational activities for main rivers only. Responsibility for maintenance however, rests with the riparian owner (the land owner).

Ordinary watercourses - An ordinary watercourse is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows which does not form part of a main river.

Permeability - A measure of the ease with which a fluid can flow through a porous medium. It depends on the physical properties of the medium, for example grain size, porosity and pore shape.

Permeable surface - A surface formed of material that is itself impervious to water but, by virtue of voids formed through the surface, allows infiltration of water to the sub-base through the pattern of voids, e.g. concrete block paving.

Pervious surface - A surface that allows inflow of rainwater into the underlying construction or soil.

Pluvial Flooding - Pluvial flooding is defined as flooding that results from rainfall-generated overland flow, before the runoff enters any watercourse or sewer.

Planning Policy Statement 25: Development and Flood Risk – Planning guidance issued by the Department of Communities and Local Government to advise local planning authorities and developers on issues relating to flood risk.

Probability of occurrence - The probability of a flood event being met or exceeded in any one year (usually expressed as a return period – for example 1% annual probability).

Rainwater harvesting or rainwater use system - A system that collects rainwater from where it falls rather than allowing it to drain away. It includes water that is collected within the boundaries of a property, from roofs and surrounding surfaces.

Receptor – Who or what is affected by flooding. Receptors can be environmental (for example SSSI), social (for example people or public transport) or economic (for example property or agricultural land).

Regional planning guidance (RPG) – Planning guidance issued by a regional level. RPGs are being replaced by Regional Spatial Strategies.

Riparian - Land or habitat connected with, or immediately next to, the banks of a river or stream.

Run-off - Water flow over the ground surface to the drainage system. This occurs if the ground is impermeable, is saturated or if rainfall is particularly intense.

Scarp and Dip - In geology, the two slopes that comprise an escarpment. The scarp is the steep slope and the dip is the gentle slope.

Soakaway - A subsurface structure into which surface water is conveyed to allow infiltration into the ground.

Surface water management - The management of runoff in stages as it drains from a site.

Sustainability - A broad concept which deals with man's effect on society, the economy and the environment. It aims to achieve an efficient, effective solution to development which does not have undue costs or impacts in the present or the future.

Sustainable Urban drainage systems (SUDS) - A sequence of management practices and control structures designed to minimise the impact of surface water on flood risk and the environment. Techniques include the use of porous materials and soak-away systems to increase the time taken for water to enter the river network.

Watercourse - a channel through which water flows. It including all rivers, streams, ditches, drains, cuts, culverts, dykes, sluices and passages through which water flows.

Water Table – the upper surface of groundwater, the boundary between saturated and unsaturated soil conditions.

Appendix One - Consultees on the Strategic Flood Risk Assessment

CONSULTEE	Responded	Observations
Environment Agency	√	Substantial information provided
Severn Trent Water Limited	X	
The Coal Authority	√	
Ashfield District Council – • Neighbourhood Services Section (Engineering) • Neighbourhood Services Section (as agent for the Highway Authority) • Environmental Health Section (Environment Protection) • Corporate Heath & Safety • Homes Renovations • Development Advice and Control Section • Customer Services Section	√	Quality of information varied
Selston Parish Council	√	
Annesley and Felly Parish Council	X	
Amber Valley Borough Council	X	
Bolsover District Council	√	
Broxtowe Borough Council	X	
Gedling Borough Council	X	
Nottingham City Council	√	SFRA River Leen & Day Brook
Newark & Sherwood District Council	X	
Mansfield District Council	√	Currently undertaking a SFRA
Nottingham Regeneration Limited	√	
Nottinghamshire County Council – Flood Risk Assessment Inner Relief Road, Hucknall.	√	

Flood Risk Assessment on Individual Planning Applications Reviewed

2006/0943	Bentinck Void, Annesley Woodhouse - Flood Risk Assessment.
2006/0316	South West of Oakham, Sutton in Ashfield - Sustainable Appraisal.
2006/1018	South West of Oakham, Sutton in Ashfield - Sustainable Appraisal.
2006/0144	Diversion of Water Course, Kings Mill Road East/Coxmoor Road, Sutton in Ashfield - Flood Risk Assessment.
2004/356	Residential Development, Papplewick Lane, Hucknall – Flood Risk Assessment.
2006/0163	Butlers Hill, Hucknall – Flood Risk Assessment

Appendix Two – The Draft River Trent Catchment Flood Management Plan - actions proposed by the CFMP for each of the Policy Units

