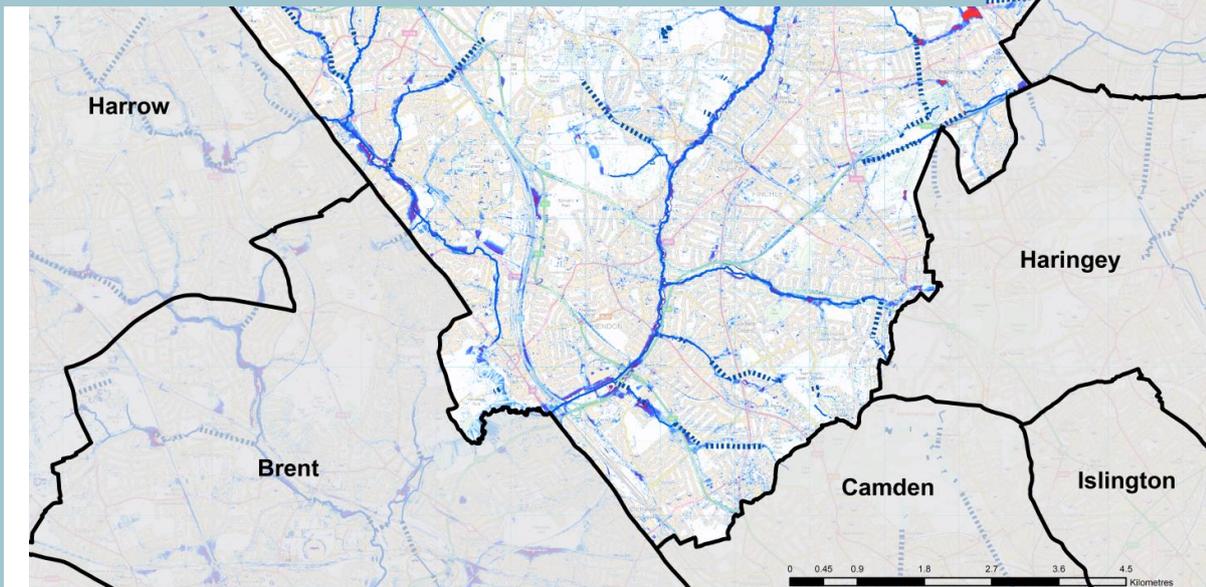


# London Borough of Barnet Local Flood Risk Management Strategy

October 2017



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# Executive Summary

The London Borough of Barnet has experienced flooding incidents every year since 2010; even though this flooding was in general local these events highlight that flooding can occur at any time with potentially devastating consequences. The surface water flooding experienced in 2012 further reinforces the risk faced by the London Borough of Barnet from local sources. With the expectancy for flooding frequency and severity to increase due to a changing climate, flood risk management has never been more important.

The Flood and Water Management Act 2010 and the Flood Risk Regulations 2009 have placed new duties on local authorities. As a Lead Local Flood Authority, the London Borough of Barnet Council has a responsibility for leading the co-ordination of local flood risk management within the London Borough of Barnet. This includes ensuring that flood risks from local sources, including surface water runoff, groundwater and ordinary watercourses and their interactions, are identified and managed. The London Borough of Barnet Council have the duty, under Section 9 of the Flood and Water Management Act (2010) to put in place a Local Flood Risk Management Strategy (hitherto referred as a 'Local Strategy') to manage all sources of local flood risks consistent with EU and national risk management approaches.

This Local Strategy sets out to achieve the following:

- Produce a summary of local flood risk within the London Borough of Barnet;
- Identify the roles and responsibilities of Risk Management Authorities;
- Demonstrate The London Borough of Barnet Council's position as a Lead Local Flood Authority;
- Outline the national and local objectives and measures for managing flood risk within Barnet; and
- Identify the possible funding sources and the feasible implementation approaches.

The Local Strategy outlines ten local objectives. These local objectives have been developed to be consistent in line with the national objectives, which have been previously outlined in the National Flood and Coastal Erosion Risk Management Strategy (2011) and have been developed in collaboration with the relevant Risk Management Authorities. These objectives are outlined below:

| London Borough of Barnet Local Flood Risk Management Strategy Objectives |   |
|--|---|
| 1  | Prevent risks of flooding in new developments   |
| 2  | Promote flood resistance and resilience   |
| 3  | Evaluate maintenance and update the flood risk asset register   |
| 4  | Prepare emergency plans for flood warnings and alerts, efficient response to flood incidents and emergency recovery following a flood incident                |
| 5  | Establish and maintain long term partnership working, both internally within Barnet Council departments and externally with other Risk Management Authorities |
| 6  | Update and review hydraulic modelling of Critical Drainage Areas  |
| 7  | Modelling of Barnet catchment sewerage network  |
| 8  | Develop, maintain, apply and monitor a strategy for local flood risk management of the area   |
| 9  | Prepare flood hazard maps and flood risk maps   |
| 10   | Prepare flood risk management plans   |

The Local Strategy identifies numerous measures to be taken to achieve the ten local objectives and highlights how the Council can work in partnership with other Risk Management Authorities in order to deliver measures to mitigate local sources of flooding. To aid in delivery of these measures the Strategy

provides details on the various national, local and other sources of funding available to the London Borough of Barnet Council for flood risk management.

Through the use of the objectives and measures identified within the Local Strategy, flood protection, prevention and efficient responses to flooding can be implemented to reduce the local flood risk and the potential impacts of flooding within the London Borough of Barnet.

# 1. Introduction

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

The Flood and Water Management Act 2010 (hitherto referred as the FWMA) places a responsibility upon Local Authorities, as Lead Local Flood Authorities (LLFAs), to develop, maintain, apply and monitor a strategy for Local Flood Risk Management (hitherto referred as a 'Local Strategy').

The Local Strategy is designed to form the framework, within which communities have a more prominent role in local flood risk management decisions. In conjunction with the 2011 National Flood and Coastal Erosion Risk Management Strategy for England<sup>1</sup> (hitherto referred as 'the National Strategy'), the Local Strategies are designed to improve effective risk management by enabling communities, business and the public sector to work together towards the following:

- Identify a clear understanding of the risks of flooding and erosion, both nationally and locally, so that investment in risk management can be prioritised more effectively;
- Set out clear and consistent risk management plans so that communities and businesses can make informed decisions about the management of the residual risks;
- Encourage innovative management of flood and coastal erosion risks. This should also take into account the needs of the community and the environment;
- Build links between the local flood risk management strategy plans and local spatial planning;
- Identify the current emergency plans and responses to flood incidents and ensure they are operating efficiently and effectively.
- Ensure communities are able to respond properly to flood warnings; and
- Provide communities with assistance to recover more efficiently after incidents.

The Local Strategy will do this by acting as the evidence base for the decisions and actions required for managing flood risk. The minimum requirements for a Local Strategy are summarised below:

- Identify Risk Management Authorities (RMAs) in the Local Authority's area. For the London Borough of Barnet (Barnet) this includes: the Environment Agency (EA), Barnet Council, Thames Water Utilities Ltd, Transport for London (TfL) and Highways England – see Section 3.1.1 for further details;
- Describe the flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area;
- Set objectives for managing local flood risk;
- Describe the measures proposed to achieve those objectives;
- Define how and when the measures are expected to be implemented;
- Complete an assessment of local flood risk for the purpose of the Local Strategy;
- Encourage better co-operation and communication between the London Borough of Barnet (Barnet) internal departments;
- Identify how and when the strategy is to be reviewed; and
- Show how the strategy contributes to the achievement of wider environmental objectives.

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<sup>1</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/228898/9780108510366.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228898/9780108510366.pdf)

## 1.2 Purpose of the Strategy

The Local Strategy is an important plan to assist with the identification of the risks of flooding and to help manage flood risk within Barnet. Flood risk management in Barnet will markedly improve with; an increased knowledge of the risks in the region; better co-operation between organisations involved in the management of Barnet’s flood risk; and improved communication with the public about the risk of flooding and proposed management solutions. Consequently, one of the purposes of the Barnet Local Strategy is to highlight the steps that could be taken to ensure these drivers are carried out effectively.

It should be noted that Barnet Council, as a LLFA, is only responsible for management of Local Flood Risk, defined by the FWMA (2010) as surface water flooding, ordinary watercourse flooding and groundwater flooding. Thus, the Barnet Local Strategy only addresses these sources of local flood risk and the interactions there might be with other sources of flood risk.

## 1.3 Structure of the Local Strategy

Table 1-1 below summarises the structure of the Strategy and the key questions that are answered by each section.

**Table 1-1: Structure of the Local Strategy**

| Section No. | Title                      | Key Questions answered within each section   |
|-------------|----------------------------|--|
| 1           | Introduction               | <ul style="list-style-type: none"> <li>• What is a Local Flood Risk Management Strategy?</li> <li>• What is ‘local flood risk’?</li> <li>• Where can I find specific information within this document?</li> <li>• What are the legislative drivers for this Local Strategy?</li> <li>• What other documents relate to the Local Strategy?</li> </ul> |
| 2           | Local Flood Risk           | <ul style="list-style-type: none"> <li>• Where has flooding occurred in the past?</li> <li>• What were the mechanisms for historical flood events?</li> <li>• What flooding could happen in the future?</li> <li>• How do the sources of flooding within Barnet interact?</li> <li>• Where are the highest risk areas?</li> </ul>                    |
| 3           | Roles & Responsibilities   | <ul style="list-style-type: none"> <li>• Who is responsible for managing flood risk within the Borough?</li> <li>• What are the responsibilities of each of these organisations?</li> <li>• Who do I contact about flooding?</li> </ul>  |
| 4           | Objectives and Measures    | <ul style="list-style-type: none"> <li>• What are the National Objectives for management of flood risk?</li> <li>• What are the Local Objectives for management of flood risk?</li> <li>• What measures will be used to deliver the Local Objectives?</li> <li>• Who will be responsible for implementing the measures?</li> </ul>                   |
| 5           | Funding and Implementation | <ul style="list-style-type: none"> <li>• Who will fund the measures?</li> <li>• How will the measures be implemented?</li> </ul>   |
| 6           | Review and Update          | <ul style="list-style-type: none"> <li>• <i>How often will the Local Strategy be reviewed?</i></li> <li>• <i>Who is responsible for update of the Local Strategy?</i></li> <li>• <i>How can the community contribute to the Local Strategy?</i></li> <li>• <i>What happens after the consultation process?</i></li> </ul>                            |

| Section No. | Title      | Key Questions answered within each section  |
|-------------|------------|---|
| 7           | References | <ul style="list-style-type: none"> <li>• <i>Details of referenced documents used to inform the Local Strategy</i></li> </ul>                                |
| Appendices  | Various    | <ul style="list-style-type: none"> <li>• <i>Supporting documents for the Local Strategy – including a glossary of terms and relevant figures</i></li> </ul> |

## 1.4 Community Engagement and Consultation

This document is a final version of the Local Strategy, which has undergone a period of public consultation to offer the opportunity for businesses, residents and risk management stakeholders to provide their opinions and feedback on the proposed Local Strategy. Following this period of public consultation amendments have been made to the Local Strategy in line with the feedback given.

## 1.5 Legislative Context

### 1.5.1 Flood and Water Management Act (2010)

The FWMA<sup>2</sup> (2010) has implemented new responsibilities on the Local Authorities, increasing their management and lead on local flooding issues. The new responsibilities required by Local Authorities by the FWMA are outlined below:

- Taking an active role leading flood risk management as LLFAs;
- Improve cooperation with other relevant authorities to manage local flood risk;
- Increased duty to investigate and report upon flood incidents;
- Maintain an 'Asset Register' of all flood management infrastructure which have a significant influence on local flood risk;
- Designate 'features' that have a significant influence on local flood risk;
- Carry out a regulation of works on 'ordinary watercourses' within the Borough;
- Development and implementation of Local Flood Risk Management Strategies such as this document;
- Act as a statutory consultee in the planning process for all matters relating to surface water management (*as of April 2015, this function replaced the previously defined Sustainable Drainage Systems Approval Body as originally defined in Schedule 3 of the FWMA*); and
- Create and build upon a Local Strategy for flood risk management.

The FWMA reinforces the need to manage flooding holistically and in a sustainable manner, a principle which originated with the Making Space for Water<sup>3</sup> (Defra, 2005) report and was reinforced by the summer 2007 floods and the Pitt Review<sup>4</sup> (2008).

<sup>2</sup> [http://www.legislation.gov.uk/ukpga/2010/29/pdfs/ukpga\\_20100029\\_en.pdf](http://www.legislation.gov.uk/ukpga/2010/29/pdfs/ukpga_20100029_en.pdf)

<sup>3</sup> [http://ipcc-wg2.gov/njlite\\_download.php?id=5488](http://ipcc-wg2.gov/njlite_download.php?id=5488)

<sup>4</sup>

[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)

### 1.5.2 Flood Risk Regulations (2009)

The Flood Risk Regulations<sup>5</sup> (2009) were produced to transpose European Union Flood Directive into English and Welsh legislation. The Flood Risk Regulations require three main types of assessment to be produced:

- a) Preliminary Flood Risk Assessments (PFRA), which was to be completed by all LLFAs by the 22 December 2011. The PFRA identified the Borough's Flood Risk Areas, areas potentially at significant risk of flooding and produced maps and developed management plans on the basis of these flood risk areas.
- b) Flood Hazard Maps and Flood Risk Maps. The EA and LLFAs were required to produce Hazard and Risk Maps for all sources of flooding by 22 December 2013.
- c) Flood Risk Management Plans (FRMPs). The EA and LLFAs were required to produce FRMPs for each previously identified Flood Risk Areas by 22 December 2015. All 34 LLFA in the London Flood Risk area were elected to meet their requirements by including their information in the Thames FRMP which was developed by the EA - <https://www.gov.uk/government/publications/thames-river-basin-district-flood-risk-management-plan>.

Chapter 6 of the London Borough of Barnet PFRA<sup>6</sup> identifies that Barnet is located within an 'indicative Flood Risk Area', as identified by the EA. Since publication of the PFRA, the EA has confirmed that all of greater London is classified as a Flood Risk Area. It should be noted that only the PFRA are compulsory for all LLFAs; flood hazard maps, flood risk maps and FRMPs are only required where a LLFA is located within a nationally defined 'Flood Risk Area'. The second cycle of the flood risk regulations is due to commence in 2017.

### 1.5.3 National Strategy for Flood and Coastal Erosion Risk Management (2012)

The FWMA (2010) requires the EA to develop, maintain, apply and monitor a strategy for flood and coastal erosion risk management in England. The National Strategy<sup>7</sup> (2011) requires Government to cooperate with individuals, communities and organisations in order to mitigate the threats of flooding and coastal erosion using the following methods:

- Understand the risks of flooding and coastal erosion, whilst working together to put in place long-term plans, taking into account other local and national plans;
- Identify and avoid inappropriate development in areas at risk of flooding and coastal erosion, being careful to manage land elsewhere to avoid increasing risks;
- 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;
- Increasing public awareness of the risk that remains and engaging with people at risk to make their property more resilient; and
- 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.

In Section 4 of the FWMA (2010) it states that a Local Strategy must be consistent with the National Strategy

<sup>5</sup> [http://www.legislation.gov.uk/uksi/2009/3042/pdfs/ukxi\\_20093042\\_en.pdf](http://www.legislation.gov.uk/uksi/2009/3042/pdfs/ukxi_20093042_en.pdf)

<sup>6</sup> <http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/research/planning/135542.aspx#2>

<sup>7</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/228898/9780108510366.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228898/9780108510366.pdf)

#### 1.5.4 National Planning Policy Framework (NPPF) (2012)

The NPPF<sup>8</sup> (2012) was originally published to outline the national policy on development and flood risk assessments. The NPPF states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk but where development is necessary, making it safe without increasing flood risk elsewhere.

