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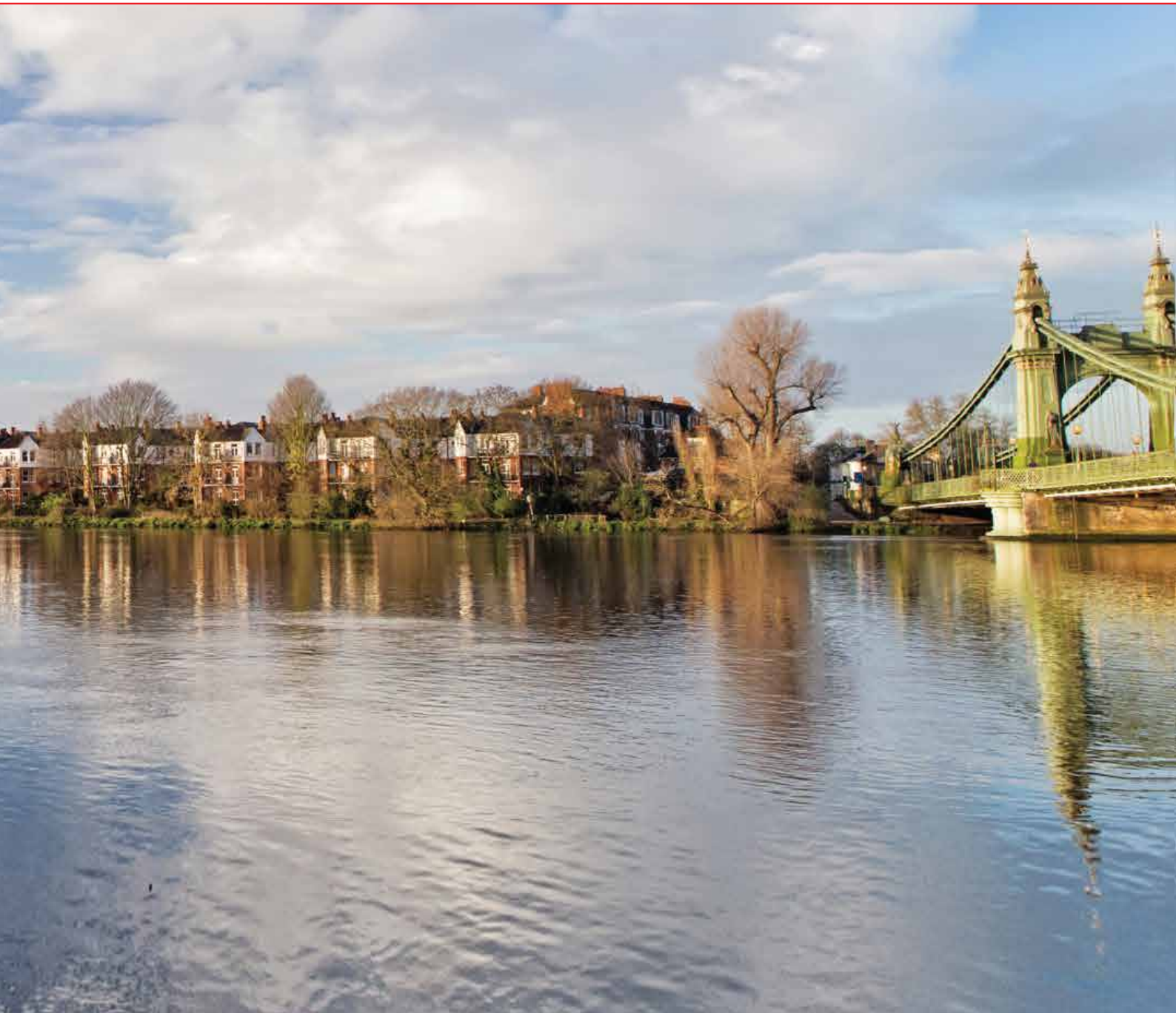


Hammersmith & Fulham Council

Local flood risk management strategy

April 2017

Contents

1. Executive Summary

This report represents the Local Flood Risk Management Strategy (LFRMS) for the London Borough of Hammersmith & Fulham. This is a requirement of the Flood and Water Management Act (2010) and will be reviewed every five years to ensure that it contains the most up to date information relating to flood risk within the Borough.

The LFRMS draws upon the previously prepared Preliminary Flood Risk Assessment (PFRA, June 2011) and makes use of local knowledge of flood risk within the borough, both from London Borough of Hammersmith & Fulham and external parties, such as the Environment Agency and Thames Water. Information has also been taken from the Surface Water Management Plan (SWMP, 2015), the updated Strategic Flood Risk Assessment (SFRA, 2017) and the Multi-Agency Flood Plan (MAFP, 2016).

The LFRMS is an important tool to help understand and manage flood risk within Hammersmith & Fulham. It seeks to increase awareness of the flood risk in the Borough, and to encourage better co-operation and communication between organisations involved in flood risk management and the public. It sets out plans for flood risk management and makes links to planning and other relevant departments to achieve an integrated management of flood risk.

The LFRMS sets out the roles and responsibilities of flood risk management partners along with the Council's position as a Lead Local Flood Authority (LLFA).

The LFRMS also includes a series of five local objectives, supported by actions. The five local objectives are listed below and reflect how local flood risk will be managed across the Borough:

1. Understanding Flood Risk posed to LBHF and creating a method of capturing data;
2. Working with Key Stakeholders and other Risk Management Authorities;
3. Decreasing Flood Risks through the Planning Process;
4. Decreasing Flood Risks through other means; and
5. Raising Public Awareness.

2. Introduction

Background

The London Borough of Hammersmith & Fulham has been regularly affected by surface water flooding after significant rainfall. In particular, in July 2007 when the Borough was severely affected by rainfall intensities in excess of 25mm/hr at many locations in England, with daily totals exceeding 100mm (over twice the monthly average rainfall of 44mm for July in the period 1971 to 2000). This short duration/high intensity storm led to substantial overland flow and ponding of surface water in low lying areas. Drainage systems were overwhelmed in several locations across the Borough. Widespread damage and disruption was caused to residential and commercial properties.

An initial overview of the flooding issues in the borough, based on historic flooding records, indicate that several areas are affected by multiple sources of flood risk. These include complex interactions between direct surface water ponding, overland flow paths, and the combined sewer system. There are also several cross-boundary surface water flooding issues, with surface water and combined sewer flows from the London Borough of Ealing, London Borough of Brent and the Royal Borough of Kensington and Chelsea contributing to flood risks in the Borough.

Overview

The London Borough of Hammersmith & Fulham (LBHF) covers an area of approximately 16.4km^2 and is heavily urbanised, comprising predominantly residential and commercial land use. The River Thames runs along the southern boundary of the borough which helps to enhance the environmental quality and character of the borough. However, it also means that the borough is potentially more at risk of flooding than some other parts of London.

There are risks of flooding from a range of sources, including surface water runoff and ponding, groundwater, sewer surcharging, rivers and tidal watercourses (River Thames). Often more than one of these sources can combine to cause a flood event.

Flood risk in Hammersmith & Fulham will increase in the future, influenced by climate change and increasing pressures on development and housing needs. Funding is limited to address the increased risk through flood defences or drainage capacity works and therefore this LFRMS seeks to identify opportunities to mitigate risks in more affordable ways and where multiple benefits can be delivered.

Purpose of the LFRMS

The aim of the LFRMS is to set out the approach to managing flood risk from local sources (i.e. surface water, sewer, ground water and ordinary watercourses) in both the short and longer term, with objectives and actions that will help to manage the risk in a way that delivers the greatest benefit to LBHF residents, businesses and the environment. It will also ensure local communities acquire a better understanding of local risk management, a co-ordinated planning approach to managing flood risks and improved levels of sustainability.

A key output of the LFRMS is the Action Plan and how the Council intends to manage local flood risk over the next five years and beyond. The Action Plan will be reviewed every 5 years but will be monitored to ensure it takes into consideration any factors that may influence delivery of the plan and to respond to new flood incidents.

This LFRMS will also help the Council and the communities within the borough to understand their different roles and responsibilities to reduce the risk and impact of flooding. Communities, individuals, voluntary groups and private and public sector organisations will work together to:

- Manage the risk to people and their property;
- Facilitate decision making and action at the appropriate level – individual, community, local authority, river catchment or national; and
- Achieve environmental, social and economic benefits, consistent with the principles of sustainable development.

The LFRMS will not remove the risk of flooding altogether, however it will be used to increase the level of understanding of local flood risk by the community and implementing measures to manage the risk where appropriate. This LFRMS outlines the priorities for flood risk management in the borough and provides a delivery plan to manage the risk. It builds on the outcomes of the Hammersmith & Fulham Strategic Flood Risk Assessment (SFRA) and the Hammersmith & Fulham Surface Water Management Plan (SWMP), both of which are available on the Council's website.

The SWMP, the SFRA and their associated risk maps provide the necessary evidence base to support the development of the LFRMS.

Flood Risk Management Strategy Requirements

The Flood and Water Management Act 2010 specifies the Lead Local Flood Authority's duties regarding Local Flood Risk Management Strategies and outlines the elements that must be included in a LFRMS.

The Flood and Water Management Act 2010[1] states:

'A lead local flood authority for an area in England must develop, maintain, apply and monitor a strategy for local flood risk management in its area (a "local flood risk management strategy") (Part 1, Section 9).

