

# Nottinghamshire Local Flood Risk Management Strategy

2016 - 2021

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Local Flood Risk Management Strategy					
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### Cover Photographs

Top Left	Cropwell Butler 2013	Top Right	Surcharging of Drains in East Stoke
Bottom Left	Flooding; Oxtou Road Southwell 2013	Bottom Right	Pleasley Vale Mansfield 2013



<b>TABLE OF CONTENTS</b>	<b>ACRONYMS AND ABBREVIATIONS .....</b>	<b>1</b>
	<b>1. INTRODUCTION.....</b>	<b>5</b>
1.1	Background .....	5
1.2	Local Flood Risk Management .....	6
1.3	What is a Local Flood Risk Management Strategy? .....	6
1.4	Legislative drivers for local flood risk management .....	8
	<b>2. ROLES AND RESPONSIBILITIES .....</b>	<b>11</b>
2.1	Who are the 'Risk Management Authorities' in Nottinghamshire? .....	11
2.2	Roles and Responsibilities of Risk Management Authorities In Nottinghamshire .....	12
2.3	Neighbouring Lead Local Flood Authorities: .....	16
2.4	Other Key Stakeholders .....	16
2.4.1	Property Owners and Residents .....	17
2.4.2	Riparian Owners .....	17
2.5	Working in Partnership .....	19
2.6	Local Flood Risk Management Steering Group .....	19
2.7	Nottinghamshire Local Resilience Forum .....	19
2.8	Local Engagement Survey .....	20
	<b>3. FLOOD RISK IN NOTTINGHAMSHIRE .....</b>	<b>21</b>
3.1	Geographic Context .....	21
3.2	Local sources of Flood Risk .....	22
3.2.1	Surface Water .....	23
3.2.2	Groundwater .....	27
3.2.3	Ordinary Watercourses .....	28
3.2.4	Historic Flooding from Local Sources .....	30
3.3	Other sources of flood risk .....	32
3.3.1	Main Rivers .....	32
3.3.2	Sewer Flooding .....	37
3.3.3	Reservoir Flooding .....	38
3.3.4	Canal Flooding .....	39
3.4	Current Management of Flood Risk .....	40
3.5	Managing Future Flood Risk .....	40
3.5.1	Impacts of Future Climate Change .....	40
3.5.2	Changes in Land Management .....	41
3.6	Priority Flood Risk Locations .....	42
	<b>4. OBJECTIVES FOR MANAGING LOCAL FLOOD RISK IN NOTTINGHAMSHIRE .....</b>	<b>43</b>
4.1	Guiding Principles for Setting Objectives .....	44
4.2	Nottinghamshire Local Objectives .....	45
	<b>5. DELIVERY OF LOCAL FLOOD RISK MANAGEMENT... ..</b>	<b>47</b>
5.1	Developing measures .....	47

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5.2	Current flood risk management.....	47
5.3	Case studies of flood alleviation work in Nottinghamshire	48
5.4	Delivering our objectives .....	52
5.4.1	Public priorities for future flood management in Nottinghamshire .....	52
5.4.2	Identification of Local Flood Risk Measures .....	52
5.5	Taking a Proportionate Risk-based Approach .....	54
5.6	Delivery of the Strategy – The Local Flood Risk Management Action Plan .....	55
6.	<b>FUNDING FOR LOCAL FLOOD RISK MANAGEMENT</b> .	<b>56</b>
6.1	Current Funding of Flood Risk Management Projects .....	56
6.2	Changes to Investment in Flood Risk Management .....	57
6.3	Summary of Funding Sources.....	58
6.4	Collaborative Working .....	59
6.5	Considerations for Future Investment.....	60
7.	<b>ENVIRONMENTAL IMPACT</b> .....	<b>61</b>
7.1	Achieving wider environmental objectives .....	61
7.2	Strategic Environmental Assessment .....	62
7.3	Habitats Regulations Assessment .....	62
7.4	EU Water Framework Directive .....	62
8.	<b>STRATEGY MONITORING AND REVIEW</b> .....	<b>63</b>
8.1	Monitoring Progress and Success .....	63
8.2	Reviewing the Strategy .....	63
	<b>APPENDIX A FIGURES</b>	
	<b>APPENDIX B NOTTINGHAMSHIRE LOCAL FLOOD RISK MANAGEMENT STRATEGY ACTION PLAN</b>	
	<b>APPENDIX C STATUS OF LEGISLATION FOR LOCAL FLOOD RISK MANAGEMENT</b>	
	<b>APPENDIX D NATIONAL, REGIONAL, LOCAL AND CORPORATE STRATEGIES</b>	
	<b>APPENDIX E SUMMARY OF LOCAL ENGAGEMENT SURVEY RESPONSES</b>	
	<b>APPENDIX F PROPERTY COUNTS OF CRITICAL INFRASTRUCTURE AT RISK FROM SURFACE WATER FLOODING</b>	



**ACRONYMS AND ABBREVIATIONS**

Term	Definition
<b>Aquifer</b>	A source of groundwater comprising water bearing rock, sand or gravel capable of yielding significant quantities of water.
<b>Attenuation</b>	In the context of this strategy – the storing of water to reduce peak discharge of water.
<b>Catchment Flood Management Plan</b>	A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
<b>Category 1 Responders</b>	As defined under Schedule 1 of the Civil Contingencies Act, Category 1 responders are “core responders” in the event of an emergency and include emergency services, local authorities, health bodies and Government agencies including the Environment Agency.
<b>Civil Contingencies Act 2004</b>	Aims to deliver a single framework for civil protection in the UK and sets out the actions that need to be taken in the event of a flood. The Civil Contingencies Act is separated into two substantive parts: local arrangements for civil protection (Part 1) and emergency powers (Part 2).
<b>Climate Change</b>	Long term variations in global temperature and weather patterns caused by natural and human actions.
<b>Culvert / culverted</b>	A channel or pipe that carries water below the level of the ground.
<b>DG5 Register</b>	A water-company held register of properties which have experienced sewer flooding due to hydraulic overload, or properties which are 'at risk' of sewer flooding more frequently than once in 20 years.
<b>Flood Zone 1</b>	Low Probability of Flooding. In accordance with the NPPF, land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year.
<b>Flood Zone 2</b>	Medium Probability of Flooding. In accordance with the NPPF, land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1-0.1%), or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5-0.1%) in any year.
<b>Flood Zone 3a</b>	High Probability of Flooding. In accordance with the NPPF, land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of sea flooding (>0.5%) in any year.
<b>Flood Zone 3b</b>	Functional Floodplain. In accordance with the NPPF, land where water has to flow or be stored in times of flood.
<b>Environment Agency</b>	Environment regulator for England and Wales. Risk Management Authority responsible for management of flood risk from fluvial (main rivers), tidal and coastal sources of flooding and Reservoirs.
<b>Flood Defence</b>	Infrastructure used to protect an area against floods as floodwalls and embankments; they are designed to a specific standard of protection (design standard).
<b>Floodplain</b>	Area adjacent to river, coast or estuary that is naturally susceptible to flooding.
<b>Flood Resilience</b>	Resistance strategies aimed at flood protection.
<b>Flood Risk</b>	The level of flood risk is the product of the frequency or likelihood of the flood events and their consequences (such as loss, damage, harm, distress and disruption).
<b>Flood Risk Assessment</b>	Considerations of the flood risks inherent in a project, leading to the development actions to control, mitigate or accept them.
<b>Flood Storage</b>	A temporary area that stores excess runoff or river flow often ponds or reservoirs.

Term	Definition
<b>Flood Risk Management Plans (FRMPs)</b>	Flood Risk Management Plans (FRMP's). These are the high level strategies that sit above LFRMS. The Humber FRMP will be published later this year. They have new actions and measures and have inherited some of the relevant actions/measures from the CFMP and also all LLFA's have been consulted upon them and some have contributed to adding measures.
<b>Flood Zone</b>	The extent of how far flood waters are expected to reach.
<a href="#">Flood and Water Management Act 2010</a>	The Act aims to provide better, more comprehensive management of flood risk for people, homes and businesses. It does this by defining 'Risk Management Authorities' (RMAs) and formalises the flood risk management roles and responsibilities for each.
<b>Fluvial</b>	Relating to the actions, processes and behaviour of a watercourse (river or stream).
<b>Fluvial flooding</b>	Flooding by a river or a watercourse.
<b>Functional Floodplain</b>	Land where water has to flow or be stored in times of flood.
<b>Greenfield</b>	Previously undeveloped land.
<b>Groundwater</b>	Water that is in the ground, this is usually referring to water in the saturated zone below the water table.
<b>Habitats Regulations Assessment</b>	The assessment of the impacts of implementing a plan or policy on international protected sites for nature conservation.
<b>Highways Act 1980</b>	Sets out the main duties (management and operation of the road network) of highways authorities in England and Wales. The Act contains powers to carry out functions / tasks on or within the highways such as improvements, drainage, acquiring land etc.
<b>Hydraulic Modelling</b>	A computerised model of a watercourse and floodplain to simulate water flows in rivers too estimate water levels and flood extents.
<b>IDB</b>	Internal Drainage Board
<b>Infiltration</b>	The penetration of water through the grounds surface.
<b>Infrastructure</b>	Physical structures that form the foundation for development.
<b>Land Drainage Act 1991</b>	Sets out the statutory roles and responsibilities of key organisations such as Internal Drainage Boards, local authorities, the Environment Agency and Riparian owners with jurisdiction over watercourses and land drainage infrastructure. Parts of the Act have been amended by the Flood and Water Management Act 2010.
<b>Lead Local Flood Authority (LLFA)</b>	The statutory body defined under the Flood and Water Management Act responsible for the management of local flood risk, namely surface water runoff, groundwater and ordinary watercourses.
<b>Local Flood Risk</b>	Defined in the Flood and Water Management Act as flooding from surface runoff, ordinary watercourses and groundwater.
<b>Local Planning Authority</b>	Body that is responsible for controlling planning and development through the planning system.
<b>Main River</b>	Watercourse defined on a 'Main River Map' designated by DEFRA. The Environment Agency has permissive powers to carry out flood defence works, maintenance and operational activities for main rivers only.

Term	Definition
<b>Mitigation Measure</b>	An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere.
<b>Multi-Agency Flood Plan (MAFP)</b>	Plan outlining how responding parties under the Civil Contingencies Act and key voluntary response organisations will work together on an agreed coordinated response to severe flooding in South Gloucestershire.
<b>National Strategy</b>	National Flood and Coastal Erosion Risk Management (FCERM) Strategy for England, developed by the Environment Agency.
<b>National Planning Policy Framework (NPPF)</b>	National Planning Policy Framework (NPPF) for England, published by the Development for Communities and Local Government. This sets the government's planning policies for England and how these are expected to be applied.
<b>Ordinary Watercourse</b>	A watercourse that does not form part of a main river. This includes "all rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows" according to the Land Drainage Act 1991.
<b>Overland Flow</b>	Flooding caused when intense rainfall exceeds the capacity of the drainage systems or when, during prolonged periods of wet weather, the soil is so saturated such that it cannot accept any more water.
<b>PFRA</b>	Preliminary Flood Risk Assessment
<b>SEA</b>	Strategic Environmental Assessment
<b>SMP</b>	Shoreline Management Plan
<b>Residual Flood Risk</b>	The remaining flood risk after risk reduction measures have been taken into account.
<b>Return Period</b>	The average time period between rainfall or flood events with the same intensity and effect.
<b>Riparian Owner</b>	Anyone who owns land or property alongside a river or other watercourse. Responsibilities include maintaining river beds/banks and allowing flow of water to pass without obstruction.
<b>Risk</b>	The probability or likelihood of an event occurring.
<b>RMA</b>	Risk Management Authority
<b>River Catchment</b>	The areas drained by a river.
<b>SFRA</b>	Strategic Flood Risk Assessment
<b>Sewer Flooding</b>	Flooding caused by a blockage or overflowing in a sewer or urban drainage system.
<b>Standard of Protection</b>	The flood event return period above which significant damage and possible failure of the flood defences could occur.
<b>Sustainability</b>	To preserve /maintain a state or process for future generations. The integration of sustainability principals in the control of surface water flooding is fundamental to the successful implementation of Surface Water Management Plans.
<b>Sustainable Drainage System (SuDS)</b>	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques.
<b>Sustainable Development</b>	Development that meets the needs of the present without compromising the ability of future generations meeting their own needs.
<b>Tidal</b>	Relating to the actions or processes caused by tides.

Term	Definition
<b>Tributary</b>	A body of water, flowing into a larger body of water, such as a smaller stream joining a larger stream.
<b>WFD</b>	Water Framework Directive
<b>1 in 30 year event</b>	Event that on average will occur once every 30 years. Also expressed as an event, which has a 3.33% probability of occurring in any one year.
<b>1 in 100 year event</b>	Event that on average will occur once every 100 years. Also expressed as an event, which has a 1% probability of occurring in any one year.

## 1. INTRODUCTION

### 1.1 Background

In England, 5.2 million properties are at risk of flooding. Of these, 1.4 million are at risk from rivers or the sea, 2.8 million are at risk from surface water and 1 million are at risk from both<sup>1</sup>. This risk was realised in many parts of the country during the summer floods of 2007, which resulted in 55,000 properties flooding, 7,000 rescues by emergency services, 13 deaths and an estimated £3 billion of damages, and more recently in the winter of 2013 to 2014 where over 7,800 homes and nearly 3,000 commercial properties flooded across the UK.

The flooding experienced throughout Nottinghamshire in June 2007 and more recently in July and November 2012 and summer 2013 demonstrates the vulnerability of local communities to flooding. Across the county, there are risks of flooding from a number of different sources, including, surface water runoff and ponding, groundwater, sewer surcharging, rivers and reservoirs. In some cases more than one of these sources of flooding can combine to cause a flood event and exacerbate localised flooding. In Nottinghamshire there are approximately 78,700 residential properties that could be affected by surface water flooding in an event with a 1% chance of happening in any given year<sup>2</sup>.



Figure 1-1 Flooding in Oxtan Road, Southwell in July 2013 (Source: Nottinghamshire County Council)

<sup>1</sup> Environment Agency (2009) Flooding in England: A National Assessment of Flood Risk [http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b\\_r19\\_cf3\\_rackcdn.com/geho0609bqds-e-e.pdf](http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b_r19_cf3_rackcdn.com/geho0609bqds-e-e.pdf)

<sup>2</sup> Environment Agency (2013) updated flood map for surface water

## 1.2 Local Flood Risk Management

The Flood Risk Regulations 2009 ('the Regulations')<sup>3</sup> and the Flood and Water Management Act 2010 ('the Act')<sup>4</sup>, enacted by Government in response to the recommendations of The Pitt Review - Learning Lessons from the 2007 Floods<sup>5</sup>, gave Unitary and County Councils, as Lead Local Flood Authorities (LLFAs), responsibilities for leading and co-ordinating the management of local flood risk.

### Local flood risk is defined as...

"The risk of flooding from local sources including surface water, groundwater and ordinary watercourses (small ditches and watercourses)"

**This Local Flood Risk Management Strategy outlines how we, Nottinghamshire County Council, will manage flooding from local sources in our area and work with other authorities to manage all sources of flooding, now and in the future.**

We are a LLFA under the Regulations and the Act and have powers and statutory duties to manage and co-ordinate flooding from local sources (see [Appendix C](#) for more detail on these). We are doing this by working together with other organisations including the Environment Agency, who manage flooding from generally larger rivers (known as Main Rivers) such as the River Trent, Internal Drainage Boards (IDBs) managing low lying areas, District, Borough, Parish and Town Councils and infrastructure and utility providers, such as Severn Trent Water and the Highways England.

Our new responsibilities complement the work that we and our partner organisations already undertake on flood risk management. This includes highways drainage, land drainage, development planning and management, regeneration, emergency planning and response, environmental management and local investment.

There are both strategic and operational elements to the role of LLFA. Strategically, we have developed a Preliminary Flood Risk Assessment (PFRA)<sup>6</sup> in 2011. We have used the PFRA to inform the Local Flood Risk Management Strategy. We are now developing this Local Flood Risk Management Strategy and seeking to influence the strategic plans of other organisations, such as Local Planning Authority Local Plans and Severn Trent Water business planning.

## 1.3 What is a Local Flood Risk Management Strategy?

As part of our role as an LLFA, we have a legal duty under the Act to develop, maintain, apply and monitor a Local Flood Risk Management Strategy, (hereafter 'the Strategy'). Figure 1-2 sets out what the Strategy must cover, as laid out in [Section 9](#) of the Act and where this can be found in the document. A Strategic Environmental Assessment (SEA), including Water Framework Directive (WFD) review and Habitats Regulations Assessment (HRA) have been carried out to inform the Strategy. These accompany the Strategy and are summarised in Section 7.

We are working with other risk management authorities to manage all flood risk in a joined-up way, and have prepared our Strategy in partnership with other organisations. These include the seven District and Borough Councils across Nottinghamshire, the Environment Agency, Water

<sup>3</sup> HSMO (2009) The Flood Risk Regulations <http://www.legislation.gov.uk/ukxi/2009/3042/contents/made>

<sup>4</sup> HMSO (2010) The Flood and Water Management Act 2010 <http://www.legislation.gov.uk/ukpga/2010/29/contents>

<sup>5</sup> Cabinet Office (2008) Sir Michael Pitt Report 'Learning lessons learned from the 2007 floods'

[http://webarchive.nationalarchives.gov.uk/20100807034701/http://archive.cabinetoffice.gov.uk/pittreview/\\_media/assets/www.cabinetoffice.gov.uk/flooding\\_review/pitt\\_review\\_full%20pdf.pdf](http://webarchive.nationalarchives.gov.uk/20100807034701/http://archive.cabinetoffice.gov.uk/pittreview/_media/assets/www.cabinetoffice.gov.uk/flooding_review/pitt_review_full%20pdf.pdf)

<sup>6</sup> JBA consulting (2011) Nottinghamshire Local Flood Risk Management Strategy

Companies, Internal Drainage Boards and Nottingham City Council. The flood management roles of these organisations are detailed further in Section 2 of this strategy document.

