

LONDON BOROUGH OF REDBRIDGE LOCAL FLOOD RISK MANAGEMENT STRATEGY

December 2015



The Local Flood Risk Management Strategy for the Lead Local Flood Authority of the London Borough of Redbridge

Version 1.2 – Final

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1. Introduction

1.1. Why produce a Local Flood Risk Management Strategy

Following the implementation of the Flood and Water Management Act 2010 ('the Act'), the London Borough of Redbridge became the Lead Local Flood Authority (LLFA) and is responsible for the management of flood risk across the borough. The Act was a direct consequence of the 2007 widespread flooding that England experienced and the Pitt Review, which analysed the causes and responses to these extreme events. Due to climate change and an increase in the demand for development it is recognised that these events may become more of a regular feature for this country, therefore the management of flood risk and its associated resources is now more vital than ever before.

One of the duties we have is to develop, maintain, apply and monitor a Local Flood Risk Management Strategy ('the Strategy') which sets out the method on how we and other stakeholders provide support and manage flood risk in Redbridge. The Strategy introduces these stakeholders and their responsibilities in addition to highlighting areas at risk of flooding. Existing drainage systems are largely unable to cope with present day volumes of water so significant changes in the way of thinking about drainage engineering are needed, something which the Strategy will support and lead on.

1.2. What you'll get from the Strategy

We aim to better manage flood risk and mitigate the risks through the introduction of some over-arching objectives and associated actions. Although we cannot completely prevent any flooding from occurring, the Strategy will enable improved partnership working between all responsible stakeholders to reduce the risks and impacts any future flooding may have on residents and businesses. The Strategy introduces the holistic approach to flood risk management that we are proposing to implement across the borough. This is based upon the reduction of runoff closest to its source in areas higher up the catchment, consideration of runoff control in areas part way down the catchment, and runoff control methods such as exceedance flow routing to reduce flood risk lower down the catchment.

As well as the objectives and actions for us to work towards, it is important that the Strategy is a framework which local residents, businesses and organisations

alike are able to use to gain a greater understanding of the flood risks and what we are doing to manage them. The Strategy is also to highlight the importance of knowing who is responsible for what, as well as the responsibilities that residents, businesses and organisations have too. Working in partnership is key for successful management of the risks and we want everyone to be involved, as the Strategy balances the needs of the environment with the community and the economy.

The Strategy is split into chapters, introducing the key concepts of flood risk management, the Risk Management Authorities, a background to local risk areas, and Redbridge's history of flooding. Further detail on each of our chosen objectives are included in chapters 5 to 9, stating what we have done so far and the proposed actions we have agreed to implement to achieve these.

As the Strategy is a living document we propose to review and update it every five years, which will include a public consultation exercise. However, we will also review the objectives and actions on an annual basis and amend where necessary following an internal review. Through the annual review we aim to be able to include greater detail in the actions, for example outline costs and potential funding sources which we can use to work towards the achievement of the Strategy's objectives. We have been unable to include costs at this stage because of the lack of specific work schemes proposed, but through further detailed understanding and building of our data sources of potential risks we will be increasing the evidence base which we can use to apply for funding, both from other agencies and also from local businesses and communities through improved partnership working. We believe that the Thames Regional Flood and Coastal Committee will be a significant source of funding along with local Redbridge funding.

Alongside the Strategy's associated Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) documents it has already been reviewed by the SEA and HRA statutory consultees (English Heritage, the Environment Agency and Natural England) and Thames Water and the feedback from this consultation has been incorporated into this version of the Strategy. A public consultation also occurred between July and August 2015 therefore this document represents the final version for adoption by the Council.

1.3. Objectives

The Strategy has to be consistent with the National Flood and Coastal Erosion Risk Management Strategy for England published by the Environment Agency (EA) and the Department for Environment, Food and Rural Affairs (Defra) in July 2011, and act as the evidence base for our future flood risk management work streams and projects. The National Strategy sets out six guiding principles to assist with the prioritisation and development of flood risk management practices at the local level. We have used these to structure our objectives and actions.

The six guiding principles are:

- i. Community focus and partnership working
- ii. A catchment and coastal “cell” based approach
- iii. Sustainability
- iv. Proportionate, risk-based approaches
- v. Multiple benefits
- vi. Beneficiaries should be allowed and encouraged to invest in local risk management

Our objectives for flood risk management in Redbridge are to:

1. Increase the knowledge and understanding of flood risk in Redbridge
2. Prevent any increase in flood risk from new developments and reduce flood risk at existing sites where possible
3. Increase residents’ and businesses awareness of flood risk and actions that should be taken
4. Promote flood alleviation schemes where the potential benefits are significant
5. Ensure flood alleviation schemes deliver environmental benefits where the opportunities exist

2. Context

2.1. National Context

Following the widespread flooding in the summer of 2007, Sir Michael Pitt wrote an independent Government report on what had been learnt from the events, better known as the Pitt Review, which was published in 2009. It highlighted that better levels of preparedness for flooding was needed, not just before, but also during and after flooding events. This led to the implementation of the **Flood and Water Management Act** ('the Act') in 2010, from which we were given LLFA status along with all upper tier local authorities (county councils and unitary authorities).

