

Nottingham City Council

Nottingham Local Flood Risk Management Strategy

Draft for Public Consultation

December 2014



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City Council

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Foreword

The effects of flooding can be devastating. It can cause people to be displaced from their homes for several months, cause major disruption to transport and have significant impacts for the local economy.

Parts of Nottingham recently benefited from the construction of a £45 million flood defence scheme along the River Trent, but there is still work to do to improve the level of protection to other areas of the City. One of our biggest challenges is dealing with flash flooding, which is difficult to predict and can affect the City with little or no warning. With a changing climate and the predicted increase in rainfall events it is important that the Council works closely with other organisations and takes a long-term and strategic approach to flood risk management.

We are committed to managing flood risk through routine measures, such as maintenance, and physical measures, such as flood defences. We also recognise the importance of supporting our citizens and businesses so that they know if they are at risk of flooding and what measures they can take to protect their own properties. It is important that we focus our resources on the communities that suffer the greatest impacts of flooding.

This Strategy has been developed in consultation with the many different organisations that have a role to play in managing flood risk across Nottingham. As part of this consultation exercise, we would like to hear your views about our draft Strategy and our proposals for managing flood risk in the future.



Councillor Jane Urquhart

Portfolio Holder for Planning & Transportation
Nottingham City Council

1 Introduction

1.1 What is local flood risk management?

Flooding can have devastating impacts that affect people, property, business, the environment and transport. The risk of flooding is expected to increase in the UK due to climate change and whilst it is not possible to prevent all flooding there are actions that can be taken to manage the risks and reduce the impacts on our communities.

There are many different sources of flooding, including rivers, sewers, surface water and groundwater. 'Local' flood risk refers to flooding from surface water, smaller watercourses and groundwater. This Local Flood Risk Management Strategy focuses on these 'local' flood risks and does not specifically include the risk of flooding from sewers or large rivers such as the River Trent and River Leen. However, flooding that occurs within the urban area it is often a combination of a number factors and local flood risk cannot be considered in isolation of the importance of larger rivers or the sewer network.

There are many different measures that can be taken by individuals, communities and authorities to manage local flood risk and the associated impacts. These can include non-physical measures such as surveying, mapping and communicating risks or creating a flood plan for your home or business. Physical measures can also be implemented, such as removing blockages from watercourses, building flood defences or installing flood protection measures at your home.



Figure 1-1: Flooding in Nottingham City Centre

1.2 Why has the Strategy been produced?

Flooding affects a number of areas in Nottingham and the frequency and impacts of flooding at each location vary considerably. The funding and resources available to reduce flood risk is limited and it is important that the available resources are focused towards the areas that suffer the greatest impacts.

Under the Flood and Water Management Act 2010 (FWMA), Nottingham City Council is a Lead Local Flood Authority (LLFA) and we have a statutory duty to develop, maintain, apply and monitor a strategy for local flood risk management – a ‘Local Flood Risk Management Strategy’. The Nottingham Local Flood Risk Management Strategy (hereafter ‘the Strategy’) has been developed to direct investment and resources to reduce flood risk to our communities using a prioritised approach.

The FWMA outlines what the Strategy must include. These requirements are included in Appendix A, along with the Sections of this report that meet each requirement.

1.3 Who should read this Strategy?

The Strategy outlines the work that the City Council is planning to do to manage local flood risk to our communities now and in the future. It is a source of information for all individuals, communities and businesses prone to flooding in Nottingham City. It is also intended to be an information source for the many different organisations that we work with to manage flood risk across the City.

2 Legislative Framework

2.1 Introduction

This Strategy has been developed with regard to all current legislation and guidance relating to flood risk management in Nottingham City. This chapter describes key legislation and guidance relating to flood risk management in Nottingham. A complete list of legislation and guidance referred to in the preparation of this Strategy is included in Appendix B.

2.2 Flood Risk Regulations 2009 & Flood and Water Management Act 2010

The European Union Floods Directive (2007/60/EC) was transposed into UK law by the Flood Risk Regulations 2009. The Regulations designated County Councils and Unitary Authorities as 'Lead Local Flood Authorities' (LLFAs). Under the Regulations, the City Council has a duty to undertake a Preliminary Flood Risk Assessment (PFRA), which we completed in 2011. The PFRA summarises flood risk within the City and is available on the City Council's website¹.

The Flood and Water Management Act 2010 placed a number of new responsibilities on the City Council as LLFA. Under Section 9 of the Act, LLFA's have a statutory duty to develop, maintain, apply and monitor a strategy for local flood risk management – a 'Local Flood Risk Management Strategy'.

2.3 National Flood and Coastal Erosion Risk Management Strategy

The Environment Agency (EA) and the Department for Environment, Food and Rural Affairs (Defra) jointly developed and published a National Flood and Coastal Erosion Risk Management Strategy (hereafter 'the National Strategy') for England in 2011.

The National Strategy identifies the following six Guiding Principles for all LLFAs to follow in fulfilling their flood risk management activities:

- 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

Local Flood Risk Management Strategies must be consistent with the National Strategy, especially these six Guiding Principles.

¹ <http://www.nottinghamcity.gov.uk/CHttpHandler.ashx?id=31465&p=0>

2.4 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was released in March 2012 and replaced Planning Policy Statement 25: Development and Flood Risk. Planning Practice Guidance (PPG) accompanies and amplifies the NPPF and together outline the principles for sustainable development on flood risk grounds.

2.5 The Local Plan

The Local Plan sets out the strategic and spatial land-use planning framework for the City. The Local Plan currently comprises the Nottingham City Aligned Core Strategy (ACS) (part 1 Local Plan - adopted 8 September 2014) which sets out strategic planning policies and development principles for Nottingham City to guide development until 2028, and the 'saved' Local Plan policies which were adopted in November 2005. Many other policies in the previous 'saved' 2005 Local Plan have been deleted as set out in Appendix E of the ACS.

Work is currently underway to prepare a new part 2 Local Plan known as The Nottingham City Land and Planning Policies Development Plan Document which together with the ACS will replace the 'saved' 2005 plan. This will sit alongside the ACS and set out planning policies which will guide how decisions on planning applications will be made in the future. It will also include potential sites for new development with adoption scheduled for late 2015.

Both part 1 and part 2 Local Plans include policies on flood risk management in new developments, in particular outlining the flood risk constraints to individual sites and the use of Sustainable Drainage Systems (SuDS). The policies provide a framework for ensuring sustainable development in terms of flood risk and water quality considerations.

Two Strategic Flood Risk Assessments (SFRAs) were undertaken as part of the evidence base for the new Local Plan. These SFRAs cover the River Leen & Day Brook catchments² and the Greater Nottingham area³ and aim to direct strategic development towards the areas of least flood risk. Where there are overriding reasons for developing in a flood risk area, the SFRAs present flood risk management measures that would be required for the development to be at a low risk of flooding. The SFRAs also include policies on sustainable development that have informed the planning policies included in the Local Plan documents.

2.6 Water Framework Directive

The European Union (EU) Water Framework Directive (WFD) was introduced in 2000. In 2003, it was transposed into English law by the Water Environment (Water Framework Directive) (England and Wales) Regulations.