The London Borough of Hammersmith & Fulham (LBHF) forms the Lead Local Flood Authority for the borough, and therefore has the responsibility of preparing the LFRMS.

Table 1 shows these requirements and where each one is covered in the Hammersmith & Fulham LFRMS.

Table 1: Flood and Water Management Act 2010 section 9 (4) Strategy Requirements

The Flood and Water Management Act 2010 section 9 (4) requires that the strategy must specify:		**Where it is covered in this Strategy:**
1	The risk management authorities in the authority's area	Section 3
2	The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area	Section 3
3	The objectives for managing local flood risk (including any objectives included in the authority's flood risk management plan prepared in accordance with the Flood Risk Regulations 2009)	Section 5
4	The measures proposed to achieve those objectives	Section 6
5	How and when the measures are expected to be implemented	Sections 6 and Appendix 1
6	The costs and benefits of those measures, and how they are to be paid for	Sections 6 and Appendix 1
7	The assessment of local flood risk for the purpose of the strategy	Section 4
8	How and when the strategy is to be reviewed	Section 9
9	How the strategy contributes to the achievement of wider environmental objectives.	Section 7

1 http://www.legislation.gov.uk/ukpga/2010/29/pdfs/ukpga_20100029_en.pdf

Planning Policy

There are a wide range of documents and legislation that together provide the foundation for managing flood risk locally, regionally and nationally. This LFRMS has been prepared in line with other plans, strategies and documents including:

National Legislation and Policy

- The Water Act (2014)
- National Planning Policy Framework (2012)
- National Flood and Coastal Erosion Risk Management Strategy (England) (2011)
- The Localism Act (2011)
- Flood and Water Management Act (2010)
- Conservation of Habitats and Species Regulations (2010)
- Flood Risk Regulations (2009)
- Health Act (2009)
- Climate Change Act (2008)
- EU Floods Directive (2007)
- Civil Contingencies Act (2004)
- Strategic Environmental Assessment Directive (2001)
- Environment Act (1995)
- Water Resources Act (1991)
- Land Drainage Act (1991)
- Building Act (1984)
- Highways Act (1980)
- Water Industry Act (1975)

Regional Legislation and Policy

- The London Plan (2016)
- London Sustainable Drainage Action Plan (2016)
- London Strategic Flood Response Framework (2015)
- Mayor's Climate Change Adaptation Strategy (2011)
- Thames Catchment Flood Management Plan (2009)
- Thames River Basin Management Plan (2009)
- Thames Estuary 2100 Plan (TE2100 Plan) (2012)

Local Legislation and Policy

- Proposed Submission Local Plan (2016)
- London Borough of Hammersmith & Fulham Strategic Flood Risk Assessment (2017)
- London Borough of Hammersmith & Fulham Surface Water Management Plan (2015)
- Core Strategy (2011)
- Development Management Local Plan (2013)
- Planning Guidance Supplementary Planning Document (2013)
- Preliminary Flood Risk Assessment (2011)
- Multi Agency Flood Plan (2016)

3. Roles and Responsibilities

Who has responsibility for Managing Flood Risk in Hammersmith & Fulham

The Flood and Water Management Act 2010 defines responsibilities for the management of flood risk by different organisations. Designated as Risk Management Authorities (RMAs), these organisations have a legal responsibility for managing flood risk. However, a number of other organisations also have a role to play in delivering local flood risk management.

This section outlines the responsibilities of the various organisations that contribute to managing flood risk in the borough of Hammersmith & Fulham. As a Lead Local Flood Authority (LLFA), the Council has a duty to take the lead in the management of local flood risk.

Risk Management Authorities

Many organisations have responsibilities relating to flood risk in Hammersmith & Fulham. Each organisation has a different function, but all work collaboratively to support the borough. All RMAs have a duty to co-operate with the council, as the Lead Local Flood Authority, and other RMAs when exercising their flood risk management functions.

There are four types of flood RMAs working in the borough, they are:

1. Lead Local Flood Authority (London Borough of Hammersmith & Fulham)
2. Environment Agency (EA)
3. Water Company (Thames Water)
4. Highways Authorities (Hammersmith & Fulham Council and Transport for London)

1 Lead Local Flood Authority (London Borough of Hammersmith & Fulham)

As the LLFA, Hammersmith & Fulham Council is responsible for the strategic co-ordination of local flood risk management. As part of this role, the Council requires co-operation from RMAs and stakeholders to help ensure that the risks of flooding are effectively managed. The Council's role will often be to work together with other authorities to manage the risks of flooding in the borough.

In addition to the duty to cooperate, the LLFA and the EA have the power to request information, from any person, to help carry out their flood risk management functions.

The Lead Local Flood Authority within LBHF sits within the Environmental Services Department (in particular the Highways & Planning Divisions) however, other Council departments should also use the LFRMS to help consider flood risk in their procedures and support the decision-making process. The responsibilities that each of the departments have within the Council are outlined in Table 2 below.

Table 2: Council Departments and their roles

Council Department	Role
Transportation and Highways	Project lead for all LLFA duties Highways Drainage Promotion of Sustainable Drainage Systems (SuDS[2]) in the Highway Flood Asset Register
Planning - Environmental Policy	Assessment of planning application Drainage Strategies Assessment of planning application and Flood Risk Assessments Promotion of SuDS through planning Assessment of infrastructure projects and assessment of applications (i.e. Thames Tideway Tunnel, Counters Creek Flood Alleviation Scheme)
Emergency Services	Multi-Agency Flood Plan Community flood plans, Strategic organisation of Emergency Services during an event Evacuation procedures Post flooding recovery
Housing	Promotion of SuDS within Housing Estates
Environment, Leisure and Resident Services	Promotion of SuDS within parks
Customer Services	Reporting of flooding events

2 Sustainable Drainage Systems (SuDS) - http://www.susdrain.org/delivering-suds/using-suds/background/sustainable-drainage.html

More information on the Council's duties and powers can be found on the Council's website.

2 Environment Agency

The Environment Agency (EA) is an executive non-departmental public body, sponsored by the Department for Environment, Food and Rural Affairs (DEFRA). It has principal responsibilities in England to protect and improve the environment, and to promote sustainable development. The EA has a strategic overview of all sources of flooding and coastal erosion. In addition, it is responsible for:

- Flood risk management activities on 'main rivers';
- Groundwater (strategic overview);
- Regulating raised reservoirs with a volume of at least 25000m^3 above ground level (note that none are present within LBHF); and
- Flood risk management activities from tidal waterways and the coast (note that the River Thames is tidal through LBHF).

3 Water Company (Thames Water)

Thames Water Utilities Limited (TWUL) owns and operates London's sewerage systems. As the water and sewerage company, TWUL is responsible for the maintenance and upkeep of the public sewer network in LBHF. This includes the surface water, foul water and combined (surface and foul water) sewers and drains that serve more than one property. In LBHF, the vast majority of the sewer network is a combined system meaning that foul and surface water flows drain into the same sewer. Thames Water also investigates and records reported incidents of sewer flooding and has a duty to report findings to OFWAT, the economic regulator of the water sector in England and Wales. Private drains are the responsibility of the landowner.

4 Highways Authorities (Hammersmith & Fulham Council and Transport for London)

As a highways authority, LBHF is responsible for the drainage of surface water and highway flooding on all non-Transport for London (TfL) roads in the borough. This includes the majority of highway gullies and drains.

The authority does not have maintenance responsibilities for the following:

- Any drainage from private estates
- The sewers that highway gullies drain into

Drainage systems from private estates are the responsibility of the landowner or estate management team. Flooding due to public sewer blockages are the responsibility of Thames Water.

Suggested Flood Risk Management Actions for Others

Hammersmith & Fulham Council recognises the vital role individuals, communities and businesses have in managing flood risk and the requirement for more information to be made available to support these initiatives. The LFRMS aims to promote and encourage personal responsibility by raising awareness of flood risk and how risk can be reduced by supporting community-based actions.

It is strongly recommended that householders, whose homes are at risk of flooding (check this website for further information: https://flood-warning-information.service.gov.uk/long-term-flood-risk), take steps to ensure that their home is protected. Practical guidance can be found in the publication 'Prepare your property for flooding' available on the Environment Agency website.

The specific duties relating to each Risk Management Authority are outlined in Table 3 below:

Table 3: Responsibilities of the RMAs

Responsibility	Risk Management Authorities			
	LBHF	Environment Agency	Thames Water	Transport for London
Highways drainage and asset management of major A-roads which include: A4 (including the Hammersmith Flyover) A40 (The Westway) A3220 West Cross Route Holland Park Roundabout				X
Highways drainage and asset management of other public roads,	X			
Management of the flood risk from the River Thames		X		
Management of the public sewer network			X	
Management of the risk of groundwater flooding	X			
Management of the risk of surface water flooding	X			
Emergency Planning	X	X	X	X

Suggested actions for Home and Business Owners:

Looking after their property and protecting it from flooding through property level resilience and resistance measures (such as installing barriers, flood resilient finishes, dropping down of electrical services in the basement etc.);

- Maintaining proper flow of water in any watercourse running through or under their land or other private drainage pipes;
- Prepare a Flood Plan; and
- Sign up to the free EA Flood Warning Service.

Suggested actions for Developers:

- Maintain proper flow of water in any watercourse running through or under their land or other private drainage pipes; and
- Incorporate flood resilient and waterproof measures into the design of new developments.