As the LLFA for the area, we are responsible for the management of flood risk across the borough and has several duties that we have to perform, including drafting the Strategy. Additional duties and powers that we have as a LLFA include:

- Cooperation with relevant authorities dealing with flood risk and the establishment of partnership working practices
- Investigation of the responsible management authority/authorities of flooding incidents and publishing reports
- Creation of an asset register of structures and features deemed significant for flood risk management purposes
- Designation of structures and features deemed to be flood risk protection assets
- Powers to carry out works to manage flood risk from surface water, groundwater and Ordinary Watercourses
- Consenting and enforcement regulation of Ordinary Watercourses

The Act also proposed the implementation of a Sustainable Drainage System (SuDS) Approving Body (SAB) with the responsibility for the assessment of drainage applications for future building developments. This has since been superseded by the LLFA becoming a statutory consultee for major planning applications since April 2015. We are very keen to promote sustainable drainage as, amongst other environmental benefits, it will help to reduce the amount of surface water flooding generated by impermeable surfaces.

The **Flood Risk Regulations** (FRR) 2009 were created to enforce the 2007 European Union (EU) Floods Directive into law in England and Wales, the latter being a sister document to the 2000 EU Water Framework Directive (WFD) which sets out environmental goals for water bodies throughout the EU states, initially by 2015. LLFAs were required to produce Preliminary Flood Risk Assessments (PFRAs) and Flood Hazard and Risk Maps which identify areas at greater risk through the FRR, and we were also responsible for feeding into a Flood Risk Management Plan by 2015. The FRR outputs are to be reviewed every six years to update areas at risk, through improved historical datasets and modelling technology.

As already stated in section 1.3., the Strategy has to be consistent with the **National Flood and Coastal Erosion Risk Management Strategy for England**. The National Strategy's overall aim is 'to ensure that flooding and coastal erosion risks are well-managed and co-ordinated, so that their impacts are minimised'. In response to this, the Strategy is built to support local residents, businesses and other stakeholders through raising the awareness of flood risk management in Redbridge so as to enable multiple benefits through closer partnership working.

In 2012 the Department for Communities and Local Government produced the **National Planning Policy Framework** (NPPF) which superseded all Planning Policy Statements (PPSs), including PPS25 which was directly concerned with development and flood risk. The NPPF document states that any areas at highest risk of flooding should not be used for any development unless deemed a necessity, where appropriate action is taken to protect the new properties and also prevent an increase in flood risk elsewhere as a result of such development. It also pushes for sustainable development and highlights SuDS as the favoured option for a site's drainage. It sets out the 'Duty to Cooperate' requirements between Local Authorities and public bodies like the Environment Agency.

There has also been additional National Planning Practice Guidance on **Flood Risk and Climate Change** which was produced in March 2014. This provides further information on the application of the Sequential and Exceptions Tests to site specific flood risk assessments. This guidance also includes advice to officers assessing planning applications, introduces the different fluvial flood risk zones,

advice on flood resistance and resilience measures and has definitions for specific flood risk assessment terms.

2.2. Regional Context

The Environment Agency (EA) has produced Catchment Flood Management Plans (CFMPs) to provide an overview of all inland flood risk within the catchment of rivers and recommend options to manage the risks over the next 50-100 years, including climate change and additional development. The **Thames CFMP**, which includes Redbridge was published in 2009. It states that regional planning bodies and local authorities should use the Thames CFMP as an additional resource for the management of spatial planning and emergency planning. It also breaks the catchment up into sub-areas depending on their land use and ground conditions, with Redbridge being designated as 'London catchments' having 'heavily populated floodplains'. Moreover, the Thames CFMP lists Redbridge as having an estimated 2,000-5,000 properties at risk of flooding in a 1 in 100 year flood event. However, more detailed modelling has since been done to further our understanding of the flood risk, which has in turn reduced this estimation. Sub-areas in Redbridge are mostly considered to be at a low to moderate risk, where flood risk is generally being managed effectively, although there will still be a need for further work to take climate change predictions into account. It suggests that the resilience and resistance of new developments and the overall urban environment to flood risk should be increased. We have developed the objectives and actions for the Strategy with these factors in mind.

The floodplain surrounding the River Roding which flows through Redbridge, is an area of moderate to high fluvial flood risk, where further action has been explored and will be implemented via the **Roding Flood Risk Management Strategy**. This document, adopted in 2012, gives options for improving the management of flood risk on the River Roding, from its source near Stansted to where it becomes tidal in Ilford, for the next 100 years. The outcomes, which align with the Thames CFMP, include alterations to the maintenance schedules in the upper and middle sections of the Roding, continued maintenance of urbanised tributaries flowing into the Roding, plus the Woodford Flood Alleviation Scheme which we are working with the EA and Thames Water to achieve. The measures of the latter scheme are

estimated to reduce the flood risk from a 1 in 20 year event probability to a 1 in 75 year event.