² Black & Veatch (2008) River Leen & Day Brook Strategic Flood Risk Assessment Technical Report

³ Black & Veatch (2008) Greater Nottingham Strategic Flood Risk Assessment Technical Report

The WFD aims to enhance and prevent deterioration of aquatic ecosystems, reduce water pollution, promote the sustainable use of water and reduce of groundwater pollution. In England, the Environment Agency is the competent authority for delivering all WFD objectives.



Figure 2-1: Wildlife at Wollaton Park Lake

3 Roles and Responsibilities

3.1 What is a Risk Management Authority?

There are a number of organisations that operate in the Nottingham City area with responsibilities relating to flood risk management. The Flood & Water Management Act 2010 (FWMA) defines organisations with flood risk management functions and responsibilities as 'Risk Management Authorities' (RMAs).

The FWMA identifies which authorities are classed as RMAs. In Nottingham, the RMAs are:

- The **Environment Agency** has a Strategic Overview of all forms of flooding. They have developed a National Flood and Coastal Erosion Risk Management Strategy. The Environment Agency is responsible for managing flood risk from larger watercourses ('Main Rivers'), estuaries, the sea and reservoirs.
- **Nottingham City Council** is the Lead Local Flood Authority, responsible for managing flood risk from smaller watercourses ('Ordinary Watercourses'), surface water and groundwater. The City Council is also the Highway Authority and is responsible for the provision and maintenance of highway drainage features.
- **Severn Trent Water** is the Water and Sewerage Company that covers Nottingham. They have a duty to provide effectual drainage and are responsible for public sewers and associated infrastructure.

Further details on the roles and responsibilities of the Risk Management Authorities are included in Appendix C.

RMAs have a duty to act consistently with both the National Flood and Coastal Erosion Risk Management Strategy (Environment Agency, 2011) and Local Flood Risk Management Strategies. Water and Sewerage Companies must act consistently with the National Strategy and have regard to the Local Strategy when carrying out their flood risk management functions. This Strategy has been developed in consultation with the Risk Management Authorities.

3.2 Other Key Stakeholders

There are a number of other key stakeholders that are not statutory Risk Management Authorities but are important partners to the City Council when managing local flood risk in Nottingham. These stakeholders include:

- Citizens and communities are critical in managing flood risk in Nottingham. Citizens and communities can take measures to reduce the flood risk and work with other authorities to understand flooding issues and appropriate solutions,
- Nottinghamshire County Council, which is the Lead Local Flood Authority for the neighbouring area,

- Nottingham City Homes is the organisation that manages the City Council's social housing stock,
- Trent Valley Internal Drainage Board, which is responsible for maintaining a small length (approximately 250m) of the Fairham Brook in Clifton and the upstream catchment,
- Ashfield District Council, Broxtowe Borough Council, Rushcliffe Borough Council and Gedling Borough Council as neighbouring Districts,
- The Canal and River Trust (formerly British Waterways) which is the responsible Authority for the Nottingham & Beeston Canal that passes through the City,
- Network Rail, which maintain operational railway land to ensure the safe and effective operation of the railway and associated infrastructure, which includes drainage and flood risk,
- The Trent Regional Flood and Coastal Committee, which brings together members appointed by LLFAs and independent members to ensure coherent plans and targeted, risk-based investment across the Trent catchment.
- The Nottingham & Nottinghamshire Local Resilience Forum, which brings together the emergency planning and response organisations and provides direction and policies for responding to flooding incidents.
- Natural England, which is responsible for enhancing and protecting the natural environment,
- English Heritage, which advises on the protection and enhancement of the historic environment,
- Nottinghamshire Wildlife Trust, which is the largest conservation charity operating in the City,
- Trent Rivers Trust, which works with anglers, landowners, partner organisations and the general public to improve the river environment in the Trent catchment.
- Riparian land owners who are responsible for maintaining watercourses through or adjacent to their land under common law.

3.3 Local Partnerships and Governance Arrangements

As Lead Local Flood Authority, the City Council works in partnership with Risk Management Authorities and other relevant partners. The City Council has established a framework for working in partnership with flood risk management authorities, consisting of governance and meetings described below.

The joint Nottingham and Nottinghamshire Strategic Flood Risk Management Board brings together Senior Management from the City Council and Risk Management Authorities. The Board oversees flood risk management activities across the City and County Areas. The City Council's Portfolio Holder for Planning and Transportation is the co-chair of the Board.

Officers from across the City Council and representatives from Risk Management Authorities sit on three Operational Groups:

- The Flood Response and Maintenance Group which meets quarterly with the main aim of complimenting the work of the Local Resilience Forum, identifying specific emergency planning and drainage issues and discussing operations and maintenance activities.
- The Development and Flood Risk Group which meets quarterly to discuss development policy, sustainable development, flood risk management schemes linked to new development and sustainable drainage policy.
- Community Engagement Group which meets on an ad hoc basis to deliver specific community engagement initiatives linked to flood risk management.

The City Council and Risk Management Authorities report annually to the Overview and Scrutiny Committee on flood risk management activities. The Committee provides accountability and transparency and ensures that flood risk management activities undertaken by the City Council and Risk Management Authorities meet the needs of communities and citizens. The Committee will monitor progress against this Strategy.

4 Flood Risk in Nottingham

4.1 What is Flooding?

Flooding is defined as a situation where land that is normally dry becomes covered by water that arises from rivers, surface water, groundwater, sewers, canals or reservoirs and is normally caused by natural weather events. The risk of an area flooding is related to the surrounding landscape such as soil type, slopes, vegetation cover and paved surfaces. Flood risk management relates to any activity that can be carried out by individuals or organisations to reduce the adverse effect of flooding.

There are many measures that can reduce the risk of flooding including flood defences, pumping stations and road gullies. The need to adequately maintain these features should not be underestimated because any obstruction to flow could result in flooding during dry weather conditions or make flooding worse following rainfall. Structural defects could cause an asset to fail resulting in flooding of an area that would otherwise be protected.

4.2 The Nottingham City Landscape

Nottingham City Council's administrative area, shown in Figure 4-1, comprises the City of Nottingham and smaller settlements including Bulwell, Top Valley, Broxtowe, Old Basford, Sherwood, Hyson Green, St Ann's, Wollaton and Clifton. According to the 2011 census, the population of Nottingham is approximately 305,700. Parts of the City contain large areas of retail, industry and commerce that provide jobs and services for the local population.

There are vast expanses of paved surfaces in urban areas of the City, which can cause large amounts of surface water to runoff and accumulate in low lying areas, resulting in flash flooding. There are also extensive areas of public open space and green infrastructure networks, particularly in suburban areas.

The topography of the area is varied, ranging from the flat expanses of the River Trent floodplain to the moderate and steep gradients of Mapperley Park, Top Valley and Sherwood. Due to the urban nature of the study area, the areas of steep topography and valleys are often unnoticed but they are a significant feature that affects surface water and sewer flood risk in the City.

The majority of the study area is underlain by a major aquifer that carries groundwater. Some parts of the City such as Old Basford and Sneinton suffer the effects of a high groundwater table, resulting in water ingress into cellars and waterlogged land.