The essence of NPPF is that:

- Local Plans should be supported by Strategic Flood Risk Assessments (SFRAs) and develop policies to manage flood risk from all sources, taking advice from the relevant RMAs;
- Policies in development plans should outline the consideration, which will be given to flooding issues, recognising the uncertainties that are inherent in the prediction of flooding and that flood risk is expected to increase as a result of climate change;
- Planning authorities should apply the precautionary principle to the issue of flood risk, using a risk-based search sequence to avoid such risk where possible and managing it elsewhere;
- The vulnerability of a proposed land use should be considered when assessing flood risk;
- Opportunities offered by new developments should be used to reduce the causes and impacts of flooding;
- Planning authorities should recognise the importance of functional floodplains, where water flows or is held at times of flood, and avoid inappropriate development on undeveloped and undefended floodplains; and
- Development is based on the concept of Flood Risk Reduction, particularly in circumstances where development has been sanctioned on the basis of the “Exception Test”.

The NPPF is supported by the National Planning Policy Guidance<sup>9</sup> (NPPG) (2015). The Flood Risk and Coastal Change section of the guidance advises on how planning can take account of the risks associated with flooding and coastal change in plan-making and the application process.

#### 1.5.5 Planning Practice Guidance Flood Risk and Coastal Change (2015)

The accompanying practice guidance to the NPPF provides additional guidance to Barnet’s local planning authorities to ensure the effective implementation of the planning policy set out in the NPPF on development in areas at risk of flooding.

The practice guidance provides supporting information on:

- The application of the sequential approach and Sequential and Exception Tests;
- Measures to reduce flood risk to acceptable levels;
- How to manage residual risks; and
- Guidance on how to take climate change into account.

As part of the April 2015 update, the practice guidance provides details on the parties responsible for assessing the suitability of Sustainable urban Drainage Systems (SuDS) practices. As per paragraph 084 from the practice guidance:

*The decision on whether a sustainable drainage system would be inappropriate in relation to a particular development proposal is a matter of judgement for the local planning authority. In making this judgement the local planning authority will seek advice from the relevant flood risk*

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<sup>8</sup> [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>9</sup> <http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/>

*management bodies, principally the lead local flood authority, including on what sort of sustainable drainage system they would consider to be reasonably practicable.*

The April 2015 update to the practice guidance provides the following additional guidance on SuDS:

- The importance of SuDS;
- When SuDS should be considered;
- The SuDS discharge hierarchy;
- Factors a local authority will address when SuDS as part of a planning application;
- When SuDS are inappropriate and relevant flood risk consultees;
- Applicability of Defra’s Non-statutory Technical Standards for SuDS;
- Design and construction cost considerations;
- Operation and maintenance considerations; and
- Where to go for further SuDS advice.

An update on the allowances to be made within the Planning Practice Guidance on climate change was released in February 2016<sup>10</sup>. The climate change allowances were updated for the anticipated changes in: peak river flow by river basin district, peak rainfall intensity, sea level rise and offshore wind speed and extreme wave height. They are based on climate change projections and different scenarios of carbon dioxide emissions to the atmosphere. This new policy supersedes the old guidance on climate change; although all planning applications already submitted for examination or have a valid planning application already submitted to the local planning authority prior to this date should adhere to the previous guidance allowances. The changes to climate change allowances include, but are not limited to, the following:

- Peak river flow allowances by river basin district have changed from a set value to a “range of allowances”, which is based on percentiles. The ranges of the River Thames for each epoch and allowance category are shown in Table 1.2; and
- A similar transition has been made for peak rainfall intensity; the conversion from a set value to a range of allowances has been established for each epoch.

**Table 1-2:** The February 2016 updated EA range of allowances for climate change for the River Thames District Basin

| Allowance Category | Total potential change anticipated for ‘2020s’ (2015 to 2039) | Total potential change anticipated for ‘2050s’ (2040 to 2069) | Total potential change anticipated for ‘2080s’ (2070 to 2115) |
|--------------------|---|---|---|
| Upper End          | 25%   | 35%   | 70%   |
| Higher Central     | 15%   | 25%   | 35%   |
| Central            | 10%   | 15%   | 25%   |

### 1.5.6 Non-statutory Technical Standards for Sustainable Drainage Systems, March 2015

This document, published by the Department for Environment, Food and Rural Affairs (DEFRA), sets out the non-statutory technical standards for SuDS<sup>11</sup>. The non-statutory technical standards should be used in conjunction with the NPPF and Planning Practice Guidance.

<sup>10</sup> <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

<sup>11</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/415773/sustainable-drainage-technical-standards.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf)

Non-statutory technical standards are provided for the following items:

- Flood risk outside the development;
- Peak flow control;
- Volume control;
- Flood risk within the development;
- Structural integrity;
- Designing for maintenance considerations; and
- Construction.

#### 1.5.7 *The London Plan, The Spatial Development Strategy for London, Consolidated with Alterations Since 2011, (updated March 2015)*

The London Plan <sup>12</sup>is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for development in London.

On 10 March 2015 the Mayor published the Further Alterations to the London Plan (FALP), which incorporates the Revised Early Minor Alterations to the London Plan (REMA) published in October 2013. From this date the FALP were operative as formal alterations to the London Plan and form part of the development plan for London.

The London Plan policies 5.12 and 5.13 apply to surface water management and flood risk mitigation. Applicable provisions within this policy are reproduced below.

#### **Policy 5.12 Flood Risk Management**

- All development proposals within Barnet must comply with the flood risk assessment and management requirements set out in the NPPF and the associated technical guidance on flood risk over the lifetime of the development and have regard to measures proposed in the Thames River Basin Catchment Flood Management Plans (CFMPs).
- Developments which are required to pass the Exceptions Test set out in the NPPF and the Technical Guidance will need to address flood resilient design and emergency planning by demonstrating the following:
  - The development will remain safe and operational under flood conditions;
  - A strategy of either safe evacuation and/or safely remaining in the building is followed under flood conditions;
  - key services including electricity, water etc will continue to be provided under flood conditions; and
  - Buildings are designed for quick recovery following a flood.
- Development adjacent to flood defences will be required to protect the integrity of existing flood defences and wherever possible should aim to be set back from the banks of watercourses and those defences to allow their management, maintenance and upgrading to be undertaken in a sustainable and cost effective way.

#### **Policy 5.13 Sustainable Drainage**

- Furthermore, policy 5.13 outlines the necessity that developments should utilise SuDS unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:
  - store rainwater for later use
  - use infiltration techniques, such as porous surfaces in non-clay areas

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<sup>12</sup> <https://www.london.gov.uk/what-we-do/planning/london-plan/current-london-plan/london-plan-chapter-5>

- attenuate rainwater in ponds or open water features for gradual release
- attenuate rainwater by storing in tanks or sealed water features for gradual release
- discharge rainwater direct to a watercourse
- discharge rainwater to a surface water sewer/drain
- discharge rainwater to the combined sewer.

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

#### 1.5.8 *The Water Framework Directive (2000<sup>13</sup>)*

The Water Framework Directive (WFD) is the Directive 2000/60/EC of the European Parliament and of the Council of 23<sup>rd</sup> October 2000. The purpose of the WFD is to establish a framework for Community action in the field of water policy. The WFD sets out a number of environmental objectives which include the following:

- To prevent the deterioration of the status of surface waters and groundwater;
- To achieve objectives and standards for protected areas;
- To aim to achieve good status for all water bodies, or for heavily modified water bodies and artificial water bodies, good ecological potential and good surface water chemical status;
- To reverse any significant and sustained upward trends in pollutant concentrations in groundwater; and
- The cessation of discharges, emissions and losses of priority hazardous substances into surface waters.

#### 1.5.9 *Other Relevant Legislation*

Flood Risk Management is affected by a range of guidance and legislation. Some of these include:

- Public Health Act (1936);
- Wildlife and Countryside Act (1981);
- Land Drainage Act (1991);
- Countryside and Rights of Way Act (2000);
- Strategic Environmental Assessment (SEA) Directive (2001/42/EC);
- Civil Contingencies Act (2004);
- Climate Change Act (2008);
- Conservation of Habitats and Species Regulations (2010); and
- Revised Climate Change Allowances (2016).

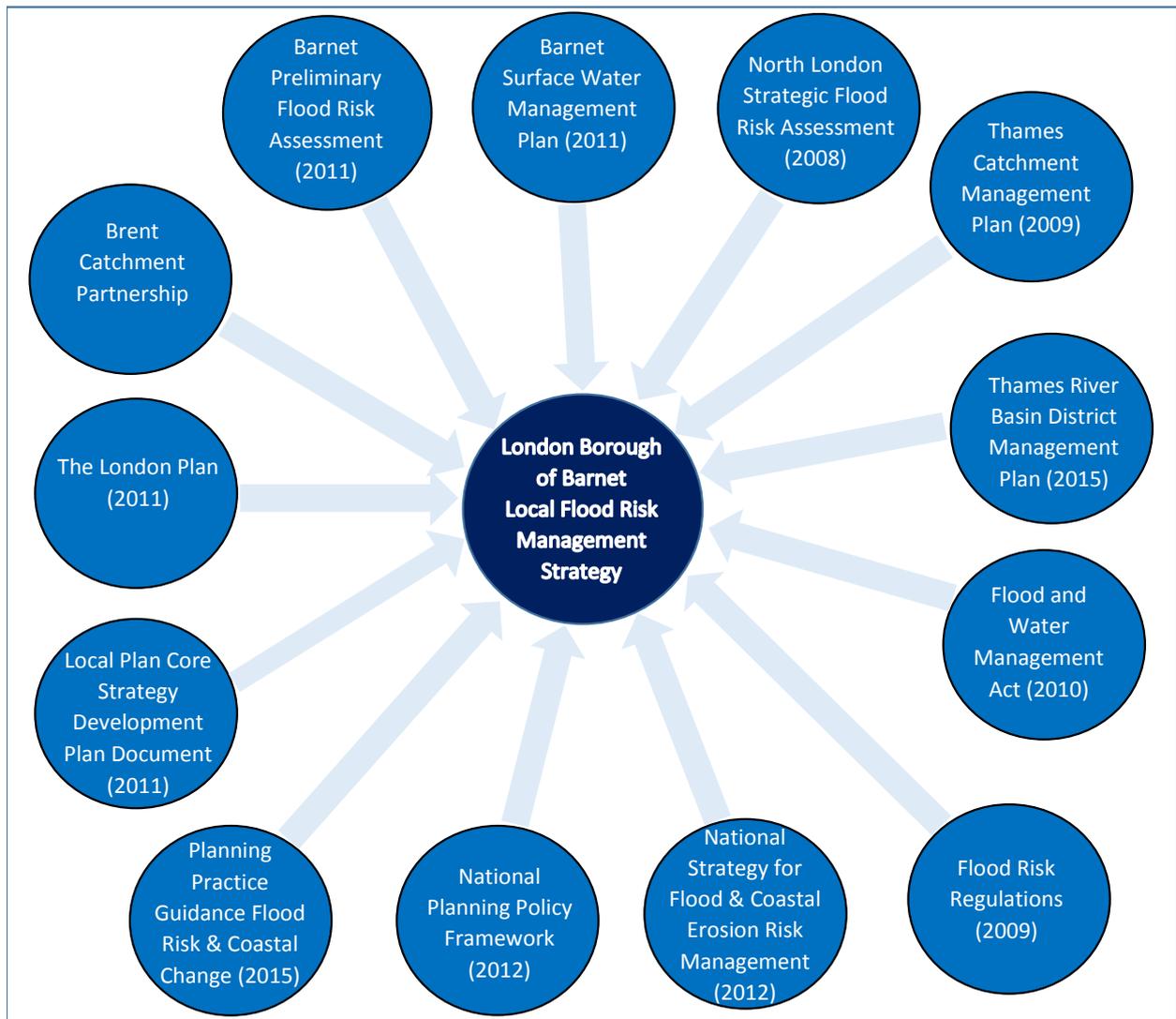
## 1.6 Related Documents and Partnerships

A number of related documents have been prepared, which provide details on the assessment and management of flood risk with Barnet. The Local Strategy is designed to be a collaborative document, drawing together the existing flood risk assessments and plans into a single overview document that outlines how Barnet will manage its local flood risk in the future.

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<sup>13</sup> [http://ec.europa.eu/environment/water/water-framework/index\\_en.html](http://ec.europa.eu/environment/water/water-framework/index_en.html)

Therefore, the Local Strategy draws on the historic flood records and the technical information available within the London Borough of Barnet Surface Water Management Plan<sup>14</sup> (SWMP), the North London Strategic Flood Risk Assessment<sup>15</sup> and the Barnet Preliminary Flood Risk Assessment PFRA. Moreover, the Local Strategy utilises information from wider environment plans, such as the updated Thames CFMP and the Thames River Basin District Management Plan. This ensures the Local Strategy takes a coordinated approach to flood risk management across all the London Boroughs. Figure 1-1 below illustrates the documents which are referenced within this Local Strategy and the associated legislation.



**Figure 1-1:** The related documents and legislative drivers for the Local Strategy

The related documents which have been utilised by the Local Strategy have been outlined below:

<sup>14</sup> [https://www.barnet.gov.uk/dam/jcr:8e7f075f-4434-45c8-9030-68244fe07135/London\\_Borough\\_of\\_Barnet\\_Surface\\_Water\\_Management\\_Plan\\_Vol\\_1.pdf](https://www.barnet.gov.uk/dam/jcr:8e7f075f-4434-45c8-9030-68244fe07135/London_Borough_of_Barnet_Surface_Water_Management_Plan_Vol_1.pdf)

<sup>15</sup> [http://www.nlwp.net/downloads/north\\_london\\_sfra\\_final\\_august\\_08.pdf](http://www.nlwp.net/downloads/north_london_sfra_final_august_08.pdf)

### 1.6.1 *London Borough of Barnet Surface Water Management Plan (2011)*

A SWMP was produced for Barnet in 2011. The SWMP is a framework to help understand the causes of surface water flooding and to agree a preferred strategy for the management of surface water flood risk. SWMP studies are undertaken in partnership with key local stakeholders who are responsible for surface water management and drainage within the study areas. Within Barnet the key stakeholders include, but are not limited to:

- The Environment Agency (EA);
- The Greater London Authority (GLA);
- Thames Water Utilities Ltd (TWU)

These organisations collaborate to understand the causes and effects of surface water flooding and agree the most cost effective way of managing surface water flood risk for the long term.

### 1.6.2 *The North London SFRA (2008)*

The North London SFRA, which comprises of the North London Boroughs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest, is part of the North London Waste Plan. The objectives of the SFRA were the following:

- Identify the areas within North London that are at risk of flooding for all areas situated within Flood Zone 3, the variations in the actual flood risk including the effect of any formal or informal flood defences;
- Identify the risk of flooding due to surface water either in the form of flash flooding due to surface water run-off, rising groundwater, inadequate drain/sewer capacity or inadequate drain/sewer maintenance;
- Identify the likely effects of climate change on flood risk;
- Identify catchment areas and the potential for development to affect flood risk in areas beyond the individual Borough boundaries;
- Provide the basis for allocating sites in the Local Development Framework, including applying the sequential test approach to site allocation within the indicative floodplain;
- Provide a clear rationale for assessing the merits of potential development allocations based on a sequential flood risk assessment, taking into account the flood risk vulnerability of proposed uses;
- Recommend appropriate monitoring and review methods; and
- Recommend policy options for dealing with the range of flood risks and provide guidance for developers.

The SFRA was prepared under the guidance of the now superseded Planning Policy Statement 25 (PPS 25). PPS25 was superseded by the National Planning Policy Framework in 2012. The SFRA provides a useful overview of the flood risk from all sources across Barnet, guidance on development control and the requirements for site specific Flood Risk Assessments (FRAs).

### 1.6.3 *The London Borough of Barnet Preliminary Flood Risk Assessment (2011)*

The PFRA produced for Barnet in 2011 is a key document informing the preparation of future Local Flood Risk Management Strategies as required by the FWMA (2010). Future flood risk within Barnet was

assessed on a borough-wide basis, identifying areas potentially at risk from flooding based on a variety of local flooding sources. Based on the surface water modelling outputs, approximately 25,400 residential properties in Barnet are considered at potential risk of flooding from surface water in a 1 in 200 year rainfall event within Barnet.