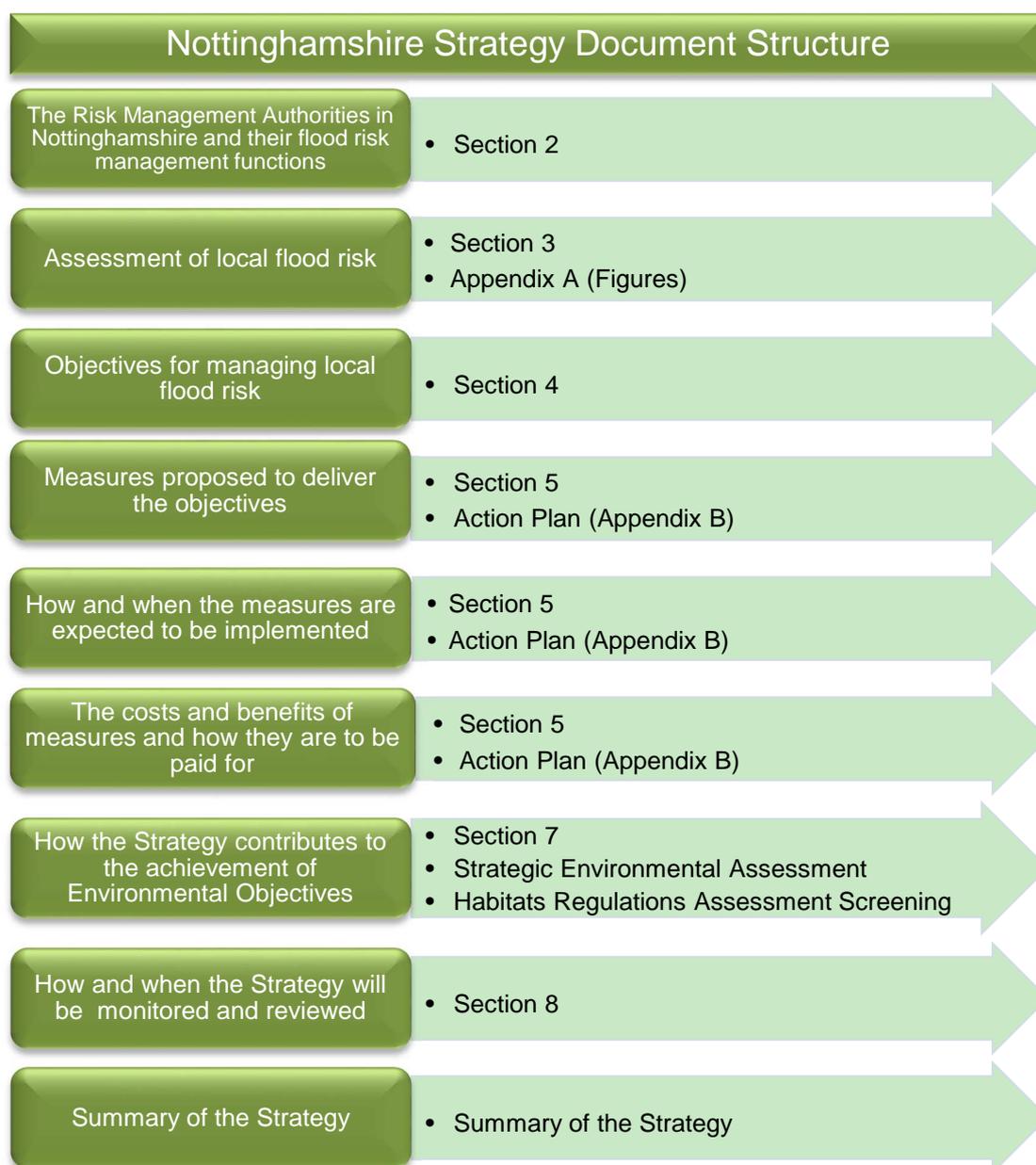


Figure 1-2: Structure of the Strategy following the requirements of the Act

This Strategy complements and supports The National Flood and Coastal Erosion Risk Management Strategy for England<sup>7</sup>, published by the Environment Agency, which outlines a national framework for flood and coastal risk management, balancing the needs of communities, the economy and the environment. The National Strategy outlines six guiding principles that should be applied in developing local flood risk management:

<sup>7</sup> Defra, Environment Agency (2011) The National Flood and Coastal Erosion Risk Management Strategy for England <http://www.environment-agency.gov.uk/research/policy/130073.aspx>

### The National Flood and Coastal Erosion Risk Management Strategy Guiding Principles

- Community focus and partnership working
- A catchment and coastal 'cell' based approach
- Sustainability
- Proportionate, risk-based approaches
- Multiple benefits
- Beneficiaries should be encouraged to invest in risk management

#### 1.4 Legislative drivers for local flood risk management

Table 1-1 provides a summary of some key pieces of national legislation and local policies that outline our requirements for flood risk and environmental management across Nottinghamshire.

**Table 1-1: Summary of legislation and policy relating to flood risk management**

Legislation	Summary
<a href="#">Flood and Water Management Act 2010</a> <sup>8</sup>	<p>The Act aims to provide better, more comprehensive management of flood risk for people, homes and businesses. It does this by defining 'Risk Management Authorities' (RMAs) and formalises the flood risk management roles and responsibilities for each. Further details regarding responsibilities and functions in relation to their flood risk management in Nottinghamshire is provided in Section 2.</p> <p>The duties and progress of Nottinghamshire County Council under the Act are explained in more detail in <a href="#">Appendix C</a></p>
<a href="#">Flood Risk Regulations 2009</a> <sup>9</sup>	<p>We have legal obligations under the EU Floods Directive<sup>10</sup>, which was transposed into UK Law through the Flood Risk Regulations 2009. Ten Flood Risk Areas have been identified in the UK under the Regulations as areas that are susceptible to surface water flooding, although none of these overlap with any part of Nottinghamshire.</p> <p>The regulations designated both Unitary Authorities and County Councils as Lead Local Flood Authorities. Under the Regulations we have a duty to undertake and produce a Preliminary Flood Risk Assessment (PFRA) and contribute to the preparation of the Flood Risk Management Plan (FRMP) for the Humber River Basin District.</p> <p>Nottinghamshire's PFRA was produced in 2011 and acts as a high level screening exercise to identify significant areas of flood risk across Nottinghamshire. The assessment covers flooding from local sources and compliments a suite of flood risk management studies and plans carried out in the County. The PFRA can be found on the County Council website<sup>11</sup>.</p>
<a href="#">National Planning Policy Framework</a> <sup>12</sup>	<p>Each of the District and Borough Councils within Nottinghamshire are Local Planning Authorities (LPA). The National Planning Policy Framework (NPPF) and supporting guidance (National Planning Practice Guidance, NPPG)<sup>13</sup> requires each LPA to undertake a Strategic Flood Risk Assessment (SFRA) and to use the findings, and those of other studies, to inform strategic land</p>

<sup>8</sup> HMSO (2010) The Flood and Water Management Act <http://www.legislation.gov.uk/ukpga/2010/29/contents>

<sup>9</sup> HMSO (2009) The Flood Risk Regulations <http://www.legislation.gov.uk/uksi/2009/3042/contents/made>

<sup>10</sup> European Union (2007) EU Floods Directive 2007/60/EC <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32007L0060:EN:NOT>

<sup>11</sup> Nottinghamshire Preliminary Flood Risk Assessment (PFRA) (2011). <http://www.nottinghamshire.gov.uk/enjoying/countryside/flooding/lead-local-flood-authority/pfra/>

<sup>12</sup> Communities and Local Government (2012) National Planning Policy Framework

<http://www.communities.gov.uk/documents/planningandbuilding/pdf/2116950>

<sup>13</sup> Communities and Local Government (2014) Planning Practice Guidance: Flood Risk and Coastal Change: <http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/>

**Table 1-1: Summary of legislation and policy relating to flood risk management**

Legislation	Summary
	<p>use planning including the application of the Sequential Test which seeks to steer development towards areas of lowest flood risk in preference to consideration of areas of greater risk.</p> <p>As part of the County's duties in minerals and waste planning, a Level 1 SFRA was carried out in 2011<sup>14</sup>, which analysed flood risks across the County. The SFRA is currently being updated for publication in 2015/2016 and will feed into the strategy review</p> <p>Changes implemented to the NPPF from 6<sup>th</sup> April 2015 accompanied by a ministerial statement<sup>15</sup> have strengthened the requirement for prioritisation of Sustainable Drainage Systems(SuDS) in all new major developments and placed a new duty on Nottinghamshire County Council as LLFA as a statutory consultee for surface water management on major development applications</p>
<a href="#">Land Drainage Act 1991</a> <sup>16</sup>	<p>The Land Drainage Act sets out the statutory roles and responsibilities of key organisations such as Internal Drainage Boards, local authorities, the Environment Agency and Riparian owners with jurisdiction over watercourses and land drainage infrastructure. Parts of the Act have been amended by the Flood and Water Management Act 2010.</p>
<a href="#">Climate Change Act 2008</a> <sup>17</sup>	<p>Under the Climate Change Act, the Government, public bodies and statutory organisations are required to report on how they are adapting to climate change.</p> <p>We will report in this Strategy the impact of climate change and its effect on flood risk in Nottinghamshire, including how we plan to manage and mitigate the effects.</p>
<a href="#">Strategic Environmental Assessment (SEA) Directive 2001</a> <sup>18</sup>	<p>The SEA Directive was adopted by the European Union and transposed into English law as the Environmental Assessment of Plans and Programmes Regulations<sup>19</sup> (Statutory Instrument No.1633) in 2004.</p> <p>The Directive requires a SEA to be carried out for all plans and programmes which are 'subject to preparation and/or adoption by an authority at national, regional or local level.' The SEA informs the preferred long-term strategy through its identification of the likely significant effects of the implementation of the Strategy on identified environmental receptors.</p>
<a href="#">Water Framework Directive (WFD) 2000</a> <sup>20</sup>	<p>The Water Framework Directive (WFD) is a European Directive which introduced a strategic planning process to manage, protect and improve the water environment. Local strategies should be assessed for WFD compliance to ensure that local measures reduce flood risk, comply with the objectives of the WFD, and identify, where possible, measures to contribute to achieving WFD objectives.</p> <p>The Environment Agency is responsible for preparing management plans for river basin districts in England and Wales. Those plans must be prepared in line with the requirements of the WFD. The plans outline the characteristics of the river basin district, identify the pressures that the local water environment faces and actions to improve or manage these.</p>
<a href="#">Highways Act 1980</a> <sup>21</sup>	<p>Under Section 100 of the Highways Act, we as the Highway Authority have powers to construct, maintain or cleanse drainage systems in the highway or on adjoining/nearby land, for the purpose of drainage or prevention of surface water on the highway</p>
<a href="#">Water Resources Act 1991</a> <sup>22</sup>	<p>These Acts both place duties and powers upon specific organisations and individuals of relevance to local flood risk management.</p>

<sup>14</sup>URS Scott Wilson (2011) Nottinghamshire County Council & Nottingham City Council Level 1 Minerals & Waste SFRA <http://cms.nottinghamshire.gov.uk/sfra.pdf>

<sup>15</sup> DCLG (2014) Sustainable drainage systems: Written statement - HCWS161 <http://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2014-12-18/HCWS161/>

<sup>16</sup> HMSO (1991) Land Drainage Act <http://www.legislation.gov.uk/ukpga/1991/59/contents>

<sup>17</sup> HMSO (2008) Climate Change Act <http://www.legislation.gov.uk/ukpga/2008/27/contents>

<sup>18</sup> European Union (2001) Strategic Environmental Assessment Directive 2001/42/EC. <http://ec.europa.eu/environment/eia/sea-legalcontext.htm>

<sup>19</sup> HMSO (2004) Environmental Assessment of Plans and Programmes Regulations. <http://www.legislation.gov.uk/uksi/2004/1633/contents/made>

<sup>20</sup> European Union (2000) Water Framework Directive 2000/60/EC. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT>

<sup>21</sup> HMSO (1980) Highways Act <http://www.legislation.gov.uk/ukpga/1980/66/contents>

<sup>22</sup> HMSO (1991) Water Resources Act <http://www.legislation.gov.uk/ukpga/1991/57/contents>

**Table 1-1: Summary of legislation and policy relating to flood risk management**

Legislation	Summary
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<a href="#">Civil Contingencies Act 2004<sup>1</sup></a>	
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## 2. ROLES AND RESPONSIBILITIES

### 2.1 Who are the 'Risk Management Authorities' in Nottinghamshire?

Flood events are often a complex interaction of flood source(s), pathway(s) and receptor(s), the responsibility for managing which can lie with a number of different organisations or individuals. As a result, a clear definition of responsibilities and effective communication across these organisations and individuals is vital if the risk to people, property and the environment in Nottinghamshire is to be managed effectively.

The FWMA identifies which types of authority will have responsibility as Risk Management Authorities (RMAs).

The RMAs for Nottinghamshire are detailed in Table 2-1. These authorities have a number of legal responsibilities for managing flood risk in the County which are explained further in Boxes 2.1 – 2.7. All RMAs have a duty to cooperate with the LLFA and other RMAs when exercising their flood risk management functions.

**Table 2-1: Summary of Risk Management Authorities in Nottinghamshire**

RMA Type	RMAs in Nottinghamshire	Risk Management responsibilities
<b>Lead Local Flood Authority</b> [Box 2.1]	Nottinghamshire County Council	Flooding from surface water, groundwater or ordinary watercourses <sup>23</sup>
<b>Environment Agency</b> [Box 2.2]	Environment Agency	Flooding from main rivers <sup>24</sup> , the sea and reservoirs  Strategic overview of all sources of flooding
<b>District and Borough Councils</b> [Box 2.3]	Ashfield District Bassetlaw District Broxtowe Borough Gedling Borough Mansfield District Newark and Sherwood District Rushcliffe Borough	Responsibility for local land drainage (under the <a href="#">Land Drainage Act 1991</a> ) which can include works to ordinary watercourses and other delegated powers.
<b>Internal Drainage Boards</b> [Box 2.4]	Doncaster East Isle of Axholme and North Nottinghamshire Water Level Management Board Trent Valley Upper Witham	Management of ordinary watercourses within administrative area
<b>Water Companies</b> [Box 2.5]	Severn Trent Water Anglian Water	Management of flooding from sewers

<sup>23</sup> An 'ordinary watercourse' is a watercourse that is not part of a main river and includes rivers, streams, ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows.

<sup>24</sup> Main rivers are watercourses that have been classified as such on maps produced and held by the Environment Agency

RMA Type	RMAs in Nottinghamshire	Risk Management responsibilities
	Yorkshire Water	
<b>Highway Authorities</b> [Box 2.6]	Highways England (motorways and trunk roads) Nottinghamshire County Council (other adopted roads)	Management of highways drainage
<b>Neighbouring Lead Local Flood Authorities</b> [Box 2.7]	Derbyshire County Council Doncaster Metropolitan Borough Council Leicestershire County Council Lincolnshire County Council North Lincolnshire Council Nottingham City Council Rotherham Metropolitan Borough Council	Flooding from surface water, groundwater or ordinary watercourses within their administrative areas

## 2.2 Roles and Responsibilities of Risk Management Authorities In Nottinghamshire

### Box 2.1: Lead Local Flood Authority: Nottinghamshire County Council

Nottinghamshire County Council (NCC) is the LLFA for Nottinghamshire and has a number of roles and responsibilities for flood risk management under the Act, the Regulations and other national legislation.

We are responsible for flood risk management from;

- surface water,
- groundwater; and
- ordinary watercourses.

Operationally as a LLFA, the County Council;

- investigates flooding incidents,
- develops Flood Risk Management solutions where viable and appropriate, for example Hucknall and Southwell, these are discussed in more detail later in the strategy.
- is developing a flood risk management asset database,
- undertakes various land drainage activities, including consenting to works and enforcement on Ordinary Watercourses outside of Internal Drainage Board areas, and,
- responds to planning applications for major developments as a statutory consultee on local flood risk management and drainage, in accordance with the Town and Country Planning (Development Management Procedure) (England) Order 2015<sup>25</sup>.

We are also a Highways Authority and maintain drains and ditches that serve to drain the adopted highway.

Our responsibilities as LLFA, complement the work that we and our partner organisations undertake across other Council functions, including

- highways drainage, and particularly the Highways Infrastructure Asset Plan
- land drainage,
- development planning and management,



<http://www.nottinghamshire.gov.uk/enjoying/countryside/flooding/>

<sup>25</sup> HMSO (2015 Town and Country Planning (Development Management Procedure) (England) Order 2015 <http://www.legislation.gov.uk/uksi/2015/595/contents/made>

- regeneration,
- emergency planning and response, and
- environmental management and local investment.

Nottinghamshire County Council will seek to work with relevant landowners to promote suitable action where such private drainage networks have the potential to cause flooding, in some situations a RMA may be a landowner. The County Council has no legal responsibility for clearing out drains, ditches and watercourses that are on private land in private ownership.