Sherwood					
Policy unit	Policy	Action	Principal Organisations	Priority and timescale	Consequence
Policy unit 2	Policy option 3 - Continue with existing or alternative actions to manage flood risk at the current level (accepting that flood risk will increase over time from this baseline).	Investigate locations and ways to return river channel to more natural state – particularly Retford, Mansfield, Worksop, and the middle Idle where the channel has been heavily engineered through mining activities.	Environment Agency/ Natural England/ land owners/ local authorities	Medium 3 - 8 years	Development of a strategy for river restoration aimed at returning the river to a natural state.
		Identify opportunities to maximise the use and benefits of SuDS, particularly in areas where the sandstone geology will support extensive use, and where a strategy for retro-fitting SuDS may be developed.	Environment Agency / Local Authorities	Medium 0 – 3 years	Clear guidance for planners, developers and home owners regarding best practice for drainage, and a practical guide for implementation.
		Identify areas where efficiencies can be achieved, such as reduced channel maintenance and removal of structures.	Environment Agency	Medium 5 – 10 years	Cost savings whilst maintaining appropriate levels of protection.
		Investigate the effectiveness of current flood risk management and develop a prioritised maintenance plan for of the existing flood protection infrastructure, and a the viability of future levels of protection.	Environment Agency	Medium 3 – 8 years	Direction for works programmes and the asset review.
		Develop a strategy for implementing measures and schemes that will encourage land management practices and land drainage that will reduce run-off.	Environment Agency/ Natural England/ land owners/ local authorities	Medium 2 – 5 years	Clear guidance to drive appropriate land management, and encourage collaborative schemes.
		Review and agree the role of the IDBs within the area.	Environment Agency/IDB	Medium 0 –5 years	Clarity in roles and responsibilities for the future.
		Review hydrometric monitoring networks in relation to flood warning, and revise flood warning areas and trigger levels to improve accuracy and resolution of flood warning.	Environment Agency	High 0 - 3 years	Improved ability to provide accurate and timely flood warnings. Refine flood warning areas and allow more targeted warnings.

Burton, Derby and Nottingham					
Policy unit	Policy	Action	Principal Organisations	Priority and timescale	Consequence
Policy unit 5	Policy option 5 - Take further action to reduce flood risk (now and/or in the future).	Investigate protection schemes for Hatton and Scropton. Options appraised are likely to include upstream storage and attenuation.	Environment Agency/ local authorities/ water company/ IDB	High 0 – 3 years	A clear way forward with appropriate actions and responsibilities identified.
		Identify locations and opportunities where we can work with the Aggregate extraction companies to improve planning for and restoration of gravel workings, - particularly in relation to flood risk management.	Environment Agency/ aggregates companies/ Natural England	Medium 3 – 8 years	Develop relationships and an approach to quarry restoration.
		Increase green corridors through urban areas, particularly on the River Erewash through building partnerships with local authorities and by aplying appropriate development controls.	Environment Agency/ local authorities	Low 5 – 20 years	Increased flooding within green areas next to rivers through urban areas.
		Identify problem sites and carry out a detailed assessment of local mine water flooding and resulting pollution.	Environment Agency / relevant mining company or authority	High 2 – 5 years	Improved understanding of the issue, and a cooperative approach to resolving or mitigating the problems.
		Complete Derby strategy and implement findings.	Environment Agency	High 2 – 5 years	Reduced flood risk in Derby – achieve primary policy unit objective.
		Implement the findings of the Nottingham strategy.	Environment Agency	High 2 – 5 years	Reduced flood risk in Nottingham – achieve primary policy unit objective.
		Complete the Burton-upon-Trent scheme	Environment Agency	High 1 – 2 years	Reduced flood risk in Burton-upon-Trent – achieve primary policy unit objective.
		Investigate flood resilience for infrastructure, i.e. roads, rail, power and water.	Highways Dept, Network Rail, water and power companies	High 0 – 5 years	Improved resilience (including alternative routes or sources).
		Identify locations within the urban areas where BAP habitats may be created, expanded or improved through links with other flood risk management schemes or initiatives.	Environment Agency / Local Authorities	Medium 3 – 8 years	Increased BAP habitats in line with local and regional targets.
		Implement Integrated Urban Drainage strategies – priority for principal urban areas, to reduce the incidence of surface water and foul water flooding through greater involvement of Severn Trent Water Ltd in flood risk management.	Environment Agency/ local authorities/ Severn Trent Water Ltd / IDBs	High 1 – 2 years	Reduction in urban drainage problems, with clear lines of responsibility for all those involved both in planning, regulation and development.