Suggested actions for Individuals:

- Take action such as disposing of leaf litter, grass cuttings and other garden waste rather than letting it block drains or watercourses;
- Co-operate with neighbours and other risk management authorities;
- Get involved with local flood risk management activities;
- Sign up to the free EA Flood Warning Service; and
- Report flooding incidents.

4. Flood Risk in Hammersmith & Fulham

Flooding from rivers and sea

Fluvial flooding refers to flooding that occurs when a river cannot hold the volume of water which drains into it from the surrounding land. Tidal flooding refers to flooding that occurs from water bodies that are affected by tidal fluctuations in water level, such as the sea and the River Thames along the stretch adjacent to LBHF. This document will refer to the flood risk posed by the River Thames as tidal flood risk despite it being a river.

The Borough is covered by three different Flood Zones, as defined by the Environment Agency, in relation to the increasing probability of river and sea flooding (ignoring the presence of flood defences). Zone 1 is low probability, Zone 2 refers to medium probability and Zone 3 is high probability. Over 60% of the area of Hammersmith & Fulham and about 75% of the population are located in Flood Zones 2 and 3 (Medium/High probability of flooding from the Thames).

The risk of flooding is greatly reduced by the presence of the Thames tidal flood defences (river wall embankments and the Thames Barrier[3]). The annual probability of an extreme tide level is 0.1%, which means that the risk of flooding from the Tidal Thames is small. Although the probability of flooding from the Tidal Thames is small, the consequences are potentially high due to the high flows and rapid inundation in some locations and potential threat to life. At present Hammersmith & Fulham is fully defended against the 0.1% annual probability extreme tide level.

Please refer to the Strategic Flood Risk Assessment (SFRA), available on the council's website, for more information on flooding from the River Thames as a result of overtopping or breach of the flood walls.

3 https://www.gov.uk/guidance/the-thames-barrier

Flooding from surface water and sewer

Surface water flooding occurs when rainfall cannot soak into the ground, or drain into the local sewer system and therefore flows across the ground. This type of flooding is due to intense rainfall overwhelming the capacity of the sewer system. Flooding from surface water and sewers is less likely to pose a risk to residents' lives, but it can cause damage to property and incur high costs to clean up. It is also much more difficult to predict than fluvial or tidal flooding and this means that there is often little forewarning.

Sewer and surface water flooding are particularly problematic in Hammersmith & Fulham and the borough's SWMP identified that much of the Borough is at risk from sewer and/or surface water flooding. This is mainly because both foul and surface water drainage are directed into a combined sewer system. Wastewater from other boroughs also passes through the local sewer system, which can become overwhelmed when large volumes of surface water enter the system very quickly – i.e. during very heavy downpours.

Please refer to the Council's SWMP and SFRA (available on the website) for more information on surface water flooding. The SWMP provides a more detailed description of flood risks for each Ward including details of surface water modelling results, and information on any records of flooding in the area.

Flooding from groundwater

Groundwater is water which is present beneath the surface in soil void spaces, sediments and rocks. It is often used as a source of drinking water and is always present. The depth of groundwater under the surface varies depending on the geology of the area and the amount of rain that has fallen and infiltrated into the ground. Groundwater levels are difficult to predict.

The bedrock underlying the borough is predominantly London Clay but this is overlaid with superficial deposits of sand and gravel across the southern extent of the borough. These permeable gravels outline the historic floodplain of the River Thames and may contain a perched water table. If, following heavy rainfall, the water table within this gravel layer rises, localised groundwater flooding may occur in excavations and basements. The majority of the southern half of the borough is therefore considered to be potentially at high risk of groundwater flooding.

Climate change

Climate change impacts such as more frequent extreme weather events are expected to increase the frequency and severity of flooding. The borough already has many residential streets with basement properties which are potentially vulnerable to surface water flooding. It is therefore vital that basement developments are carried out with appropriate flood mitigation measures in place to guard against future flood events.

See the SFRA for more information on climate change.

5. Objectives for Managing Local Flood Risk

Guiding Principles for setting objectives

The objectives for future local flood risk management in Hammersmith & Fulham have been developed taking into account:

- the historic and predicted flood risk across the borough;
- the overall aims for local flood risk management in Hammersmith & Fulham;
- the Environment Agency's national objectives for flood risk management; and
- objectives and aims set out in complementary plans and strategies.

National Flood Risk Management Objectives

The Environment Agency's Flood and Coastal Erosion Risk Management Strategy for England sets out the following National objectives for flood risk management:

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

Complementary Plans and Strategies

A number of plans and strategies are already in existence which outline how flood risk management and the achievement of wider environmental objectives will be delivered in Hammersmith & Fulham. We have considered the objectives set out in each of these to ensure that our LFRMS complements and seeks to deliver these through local flood risk management.

A summary of the key plans and strategies influencing the LFRMS are provided in Table 4 below.

Table 4: Key Plans and Strategies

Plan/Strategy	Main Objectives
National FCERM Strategy for England (2011)	Sets out the Environment Agency's overview role in Flood and Coastal Erosion Management (FCERM) encouraging more effective partnership working between national and local agencies and local communities.
London Sustainable Drainage Action Plan (2016)	This Action Plan is a long-term plan intended to inspire, facilitate and co-ordinate a step-change in how rainwater is managed in London. It focusses on retrofitting of SuDS to existing buildings, land and infrastructure, identifying potential means by which these works can be best funded. With the vision that by 2040, London will manage its rainwater more sustainably to reduce flood risk and improve water quality and security. This will maximise the benefits to people, the environment and the economy.
The London Plan (2016)	The London Plan is the overall strategic plan for London, and sets out a fully integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years.
Thames Catchment Flood Management Plan (2009)	Produced by the Environment Agency, proposing catchment-wide, long-term measures, the Catchment Flood Management Plan considers all types of flooding and sets the context and direction for more local, delivered plans.
The Thames Estuary 2100 (TE2100) project (2012)	Sets out a tidal flood risk management plan for the Thames Estuary until the end of the century. The plan recommends the required flood risk management measures and when and where these will be needed, based on climate changes and sea level rises.
Hammersmith & Fulham Strategic Flood Risk Assessment (2017)	The SFRA is a study to assess present and future flood risk to the Borough from all sources and assess the impact that development will have on flood risk. It enables LBHF to select and develop sustainable site allocations away from vulnerable flood risk areas. The assessment focuses on existing site allocations within the Borough but also sets out the procedure to be followed when assessing additional sites for development in the future.
Hammersmith & Fulham Updated Surface Water Management Plan (2015)	This document is a plan which outlines the preferred surface water management strategy for the Borough including consideration of flooding from sewers, drains, groundwater, and runoff from land, small watercourses and ditches that occurs as a result of heavy rainfall.
Hammersmith & Fulham Multi-Agency Flood Plan (2016)	The aim of the MAFP is to provide a co-ordinated multi-agency response framework at a strategic level to mitigate the impact of a large scale flooding incident within LBHF. The focus of this plan is on sewer and surface water flooding, and the residual risk of a breach in the River Thames flood defence wall.
Development Management Local Plan (2013)	The Development Management Local Plan sets out the development management policies to be used by the council in helping to determine individual planning applications and must be read alongside the Core Strategy. The policies within this document aim to ensure development within the borough accords with the spatial vision and strategic objectives set out within the Core Strategy. Policy DM H3 seeks to reduce water use and the risk of flooding, sustainable drainage and water efficient appliances.
Core Strategy (2011)	The Core Strategy is the overarching planning policy document and sets out the long term strategic vision for the borough. It highlights the main issues facing the borough and includes strategic policies as to how these issues are to be addressed. Policy CC2 addresses Water and Flooding and minimising current and future flood risk and the adverse effects of flooding on people.
Emerging Local Plan (2016)	The council consulted on the Proposed Submission Local Plan in Autumn 2016. Once adopted this document will set out the vision, objectives and detailed spatial strategy for future development in Hammersmith & Fulham for the next 15-20 years along with specific development management policies. It includes policies on: minimizing flood risk and reducing water use and minimising surface water run-off with sustainable drainage systems.

Hammersmith & Fulham Flood Risk Guiding Principles

The LFRMS must set objectives for managing local flood risk. The aim of the LFRMS is to achieve an integrated management of flood risk and this will be carried out through a series of strategic local objectives.

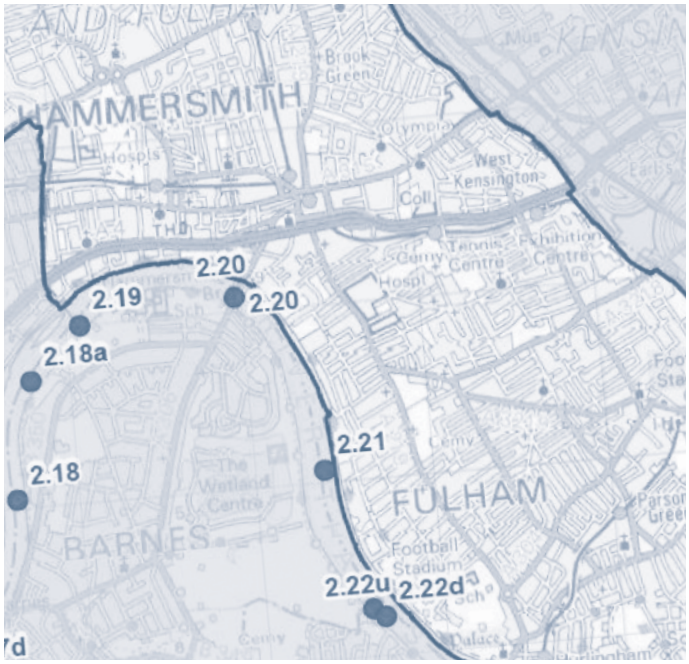
The actions identified with each objective have derived from local knowledge, the use of evidence based documents such as the Surface Water Management Plan, the need to implement our LLFA duties and other duties as a Council.