#### Box 2.2: Environment Agency (Derbyshire, Nottinghamshire and Leicestershire Area)

The Environment Agency takes a risk-based approach to flood risk management and is responsible for providing a strategic overview for all sources of flooding. The EA is a National organisation and is locally administered by the DNL Office and leads the delivery of the national FCRM Investment Programme with a national spend of £2.3 Bn over the 6 year period from 2015/16 to 2020/21. The EA carries out maintenance to FRM Assets in line with Government Policy of maximising benefits from available funding and leads nationally on Flood mapping, modelling, forecasting and warning.



<https://www.gov.uk/government/organizations/environment-agency>

24hr Floodline: **0345 988 1188**

Locally the EA ;

- Provides a Flood Warning Service, which helps and advises of imminent flood risk to individuals and emergency responders alike.
- Administers the RFCC.
- Leads on developing improving evidence in a variety of FCRM fields, e.g. Working with Natural Processes (WWNP's).
- Provides a strategic overview role in FCRM and has a critical role in FCRM strategic planning.
- Key role in climate change adaptation. And provides critical flood risk data to individuals and private businesses.

Generally the Environment Agency manages flooding from main rivers, including the River Trent and River Maun, and regulates third party works on main rivers. The Environment Agency is also responsible for tidal sources of flooding, coastal erosion and managing risk from reservoirs.

Additionally the Environment Agency has a number of further roles and responsibilities including being a statutory consultee for planning applications in Flood Zone 2 and 3 or Flood Zone 1 where critical drainage problems have been notified to the LPA. The Environment Agency also has the responsibility of developing, maintaining, applying and monitoring the implementation of The National Flood and Coastal Erosion Risk Management Strategy for England.

**Box 2.3: District and Borough Councils in Nottinghamshire**

There are seven District and Borough Councils in Nottinghamshire including:

- Ashfield District (<http://www.ashfield-dc.gov.uk/>)
- Bassetlaw District; (<https://www.bassetlaw.gov.uk/>)
- Broxtowe Borough; (<http://www.broxtowe.gov.uk/>)
- Gedling Borough; (<http://www.gedling.gov.uk/>)
- Mansfield District; (<http://www.mansfield.gov.uk/>)
- Newark and Sherwood District; (<http://www.newark-sherwooddc.gov.uk/>)
- Rushcliffe Borough (<http://www.rushcliffe.gov.uk/>)

District and Borough Councils are responsible for certain works on ordinary watercourses as part of their land drainage responsibilities and may be delegated tasks for the management of other local water sources/resources.

As Local Planning Authorities (LPA), District and Borough Councils are responsible for the production of local plans such as the [2002 Ashfield District Council Local Plan](#) which ensured that the environment and flooding were thoroughly considered (Chapter 3). Each LPA has produced a Strategic Flood Risk Assessment (SFRA) which help to guide development away from areas at greatest risk of flooding. Each SFRA can be found online through the council websites detailed above or through clicking the links below;

- [Ashfield DC SFRA](#) (2013)
- [Bassetlaw DC SFRA](#) (2009)
- [The Greater Nottingham SFRA \(Broxtowe BC\)](#) (2008)
- The Greater Nottingham SFRA (Gedling BC) (on request) (2008)
- [Mansfield DC SFRA \(2008\)](#)
- [Newark and Sherwood DC SFRA](#) (2009)
- [The Greater Nottingham SFRA \(Rushcliffe BC\)](#) (2010)

As LPAs, Nottinghamshire District and Borough Councils are responsible for managing and investigating planning permissions and must ensure that such plans do not impact flood risk management efforts e.g. through the development of flood storage areas. From 6<sup>th</sup> April 2015, changes to planning policy mean decisions on planning applications must ensure sustainable drainage systems for the management of run-off are put in place for developments of 10 dwellings or more. The County Council as LLFA must be consulted on the management of surface water and the LPA must ensure that clear arrangements are in place for ongoing maintenance of the drainage over the lifetime of the development.

Continued joint working between the County Council and the District and Borough Councils will contribute to delivering the Strategy objectives of all parties and should be achieved through existing governance.

#### Box 2.4: Internal Drainage Boards

There are four Internal Drainage Boards (IDBs) acting within Nottinghamshire:

- Doncaster East (<http://www.shiregroup-idbs.gov.uk/summary.aspx>)
- Isle of Axholme and North Nottinghamshire Water Level Management Board (<http://www.wmc-idbs.org.uk/loAaNN/>)
- Trent Valley (<http://www.wmc-idbs.org.uk/TVIDB/>)
- Upper Witham (<http://www.uwidb.co.uk/h>)

IDBs are responsible for maintenance of ordinary watercourses within their internal drainage districts, overseeing the risk from flooding, and for the production of water level management plans<sup>26</sup>.

#### Box 2.5: Water Companies

There are three water companies which operate in Nottinghamshire;

- Severn Trent Water (STW) - the predominant water supply and sewerage undertaker in the County,
- Anglian Water (AW) – operates sewers for a very small area in the East of the County, around the village of Harby, north of Collingham. Yorkshire Water – water supply only within some north western parts of the County

STW (and AW where relevant) are responsible for:



<http://www.stwater.co.uk/>

- The drainage of surface water from development via sewers they have adopted;
- Maintaining public sewers into which much of the highway drainage connects;
- Maintaining and improving water mains and other pipes to reduce the risk of leaking or bursts pipes (also applicable to Yorkshire Water); and,
- Producing Asset Management Plans and reporting its performance each year to Ofwat (The Water Services Regulation Authority), including in respect of internal sewer flooding of properties.

STW as the main water company have been actively engaged in partnership working with Nottinghamshire CC to address flood prevention through a number of schemes including; *Selston village, Coningswath Road and Carlton Valley, and Nottingham and the Thoresby Dale property protection scheme at Hucknall.*

#### Box 2.6: Highways England

In Nottinghamshire, Highways England is responsible for motorways and trunk roads whilst the County Council is responsible for other adopted roads. Both are responsible for highways drainage and the preparation, development and implementation of associated plans and policy. Highways maintenance is also

<sup>26</sup> Water Level Management Plans (WLMPs) are required for all areas which have a conservation interest and where water level management is important for the maintenance, or rehabilitation, of that interest (e.g. Sites of Special Scientific Interest (SSSIs), Special Protection Areas and Ramsar sites). WLMPs also provide a framework for balancing and integrating the water level requirements of agriculture, recreation, flood risk and conservation within an area.

required including road drain maintenance inclusive of kerbs, road gullies, ditches and the pipe network which connect to Severn Trent Water sewers.



<http://www.highways.gov.uk/highways-england/>

### 2.3 Neighbouring Lead Local Flood Authorities:

#### Box 2.7: Nottingham City Council

Nottingham City Council is a Unitary Authority and is also a LLFA under the Act.

Nottingham City Council's own Local Flood Risk Management Strategy for the administrative area of the City Council was adopted in March 2015. The County Council and the City Council Local Flood Risk Management Strategies have been developed in concert with each other to provide an approach to managing local flood risk which effectively manages cross-boundary issues.



Nottingham  
City Council

<http://www.nottinghamcity.gov.uk>

Other neighbouring Lead Local Flood Authorities include:

- Derbyshire County Council <http://www.derbyshire.gov.uk/>;
- Doncaster Metropolitan Borough Council <http://www.doncaster.gov.uk/search/searchhomepage.aspx>;
- Leicestershire County Council <http://www.leics.gov.uk/>;
- Lincolnshire County Council <http://www.lincolnshire.gov.uk/>;
- North Lincolnshire Council <http://www.northlincs.gov.uk/>; and
- Rotherham Metropolitan Borough Council <http://www.rotherham.gov.uk/>.

Roles and responsibilities of the above neighbouring LLFAs are similar to that of Nottinghamshire County Council for their own administrative areas.

### 2.4 Other Key Stakeholders

There are a number of organisations who are not Risk Management Authorities under the Act but are still important partners in managing local flood risk. Some of these stakeholders include:

- [The Canal & River Trust](#)<sup>27</sup> (formerly British Waterways) – responsible for maintaining the canal networks in Nottinghamshire, although without any specific flood management responsibility;
- [Natural England](#)<sup>28</sup> – responsible for enhancing and protecting the natural environment;
- [English Heritage](#)<sup>29</sup> – advises on the protection and enhancement of the historic environment; and
- [Nottinghamshire Wildlife Trust](#)<sup>30</sup> – working across the county to protect and enhance wildlife and habitats in Nottinghamshire.

We also recognise the vital role individuals, communities and businesses have in managing flood risk and the requirement for more information to be available to support these initiatives. This Strategy aims to promote and encourage personal responsibility by raising awareness of flood risk and how this can be reduced and by supporting community-based actions.

#### 2.4.1 *Property Owners and Residents*

It is the responsibility of householders and businesses to look after their property, including protecting it from flooding. It is important that householders, whose homes are at risk of flooding, take steps to ensure that their home is protected. Practical guidance can be found in the publication '[Prepare your property for flooding](#)' available on the Environment Agency website<sup>31</sup>.

- **Home and Business owners** are responsible for protecting their property (through property level resilience and resistance measures), and maintaining a proper flow of water in any watercourse running through their land.
- **Individuals** can reduce flood risk by taking action such as disposing of leaf litter rather than letting it block drains, co-operating with neighbours and other RMAs, and getting involved in local flood risk management activities.

#### 2.4.2 *Riparian Owners*

If you own land which is adjacent to a watercourse or land which has a watercourse running through it, you are a riparian owner and you have certain legal responsibilities to maintain the watercourse unobstructed. Where a watercourse marks the boundary between adjoining properties, it is normally presumed the riparian owner owns the land up to the centre line of the watercourse.

**Riparian Owner:** Anyone who owns land or property alongside a river or other watercourse.

RMAs have powers and responsibilities to manage flood risk and work with others to improve river environments. This may often affect riparian owners, who must also adhere to certain responsibilities including:

- To maintain the watercourse (open channel or culverted) and to clear any obstructions (natural or otherwise) so the normal flow of water is not impeded,
- To maintain the banks and bed of the watercourse and any flood defences that exist on it,

<sup>27</sup> Canal & River Trust <https://canalrivertrust.org.uk/>

<sup>28</sup> Natural England <https://www.gov.uk/government/organisations/natural-england>

<sup>29</sup> English Heritage <http://www.english-heritage.org.uk/>

<sup>30</sup> Nottinghamshire Wildlife Trust <http://www.nottinghamshirewildlife.org/>

<sup>31</sup> Environment Agency website - 'Prepare your property for flooding' <https://www.gov.uk/prepare-for-a-flood>

- To accept the natural flow from your upstream neighbour and transfer it downstream without obstruction, pollution or diversion,
- To maintain any structures on your stretch of watercourse including culverts, weirs and mill gates,
- To apply to Nottinghamshire County Council for formal Land Drainage Consent for any works within an ordinary watercourse, and
- Applying to the Environment Agency for formal Flood Defence Consent to carry out works within 8 metres of a main river.

We have permissive powers to carry out flood defence works for ordinary watercourses at our discretion, in a similar manner to those powers used by the Environment Agency for main rivers. Further information is available in the Environment Agency publication '[Living on the Edge](#)'<sup>32</sup>

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<sup>32</sup> Environment Agency (2012) 'Living on the Edge' <https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities>

## 2.5 Working in Partnership

We have set up a partnership working framework for working with RMAs in Nottinghamshire (Figure 2-1). All groups within this framework have relevant representatives from our RMAs. The joint Nottingham and Nottinghamshire Strategic Flood Risk Management Board is jointly chaired by the Lead Elected Member for flooding in Nottinghamshire and meets every six months. Communities are invited to attend the Strategic Board to discuss local flooding issues.

In addition to this framework we have an internal Local Flood Risk Management Stakeholder Group and we meet regularly with the other County and Unitary Authorities in the East Midlands and further afield to share emerging approaches and best practice. Flood alleviation work we have been developing with local partners including the East Midlands Council Reports on Flooding and the impact of Climate Change is discussed further in [Section 4.2](#).



**Figure 2-1: Partnership working framework in Nottinghamshire**

## 2.6 Local Flood Risk Management Steering Group

We set up our Local Flood Risk Management Steering Group in September 2011. This has representatives from Nottinghamshire County Council, Nottingham City Council, Water Companies represented by Severn Trent Water, the Environment Agency, Internal Drainage Boards represented by the Lindsey Marsh Group of IDBs (Trent Valley and Isle of Axholme and North Nottinghamshire) and all District and Borough Councils.

Our terms of reference include steering the implementation and development of the Local Flood Risk Management Strategy, communications, working together on the new roles and responsibilities, prioritising investment in flood schemes and looking for funding and sharing information and best practice. The Steering Group decide which actions and recommendations to take to the Strategic Board for sign off and delegate detailed discussion on site specific matters to the operational groups. The Group complements the Local Resilience Forum Flood Planning and Warning and Communicating with the Public Groups (for emergency planning) and the Policy Planning and Development Management Manager meetings (for development planning and management)

## 2.7 Nottinghamshire Local Resilience Forum

The planning, response and recovery from flooding emergencies is overseen by the Nottingham and Nottinghamshire Local Resilience Forum (LRF) and responsibilities for this are set out in the Nottinghamshire Flood Response Plan<sup>33</sup>. This forum brings together various different

<sup>33</sup> Nottinghamshire Flood Response Plan  
<http://www.nottinghamshire.gov.uk/caring/emergencies/emergencyplanning/ouremergencyplans/>

responders<sup>34</sup> for the management of different types of emergencies, including flooding. The LLFA function works closely with all relevant functions, including Emergency Planning to ensure our services are cross-complimentary. Emergency Planning has a role in warning and informing the public and co-ordinating the response to flooding.

We share information with and co-ordinate activity between Category 1 and Category 2 Responders and promote business continuity to small - medium sized enterprises. Much of this work is undertaken through the LRF Flood Planning and Warning (sub) Group, which brings together blue light services, the County and City Councils, District and Borough Councils, Water Companies, the Military and the Environment Agency. We have identified the key linkages between emergency planning, response and recovery and local flood risk management and incorporated these into our Strategy Action Plan ([Appendix B](#)).

The aim of the group is to establish a professional network to develop and disseminate best practice in flooding resilience. The group maintains an annual work plan which includes flood plans, policy, incident response review, training and exercising. We will continue to work closely with emergency planners to make the most of opportunities to reduce flood risk together.

## **2.8 Local Engagement Survey**

During February and March 2012, we undertook a survey to inform our Strategy. We did this to understand the perspective of others, their opinion on what our priorities should be and enhance our understanding of local flood risk concerns and issues. We requested input into the survey from County Councillors, affected Risk Management Authorities, wider relevant organisations and the general public. We received over 400 responses and have fed these into this strategy document. A summary of the responses we received is included in [Appendix E](#)

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<sup>34</sup> Nottinghamshire Prepared <http://www.nottinghamcity.gov.uk/prepared/index.aspx?articleid=6520>

### 3. FLOOD RISK IN NOTTINGHAMSHIRE

#### What is Flood Risk?

Flood risk is not just the likelihood of flooding occurring, but also the potential damage a flood could cause. Assessing risk in quantifiable, financial terms can help prioritise where available funding should be directed, as well as support applications for additional external funding.

However, it should also be borne in mind that the consequences of flooding can be far reaching and not always easy to value, particularly the social impacts of displacement from property, loss of possessions and particularly the fear of repeat events.

#### What is Flood Risk?

Flood Risk is the likelihood of a particular flood happening (probability) e.g. 'there is a 1 in 100 chance of flood in any given year in this location', multiplied by the impact or consequence that will result if the flood occurs.



The evaluation of risk takes into account the severity of impacts from a flood event, which can be highly variable in terms of social, economic and environmental consequences. Consequences are often measured by number of properties flooded and level of economic damage. It will also be influenced by vulnerability (i.e. a basement flat or a key emergency service station is more vulnerable than a commercial warehouse)

There will only be a risk if there is a means (pathway) of connecting the source of the flood with the people, property and land that may be affected (receptors). Source, pathway and receptor must all be present for there to be a risk.



In this report we have expressed flood probability as an Annual Exceedance Probability (AEP). Hence a flood with a 1% AEP has a 1 in 100 chance of happening in any one year or a return period of 100 years. Return periods can be misleading however as they suggest that such a flood might not happen again for another 100 years.

#### 3.1 Geographic Context

Nottinghamshire covers an area of over 2,000km<sup>2</sup> and has a population of around 796,200<sup>35</sup>. The main urban centres are Hucknall, Beeston, Stapleford, Arnold, Carlton, West Bridgford, Mansfield, Sutton-in-Ashfield, Newark, Worksop and Retford. Nottingham City Council covers the urban area of Nottingham within their administrative boundary. Often flooding within the

<sup>35</sup> Mid 2013 estimate. Office for National Statistics.

County arises as a result of cumulative impacts wherein a combination of different flooding sources combines to create a flooding incident.

The County is largely drained by the River Trent which flows northwards into the Humber Estuary, although small parts of the county drain east into the River Witham and to the north west into the River Don. Flooding from the River Trent has caused major damage and disruption in the past, such as in 1947 and more recently in 2000 and the winter of 2012.

Recent floods have highlighted the vulnerability of Nottinghamshire to more local sources of flooding, such as surface water and the sewer and highway drainage networks becoming overwhelmed and being affected by backing up from Main Rivers and Ordinary Watercourses. The condition and location of drainage assets also has an important local influence. Many of the localised flooding incidents are related to blockage, failure or mis-connection of the local drainage network, including culverted watercourses, surface water sewers and highway gullies.