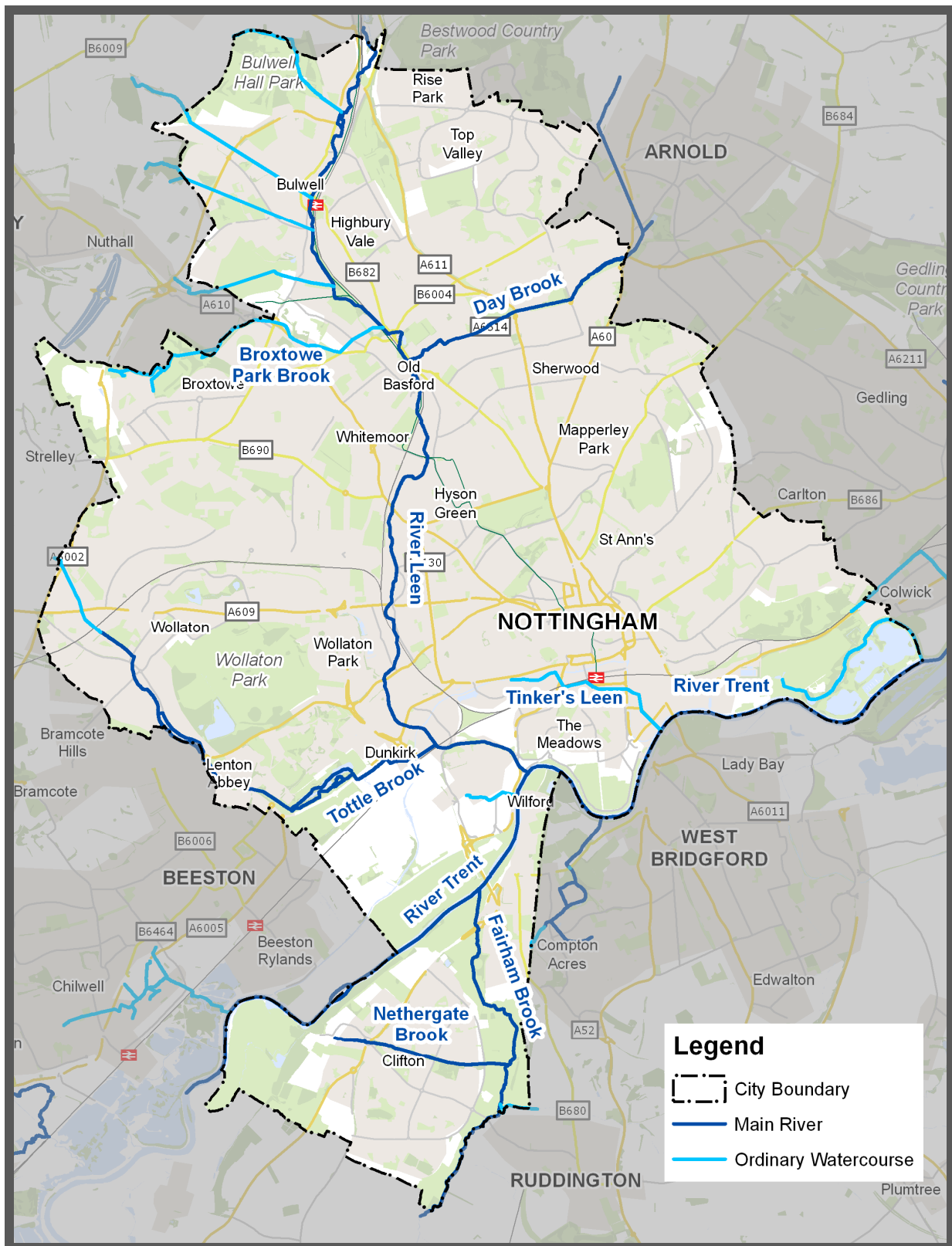


Figure 4-1: Nottingham City Council Geographical Setting

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4.3 Local Flood Risk in Nottingham

Flooding can occur from a number of different sources including rivers, sewers, surface water, reservoirs and groundwater. Different Risk Management Authorities have flood risk management functions for the different flood sources, as defined in Section 4.4 below. Flood sources that are classed as 'local' include Ordinary (minor) Watercourses, surface water and groundwater and the City Council has flood risk management functions for these sources.

It is recognised that in urban areas such as Nottingham it is not possible to consider 'local' flood risk in isolation due to the interaction with other water bodies, such as sewers and Main (major) Rivers. Therefore, this Strategy focuses on local flood risk but also promotes a collaborative and holistic approach to managing all flood risk within the City by working with other Risk Management Authorities.

Within Nottingham, floods can occur very quickly as a result of intense rainfall that overwhelms drainage systems. This flash flooding is difficult to predict and can occur with little warning and a single rainfall event can cause extensive damage to property and infrastructure. Typically flooding occurs from local sources following intense rainfall events. Nottingham is also vulnerable to floods that occur following prolonged rainfall over a number of days. This type of flooding could occur from larger watercourses (Main Rivers), such as the River Trent and Fairham Brook. This type of flooding can be predicted and warnings can be given to the public to take precaution or evacuate properties.

4.4 Flood Sources in Nottingham

Flooding can occur from many different sources or a combination of sources. The main flood sources in Nottingham are summarised below.

River flooding occurs when the volume of water exceeds the capacity of a river channel. Different river systems respond differently to rainfall. Large rivers such as the River Trent respond slowly to rainfall, giving time to issue flood warnings. Urban watercourses such as the River Leen respond rapidly to rainfall, giving less time to respond. Maps showing the areas at risk of flooding from rivers are available on the Environment Agency's website.

There are two different categories of river, as described below:

- **Main Rivers** are usually larger watercourses, but also include some smaller watercourses that have strategic flood risk importance. In Nottingham, Main Rivers include the River Trent, River Leen, Day Brook, parts of Tottle Brook, Fairham Brook and Nethergate Brook. The Environment Agency is responsible for managing Main River flood risk.
- **Ordinary Watercourses** are smaller watercourses that are not Main River. There are numerous Ordinary Watercourses within the City, including Broxtowe Park Brook, the upstream reaches of

Tottle Brook, Robins Wood Dyke and Tinkers Leen. Nottingham City Council is responsible for managing Ordinary Watercourse flood risk.



Figure 4-2: The River Leen at Basford Tram Station

Surface water flooding has significant impacts in urban areas such as Nottingham. It occurs when intense rainfall generates overland flow that can overwhelm drains and sewers causing water to accumulate in low lying areas. Maps showing the areas at risk of flooding from surface water are available on the Environment Agency's website. Generally speaking areas of greatest flood risk are in low lying areas with large paved and urbanised upstream areas that generate significant volumes of surface water. It is in response to this type of flooding where the City Council can have the greatest effect in reducing the flood risk to citizens and where we work proactively to reduce risk in our highest risk areas.