The actions are a combination of soft measures: investigations, reviews, policy implementation, and hard measures: ensuring the physical integrity of critical infrastructure. Some actions are linked and could be used to meet more than one objective.

We have taken the guiding principles from the strategies mentioned above into account when setting the following objectives for the management of local flood risk in Hammersmith & Fulham:

1. Understanding Flood Risk posed to LBHF and creating a method of capturing data;
2. Working with key stakeholders and other RMAs;
3. Reducing Flood Risk through the Planning Process;
4. Reducing Flood Risk through other means; and
5. Raising Public Awareness.

Further information on these objectives, their associated actions and how these will be delivered are discussed in Section 6.0 below.



6. Delivery of Local Flood Risk Management

Overview

This section sets out how the local flood risk management objectives will be delivered over the next five years. The Action Plan outlines the proposed action, responsible RMA, timescale and estimated costs for the Council. These will help to improve the understanding of flood risk across the Borough and inform the way flood risk is managed and planned for.

Objective 1: Understanding Flood Risk posed to LBHF and creating a method of capturing data

Work to Date

To help implement the Flood and Water Management Act 2010 and the Flood Risk Regulations 2009, all London Borough's worked together as part of the Drain London forum to develop SWMPs and PFRAs. These documents have provided a good borough level assessment of the risk of flooding from multiple sources. The LBHF SWMP modelled flood risk at a borough level and identified areas at significant risk of flooding, designating them as "flooding hotspots".

The council also produced the SFRA in 2010, and updated in 2017, which assesses present and future flood risk in the Borough from all sources and considers the implications for new developments.

Working with the Environment Agency, Hammersmith & Fulham Council have contributed to the development of the updated Flood Maps for Surface Water. Any future modelling projects the Council undertakes will feed into further updates of the maps.

Hammersmith & Fulham Council has also compiled a public register of Flood Risk Management Assets which includes the location of features relevant to flood risk within the Borough.

Action Plan

Action No.	Action	Responsible RMA	Timescale	Estimated Cost (£)
1.1	Check Surface Water and tidal Breach Modelling and update as required	LBHF	Ongoing	20k-50k
1.2	Map historical flooding and develop methodology for the recording of future flood events (call centre)	LBHF	Ongoing	<5k
1.3	Review and update asset database	LBHF	April 2017 then annually	<5k
1.4	Record and map measures (including SuDS, Attenuation, etc.) implemented by Council and installed in new major developments approved by Council through planning	LBHF	Ongoing	<5k
1.5	Gain a better understanding of groundwater flooding within the borough and interactions with other sources of flooding	LBHF	December 2017	<5k

Benefits

To improve the Council's understanding of flood risks in the borough, it proposes to collect further evidence of flood events and five associated actions have been set out.

Actions 1.1 and **1.2** will continue to improve the Council's knowledge of where flooding commonly occurs through the collection of information on historical events such as depth, duration, and the properties affected. This information can help to validate models and support bids for funding of future flood management projects.

Action 1.2 will include the implementation of a standardised Flood Incident Log to record and investigate future flooding incidents within the borough. This will improve procedures and protocol for recording flood events and flood risk in the borough and will provide improved historical flood information to support ongoing and future flood mitigation schemes. It will require actions to educate departments to ensure everyone involved understands the log and the methodology.

Action 1.3 is a duty under the Act and will be ongoing to ensure that the flood asset register is kept up to date to include all Flood Risk Management Assets, which are defined by LBHF as being "structures or features that would cause an increased flood risk if they were absent, modified or not appropriately maintained".

The proposed actions will improve procedures for recording surface water flooding incidents as well as the understanding and record of assets in the borough. Each of these actions help to build up the Council's knowledge of flood risk areas and better direct limited resources on a priority basis. By collecting this information, the Council will be better placed to target support before, during and after flood events and deliver its responsibilities as an LLFA.

Objective 2: Working with key stakeholders and other Risk Management Authorities

Work to Date

To strengthen the Council's relationship with other RMAs, it proposes to continue to collaborate and work with relevant organisations and councils to get better outcomes. Six associated actions have been set out.

LBHF is within the North Central Flooding Partnership Group as designated by the Thames Regional Flood and Coastal Committee (TRFCC) which contains the London Boroughs of Camden, Islington, Westminster, City of London and the Royal Borough of Kensington and Chelsea. The group meets on a quarterly basis to provide updates (which are fed back to the TRFCC) and discuss topical issues. Within London, there are other groups which LBHF works closely with including the Drain London Forum and the London Drainage Engineers Group (LoDEG). Through these groups, LBHF has worked to deliver the requirements of the Flood and Water Management Act at the local and London level, working in partnership with Thames Water and other neighbouring LLFA Councils.

The Council has regular contact with the Environment Agency and Thames Water and consults with both on the development of new planning policies and has taken note of their comments in relation to the requirements of the EA's Thames Estuary 2100 Plan and Thames Water's requirements in terms of reducing the pressure on the combined sewer network. The council has also worked jointly with Thames Water on implementing SuDS retrofit pilot schemes in the borough.

Action Plan

Action No.	Action	Responsible RMA	Timescale	Estimated Cost (£)
2.1	Continue to work in partnership with the EA, TWUL, TfL, Port of London Authority and neighbouring Boroughs to manage Flood Risk	LBHF EA, TWUL, TfL, PLA, RBKC, Ealing, Hounslow and Brent	Ongoing	<5k
2.2	Gain a better understanding of key problem areas within the TWUL network to help prioritise areas for SuDS	LBHF, TWUL	Ongoing	<10k
2.3	Work with the EA on groundwater mapping	LBHF, EA	December 2017	<20k
2.4	Work with TWUL on identifying sustainable drainage retrofitting opportunities	LBHF, TWUL	Ongoing with annual meetings	<20k
2.5	Work with TfL to identify potential collaborative working opportunities	LBHF, TfL	Ongoing with annual meetings	<10k
2.6	Closer co-ordination with neighbouring boroughs to utilise cross boundary working opportunities	LBHF, RBKC, Ealing, Hounslow and Brent	Ongoing with annual meetings	<5k

Benefits

As the LLFA, LBHF are responsible for co-ordinating the management of flood risk from surface water, groundwater and ordinary watercourses flooding (note that there are no ordinary watercourses within LBHF). The actions proposed above will raise awareness of flood risk in the borough and generate opportunities for joint partnership for future flood mitigation works.

Action 2.1 will achieve this by encouraging the relevant authorities to have suitable plans in place to help mitigate flood consequences for infrastructure within Flooding Hotspots.

Actions 2.1 to 2.5 will encourage further collaboration with RMAs to help reduce flooding through the exercising of each partner's flood responsibilities. The more information and data known about local flood risk, the more schemes or solutions become available to help reduce that risk.

RMAs are often looking at schemes to reduce the risk of flooding. **Actions 2.3 to 2.6** aim to ensure proactive engagement with other authorities where flood reduction schemes are proposed and/or planned for the future. This is to ensure that the maximum amount of benefits can be achieved where proposed schemes overlap or where joint working could see increased benefits as well as opportunities for funding.

Objective 3: Decreasing Flood Risk through the Planning Process

Work to Date

The Council has a responsibility to manage the impact on flood risk of developments. Within Hammersmith & Fulham, the Planning team has a range of tools available, which they have produced or have been provided by Government to help manage the risk of flooding. These include:

1. Proposed Submission Local Plan (2016)
2. Development Management Local Plan (2013)
3. Core Strategy (2011)
4. Planning Guidance Supplementary Planning Document (2013)
5. Surface Water Management Plan (2015)
6. The Strategic Flood Risk Assessment (2017)
7. The London Plan (2015)
8. National Policy Planning Framework and Planning Policy Guidance

Please see Table 4, Section 5.0 for document summaries, or visit the London Borough of Hammersmith & Fulham website to view council documents such as the Local Plan, SFRA, SWMP.

All applications that are made to the authority are assessed according to the Council policies and legislative requirements. This includes preventing development in identified hotspots unless appropriate mitigation measures are integrated. Through this regular screening of applications, flood risk is taken into account and either reduced or mitigated.

Applications for development located in areas at risk of flooding are required to include a Flood Risk Assessment which includes details of appropriate flood mitigation measures such as structural waterproofing and flood resilient design measures. Developments, particularly major sites, are also required to show how Sustainable Drainage Systems (SuDS) such as green roofs, permeable paving and rainwater harvesting will be integrated to help reduce flood risk.