The elevation of the County varies, from the steep topographic ridge that runs through Gedling Borough, to the undulating hills of the south and west and to the low lying areas that are in some cases artificially drained to the north and east. In low lying areas, Internal Drainage Boards (IDBs) have been set up to manage the specific drainage characteristics of these areas. These areas often rely on pumped drainage and as a consequence flood waters can pond and take longer to subside.

Flooding in rural areas can be influenced by some farming practices which have the potential to cause rapid runoff during rainfall and exceed the limited capacity of many of the smaller watercourses and the highways drainage and sewer network (where one exists).

The pattern of flooding is further complicated by the underlying geology, which can influence the movement of groundwater and ability of rainfall to soak into the ground. Nottinghamshire lies within a broad belt of sedimentary rocks, which dip gently eastwards, from the Pennine axis of Derbyshire towards Lincolnshire and the North Sea basin. There are coal measures across the county which dip from west to east, which has influenced the distribution of past mining activity. Now that much of the mining activity has ceased, minewaters and groundwater will readjust, with the potential for groundwater flooding and seepage. In places the solid geology is overlain by drift geology of former glacial and river deposits, such as sands and gravels, many of which have been excavated over time, such as at Attenborough Nature Reserve. Gravel works have the potential to significantly contribute to the storage of flood waters along the Trent valley.

### **3.2 Local sources of Flood Risk**

The Act defines local flood risk as flood risk from:

- Surface runoff;
- Groundwater; and
- Ordinary watercourses.

The majority of reported incidents of flooding in Nottinghamshire are as a result of intense rainfall events culminating in surface water runoff which overwhelms local drainage capacity, ordinary watercourses and associated structures including that of culverts.

We have already undertaken a comprehensive review of local sources of flooding and their interactions as part of our Preliminary Flood Risk Assessment (PFRA)<sup>36</sup>. This assessment along with other sources of data provided by RMAs, local knowledge, investigations and consultation

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<sup>36</sup> JBA Consulting (2011) Nottinghamshire Preliminary Flood Risk Assessment. Final June 2011

responses from residents, has fed into the development and delivery of this Strategy. Data has been collated and analysed regarding past, current and potential future flooding incidents in light of future challenges such as climate change.

Flooding from main rivers, sewer flooding and flooding from artificial sources are not defined as 'local' sources of flooding and therefore do not fall under our responsibility and requirements of this Strategy. However, these sources of flooding are considered particularly significant within Nottinghamshire and can occur in combination with local sources of flooding. This is a critical issue in the understanding of local flood issues in that high river levels in a main river may prohibit the normal discharge from an ordinary watercourse, which in turn impedes the function of a sewer. As a consequence we have a role as RMA's to cooperate to manage such situations and that after a flood event the LLFA have a critical investigation role that requires the LLFA to ensure the relevant RMA's understand and undertake their Flood Risk responsibilities. The LLFA investigations following a flood event will identify all of the contributing factors to a flood so that any investigation that suggests potential flood risk solutions can be led by the relevant RMA. The result of such cooperation is that responses to flood events are considered and have maximum effect rather than knee jerk. A summary of the risk for all sources is therefore provided below.

We are approaching the management of local flooding in the County with the understanding that many incidents result largely from a combination of surface water and ordinary watercourse flooding as the main sources, particularly in large scale flood events. As a result, it cannot always be determined where properties have been affected by one single or multiple sources of flooding. The following tables separate each individual source of flood risk so that the differences can be clearly understood. Maps illustrating the flood risk from all sources in Nottinghamshire are provided in [Appendix A](#)

### 3.2.1 **Surface Water**

**Table 3.1: Local sources of risk – Surface water**

<b>Description of source</b>	Surface water flooding usually occurs when high intensity rainfall generates runoff which flows over the surface of the ground and ponds in low lying areas, before the runoff enters a watercourse or sewer. It can be exacerbated when the ground is saturated and/or when watercourses or road drainage systems have insufficient capacity to cope with the additional surface water runoff.
<b>Historic Flooding</b>	<p>The River Witham<sup>37</sup> and River Trent<sup>38</sup> Catchment Flood Management Plans (CFMPs) report that approximately 26% and 20% respectively of flood events within the catchment are a result of surface water or sewer flooding. Surface water flooding in Nottinghamshire occurs as a result of rapid runoff due to intense rainfall, complicated overland flow networks, complicated drainage networks with multiple ownership and varying condition, culverted/open watercourses and specific agricultural practices.</p> <p>In Nottinghamshire there are flat, sometimes artificially drained areas to the north and east, particularly those areas that form the natural floodplain of the River Trent and tributaries. Pumping in these areas reduces the chance of surface water and groundwater flooding but if pumping stations should fail, this could cause flooding in a wider area, since there would be no operational drainage system. Nottinghamshire also has undulating agricultural areas. Farming practices can have a significant impact upon the water quality of runoff following rainfall.</p>

<sup>37</sup> River Witham Catchment Flood Management Plan (209) <https://www.gov.uk/government/publications/river-witham-catchment-flood-management-plan>

<sup>38</sup> River Trent Catchment Flood Management Plan (2009). <https://www.gov.uk/government/publications/river-trent-catchment-flood-management-plan>

**Table 3.1: Local sources of risk – Surface water**

To the south and west of Nottinghamshire there are relatively steep areas, including heavily urbanised areas, such as Nottingham City, Sutton-in-Ashfield and Mansfield. In these areas there is rapid surface water runoff and complicated interactions with the private sewer and highway drainage networks and culverted and open watercourses which can cause further surface water flooding.

The Nottinghamshire PFRA analysed the Highways Asset Management System (HAMS) related to received calls at NCC customer service centre and highlighted particular concentrations of flood events related to blocked drains or manholes in Burton Joyce, Newark on Trent, Retford, Southwell, Worksop and the Arnold, Carlton and West Bridgford areas of Nottingham. More recent records from HAMS for the period 2014 -2015 show the greatest numbers of reported flood events in Mansfield, Hucknall and Retford, but also with high concentrations in Southwell, Worksop, Arnold, Carlton and West Bridgford.

During July 2013, hundreds of properties across the County were affected from a combination of flood sources, most extensively in Southwell. Many of the smaller flood incidents recorded at this time were attributed to surface water due to intense rainfall; for example, on the 23<sup>rd</sup> July 2013 36mm of rain was recorded in one hour in Nottingham<sup>39</sup> and as such would potentially overwhelm the engineered flood defence systems which were designed for a given return event, these flooding events were as a consequence of exceptional rainfall events. The floods of summer 2007 also had a huge impact on Nottinghamshire with properties affected mapped in the PFRA. Newark and Sherwood District Council described the flooding as ‘the most significant natural disaster the area has experienced since 1947<sup>40</sup>’. The flooding affected homes, businesses, schools and infrastructure across the County.

<sup>39</sup> Met Office July 2013 UK overview <http://www.metoffice.gov.uk/climate/uk/summaries/2013/july>

<sup>40</sup> Newark and Sherwood District Council (2009) Fighting the floods, looking back and moving forwards

Table 3.1: Local sources of risk – Surface water



Photo 3.1.1: Surcharging drains in East Stoke (Source: Nottinghamshire County Council)

**Future Flood Risk**

The Environment Agency has undertaken national modelling of the risk of flooding from surface water and published the mapping outcomes on their website in December 2013. The Flood Risk from Surface Water map<sup>41</sup>, identifies the risk of surface water flooding at a strategic scale and bands flood risk as follows:

- High Risk – chance of flooding of greater than 1 in 30 (3.3%) in any given year
- Medium Risk – chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) in any given year
- Low Risk – chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) in any given year, and,
- Very Low Risk – chance of flooding of less than 1 in 1000 (0.1%) in any given year.

Appendix A Figure 1 shows the Flood Risk from Surface Water mapping for Nottinghamshire.

An assessment of the risk to properties, critical infrastructure, transport, heritage and the environment has been undertaken for the Strategy using the Environment Agency's National Receptor Database to provide an indication of the level of risk facing Nottinghamshire. The

<sup>41</sup> Flood Risk from Surface Water maps, also known as the updated Flood Map for Surface Water (uFMfSW) dataset.

**Table 3.1: Local sources of risk – Surface water**

residential properties at risk for each district and borough are presented in the table below, whilst non-residential receptors are displayed in Appendix F and Figure 2 in Appendix A.

<b>No. Residential properties at risk of flooding in Nottinghamshire (based on Environment Agency 'Flood risk for surface water' mapping)</b>			
<b>District or borough</b>	<b>Surface water flood risk</b>		
	<b>Low</b>	<b>Medium</b>	<b>High</b>
<b>Ashfield</b>	8,733	2,509	881
<b>Bassetlaw</b>	8,321	2,689	1,209
<b>Broxtowe</b>	9,397	2,009	745
<b>Gedling</b>	10,144	3,023	1,231
<b>Mansfield</b>	7,733	2,133	707
<b>Newark and Sherwood</b>	9,488	2,400	935
<b>Rushcliffe</b>	8,236	1,921	665
<b>Nottinghamshire</b>	<b>62,052</b>	<b>16,684</b>	<b>6,373</b>

All of the Districts and Boroughs within Nottinghamshire have a significant number of homes at high risk from surface water flooding with the greatest numbers in Gedling, Newark and Sherwood and Broxtowe. These figures have been used to inform local flood risk hotspots alongside historic information, discussed further in Section 3.5.

There are also numerous former coal mining assets in Nottinghamshire which can influence flooding through infrastructure connected to such works, such as culverts and lagoons. Mine waste disposal operations have given rise to another source of flooding from spoil heaps which are often fairly impermeable. Rapid runoff may overload drainage ditches and cause localised flooding to surrounding areas, although many of these in the County have now been restored for parkland, agriculture or golf courses. Various sustainable drainage features and vegetation have been encouraged to allow infiltration and attenuation of runoff. Additionally, future development applications must acknowledge potential risks from spoil tips and provide adequate mitigation<sup>42</sup>.

Future development such as that being driven forward by the Greater Nottingham and Newark and Sherwood Growth point initiatives has the potential to increase flood risk, if not carefully managed. New initiatives are being investigated to use mining infrastructure as drainage features for new development. These are discussed further in [Section 5.2](#)

<sup>42</sup> Nottinghamshire County Council (2012) Report to Communities and the Environment Standing Committee: Water and gas emissions from disused mines draft final report. 23 April 2012

**Table 3.1: Local sources of risk – Surface water**

<b>Supporting Documents</b>	<a href="#">River Witham Catchment Flood Management Plan (2009)</a> <a href="#">River Trent Catchment Flood Management Plan (2009).</a> <a href="#">Nottinghamshire Preliminary Flood Risk Assessment</a>
<b>Figures</b>	Figure A1: Risk of flooding from surface water Figure A2: Critical infrastructure at risk from surface water flooding Figure A3: Heritage and biodiversity assets at risk from surface water flooding

### 3.2.2 Groundwater

**Table 3.2: Local sources of Flood risk - Groundwater**

<b>Description of Source</b>	Groundwater flooding generally occurs in low-lying areas, as the result of groundwater rising above the surface of the land. The underlying geology has a significant influence on the risk of groundwater flooding. In Nottinghamshire this is particularly related to the presence of alluvial gravels, on the floodplain of the River Trent, and groundwater rebound following cessation of industrial extraction (including mine dewatering).
<b>Historic Flooding</b>	<p>Despite the presence of alluvial gravels, there are few recorded instances of groundwater flooding in Nottinghamshire. However, it may be that the incidence of groundwater flooding is disguised by other flooding sources such as main river flooding from the River Trent. The Environment Agency historic flood records attribute a flood incident in West Bridgford to groundwater in November 2000 when exceptionally wet conditions were experienced across the UK.</p> <p>The Nottinghamshire PFRA indicates that there are high levels of groundwater in parts of the County such as Ashfield and groundwater flooding was reported in 2007 at Bleasby, Staythorpe and Eginton in Newark and Sherwood. However, this flooding is likely to be interrelated to wider flooding experienced throughout Nottinghamshire in 2007. Groundwater flooding was also identified in Hucknall combined with watercourse flooding in the Greater Nottingham SFRA<sup>43</sup>.</p> <p>Groundwater rebound has been observed in areas previously depleted by former industrial extraction. This was predominantly for coal mine dewatering which has in the past been extensive across the county. The Environment Agency and Coal Authority are working together to monitor the impacts of the changing water table.</p> <p>Whilst the River Trent CFMP does not consider groundwater flooding as a significant problem at the county level, the potential for increasing risk throughout Nottinghamshire would benefit from further investigation and/or monitoring, especially as a result of potential future challenges posed by climate change for instance. The River Trent CFMP does acknowledge that <i>“flooding through alluvial gravels and sands does occur within the main Trent valley where aggregate extraction is undertaken, causing occasional flooding in unexpected areas, but more generally just resulting in areas which routinely tend to become more water logged when river levels are high”</i>. The River Witham CFMP did not identify any groundwater flooding incidents within Nottinghamshire</p>

<sup>43</sup> Black & Veatch (2008) The Greater Nottingham Strategic Flood Risk Assessment. June 2008

**Table 3.2: Local sources of Flood risk - Groundwater**

<b>Future Flood Risk</b>	<p>Groundwater flooding can be particularly difficult to predict due to the ‘hidden’ nature of the source of flooding and relatively longer period of build-up and emergence, often several days or weeks after heavy rainfall has fallen and river levels have receded.</p> <p>Existing efforts to predict groundwater flooding events are based on monitoring water levels in boreholes in areas known to be at risk. These systems can give notice (typically days or weeks ahead) of impending events. Groundwater models can be used to provide early warning systems that can alert authorities to possible groundwater flooding in advance allowing authorities to plan their response and possibly even to implement mitigating measures. However, the monitoring of boreholes and development of groundwater flood models can be costly, and are only normally undertaken in those areas of greatest risk.</p> <p>Data has been produced by the Environment Agency and mapped for Nottinghamshire in Figure A5 indicating areas susceptible to groundwater flooding at a 1km grid square scale based on the hydrogeological conditions. This data is meant as a guide for LLFAs to look at where further studies may be useful rather than specifically where groundwater will flow and pond. It does not take into account the chance of flooding from groundwater rebound.</p> <p>The future risks to Nottinghamshire from groundwater are complex and require improved understanding. Work is already being carried out in partnership with the Environment Agency to investigate the risks from groundwater recharge in disused mining sites. A proactive minewater monitoring programme is in place to manage the predicted rise in groundwater levels. It is estimated that pumping and treatment of minewaters may be required in the county at some point in the next 5-10 years or longer (based on 2012 report)<sup>44</sup>. Current monitoring does not indicate that minewater rebound will cause surface flooding, provided a controlled programme of pumping is carried out.</p>
<b>Supporting Documents</b>	<p><a href="#">Nottinghamshire Preliminary Flood Risk Assessment</a></p> <p><a href="#">River Witham Catchment Flood Management Plan (2009)</a></p> <p><a href="#">River Trent Catchment Flood Management Plan (2009)</a></p>
<b>Figures</b>	<p>Figure A5: Risk of flooding from groundwater</p> <p>Figure A6: Disused mine locations and risk of flooding from groundwater</p>

### 3.2.3 Ordinary Watercourses

**Table 3.3: Local Sources of Risk - Ordinary watercourses**

<b>Description of Source</b>	<p>Ordinary watercourses include every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows, above ground or culverted, which is not designated as a main river. An example is Rainworth Water which runs through Ollerton and Rainworth.</p> <p>All of the ordinary watercourses in the County are shown along with main rivers in Figure A8 in Appendix A. Whilst there is often a focus on flooding from main rivers, flooding from ordinary watercourses has resulted in or made a significant contribution to numerous flooding incidents in the wider Nottinghamshire area.</p>
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<sup>44</sup> Nottinghamshire County Council (2012) Report to Communities and the Environment Standing Committee: Water and gas emissions from disused mines draft final report. 23 April 2012

**Table 3.3: Local Sources of Risk - Ordinary watercourses**

Riparian land owners are responsible for managing and maintaining ordinary watercourses within their land ownership. In Nottinghamshire, this duty often falls to the Internal Drainage Boards (listed in Section 2.2) who are also responsible for managing the risk of flooding arising from ordinary watercourses located within their administrative area. As the LLFA, we have responsibility to manage the risk of flooding arising from ordinary watercourses outside of IDB areas through engagement with riparian owners and enforcing maintenance responsibilities in accordance with the Land Drainage Act 1991. The County Council will only maintain a watercourse where we are the landowner and therefore have those responsibilities of the riparian owner.

Under the Act, anyone wishing to do works, which may alter or impede the flow of an ordinary watercourse must obtain prior consent from the County Council as LLFA. More information can be found on our website:

<http://www.nottinghamshire.gov.uk/enjoying/countryside/flooding/lead-local-flood-authority/ordinarywatercourseslanddrainageconsent/>

**Supporting Documents**

[Nottinghamshire Preliminary Flood Risk Assessment](#)

[Nottinghamshire and Nottingham Level 1 Strategic Flood Risk Assessment Minerals and Waste](#)

**Historic Flooding**

Extensive records of flooding in Nottinghamshire can be attributed to ordinary watercourses as a main source of flooding. Records dating back to 1983 are summarised in Table 3-4. Records of flooding are often attributed to a combination of surface water drainage and the physical capacity of ordinary watercourses.

There are a large number of ordinary watercourses in the county. Some have featured more prominently during more recent flooding such as the Potwell Dyke in Southwell which overflowed following torrential rain in July 2013, contributing to flooding of hundreds of properties. Similarly, the Thurgarton Beck and the Oxton Dumble are reported as the main sources of flooding combined with surface water in Thurgarton and Oxton during the same event. All three ordinary watercourses are in the River Trent catchment.