Highway flooding is similar to surface water flooding and can occur when rainfall overwhelms the capacity of gullies or highway drains or when the sewers or watercourses that they connect into are full to capacity. Flooding can also occur when gullies are blocked, for example by leaves or silt, and maintenance is therefore an important aspect of flood risk management. The City Council has a proactive, risk-based gully cleansing regime. All gullies are cleansed annually with gullies in known flood risk areas cleansed quarterly or prior to known severe weather.



Figure 4-3: Surface water flooding at University Boulevard

Groundwater flooding relates to situations where land at or above the ground surface that is not normally covered by water becomes flooded by groundwater. Compared to rivers and surface water, groundwater levels respond more slowly to rainfall, river levels and abstraction activities. Since the decline in water-intensive industry, groundwater levels in Nottingham are recovering to natural levels. The City Council has had a number of reports of groundwater ingress into basements and cellars in areas such as Old Basford and Sneinton that have historically been dry. These properties were likely to have been built at a time when the groundwater table was artificially lowered by water-intensive industry that relied on abstracting groundwater to support operations. As a result of the decline in water-intensive industry, groundwater is rebounding to natural levels and consequently is entering below-ground voids. The water in cellars that is experienced by some residents is therefore a natural phenomenon. Artificially reducing the level of groundwater is an unsustainable option because the aquifer causing these issues is large and extends north to Doncaster. In the unlikely event that groundwater would rise above the surface of the land, the Council would be responsible for managing this flood risk.

Sewer flooding can occur when the capacity of the sewerage network is overwhelmed or when there is a blockage or collapse of a sewer that prevents the sewerage network from conveying flow effectively. The risk of sewer flooding varies across the City according to available capacity and condition of assets. Some areas of the City experience high levels of blockages due to sewer misuse as a result of flushing sanitary products into toilets or pouring fats, oils and grease down the sink. Severn Trent Water is responsible for managing flooding from the sewerage network in the Nottingham City area.

Reservoir flooding can occur when all or part of a reservoir dam structure fails. Wollaton Park Lake is a large reservoir that is categorised as high risk due to the number of properties at risk of flooding if the dam wall failed. Martin's Pond in Wollaton is a smaller and lower risk reservoir. There are a number of smaller lakes within the City area that provide effective flood storage and control flows in watercourses. It should be noted that reservoir failure is rare and that inspection regimes are in place to ensure that high risk reservoirs are in good condition. The Environment Agency is responsible for managing flood risk from reservoirs.

Canal flooding could occur where there are issues with the management of water levels or a breach in embanked sections. Generally, locks and weirs on canals will control water levels and the risk of flooding is therefore low. In the City, the Nottingham and Beeston Canal interacts with the River Trent and flood gates are operated to manage the flood risk. The Canal and River Trust is responsible for managing flood risk from canals.

Integrated flooding can occur when two or more flood sources interact. A lack of capacity in one system can lead to flooding and the cause of flooding can be difficult to attribute. For example, when river levels are high, sewers may become 'tide locked' and unable to drain away resulting in a backing up effect, which can lead to flooding some distance away from the watercourse itself.

4.5 Priority Flood Risk Locations

Priority flood risk locations were identified at a strategic level in the Nottingham City Preliminary Flood Risk Assessment (PFRA). Following the PFRA, the Nottingham City Surface Water Management Plan (2014 revision) was undertaken, which identifies priority areas based on flood risk. The assessment undertaken as part of the Surface Water Management Plan (SWMP) included all forms of local flood risk and has been used to inform priority areas for this Strategy.

Priority areas were identified using a risk-based approach, which involved comparing historic flood records with predicted flood outlines for both river flooding and surface water flooding. Each area where there is a known and predicted flood risk was classed as a 'Local Flood Hotspot Area'. Each Local Flood Hotspot Area was prioritised based on the numbers of domestic properties, businesses and critical infrastructure at risk of flooding. The level of social deprivation was also taken into account. This approach will ensure that investment is directed towards locations where people, property and businesses suffer the greatest impacts of flooding.

Seventeen Local Flood Hotspot Areas were identified based on the number of properties at risk of flooding, historic flooding records and social deprivation. Further information on the methodology can be found in the SWMP document. The SWMP presents a high level action plan for each location, which will be taken forward to inform the Action Plan in Section 5.3 of this Strategy. This list will be

reviewed periodically in line with the Strategy, as detailed in Section 7. The Local Flood Hotspot Areas are listed in **Table 4-1** and shown on a map in Figure 4-4.

In addition, there are a number of locations in the City where individual properties are regularly affected by localised flooding, which causes property damage and disruption to people's lives. These locations may not appear on the priority list included in Table 4-1 but it is important to note that the City Council is constantly seeking funding opportunities to resolve flooding at such locations.

Table 4-1: Nottingham City Local Flood Hotspot Areas

Local Flood Hotspot Area	Ward(s)	Priority	Map Reference (Figure 4-4)
Bestwood Road	Bulwell	Medium	01
Main Street Bulwell	Bulwell	Medium - High	02
Top Valley Way	Bulwell Forest	High	03
Colmon Close	Bestwood	Medium	04
Cinderhill Road	Bulwell	Medium	05
Woolsington Close	Bilborough	Medium	06
Nuthall Road	Aspley, Nuthall East & Strelley, Basford	Medium	07
Stockhill	Basford	Medium - High	08
Old Basford	Basford	High	09
Haydn Road	Berridge, Sherwood	Medium - High	10
Winchester Street	Sherwood	Medium	11
Mansfield Road	Mapperley, Sherwood, Berridge	Medium	12
Gregory Boulevard	Radford & Park, Arboretum, Berridge	Medium	13
Felstead Road	Bilborough, Wollaton West, Leen Valley	Medium - High	14
Shakespeare Street	St Ann's	Medium	15
Tottle Corridor	Bilborough, Wollaton West (Beeston N, Broxtowe BC)	High	16
University Boulevard	Dunkirk & Lenton, Wollaton East & Lenton Abbey	Medium	17