#### *1.6.4 Thames Catchment Flood Management Plan (2009)*

The Thames Catchment Management Plan is a catchment-wide management plan, which aims to help understand the current and future scale and extent of flooding and to set policies for managing flood risk within the River Thames catchment. The Thames Catchment Management Plan states that between 500 to 1,000 properties within Barnet are considered at risk of fluvial flood in a fluvial event with a 1 in 100 year annual probability (1% AEP).

#### *1.6.5 The Thames River Basin District Flood Risk Management Plan (2015)*

The Thames River Basin District Management Plan<sup>16</sup> explains the risk of flooding from the River Thames, the sea, surface water and reservoir flooding. It forms the Flood Risk Management Plans (FRMPs) for the seventeen catchments within the Thames River Basin District. This is a joint plan which was prepared in partnership with thirty-nine different local councils within the Thames River Basin District.

#### *1.6.6 Local Plan Core Strategy Development Plan Document (2012)*

The Development Plan Document (DPD) provides specific planning policy and guidance for an area where significant regeneration or investment needs to be managed. DPDs detail Area Action Plans (AAPs), which address the specific challenges of an area, specify the required land uses in particular locations and identify key strategic interventions. Barnet has four AAPs outlined in the Local Plan Core Strategy:

- The Mill East AAP;
- The Colindale AAP;
- Brent Cross – Cricklewood Regeneration Area; and
- North London Business Park / Oakleigh Road South.

The AAPs set a combined target of over 21,000 new homes by 2021 for the four AAPs.

#### *1.6.7 The Thames River Basin Management Plan (2015)*

The Thames River Basin Management Plan<sup>17</sup> covers the entire river system, including river, lake, groundwater, estuarine and coastal water bodies within a catchment. It sets out the current state of the water environment, the pressures affecting the water environment and environmental objectives for protecting and improving the waters. It also informs decisions on land-use planning because water and land resources are closely linked.

#### *1.6.8 Brent Catchment Partnership (March 2012)*

The Brent Catchment Partnership (BCP) is an informal group of stakeholders committed to working together to improve the rivers, Grand Union Canal and the Brent Reservoir within the Brent Catchment. In March 2012 a Strategic Agreement was made to adopt a catchment-based approach to improve the water bodies within the catchment.

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<sup>16</sup> <https://www.gov.uk/government/publications/thames-river-basin-district-flood-risk-management-plan>

<sup>17</sup> <https://www.gov.uk/government/publications/thames-river-basin-district-river-basin-management-plan>

The BCP has two main aims:

- To promote a robust and coherent vision for the catchment and to raise the profile of the Brent corridor; and
- To promote awareness and understanding of the potential of the River Brent corridor to contribute to the social, environmental and economic wellbeing of local people.

## 2. Local Flood Risk

### 2.1 Sources of Flooding – Local Flood Risk

There are several sources of flooding within Barnet which are summarised in the table below. The local flood risk sources that are addressed by the Barnet Local Strategy are: surface water flooding, flooding from ordinary watercourses and groundwater flooding. Figures B-1a to B-1d in Appendix B show the predicted extent of flooding from surface water within Barnet. Figures B-2a to B-2d in Appendix B show the areas of Barnet which are susceptible to groundwater flooding and Figures B-3a to B3d in Appendix B show the areas of Barnet which are susceptible to flooding from ordinary watercourses. The non-local sources of flooding are the responsibility of the stated RMAs. Further information on the roles and responsibilities of RMAs for flood risk is provided in Section 3.

The various sources of flooding interact with each other and create complex flood mechanisms in certain areas. This can make it difficult to determine the overall lead responsibility for flooding in specific areas as is often concluded that flooding is caused by multiple interlinked sources. Whilst the Local Strategy is focussed on reducing the consequences of the three ‘local’ sources of flooding described in Table 2-1, it also facilitates partnership working to manage risk with other organisations where multiple sources of flooding have occurred historically or are predicted to occur in the future.

**Table 2-1** Sources of Flooding

| Flood Source and Mechanism  | Responsibility         |                    |                            |                    |   |                 |                 |
|---|------------------------|--------------------|----------------------------|--------------------|---|-----------------|-----------------|
|   | Barnet Borough Council | Environment Agency | Thames Water Utilities Ltd | Affinity Water Ltd | Transport for London (TfL) / Network Rail | Highways Agency | Riparian Owners |
| <b>Surface Water</b> - Runoff as a result of high intensity rainfall when water is ponding or flowing over the ground surface before it enters the underground drainage network or a watercourse. <i>This includes flooding of local roads that Barnet Council is responsible for maintaining.</i>  | ●                      |                    |                            |                    |   |                 |                 |
| <b>Ordinary Watercourse</b> - Flooding which occurs as a result of the capacity of the ordinary watercourse being exceeded (water coming back out of rivers and streams).   | ●                      |                    |                            |                    |   |                 | ●               |
| <b>Groundwater</b> - Occurs when the water level within the groundwater aquifer rises to the surface.   | ●                      |                    |                            |                    |   |                 |                 |
| <b>Main Rivers</b> - Occurs when a designated ‘Main River’ cannot cope with the volume of water draining into it from the surrounding land and it spills onto the surrounding area.   |                        | ●                  |                            |                    |   |                 | ●               |
| <b>Reservoirs</b> – Occurs when a reservoir / canal embankment or control fails and releases a large volume of retained water into the downstream area. Responsibility is dependent on the size and ownership of the reservoir. It is the responsibility of the site owner to have an onsite plan; however, this does not need to be shared with Barnet Council | ●                      | ●                  | ●                          | ●                  |   |                 | ●               |

| Flood Source and Mechanism  | Responsibility         |                    |                            |                    |   |                 |                 |
|---|------------------------|--------------------|----------------------------|--------------------|---|-----------------|-----------------|
|   | Barnet Borough Council | Environment Agency | Thames Water Utilities Ltd | Affinity Water Ltd | Transport for London (TfL) / Network Rail | Highways Agency | Riparian Owners |
| <b><u>Sewer</u></b> - Flooding which occurs when the capacity of the underground drainage system is exceeded.   |                        |                    | ●                          |                    |   |                 |                 |
| <b><u>Burst pipes or water mains</u></b> – Occurs when water supply or drainage infrastructure fails.   |                        |                    | ●                          |                    |   |                 |                 |
| <b><u>Railway Flooding</u></b> – A combination of sewer and surface water flooding located on railway networks managed by Transport for London or Network Rail. |                        |                    |                            |                    | ●   |                 |                 |
| <b><u>Roads / Highways Flooding</u></b> – A combination of sewer and surface water flooding located on roads managed by Barnet Council.                         | ●                      |                    |                            |                    |   |                 |                 |
| <b><u>Highways Flooding</u></b> - A combination of sewer and surface water flooding located on a main highways managed by Highways England (e.g. the M1).       |                        |                    |                            |                    | ●   | ●               |                 |

## 2.2 Historical Flooding

### 2.2.1 Main River Flooding

All watercourses in England and Wales are classified as either ‘Main Rivers’ or ‘Ordinary Watercourses’. The difference between the two classifications is based largely on the perceived importance of a watercourse; in particular it’s potential to cause significant / widespread flooding. The Water Resources Act (1991) defines a ‘Main River’ as “a watercourse shown as such on a Main River Map”. The EA keep and maintain information on the spatial extent of the Main River designations. The FWMA defines any watercourse that is not a Main River as an ordinary watercourse- being any river, ditch, stream, cut, sluice, dyke or non-public sewer. The EA have duties and powers in relation to Main Rivers. Local Authorities, or in some cases Internal Drainage Boards, have powers and duties in relation to Ordinary Watercourses. A map of watercourses within the Barnet is provided in Figure B-4 in Appendix B.

Figure B-4 demonstrates that Dollis Brook, Pymme’s Brook and Silk Stream are the primary watercourses which drain the majority of the Barnet area. Mutton Brook, Dean’s Brook, Folly Brook, Decoy Brook and Edgwarebury Brook are significant tributaries, which flow into Dollis Brook and Silk Stream.

The North London SFRA identifies that the Silk Stream flooded in 1992 and 1999. The trigger for both flood events is not known; however, the lead time of the watercourse during these events would indicate that the Silk Stream is susceptible to fluvial flooding which is caused by short, intense pluvial events. The most recent flood event occurred in 2015, in which Silk Stream and Pymmes Brook caused flooding in several locations. The upstream area of Pymmes Brook, which is within Barnet, was observed flood in 1980, 1981 and 2007. The Barnet PFRA identified several flooding incidents from the Silk Stream in 1980 and 1981, as well as Borough-wide flood incidents in 1928, 1947 and 1977; however, there is no more specific knowledge regarding the sources and mechanisms of the Borough-wide flood incidents.

### 2.2.2 *Ordinary Watercourse Flooding*

An ordinary watercourse can be defined as a watercourse that does not form part of a main river. The usual mechanism of flooding from ordinary watercourses is as a result of an exceedance in the capacity of the watercourse, resulting in out-of-bank flow. The location of the major ordinary watercourses is shown in Figure B-4.

The North London SFRA mentions several fluvial flooding events within LBB however very little information is provided about specific locations affected. Decoy Brook is one ordinary watercourse within Barnet which has displayed historical flooding. In 2007, flooding was reported along the Decoy Brook near its confluence with the Dollis Brook. Two further fluvial flood events were recorded from Decoy Brook in 2009 and 2012. Additional fluvial flooding has been reported along Mutton Brook in 2012. The 2012 fluvial event was particularly severe. The flooding mechanism for this event was the blockage of a 1.2m culvert along Decoy Brook. The result of this flooding event almost impacted a critical asset to the area, the electrical substation on The Highfield Road.

### 2.2.3 *Surface Water Flooding*

Surface water flooding occurs when heavy rainfall exceeds the capacity of local drainage networks and water flows across the ground.

Twenty-seven surface water flooding incidents were logged by the Barnet Borough Call Centre between 2011 and 2015. These incidents took place throughout the Borough region. The flooding mechanism for many of the surface water flood incidents was drainage issues, which led to surface water ponding. The SWMP states that surface water flooding occurred in 1982, 1992 and 2007.

### 2.2.4 *Groundwater Flooding*

A groundwater flood event results from a rise in groundwater level sufficient for the water table to intersect the ground surface. Groundwater floods tend to be long in duration developing over weeks or months. Groundwater flooding is known to occur in areas underlain by major aquifers, although increasingly it is also associated with more localised floodplain sands and gravels.

The geology of Barnet is overlain by a thick layer of London Clay which sits on top of a chalk aquifer. The clay varies in depth from 20m in the lower lying areas of the borough to over 100m in areas of higher ground. In Finchley, Hendon and north Hampstead there is a chalk-sand and gravel outcrop which lies close to the surface. This outcrop area may be susceptible to groundwater flooding however the majority of the borough is protected by the impermeable layer of clay.

The EA provided a groundwater flooding GIS dataset which documented all reported groundwater incidents across London. The dataset shows a large number of incidents across Barnet; however, the majority of incidents are reported as waterlogging / standing water in gardens rather than ground water flooding to property.

The groundwater historical flood incidents within Barnet appear to be individual instances of flooding. Thus it is difficult to determine a link between the reported groundwater incidents with any underlying trend of other historic flooding incident records.

### 2.2.5 *Sewer Flooding*

Flooding from surface water and combined sewers occurs when rainfall exceeds the capacity of drainage networks or when there is an infrastructure failure. The majority of Barnet is served by separate surface

water and foul sewers which, in many cases have been subject to a history of misconnections and inappropriate usage as the area has been developed.

The Barnet SWMP states the mechanisms for sewer flooding within Barnet includes, but is not limited to, the following:

- Misconnections;
- Cross connections;
- Urban intensification
- Poor historical planning decisions;
- Inappropriate uses (such as drainage of fats, oils and greases);
- Natural catchment – impermeable soils;
- Urban Creep; and
- Diversion of 'natural' watercourses into the sewerage system.

Thames Water provides postcode linked records of sewer flooding (known as the DG5 register). The March 2016 DG5 register shows that the entire borough has experienced sewer flooding at some point. Once a property is identified on the water companies DG5 register, it typically means that the water company can put funding in place to take properties off the DG5 register. Table 2-2 demonstrates the summary of the DG5 register (as of March 2016). The most significant areas which have encountered DG5 flooding is in the northern area of Edgware, to the west of the borough boundary; the Postal District code HA8 has experienced 234 counts of sewer flooding within Barnet. The Postal sector HA8 8 has recorded the highest number of sewer flooding incidents with 143. Other Postal sector areas with significant historical sewer flooding include NW9 7, with 85 recorded incidents, and HA8 9, with 68 sewer flooding incidents. The areas with the least sewer flooding records include NW1, NW10 and NW11.

**Table 2-2: Summary of DG5 Register (as of March 2016)**

| Post code area | Total Sewer Flooding Incidents | Post code area | Total Sewer Flooding Incidents |
|----------------|--------------------------------|----------------|--------------------------------|
| EN4 8          | 24                             | N20 9          | 10                             |
| EN4 9          | 11                             | N3 1           | 18                             |
| EN5 1          | 9                              | N3 2           | 12                             |
| EN5 2          | 63                             | N3 3           | 5                              |
| EN5 3          | 8                              | NW1 8          | 0                              |
| EN5 4          | 13                             | NW100          | 1                              |
| EN5 5          | 13                             | NW101          | 1                              |
| HA8 0          | 2                              | NW110          | 2                              |
| HA8 5          | 1                              | NW116          | 2                              |
| HA8 7          | 20                             | NW117          | 6                              |
| HA8 8          | 143                            | NW118          | 4                              |
| HA8 9          | 68                             | NW119          | 4                              |
| N10 1          | 4                              | NW2 1          | 21                             |
| N10 2          | 2                              | NW2 2          | 1                              |
| N11 1          | 0                              | NW3 7          | 1                              |
| N11 3          | 13                             | NW4 1          | 14                             |
| N12 0          | 11                             | NW4 2          | 11                             |
| N12 7          | 6                              | NW4 3          | 7                              |
| N12 8          | 17                             | NW4 4          | 59                             |
| N12 9          | 15                             | NW7 1          | 1                              |
| N14 4          | 6                              | NW7 2          | 7                              |
| N14 5          | 7                              | NW7 3          | 25                             |
| N14 7          | 0                              | NW7 4          | 9                              |
| N2 0           | 13                             | NW9 0          | 1                              |
| N2 8           | 14                             | NW9 5          | 7                              |
| N2 9           | 11                             | NW9 6          | 4                              |
| N20 0          | 24                             | NW9 7          | 85                             |
| N20 8          | 10                             |                |                                |

## 2.3 Potential Future Risk of Flooding

### 2.3.1 *Local Future Flood Risk – Surface Water and Ordinary Watercourses*

The Barnet Local Strategy includes an analysis of the potential impacts of future surface water flooding within the Borough. The direct rainfall modelling undertaken for the Barnet SWMP has been used as the primary dataset to determine the significance of flooding from surface water and ordinary watercourses for the Barnet Local Strategy. The Barnet Local Strategy uses up-to-date mapping, information on the locations of different types of critical services and non-residential properties, the locations of designated sites (such as Areas of Outstanding Natural Beauty and Special Sites of Scientific Interest) and heritage sites (such as National Parks and Gardens and listed buildings), as well as up-to-date information regarding historical flood incidents within Barnet.

As part of the Barnet SWMP thirty three Critical Drainage Areas (CDAs) were identified within the Borough. These were the areas within Barnet which were considered to be at the highest risk of surface water flooding.

The Local Strategy has analysed local flood risk within Barnet using these CDAs. As there was a large portion of the Borough not located within a specific CDA this remaining area was split into four geographical sections – North West Barnet, North East Barnet, South West Barnet and South East Barnet – Figure 2-1 demonstrates the thirty-seven regions used in the Barnet Local Strategy analysis. The thirty-seven regions were ranked in terms of risk prioritisation and each region was categorised as ‘low’, ‘medium’ or ‘high’ priority areas. Figure B-5a to B-5d in Appendix B shows the CDAs within Barnet, the potential surface water flood impacts and the prioritised risk extents for each region. The results of the analysis are presented in Table 2-5. Colour coding for impact and overall priority for further investigation are described in Section 2.4. The purpose of this analysis is to provide a consistent basis for making prioritisation decisions on future flood mitigation investigations and possible works. Barnet Council intends to make use of the information obtained from the flood risk analysis on the regions within Barnet.