The exceptional flooding of summer 2007 involved significant fluvial flooding from main rivers as well as surface water and it is likely that overtopping of ordinary watercourses occurred as a result of these combined influences. It has been noted in the River Trent CFMP that flooding can be exacerbated by high water levels in watercourses impeding drainage as well as blocked culverts and trash screens.



Photo 3.3.1: Oxton Road, Southwell  
 July 2013  
 (Photos source: Nottinghamshire County Council)



Photo 3.3.2: Cauntun Ford Bridge 2012

**Table 3.3: Local Sources of Risk - Ordinary watercourses**

<b>Future Flood Risk</b>	<p>Future flood risk is based on the potential risk that might arise based on knowledge of known flooding hotspots and potential mechanisms for flooding. Often ordinary watercourses in combination with other sources of flooding, such as surface water or main river flooding can combine to exacerbate flood risk. Therefore it important to consider this source of flooding not just in isolation but in combination with these additional flood mechanisms.</p> <p>Newark and Sherwood District Council have developed Parish Flood maps indicating areas likely to flood relating both to main rivers and IDB maintained watercourses within their district which can be accessed at <a href="http://www.newark-sherwooddc.gov.uk/yourcouncil/flooding/parishfloodmaps/">http://www.newark-sherwooddc.gov.uk/yourcouncil/flooding/parishfloodmaps/</a></p> <p>Nottinghamshire has extensive lengths of ordinary watercourse, many known to contribute to regular flooding issues. Monitoring and maintenance through working with our partner authorities is essential. Trash screens and culverts have the potential to become blocked by items such as plant debris and rubbish. Blockages can restrict the natural flow of water, increasing the chance of water flowing out of bank and causing local flooding due to the reduced conveyance potential of the constricted watercourse.</p>
<b>Figures</b>	Figure A8: Location of main rivers and ordinary watercourses

### 3.2.4 *Historic Flooding from Local Sources*

Historic flood records have been collated from a large number of information sources during the development of the Strategy and the PFRA previously. A summary of evidence about locations which have experienced flooding is included in Table 3-4. These incidents have also been mapped in Figure 7a and 7b, which can be viewed in [Appendix A](#) This information should not be considered a complete record as the information sources are variable. As LLFA we will continue to build on our evidence base to help us implement more effective Local Flood Risk Management through an improved understanding of the combined effects of different flood sources.

Table 3-4 summary of recent flooding events and predominant sources of flooding

Date*	Location	Source of Flooding	Approximate Number of Properties Affected
<b>Unknown</b>	Elston	Ordinary Watercourse	6
<b>1983</b>	Clarbrough	Ordinary Watercourse	2
<b>2000</b>	Attenborough, Averham, Beckingham, Besthorpe, Bleasby, Burton Joyce, Carlton-On-Trent, Caythorpe, Collingham, East Stoke, Edwinstowe, Farndon, Fiskerton, Girton, Grassthorpe, Gunthorpe, High Marnham, Holme, Hoveringham, Kelham, Laneham, Littleborough, Lowdham, Morton, Newark On Trent,	Main River, Ordinary Watercourse, Surface runoff	318

Date*	Location	Source of Flooding	Approximate Number of Properties Affected
	North Clifton, South Muskham, Staythorpe, Stoke Bardolph, Walkeringham, Winthorpe		
<b>2007</b>	Annesley Woodhouse, Bagthorpe, Balderton, Beckingham, Bilsthorpe, Bingham, Bircotes, Bleasby, Blidworth, Brinsley, Bulcote, Burton Joyce, Calverton, Carlton-On-Trent, Carlton In Lindrick, Caunton, Clarbrough, Clayworth, Coddington, Colston Bassett, Cromwell, Cuckney, East Drayton, East Markham, East Stoke, Edingley, Edwinstowe, Egmanton, Epperstone, Fackley, Farndon, Fiskerton, Gamston, Gringley on the Hill, Halam, Harworth, Headon, Hockerton, Hucknall, Huthwaite, Jacksdale, Kelham, Kirkby in Ashfield, Kirklington, Lambley, Langold, Laxton, Little Carlton, Lound, Lowdham, Mansfield, Market Worksop, Milton, Moorhouse, Newark On Trent, Normanton on Trent, North Leverton, North Wheatley, Norwell, Oldcotes, Ollerton, Ompton, Oxton, Pleasley, Radcliffe on Trent, Ragnall, Rampton, Ranskill, Retford, Rhodesia, Rockley, Rolleston, Ruddington, Selston, Shireoaks, Skegby, South Clifton, South Leverton, Southwell, Stanley, Staythorpe, Sturton le Steeple, Sutton in Ashfield, Sutton On Trent, Syerston, Teversal, Thurgarton, Treswell, Trowell, Tuxford, Underwood, Walkeringham, Weston, Whaley Thorns, Woodborough, Worksop	Main River, Ordinary Watercourse, Surface runoff	1,411
<b>2008</b>	Carlton, Clarbrough, Clayworth, Eaton, Gunthorpe, Harworth, Hayton, Lambley, Mansfield, Oldcotes, Retford, Sutton, West Stockwith, Wiseton, Worksop	Main River, Ordinary Watercourse, Surface runoff	2
<b>2012</b>	Arnold, Aslockton, Beckingham, Bingham, Bramcote, Bunny, Burton Joyce, Calverton, Car Colston, Carlton, Carlton on Trent, Chilwell, Colwick, Costock, Cropwell Butler, East Leake, Edingley, Edwalton, Gedling, Girton, Gotham, Gunthorpe, Keyworth, Kimberley, Lambley, Lowdham, Mansfield, Netherfield, Newark, North Wheatley, Orston, Pleasley, Rempstone, Retford, Rolleston, Stanford on Soar, Sutton Bonington, Sutton in Ashfield, Syerston, Tollerton, Trowell, West Bridgford, Woodborough, Worksop	Main River, Ordinary Watercourse, Surface runoff, sewers	144 (including repeat flooding)
<b>2013</b>	Arnold/ Mapperley/ Gedling, Awsworth, Balderton, Bingham, Blidworth, Burton Joyce/ Bulcote, Calverton, Carlton, Caythorpe, Coddington, Cropwell Butler, East Bridgford, Eastwood, Elton, Farnsfield, Fiskerton, Hucknall, Kimberley, Lambley, Netherfield, Newark, Newthorpe, Newton, Normanton on Trent, Nuthall, Ollerton, Orston, Owthorpe, Oxton, Papplewick, Radcliffe on Trent, Ravenshead, Red	Mainly surface water and Ordinary Watercourse	520

Date*	Location	Source of Flooding	Approximate Number of Properties Affected
	Hill, Shelford, Southwell, Thurgarton, Trowell, Woodborough, Woodthorpe		
	Lowdham	Main River and Surface Water Flooding	70
<b>2014 and early 2015**</b>	Hucknall, Mansfield, Retford, Calverton, Carlton, Southwell, Arnold, Sutton in Ashfield, Ravenshead, Worksop, Kirkby-in-Ashfield, Kimberley, Mansfield Woodhouse, Papplewick, Awsworth, Cossall, Gedling, Balderton, Bestwood, Bingham, Forest Town, Eastwood, Newark on Trent, Burton Joyce, Farnsfield, Ranskill, Ruddington, Bunny Chilwell Gamston Cotgrave Ollerton, Rainworth, Strelley, Trowell, Blidworth, Claborough, Lowdham, Mapperley, Netherfield, Newthorpe, North Leverton, Nuthall, Stapleford, Sutton on Trent, Underwood, Walesby, Watnall, Woodthorpe	Mainly Surface Water and ordinary watercourse	TBC
	West Bridgford, Misterton	Surface water and groundwater	

\* Events only included where there is reasonable information on flood consequences. The number of properties is intended to serve as an indication only. Sewer information is based on those incidents reported to the County Council.

\*\* Based on reports to NCC Highways Management until February 2015

### 3.3 Other sources of flood risk

The purpose of the Strategy is to consider all flooding from 'local' sources and how the flooding can be managed. However, the causes of flooding can be complex and interrelated. Managing risks from other sources of flooding needs to be considered in local flood risk management even though primary management responsibility may sit with other RMAs. As mentioned previously the LLFA will lead the flood investigations and through the cooperative efforts of all RMAs ensure understanding of the causes and impacts of the flooding event, so that through the LLFA the RMAs can implement effective and efficient flood control measures which have been developed through robust investigation and consultation processes.

#### 3.3.1 Main Rivers

The Environment Agency is responsible for managing risk from main rivers. However, due to the complex, interrelationships between flood sources, main river flooding will be considered in conjunction with local sources within this Strategy. Flooding from 'larger rivers' was perceived as the main source of flooding by 60% of Nottinghamshire residents who completed the consultation survey (see [Appendix D](#) for further information). NCC is working closely with the Environment Agency to jointly address combined risks from both main rivers and ordinary watercourses.

**Table 3.5: Other sources: Flooding from main rivers**

<b>Description of Source</b>	Flooding from main rivers, referred to as fluvial flooding, usually occurs when a river, stream or brook bursts its banks and is usually caused by prolonged periods of heavy rainfall. The River Trent has a very large catchment and will typically take longer to respond to rainfall (a
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**Table 3.5: Other sources: Flooding from main rivers**

matter of days) than smaller watercourse catchments, like the River Maun at Mansfield or Cocker Beck at Lowdham that can respond within hours of a rainfall event.

The River Trent is a tidal watercourse from Cromwell Weir, downstream of Newark to its confluence with the River Humber, north of Scunthorpe. Tidal flooding may directly affect communities living in the tidal floodplain, but often this will be complicated because high water levels in the tidal river can cause flows coming downstream to back up or mean that surface water and smaller watercourse outfalls become tide-locked and are unable to discharge freely into the tidal section of the river. In terms of flood risk, however, the river is fluviially dominated from Cromwell Weir to Gainsborough. This means that it is highly unlikely that a tidal event, in isolation of any other flood sources, could cause flood risk to properties in this reach of the River Trent. Whilst there are numerous sources of feeds into the tidal section of the Trent, these are usually designed to deal with tide-locked situations, as the River Trent will normally go through a tidal cycle twice in a day.

**Historic  
Flooding**

Main rivers flowing, at least in part, through Nottinghamshire include;

- River Trent
- River Soar
- River Erewash
- River Leen
- Rivers Maun, Meden & Idle
- River Ryton
- River Smite
- Additionally Fairham Brook, Cocker Beck, River Greet, Crock Dumble, Boundary Brook, River Devon, Baker Lane Brook, Greythorn Dyke.

The River Trent has a long history of significant flooding. In 2014 a tidal surge led to overtopping of the Trent in North Lincolnshire but did not reach as far as Nottinghamshire. Arguably numerous recent recorded flooding from ordinary watercourses can be linked to high flows in the Trent where many of these smaller rivers culminate. In 2012 flooding from the Crock Dumble is recorded in Burton Joyce and from the Cocker Beck at Lowdham, both are tributaries of the River Trent. Both of these watercourses are Main River. Crock Dumble has a pumped outfall, which has been improved by the Nottingham Left Bank Scheme. Whilst high levels in the Trent may determine the pumping regime, any properties still impacted are mainly from a combination of the Brook, highway drainage and sewer interactions. Cocker Beck is still able to freely discharge across fields and the floodplain before the interaction with the Trent which is closer akin to the situation at Gunthorpe. Whilst the events at Lowdham were influenced by surface water runoff and sewer interaction.

The Nottinghamshire Minerals and Waste SFRA refers to reports dating back as far as 530 AD<sup>45</sup>. Overtopping and breach of flood embankments has long been a common cause of flooding. The Trent CFMP<sup>46</sup> identifies the most significant river flooding on record as February 1795 but notes other large events; in October 1875, March 1932, March 1947, December 1965, the winter of 2000 and the summer of 2007. The most severe tidal flooding took place in October/November 1954 as a result of a series of tidal surges.

Specific records held by the County Council identify flood incidents from the River Soar in 2004 and 2012 flooding in Retford in 2008 from the River Idle and the River Ryton overtopping in Worksop in 2007 when the County experienced widespread flooding from multiple sources.

<sup>45</sup> URS Scott Wilson (2011) Nottinghamshire Minerals and Waste Level 1 Strategic Flood Risk Assessment

<sup>46</sup> Environment Agency (2010) River Trent Catchment Flood Management Plan. December 2010

**Table 3.5: Other sources: Flooding from main rivers**

	<p>The Baker Lane Brook (main river) has played a prominent role in severe flooding in Hucknall in 2007 and 2013.</p>
<b>Future Flood Risk</b>	<p>In December 2013, the Environment Agency published a new set of mapping called the <a href="#">Risk of Flooding from Rivers and the Sea</a>, which shows the risk of flooding from rivers and the sea banded into High, Medium and Low Risk, in a consistent format with the Risk of Flooding from Surface Water (see Section 3.1). Whilst this dataset is readily available to the public to understand their own flood risk, the Strategy uses the <a href="#">Flood Map for Planning (Rivers and Sea)</a>, also published by the Environment Agency, as the basis to determine future flood risk from rivers. The Flood Map for Planning (Rivers and Sea) defines Flood Zones and is used by the District and Borough Councils, in Nottinghamshire as well as the county to make planning decisions in line with national legislation.</p> <p>The <a href="#">National Planning Policy Framework (NPPF)</a><sup>47</sup> defines Flood Zones associated with tidal and river flooding based upon the probability of flooding. The extent of land adjacent to main rivers within Flood Zone 2 (between a 1 in 100 and 1 in 1000 chance of flooding in any given year (1% AEP - 0.1% AEP) and Flood Zone 3 (greater than 1 in 100 chance of flooding in any given year (&gt;1% AEP)) varies throughout the County, as shown in Figure A9 in Appendix A.</p> <p>Districts with the greatest areas of Flood Zones 2 and 3 are largely in the catchment of the River Trent including the northern and eastern areas of Bassetlaw, eastern areas of Newark and Sherwood and south east of Gedling as it joins the City of Nottingham. The Environment Agency flood zone data shows areas that could be affected by flooding from rivers if there were no flood defences in place. It should only be used to indicate areas that could be affected. You can find more information about the Environment Agency's Flood Zones using the <a href="#">Environment Agency website</a>.</p> <p>The Environment Agency offers a free <a href="#">flood warning service</a><sup>48</sup>, which gives advance warning of flooding via telephone, mobile SMS text, e-mail or fax if you live in an area of risk.</p>
<b>Supporting Documents</b>	<p><a href="#">Nottinghamshire and Nottingham Level 1 Strategic Flood Risk Assessment Minerals and Waste</a></p> <p><a href="#">River Trent Catchment Flood Management Plan (2010)</a>.</p> <p>District and Borough Councils SFRA's (see Section 2.2, Box 2.3)</p>
<b>Figures</b>	<p>Figure A8: Main rivers and ordinary watercourses</p> <p>Figure A9: Risk of flooding from main rivers</p>

### 3.3.1.1 *The Catchment Based Approach*

Nottinghamshire County lies within the [Humber Catchment](#) which covers an area of 26,000km<sup>2</sup><sup>49</sup>. Each WFD Management Catchment Area and Catchment Flood Management Plan area contains a number of individual river catchments. Individual catchment boundaries are usually formed by ridges of surrounding higher ground which separate the lower lying areas

<sup>47</sup> CLG (2012) National Planning Policy Framework. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6077/2116950.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf)

<sup>48</sup> <https://www.gov.uk/sign-up-for-flood-warnings>

<sup>49</sup> The Catchment Based Approach (CaBA) Humber RBD <http://www.catchmentbasedapproach.org/humber>

(a line known as the watershed). At its greatest extent a primary catchment can describe the whole area that contributes surface water flow to all the tributaries and outfalls that feed into a river and its ultimate outfall to the sea

The main catchments in Nottinghamshire are described below;

### Idle and Torne Catchment

The Idle and Torne catchment extends from central Nottinghamshire to southern Yorkshire. The catchment which covers 1300km<sup>2</sup> contains a number of sections of ordinary watercourses. The River Idle is formed by the Rivers Meden, Maun and Poulter. Both the Idle and Torne flow through heavily urbanised areas and require careful management as a result of nearby historic land use such as collieries. Generally the watersides within the catchment are of good overall status or potential with flood protection measures apparent throughout the catchment.

### Lower Trent and Erewash Catchment

The Lower Trent and Erewash catchment covers 2045km<sup>2</sup> and covers part of Nottinghamshire along with areas of Derbyshire, Leicestershire, Lincolnshire and South Yorkshire. The River Trent stretches through the city of Nottingham and as such becomes increasingly modified with formal embankments and riverside developments. The River Erewash is a major tributary of the River Trent whilst the River Leen rises in Newstead before entering the city of Nottingham there the river also develops a more urbanised character. The remaining tributaries in the Lower Trent and Erewash catchment are typically more rural in character and dominated by arable agricultural land use. Only 3% of rivers achieve a good and better biological status largely as a result of agricultural and point source discharges from water industry sewage works.

It is important to appreciate the extent and boundaries of the river catchments and their interconnectivity of rivers as any precipitation that does not either evaporate or discharge to underlying ground aquifers will ultimately flow into these rivers either directly or via drainage systems. This strategy does not omit the impact upon catchments lower down the network and has noted the Humber Estuary Flood Risk Management Strategy August 2014.

However, a catchment can be subdivided into sub-catchment which in turn may be subdivided into sub-sub catchments and so on, until only the area contributing to the surface water flow in a single watercourse and its outfall is described. These basic units are then used to understand the flooding mechanism as it develops in the local area.