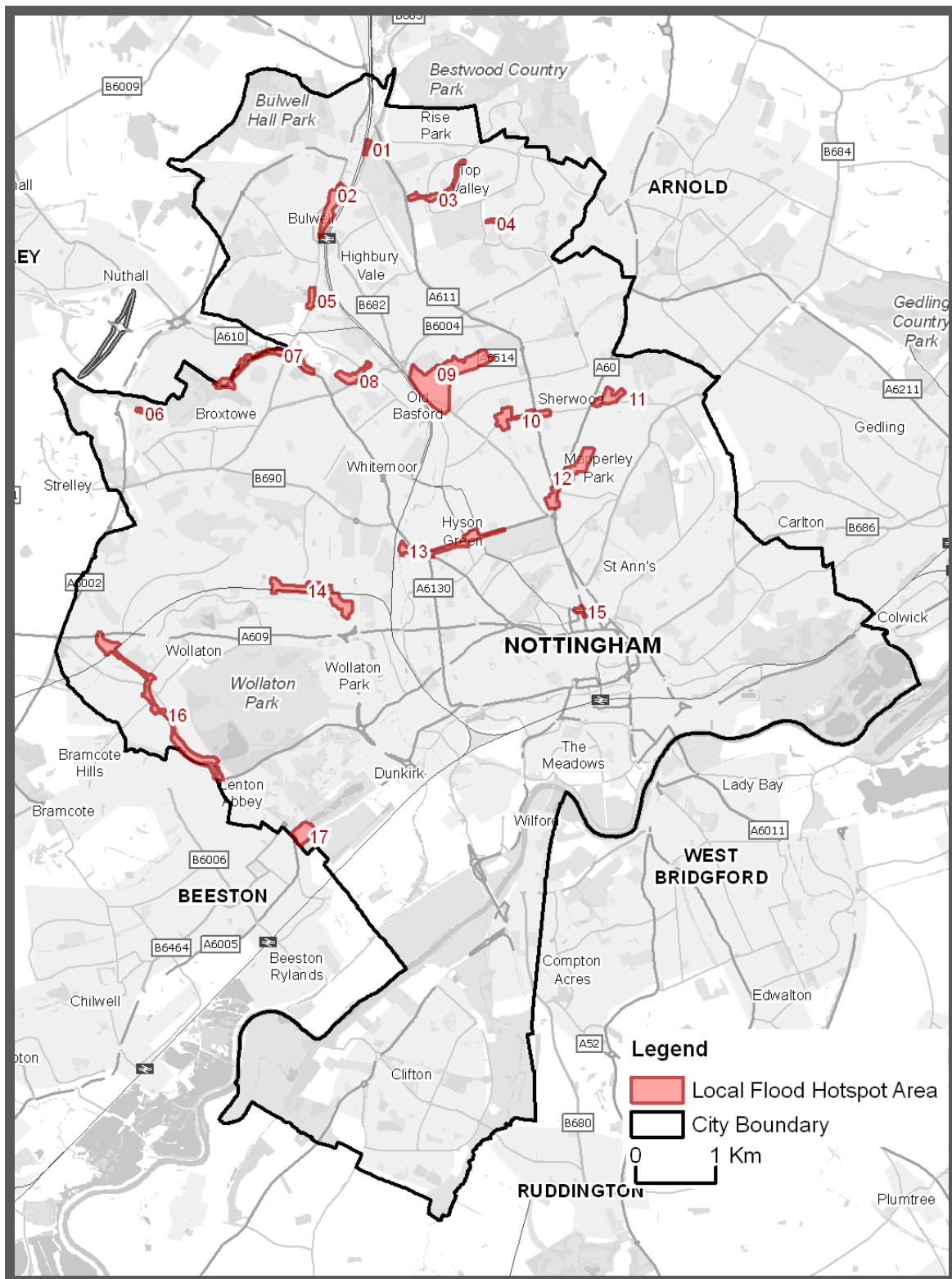


Figure 4-4: Local Flood Hotspot Areas in Nottingham City

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4.6 Managing Future Flood Risk

4.6.1 Impacts of Future Climate Change

The predicted effects of climate change will be far reaching and the East Midlands is expected to see hotter, drier summers and warmer, wetter winters with an increase in extreme weather events ⁴.

‘Climate change adaptation’ involves making changes to prepare for the potential impacts of climate change. In relation to flooding, adaptation measures include increasing community awareness and taking steps to improve the resilience of homes and businesses. Nottingham City Council’s Climate Change Adaptation Action Plan⁵ outlines high level steps that have been integrated into the work of service areas across the Council to improve adaptation. At a community level, the Nottingham Community Climate Change Strategy⁶ outlines the need for behavioural change, including creating ‘green’ social norms, engaging with communities, incentivising changes and making it easy for communities to make changes. There are a number of actions in the Strategy that relate to flood risk management indirectly, but the specific action relating to flood risk is included below:

CC6: Resilience awareness programme designed and rolled out for communities most at risk of flooding and heat waves.

In light of the predicted climatic changes, it is essential that the effects of more extreme flooding are managed. Any flood risk management activities within the City should take account of the predicted climatic changes to improve community resilience to more extreme weather. This Strategy has been developed in line with local and national climate change strategies, plans and guidance and many of the outcomes of the Strategy will support the vision of local climate change plans and strategies.

The Environment Agency recommends national precautionary ranges for peak rainfall intensity and peak river flow⁷. This guidance is included in Table 4-2 below and should be used in the assessment of flood risk, for example for new developments, and when designing flood risk management measures.

Table 4-2: Climate Change Projections⁷

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%		+20%	

⁴ United Kingdom Climate Projections 2009 (UKCP09)

⁵ Nottingham City Council, Climate Change Adaptation Action Plan, available at: <http://m.nottinghamcity.gov.uk/CHttpHandler.ashx?id=27634&p=0>

⁶ Nottingham City Council, The Nottingham Community Climate Change Strategy 2012 – 2020, available at: <http://m.nottinghamcity.gov.uk/CHttpHandler.ashx?id=33519&p=0>

⁷ Environment Agency (2013) Climate Change Allowances for Planners, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296964/LIT_8496_5306da.pdf

4.6.2 Spatial Planning, Flood Risk Management and Sustainable Drainage Systems (SuDS)

The National Planning Policy Framework (NPPF) and accompanying planning practice guidance aims to ensure that new development is sustainable on flood risk grounds. The Policy ensures that flood risk is considered at all stages in the planning process and seeks to guide new development away from flood risk areas. Where development in flood risk areas cannot be avoided suitable mitigation and resilience measures should be incorporated into the design of the development to ensure that the risk to people and property within the new development is mitigated.

The legacy of using conventional piped drainage systems in new developments over many decades has resulted in numerous locations in the City that are vulnerable to flash flooding. Sustainable Drainage Systems ('SuDS') mimic natural processes and slow the flow of surface water following rainfall events. They also help to reduce pollution and improve wildlife habitat. Typical SuDS features include swales, permeable paving and attenuation ponds.



Figure 4-5: Examples of SuDS schemes that have been installed in Nottingham
Top left: Attenuation basin at Nottingham Business Park; top right: green roof at Nottingham Trent University; bottom left: geocellular units at Ruddington Lane, bottom right: example of permeable paving

The National Planning Policy Framework and Building Regulations encourage the use of SuDS in all new developments. Over recent years, the City Council has been successful in increasing the use of SuDS in new developments by encouraging developers at the pre-application stage and by using the planning process to require the use of SuDS, particularly in major developments.

Under Schedule 3 of the Flood & Water Management Act 2010 the Government is implementing SuDS Approving Bodies ('SABs') to address long-standing issues with adoption and maintenance of SuDS in new developments. As Lead Local Flood Authority, the City Council will take on the statutory role of the SAB. Currently, this legislation is expected to be enacted in 2015.

5 Managing Local Flood Risk in Nottingham

5.1 What do we want to achieve?

The aim of this Local Flood Risk Management Strategy is to reduce the impact of flooding on people, property and businesses in Nottingham. There are many different elements to flood risk management and this aim will be achieved through a variety of activities and measures over a range of timescales, which are outlined throughout this chapter.

5.2 Objectives of the Strategy

A number of objectives have been derived that reflect the requirements of the Flood and Water Management Act 2010 and the National Flood and Coastal Erosion Risk Management Strategy (Section 2.3). The objectives for local flood risk management in Nottingham have been developed in consultation with Risk Management Authorities and are outlined below.