Figure 2-1: The locations of the thirty-seven Barnet regions used for the Local Strategy analysis (© Crown copyright [and database rights] 2016 OS 100017674 EUL) (© London Borough of Barnet, 2016).

## 2.4 Prioritisation of Risk Areas

It is not feasible for Barnet to investigate in detail every potential flooding location within the borough immediately. Flood risk management resources are finite, thus it is necessary to prioritise the regions identified where the focus of effort will derive the maximum benefit in terms of overall flood risk reduction in Barnet.

Building on the work undertaken previously for the PFRA with regard to ‘locally significant harmful consequences’ Table 2-3 below contains the preliminary thresholds for classifying the impacts and consequences of flooding and the associated level of priority for further investigation work in line with the measures defined in Section 4 of the Local Strategy.

The National Strategy has set thresholds for defining areas where the flood risk is significant. No guidance has been issued for defining ‘locally significant harmful consequences’, consequently it is up to each LLFA to set its own definition. It has been suggested by the EA, as a part of the PFRA guidance<sup>18</sup>, that the local thresholds should be an order of magnitude below the significance criteria for determining Flood Risk Areas. The thresholds for each of the locally significant harmful consequences have been counted in flood depths greater than 0.1m for the 1 in 200 year pluvial event, in accordance with the SWMP.

**Table 2-3** Locally Significant Harmful Consequences

| Impact            | Parameter  | Threshold  | Justification   |
|-------------------|--|--|---|
| Human Health      | Number of People   | 20 persons / 8.55 properties (assuming 2.34 people per property)           | One order of magnitude less than national threshold                             |
|                   | Critical Services  | 1 service  | Disruption to critical services can have a significant impact                   |
| Economic Activity | Non Residential Properties   | 10 non-residential properties  | Significant impact to local businesses  |
|                   | Roads and Rail   | 0.28km of road (A Road and motorway) or 0.27km of rail (any type) impacted | Disruption to key transport links has a significant impact on economic activity |
| Environment       | Internationally or nationally designated site                      | 7 or more sites potentially impacted                                       | Potential impacts need to be identified and reviewed on a case-by-case basis    |
|                   | Number of nationally / internationally important heritage features | 4 or more features potentially impacted                                    | Potential impacts need to be identified and reviewed on a case-by-case basis    |

<sup>18</sup> <https://www.gov.uk/government/publications/preliminary-flood-risk-assessments-and-flood-risk-areas/preliminary-flood-risk-assessments-and-flood-risk-areas>

Table 2-4 below shows the scoring matrix used to determine the overall flood risk priority scores, which were applied to each region selected. Each parameter (number of people at risk of flooding, critical services, non-residential properties etc.) has a threshold (as shown in Table 2-3). Each parameter threshold is categorised into low, medium or high priority for each region. According to Table 2-4 each parameter is then assigned a score of 1, 3 or 5 according to the priority classification (Low, Medium, and High respectively).

**Table 2-4:** Parameter Priority Scoring and Classification

| Parameter  | Priority Classification and Score      |                             |   |
|--|--|-----------------------------|---|
|  | More than zero but less than Threshold | Equals or Exceeds Threshold | Significant Historic Flooding Experienced |
| Number of People   | LOW (1)                                | MEDIUM (3)                  | HIGH (5)                                  |
| Critical Services  | LOW (1)                                | HIGH (5)                    | HIGH (5)                                  |
| Non Residential Properties   | LOW (1)                                | MEDIUM (3)                  | HIGH (5)                                  |
| Roads and Rail   | LOW (1)                                | MEDIUM (3)                  | MEDIUM (3)                                |
| Internationally or nationally designated site                      | LOW (1)                                | HIGH (5)                    | HIGH (5)                                  |
| Number of nationally / internationally important heritage features | LOW (1)                                | HIGH (5)                    | HIGH (5)                                  |

The overall total score for all the parameters in each CDA / Region is the one used to populate the Overall Investigation Priority – the last column of Table 2-5 - according to the overall priority ranges which are presented below:

- **High = 20+**
- **Medium = 10 to 19**
- **Low = 0 to 9**

Thirty-seven regions were selected within Barnet for the analysis (the thirty-three CDAs identified in the Barnet SWMP and four geographical regions selected to represent the areas of Barnet which are not covered by CDAs). As the area within each of the four non-CDA regions was much greater than the area within each of the CDAs, this meant a disproportionate number of flooded parameters were located within these four areas. To adjust for the effect that area had on the scores the final overall priority score was weighted according to the size of each CDA / Region.

Further details regarding how the Overall Investigation Priority scores were determined and how these were weighted is provided in Appendix C. The summary table of this assessment is provided in Table 2-5 overleaf.

Table 2-5: Barnet Risk Prioritisation Table

| Critical Drainage Areas (CDAs) derived from 2012 London Borough of Barnet SWMP | Human Health  |   |                         |  | Economic Activity                |                     |           | Environment   |                        |  | Significant Historic Local Flooding Experienced (Residential) | Historic Flooding Notes | Overall Investigation Priority | CDA Priority (Rank) |
|--|---|---|-------------------------|--|----------------------------------|---------------------|-----------|---|------------------------|--|---|-------------------------|--------------------------------|---------------------|
|  | Res. Properties (No.)   | No. People at risk of flooding (Based on 2.34 people per household) | Critical Services (No.) | Critical Service Type  | Non-Residential Properties (No.) | Road (km) A&M roads | Rail (km) | Designated Sites (SSSI, AONB, Ancient Woodland, Registered Parks & Gardens) (No.) | Listed Buildings (No.) | Details of heritage sites at risk of flooding                          |   |                         |                                |                     |
|  | <i>Figures below based on predicted flood depths &gt;0.1m depth of flooding for the 1 in 200 year return period event</i> |   |                         |  |                                  |                     |           |   |                        |  |   |                         |                                |                     |
| CDA_001 - Scratchwood  | 0   | 0   | 0                       |  | 0                                | 0.00                | 0.02      | 2   | 0                      |  | No  |                         | LOW                            | 37                  |
| CDA_002 - Arkley   | 63  | 147   | 0                       |  | 1                                | 0.01                | 0.00      | 0   | 0                      |  | No  |                         | LOW                            | 36                  |
| CDA_003 - Duck Island  | 444   | 1039  | 3                       | 1 x hospital, 2 x surgery / health centre  | 7                                | 0.04                | 0.00      | 0   | 0                      |  | No  | 2015                    | MEDIUM                         | 26                  |
| CDA_004 - Barnet   | 530   | 1240  | 2                       | 2 x electrical substation  | 5                                | 0.06                | 0.00      | 0   | 0                      |  | No  | 2011, 2013, 2015        | MEDIUM                         | 22                  |
| CDA_005 - Hadley   | 714   | 1671  | 3                       | 1 x electrical substation, 1 x leisure centre  | 17                               | 0.27                | 0.00      | 0   | 2                      | Grade II Baptist Church, Grade II listed Gate and railings of Fairholt | Yes   | 2012, 2015              | MEDIUM                         | 9                   |
| CDA_006 - Pricklers Hill   | 94  | 220   | 0                       |  | 9                                | 0.03                | 0.00      | 0   | 0                      |  | No  | 2011                    | MEDIUM                         | 29                  |
| CDA_007 - Longmore Avenue  | 511   | 1196  | 7                       | 1 x police station, 1 x electrical substation, 3 x church, 1 x community centre, 1 x surgery / health centre | 157                              | 0.28                | 0.00      | 0   | 0                      |  | No  | 2011, 2012              | MEDIUM                         | 12                  |
| CDA_008 - Oakleigh Park  | 186   | 435   | 1                       | 1 x surgery / health centre  | 73                               | 0.19                | 1.24      | 0   | 0                      |  | No  |                         | MEDIUM                         | 11                  |
| CDA_009 - Friern Barnet  | 520   | 1217  | 6                       | 5 x electrical substation, 1 x surgery / health centre   | 29                               | 0.48                | 0.00      | 0   | 1                      | Grade II listed building   | Yes   |                         | HIGH                           | 7                   |

| Critical Drainage Areas (CDAs) derived from 2012 London Borough of Barnet SWMP | Human Health  |   |                         |  | Economic Activity                |                     |           | Environment   |                        |  | Significant Historic Local Flooding Experienced (Residential) | Historic Flooding Notes | Overall Investigation Priority | CDA Priority (Rank) |
|--|---|---|-------------------------|--|----------------------------------|---------------------|-----------|---|------------------------|--|---|-------------------------|--------------------------------|---------------------|
|  | Res. Properties (No.)   | No. People at risk of flooding (Based on 2.34 people per household) | Critical Services (No.) | Critical Service Type  | Non-Residential Properties (No.) | Road (km) A&M roads | Rail (km) | Designated Sites (SSSI, AONB, Ancient Woodland, Registered Parks & Gardens) (No.) | Listed Buildings (No.) | Details of heritage sites at risk of flooding                          |   |                         |                                |                     |
|  | <i>Figures below based on predicted flood depths &gt;0.1m depth of flooding for the 1 in 200 year return period event</i> |   |                         |  |                                  |                     |           |   |                        |  |   |                         |                                |                     |
| CDA_010 - Coppetts Wood  | 369   | 863   | 4                       | 2 x electrical substation, 1 x residential home, 1 x school        | 57                               | 0.53                | 0.00      | 2   | 1                      | Grade II listed building, Coppetts Wood (Ancient Woodland & SSSI site) | No  | 2011                    | MEDIUM                         | 13                  |
| CDA_011 - Victoria Park  | 133   | 311   | 2                       | 1 x electrical substation, 1 x school                              | 2                                | 0.04                | 0.00      | 0   | 0                      |  | No  | 2011                    | MEDIUM                         | 21                  |
| CDA_012 - Long Lane  | 542   | 1268  | 0                       |  | 3                                | 1.59                | 0.00      | 1   | 1                      | St Pancras and Islington Cemetery (Park) & Grade II listed building    | No  |                         | MEDIUM                         | 31                  |
| CDA_013 - Creighton Avenue   | 157   | 367   | 0                       |  | 3                                | 0.06                | 0.00      | 0   | 0                      |  | No  |                         | LOW                            | 35                  |
| CDA_014 - Muswell Hill   | 270   | 632   | 0                       |  | 13                               | 1.81                | 0.00      | 0   | 0                      |  | No  |                         | MEDIUM                         | 23                  |
| CDA_015 - Bittacy Park   | 961   | 2249  | 6                       | 4 x electrical substation, 1 x surgery / health centre, 1 x school | 15                               | 0.00                | 0.00      | 0   | 0                      |  | No  |                         | MEDIUM                         | 15                  |
| CDA_016 - Westchester Drive  | 313   | 732   | 1                       | 1 x electrical substation  | 1                                | 0.17                | 0.00      | 0   | 0                      |  | No  |                         | MEDIUM                         | 19                  |
| CDA_017 - Victoria Road  | 586   | 1371  | 2                       | 1 x electrical substation, 1 x surgery / health centre             | 16                               | 0.42                | 0.00      | 0   | 1                      | Grade II listed building   | No  | 2011                    | MEDIUM                         | 10                  |

| Critical Drainage Areas (CDAs) derived from 2012 London Borough of Barnet SWMP | Human Health  |   |                         |  | Economic Activity                |                     |           | Environment   |                        |  | Significant Historic Local Flooding Experienced (Residential) | Historic Flooding Notes | Overall Investigation Priority | CDA Priority (Rank) |
|--|---|---|-------------------------|--|----------------------------------|---------------------|-----------|---|------------------------|--|---|-------------------------|--------------------------------|---------------------|
|  | Res. Properties (No.)   | No. People at risk of flooding (Based on 2.34 people per household) | Critical Services (No.) | Critical Service Type  | Non-Residential Properties (No.) | Road (km) A&M roads | Rail (km) | Designated Sites (SSSI, AONB, Ancient Woodland, Registered Parks & Gardens) (No.) | Listed Buildings (No.) | Details of heritage sites at risk of flooding  |   |                         |                                |                     |
|  | <i>Figures below based on predicted flood depths &gt;0.1m depth of flooding for the 1 in 200 year return period event</i> |   |                         |  |                                  |                     |           |   |                        |  |   |                         |                                |                     |
| CDA_018 - Golders Green  | 2069  | 4841  | 11                      | 6 x electrical substation, 2 x school, 1 x surgery / health centre, 2 x church                       | 78                               | 1.17                | 0.00      | 1   | 15                     | 8 Grade II listed buildings, 2 Grade II listed telephone kiosks, Grade II listed chapel, Golders Green Crematorium | Yes   | 2012                    | HIGH                           | 1                   |
| CDA_019 - Hendon Way   | 408   | 955   | 0                       |  | 3                                | 0.33                | 0.00      | 0   | 0                      |  | No  |                         | MEDIUM                         | 28                  |
| CDA_020 - Childs Hill  | 2341  | 5478  | 8                       | 3 x electrical substation, 2 x surgery / health centre, 1 x school, 1 x residential home, 1 x church | 38                               | 1.03                | 0.00      | 0   | 1                      | Grade II listed Golders Green Synagogue  | Yes   |                         | HIGH                           | 4                   |
| CDA_021 - Claremont Way Industrial Estate                                      | 38  | 89  | 0                       |  | 5                                | 0.00                | 0.00      | 0   | 0                      |  | No  |                         | LOW                            | 32                  |
| CDA_022 - Brent Terrace  | 375   | 878   | 1                       | 1 x electrical substation  | 1                                | 0.00                | 0.00      | 0   | 0                      |  | No  |                         | MEDIUM                         | 18                  |
| CDA_023 - Lichfield Road   | 278   | 651   | 1                       | 1 x electrical substation  | 1                                | 0.10                | 0.00      | 0   | 0                      |  | No  |                         | MEDIUM                         | 17                  |
| CDA_024 - Edgware Station  | 27  | 63  | 1                       | 1 x school   | 5                                | 0.00                | 0.00      | 0   | 0                      |  | No  |                         | MEDIUM                         | 16                  |
| CDA_025 - Mill Hill  | 308   | 721   | 0                       |  | 0                                | 0.03                | 0.00      | 0   | 0                      |  | No  |                         | LOW                            | 33                  |

| Critical Drainage Areas (CDAs) derived from 2012 London Borough of Barnet SWMP | Human Health  |   |                         |   | Economic Activity                |                     |           | Environment   |                        |   | Significant Historic Local Flooding Experienced (Residential) | Historic Flooding Notes | Overall Investigation Priority | CDA Priority (Rank) |
|--|---|---|-------------------------|---|----------------------------------|---------------------|-----------|---|------------------------|---|---|-------------------------|--------------------------------|---------------------|
|  | Res. Properties (No.)   | No. People at risk of flooding (Based on 2.34 people per household) | Critical Services (No.) | Critical Service Type   | Non-Residential Properties (No.) | Road (km) A&M roads | Rail (km) | Designated Sites (SSSI, AONB, Ancient Woodland, Registered Parks & Gardens) (No.) | Listed Buildings (No.) | Details of heritage sites at risk of flooding             |   |                         |                                |                     |
|  | <i>Figures below based on predicted flood depths &gt;0.1m depth of flooding for the 1 in 200 year return period event</i> |   |                         |   |                                  |                     |           |   |                        |   |   |                         |                                |                     |
| CDA_026 - Mill Hill Circus   | 1051  | 2459  | 10                      | 1 x electrical substation, 3 x sports and leisure centre, 1 x school, 2 x surgery / health centre, 2 x community centre, 1 x church | 150                              | 1.18                | 0.17      | 0   | 2                      | Grade II listed building, Grade II listed decorative wall | Yes   | 2011, 2013, 2015        | HIGH                           | 5                   |
| CDA_027 - Blondell Road  | 778   | 1821  | 0                       |   | 0                                | 0.00                | 0.00      | 0   | 0                      |   | No  |                         | LOW                            | 34                  |
| CDA_028 - Grahame Park   | 677   | 1584  | 3                       | 3 x electrical substation   | 5                                | 0.05                | 0.97      | 0   | 2                      | Grade II listed entrance gates                            | No  |                         | MEDIUM                         | 27                  |
| CDA_029 - Oak Hill Park  | 308   | 721   | 2                       | 1 x electrical substation, 1 x community centre   | 4                                | 0.01                | 0.03      | 0   | 0                      |   | No  | 2012, 2013              | MEDIUM                         | 24                  |
| CDA_030 - Brunswick Park   | 83  | 194   | 2                       | 2 x electrical substation   | 3                                | 0.06                | 0.91      | 0   | 0                      |   | No  |                         | MEDIUM                         | 20                  |
| CDA_031 - Broadfields Ditch  | 1304  | 3051  | 2                       | 1 x electrical substation, 1 x community centre   | 5                                | 0.03                | 0.00      | 0   | 0                      |   | No  |                         | MEDIUM                         | 25                  |
| CDA_032 - Sunnyhill Park   | 494   | 1156  | 2                       | 1 x school, 1 x leisure centre  | 6                                | 1.42                | 0.00      | 0   | 0                      |   | No  | 2012                    | MEDIUM                         | 14                  |
| CDA_033 - Church End Farm  | 265   | 620   | 0                       |   | 2                                | 0.47                | 0.00      | 0   | 1                      | Grade II listed Farm buildings                            | No  |                         | MEDIUM                         | 30                  |
| Non-CDA - NW region  | 1551  | 3629  | 4                       | 1 electrical substation, 2 x leisure centre, 1 x education department   | 17                               | 2.43                | 1.01      | 8   | 2                      |   | Yes   | 2011, 2015              | HIGH                           | 2                   |