The River Trent CFMP<sup>50</sup> divides the River Trent catchment into ten distinct sub areas which have similar physical characteristics, sources of flooding and levels of risk. This identified the most appropriate approach to managing flood risk for each of the sub areas and allocated one of six generic flood risk management policies.

### Soar Catchment

Whilst the Soar catchment largely covers Leicestershire, a small area of south Nottinghamshire also lies within the catchment boundary. The River Soar is a significant tributary of the River Trent. There are a number of important tributaries including Rothley, Black and Kingston Brooks. Only ten percent of rivers within the Soar catchment achieve good or better ecological status.

Catchment Based Approach (CBA) looks at the interaction of catchment characteristics and how this interrelationship can influence other factors, as well as how different catchments interrelate. Whilst CBA is led from a WFD

<sup>50</sup> Environment Agency (2010) River Trent Catchment Management Plan

perspective it does have key FCRM implications. For example; sedimentation is a key WFD measure of failing water quality, and it also has implications upon river maintenance. Thus adopting a CBA to reduce sedimentation sources within the whole catchment can have benefits to FCRM. Identifying and quantifying the significance of these relationships is crucial and also key when considering future FCRM solutions to communities, so that there are no negative environmental impacts. A key developing area within WWNP's is the inspection and audit of land management practices, where we can start to identify the relationship with flood risk. It is only through adopting a CBA that we can start to look at the source of flood risk rather than setting about treating the outcome.

### 3.3.2 Sewer Flooding

**Table 3.5: Other sources: flooding from sewers**

<b>Source of Flooding</b>	<p>Sewer systems can flood for different reasons, such as lack of capacity in the network or blockage. The impact of a sewer flooding is usually much localised, but such flooding can be rapid and potentially hazardous to health.</p> <p>Nottinghamshire's drainage network is both complex and extensive and comprises:</p> <ul style="list-style-type: none"> <li>• Private sewers;</li> <li>• Highway gullies;</li> <li>• SuDS;</li> <li>• Surface water sewers;</li> <li>• Foul sewers; and,</li> <li>• Combined sewers.</li> </ul> <p>Flooding from sewers or burst water mains must be managed by the water company responsible for them.</p>
<b>Historic Flooding</b>	<p>The historic handover of local services from former Urban and Rural District Councils, the sewerage agency role to water companies and the development of housing in the past by the Coal Authority means that in many cases the ownership and in some places the location of the drainage network is unclear and/ or unknown. As a County Council we make best efforts to investigate and resolve such difficulties and we have systems in place to store historical information and collate drainage assets.</p> <p>Severn Trent Water has a duty to keep a record of all reported flooding from public sewers. For the period 2015-2020 these records, including historical data, are held in the AMP6 Flood Risk Register. Our liaison with STW allows us to be aware of key areas of flooding from sewers and assists us in providing a strategic approach to flood management.</p> <p>The information available across Nottinghamshire relating to the sewer network, and in particular its capacity is very limited. As previously mentioned it is likely that sewer flooding plays a part in many cases of flooding in Nottinghamshire as causes appear to often be inter-related. This is further complicated by ownership issues. One area known to be affected by sewer flooding includes West Bridgford in Nottingham where the PFRA notes sewer capacity is known to be limited.</p>
<b>Future Flooding</b>	<p>Climate change is anticipated to increase the potential risk from sewer flooding as summer storms become more intense and winter storms more prolonged. This combination is likely to increase the pressure on the existing efficiency of sewer systems, thereby reducing their design standard and leading to more frequent localised flooding incidents. Any sewer flooding that may occur could be exacerbated as a result of surface water runoff during extreme rainfall events.</p> <p>STW will monitor the risk of sewer flooding and put plans in place to manage this, as required, based on their business plan and company priorities. We will continue to work with STW to identify flooding hotspots and locations of known sewer capacity issues where risk could be exacerbated by climate change impacts. The town of Newark has been</p>

**Table 3.5: Other sources: flooding from sewers**

identified through the STW AMP6 programme<sup>51</sup> as a hotspot for sewer capacity issues. A schedule of improvements is planned to help protect properties at risk of flooding in Newark alongside a programme of works addressing flooding issues across the County.

STW will prioritise investment for potential flood alleviation schemes depending on the severity and frequency of flooding, but this can only be identified where affected property owners report the incident to the water company.

**Supporting documents** [Nottinghamshire Preliminary Flood Risk Assessment](#)

**Figures** PFRA Figure E (Annex 3)

### 3.3.3 Reservoir Flooding

**Table 3.6: Other sources: flooding from artificial sources (reservoirs)**

**Source of Flooding** Artificial sources include any water bodies not covered under other categories and typically include canals, lakes and reservoirs. Canals have been covered separately in table 3.7

**Historic Flooding** The County Council own 2 reservoirs;

- Mill Lakes, located in Lean Valley Country Park, and
- Rufford Lake in Rufford Country Park.

Additionally there are a number of other large water bodies across the County, including within former colliery spoil tip sites, some of which are undergoing risk designation review by the Environment Agency.

There have been no recorded incidents of reservoir flooding within Nottinghamshire.

**Future Flood Risk** Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers on a yearly basis. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency are responsible for ensuring that reservoirs are inspected regularly and essential safety work is carried out. The NCC Emergency Planning team maintain joint incident plans with the Environment Agency to deal with any emergency.

In the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning. The Environment Agency's Risk of Flooding from Reservoirs map<sup>52</sup> shows the area and depths of flooding and flow velocities that could occur if a large reservoir were to fail and release the water it holds. A large reservoir is one that holds over 25,000 cubic metres of water, equivalent to approximately 10 Olympic sized swimming pools. Since this is a worst case scenario, it's unlikely that any actual flood would be this large.

<sup>51</sup> AMP6 is the current Asset Management Plan period (2015 – 2020) for water companies which they use to drive continual improvements across their service such as improving water quality, reducing leakage and reducing flooding.

<sup>52</sup> [Environment Agency Risk of Flooding from Reservoirs, http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=reservoir#x=357683&y=355134&scale=2](http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=reservoir#x=357683&y=355134&scale=2)

Smaller reservoirs and ponds, such as those on farms or former mining and industrial sites, are more likely to pose a risk of flooding to the local area. We are working with riparian owners and district and borough councils to identify risks from these features and identify how they can be used for flood management benefits in the future.

**Supporting Documents**     [Environment Agency Risk of Flooding from Reservoirs](#)

### 3.3.4 Canal Flooding

**Table 3.7: Other sources: flooding from artificial sources (canals)**

<b>Source of Flooding</b>	Canals that are in cut or follow natural contours are likely to act as conduits for flood waters and may divert floodwaters from one place to another. They can also be used to store water at times of flood and reduce the risk of flooding on rivers. However, flooding from canals can be caused by overtopping from excess water or by a breach or failure from raised canals, particularly where there are large raised embankments formed of 'made' material.
<b>Historic Flooding</b>	<p>Historically, Nottinghamshire built its industry upon a network of navigable waterways, many of which are now used for recreational purposes. Many of the canals in Nottinghamshire interact with watercourses to a greater or lesser extent, for example the River Ryton and Chesterfield Canal at Worksop or the Nottingham and Beeston Canals and the River Trent in Nottingham.</p> <p>Canals in Nottinghamshire include the:</p> <ul style="list-style-type: none"> <li>• Erewash;</li> <li>• Nottingham (Local Nature Reserve);</li> <li>• Beeston;</li> <li>• Grantham; and,</li> <li>• Chesterfield (where the majority of overtopping and breach incidents occur).</li> </ul> <p>Historically land next to the Chesterfield Canal has been the most affected by this type of flooding. Many localised flooding incidents on the canal network are also due to acts of vandalism.</p> <p>Records of canal flooding as a result of breach are present at the districts of Bassetlaw, Newark and Sherwood and at the administrative boundary of Rushcliffe. Records of overtopping include the districts of Bassetlaw and Broxtowe.</p>
<b>Future Flooding</b>	<p>The Canals and Rivers Trust (CRT) is a navigation authority and has a responsibility to maintain its waterways but no statutory duty with regards to flood risk management. As LLFA for the County, Nottinghamshire County Council must oversee potential risks and maintain effective dialogue with the CRT over maintenance of assets as well as any relevant riparian owners. The CRT monitors the condition of its assets, which it updates on an annual basis.</p> <p>There is currently no available information on future risks from canals. As canals have various features which allow regulation of flow, the risk of flooding is generally a lot lower than natural watercourses. However, incidents from breaches and overtopping are known in the County and risks are likely to be greater where the canal is closely linked to another major river.</p>

**Table 3.7: Other sources: flooding from artificial sources (canals)**

<b>Supporting documents</b>	<a href="#">Nottinghamshire Preliminary Flood Risk Assessment</a> <a href="#">Nottinghamshire and Nottingham Level 1 Strategic Flood Risk Assessment Minerals and Waste</a>
<b>Figures</b>	Figure A7a: Historic flooding in Nottinghamshire until 2011

### 3.4 Current Management of Flood Risk

We are currently undertaking a number of flood risk management schemes in collaboration with other RMAs and stakeholders. These are discussed further in Section 5.2.

### 3.5 Managing Future Flood Risk

#### 3.5.1 Impacts of Future Climate Change

Climate change can be considered in the context of how future flooding will be influenced, how the County Council can act to mitigate the effects of climate change and how we can adapt to changes in flood risk over time. We are working with Climate East Midlands, which is one of nine regional Climate Change Partnerships. The partnership consists of a number of East Midlands based organisations, including local authorities, working together to coordinate action on the causes and consequences of climate change. They are hosted by East Midlands Councils and cover both mitigation of and adaptation to climate change.

#### ***UKCP09 predictions<sup>53</sup> for the East Midlands***

Climate projections are available for the East Midlands for the years 2020, 2050 and 2080. Table 3-1 shows the projections under a medium emissions scenario and taking the 50% probability level.

**Table 3-1 UKCP09 Medium emissions projections for the East Midlands**

	2020s	2050s	2080s
<b>Mean precipitation %</b>	0.0	0.0	1.0
<b>Summer mean precipitation %</b>	-6.0	-16.0	-20.0
<b>Winter mean precipitation %</b>	5.0	14.0	19.0
<b>Mean temperature summer °C</b>	1.4	2.5	3.5
<b>Mean temperature winter °C</b>	1.3	2.2	3.0

The climate projections indicate that winter rainfall is likely to increase, which may increase the likelihood of flooding. Flooding in the winter is often caused by slow moving frontal systems, which are more likely to trigger flooding on the larger river systems such as the River Trent with potentially associated groundwater flooding and localised surface water flooding where smaller watercourses and sewers cannot outfall due to ‘tide locking’ on main rivers. However, extreme

<sup>53</sup> UKCP09 Website <http://ukclimateprojections.metoffice.gov.uk/21678>

weather events are not limited to winter months as shown by the 2007 and 2013 flood events. Higher temperatures in summer may trigger more convective thunder storms, which are more likely to cause flooding from surface water and on smaller watercourses due to the increased intensity of the rainfall.

#### ***Local Climate Impacts Profile<sup>54</sup>***

The County Council has prepared a Local Climate Impacts Profile (LCLIP) (2011) which has looked in detail at the vulnerability of the local authority to extreme weather to inform future policy and strategy and adaptation responses. Flooding in November 2000, July-August 2004, July 2006, June-July 2007 and January 2008 was noted to have had a significant impact on a service area or department of the County Council.

### **3.5.2 *Changes in Land Management***

Changes in the way that land is managed have the potential to affect flood risk. These are largely affected by the economy, availability of and access to regional, national or international subsidies and payments and environmental initiatives. For example, changes to the payments farmers receive could encourage more intensive agriculture or conversely less intensive production and more environmental stewardship. Mining and quarrying can have a key impact on flood risk. Mines that are being reclaimed and restored have the potential to reduce flood risk in the surrounding areas and quarries in the River Trent floodplain are known to be beneficial for storing excess floodwaters and releasing these gradually over time. Such changes are inherently difficult to forecast, but we will explore this area further at the next stage of the Strategy. Ideally any changes in land management should work with due regard to the natural processes and deliver multiple environmental, social and economic benefits. The investigation and assessment of these impacts will need to be on a catchment scale as has been indicated in the previous section regarding Catchment Based Approach to flood risk and working with natural processes.

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<sup>54</sup> Local Climate Impacts Profile Summary <http://www.climate-em.org.uk/images/uploads/Nottingham-web.pdf>

### 3.6 Priority Flood Risk Locations

Priority Flood Risk Locations have been identified across Nottinghamshire based on where the greatest numbers of flood events have been recorded during 2012-2015 as well as those with longer records of historical flooding (see Figure A7a and Figure A7b in [Appendix A](#)). The sources of flooding are largely attributed to a combination of surface water and ordinary watercourse flooding, although main river, groundwater and sewer flooding incidents have also been recorded. Information and education relating to how these areas are identified and delineated will be required for an appreciation of aims of the strategy.

The evidence of combined flood sources supports our approach of managing catchments holistically and through a partnership approach. Significant flood alleviation projects are already underway in Southwell and Hucknall, as well as numerous other schemes where we are working in partnership with other local RMAs. These are discussed further in chapter 6.

**Table 3-2: Recorded flood incidents from multiple and/or combined sources between January 2012 and February 2015**

Location	Recorded incidents <sup>55</sup>
Southwell	275
Hucknall	106
Lowdham	86
Calverton	47
Mansfield	40
Retford	34
East Bridgford	33
Carlton	32
Thurgarton	29
Girton	29
Newthorpe	28
Sutton in Ashfield	26
West Bridgford	23
Kimberley	22
Arnold	20
Ravenshead	18
Worksop	18

<sup>55</sup> Number of separate recorded floods from any source held by Nottinghamshire County Council.

#### 4. OBJECTIVES FOR MANAGING LOCAL FLOOD RISK IN NOTTINGHAMSHIRE

Through our partnership work with local RMAs, we have developed a joint vision for flood risk management in Nottinghamshire and our strategy objectives that set out what we would like to achieve.

##### ***Our vision for flood risk management***

Public sector, private and voluntary organisations are working together with communities to manage flood risk across Nottinghamshire, prioritising the finite resources available to where they will have the greatest impact. This is part of a strategic and proactive approach to reduce and manage flood risk over time.

Actions taken to manage flooding are wide ranging; from influencing the location and form of new development, to emergency response, to maintaining existing and constructing new flood defences. Collective responsibility is sought when solving flooding problems in the County. Flood risk management is considered an integral part of managing the wider water cycle. There is also an investigative role whereby new flooding events develop, existing flooding patterns change due to development and climatic changes, all of which will require research and resource application.

Communities are aware of the risks they face and the roles of different organisations involved in flood risk management; and are encouraged to become more resilient to flooding. The various organisations are held accountable through local Councillors and a joint Strategic Level Flood Risk Management Board involving the key organisations, lead Councillors and local communities. LLFA have a vital role in ensuring all RMA's deliver on their responsibilities,

The Strategy will set out how this will happen and what our targets will be so that we can help make Nottinghamshire a place where people enjoy life, are healthy, safe and prosperous. There should always be acceptance or realisation that there will be occasions where flooding, as a natural phenomenon will occur, despite the best endeavours of the RMAs.

## 4.1 Guiding Principles for Setting Objectives

### National Flood Risk Management Objectives

The [National Flood and Coastal Erosion Risk Management Strategy for England](#) sets out the following national objectives for flood risk management;

- **Understand the risks** – understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them,
- **Prevent inappropriate development** – avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks,
- **Manage the likelihood of flooding** – building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society,
- **Help people to manage their own risk** – increasing public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient, and
- **Improve flood prediction, warning and post-flood recovery** – improving the detection, forecasting and issue of warnings of flooding, planning for and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.

### Guiding Principles for Local Flood Risk Management

The National Strategy strategic aims and objectives are supported by six high-level principles, to guide decisions on risk management activities, and the process by which they are taken, at both a national and local level. We have used these to guide the development of objectives and identification of measures to deliver local flood risk management within Nottinghamshire.

**Table 4-1 Guiding Principles for Local Flood Risk Management in Nottinghamshire**

<b>Proportionate and risk based approach</b>	Flood risk management activities should be proportionate to the risk that is faced. It is not possible to prevent flooding altogether. To try and do so would be technically unfeasible, environmentally damaging and uneconomical. A risk based approach to managing flooding targets investment to areas where the risk is greatest by examining both the likelihood and consequences of a flood occurring.
<b>A catchment based approach</b>	To manage flood risk effectively, it is important to understand the interactions with the wider area over the entire catchment. This means ensuring that activities are coordinated and that we work closely with neighbouring authorities to ensure that activities do not adversely affect other areas.
<b>Community focus and partnership working</b>	Working closely with communities provides a clearer understanding of the issues and appreciation of the community perspective of flooding. Giving communities a greater say in what activities take place and helping them to manage their own risk will result in better decisions being made and allows greater flexibility in the activities that take place. It is also vital to work in partnership with other authorities to ensure that risk is managed in a coordinated way beyond the boundaries and responsibilities of individual authorities and organisations. Best

	practice techniques are outlined in CIRIA's <a href="#">Communication and engagement in local flood risk management (C751)</a> <sup>56</sup>
<b>Beneficiaries encouraged to invest</b>	If funding for flood risk management activities relies on central and local government alone, then those activities will be significantly limited by the funds available. They will also be constrained by national controls and reduce the scope for local influence. Those that benefit should therefore be encouraged to invest in order to maximise flood risk management activity and allow innovative solutions to take place.
<b>Sustainability</b>	More sustainable approaches to flood risk management should be sought to consider wider sustainability issues such as the environment, whole-life costs, and the impact of climate change. Wherever possible, solutions to flooding problems should work with natural processes and aim to enhance the environment.
<b>Multiple benefits</b>	Flood risk management solutions can often provide additional social, economic and environmental benefits. For example the use of sustainable drainage systems (SuDS) can reduce the pollution of watercourses by minimising urban storm water runoff. The potential to achieve multiple benefits should be considered in all flood risk management activities.