Action Plan

Action No.	Action	Responsible RMA	Timescale	Estimated Cost (£)
3.1	Undertake a review of our policies to ensure flood risk is fully addressed and encourage uptake of SuDS and infiltration measures/ rainwater harvesting	LBHF	December 2016	<5k
3.2	Review SFRA/ SWMP and other strategies	LBHF	December 2020	<30k
3.3	Ensure clear requirement for applicants through the following: Pro-forma Clearer webpage	LBHF	June 2017	<10k
3.4	Promoting flood resistance/ resilience measures in new development	LBHF	Ongoing	<5k
3.5	Providing mechanisms to ensure proper assessment of Flood Risk for new developments and integration of appropriate mitigation measures	LBHF	June 2017	<10k

Benefits

Preventing flooding through effective planning controls has a large potential to help ensure that new developments are not at risk of flooding and do not increase flood risk off-site. The actions above will help raise awareness of flood risk (and flooding hotspots) amongst planners and developers as well as influencing planning policies to prevent the creation of new risk areas.

Actions 3.1 and **3.2** ensure that existing policies and documents are up to date. When assessing planning applications, consideration will be given to all sources of flooding, and regard will be had to national policy in the form of the NPPF (and NPPG), regional policy in the form of the London Plan, and local policy, guidance and evidence in the form of the documents listed above. An assessment of what is appropriate will take into account the latest flood modelling as well as the need for development in an area.

Action 3.3 For the built environment that is already at risk of flooding, sustainable drainage retrofitting can be a solution. This means adapting the drainage systems to capture rainwater for reuse (water butts, rainwater harvesting) or to slow the flow to the sewer (permeable paving, green roofs, etc.). To ensure that developers have a clear idea of what LBHF will be looking to achieve with SuDS, guidance will be created.

Actions 3.4 and **3.5** aim to ensure that new developments are protected through the integration of flood mitigation measures that protect against all relevant sources of flooding, depending on the risks present on site. As well as protecting the new development itself, measures will be required to ensure that flood risk is not increased off-site as a result of the proposed development.

Objective 4: Decreasing Flood Risk through other means

Work to Date

There are also other means to assist with the prevention of flooding and to help ensure that new developments are not at risk of flooding and five associated actions have been set out.

In addition to requiring flood mitigation measures to be integrated in new developments, the council is also implementing flood risk reduction measures across the borough in housing estates and on the public highway.

The council have also worked with Thames Water on two retrofit SuDS pilot projects on the public highway to help reduce sewer/surface water flood risk flood at Melina Road and Mendora Road with a view to rolling out similar projects if the pilots prove to be successful.

Case Studies showing more detailed examples of two Council led schemes (Bridget Joyce Square and Queen Caroline Estate) that have reduced surface water flood risk are provided in Appendix 2.

Action Plan

Action No.	Action	Responsible RMA	Timescale	Estimated Cost (£)
4.1	Promoting an integrated water management approach and seeking opportunities for future council infrastructure works could be used to help deliver local flood risk management benefits	LBHF	Ongoing	<10k
4.2	Identify opportunities for SuDS within the Council owned land and maximise opportunities for installation of SuDS measures on Council buildings when they become available	LBHF	Ongoing	>100k
4.3	Continue to identify and apply for funding for flood risk management and SuDS schemes	LBHF	Ongoing	<5k
4.4	Quantifying benefits achieved through Council led schemes to tackle flooding	EA, LBHF	Annual	<40k

Benefits

Using means other than planning can also help ensure that new developments are not at risk of flooding.

Action 4.1 promotes a holistic and integrated approach to water management by identifying opportunities within/across different departments in the Council for flood risk management benefits. Such action would ensure that the maximum amount of benefits can be achieved where proposed schemes overlap within the Council and where joint working could create wider benefits.

Action 4.2 seeks to identify opportunities on Council buildings and/or land for SuDS, to ensure that when the building is altered/rebuilt or the land becomes available, the opportunities are not missed.

Action 4.3 commits the Council to apply for funding each year and when appropriate to support the development and implementation of flood risk management schemes. The Council also looks for contributions from all parties who will benefit from the proposed schemes. This would help get schemes implemented and increases the chances of funding from Central Government (e.g. Flood Defence Grant in Aid).

Action 4.4 includes the monitoring and recording of Council led schemes and the evaluation of all the benefits achieved through these interventions.

Objective 5: Raising Public Awareness

Work to Date

One of the goals of creating this LFRMS is to make stakeholders more aware of the potential risks in the borough. The council raises public awareness of flood risks by publicising the flood reduction schemes it is implementing around the borough.

One of the major ways in which the Council makes information available is through its website. The Emergencies and safety section of the Council's website (www.lbhf.gov.uk/emergencies-and-safety) advises what to do before, during and after a flood. It directs users to the Environment Agency's guidelines to help prepare for and respond to flooding. It also provides contact details for who to contact in case of a flood.

The LLFA and Emergency Planning team have recently updated the Multi-Agency Flood Plan (MAFP) which encourages all responding parties to work together on an agreed coordinated response to severe flooding and sets out the process of who to contact during an event. The Emergency Planning team is due to carry out a surface water flooding incident exercise in the borough in 2017 in order to test the MAFP and to run through the responsibilities of the various parties, including the emergency services.

This LFRMS is the next big step in communicating flood risk to communities in the borough and providing signposts to where there is further information about particular flood issues.

Action Plan

Action No.	Action	Responsible RMA	Timescale	Estimated Cost (£)
5.1	Use Resident Associations and Community forums to form a Flooding Risk Management Group and actively engage with community action groups on a regular basis	LBHF	April 2017 onwards	<20k
5.2	Provide information and guidance on planning policy including the emerging Local Plan	LBHF	December 2017	<5k
5.3	Develop communication tools to increase public awareness related to Flooding, e.g. website	LBHF	September 2017	<10K
5.4	Work with local communities, businesses and landowners to increase public awareness of flood risk and promote individual and community level resilience	LBHF	April 2017 onwards	<20k
5.5	Produce guidance and good practise examples of sustainable drainage applicable to the housing sector	LBHF	April 2017	<10K

Benefits

The identified actions seek to ensure that residents are made aware of the potential Flood Risk issues in their area and what they can do to prevent or reduce the impact, as well as who they can contact to find help. This will include raising the awareness of the impacts that developments such as garages, kerbs, and paving front gardens can have, as well as potential mitigations such as property level flood protection, water efficiency appliances and SuDS such as, permeable paving and water butts.

Action 5.1 will see the Council reaching out to the community to establish a good working relationship with a group of individuals from Resident Associations, Community Forums and Community Action Groups. The group will then have regular engagement to ensure that the LLFA is providing the necessary information to residents and in an appropriate manner**.**

Action 5.2 will provide guidance on the policies in the emerging Local Plan and the implications and requirements for obtaining planning permission for future development in the Borough.

Actions 5.2 to **5.5** seek to educate and involve the community to increase awareness of flood risk in communities, therefore improving resilience to flooding and encouragement to implement property-level mitigation measures.

7. Achieving wider environmental objectives and other benefits

Guidance on the production of the LFRMS[4] states that "the Local Flood Risk Management Strategy is likely to require statutory Strategic Environmental Assessment, but this requirement is something the Lead Local Flood Authority must consider". The Council considers that this LFRMS does not require an SEA and has sought legal advice which supports this opinion, however a brief evaluation of potential environmental impacts of the LFRMS is included below.

The majority of the LFRMS objectives are likely to have indirect beneficial effects on the environment as they relate to improving knowledge, understanding and high level management of local flood risk rather than actual works or actions that could have an effect on the ground.

The Sustainability Appraisal undertaken indicates that the LFRMS objectives and measures (attached as Appendix 1) are considered to be beneficial for the environment due to the likely outcomes of improved local flood risk management and subsequently reduced local flood risk to the natural and built environment within LBHF.

An assessment has been undertaken of the proposed objectives within the LFRMS and the Sustainability objectives used for the emerging Local Plan as shown in Table 5 below. This indicates that the LFRMS is unlikely to have any negative impacts on the environment, and all of the LFRMS objectives and associated measures are predicted to have either neutral, minor positive or major positive impacts on the environment.

4 Local Government Association (2011) Framework to Assist the Development of the Local Strategy for Flood Risk Management.

Table 5: Proposed objectives assessed against Sustainability objectives

	Social justice	Health	Education and skills	Affordable homes	Social cohesion	Satisfying work	Heritage	Reduce pollution	Reduce transport impacts	Careful consumption	Climate change	Sustainable economy
Understanding Flood Risk posed to LBHF and creating a method of capturing data	N	N	N	N	N	N	N	N	N	N	N	N
Working with key stakeholders and other RMAs	N	N	N	N	N	N	N	N	N	N	N	N
Decreasing Flood Risk through Planning Process	N	I+	N	N	N	N	N	D+	N	D+	D++	D+
Reducing Flood Risk within LBHF	N	I+	N	N	I+	N	I+	D+	N	D++	D++	D+
Raising Public Awareness	N	N	I+	N	I+	N	I+	D+	N	D++	D++	D+

N= neutral, I=Indirect, D=Direct
+ Minor positive effect ++ Major positive effect
- Minor negative effect - - Major negative effect

Table 5 assesses the proposed objectives against the Sustainability objectives used for the emerging Local Plan and indicates that:

- The proposed objectives provide a high level of environmental protection and contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development.
- The proposed objectives are in conformity with the sustainability objective on reducing climate change impact by seeking to minimise the risk of flooding from storm events and overflow of watercourses. This is important to reduce run-off of water so that it does not exceed the capacity of the local drainage systems. This is already a serious London-wide problem and results in localised flooding in some streets and contamination of the River Thames by untreated sewage from the increasing intensity of rainfall. Also, encouraging efficient water consumption will contribute towards reducing the impacts of climate change.
- The proposed objectives will increase the overall efficiency of water use, reducing per person daily consumption.