| Critical Drainage Areas (CDAs) derived from 2012 London Borough of Barnet SWMP | Human Health  |   |                         |  | Economic Activity                |                     |           | Environment   |                        |   | Significant Historic Local Flooding Experienced (Residential) | Historic Flooding Notes | Overall Investigation Priority | CDA Priority (Rank) |
|--|---|---|-------------------------|--|----------------------------------|---------------------|-----------|---|------------------------|---|---|-------------------------|--------------------------------|---------------------|
|  | Res. Properties (No.)   | No. People at risk of flooding (Based on 2.34 people per household) | Critical Services (No.) | Critical Service Type  | Non-Residential Properties (No.) | Road (km) A&M roads | Rail (km) | Designated Sites (SSSI, AONB, Ancient Woodland, Registered Parks & Gardens) (No.) | Listed Buildings (No.) | Details of heritage sites at risk of flooding |   |                         |                                |                     |
|  | <i>Figures below based on predicted flood depths &gt;0.1m depth of flooding for the 1 in 200 year return period event</i> |   |                         |  |                                  |                     |           |   |                        |   |   |                         |                                |                     |
| Non-CDA - NE region  | 1690  | 3955  | 4                       | 2 x electrical substation, 1 x leisure centre, 1 x education department  | 40                               | 0.62                | 0.41      | 2   | 2                      |   | Yes   | 2012, 2013, 2014, 2015  | HIGH                           | 6                   |
| Non-CDA - SW region  | 8883  | 20786   | 29                      | 13 x electrical substation, 1 x Sewer Treatment Works, 6 x surgery / health office, 3 x community centre, 2 x leisure centre, 2 x education department, 2 x church | 226                              | 7.82                | 0.96      | 0   | 5                      |   | No  | 2012, 2015              | HIGH                           | 8                   |
| Non-CDA - SE region  | 5016  | 11737   | 18                      | 11 x electrical substation, 1 x education department, 2 x surgery / health office, 2 x leisure centre, 2 x church  | 110                              | 4.68                | 0.07      | 8   | 5                      |   | No  | 2012                    | HIGH                           | 3                   |

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#### 2.4.1 Local Future Flood Risk –Groundwater

As part of the Barnet SWMP groundwater flooding analysis was undertaken to provide a consistent data source across London for groundwater flooding. The analysis produced the Increased Potential Elevated Groundwater (iPEG) maps. The iPEG mapping assists in identifying areas which have an increased potential to experience groundwater flooding. The iPEG map shows those areas within Barnet where there is an increased potential for groundwater to rise sufficiently to interact with the ground surface or be within 2 m of the ground surface.

The four data sources listed below have been utilised to produce the iPEG map:

- British Geological Survey (BGS) Groundwater Flood Susceptibility Map;
- Jacobs Groundwater Emergence Maps (GEMs);
- Jeremy Benn Associates (JBA) Groundwater Flood Map; and
- EA/Jacobs Thames Estuary 2100 (TE2100) groundwater hazard maps.

Figures B-2a to B-2d in Appendix B demonstrates the iPEG extents and the Areas Susceptible to Groundwater Flooding within Barnet. The iPEG data shows that the areas at most significant risk of groundwater flooding are located in and around the main rivers and ordinary watercourses. This is an expected result as these areas are where there are alluvial deposits. The EA dataset 'Areas Susceptible to Groundwater Flooding' (ASTgWF) is a strategic scale map showing groundwater flood areas on a 1km square grid. It provides an indicative assessment of areas where there may be a risk of flooding. The AstgWF mapping has been used in conjunction with the iPEG mapping to analyse the areas of Barnet which are susceptible to groundwater flooding. Please refer to Appendix B (Figures B-2a to B-2d) for further details regarding groundwater susceptibility within Barnet.

#### 2.4.2 Local Flooding Interactions

Whilst the primary focus of the Barnet Local Strategy is to assess the local flood risk (from surface water, ground water and ordinary watercourses), flooding can arise from a combination of different sources. Where the source of flooding can be clearly identified, the responsible organisation will be the main point of contact. However, it is often not easy to determine the source or where multiple sources are involved. In these cases the LLFA will take the lead and work with partners to investigate the issue in a manner appropriate to the level of risk.

The investigative approach to be undertaken must be proportional to the frequency and consequence of the flooding.

## 2.5 Management of Other Sources of Flooding

#### 2.5.1 Main River

Figures B-3a to B3-s in Appendix B shows the Environment Agency Flood Map for Planning (Rivers and Seas) extents of Flood Zone 2 and Flood Zone 3 within Barnet. The Environment Agency Flood Zones are defined as follows:

- **Flood Zone 2** – Medium Probability – Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding
- **Flood Zone 3** – High Probability – Land having a 1 in 100 or greater annual probability of river flooding

## Catchment Flood Management Plans

As previously discussed, the EA has operational responsibility for managing the risk of flooding from main rivers. The EA has produced CFMPs to provide an overview of Main River flood risk across each river catchment. The CFMP sets out the EA's recommendations to manage flood risk over the next fifty to one hundred years. The CFMP considers all types of inland flooding, (Main River, Ordinary watercourse, ground water, surface water and tidal flooding – not flooding directly from the sea.) Furthermore, CFMPs discuss the likely impacts of climate change and how areas could be developed to meet our present day needs without compromising the ability of future generations to meet their own needs<sup>19</sup>.

### *Thames Catchment Flood Management Plan (2009)*

The whole of Barnet is encompassed by the River Thames catchment, thus it is included in the Thames CFMP<sup>20</sup> (2009). Six standard policies for managing flood risk within the Thames catchments were considered within the policy appraisal of the Thames CFMP. The following policy applies to Barnet "Areas of moderate to high flood risk where we can generally take further action to reduce flood risk".

This policy will tend to be applied to those areas where the case for further action to reduce flood risk is most compelling, such as densely populated areas which are at high risk. Taking further action to reduce risk will require additional appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options. The proposed actions to implement the preferred policy are the following:

- To deliver actions recommended in Flood Risk Management Strategies once they are approved;
- To encourage partners to develop policies, strategies and initiatives – in the short-term – to increase the resistance and resilience of all new development at risk of flooding. Land that might be needed to manage flood risk in the future will need to be protected; Working with partners to identify opportunities for this and recreate river corridors in urban areas will be essential;
- In the long-term, land and property owners will need to adapt the urban environment to be more resilient to flooding. This includes the refurbishment of existing buildings to increase resilience and resistance to flooding; and
- To promote the management of flood consequences. Working with partners will improve public awareness and local emergency planning.

### 2.5.2 Tidal

As Barnet is located upstream of the Thames Tidal limit it is not considered at risk of tidal flooding.

### 2.5.3 Sewers

Water and sewerage companies are responsible for making appropriate arrangements for the drainage of foul water, the treatment of waste, surface water sewers and combined sewers. Thames Water Utilities Ltd have this responsibility in the Barnet area. They have primary responsibility for floods from surface water and foul sewers, burst pipes or water mains or floods caused by system failures.

A key distinction between the responsibility for surface water and sewer flooding between Thames Water Utilities Ltd and Barnet is that Thames Water Utilities Ltd have an agreed level of service with their industry regulator, Ofwat for sewerage capacity. The agreed level of service states that "Increased demands on the sewerage system should not put properties at risk of flooding from storm events with a return period less than 1 in 20 years". If flooding occurs during an event that exceeds this defined level of service, then it is

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<sup>19</sup> Definition of CFMPs from Environment Agency website <https://www.gov.uk/government/collections/catchment-flood-management-plans>

<sup>20</sup> <https://www.gov.uk/government/publications/thames-catchment-flood-management-plan>

classified as surface water flooding. Thames Water Utilities Ltd is responsible for internal and external property flooding caused by sewer systems operating under their normal design conditions.

Causes of flooding may include blockage or other operational problems with the sewer network. When flooding occurs during these conditions, Thames Water Utilities Ltd is required to maintain a register of locations that incur damage from the flooding and prioritise funding for works to alleviate the problem. Funding priorities are defined using a five year cycle called Asset Management Plans (AMP). The AMP is the programme of work agreed with the Regulator (Ofwat). Thames Water Utilities Ltd are in the AMP6 period (2015 – 2020).

## 2.6 Artificial Sources – Reservoirs and Canals

The south west boundary of Barnet is marked by the River Brent and the Silk Stream confluence at the Brent Reservoir. The 598,000 m<sup>2</sup> Brent Reservoir is owned and maintained by the Canal and River Trust Charity and feeds the Paddington Arm of the Grand Union Canal. There are three reservoirs located within the London Borough of Barnet: Arkley reservoir, which runs alongside Rowley Green Lane; Bury Farm reservoir; and Stoney Wood. Arkley reservoir is managed by Affinity Water Ltd and the EA, Bury Farm reservoir is managed by the EA and Edgware FSA and Stoney Wood reservoir is managed by Edgware FSA. Failure of the defences of these reservoirs could have significant consequences to properties in the vicinity.

The EA's reservoir inundation mapping shows the maximum flood extent from large reservoirs (which hold over 25,000 cubic metres of water) in the unlikely event of a breach. The sudden failure of a dam could potentially have catastrophic consequences, due to a surge in water being released into the catchment. The enforcement of the Reservoirs Act is the responsibility of the EA. However, the maintenance and regular inspection of the reservoirs is the responsibility of the owners. It is the responsibility of the site owners to have an onsite plan; however, they are not required to share these plans with Barnet Council.

## 3. Roles and Responsibilities

### 3.1 Organisations Responsible for Managing Flood Risk

#### 3.1.1 *Risk Management Authorities*

A RMA is defined in the FWMA as one of the following:

- The EA;
- A LLFA, for example Barnet;
- A District Council for an area for which there is no unitary authority;
- An Internal Drainage Board;
- A Water Company, for example Thames Water Utilities Ltd; and
- A Highway Authority.

#### 3.1.2 *London Borough of Barnet (Lead Local Flood Authority)*

Under the FWMA Barnet Council, as the LLFA, is the lead organisation responsible for managing local flood risk within the borough. The responsibilities of a LLFA are:

- Development, maintenance, application and monitoring of a strategy for local flood risk management (i.e. this Local Strategy report). This will be guided by the national strategy;
- Strategic leadership of local flood RMAs;
- Powers to request information from any person in connection with the authority's flood risk management functions and a duty to co-operate with other flood risk authorities;
- A duty to investigate and publish reports on flood incidents within Barnet (where appropriate and necessary) to identify which authorities have relevant flood risk management functions and what they have done or intend to do;
- A duty to maintain a register of structures or features that have a significant effect on flood risk;
- Power to do works to manage flood risk from surface water runoff or groundwater;
- Power to designate structures and features that affect flood risk;
- Act as a Statutory Consultee on planning applications with regard to surface water management issues;
- Decision-making responsibilities for whether third party works on ordinary watercourses by third parties, that may affect water flow, can take place; and
- A duty to contribute towards the achievement of sustainable development in the exercise of flood risk management functions and to have regard to any Ministerial guidance on this topic

### 3.2 Roles and Responsibilities for Managing Flood Risk

The tables below detail the roles and responsibilities of the various organisations and other stakeholders involved with management of flood risk within Barnet.

**Table 3-1: Barnet Risk Management Authorities**

| Organisation   | Role  | Responsibilities   | Additional Info   |
|--|---|--|---|
| Environment Agency   | Operational responsibility for flooding from main rivers, the sea & coastal erosion (the EA takes a risk based approach to flood risk management) | Responsibility for managing flooding from main rivers and regulating third party works on main rivers              | <a href="https://www.gov.uk/guidance/flood-risk-activities-environmental-permits">https://www.gov.uk/guidance/flood-risk-activities-environmental-permits</a>   |
|  |   | Enforcement Authority for the Reservoir Act  | There are three reservoirs located within Barnet: Arkley reservoir, Bury Farm reservoir and Stoney Wood reservoir.  |
|  |   | Responsibility for managing coastal flooding   | This does not apply to Barnet as the Borough is upstream of the River Thames Tidal Limit at Teddington.   |
|  | Oversight responsibilities in relation to all flood and coastal erosion risk management in England  | Strategic overview for all forms of flooding   |   |
|  |   | Monitoring and reporting on flood and coastal erosion risk management  |   |
|  |   | Review of the assessments, plans and maps produced by Barnet as LLFA to meet the FRR (2009)                        |   |
|  |   | Supporting collaboration, knowledge-building and sharing of good practice  |   |
|  |   | Providing grants to local Risk Management Authorities to support the implementation of their powers                |   |
|  |   | Issuing levies to LLFAs to support the implementation of coastal erosion and flood defence schemes                 |   |
|  |   | Communication of flood risk warnings to the public, the media and to partner organisations                         | This includes the Silk Stream and the Deans, Edgware, Dollis, Mutton and Wealdstone Brooks Flood Alert Area. Flooding information can be found here: <a href="https://www.gov.uk/check-flood-risk">https://www.gov.uk/check-flood-risk</a>  |
| Supporting communities to be flood resilient through sharing best practice and provision of information                        |   |  |   |
| Advising on the planning process   |   |  |   |
| Statutory consultee for some development proposed in Flood Zones 2 and 3, or within 20m of the top of the bank of a main river | <a href="https://www.gov.uk/guidance/flood-risk-and-coastal-change">https://www.gov.uk/guidance/flood-risk-and-coastal-change</a>                 |  |   |
| London Borough of Barnet   | Lead Local Flood Authority  | Responsibility for managing local flood risk – flooding from ordinary watercourses, surface runoff and groundwater |   |
|  |   | A requirement to produce off site reservoir plans  | This should include reservoirs outside of Barnet, which could have an impact on Barnet.   |
|  |   | Duty to comply with the National Strategy & prepare the Local Strategy   | <a href="https://www.barnet.gov.uk/citizen-home/planning-conservation-and-building-control/planning-policies-and-further-information/Adopted-Local-Plan---Core-Strategy-DPD.html">https://www.barnet.gov.uk/citizen-home/planning-conservation-and-building-control/planning-policies-and-further-information/Adopted-Local-Plan---Core-Strategy-DPD.html</a> |
|  |   | Investigations of flooding where appropriate and publishing reports  | An initial appraisal is carried out in any circumstance where inundation residential properties, business properties and key infrastructure (as detailed in the Local Strategy). The results of the investigation must be published through the flood risk implementation plan on the Barnet website.   |
|  |   | Regulation & consenting works on ordinary watercourses   | Barnet Council is responsible for the consenting of works to ordinary watercourses. It has powers to enforce un-consented and non-  |