## 4.2 Nottinghamshire Local Objectives

Objectives allow us to set targets for managing flood risk so that we can monitor progress as we implement the Strategy. [Appendix D](#) contains details of the plans and studies at a National, Regional, Local and Corporate level that we have considered in developing the Strategy. The developing Nottingham City Joint Core Strategy (with Broxtowe and Gedling Borough Councils) may have impacts and implications for the Nottinghamshire County Strategy especially at the common boundaries.

We have reviewed the outcomes from the public engagement survey and workshops with RMAs as we have developed our objectives in line with the [National Flood and Coastal Erosion Risk Management Strategy for England](#)<sup>57</sup> (as outlined in [Section 2](#)) and our corporate priorities ([Appendix D](#)).

**Overarching objective:** To reduce flood risk to people, properties and critical infrastructure wherever possible, maximise multiple benefits and ensure that the inequalities gap does not widen

<sup>56</sup> CIRIA [Communication and engagement in local flood risk management \(C751\)](http://www.ciria.org/Resources/Free_publications/c751.aspx)  
[http://www.ciria.org/Resources/Free\\_publications/c751.aspx](http://www.ciria.org/Resources/Free_publications/c751.aspx)

<sup>57</sup> Environment Agency (2011) [National flood and coastal erosion risk management strategic for England](http://www.environment-agency.gov.uk/research/policy/130073.aspx)  
<http://www.environment-agency.gov.uk/research/policy/130073.aspx>

**Nottinghamshire Local Strategy Objectives**

1. To pursue new solutions, partnerships and alleviation schemes to manage future flood risks and adapt to climate change in Nottinghamshire.
2. To increase levels of awareness and cooperation within local organisations and communities so they can become more resilient to flooding and understand their land drainage responsibilities.
3. To improve delivery of flood risk management by working in partnership across functions and organisations, taking a catchment based approach.
4. To integrate local flood risk management into the planning process and support sustainable growth.
5. To consider the environmental impact of proposed flood risk management measures, maximise opportunities to contribute to the sustainable management of our cultural heritage and landscape and deliver environmental benefits.

## 5. DELIVERY OF LOCAL FLOOD RISK MANAGEMENT

### 5.1 Developing measures

Measures to reduce flood risk are more than building flood alleviation schemes and maintaining watercourses and assets; although these are the traditional approaches to reducing risk they are not always the most appropriate solution. Realisation that the limit of economic viability has been reached for a particular scheme or that it is not technically possible to raise flood defences any higher leads to alternative approaches such that improved warning systems and greater resilience to property and business are initiated. Our aim is for communities, businesses and other organisations such as Parish and Town Councils, conservation organisations and RMAs to take collective action to reduce flood risk in Nottinghamshire.

### 5.2 Current flood risk management

The development and implementation of flood risk management measures is part of day to day work across the County, as outlined in Box 5.1

#### Box 5.1: Work carried out since 2007

We have carried out extensive work alongside other RMAs since 2007. This includes:

- Spending an additional £600,000 per year on flood risk management, including improvements to road drainage systems and culverts;
- Working with other organisations, especially the Environment Agency, District and Borough Councils and Internal Drainage Boards to take forward flood risk management schemes;
- Working with communities to increase resilience to flooding, with the provision of some community resilience stores and working with communities on Emergency Plans;
- Working with riparian owners to resolve land drainage issues, spending £100,000 a year in high priority areas and consenting to works on Ordinary Watercourses;
- Spatial and emergency planning work.
- Completed flood defence schemes of North Wheatley and East Markham and the Day Brook diversion scheme.
- Early support for potential schemes whereby the schemes are developed to a stage when viability and feasibility can be considered in an engineering solution, and subsequently meaningful consultation with the local communities affected can take place. This has been particularly pertinent to the technical issues related to surface water flooding.

We have developed a suite of 'no regrets' measures, which are actions that the County Council and their partners are currently undertaking and should continue to do so for the greater good

of managing and reducing flood risk in the County. These should be funded by existing revenue and capital grant funding, subject to available funds and resources. These include:

- Water sensitive urban design: considering sustainable drainage (including retrofitting Sustainable Drainage Systems (SuDS)), potable water supply and wastewater;
- Rural land management, including catchment sensitive farming, woodland planting, and considering the links to wider water cycle management;
- Incident management and supporting communities and businesses with preparation and response to and recovery from flooding;
- Managing flood risk through the development process (both planning policy and development management);
- Managing and reducing flood risk wherever possible by applying our new roles and responsibilities e.g. by designating a third party asset known to reduce flood risk;
- Quick win schemes e.g. minor highway works and environmentally led initiatives that have flood risk management benefits (e.g. through projects to deliver Water Framework Directive targets);
- An on-going programme of works, opportunity based at present with a move towards an integrated common programme of schemes and taking a partnership approach wherever possible through the implementation of this Strategy; and,
- Continuing to improve our knowledge about flood risk, assets and drainage matters in the County and sharing our knowledge with others.

### 5.3 Case studies of flood alleviation work in Nottinghamshire

Flood risk management is being approached across the County with a variety of small and large scale approaches, maximising partnership contributions for the most efficient use of limited resources. The following boxes present some examples of successfully implemented schemes and ongoing work.

#### **Box 5.2: Culvert Improvements in North Wheatley, 2011**

A scheme was jointly funded by Nottinghamshire County Council and Bassetlaw District Council to alleviate flood risk to protect the village and school in North Wheatley, which had suffered repeated flooding.



Photo 5.1: Construction in progress of new bridge flows and culvert



Photo 5.2: new culvert functioning during high flows

(Source: Nottinghamshire County Council)

### Box 5.3: SuDS Case Study: Retrofitting SUDS in the Day Brook Catchment

Nottingham City Council, Groundwork Greater Nottingham and the Environment Agency have recently worked in partnership to retrofit rain gardens on Ribblesdale Road to slow down and reduce the amount of water reaching the local drainage network and improve local water quality in the Day Brook catchment. These were installed in winter 2012 and preliminary analysis shows they are having a beneficial effect on both surface water flows and water quality.



The County Council is now working with Gedling Borough Council (GBC), Groundworks and the Environment Agency to look at other opportunities for small scale measures in the Day Brook catchment. The Day Brook diversion at Thackeray's Lane Playing Fields is part of the proposed wider SUDS scheme promoted by NCC, Environment Agency, GBC, and STW.



(Photos taken 2014 (Source: Nottingham City Council))

#### Box 5.4: Hucknall Town Centre Scheme

Nottinghamshire County Council have led and co-ordinated this scheme which has included the investigation and assessment of a number of complex flooding sources. The risk of flooding in Hucknall from Baker Lane Brook (main river) and Titchfield Park Brook (ordinary watercourse) is reported to be due to channel and structural capacity issues, with water flowing over banks and flooding properties and roads in the vicinity of the watercourses. Alongside this, there is also a risk associated with surface water flooding and sewer network flooding, where the capacity of the networks have been exceeded, resulting in surcharge of systems.

Hucknall has suffered from flooding from watercourses (fluvial), overland flow (surface water) and sewers on a regular basis for a number of years, most recently in July 2013 and earlier in July 2007. During these events, Hucknall town centre and Thoresby Dale areas were particularly affected as well as The Titchford Brook catchment at Arden Grove.

The flooding at Thoresby Dale is a combination of surface water flow, main river flooding and sewer flooding, whilst at Arden Grove there is no main river flooding. A major hydraulic study has been carried out for both catchments in Hucknall and schemes are in the process of being developed in partnership with other RMA's to reduce flood risk.

As part of the Hucknall town centre scheme a new flood relief culvert and upstream storage will be incorporated as part of the Hucknall Inner Relief Road project in 2015. Consequently NCC has initiated two complementary schemes to address the issues as part of the current NCC major road improvement scheme in Hucknall Town Centre. The RFCC have approved £336,250 funding over the 2015/16 – 2016/17 financial years to develop a flood alleviation scheme as part of these works which aims to significantly reduce risk of flooding to residents of Hucknall.

#### Box 5.5: The Sherwood Energy Village: Sustainable development within a United Kingdom coalfield community

Sherwood Energy Village transformed a former colliery in Ollerton into an environmental enterprise comprising industry, housing, recreation and leisure and developed to the highest environmental standards.



All rainfall on site is managed through SuDS (images from June 2007)

#### Increasing use of SuDS in former colliery sites

Many of the former colliery sites in Nottinghamshire are being investigated for development opportunities and regeneration to meet growing needs in the County. It is recognised that these type of sites present excellent

opportunities to incorporate SuDS. Similar schemes are being developed at Cotgrave and Gedling Colliery sites.

## 5.4 Delivering our objectives

Keeping people safe and protecting life is always the priority for flood management. Beyond this there are a number of measures that can be taken to manage the risk and impacts of flooding on local communities, businesses, infrastructure, heritage and the environment.

For each of the local flood risk management objectives, potential measures have been identified for further consideration. These have been informed by council staff and RMAs attending workshops throughout the strategy development in addition to outcomes from the online survey undertaken as part of the community engagement exercise described in [Appendix E](#), and consultation with CIRIA's '[Communication and engagement in local flood risk management \(C751\)](#)'<sup>56</sup>.

### 5.4.1 *Public priorities for future flood management in Nottinghamshire*

As part of the public engagement survey, people were asked '**What are you concerned about most with regards to flood risk management?**' The top three responses were

1. The effect of new development on flooding
2. Available funding for building flood alleviation schemes
3. Maintenance of watercourses

In response to the question '**Keeping people safe and protecting life will always be our top priority. Beyond this, what should be our highest priority when it comes to flood risk management?**'

The majority of people considered that homes should be our next highest priority. This was followed by infrastructure and then amenities. We have taken forward these concerns in the development of our action plan for local flood risk management.

### 5.4.2 *Identification of Local Flood Risk Measures*

Table 5-1 outlines the measures identified to deliver the local flood risk management objectives for Nottinghamshire and the flood risk management guiding principles that they achieve.

**Table 5.1 Nottinghamshire Local Flood Risk Management Objectives and Measures**

<b>Objective</b>	<b>Measure to achieve the objective</b>	<b>Guiding Principles</b>
To pursue new solutions, partnerships and alleviation schemes to manage future flood risks and adapt to climate change in Nottinghamshire.	<ul style="list-style-type: none"> <li>• Develop a robust approach to the prioritisation of schemes to manage flood risk</li> <li>• Seek external funding opportunities whenever possible</li> <li>• Collaborate with local stakeholders to achieve common goals</li> <li>• Progress capital schemes identified for flood alleviation</li> <li>• Ensure flood management actions will be adaptable and responsive to future changes in the climate</li> </ul>	Community focus and partnership working  Beneficiaries encouraged to invest  Proportionate and risk based approach
To increase levels of awareness within local organisations and communities so they can become more resilient to flooding and understand their land drainage responsibilities.	<ul style="list-style-type: none"> <li>• Ensure effective coordination between LRF, emergency planning and highways management / land drainage</li> <li>• Improve sources and avenues of information dissemination to the public</li> <li>• Encourage people to manage their own risk</li> <li>• Develop more online tools and investigate new uses of social media</li> </ul>	Community focus and partnership working  Proportionate and risk based approach
To improve delivery of flood risk management by working in partnership across functions and organisations, taking a catchment based approach.	<ul style="list-style-type: none"> <li>• Take an active role in local flood risk management partnerships</li> <li>• Continue to develop our understanding of groundwater risks in Nottinghamshire</li> <li>• Maintain effective linkages with the Isle of Axholme Flood Risk Management Strategy</li> <li>• Pursue joint initiatives with Severn Trent Water ,IDBs and the Environment Agency</li> <li>• Maintain and improve communications with farmers and landowners in rural areas to pursue multi-beneficial schemes</li> <li>• Identify joint benefits of highways and transport schemes</li> </ul>	Community focus and partnership working  A catchment based approach  Beneficiaries encouraged to invest  Multiple benefits
To integrate local flood risk management into the planning process and support sustainable growth.	<ul style="list-style-type: none"> <li>• Encourage and promote the use of SuDS in all new developments and retrofit SuDS wherever possible</li> <li>• Ensure as far as practical, local planning authorities take full account of flood risk in Local Plan policies and allocations, planning applications and supplementary planning documents</li> <li>• Maximise opportunities to integrate flood management with other County functions</li> <li>• Develop a better understanding of drainage maintenance requirements on public property</li> </ul>	Community focus and partnership working  Sustainability
To consider the environmental impact of proposed flood risk management measures, maximise opportunities to contribute to the sustainable management of our cultural heritage and landscape and deliver environmental benefits.	<ul style="list-style-type: none"> <li>• Improve connections between blue and green infrastructure<sup>58</sup> management</li> <li>• Identify improvements for existing and planned scheme development</li> <li>• Investigate how we can ‘make space for water’ in Nottinghamshire</li> </ul>	Multiple benefits  Sustainability

<sup>58</sup> Blue green infrastructure refers to the ‘blue’ elements of an environment such as water bodies or drainage and the ‘green’ elements such as open space, trees or biodiversity

## 5.5 Taking a Proportionate Risk-based Approach

It is not possible to prevent all flooding, and with limited resources and funding, flood risk management work will need to be prioritised. The approach must be proportionate and risk based as recommended by [The National Flood and Coastal Erosion Risk Management Strategy](#) and should take environmental and other consequences into account.

RMA's may have differing priorities therefore when prioritising *locations* we will need to consider:

- Where is the highest flood risk in terms of investing limited resources to secure maximum benefits? First and foremost to people and life, followed by homes, infrastructure and amenities.

When it comes to prioritising *actions*, such as further investigation, capital works, increased maintenance etc. we will need to consider:

- What will reduce the risk the most to the highest risk receptors and what is affordable? (i.e. conduct a cost benefit analysis of the proposed measures); and,
- What is the potential for funding for flood alleviation schemes?
- Are there multiple sources of flooding? Could we invest with another RMA?

We need to work closely with other RMA's to ensure that an integrated, objective and consistent approach to prioritisation is taken wherever possible. We plan to develop a tool that will enable RMA's to answer these questions. Figure 5-1 shows some of the factors which we plan to incorporate into this tool.

**Figure 5-1: Factors to be incorporated into a prioritisation tool**



Each measure in this Strategy has been split into a number of actions (as outlined in the Action Plan in [Appendix B](#)). These have been prioritised as High, Moderate or Low based on current understanding of local flood risk and available resources and funding.

## 5.6 Delivery of the Strategy – The Local Flood Risk Management Action Plan

In order to deliver the overarching aim of the Strategy, a number of objectives have been devised as discussed above. These objectives are further subdivided into measures which are supported by actions (see [Appendix B](#)).

Achieving the actions detailed within the Action Plan depends on the levels of funding available to the County Council and partner organisations. The action plan will be reviewed annually to ensure:

- The effective delivery of local flood risk management objectives in Nottinghamshire;
- The effectiveness of the measures contained within the Local Flood Risk Management Strategy;
- That bids for national and regional funding for flood alleviation can feed into the annual submission process administered by the Environment Agency; and,
- Where necessary, that measures that are proved ineffective or are not delivering value for money can be altered.

The findings of the review will be fed into subsequent versions of the Action Plan which will be a critical document setting out the measures we, our partners and communities should undertake collectively to manage flood risk in the county in the short, medium and long term.

## 6. FUNDING FOR LOCAL FLOOD RISK MANAGEMENT

The Central Government's funding mechanism for flood risk management schemes is called Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA).

The Pitt Review (2008) into the 2007 floods recommended that '*The Government should develop a scheme which allows and encourages local communities to invest in flood risk management measures*'. This approach has been taken forward and in 2011 Defra published their new funding policy on Partnership Funding, which is based on payments for the benefits that a scheme delivers. If this payment for the benefits does not cover the cost of the scheme, then the scheme cost will need to reduce and/ or local contributions will need to be found. The principles of encouraging beneficiaries to invest in flood risk management, delivering multiple benefits and taking a risk based approach are also in the National Flood and Coastal Erosion Risk Management Strategy

RMA's including Nottinghamshire County Council can submit bids for FCRM GiA and schemes are approved by the Trent Regional Flood and Coastal Committee (RFCC)<sup>59</sup>. In order to secure 'other' sources of funding and therefore increase the likelihood of receiving FCRM GiA, County Council Officers have liaised extensively with relevant district Councils, Severn Trent Water, the Environment Agency, local communities and the various IDBs to pull together a programme of schemes for the County.

The proposed schemes will be profiled across the six year implementation period to ensure that programmes are able to be delivered with regards to resources and funding in line with other schemes. The Environment Agency provides River Trent RFCC meeting papers on their website which detail information related to current and future schemes within the Trent RFCC boundary<sup>60</sup>.