Local Flood Risk Management Aim: Reduce the impact of flooding on people, property and businesses in Nottingham	
Objective 1: Work collaboratively with partners	Work collaboratively with Risk Management Authorities and stakeholders to deliver effective maintenance, understand flood risk, to jointly invest in schemes and share expertise.
Objective 2: Sustainable new developments	Ensure that new development is sustainable, is not at risk of flooding and does not increase flooding elsewhere. Promote the use of Sustainable Drainage Systems to manage water quality, water quantity and biodiversity improvements.
Objective 3: Economically sustainable activities	Deliver cost-effective, proportionate and risk-based flood risk management schemes and maintenance activities.
Objective 4: Community education & engagement	Educate and engage with communities and politicians to raise awareness of flood risk, resilience measures, preparedness and riparian responsibilities.
Objective 5: Multiple benefits	Promote flood risk management activities that consider climate change, enhance the natural environment, deliver blue-green infrastructure, improve water quality and provide biodiversity and amenity benefits.
Objective 6: Catchment based approach	Promote a joined-up and catchment-based approach to flood risk management whilst supporting the delivery of improvements to the water environment.
Objective 7: Local flood risk information	Further improve data, asset information and knowledge of current and future local flood risk using a risk-based approach.

5.3 How will we deliver the Strategy - The Local Flood Risk Management Action Plan

An Action Plan has been developed to guide the management of local flood risk in Nottingham. The Action Plan draws on available plans and guidance and considers all elements of flood risk management, including flood alleviation schemes, maintenance activities, strategies and studies, community engagement and asset information improvements. The delivery timescales included in the Action Plan are indicative and their delivery is subject to viability, feasibility, funding availability and community buy-in. If a scheme is listed in the Action Plan it is not a guarantee that the measures will be delivered. Moreover it is an indication of where the City Council intends to invest if funding becomes available.

An estimated timescale is provided for each Action according to the below categories:

- **Short Term:** 2014/15 to 2016/17
- **Medium Term:** 2017/18 to 2020/21
- **Long Term:** 2021/22 and beyond

The Strategy is a Living Document and this Action Plan will be updated annually to reflect work that has been completed, any change in funding status or priorities and new schemes that could be delivered.

Flood Risk Management Actions		Strategy Objectives Met	Priority	Timescale	Lead & Partner Organisations	Estimated cost	Potential funding sources	Funding Status	
								Under investigation	Indicative Allocation
Statutory Duties									
S1	Develop a Local Flood Risk Management Strategy (Section 9 of the Flood & Water Management Act (FWMA))	All	High	Short	Lead: Nottingham City Partners: all RMAs	Existing resource	Existing resource		✓
S2	Lead on investigations into flooding incidents that meet local thresholds (Section 19 FWMA)	1, 3, 4, 5, 6, 7	High	Ongoing	Lead: Nottingham City Partners: all RMAs	Existing resource	Existing resource		✓
S3	Develop a comprehensive register of flood risk management assets and features to replace the interim register (Section 21 FWMA)	1, 3, 7	Medium	Medium	Lead: Nottingham City	Existing resource	Existing resource		✓
S4	Continue to support the work of the Development Management, Regeneration and Planning Policy teams, Severn Trent Water and the Environment Agency to ensure that development is sustainable on flood risk grounds (Section 27 FWMA)	1, 2, 5, 6	High	Ongoing	Lead: Nottingham City	Existing resource	Existing resource		✓
S5	Identify and designate features that may have a significant impact on flood risk (Schedule 1 FWMA)	1, 4, 7	Low	Ongoing	Lead: Nottingham City Partners: all RMAs	Existing resource	Existing resource		✓
S6	Make preparations for the implementation of the Sustainable Drainage Systems Approving Body (SAB), pending an announcement from Defra (Schedule 3 FWMA)	1, 2, 5	Medium	Short (pending further information)	Lead: Nottingham City	TBC	Existing resource supplemented using Defra's SAB Grant Award	✓	
Asset Management									
A1	Continue to implement the recommendations of the Urban Highway Drainage Good Practice Guide, including asset data collection and condition surveys, electronic records of maintenance and flooding and a targeted risk-based approach to maintenance regimes.	1, 3, 6, 7	High	Ongoing	Lead: Nottingham City	Existing resource and revenue budgets	Existing NCC Highway Services budget		✓
A2	Continue to clear watercourse trash screens proactively and reactively, informed by telemetry systems.	3, 7	High	Ongoing	Lead: Nottingham City	Existing resource and revenue budgets	Existing NCC Drainage budget		✓
A3	Implement and record a cyclical programme of asset inspections, including CCTV surveys, asset data improvements and site inspections.	1, 3, 5, 6, 7	Medium	Short	Lead: Nottingham City	£10,000 per annum	Defra Area Based Grant	✓	
Community Engagement									
C1	Working in partnership with RMAs, develop a prioritised and targeted community engagement strategy with at risk communities.	1, 3, 4	Medium	Medium	Lead: Nottingham City Partners: Environment Agency & Severn Trent	Existing resource	Existing resource		✓
C2	Investigate options for entering into partnerships with suppliers to support communities in protecting their own properties by obtaining self-help measures at a lower cost.	1, 3, 4, 5	Medium	Short	Lead: Nottingham City	Existing resource	Existing resource		✓

Flood Risk Management Actions	Associated Strategy Objectives	Priority	Timescale	Lead & Partner Organisations	Estimated cost	Potential funding sources	Funding Status	
							Under investigation	Indicative Allocation
Nottingham City Medium Term Plan (Capital Investment Schemes)								
Broxtowe Park Brook, Nuthall: Capital Maintenance and Flood Alleviation Scheme (Map Reference 07 in Figure 4-4)					£1,130,000			
Silt removal and silt management	1, 3, 5	High	Short	Lead: Nottingham City Partner: Severn Trent, Nottinghamshire County, Broxtowe Borough	£90,000	Central Government (Flood Defence Grant in Aid (FDGiA)), Local Levy, Nottingham City Council	✓	
Modelling, mapping and flood risk management option development	1, 3, 4, 5, 6, 7	Medium	Medium		£40,000		✓	
Design, construction and delivery flood risk management scheme	3, 5, 6	Medium	Long		£1,000,000			✓
Tottle Brook, Wollaton: Flood Alleviation Scheme (Map Reference 16 in Figure 4-4)					£800,000			
Modelling, mapping and flood risk management option development	1, 3, 4, 5, 6, 7	Medium	Medium	Lead: Environment Agency Partner: Nottingham City, Severn Trent, Nottinghamshire County, Broxtowe Borough	£50,000	Central Government (FDGiA), Local Levy, Nottingham City Council		✓
Design, construction and delivery flood risk management scheme	3, 5, 6	Medium	Long		£750,000		✓	
Colmon Close, Top Valley: Surface Water Management Scheme (Map Reference 04 in Figure 4-4)					£390,000			
Modelling, mapping and flood risk management option development	1, 3, 4, 5, 6, 7	Medium	Medium	Lead: Nottingham City	£30,000	Central Government (FDGiA), Local Levy, Nottingham City Council		✓
Design, construction and delivery flood risk management scheme	3, 5, 6	Medium	Long		£360,000			✓
Day Brook Flood Alleviation Scheme (Map Reference 09 in Figure 4-4)					£2,300,000			
Catchment-Based Approach scoping study	1, 2, 3, 4, 5, 6, 7	High	Short	Lead: Environment Agency Partner: Nottingham City, Nottinghamshire County, Severn Trent, Gedling Borough, developers / landowners	£30,000	Local Enterprise Partnership, Central Government (FDGiA), Local Levy, Nottingham City Council, New Homes Bonus, Developer contributions		✓
Modelling, mapping and flood risk management option development	1, 3, 4, 5, 6, 7	High	Medium		£50,000		✓	
Design, construction and delivery flood risk management scheme	3, 5, 6	High	Long		£2,220,000		✓	
City-wide Individual Property Level Protection Programme					£338,238			
Deliver Property Level Protection to approximately 70 properties across the City between 2015/16 – 2021/22	1, 3, 4	High	Short through to long	Lead: Nottingham City	£4,832 per property	Central Government (FDGiA), Local Levy, Nottingham City Council, Property owner contributions	✓	✓