| Organisation                | Role  | Responsibilities   | Additional Info  |
|-----------------------------|---|--|--|
|                             |   |  | compliant works, which includes any works (including temporary) that affect flow within the channel of any ordinary watercourse (such as in channel structures or diversion of watercourses) |
|                             |   | Produce an Asset Register and designate structures or features that, in the opinion of the authority are likely to have a significant effect on flood risk   |  |
|                             |   | Powers to carry out practical works to manage flood risk from surface water and groundwater.   |  |
|                             | Highways Authority  | Management of the major roads across Barnet and their associated drainage  | Roads such as the M1   |
|                             |   | Regular inspection and maintenance to ensure major highway drainage systems are clear and blockages cleared where reasonably practicable   |  |
|                             |   | Powers to undertake works to prevent the highway from flooding and to divert or carry out works to a watercourse as necessary  |  |
|                             |   | Assistance to transport people to a place of safety and restore traffic flow during an event   |  |
|                             | Planning Authority  | Preparation of the local development plan, supported by an appropriate assessment of flood risk (in accordance with NPPF) and determining planning applications  |  |
|                             |   | Ensure new development applications are supported by appropriate drainage proposals  |  |
|                             | Emergency Planning  | Emergency Planning – category one responder under the civil contingencies act and the role is set out in the Multi Agency Flood Plan   |  |
|                             |   | Develop Emergency Plans and Business Continuity Plans; Provide advice and assistance to businesses and voluntary organisations regarding business continuity management                                      |  |
|                             |   | Develop arrangements for Civil Preparedness information available for public use, and maintain a system for warning, informing and advising the public in the event of an emergency                          |  |
|                             |   | Share information and co-operate with other responders   |  |
| Thames Water Utilities Ltd. | Drainage of foul water, treatment of waste, surface water sewers and combined sewers. Provision of water. | Primary responsibility for floods from water & sewerage systems (sewer flooding, burst pipes or water mains, floods caused by system failures)   |  |
|                             |   | Duty to have regards to the most recent Local Strategy and act consistently with the National Strategy   |  |
|                             |   | Duty to cooperate with other authorities, including sharing data   |  |
|                             |   | Maintain a register of properties at risk of flooding due to a hydraulic overload in the sewerage network (DG5 register) and undertake improvements to alleviate sewer flooding problems on the DG5 register |  |
|                             |   | Adoption of private sewers. Adoption of sewers offered for adoption by developer.  |  |
|                             |   | Statutory consultee to the LLFA when the system is proposed to communicate with the public sewer.  |  |

| Organisation                                | Role               | Responsibilities   | Additional Info |
|---|--------------------|--|-----------------|
| Transport for London and London Underground | Highways Authority | Responsible for the effectual drainage of surface water from adopted roads along red routes  |                 |
|   |                    | Responsible for the effectual drainage of surface water from TFL rail/ London underground lines  |                 |
|   |                    | Responsible for the effectual drainage of surface water from TFL rail/tube stations  |                 |
|   |                    | Responsible for ensuring that drains, including kerbs, road gullies and ditches and the pipe network which connect to the sewers, are maintained           |                 |
| Highways England                            | Highways Authority | Responsible for the effectual drainage of surface water from the A12   |                 |
|   |                    | Responsible for ensuring that drains on the A12 including kerbs, road gullies and ditches and the pipe network which connect to the sewers, are maintained |                 |

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**Table 3-2 Other Stakeholders**

| Organisation                         | Responsibilities   |
|--------------------------------------|--|
| Canal and River Trust                | Canal and River Trust manage the canal network throughout the river basin district. Although not a designated 'Risk Management Authority', Canal and River Trust manages its network in a way that minimises risk of flooding.   |
| Affinity Water Ltd                   | Affinity Water Ltd manage Arkley reservoir on Rowley Green Lane. It is the responsibility of Affinity Water Ltd to have an onsite plan for Arkley reservoir; however, they are not required to share this with Barnet Council.   |
| Greater London Authority             | The Greater London Authority is a statutory consultee on planning applications of potential strategic importance, and has a shared responsibility for strategic planning in London with the 32 London boroughs and the Corporation of the City of London. Under the legislation establishing the Greater London Authority (GLA), the Mayor has to produce a spatial development strategy known as 'the London Plan' and to keep it under review. Boroughs' local development documents have to be 'in general conformity' with the London Plan. The Greater London Authority also provides a research and knowledge transfer role across London, establishing the Drain London project in 2007 to investigate flood risk and potential mitigation opportunities.   |
| Network Rail                         | It is the responsibility of Network Rail for the effectual drainage of surface water from Network Rail managed railway lines and Network Rail managed stations. Furthermore, Network Rail are responsible for ensuring that drains, including kerbs, road gullies and ditches and the pipe network which connect to the sewers from Network Rail managed properties are maintained.  |
| Property owners & residents          | It is the responsibility of householders and businesses to look after their own property and protect it from flooding. There will be many occasions when flooding occurs despite all parties meeting their responsibilities. Thus, it is important that householders whose homes are at risk of flooding take steps to ensure that their house is protected.   |
| Riparian owners                      | Householders or businesses whose property is adjacent to or over a river, stream or ditch are likely to be riparian owners with responsibilities. Riparian owners have a right to protect their property from flooding and erosion but in most cases will need to discuss the method of doing this with the EA (main rivers) or Barnet (ordinary watercourses). They are responsible for maintaining the bed and banks of the watercourse and ensuring there is no obstruction, diversion or pollution to the flow of the watercourse. Barnet Council has permissive powers to carry out flood defence works for ordinary watercourses at their discretion, in a similar manner to those powers used by the EA for Main Rivers. The EA provides advice to riparian owners in a leaflet entitled ' <a href="#">Living on the Edge</a> '. Further information is also available in <a href="https://www.gov.uk/permission-work-on-river-flood-sea-defence">https://www.gov.uk/permission-work-on-river-flood-sea-defence</a> |
| Utility and infrastructure providers | Utility and infrastructure providers, such as Network Rail, energy and telecommunication companies have a role to play in flood risk management as their assets can be an important consideration in planning for flooding. They should share information on relevant assets (e.g. culverts) with flood RMAs and consider flood risk management issues when planning for the future development and maintenance of their infrastructure to provide that their assets and systems are resilient to flood and coastal risks and that the required level of service can be maintained in the event of a flood.  |
| Local flood groups                   | Setting up a community based flood action group can be a very effective way of bringing residents and businesses together to discuss flood risk issues and identify actions that can be taken collectively to minimise the impacts of flooding. Such groups can liaise with RMAs on behalf of the community, and enable joint working. The National Flood Forum provides advice about the formation of a local flood risk group. Additional advice can be found here: <a href="https://www.gov.uk/prepare-for-flooding/future-flooding">https://www.gov.uk/prepare-for-flooding/future-flooding</a>  |
| Emergency services                   | Responding to flooding incidents (alongside other emergencies). Responsibility to assist with planning for flooding incidents.   |

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## 4. Objectives and Measures

### 4.1 National Objectives

One of the statutory requirements of a Local Strategy is that it remains consistent with the National Strategy for Flood and Coastal Risk Management, whose overall aim is to ensure the risk of flooding and coastal erosion is properly managed by using the full range of options in a co-ordinated way. In order to achieve this the National Strategy outlines six high level guidance principles:

#### ***Community focus and partnership working***

It is a necessity for RMAs to engage with the public communities in order to improve their understanding of the flood risks, encourage them to join the decision-making process and to have direct involvement with risk management actions. Working in partnership with other RMAs and stakeholders to develop and implement local flood risk management strategies will enable better sharing of information and expertise, which will lead to the identification of efficiencies in managing risk.

#### ***A catchment and coastal “cell” based approach***

It is essential to consider the impacts managing flood risk can have on other parts of the catchment or coast. All flood management activities must attempt to avoid passing risk onto other areas within the catchment without prior agreement. In the development of Local Strategies and partnership working with neighbouring LLFAs within catchments the agreement of the avoidance of upstream and downstream risks in managing flooding can be tackled more efficiently. Strategic plans, such as the CFMPs and Shoreline Management Plans (SMPs) should be used to help strategic priorities for Local Strategies. Regional Flood and Coastal Committees will have an important role in this approach.

#### ***Sustainability***

When assessing the implementation of risk management LLFAs should take into account ways which take account of all impacts of flooding (for instance on people, properties, cultural heritage, infrastructure and local economy) and the whole-life costs of investment. Where possible opportunities which enhance the environment and work with natural processes should be taken into account. Risk management measures should be forward-looking, taking into account the potential risks that may arise in the future and being adaptable to climate change.

#### ***Proportionate risk based approaches***

It is not technically, economically or environmentally feasible to prevent all flooding and coastal erosion altogether. Thus a risk-based management approach, which targets resources to areas where they have the greatest effect, is the most efficient approach for LLFAs to undertake. All aspects of risk management, including the preparation and implementation of Local Strategies, should be carried out in a proportionate way that reflects the size and complexity of risk. The Local Strategy provides an opportunity to agree a local framework for risk-based decisions and interventions with RMAs and local communities.

#### ***Multiple benefits***

As well as reducing the risks to people and property flood and coastal erosion risk management is able to provide other economic, environmental and social benefits. In developing and implementing Local Strategies, LLFAs should help deliver broader benefits by working with natural processes where possible and seeking to provide environmental benefit, including those required by the Habitats, Birds and Water Framework Directive. Measures such as the use of SuDS to manage risk should be considered wherever possible as they can also deliver benefits for amenity, recreation, pollution reduction and water quality. Further benefits can be realised in relation to regeneration, growth and emergency planning.

#### ***Beneficiaries should be allowed and encouraged to invest in local risk management***

The benefits achieved when flood and coastal erosion risks are managed can be both localised and private, through the protection of specific individuals, communities and businesses. In developing Local Strategies, LLFAs should consider opportunities to seek alternative sources of funding for managing local flood risk rather than relying solely on Government funds. However, LLFAs should consider the balance they wish to achieve in relation to major coastal and fluvial schemes, where the scale of local contributions required to make up partial national funding may be much more significant than that usually needed for surface water management schemes.

## 4.2 Local Objectives

A key aim for the Barnet Local Strategy is to establish a series of objectives which can be taken forward to deliver effective local flood risk management through measures and actions. The following local objectives have been developed in line with the National Strategy, which will enable Barnet Council to effectively work with the Government, EA, neighbouring LLFAs and other RMAs as they will all be aiming to achieve a similar set of objectives. The following sections detail the Local Strategy objectives for Barnet, including, but not limited to, the measures proposed to achieve them:

1. Prevent risks of flooding in new developments;
2. Promote flood resistance and resilience;
3. Evaluate maintenance and update the flood risk asset register;
4. Prepare emergency plans for flood warnings and alerts, efficient response to flood incidents and emergency recovery following a flood incident;
5. Establish and maintain long term partnership working, both internally within Barnet Council departments and externally with other RMAs. Additionally collaborate with other key partnership groups in order for the contribution to the achievement of wider environmental benefits;
6. Update and review hydraulic modelling of CDAs;
7. Modelling of Barnet catchment sewerage network;
8. Develop, maintain, apply and monitor a strategy for local flood risk management of the area;
9. Prepare flood hazard maps and flood risk maps; and
10. Prepare FRMPs.

It is noted that Barnet Council, as a LLFA, is responsible only for the management of Local Flood Risk, defined as surface water flooding, ordinary watercourse flooding and groundwater flooding. This area of responsibility is outlined by the FWMA (2010). Consequently the local objectives and actions only address Local Flood Risk and the interactions it might have with other forms of flood risk.

## 4.3 How the Objectives will be Achieved

The Barnet Local Strategy identifies the measures that Barnet Council will use to manage flood risks and achieve the stated objectives. When possible the objectives will achieve multiple benefits, as outlined in the National Strategy. Both structural and non-structural measures have been considered. Structural measures are those which require fixed or permanent assets to mitigate flood risk. This can include, but are not limited to, the following measures: detention basins, de-culverting watercourses, land management to reduce surface water runoff or subsurface infiltration systems. Non-structural measures are those which

may not involve fixed or permanent facilities; instead the benefits of flood risk reduction are likely to occur through influencing behaviour. This can range from public education of flood risk and possible flood resilience measures to emergency planning.

Barnet Council will continue to develop their approach to flood risk management, which will be supported by their surface water and drainage partnership with Thames Water Utilities Limited. Emergency planning has been strengthened within Barnet with the use of Flood Station – a historical flooding and flood infrastructure register. Use of Flood Station assists the identification of Priority sites where there is a risk of flooding to properties or essential routes.

#### 4.4 When the Measures will be Implemented

Table 4-1 describes the timelines for the delivery of each proposed measure and action, the suggested lead RMA responsible for implementing the action and the potential sources of funding. The timing of the measures is categorised into the following timescales:

- Short term (0 – 3 years);
- Medium term (3 – 10 years); and
- Long term (> 10 years).

The longer term timescales is set out to account for managing flood risks including the effects of climate change.

## 4.5 Local Objectives and Measures

Table 4-1 summaries the details of the local objectives and associated measures that will be actioned within Barnet by Barnet Council and other RMAs to manage local flood risk issues identified within the borough.

**Table 4-1: Local Objectives**

| Objective No. | Local Objective   | Measures   | Timescale for Implementation |        |      | Key Partners   | Potential source of funding                                 | Comments   |
|---------------|---|--|------------------------------|--------|------|--|---|--|
|               |   |  | Short                        | Medium | Long |  |   |  |
| 1             | Prevent risks of flooding in new developments                 | Prevention of flood risk in new developments should be tackled at the planning process stage. Enhance flood resilience measures and encourage the use of SuDS wherever possible.   | X                            | X      | X    | Barnet Council (Planning) / Thames Water / EA                        | Local funding sources                                       | Measures to be set out in line with the NPPF and the London Plan.  |
|               |   | Ensure that local planning policy sets out the minimum requirements for flood risk mitigation measures within development, including areas at risk of local sources of flooding, particularly within CDAs.   | X                            | X      | X    | Barnet Council (Planning)  | Local funding sources                                       | Measures to be set out in line with the NPPF and the London Plan.  |
|               |   | Develop protocols for implementing the statutory consultee role with regard to management of surface water and implementation of SuDS within new development as part of the planning process.  | X                            |        |      | Barnet Council (Planning)  | Local funding sources / Revenue funding for LLFAs           | To be kept in line with policies set out in the London Plan.   |
| 2             | Promote flood resistance and resilience                       | Promote flood resistance and resilience measures to property owners at risk of flooding through community awareness programs, social media and community workshops wherever feasible.  | X                            | X      | X    | Barnet Council   | Local funding sources                                       |  |
|               |   | Undertake hydraulic modelling to identify areas which feasibly would benefit from flood avoidance, resistance and resilience measures, such as SuDS and Property Level Protection.   | X                            | X      |      | Barnet Council   | Local funding sources / FCRM GiA / Local Levy               | The options proposed should be kept in line with NPPF, The London Plan and local Barnet planning policies. |
|               |   | Barnet Council to ensure that SuDS practices are adopted by an Adopting Authority following their construction to ensure that SuDS practises are properly managed throughout their lifespan. Planning applications for all major developments (greater than 10 dwellings) should contain an Adopting Authority Statement outlining the Adopting Authority throughout the development's lifespan and provide assurances that they will undertake appropriate operation and maintenance duties for the SuDS practices. | X                            | X      | X    | Barnet Council (Planning)  | Local funding sources / Revenue funding for LLFAs           | SuDS practices to be kept in line with Non-statutory Technical Standards for SuDS guidance.                |
| 3             | Evaluate maintenance and update the flood risk asset register | Maintain and update the asset register using Flood Station.  | X                            | X      | X    | Barnet Council   | Local Levy / Revenue for LLFAs / Local funding sources      | This is a requirement defined within the FWMA.   |
|               |   | Investigate all reported flooding incidents and update records on Flood Station and other RMA registers, such as the DG5 register.   | X                            | X      | X    | Barnet Council / Thames Water Utilities Ltd. / other RMAs            | Local funding sources                                       |  |
|               |   | Encourage the maintenance of third party infrastructure assets.  | X                            | X      | X    | Barnet Council / EA / neighbouring LLFAs / other RMAs                | Local funding sources / Community funding / Private funding |  |
|               |   | Encourage the maintenance of privately owned assets.   | X                            | X      | X    | Barnet Council / other RMAs / Canal and River Trust / Private owners | Local funding sources                                       |  |