Appendix Three: SINC sites (water associated or adjacent)

SITE_NAME	DESCRIPTION	INTEREST	x	y
River Lean Pastures, Bestwood	'Fine pastures with an unusual and valuable species composition	Botanical	455120	348879
Bulwell Hall Park	'An excellent assemblage of species-rich habitats in a large city park'	Botanical	453496	346609
Newboundmill and Blackholme Woods	'Wet species-rich deciduous woodland'	Botanical	449272	363533
Stanley Farm Grasslands	'Species-rich Coal Measures grasslands along a tree-lined stream'	Botanical	446558	362620
Teversal Pastures	Excellent neutral grasslands with marsh and wet woodland - of botanical and zoological interest	Botanical	449274	361870
Bulwell Wood and Pond	'An ancient deciduous woodland with a characteristic ground flora	Botanical	451779	346297
Newstead Park (including River Leen System)	'An impressive variety of habitats of faunal and floral importance'	Botanical, Moth	454544	353805
Felley Priory Pond	'A pond with a notable aquatic and bankside flora'	Botanical	448518	351272
Stubbinghill Farm Meadow	'A notable meadow with a particularly valuable sloping portion'	Botanical	447612	360127
Langton Marshy Grassland	'Interesting marsh, swamp, and damp grasslands - of both botanical and zoological interest'	Botanical	447185	354827
Felley Mill Pond	'A drying pool with woodland and damp grassland'	Botanical	448746	350145
Langton Meadow	'A notable Coal Measures grassland'	Botanical	447409	354932
Middle Brook	'A stream with good riparian woodland and notable bankside communities'	Botanical	448234	352140
Brierley Park Marshy Grassland	'An interesting and valuable remnant of rough marshy grassland'	Botanical	447507	359582
Mawkin's Lane	'A green path with a notable community'	Botanical	446979	356121
Felley Brook Wood	'A semi-natural riparian woodland with a notable ground flora'	Botanical	448496	349857
Two Dales Farm Pasture, Annesley	'A notable pasture with damp and dry parts'	Botanical	448910	353166
Annesley Park Pond	'A relatively large field pond that is rich in aquatic and marginal species'	Botanical	450404	352157

Heatherdale Pond	'A pond with a noteworthy aquatic flora and a complementary wooded fringe'	Botanical, Water Beetles/Bugs	450532	351473
Maghole Brook and Ashfield Dumble	'A stream and dumble with their associated woodland and sections of interesting ground flora'	Botanical	447461	356667
Hollinwell Golf Course	'An extensive area incorporating a number of acidic habitat types with their characteristic species'	Botanical	452506	354741
King's Mill Reservoir	'A valuable water body for fauna and flora'	Botanical	451625	359641
Bleinheim Lane Ponds	'Species-rich pools surrounded by a noteworthy grassland and newly planted saplings'	Botanical	452089	346405
Mill Lakes, Bestwood	'A landscaped lake with a good range of species'	Botanical	454843	347891
Mill Lake Swamp	A valuable tall swamp habitat	Botanical	454746	347352
Mill Lake Pasture, Bestwood	'A valuable damp riverside pasture'	Botanical	454684	347487
Felley Dumble	'A good habitat mosaic of woodland, scrub, banks, stream and pond with a noteworthy flora'	Botanical	449617	350493
Skegby Grassland III	'A valuable wet meadow'	Botanical	449467	361689
Pye Hill Marshy Grassland	'An interesting marshy field with locally characteristic grassland species'	Botanical	444325	351602
Border Marsh, Huthwaite	'A notable marshy community on the county boundary'	Botanical	445614	359791
Fountain Dale	'A damp, open valley woodland with drying out fish pools, and clearings of an acidic character'	Botanical	456283	356627
High Park Wood	'A predominantly coniferous plantation with deciduous portions and numerous species-rich pockets'	Botanical	449013	349249
Papplewick Ponds	'Interesting subsidence ponds with some valuable peripheral habitats'	Botanical	455047	349342
Cauldwell Dam and Drain	'A pond, marsh and drain with a noteworthy community'	Botanical	453074	358334
Annesley Park Duck Decoy	'A lake with a noteworthy flora, together with a mostly naturally regenerated woodland'	Botanical	451399	351330
Wighay Wood Stream	A rich woodland lining a clear stream	Botanical	451884	350623
County Dumble	A wooded stream supporting a noteworthy flora	Botanical	445475	362878
River Leen (Part)	'City section of a river with important plant and animal communities'	Botanical	454969	342472