Overall, the LFRMS's objectives and measures are considered to be beneficial for the environment, due to the likely outcomes of improved local flood risk management and subsequently reduced local flood risk to the natural and built environment within the Borough. The full assessment is included within Appendix 3.

8. Funding for Flood Risk Management

This section sets out the framework by which the council will invest in local flood risk management to ensure that local communities can enjoy the benefits of protection.

Local flood risk management measures will require funding from a variety of sources, both internal and external to the Council. The Council is allocated an annual budget for LLFA activities from the Department for Environment, Food and Rural Affairs (DEFRA). Some actions will require further funding for additional staff resources, expert consultancy fees and direct project construction costs. A number of external sources of funding and resources have been identified and will be utilised where available:

- **DEFRA's Flood Defence Grant in Aid (FDGiA) and Thames Regional Flood and Coastal Committee (TRFCC) Local Levy** – Administered by the EA, both of these streams have funding available for potential local flood risk investigations and the implementation of flood alleviation schemes that deliver reductions in flood risk (typically related to property counts). There is a formal application process and new applications can be made on an annual basis for potential inclusion within the 6 year programme.
- **Thames Water** – Potential funding is available for schemes that help alleviate flooding related to the sewer network, subject to meeting the appropriate criteria. No formal process is established to date, although there have been schemes setup to help provide funding for surface water related schemes, such as the Twenty4Twenty project.
- **Community Infrastructure Levy (CIL) and Section 106 Agreements** – Contributions from new developments towards offsite flood alleviation schemes can potentially be achieved through CIL and Section 106 planning agreements.

9. Strategy Delivery, Monitoring and Review

Delivery

An Action Plan has been developed that details the measures and actions that will be taken to deliver the LFRMS (Appendix 1). For each measure, a number of actions have been identified and for each of these there is a proposed timescale for implementation, with relevant partners identified.

Monitoring

The Action Plan will be the key mechanism through which progress in meeting the LFRMS will be monitored. Hammersmith & Fulham Council proposes to monitor progress against the LFRMS Action Plan annually. This will involve assessing which actions have been delivered, and determining whether there is a need to prioritise particular actions. Findings from this monitoring process will be presented to the North Central London Flood Risk Partnership.

Review

The LFRMS has been developed to deliver a short to medium (5 year) improvement plan to establish a sound evidence and knowledge base upon which to develop a longer-term investment plan for local flood risk management activities in the London Borough of Hammersmith & Fulham.

The LFRMS will be formally reviewed in 2022 and thereafter every five years (as a minimum). However, the strategy should be viewed as dynamic and may require review more regularly to recognise specific changes. Potential triggers for a review may include:

- Occurrence of a significant and widespread flood event
- Significant changes to datasets or information which may alter the understanding of risk within the study area
- Significant amendments to the legal responsibilities and/or roles and functions of Risk Management Authorities and/or other organisations
- Annual monitoring identifying that the LFRMS is not achieving its objectives
- Changes to relevant National and European legislation or
- Changes in funding availability which has a significant effect on the LFRMS Action Plan.

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APPENDIX 1 – Summary table of the actions we are proposing to achieve the strategy's objectives

Objective	Action No.	Action	Responsible RMA	Timescale	Estimated Cost (£)
Understanding Flood Risk posed to LBHF and creating a method of capturing data	1.1	Check Surface Water and tidal Breach Modelling and update as required	LBHF	Ongoing	20k-50k
	1.2	Map historical flooding and develop methodology for the recording of future flood events (call centre)	LBHF	Ongoing	<5k
	1.3	Review and update asset database	LBHF	April 2017 then annually	<5k
	1.4	Record and map measures (including SuDS, Attenuation, etc.) implemented by Council and installed in new major developments approved by Council through planning	LBHF	Ongoing	<5k
	1.5	Gain a better understanding of groundwater flooding within the borough and interactions with other sources of flooding	LBHF	December 2017	<5k
Working with key stakeholders and other RMAs	2.1	Continue to work in partnership with the EA, TWUL, TfL, PLA and neighbouring Boroughs to manage Flood Risk	LBHF EA, TWUL, TfL, PLA, RBKC, Ealing, Hounslow and Brent	Ongoing	<5k
	2.2	Gain a better understanding of key problem spots within the TWUL network to help prioritise areas for SuDS	LBHF, TWUL	Ongoing	<10k
	2.3	Work with the EA on groundwater mapping	LBHF, EA	December 2017	<20k
	2.4	Work with TWUL on identifying sustainable drainage retrofitting opportunities	LBHF, TWUL	Ongoing with annual meetings	<20k
	2.5	Work with TfL to identify potential collaborative working opportunities	LBHF, TfL	Ongoing with annual meetings	<10k
	2.6	Closer coordination with neighbouring boroughs to utilise cross boundary working opportunities	LBHF, RBKC, Ealing, Hounslow and Brent	Ongoing with annual meetings	<5k
Decreasing Flood Risk through the Planning Process	3.1	Undertake a review of our policies to ensure flood risk is fully addressed and encourage uptake of SuDS and infiltration measures/ rainwater harvesting	LBHF	December 2016	<5k
	3.2	Review SFRA/SWMP and other strategies	LBHF	December 2020	<30k
	3.3	Ensure clear requirement for applicants through the following Pro-forma Clearer webpage	LBHF	June 2017	<10k
	3.4	Promoting flood resistance/resilience measures in new development	LBHF	Ongoing	<5k
	3.5	Providing mechanisms to ensure proper assessment of Flood Risk for new developments and integration of appropriate mitigation measures	LBHF	June 2017	<10k

Objective	Action No.	Action	Responsible RMA	Timescale	Estimated Cost (£)
Decreasing Flood Risk through other Means	4.1	Promoting an integrated water management approach and seeking opportunities for future council infrastructure works could be used to help deliver local flood risk management benefits	LBHF	Ongoing	<10k
	4.2	Identify opportunities for SuDS within the Council owned land and maximise opportunities for installation of SuDS measures on Council buildings when they become available	LBHF	Ongoing	>100k
	4.3	Continue to identify and apply for funding for flood risk management and SuDS schemes	LBHF	Ongoing	<5k
	4.4	Quantifying benefits achieved through Council led schemes and planning to tackle flooding	EA, LBHF	Annual	<40k
Raising Public Awareness	5.1	Use Resident Associations and Community forums to form a Flooding Risk Management Group and actively engage with community action groups on a regular basis	LBHF	April 2017 onwards	<20k
	5.2	Provide information and guidance on planning policy including the emerging Local Plan	LBHF	December 2017	<5k
	5.3	Develop communication tools to increase public awareness related to Flooding, e.g. website	LBHF	September 2017	<10K
	5.4	Work with local communities, businesses and landowners to increase public awareness of flood risk and promote individual and community level resilience	LBHF	April 2017 onwards	<20k
	5.5	Produce guidance and good practise examples of sustainable drainage applicable to the housing sector	LBHF	April 2017	<10K

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APPENDIX 2
CASE STUDIES

The following case studies show examples of Council schemes where Sustainable Drainage Systems (SuDS) have been integrated into the urban environment within the London Borough of Hammersmith & Fulham.

Case study:
Australia Road (Bridget Joyce Square)

This is a Neighbourhood and Corridor Scheme which has developed into a flagship SuDS Scheme. The proposals were: to convert the existing road into a pedestrian and cyclist space with limited vehicular access for emergency and maintenance vehicles, whilst also helping to provide a safer link between the Early Years Centre and the playgrounds (on opposing sides of the road).

Figure 1 – Australia Road prior to works

The final design involved converting the existing road into a pedestrian and cyclist space, with limited vehicular access for emergency and maintenance vehicles only. This has provided a significantly safer link from the Early Years Centre to the playground. A large events space for the community to use has also been created beside the school entrance, CCTV has been introduced to the road alongside the provision of electricity and water points for managed use during an event. The addition of a shared community space and communal meeting point aims to invoke a sense of neighbourhood pride and community spirit.

At the heart of the design are the various multi-functional SuDS features. The road has been constructed in permeable paving (1,320m^2), this captures the rainfall and directs it below the surface to a series of bio-retention basins and raingardens. The existing downpipes from the Early Years Centre and Playground Centre roofs have been disconnected from the combined sewer and the water is diverted to these raingardens and basins. These areas have been heavily planted to help utilise the rainwater, provide biodiversity benefits and create an enhanced landscape for the community. Over 2,500 plants and 50 trees have been planted to include a wide variety of species ranging from grasses, bulbs and herbaceous perennials to Himalayan Birch trees. Together they have converted a traditional highway environment into a biophilic oasis for the community to enjoy (over 540m^2 of additional green space).

Prior to a controlled discharge to the existing combined sewer, the bio-retention basins and raingardens attenuate the surface water (approximately 55m^3 storage provided within

the basins themselves). The outlets have been specifically designed to be protected from blockage, which has greatly reduced the maintenance requirements.