### 6.1 Current Funding of Flood Risk Management Projects

Currently, we make decisions on where to invest using information on recent flooding incidents, flood strategy documents, the source of flooding and available resources. Resources vary widely between different organisations, many of which are funded in different ways and have different priorities. For example,

- We have secured a 5 year budget of budget of £600,000 per annum for capital schemes, following the flooding of 2007 and this includes nationally approved funding for large schemes in Hucknall and Southwell. Funding allocation for schemes are approved by the Transport and Highways Committee;
- Bassetlaw District Council has recently delivered a scheme on The Canch in Worksop and jointly promoted the North Wheatley scheme with the County Council. They are investigating schemes in other locations, including Retford, Clarbrough and North Leverton with Habbleshthorpe and are taking forward a flood prevention scheme which involves the diversion of a water channel in Walkeringham;
- We have recently worked in partnership with Bassetlaw District Council to reduce the risk of flooding in East Markham and North Wheatley and there are ongoing schemes in

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<sup>59</sup> The Regional Flood and Coastal Committee (RFCC) is a committee established by the Environment Agency under the Flood and Water Management Act 2010 that brings together members appointed by Lead Local Flood Authorities (LLFAs) and independent members with relevant experience for 3 purposes; to ensure there are coherent plans for identifying, communicating and managing flood and coastal erosion risks across catchments and shorelines, to encourage efficient, targeted and risk-based investment in flood and coastal erosion risk management that represents value for money and benefits local communities and to provide a link between the Environment Agency, LLFAs, other risk management authorities, and other relevant bodies to build understanding of flood and coastal erosion risks in its area.

<sup>60</sup> <https://www.gov.uk/government/groups/trent-regional-flood-and-coastal-committee>

Walkeringham, (working with Bassetlaw District Council) and in Egmonton (working with the Trent Valley IDB);

- Severn Trent Water currently invests so that they can remove properties from their register of flooded properties (the DG5 Register) but are moving away from a reactive and towards a risk based proactive approach;
- The Environment Agency has recently completed a 27km long scheme along the left bank of the River Trent through Nottingham and are currently appraising options to look at flood risk management at North Muskham, Burton Joyce and Trowell. Funding is sought from national and regional funds, as well as external partners such as the County Council; and District Councils and Utilities,
- The Trent Valley IDB are investigating schemes at Egmonton and Sutton on Trent. Much like the Environment Agency, funding is sought from national and regional sources.
- Nottinghamshire County Council and the Environment Agency have provided partnership funding along with Lincolnshire County Council, Trent Valley IDB and Newark and Sherwood DC to conduct an initial assessment of the flooding mitigation and defence measures available to Girton.

We have been working in partnership to deliver schemes wherever our partnership will maximise benefit, for example, we delivered the improvements at North Wheatley in partnership with Bassetlaw District Council, acting as designer and contractor and contributed £1million towards the Environment Agency flood defences in Nottingham.

There are a number of factors that will influence what type of capital and revenue investment would be suitable and potential funding sources, including:

- Fragmented asset ownership, relating to the historic ownership of assets by the Coal Authority and former urban and rural District Councils;
- Economic growth, such as the Nottingham and Newark Growth Points and flood risk and drainage infrastructure needs;
- A varied landscape: we have steeply sloping parts of Nottingham, Ashfield and Mansfield with modified urban watercourses and level flood plains with pumped drainage areas within Internal Drainage Districts largely towards the north. Where appropriate, different engineering options would be needed in different places;
- The outcomes that a scheme can deliver e.g. properties and critical infrastructure protected and new habitat created which affect the priority attached to schemes by different organisations and the availability of national and regional funding;
- The direct and indirect beneficiaries of a proposed scheme, such as local communities and businesses and those who represent them, such as local councils and willingness and ability to contribute towards flood alleviation schemes; and,
- The ability to provide multiple benefits through engineering works e.g. in addition to mitigating the flood risk, engineer improvements to biodiversity and/or water quality, which have the ability to attract other funding streams.

## 6.2 Changes to Investment in Flood Risk Management

In the past, flood defence schemes have often been built as a reactive response to significant flooding and funding decisions have largely been made based on the relative costs and benefits

(in terms of damages from flooding avoided) of a scheme. Recently there has been a step change in direction, from the 'all or nothing' situation to a partnership funding approach

The approach of other organisations is also reflecting the changes from the Pitt review and a proactive approach. Severn Trent Water (STW) have a duty to provide, maintain and operate systems of public sewers and works for the purpose of effectually draining their area and they work on 5 year Business Plans, known as Asset Management Plans (AMPs). The outputs of these business plans are negotiated, approved and regulated by OFWAT.

Previous AMPs have seen investment targeting reduction of flooding from sewers, AMP6 (2015-2020) includes the following flooding specific targets:

- A 13% reduction in the number of internal sewer flooding incidents.
- A 6% reduction in the number of external sewer flooding incidents.
- A 200% increase in the number of projects where partnership working with third parties helps reduce flooding

As LLFA we are committed to working with STW and will endeavour to identify partnership projects that will reduce the risk of flooding to residents of Nottinghamshire.”

### 6.3 Summary of Funding Sources

In partnership with RMAs, we will continue to explore opportunities for funding flood alleviation schemes. The main sources of funding that may contribute to flood risk management activities are detailed in Table 6-1.

**Table 6-1: Summary of potential funding sources for flood risk management**

Potential Sources of Funding	Description	Administered By:
<b>Local Levy</b>	A levy on local authorities within the boundary of each Regional Flood and Coastal Committee (RFCC). The Local Levy is used to support, with the approval of the committee, flood risk management projects that are not considered to be national priorities and hence do not attract full national funding through the FCRM GiA.	Trent RFCC/ Environment Agency
<b>Private Contributions</b>	Voluntary, but funding from beneficiaries of projects could make contributions from national funding viable. Contributions could be financial or “in kind” e.g. land, volunteer labour or expertise.	Nottinghamshire County Council
<b>Water and Sewerage Company Investment</b>	Investment is heavily regulated by Ofwat but opportunities for contributions to area-wide projects which help to address sewer under-capacity problems.	Severn Trent Water
<b>Community Infrastructure Levy (CIL)</b>	The Community Infrastructure Levy (CIL) allows Local Authorities to raise funds from developers undertaking new building projects within their area of governance. Such funds can be used to mitigate the effects of the development, including flood defences.	Nottinghamshire County Council and Districts
<b>Section 106 Contributions (Town and</b>	Section 106 agreements (Town and Country Planning Act 1990) are a mechanism designed to make a development proposal acceptable in planning terms, through the site specific mitigation of impacts from a development.	District and Borough Councils

Potential Sources of Funding	Description	Administered By:
<b>Country Planning Act)</b>		
<b>Local Residents / Businesses</b>	Community engagement can be a very effective means of raising awareness of flood risks and management activities in local areas, and promoting a sense of 'helping communities to help themselves' which can result in contributions from private sources, such as local residents and businesses.	Nottinghamshire County Council
<b>Funding for Local Flood Risk Management Responsibilities</b>	The Government has committed funding annually to support LLFAs in their 'new' flood management roles up to 2016. The funding is provided through 'Area Based Grants', which have been allocated by the Department for Environment and Rural Affairs (Defra) based on the individual flood risk each local authority faces. Beyond this period funding commitments are unclear and there are likely to be pressures on further future funding.	Nottinghamshire County Council
<b>Local Flood Risk Management Partners</b>	Local Flood Risk Management Partners, or RMAs, could also be engaged where a scheme can offer mutual benefits	Nottinghamshire County Council
<b>Council Tax</b>	A "ring-fenced" provision within the annual council tax for the specific purpose of addressing flood risk management.	Nottinghamshire County Council
<b>Business Rates Supplements</b>	Agreement from local businesses to raise rates for specified purposes.	District and Borough Councils
<b>Council Capital Funding</b>	The Council's infrastructure programme prioritising capital improvement projects. The Council programme may include funding for drainage capacity improvements for highway drainage systems, for example, but could include a flood scheme, if benefits can be identified.	Nottinghamshire County Council
<b>Council Revenue Funding</b>	The Council has a number of revenue streams to support technical and administrative processes and to maintain council infrastructure. Existing revenue budgets include Highway Drainage Maintenance, Highway Gully Maintenance, Watercourse Maintenance, discharging the Lead Local Flood Authority duties for the Council.	Nottinghamshire County Council
<b>Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)</b>	Central Government funding available for flood (and coastal) risk management projects. The funding mechanism was recently revised to encourage a partnership funding approach. Schemes are not fully funded by central government under this funding scheme and other beneficiaries must contribute towards any scheme.	Environment Agency
<b>Local Enterprise Partnership</b>	The D2N2 LEP submitted a Strategic Economic Plan to Government which included infrastructure schemes which have the potential to deliver economic growth. A number of flood risk management schemes were included in the bid for funding.	Department for Communities and Local Government and LEP Board

#### 6.4 Collaborative Working

Investment in flood alleviation works can be thought of as constructing new assets, replacing failing ones and/ or maintaining those that we already have. A number of bodies are involved in this work:

- Nottinghamshire County Council for surface water, ordinary watercourses and groundwater as the LLFA;
- Nottinghamshire County Council for highways structures as the Highways Authority;
- District/ Borough Councils for ordinary watercourses;
- Internal Drainage Boards for ordinary watercourses within their respective areas;
- Environment Agency for main rivers;
- Water Companies for the sewer network; and,
- Highways England as the Highways Authority for highways structures on motorways and trunk roads.

When it comes to doing works to reduce flood risk, resources are limited and need to be prioritised and targeted to where they can have the greatest effect.

As well as working with RMAs we aim to engage with local communities at the beginning of scheme development to get early buy in. Communities should be engaged in the preferred option selection to empower them and enable them to take ownership and understanding of the scheme in hand. Long term maintenance of schemes should also be discussed with communities including the importance of good maintenance from riparian owners (see Section 2.4.2).

Land and property owners have an important role to play in flood risk management by taking action to protect their own properties and, where they are a riparian owner, in keeping watercourses maintained and flowing without obstruction.

## 6.5 Considerations for Future Investment

We would like to invest in flood risk management in partnership with others wherever possible. Additionally;

- County Council teams should work together more readily to deliver flood and water management schemes which also deliver multiple benefits and tap into different budgets and funding streams. This approach is mirrored within the EA and discussions to exploit the mutual benefits, such as biodiversity, WFD, and FCRM ambitions, of the approach are to be progressed
- A risk-based, proportionate and more unified approach should be taken by the County Council and the District/Borough Councils of Nottinghamshire to deliver a holistic flood risk management approach across the County, which prioritises finite resources and derives multiple benefits over a wider region.
- We should identify instances where environmental initiatives could be used to deliver improvements to watercourses and adjacent habitats achieving water quality and biodiversity improvements, as well helping to reduce flood risk.
- With regard to the management of all Highways Drainage Assets, the demands these flood management assets make on the County's budget are managed as part of the Highways Infrastructure Asset Management Plan, which includes asset valuation, assessment of degradation and planned replacement.

## 7. ENVIRONMENTAL IMPACT

### 7.1 Achieving wider environmental objectives

In delivering the Strategy we have the opportunity to deliver wider benefits beyond those principally associated with flood risk management. Our Strategy aims to compliment a suite of plans, programmes and policies developed by Nottinghamshire County Council and local partners to meet wider environmental objectives. These are outlined in detail in Appendix D and listed in Table 7.1

**Table 7-1: Plans, programmes and policy to consider in development of the Strategy to achieve wider environmental objectives**

Policy or plan	Scale
EU Water Framework Directive	International
National Flood and Coastal Erosion Risk Management Strategy	National
Catchment Flood Management Plans (CFMPs) including the 'River Trent Catchment Flood Management Plan' (2009)	Regional
Nottinghamshire County Council's Carbon Management Plan (2007) <sup>61</sup>	Local
Nottinghamshire County Council's Cultural Strategy for Nottinghamshire 2011 – 2021 <sup>62</sup>	Local
Nottinghamshire's Sustainable Community Strategy (2010-2020) <sup>63</sup>	Local
Waste Core Strategy (2013) <sup>64</sup>	Local
Nottinghamshire Local Biodiversity Action Plan (BAP) <sup>65</sup>	Local
Carbon Management Plan – 'Towards Carbon Neutrality' (2007) <sup>66</sup>	Local
Climate Change Adaptation Action Plan - Climate Change Framework for Action in Nottinghamshire (Nottinghamshire Agenda 21) (2005) <sup>67</sup>	Local
Nottinghamshire County Council Greenhouse Gas Emissions Report July 2014	Local

<sup>61</sup> Nottinghamshire County Council's Carbon Management Plan <http://cms.nottinghamshire.gov.uk/carbonmanagementplan.pdf>

<sup>62</sup> Nottinghamshire County Council's Cultural Strategy for Nottinghamshire 2011 – 2021 <http://www.nottinghamshire.gov.uk/thecouncil/plans/councilplansandpolicies/policy-library/?EntryId100=162658>

<sup>63</sup> Nottinghamshire Sustainable Community Strategy <http://www.nottinghamshire.gov.uk/thecouncil/plans/councilplansandpolicies/policy-library/?entryid100=127977&q=0%7eCommunity%7e>

<sup>64</sup> Waste Core Strategy (2013). <http://www.nottinghamshire.gov.uk/thecouncil/democracy/planning/local-development-framework/wastedevelopmentplandocuments/wastecorestrategy/>

<sup>65</sup> Nottinghamshire Local Biodiversity Action Plan <http://www.nottsba.org.uk/projects.htm#bap>

<sup>66</sup> Nottinghamshire Carbon Management Plan (2007). <http://www.nottinghamshire.gov.uk/enjoying/countryside/energy-and-carbon-management/climate-change/>

<sup>67</sup> <http://cms.nottinghamshire.gov.uk/climate-actionplan.pdf>

## 7.2 Strategic Environmental Assessment

In accordance with the regulations implementing the European Directive 2001/42/EC 'on the assessment of certain plans and programmes on the environment' (the SEA Directive)<sup>68</sup>, a Strategic Environmental Assessment (SEA) of the Local Flood Risk Management Strategy is required. The purpose of the SEA is to help ensure the environmental consequences of the Strategy are considered in the preparation and adoption of the Strategy with a view to promoting sustainable development. The SEA informs decisions rather than makes decisions and as such has contributed to this Strategy document.

An SEA has been carried out in concert with the Strategy to inform and shape the Strategy objectives. It concludes that the Strategy is unlikely to have any significant adverse effects largely due to the fact that in seeking to improve flood risk, any outcomes of actions are inherently positive. At this strategic level, the specifics of flood schemes are not identified so it is not possible to assess impacts on specific environmental assets but it is likely that the measures and actions planned within the Strategy will lead to a number of significant positive effects on the environment, assets and health and wellbeing,

## 7.3 Habitats Regulations Assessment

A separate Habitats Regulations Assessment (HRA) Screening Report<sup>69</sup> has been undertaken and used to inform the development of the Strategy. This should be referred to in conjunction with the main strategy.

## 7.4 EU Water Framework Directive

The European Water Framework Directive (WFD) came into force in December 2000 and became part of UK law in December 2003. It aims to introduce a simpler approach to managing the water environment and in particular sets out targets for water quality on designated watercourses. Nottinghamshire's approach to local flood risk management incorporates consideration of impacts of water quality with the aim of delivering a holistic approach to flood and water management across the County which derives multiple benefits.

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<sup>68</sup> SEA Directive (2001) <http://ec.europa.eu/environment/eia/sea-legalcontext.htm>

<sup>69</sup> URS (2014) Nottinghamshire Local Flood Risk Management Strategy Habitats Regulations Assessment Screening Report

## **8. STRATEGY MONITORING AND REVIEW**

### **8.1 Monitoring Progress and Success**

The Strategy and associated documents such as the Action Plan are live documents and will be monitored to ensure that adequate progress towards Strategy objectives is being made.

Within Nottinghamshire County Council flooding issues fall under the remit of the Transport and Highways Committee and policy issues are scrutinised by the Policy Committee. The Strategy will cover the 5 year period between 2015 and 2020 and the achievement of the strategy will be monitored by the joint Strategic Flood Risk Management Board and reported to relevant County Council Committees. The Action Plan will be reviewed annually.

### **8.2 Reviewing the Strategy**

The Strategy will be formally reviewed at least every six years to ensure that:

- It considers any changes in flood risk and policy conditions, such as a major flood event that leads to a step change in the understanding of flood risk in the County or a change in central government funding policy;
- It considers the effectiveness of the strategy to deliver flood risk management improvements in Nottinghamshire;
- It takes effective consideration of available resources within and available to RMAs;
- Its priorities and focus are still relevant and address the issues in Nottinghamshire, as well as national and regional priorities; and,
- It considers changes in corporate priorities such as those detailed within the Sustainable Community Strategy 2010-2020.

## **APPENDIX A FIGURES**

**Figure A1: Risk of flooding from surface water**

**Figure A2: Critical infrastructure at risk from surface water flooding**

**Figure A3: Heritage and biodiversity assets at risk from surface water flooding**

**Figure A4: Risk to agricultural land from surface water flooding**

**Figure A5: Risk of flooding from groundwater**

**Figure A6: Disused mine locations and risk of flooding from groundwater**

**Figure A7a: Historic Flooding records up to 2011**

**Figure A7b: Historic flooding records 2012 to February 2015**

**Figure A8: Main Rivers and ordinary watercourses**

**Figure A9: Risk of flooding from main rivers**

- APPENDIX B NOTTINGHAMSHIRE LOCAL FLOOD RISK MANAGEMENT STRATEGY ACTION PLAN**
- APPENDIX C STATUS OF LEGISLATION FOR LOCAL FLOOD RISK MANAGEMENT**
- APPENDIX D NATIONAL, REGIONAL, LOCAL AND CORPORATE STRATEGIES**
- APPENDIX E SUMMARY OF LOCAL ENGAGEMENT SURVEY RESPONSES**
- APPENDIX F PROPERTY COUNTS OF CRITICAL INFRASTRUCTURE AT RISK FROM SURFACE WATER FLOODING**

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<sup>i</sup> HSMO (2004) Civil Contingencies Act <http://www.legislation.gov.uk/ukpga/2004/36/contents>