| Objective No. | Local Objective  | Measures  | Timescale for Implementation |        |      | Key Partners   | Potential source of funding                   | Comments  |
|---------------|--|---|------------------------------|--------|------|--|---|---|
|               |  |   | Short                        | Medium | Long |  |   |   |
|               |  | Minimise the constrictions in watercourses, such as de-culverting watercourses where feasible.  | X                            | X      | X    | Barnet Council / EA  | Local funding sources / Local Levy            |   |
| 4             | Prepare Emergency plans for flood warnings and alerts, efficient response to flood incidents and emergency recovery plans following a flood incident | Ensure flood emergency responders utilise the best available flood information from up-to-date local flood risk mapping from all sources.   | X                            |        |      | Barnet Council / Category 1 and 2 Responders   | Local funding sources / Local Levy            | Improved flood risk mapping sourced from updated modelling  |
|               |  | Work in collaboration with the EA and communities at high flood risk to develop an efficient response strategy a severe weather or flood alert.   | X                            | X      |      | Barnet Council / EA / Category 1 and 2 Responders  | Local funding sources                         |   |
|               |  | Prepare community specific emergency plans in relation to local flood risk in accord with national guidance and environment regulations.  | X                            |        |      | Barnet Council   | Local funding sources                         |   |
|               |  | Develop an understanding of the preparation and response activities of other RMAs to flooding.  | X                            |        |      | Barnet Council / Neighbouring LLFAs / Thames Water Utilities Ltd. / EA / Category 1 and 2 Responders / Transport for London / Network Rail | Local funding sources                         | As outlined in FWMA (2010)  |
|               |  | Use up-to-date flood risk mapping to identify areas which would benefit from flood warning or flood alert systems. Determine the feasibility of implementation.   | X                            |        |      | Barnet Council / EA / Thames Water Utilities Ltd.  | FCRM GiA / Local funding sources / Local Levy |   |
|               |  | Undertake post flood incident reviews to identify and implement lessons learnt into future operational practices.   | X                            | X      | X    | Barnet Council / Category 1 and 2 responders   | Local funding sources                         | Ongoing process   |
| 5             | Establish and maintain long term partnership working, both internally within Barnet Council departments and externally with other RMAs               | Share flooding information within Barnet Council, and externally with other RMAs. Design guidance on managing flood risk through local communication channels, such as the use of Barnet Council website, social media. This will ensure the communities with the highest risk and vulnerability can more accurately be targeted. | X                            | X      | X    | Barnet Council / Neighbouring LLFAs / Thames Water Utilities Ltd. / EA / Transport for London / Network Rail                               | Local funding sources / FCRM GiA / Local Levy |   |
|               |  | Barnet Council, and other RMAs, should also collaborate with other key partnership stakeholders, such as the BCP group, in order to contribute to the achievement of wider environmental benefits.  | X                            | X      | X    | Barnet Council / Neighbouring LLFAs / EA / BCP   | Local Levy / Local Funding Sources / FCRM GiA | Collaboration of stakeholders to link catchment-wide documents, such as the Thames FRMP and the Thames CFMP |
|               |  | Continue to pursue opportunities to provide information on flooding and mitigation through the use of public consultations and local community workshops wherever possible.   | X                            | X      | X    | Barnet Council   | Local funding sources                         | Ongoing process   |
|               |  | Encourage communities to register to receive flood warnings, flood alerts and associated weather warnings for flooding wherever available.  | X                            |        |      | Barnet Council   | Local funding sources                         |   |
|               |  | Identify and outline the roles and responsibilities of all RMAs and key stakeholders involved with flood risk management.   | X                            |        |      | Barnet Council / Neighbouring LLFAs / Thames Water Utilities Ltd. / EA / Transport for London / Network Rail                               | Local Levy / Local funding sources            | Keep in line with Flood Risk Regulations objectives   |
|               |  | Identify and monitor funding sources, internal and external, available for local flood risk management activities.  | X                            | X      | X    | Barnet Council / EA  | Local funding sources                         | Ongoing process   |

| Objective No. | Local Objective   | Measures   | Timescale for Implementation |        |      | Key Partners  | Potential source of funding                                    | Comments   |
|---------------|---|--|------------------------------|--------|------|---|--|--|
|               |   |  | Short                        | Medium | Long |   |  |  |
|               |   | Maintain positive relations and explore partnership working opportunities with residents, businesses and other RMAs.   | X                            | X      | X    | Barnet Council  | Local funding sources  | Ongoing process  |
| 6             | Update and review hydraulic modelling of Critical Drainage Areas                            | Update and review the detailed hydraulic models of the CDAs identified within the Barnet SWMP (and used for the analysis in the Barnet Local Strategy).  | X                            | X      | X    | Barnet Council  | Local funding sources  |  |
|               |   | Undertake detailed surveys of watercourses and culverts within the Barnet CDAs to update survey information required for accurate hydraulic representations within the modelling.  | X                            | X      |      | Barnet Council  | Local funding sources / Local Levy / Revenue funding for LLFAs | Barnet Council intends to use the information gained from the flood risk analysis of the CDAs to mitigate surface water flood risk across the Borough. |
|               |   | Create a short list of options from the hydraulic modelling of the CDAs designed to alleviate local flood risk.  | X                            | X      |      | Barnet Council  | Local funding sources / Local Levy / Revenue funding for LLFAs |  |
| 7             | Modelling of Barnet catchment sewerage network  | Barnet Council should liaise with TWU (and other RMAs which control a sewerage network or assets o, for example TFL / network rail) to undertake modelling to better identify the risk of sewer flooding from the foul and surface water sewer networks within the Barnet Catchment. | X                            |        |      | Barnet Council / Neighbouring LLFAs / Thames Water Utilities Ltd. / Transport for London / Network Rail | Local funding sources / DG5 Contribution                       | Part funding from TWU would be decided as specific schemes come forward  |
|               |   | Liaise with other neighbouring LLFAs in order to model the entire catchment as sewerage networks are not confined to Local Authoritative boundaries.   | X                            |        |      | Barnet Council / Neighbouring LLFAs   | Local funding sources/ Revenue funding for LLFA                |  |
|               |   | Ensure the updated models are integrated with other models previously prepared by the EA.  | X                            | X      | X    | Barnet Council / Neighbouring LLFAs / EA  | Local funding sources  |  |
| 8             | Develop, maintain, apply and monitor a strategy for local flood risk management of the area | Develop a local flood risk management strategy in collaboration with all RMAs, including local communities.  | X                            | X      | X    | Barnet Council  | Local Levy / Revenue funding for LLFAs                         | As outlined in the FWMA (2010)   |
|               |   | Update and maintain local flood risk management strategy on a six year cycle as a minimum to be in keeping with Barnet PFRA cycles. Update Local Strategy after a significant flood incident occurs within Barnet.   | X                            | X      | X    | Barnet Council  | Local funding sources  | The definition of a significant flood event is left at the discretion of Barnet as the LLFA  |
| 9             | Prepare flood hazard maps and flood risk maps   | Work in collaboration with neighbouring LLFAs and the EA to produce, and update where necessary, flood hazard maps and flood risk maps.  | X                            |        |      | Barnet Council / Neighbouring LLFAs / EA  | Local funding sources  |  |
| 10            | Prepare FRMPs   | Prepare FRMP for Barnet in line with national guidance and FWMA.   | X                            |        |      | Barnet Council / EA   | Local Levy / Revenue funding for LLFAs                         | FWMA (2010) requires the creation of a FRMP. FRMP completed December 2015  |

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## 5. Funding and Implementation

### 5.1 Funding

A key part of a Local Strategy is to provide details on how proposed objectives and measures could be funded. This chapter outlines the funding mechanisms that are available to Barnet.

In order to achieve the set objectives and measures funding will need to be sought from a variety of sources as national funding will be annually limited, which might only provide a contribution towards the scheduled costs of the planned schemes. Consequently additional local funding may be required. Current sources of funding are described in the following sections:

#### 5.1.1 National Funding

There are several national funding initiatives which might benefit the funding of the planned schemes set out in the Local Strategy:

- **Flood and Coastal Risk Management Grant in Aid (FCRM GiA):** Following the recommendations set out in the 2007 Pitt Review that a new funding scheme should be implemented to allow community and third party groups to invest in flood risk management, the FCRM GiA initiative is now active and grants money from the FCRM GiA pot of annual funding based upon what will be delivered by the project. Partnership Funding<sup>21</sup> of schemes allows more scheme to go ahead and communities a greater say in what is done to project them. Instead of fully meeting the costs of just a limited number of projects, the new approach could make funding available towards any worthwhile scheme over time. The key benefits considered by the initiative are the reduced risk of flooding to householders, infrastructure, to vulnerable communities, environmental benefits and agriculture. This means that, for the first time, grants for surface water management and property level protection (PLP) will be considered alongside other schemes.
- **Local Levy:** Local levies are paid by upper tier authorities for additional flood risk management schemes that would not otherwise proceed. The funds can be used to support projects relating to any source of flooding, as well as coastal erosion. Local levy payment can be used to top up FCRM GiA funding.
- **Revenue funding for LLFAs:** The government is making additional funds available to councils in the short term to fulfil their new roles and responsibilities under the FWMA (2010). Once allocated, the grants able to be management by Barnet Council according to its needs and priorities. The amount allocated is based on the level of risk in LLFA. Barnet Council intends to make use of this information obtained in order to apply national funding.

#### 5.1.2 Local Funding and Additional funding sources

- **Council Tax and Business rate supplements:** Local authorities can use income generated through council levies and precepts to invest in flood risk management schemes. The benefit of this funding method is it can be used to promote flood risk management schemes; however, this may require approval through referendum. Barnet Council is responsible for setting council tax and managing spending. Business rate supplements could be levied in a similar manner.
- **The Community Infrastructure Levy (CIL):** The CIL is widely recognised as an important new funding source, with the intention to ensure that developers contribute to the cost of the implementation of necessary flood management infrastructure to offset the impact of the development. Local planning

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<sup>21</sup> <https://www.gov.uk/government/publications/flood-and-coastal-resilience-partnership-funding-an-introductory-guide>

authorities, which levy the charge, are required to focus CIL revenues on the provision of new infrastructure; The CIL is not intended to remedy existing infrastructure deficiencies. This has been set out in the Barnet Local Plan Core Strategy as the replacement for Section 106 Planning Obligations funding.

- **Developer based contributions:** Section 106 Planning Obligations provide a means of securing developer contributions towards schemes that are necessary for a development to be acceptable in planning terms and directly relates to the development. Barnet Council is responsible for negotiating, collating and managing funding secured through this route. Section 106 contributions must be directly linked to the specific development, thus there is limited opportunity for the reallocation of funds.
- **New Homes Bonus:** The New Homes Bonus provides funding for local authorities. It matches funds and the additional Council Tax raised for new homes and empty properties brought back into use with an additional amount for affordable homes for the following six years. Therefore, the New Homes Bonus could be used as a method to fund local flood risk mitigation measures.
- **DG5 contribution:** Thames Water Utilities Ltd maintains a database of properties at risk of flooding from incapacity of the public sewerage network, which is updated quarterly. This means that areas highlighted as having surface water problems are shown on the DG5 database. Therefore, situations arise where Barnet Council and Thames Water Utilities Ltd could work together to deliver effective flood risk management collaboratively. Consequently some schemes may attract part funding from Thames Water Utilities Ltd; this would be decided as specific schemes come forward.
- **SuDS Pre-application Advice:** Barnet Council could impose a fee to applicants submitting planning applications for pre-application advice on surface water management and SuDS criteria ahead of a formal outline or full planning application submission. Funds raised through pre-application consultations could be used to offset the additional costs associated with reviewing planning applications and ensure that future development adequately manages surface water and mitigates flood risk across the borough.
- **Flood Re:** the Government has introduced a new scheme that is funded by insurers to provide flood cover on home insurance. Annual tax is collected from every home insurer in the UK which contributes to a £180m fund each year, which is used to reimburse the insurer should a claim against flood damage be made. Further information can be found at [www.floodre.co.uk](http://www.floodre.co.uk)
- **Local fundraising / private contributions:** In addition to the above contributions from the local communities and businesses that benefit from schemes can be important sources of funding for local schemes.

## 5.2 Implementation

Areas predicted to be at the greatest risk from local sources of flooding have been identified in Section 2, and it is advised that local objectives and associated measures that will be actioned by Barnet Council and other RMAs be prioritised to mitigate the risks for high priority areas in *Table 2 5: Barnet Risk Prioritisation Table*.

A cost / benefit appraisal is usually completed for all proposed flood risk management schemes, including both the structural and non-structural measures within each scheme. A cost / benefit appraisal helps to ensure the chosen measures for implementation are proportionate to the level of risk presented. Furthermore, the appraisal can in some cases help prioritise schemes and deliver a sound economic case to secure funding. It is recognised that specification of costs and benefits of measures is a requirement of a Local Strategy. However, it must also be acknowledged that in order to complete this process detailed

information on the specific costs and benefits of each proposed measure is required. At this stage of Local Strategy development, this type of information is not available in all areas to undertake a meaningful analysis.

Many of the proposed objectives relate to the following:

- Identification of flood risk within Barnet;
- Improving the understanding of flood risks within Barnet through improved knowledge gained by surveys and collected information by Barnet Council and other RMAs;
- Managing the consequences of flooding; and
- Prioritisation of future investment.

The identified measures to implement these objectives generally relate to the Barnet Council's and other RMAs' approach to their responsibilities for flood risk management in their daily work. Until further investigations are undertaken, and until there is greater certainty on funding, it is not considered appropriate to identify specific structural and non-structural measures and initiatives, thus the need for cost / benefit appraisal of proposals is not applicable at this time.

As the Local Strategy is a document with continuous updates (see Section 6.1.1) it is proposed that future iterations may include proposed measures, which involve the implementation of structural or non-structural measures to reduce the consequences of flooding. A cost / benefit appraisal of these measures will then be completed as appropriate, in accordance with the guidance in place at the time. The appraisal will consider the whole life benefits of the measures (both tangible and intangible), the associated implementation costs and ongoing maintenance costs.

## 6. Review and Update

### 6.1 Strategy Review

#### 6.1.1 Frequency

The Local Strategy should be reviewed and updated every six years as a minimum as this will align the review cycle with the requirements of the Flood Risk Regulations (2009) to produce another PFRA in 2017. The PFRA process will highlight any new flood risk information, thus this can be used to update the Local Strategy document due in 2018.

Moreover, circumstances may occur within Barnet, which would trigger an interim update in the Local Strategy. Examples of triggers include:

- Occurrence of a significant flood event;
- New information gained from surveys of ordinary watercourses and additional data or hydraulic modelling becomes available within Barnet, which may alter the understanding of flood risk;
- The outcome of investment decisions by partners, which can influence available funding; and
- Significant development, or other topographic changes, which may affect flood risk.

The definition of a 'trigger' should be at the discretion of Barnet Council. However, it is in the interest of Barnet Council, and the community they represent, that the Local Strategy remains current and up-to-date.

#### 6.1.2 Responsibility

Reviews and updates of the Local Strategy is the responsibility of Barnet Council as the LLFA. Other Barnet RMAs are required to support the review and update process with the supply of relevant data to inform the Local Strategy.

### 6.2 Consultation

#### 6.2.1 Current Position and Future Work

The Local Strategy has been circulated for consultation to appropriate departments within Barnet Council, key stakeholders and the general public. Feedback received from the consultation process has been reviewed by the authors and, where appropriate, incorporated into the Local Strategy to ensure it reflects the needs of the community.