Flood Risk Management Actions	Associated Strategy Objectives	Priority	Timescale	Lead & Partner Organisations	Estimated cost	Potential funding sources	Funding Status	
							Under investigation	Indicative Allocation
Nottingham City Medium Term Plan (Capital Investment Schemes)								
Mapperley Park Surface Water Management Scheme (Map Reference 12 in Figure 4-4)					£970,000			
Modelling, mapping and flood risk management option development	1, 3, 4, 5, 6, 7	Medium	Medium	Lead: Nottingham City Partner: Severn Trent	£40,000	Central Government (FDGiA), Local Levy, Nottingham City Council, Severn Trent Water	✓	
Design, construction and delivery flood risk management scheme	3, 5, 6	Medium	Long		£850,000		✓	
River Leen, Bobbers Mill Flood Alleviation Scheme					£2,700,000			
Modelling, mapping and flood risk management option development	1, 3, 4, 5, 6, 7	Medium	Long	Lead: Nottingham City Partner: Environment Agency, developers / landowners	£50,000	Local Enterprise Partnership, Central Government (FDGiA), Local Levy, Nottingham City Council, New Homes Bonus, Developer contributions	✓	
Design, construction and delivery flood risk management scheme	3, 5, 6	Medium	Long		£2,650,000		✓	
Woolsington Close, Strelley: Surface Water Management Scheme (Map Reference 06 in Figure 4-4)					£270,000			
Modelling, mapping and flood risk management option development	1, 3, 4, 5, 6, 7	Medium	Short	Lead: Nottingham City	£30,000	Central Government (FDGiA), Local Levy, Nottingham City Council		✓
Design, construction and delivery flood risk management scheme	3, 5, 6	Medium	Short		£240,000			✓

6 Financing the Strategy

6.1 Introduction

There are resource and funding pressures facing central Government and local authorities across the Country. As a consequence the national level of investment in flood risk management infrastructure has decreased in real terms in recent years.

Central Government's funding mechanism for flood risk management schemes is called Flood Defence Grant in Aid (FDGiA). Since 2011 FDGiA has operated on a partnership funding basis. The amount of central funding that a scheme attracts is based on a series of complex calculation but in summary is based on the benefits (domestic properties protected) and the amount of funding secured from 'other' sources.

6.2 Summary of funding streams

In partnership with Risk Management Authorities, the City Council will continue to explore all opportunities for funding flood alleviation schemes. The main sources of funding that could contribute to flood risk management activities in Nottingham are listed below⁸.

Funding Source	Description of funding	Administering Body	Qualifying Activities
Flood Defence Grant in Aid (FDGiA)	Central government funding for flood (and coastal) risk management projects. The funding mechanism was recently revised to encourage a partnership funding approach. No schemes are fully funded by central Government under this funding stream and other beneficiaries are expected to contribute towards the scheme.	Environment Agency	Medium to large capital flood risk management projects
Local Levy	All Lead Local Flood Authorities within a Regional Flood and Coastal Committee area contribute to the Local Levy fund. The allocation of funds is more flexible than FDGiA regarding the type, size and benefits.	Trent RFCC / Environment Agency	Smaller flood risk management projects or as a contribution to partnership funding
Private Contributions	Voluntary funding from beneficiaries of projects, such as businesses or householders, could improve the economic case for schemes. Contributions can be financial or 'in kind' (e.g., land, plant, labour).	Nottingham City Council	All projects

⁸ Further funding sources are available at the following reference:
Local Government Association, Defra, Environment Agency (2012) Partnership funding and collaborative delivery of local flood risk management: a practical resource for LLFAs

Funding Source	Description of funding	Administering Body	Qualifying Activities
Water and Sewerage Company Investment	Water and Sewerage Company investment is regulated by Ofwat and the number of properties on the flooding registers. Companies aim to reduce the risk of flooding to properties that have suffered flooding historically by investing in the sewer network and undertaking proactive cleansing.	Severn Trent Water	Areas with a history of sewer flooding / projects that help remove surface water from combined sewers
Section 106 contributions (Town and Country Planning Act)	Contributions from developers, linked to specific development sites where off-site improvements to infrastructure are required to ensure proposals are acceptable.	Nottingham City Council	Larger development sites
Council Capital Funding	There is no specific budget for flood risk management capital schemes. However, in some situations there may be funding available from Area Capital funds.	Nottingham City Council	Small sized flood risk management capital projects or partnership funding contributions
Council Revenue Funding	<p>The Council currently funds maintenance of existing assets via the revenue budgets of the relevant department.</p> <p>Defra funding has been provided to finance the execution of the Council's new duties as Lead Local Flood Authority. Funding at this level is expected to continue until 2015. Beyond this date the funding will be subject to government spending review.</p> <p>The City Council allocates annual revenue budget to maintain highway drainage systems and to clear trash screens on culverted watercourses.</p>	Nottingham City Council	Measures requiring officer time and / or maintenance activity
Local Enterprise Partnership (LEP)	D2N2 is the LEP that covers Derby, Derbyshire, Nottingham and Nottinghamshire. The LEP is a local partnership between local authorities and businesses and they play a central role in deciding local economic priorities and undertaking activities to drive economic growth and create local jobs. Flood risk management schemes that have the potential to deliver economic growth may be eligible for funding through the LEP and will be put forward for consideration.	D2N2 LEP	Infrastructure improvements delivering economic benefits
New Homes Bonus	A financial incentive to build new housing that could be used to fund any additional local infrastructure needed.	Nottingham City Council	Where a development is dependent on flood risk management
Landfill Communities Fund	Tax credit scheme enabling landfill operators to fund schemes that deliver environmental enhancement. Some funds are only available directly to charities and community groups.		Multiple benefit schemes with community links

7 Strategy Monitoring & Review

7.1 Monitoring Progress and Success

The Strategy is a Living Document and will be monitored to ensure that progress is being made against the strategic objectives outlined in Section 5.1 and the Strategy Action Plan.