Bentinck Void	A mosaic of habitats of botanical and zoological note on the site of a former mine	Botanical	448348	353987
Silverhill Pond	A large pond and marsh on a former colliery site of botanical and zoological interest	Botanical	446662	362274
Blenheim Lane Grassland	A species-rich calcareous grassland with a clear stream	Botanical	452406	346269
Felley Brook	A stream of zoological note	Crayfish	448608	350346
Cauldwell Brook	A length of stream of zoological importance	Crayfish	453151	359029
River Lean	A stretch of river of zoological importance	Crayfish	454898	349636
River Meden - Newboundmill Bridge	A section of the River Meden of interest for Water beetles	Water Beetle/Bugs	449673	363261
Erewash Marsh	Spring-fed ponds with notable aquatic and marginal flora in a marshy grassland	Botanical	445489	354361
Bagthorpe Brook	A brook with species-rich semi-natural woodland, relict coal measures grassland and scrub communities	Botanical	446251	351605
Kirkby Bentinck Erewash Meadow	Neutral grassland with permanent wet areas supporting notable species	Botanical	447227	354923
Annesley Woodhouse Woodland	A mixed woodland with a rich ground flora and wet flush communities	Botanical	448967	352902
Annesley Woodland I	A noteworthy mosaic of dry and wet deciduous woodland	Botanical	450156	352777
Annesley Woodland II	A small valley with notable deciduous woodland, flush and aquatic communities	Botanical	449888	351278
Teversal Flush	A notable base-rich wet flush community	Botanical	449010	363641
Skegby Riparian Woodland	A short length of stream and a pond with a well developed submerged and marginal aquatic flora in a woodland	Botanical	449350	360690
Allen's Green Dumble	Steep unmanaged neutral grassland and wooded dumble section	Botanical	446242	352078

Appendix Four - Pitt Review Recommendations relating to the Local Authorities as the Lead Organisation. (Source: The Pitt Review Learning the Lesson from the 2007 Flood. June 2008)

Rec No	Final Recommendations	Delivery timetable	Supporting organisations
7	There should be a presumption against building in high flood risk areas, in accordance with PPS25, including giving consideration to all sources of flood risk and ensuring that developers make a full contribution to the costs both of building and maintaining any necessary defences.	Beginning immediately	CLG and Environment Agency
12	All local authorities should extend eligibility for home improvement grants and loans to include flood resistance and resilience products for properties in high flood-risk areas	By end 2008	
13	Local authorities, in discharging their responsibilities under the Civil Contingencies Act 2004 to promote business continuity should encourage the take-up of property flood resistance and resilience by businesses.	By end 2008	
14	Local authorities should lead on the management of local flood risk, with the support of the relevant organisations.	By end 2010	DEFRA, Environment Agency, water companies and IDBs
15	Local authorities should positively tackle local problems of flooding by working with all relevant parties, establishing ownership and legal responsibility.	Beginning immediately	Environment Agency, water companies, IDBs and other owners
16	Local authorities should collate and map the main flood risk management and drainage assets (over and underground), including a record of their ownership and condition.	In place by end 2010	Environment Agency, water companies, IDBs and other owners
18	Local Surface Water Management Plans, as set out under PPS25 and coordinated by local authorities, should provide the basis for managing all local flood risk. (EA is a lead authority with local authorities).	Surface Water Management Plans completed – end 2010	Water companies
19	Local authorities should assess and, if appropriate, enhance their technical capabilities to deliver a wide range of responsibilities in relation to local flood risk management.	Beginning immediately, completed to support new statutory duties by end 2010	LGA, CLG, DEFRA, Environment Agency
38	Local authorities should establish mutual aid agreements in accordance with the guidance currently being prepared by the Local Government Association and the Cabinet Office. (Joint lead by Local authorities and Cabinet Office).	Guidance issued by end 2008	LGA
41	Upper tier local authorities should be the	By end 2008	Local