The Australia Road Scheme has become a flagship SuDS project. While runoff rates to the combined sewer network have been significantly reduced, we have also witnessed the advantages of sound community involvement. In order to maximise the overall achievements of the scheme, both the environmental and community benefits have been considered equally. The environmental benefits have been maximised due to the community involvement and agreement to incorporate runoff from both the Early Years Centre's and the Playground Building's roofs into the final design. The neighbourhood has gained a more usable space with a much better outlook that is safer, greener and has helped to educate the community in the process.

The project has subsequently won the following awards:

- London Institution of Civil Engineers - Community Impact Award (2016)
- Hammersmith Society - Nancye Goulden Award (2016)

Figure 1 – Australia Road post works (Credit – Robert Bray Associates)

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Case study:

Queen Caroline Estate (QCE) EU LiFE+ with Groundwork London

LBHF officers worked with Groundwork London and submitted a successful funding bid in early 2014 to the European Union's EU Life+ programme 'Climate Proofing Social Housing Landscapes'. This secured a grant to deliver environmental improvements on housing estates within the borough.

The three sites identified for environmental improvements were Queen Caroline Estate W12, Cheeseman's Terrace W14, and Cyril Thatcher / Richard Knight / Eric Macdonald Houses SW6. Information on works at the other estates can be found on the Groundwork website.

Figure 3 – Photos of QCE prior to works (Credit - Groundwork London)

SuDS integrated into QCE include:	
Green roofs	Permeable paving
Rain gardens	Vertical rain garden
Basins	

The various SuDS features have been integrated within the housing estate landscape using a combination of roof space, pavement, car park, estate road and soft landscaped areas. The estate's surface water drainage is connected to the combined sewer system.

142m^2 of extensive biodiverse green roofs have been installed on bin stores and pram sheds. These buildings have flat or shallow-domed concrete slab roofs and they drain via guttering and downpipes to the adjacent paving. A new waterproofing liner was applied to the concrete roofs and a pebble filled gabion edge was used to create a retaining structure for the green roof substrate. The roofs were planted with wildflower seeds and plugs.

Rain gardens have been installed within the paved areas and alongside estate roads to drain the adjacent hard-standing and, in one case, a section of the roof of an adjacent building. The rain gardens were filled with an engineered rain garden soil and planted with a mix of shrubs and perennials. Each rain garden has a vertical entry overflow which connects via a flow control chamber back to the sewer.

All basins are connected via flow control chambers to the sewer. In soft landscape areas run-off has been diverted from downpipes via pebble channels to shallow vegetated basins planted with a SuDS wildflower turf. In paved areas, stoney basins have been introduced which combine an outer skirt of permeable resin bound aggregate and planting beds, with an area of loose aggregate and planting at their base. The use of stoney basins reflects the Council's requirement to minimise additional maintenance associated with increases in soft landscape.

The basins are approximately 30% soft landscape and 70% hard landscape. The basins and adjacent landscaping include informal play features, including bridges, mounds, stepping logs, balance beams and boulders.

Prior to the works, the estate had several large unused paved areas. These were originally installed as drying areas, these have been replaced with stoney basins (described above) and permeable paving. Composite decking and schotterrasen (Austrian gravel lawn) have been used to provide permeable hard-surfacing.

A vertical rain garden has been installed on the end façade of Mary House, which combines an area of plug-planted green wall with an area of climbers. Both will be irrigated from water collected from the roof of Mary House. An existing downpipe will be diverted into a series of narrow stacked tanks which will drip-irrigate the plug planted section of the wall. The overflows from the tanks and the plug planted section of the wall will be fed into a raised planter within which the climbing plants are planted. Any remaining overflow from the system will drain to the adjacent rain gardens.

Capacity building sessions have also been organised as part of the project to educate staff within the housing estates teams about the benefits of Green Infrastructure SuDS and how they should be maintained.

Benefits of the scheme:

- Unused uninspiring landscape converted to diverse, attractive, multi-functional space;
- 142m^2 of biodiverse green roofs;
- Run-off from 900m^2 of impermeable surface has been diverted away from draining directly to the sewer (i.e. green roof, SuDS with controlled overflow or total disconnection);
- 32m^2 of new food growing beds for residents; and
- Capital works delivered for the same cost as typical mixed hard & soft landscape improvement works on social housing estates (£226k).

Wider benefits of the scheme, for instance for health and recreation, crime reduction and environmental education benefits, are being evaluated using a combination of the CIRIA BeST tool and the Social Return On Investment (SROI) model designed by the New Economics Foundation.

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This project has subsequently won the following awards:

- Hammersmith Society - Nancye Goulden Award (2017)
- Landscape Institute - College of Fellows Award for Climate Change Adaptation (2016)
- Sustainable Water Industry Group (SWIG) - Award for Urban Greening (2015)

Figure 4 – Queen Caroline Estate (Credit - Groundwork London)

APPENDIX 3

SEA and Habitats Assessment requirements for the LFRMS

Guidance on the production of a LFRMS[5] states that "the Local Flood Risk Management Strategy is likely to require statutory SEA, but this requirement is something the Lead Local Flood Authority must consider".

The London Borough of Hammersmith & Fulham considers that its emerging LFRMS does not require a full Strategic Environmental Assessment (SEA) and has instead undertaken a brief evaluation of potential environmental impacts of the LFRMS.

This approach has been guided by following the DCLG's Practice Guide, *Figure 2 – Application of the SEA Directive to plans and programmes,* which sets out the key questions that need to be answered by the LLFA when determining the need for a SEA.

The route path that LBHF consider to be appropriate in this instance is shown in the diagram below.

- **Assessment Stage 1**: The LFRMS is subject to preparation and adoption by the local authority. This requires progression onto Stage 2.
- **Assessment Stage 2**: The LFRMS is required by legislation/regulation. This requires progression onto Stage 3.
- **Assessment Stage 3**: Although the Strategy covers flood risk management, which could be considered to be within the remit of water management and also includes actions that relate to land use and planning matters, the Strategy does not set a framework for future development consents of projects. This requires progression onto Stage 4. Only if both of these criteria are satisfied is it necessary to go to Stage 5.
- **Assessment Stage 4**: The LFRMS identifies key actions that are required in order to manage local flood risk from a range of sources. In many respects these actions have already been identified in other strategy documents already adopted by the council – namely the Strategic Flood Risk Assessment and Surface Water Management Plan. None of the identified actions will have significant effects on a Natura 2000 site in accordance with Article 6 and 7 of the Habitats Directive. This requires progression onto Stage 6.
- **Assessment Stage 6**: The LFRMS does not set a framework for future development consent of projects. This role is covered by the council's Core Strategy and Development Management Plan.

Conclusion: No further assessment required. Directive does not require an SEA.

The Sustainability Appraisal undertaken indicates that the Strategy objectives and measures are considered to be beneficial for the environment due to the likely outcomes of improved local flood risk management and subsequently reduced local flood risk to the natural and built environment within London Borough of Hammersmith & Fulham.

An assessment has been undertaken of the proposed objectives within the LFRMS and the Sustainability objectives used for the emerging Local Plan which indicates that the Strategy is unlikely to have any negative impacts on the environment, and all of the Strategy objectives and associated measures are predicted to have either neutral, minor positive or major positive impacts on the environment.

5 Local Government Association (2011) Framework to Assist the Development of the Local Strategy for Flood Risk Management.

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	Social justice	Health	Education and skills	Affordable homes	Social cohesion	Satisfying work	Heritage	Reduce pollution	Reduce transport impacts	Careful consumption	Climate change	Sustainable economy
Understanding Flood Risk posed to LBHF and creating a method of capturing data	N	N	N	N	N	N	N	N	N	N	N	N
Working with key stakeholders and other RMAs	N	N	N	N	N	N	N	N	N	N	N	N
Planning Process	N	I+	N	N	N	N	N	D+	N	D+	D++	D+
Reducing Flood Risk within LBHF	N	I+	N	N	I+	N	I+	D+	N	D++	D++	D+
Raising Public Awareness	N	N	I+	N	I+	N	I+	D+	N	D++	D++	D+

N= neutral, **I**=Indirect, **D**=Direct
+ Minor positive effect **++** Major positive effect
- Minor negative effect **- -** Major negative effect