The monitoring process will involve measuring actions against indicators for each objective. Progress against each action in the Action Plan will also be monitored. The indicators for monitoring progress are included in Appendix D.

7.2 Reviewing the Strategy

The review process will ensure that the Strategy document remains up-to-date and relevant to flood risk management in Nottingham.

7.3 Frequency

Monitoring the progress and success of the Strategy will take place annually. An annual update of the Action Plan will be undertaken and published on the City Council's website.

The City Council will update the Strategy every three years from the date of final approval. The most up-to-date version of the Strategy will be available for download from the City Council's website. The City Council may choose to update the document more frequently outside these timescales, for example if there is a change in legislation or if a major flood event occurs.

7.4 Governance Arrangements

The monitoring and reviewing process will be undertaken alongside the City Council's Development & Flood Risk Group and Flood Response & Maintenance Group, which include representatives from key teams from across the Council and Risk Management Authorities. The Nottingham and Nottinghamshire Strategic Flood Risk Management Board will oversee the monitoring and reviewing of the Strategy.

Appendix A: Demonstrating the Statutory Requirements of the Strategy

Requirement	Section of this report
The risk management authorities in the Nottingham City area	Section 3.1
The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area	Section 3 and Appendix C
The objectives for managing local flood risk (including any objectives included in the authority's flood risk management plan prepared in accordance with the Flood Risk Regulations 2009)	Section 5.2
The measures proposed to achieve those objectives	Section 5.3
How and when the measures are expected to be implemented	Section 5.3
The costs and benefits of those measures, and how they are to be paid for	Sections 5.3 and 6
The assessment of local flood risk for the purpose of the strategy	Section 4
How and when the strategy is to be reviewed	Section 7
How the strategy contributes to the achievement of wider environmental objectives	Section 5

Appendix B: Relevant Legislation & Guidance

National legislation and guidance

- Department for Transport (2014) Transport Resilience Review: A review of the resilience of the transport network to extreme weather events
- Department for Communities and Local Government (2013) National Planning Policy Framework Planning Practice Guidance
- Department for Communities and Local Government (2012) National Planning Policy Framework
- Environment Agency (2011) National Flood and Coastal Erosion Risk Management Strategy
- HM Government (2011) Water White Paper
- HM Government (2011) Localism Act
- HM Government (2010) Flood and Water Management Act
- HM Government (2010) Building Regulations Approved Document H – Drainage and Waste Disposal
- Met Office (2009) UK Climate Projections 2009
- HM Government (2009) Flood Risk Regulations
- HM Government (2008) Climate Change Act
- CIRIA (2007) The SuDS Manual (C697)
- Department for Environment, Food and Rural Affairs (2004) Making Space for Water
- HM Government (2004) Civil Contingencies Act
- European Union (2001) Strategic Environmental Assessment Directive
- European Union (2000) Water Framework Directive
- HM Government (1991) Land Drainage Act
- HM Government (1975) Reservoirs Act

Local policy and guidance

- Nottingham City Council (2014) Nottingham City Surface Water Management Plan
- Nottingham City Council, Gedling Borough Council, Broxtowe Borough Council (2012) Aligned Core Strategy
- Nottingham City Council (2012) Urban Forestry Strategy
- Nottingham City Council (2011) Local Transport Plan
- Nottingham City Council (2011) Preliminary Flood Risk Assessment
- Nottingham City Council (2011) Nottingham Community Climate Change Strategy 2012 – 2020
- Nottingham City Council (2011) Biodiversity Position Statement 2011 - 2020
- Nottingham City Council (2010) Breathing Space: Revitalising Nottingham's Open and Green Spaces
- Environment Agency (2010) River Trent Catchment Flood Management Plan
- Nottingham City Council (2010) Greater Nottingham Outline Water Cycle Study
- Environment Agency (2009) Humber River Basin Management Plan
- Nottingham City Council / Environment Agency (2008) Greater Nottingham Strategic Flood Risk Assessment
- Nottingham City Council / Environment Agency (2008) River Leen & Day Brook Strategic Flood Risk Assessment
- Nottingham City Council River Leen Access and Biodiversity Study
<http://gossweb.nottinghamcity.gov.uk/bigdownloads/riverleen.pdf>

Appendix C: Risk Management Authorities Flood Risk Management Roles and Responsibilities

Nottingham City Council is a Lead Local Flood Authority (LLFA) under the Flood Risk Regulations 2009. As LLFA, the City Council is responsible for managing flood risk from surface water, groundwater and Ordinary Watercourses.

In addition to the responsibilities as an LLFA, the City Council is the **Highway Authority** and must provide and manage highway drainage and roadside ditches under the Highways Act 1980.

The City Council is also the **Local Planning Authority** and responsible for ensuring sustainable development on flood risk grounds.

The Environment Agency (EA) has a 'strategic overview' role for flood and coastal erosion risk management in England. The EA has developed a National Flood and Coastal Erosion Risk Management Strategy, which provides a framework for their strategic overview role. The EA is responsible for managing flood risk from Main Rivers, estuaries, the sea and reservoirs. Flood risk management from rivers and the sea must be risk based and the EA has a regulatory role for all reservoirs over 25,000 m³.

Severn Trent Water (ST) is the Water and Sewerage Company (WaSC) covering the Nottingham City area. They have a duty to provide, maintain and operate systems of public sewers and sewage treatment works for the purpose of effectually draining their area, which encompasses Nottingham City. They undertake a range of activities to monitor and manage the sewerage network including telemetry, CCTV, asset surveys and hydraulic modelling. They also repair, rehabilitate, replace and cleanse (e.g. jetting) assets as required. ST must plan the future development and maintenance of assets and services and have regard of Local FRM Strategies in their own planning process. ST is regulated by Ofwat.

Appendix D: Monitoring Progress & Success

Aim / Objective	Measure of Success
Aim: Reduce the impact of flooding on people, property and businesses in Nottingham	Number of people, properties, businesses and critical infrastructure with a reduced risk of flooding as a result of investment in flood risk management infrastructure Number of people with a reduced risk of flooding in deprived areas
Objective 1: Work collaboratively with partners	Number of community events with other Risk Management Authorities in attendance Number of projects and schemes completed in a formal Partnership Number of projects and schemes with external funding contributions
Objective 2: Sustainable new developments	Number of planning applications approved that incorporate Sustainable Drainage Systems Number of planning applications approved that incorporate resilient design
Objective 3: Economically sustainable activities	Monitoring of progress against actions in the Local Flood Risk Management Action Plan Cost : Benefit scores of flood risk management schemes
Objective 4: Community education & engagement	Number of community sessions attended (e.g. Ward Forums, Area Committees etc) and number of people attending those sessions Number of flood risk management communications campaigns
Objective 5: Multiple benefits	Number of projects and schemes that consider climate change impacts Number of projects and schemes that provide environmental enhancement (green infrastructure, water quality improvements, amenity benefits)
Objective 6: Catchment based approach	Number of projects and schemes where measures across the entire the catchment are considered Number of projects and schemes where engagement has taken place with Partners that operate within a catchment
Objective 7: Local flood risk information	Complete and maintain a robust asset register Number of asset inspections completed Number of studies completed that quantify local flood risk