	lead responders in relation to multi-agency planning for severe weather emergencies at the local level and for triggering multi-agency arrangements in response to severe weather warnings and local impact assessments.		Resilience Forums, Regional Resilience Forums, Defray, CLG and Cabinet Office
66	Local authority contact centres should take the lead in dealing with general enquiries from the public during and after major flooding, redirecting calls to other organisations when appropriate.	Arrangements in place by end 2008	Local Resilience Forums
68	Council leaders and chief executives should play a prominent role in public reassurance and advice through the local media during a flooding emergency, as part of a coordinated effort overseen by Gold Commanders.	Beginning immediately, ongoing	Local Resilience Forums
72	Local response and recovery coordinating groups should ensure that health and wellbeing support is readily available to those affected by flooding based on the advice developed by the Department of Health. (Joint lead organisations Local Authorities and Local Resilience Forums).	Support available by October 2008	CLG, Department of Health, HPA, voluntary sector
74	The monitoring of the impact of flooding on the health and wellbeing of people, and actions to mitigate and manage the effects, should form a systematic part of the work of Recovery Coordinating Groups.	Monitoring arrangements by October 2008	CLG, Local Resilience Forums, Department of Health, HPA, voluntary sector
76	Local authorities should coordinate a systematic programme of community engagement in their area during the recovery phase.	Programme developed by end 2008	CLG and voluntary sector
77	National and local Recovery Coordinating Groups should be established from the outset of major emergencies and in due course there should be formal handover from the crisis machinery. (Joint lead by CLG and Local Authorities)	Beginning immediately	Local Resilience Forums and Cabinet Office
78	Aims and objectives for the recovery phase should be agreed at the outset by Recovery Coordinating Groups to provide focus and enable orderly transition into mainstream programmes when multi-agency coordination of recovery is no longer required.	Beginning immediately	Local Resilience Forums and voluntary sector
83	Local authorities should continue to make arrangements to bear the cost of recovery for all but the most exceptional emergencies, and should revisit their reserves and insurance arrangements in light of last summer's floods.	Arrangements in place by end 2008	LGA
85	Local Recovery Coordination Groups should make early recommendations to elected local authority members about longer-term regeneration and economic development opportunities.	Beginning immediately	BERR and CLG

90	All upper tier local authorities should establish Oversight and Scrutiny Committees to review work by public sector bodies and essential service providers in order to manage flood risk, underpinned by a legal requirement to cooperate and share information. (Joint lead by Local Authorities and Cabinet Office)	Established June 2009	
91	Each Oversight and Scrutiny Committee should prepare an annual summary of actions taken locally to manage flood risk and implement this Review, and these reports should be public and reviewed by Government Offices and the Environment Agency. (Joint lead by Local Authorities, Government Offices and Environment Agency).	Implemented June 2009	

Appendix Four – Help and Advice

Help and advice on flooding is available from a variety of sources including the following:

Environment Agency

The Environment Agency has an important role in warning people about the risk of flooding and in reducing the likelihood of flooding from rivers and seas. Help is available through:

- Flood Warning Direct - Sign up to Flood Warming Direct if you property is at risk of flooding on 0845 988 1188.
- Flood Maps - Use the EA's Flood Map to find the likelihood of flooding in your area. You can also check current flood warnings in force from here and find more details on how flooding could affect your home insurance.
- Flood advice guide - Guides give information and practical advice on what to do before, during and after flooding.

Contact details
Website: www.environment-agency.gov.uk
Address: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY
Telephone
General Enquiries: 08708 506 506 (Mon-Fri 8-6)
Floodline: 0845 988 1188 (24 Hour) (Information about flooding)

Severn Trent Water

The 24 hour contact for water and sewerage issues i.e. leaks, burst mains and blocked sewers is 0800783 4444

Further information on flooding from sewers is available on Severn Trent Water's website at Homepage > Household > Sewer flooding
www.stwater.co.uk/server.php?show=nav.5902

The National Flood Forum
The National Flood Forum is a registered charity which provides support and advice to communities and individuals that have been flooded or are at risk of flooding. It aims to influence central and local government and all agencies that manage flood risk.

Contact details
Web site: www.floodforum.org.uk
Address: The National Flood Forum, Snuff Mill Warehouse, Bewdley Worcestershire, DY12 2EL.
Telephone 01299 403055. Fax 01299 403101

CIRIA
Provides advice sheets on improving the flood resistance of your home or business.

Contact details
Website: www.ciria.org.uk
Address: Classic House, 174 - 180 Old Street, London EC1V 9BP, UK
Telephone: +44 (0) 20 7549 3300. Fax: +44 (0) 20 7253 0523