## 7. References

- Defra (2005), Making space for water
- Defra / Environment Agency (2011), Understanding the risks, empowering communities, building resilience, the national flood and coastal erosion risk management strategy for England.
- Department for Communities and Local Government (2012) National Planning Policy Framework (NPPF)
- Department for Communities and Local Government (2014) Planning Policy Guidance (PPG)
- Environment Agency (2012), Thames Estuary 2100 Plan (TE2100 Plan)
- Environment Agency (2009), Thames Catchment Flood Management Plan (CFMP)
- Environment Agency (2015), Thames River Basin Management Plan
- London Borough of Barnet (2012), Core Strategy: Development Plan Document
- London Borough of Barnet (2011), Preliminary Flood Risk Assessment (PFRA)
- London Borough of Barnet (2012), Surface Water Management Plan (SWMP)
- National Archives (2009) Flood Risk Regulations
- National Archives (2010) Flood and Water Management Act
- North London (2008), Strategic Flood Risk Assessment (SFRA)

## Appendix A – Glossary

| Term                                   | Definition   |
|--|--|
| AEP                                    | Annual Exceedance Probability  |
| Aquifer                                | A source of groundwater comprising water bearing rock, sand or gravel capable of yielding significant quantities of water.   |
| AMP                                    | Asset Management Plan, see below   |
| Asset Management Plan                  | A plan for managing water and sewerage company (WaSC) infrastructure and other assets in order to deliver an agreed standard of service.   |
| AStSWF                                 | Areas Susceptible to Surface Water Flooding. A national data set held by the Environment Agency and based on high level modelling which shows areas potentially at risk of surface water flooding.   |
| Catchment Flood Management Plan (CFMP) | 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.   |
| CFMP                                   | Catchment Flood Management Plan, see entry above   |
| CIRIA                                  | Construction Industry Research and Information Association   |
| Climate Change                         | Long term variations in global temperature and weather patterns caused by natural and anthropogenic actions.   |
| Culvert                                | A channel or pipe that carries water below the level of the ground.  |
| Defra                                  | Government Department for Environment, Food and Rural Affairs  |
| DG5 Register                           | 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.  |
| Environment Agency (EA)                | Environment Agency: Government Agency reporting to Defra charged with protecting the Environment and managing flood risk in England and Wales.   |
| Indicative Flood Risk Areas            | Areas determined by the Environment Agency as potentially having a significant flood risk, based on guidance published by Defra and WAG (Welsh Assembly Government) and the use of certain national datasets. These indicative areas are intended to provide a starting point for the determination of Flood Risk Areas by LLFAs.  |
| National FCERM Strategy                | National Flood and Coastal Erosion Risk Management Strategy. Prepared by the Environment Agency in partnership with WAG. The strategy is required under the Flood and Water Management Act 2010 and will describe what needs to be done by all involved in flood and coastal risk management to reduce the risk of flooding and coastal erosion, and to manage its consequences. |
| FMfSW                                  | Flood Map for Surface Water. A national data set held by the Environment Agency showing areas where surface water would be expected to flow or pond, as a result of two different chances of rainfall event, the 1 in 30yr and 1 in 200yr events.  |
| Flood defence                          | Infrastructure used to protect an area against floods such as floodwalls and embankments; they are designed to a specific standard of protection (design standard).  |
| Flood Risk Area                        | See entry under Indicative Flood Risk Areas.   |

| Term   | Definition   |
|--|--|
| Flood Risk Regulations                       | Transposition of the EU Floods Directive into English and Welsh law. The EU Floods Directive is a piece of European Community (EC) legislation to specifically address flood risk by prescribing a common framework for its measurement and management.  |
| Flood and Water Management Act (FWMA 2010)   | An Act of Parliament which forms part of the UK Government's response to Sir Michael Pitt's Report on the Summer 2007 floods, the aim of which is to clarify the legislative framework for managing surface water flood risk in England and Wales. The Act was passed in 2010 and is currently being enacted in stages.  |
| Flood Risk Regulations Act (2009)            | The Flood Risk Regulations Act (2009) are a set of directives which assimilate the European Union Flood Directive into English and Welsh legislation. They include the need for the development of Flood Hazard and Flood Risk Maps by the EA and LLFAs, the development of Preliminary Flood Risk Assessments (PFRA) to be completed by all LLFAs the Environment Agency (EA) and Flood Risk Management Plans (FRMPs).  |
| Fluvial Flooding                             | Flooding resulting from water levels exceeding the bank level of a watercourse (river or stream). In this report the term Fluvial Flooding generally refers to flooding from Main Rivers (see later definition).   |
| IUD  | Integrated Urban Drainage, a concept which aims to integrate different methods and techniques, including sustainable drainage, to effectively manage surface water within the urban environment.   |
| LDP  | Local Development Plan containing the local planning policies which guide development over the next 15 years   |
| Local Flood Risk Management Strategy (LFRMS) | A LFRMS required by the FWMA 2010 that must specify:<br>(a) the Risk Management Authorities in the authority's area,<br>(b) the flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area,<br>(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),<br>(d) the measures proposed to achieve those objectives,<br>(e) how and when the measures are expected to be implemented,<br>(f) the costs and benefits of those measures, and how they are to be paid for,<br>(g) the assessment of local flood risk for the purpose of the strategy,<br>(h) how and when the strategy is to be reviewed, and<br>(i) how the strategy contributes to the achievement of wider environmental objectives. |
| Lead Local Flood Authority (LLFA)            | Local Authority responsible for taking the lead on local flood risk management. The duties of LLFAs are set out in the Flood and Water Management Act 2010.  |
| LiDAR  | Light Detection and Ranging, a technique to measure ground and building levels remotely from the air, LiDAR data is used to develop DTMs and DEMs (see definitions above).   |

| Term                              | Definition   |
|-----------------------------------|--|
| Local Resilience Forum            | A multi-agency forum representative of 33 London Councils, bringing together all the organisations that have a duty to cooperate under the Civil Contingencies Act, and those involved in responding to emergencies. Within each local authority there is a Borough Resilience Forum. Borough Resilience Forum roles and responsibilities are defined under the Civil Contingencies Act, which meet quarterly.   |
| LPA                               | Local Planning Authority. The local authority or Council that is empowered by law to exercise planning functions for a particular area. This is typically the local borough or district Council.   |
| LRF                               | Local Resilience Forum, see above.   |
| Main River                        | Main rivers are a statutory type of watercourse in England and Wales and are usually larger streams and rivers, but may also include some smaller watercourses. A main river is defined as a watercourse marked as such on a main river map, and can include any structure or appliance for controlling or regulating the flow of water in, into or out of a main river. The Environment Agency's powers to carry out flood defence works apply to main rivers only. |
| NRD                               | National Receptor Dataset – a collection of risk receptors produced by the Environment Agency. A receptor could include essential infrastructure such as power infrastructure and vulnerable property such as schools and health clinics.  |
| Ordinary Watercourse              | All watercourses that are not designated Main River, and which are the responsibility of Local Authorities or, where they exist, IDBs are termed Ordinary Watercourses.  |
| Partner                           | A person or organisation with responsibility for the decision or actions that need to be taken.  |
| PFRA                              | Preliminary Flood Risk Assessment, see below.  |
| Pitt Review                       | Comprehensive independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England and Wales.  |
| Pluvial Flooding                  | Flooding from water flowing over the surface of the ground; often occurs when the soil is saturated and natural drainage channels or artificial drainage systems have insufficient capacity to cope with additional flow.  |
| Preliminary Flood Risk Assessment | Assessment required by the EU Floods Directive which summarises flood risk in a geographical area. Led by LLFAs.   |
| Resilience Measures               | Measures designed to reduce the impact of water that enters property and businesses; could include measures such as raising electrical appliances.   |
| Resistance Measures               | Measures designed to keep flood water out of properties and businesses; could include flood guards for example.  |
| Risk                              | In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, combined with the consequence of the flood.  |
| Risk Management Authority         | Defined by the Flood and Water Management Act as “the Environment Agency, a lead local flood authority, a district council for an area for which there is no unitary authority, an internal drainage board, a water company, and a highway authority”.   |
| RMA                               | Risk Management Authority, see above.  |
| Sewer flooding                    | Flooding caused by a blockage or incapacity in a sewer.  |

| Term                         | Definition   |
|------------------------------|--|
| Stakeholder                  | A person or organisation affected by the problem or solution, or interested in the problem or solution. They can be individuals or organisations, includes the public and communities.   |
| SUDS                         | Sustainable Drainage Systems, see below.   |
| Sustainable Drainage Systems | Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques. Includes swales, wetland sand ponds.   |
| Surface water                | Rainwater (including snow and other precipitation) which is on the surface of the ground (whether or not it is moving), and has not entered a watercourse, drainage system or public sewer. Refer to Pluvial flooding.                         |
| SWMP                         | Surface Water Management Plan.   |
| Tidal                        | Relating to the actions or processes caused by tides   |
| UKCIP                        | The UK Climate Impacts Programme. Established in 1997 to assist in the co-ordination of research into the impacts of climate change. UKCIP publishes climate change information on behalf of the UK Government and is largely funded by Defra. |
| WAG                          | Welsh Assembly Government  |
| WaSC                         | Water and Sewerage Company.  |

## Appendix B – Figures

## Appendix C – Example of Investigation Priority

**Table C-1:** Investigation Priority Example Table

|   | CDA/Region Name  | Human Health                 |                              |  | Economic Activity                |                              |                              | Environment                  |                              | Significant Historic Local Flooding Experienced? | Historic Flooding from Local Sources   | Overall Investigation Priority<br>High = 20 +<br>Medium = 10 to 19<br>Low = 0 to 9 |
|---|--|------------------------------|------------------------------|--|----------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--|--|--|
|   |  | Res. Properties (No.)        | Critical Services (No.)      | Critical Service Type  | Non-Residential Properties (No.) | Road (km) A&M roads          | Rail (km)                    | Heritage Features (No.)      | Details                      |  |  |  |
|   | <i>Predicted depth of flooding (200yr SWMP result)</i> | <i>&gt;0.1m flood depths</i> | <i>&gt;0.1m flood depths</i> | <i>&gt;0.1m flood depths</i>   | <i>&gt;0.1m flood depths</i>     | <i>&gt;0.1m flood depths</i> | <i>&gt;0.1m flood depths</i> | <i>&gt;0.1m flood depths</i> | <i>&gt;0.1m flood depths</i> | <i>&gt;0.1m flood depths</i>                     | <i>&gt;0.1m flood depths</i>   |  |
| Actual number from the relevant Dataset       | CDA (EXAMPLE)  | 100                          | 5                            | 1 school / 1 Electricity sub-station / 1 police station / 1 hospital / 1 surgery and health centre | 0                                | 0.3                          | 0.15                         | 0                            | -                            | YES  | 2 incidents (Sewer) / 23 SW flood incidents associated with blocked gullies (2010 - 2012) / Significant main river flooding (historically) | Medium   |
| How the CDA risk priority score is calculated | (High = 5; Medium = 3; Low = 1)                        | 5                            | 5                            | 1 primary school / 1 Electricity sub-station   | 1                                | 5                            | 1                            | 1                            | -                            | YES  | 2 incidents (Sewer) / 23 SW flood incidents associated with blocked gullies (2010 - 2012) / Significant main river flooding (historically) | 18   |

The example CDA is classified as a Medium priority region according to the above table. The first row of this table represents the actual number of properties, critical services etc. The second row represents the scoring numbers that were assigned to each parameter according to Table 2-4. For example, The CDA example used has 100 Flooded Residential Properties according to the Surface Water Management Plan 1 in 200 year pluvial modelling outputs. This number is above the threshold of 8.54 properties (see Table 2-3); therefore, according to the second column of Table 2.4 it should be classified as Medium priority and receive a score of 3. However, since this CDA has experienced significant historical flooding it is classified as High Priority with a score of 5 according to the last column of the same table (see Table 2-4). Those scores were then summed up giving the overall Investigation Priority of the CDA (last column of the above table).

**Table C-2: Barnet CDA / Region Risk Prioritisation Weighting Score**

| <b>CDA / Region</b>                              | <b>Region Area (Km)</b> | <b>Original Risk Priority Score</b> | <b>Risk Priority Score after weighting</b> |
|--|-------------------------|-------------------------------------|--|
| <i>CDA_001 - Scratchwood</i>                     | <b>0.58</b>             | 7                                   | 7  |
| <i>CDA_002 - Arkley</i>                          | <b>0.92</b>             | 9                                   | 9  |
| <i>CDA_003 - Duck Island</i>                     | <b>1.51</b>             | 13                                  | 13   |
| <i>CDA_004 - Barnet</i>                          | <b>0.89</b>             | 13                                  | 13   |
| <i>CDA_005 - Hadley</i>                          | <b>2.13</b>             | 19                                  | 19   |
| <i>CDA_006 - Pricklers Hill</i>                  | <b>0.44</b>             | 11                                  | 11   |
| <i>CDA_007 - Longmore Avenue</i>                 | <b>1.50</b>             | 17                                  | 17   |
| <i>CDA_008 - Oakleigh Park</i>                   | <b>1.43</b>             | 17                                  | 17   |
| <i>CDA_009 - Friern Barnet</i>                   | <b>3.62</b>             | 21                                  | 20   |
| <i>CDA_010 - Coppetts Wood</i>                   | <b>1.96</b>             | 17                                  | 17   |
| <i>CDA_011 - Victoria Park</i>                   | <b>0.71</b>             | 13                                  | 13   |
| <i>CDA_012 - Long Lane</i>                       | <b>1.11</b>             | 11                                  | 11   |
| <i>CDA_013 - Creighton Avenue</i>                | <b>0.88</b>             | 9                                   | 9  |
| <i>CDA_014 - Muswell Hill</i>                    | <b>1.07</b>             | 13                                  | 13   |
| <i>CDA_015 - Bittacy Park</i>                    | <b>2.22</b>             | 15                                  | 15   |
| <i>CDA_016 - Westchester Drive</i>               | <b>0.53</b>             | 13                                  | 13   |
| <i>CDA_017 - Victoria Road</i>                   | <b>0.40</b>             | 17                                  | 17   |
| <i>CDA_018 - Golders Green</i>                   | <b>2.55</b>             | 25                                  | 24   |
| <i>CDA_019 - Hendon Way</i>                      | <b>0.31</b>             | 11                                  | 11   |
| <i>CDA_020 - Childs Hill</i>                     | <b>2.64</b>             | 21                                  | 20   |
| <i>CDA_021 - Claremont Way Industrial Estate</i> | <b>0.17</b>             | 9                                   | 9  |
| <i>CDA_022 - Brent Terrace</i>                   | <b>0.47</b>             | 13                                  | 13   |
| <i>CDA_023 - Lichfield Road</i>                  | <b>0.32</b>             | 13                                  | 13   |
| <i>CDA_024 - Edgware Station</i>                 | <b>0.11</b>             | 13                                  | 13   |
| <i>CDA_025 - Mill Hill</i>                       | <b>0.40</b>             | 9                                   | 9  |
| <i>CDA_026 - Mill Hill Circus</i>                | <b>2.70</b>             | 21                                  | 20   |
| <i>CDA_027 - Blondell Road</i>                   | <b>0.69</b>             | 9                                   | 9  |
| <i>CDA_028 - Grahame Park</i>                    | <b>1.60</b>             | 13                                  | 13   |
| <i>CDA_029 - Oak Hill Park</i>                   | <b>1.07</b>             | 13                                  | 13   |
| <i>CDA_030 - Brunswick Park</i>                  | <b>0.64</b>             | 13                                  | 13   |
| <i>CDA_031 - Broadfields Ditch</i>               | <b>1.39</b>             | 13                                  | 13   |
| <i>CDA_032 - Sunnyhill Park</i>                  | <b>1.59</b>             | 15                                  | 15   |
| <i>CDA_033 - Church End Farm</i>                 | <b>0.48</b>             | 11                                  | 11   |
| <i>Not CDA - NW region</i>                       | <b>15.53</b>            | 27                                  | 22   |
| <i>Not CDA - NE region</i>                       | <b>10.75</b>            | 23                                  | 20   |
| <i>Not CDA - SW region</i>                       | <b>11.89</b>            | 23                                  | 20   |
| <i>Not CDA - SE region</i>                       | <b>10.20</b>            | 25                                  | 22   |