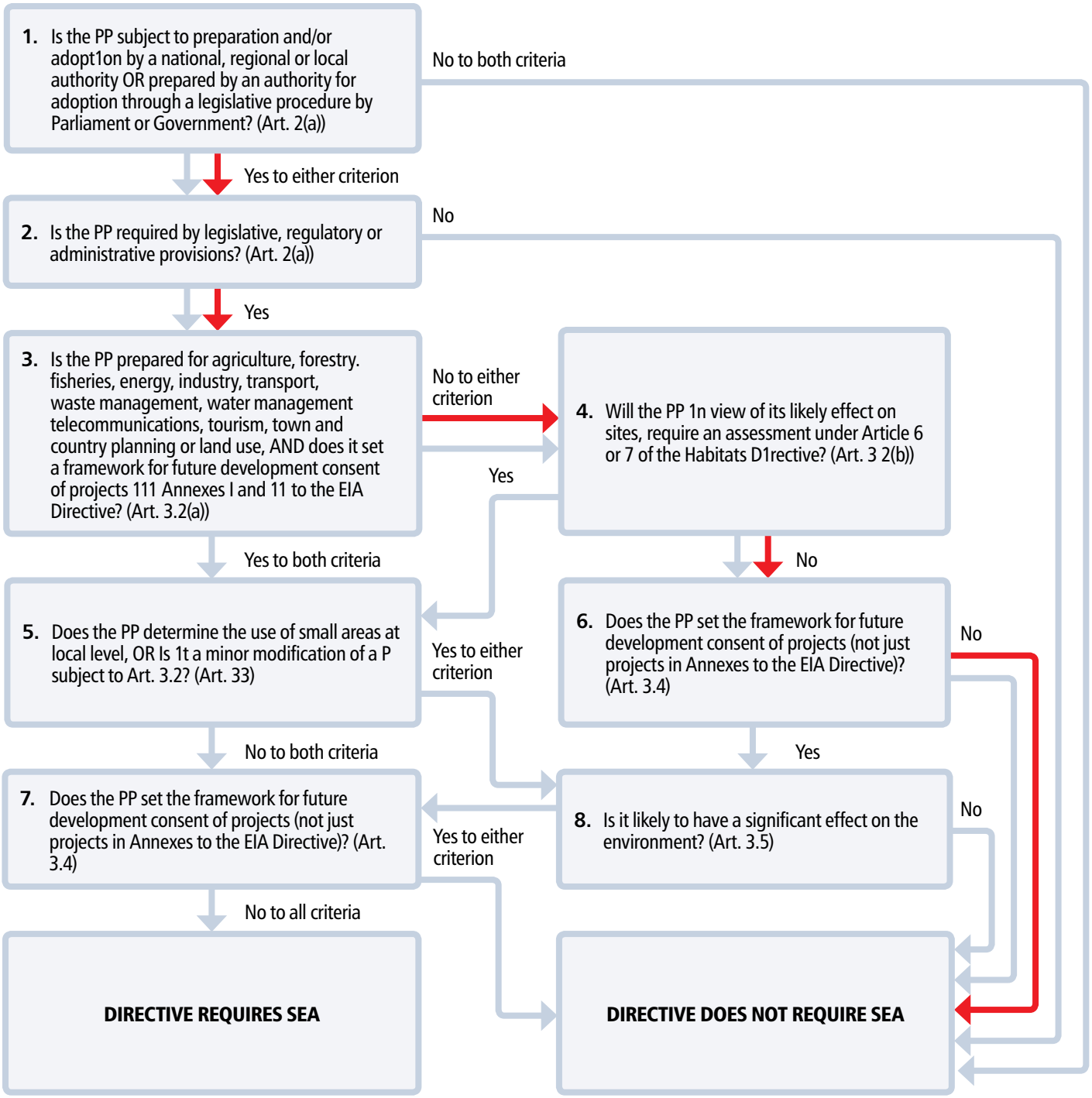
The table above assesses the proposed objectives with the Sustainability objectives used for the emerging Local Plan and indicates that:

- The proposed objectives "provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development."
- The proposed objectives are in conformity with the sustainability objective on reducing climate change impact by seeking to minimise the risk of flooding from storm events and overflow of watercourses. It is important to reduce run-off of water so that it does not exceed the capacity of the local drainage systems. This is already a serious London-wide problem and results in localised flooding in some streets and contamination of the River Thames by untreated sewage from the increasing intensity of rainfall. Also encouraging efficient water consumption will contribute towards reducing the impacts of climate change.
- the proposed objectives will increase the overall efficiency of water use, reducing per person daily consumption.

The requirement for the LFRMS to require statutory SEA is something the LLFA must consider and there is a useful decision route included within the DCLG Practice Guide to help. If the LLFA is uncertain it should draw on appropriate legal advice since this decision is critical. Within the Practice Guide a flow diagram sets out the key questions which need to be answered to determine the need for SEA.

Figure 2 Application of the SEA Directive to plans and programmes

This diagram is intended as a guide to the criteria for application of the Directive to plans and programmes (PPs). It has no legal status.



The Directive requires Member States to determine whether plans or programmes in this category are likely to have Significant environmental effects. These determinations may be made on a case by case basis and/or by speafy1ng types of plan or programme.

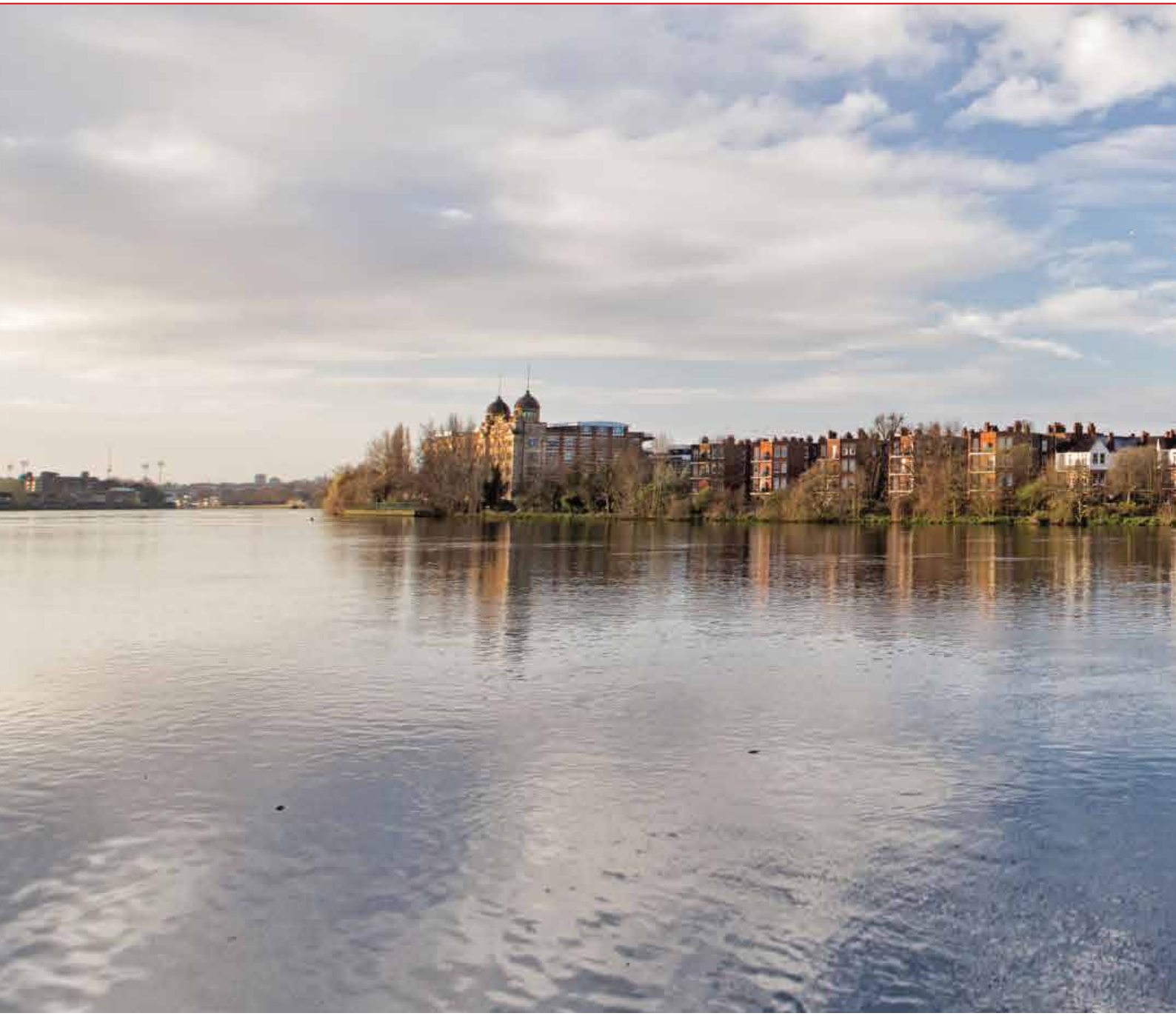
10 APPENDIX

In addition, Directive 92/43/EEC (the Habitats Directive) on the Conservation of Natural Habitats and of Wild Fauna and Flora requires an Appropriate Assessment (AA) to be undertaken to assess the impacts of a land-use plan against the conservation objectives of any European Site(s) (or so-called Natura 2000 sites – see below [*****]) and to ascertain whether it would adversely affect the integrity of that site. Where significant negative effects are identified, alternative options should be examined to avoid any potential damaging effects. There are no 'European Sites' within the London Borough of Hammersmith & Fulham, nor are there any immediately adjacent its administrative boundaries. The nearest is Richmond Park, a Special Area for Conservation (SAC), some 5 km to the SW of the borough. (For info see

http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0030246). It is not considered that this site would be significantly adversely impacted upon by any of the preferred objectives or actions within the LFRMS.

Therefore, given that the Local Flood Risk Management Strategy would not give rise to significant environmental effects on a European site designated for its biodiversity value (Special Protection Area, Special Area of Conservation, candidate Special Area of Conservation or Ramsar site) a Habitats Regulation Assessment will not be necessary. It is noted that this approach has previously been approved by a Planning Inspectorate through the adoption of recent Development Plan documents.

[*] Natura 2000 is the European Union-wide network of nature conservation sites established under the 1992 Council Directive on the conservation of natural habitats and of wild fauna and flora (92/43/EEC) -'The EC Habitats Directive'. Natura 2000 comprises Special Areas of Conservation (SACs) designated under that Directive, and Special Protection Areas (SPAs) classified under the 1979 Council Directive on the conservation of wild birds (79/409/EEC) -'The EC Wild Birds Directive'. Designation of SACs and SPAs is the responsibility of each member state.



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