The **Thames Estuary 2100 Flood Risk Management Plan** assesses the future management of flooding from tidal sources for the end of the 21st Century and beyond. Recommendations for how to manage the growing risks of flooding from the Thames are split into short term (the first 25 years), medium term (the following 15 years) and the long term (the end of the century). Each element incorporates current climate change predictions but is adaptable to future reviews based upon revised changes in sea level rise and the climate. The latest 2012 report splits the tidal Thames up into nine zones, each with action plans associated with local issues. Major changes to the existing defences is not expected to be required until 2070 although upgrade investment will be needed from 2035.

The **Thames River Basin Management Plan** (TRBMP) was prepared under the WFD Regulations, which was passed into UK law in 2003, and was published in 2009. The WFD aims to:

- Prevent deterioration in water quality
- Improve and protect inland waters and groundwater
- Encourage more sustainable use of water as a natural resource
- Create better habitats for wildlife that live in and around water
- Help reduce the effects of floods and droughts

The TRBMP is a statutory plan which summarises a 'programme of measures' required in order to meet the objectives of the WFD. River morphology, water quantity and water quality are all significant issues in Redbridge. The Strategy will, through the objectives and actions linked to promotion of SuDS schemes, further the implementation of WFD objectives by addressing water quantity and quality issues.

The Greater London Authority (GLA) produced the **London Plan** in 2011 which is a strategic overview of development across London for the next 20 years, including frameworks relating to economic, environmental, social and transport factors. It states the importance of new development being built to the standards of the PPS25 (now the NPPF) in addition to the London Plan's associated **Regional Flood**

Risk Appraisal (RFRA) 2009 document. The RFRA promotes partnership working to reduce existing and future flood risk as the preferred method, with 19 recommendations for specific authorities to work together in certain areas.

The **London Strategic Flood Framework**, produced in 2012 by the London Resilience Partnership, forms part of the GLA's London Strategic Emergency Plan suite of documents for emergency planning. It relates to flooding which would have impacts across the capital, whether one large event at a specific location or several smaller floods in different areas. Planning for potential events is also covered to enable activation prior to any events occurring if necessary. Triggers for activation of a London-wide response are also covered as well as guidance for what should be done at certain stages of a flood event, including communicating with the public.

Managing risks and increasing resilience: the Mayor's climate change adaptation strategy was published in 2011 by the GLA and focuses on the issues climate change may have in relation to drought and overheating, as well as flooding, in the future. Its aim is to help London to prepare for the extreme weather events that are predicted so as to provide as best a resilience for Londoners as possible through increased community awareness and engagement. It highlights the Drain London progress and the importance of not increasing the risk of surface water flooding through greater urbanisation.

2.3. Local Context

Through the GLA's Drain London programme, we produced our **PFRA** in 2011 to identify areas of significant flood risk across the borough as a high level screening exercise. Based upon historical flooding data it enabled the prediction of the impacts future flooding could cause, taking climate change and major development opportunities into account.

We have also produced a **Surface Water Management Plan** (SWMP) which provided further initial evidence to highlight potential areas at greater risk. To improve on the higher level modelling undertaken for the SWMP, we are in the process of updating our datasets to enable greater confidence in the areas at risk. The borough was split into 14 drainage areas in the SWMP, and those at significant risk have been investigated further. Detailed hydraulic modelling has been carried out for areas located adjacent to existing watercourses which flow through the

borough as a result. Hazard maps were also included in the SWMP to fulfil the FRR requirement of identifying areas at higher risk, and these and our improved modelling have fed into the updated Flood Map for Surface Water produced by the EA in December 2013.

A **Strategic Flood Risk Assessment** (SFRA) was published in 2009 to improve the understanding of the importance of taking flood risk into account when reviewing planning applications. This Planning document assesses the options available for promoting growth across Redbridge by identifying the viability of potential sites for use as building developments. Altering the amount of permeable surfaces on a site has a direct impact on the flood risk for that site, the surrounding locality and infrastructure and also downstream in the wider catchment. The SFRA is used to underpin Sequential and Exception Tests when assessing planning applications for new developments as well as our updated flood maps, the NPPF and associated guidance. Updated Level 1 and Level 2 SFRAs are presently being finalised.

Additional planning policy in Redbridge includes the **Core Strategy Development Plan**, which makes up one of the suite of Redbridge's Local Development Framework documents. It details the main planning issues for the borough, our vision for development, and the strategic policies and objectives used to achieve our vision. It was adopted in March 2008 and amongst other documents has been followed by the **Sustainable Design and Construction Supplementary Planning Document** (SPD) in January 2012. The latter highlights the need for sustainable development to reduce the impact growth and development has upon the environment to combat the threat of climate change. Chapter 8 of this SPD focuses on SuDS, the use of water and flood risk resilience techniques for new developments.

In February 2014 we produced a **SuDS Design and Adoption Guide** to clarify our position as a SAB with respect to the approval and adoption of SuDS. The guide is targeted at local developers and provides a reference for the SAB. It highlights the importance for developers to engage early with us to reduce the likelihood of SAB refusal further along the process and refers to both the National Standards for SuDS and the CIRIA SuDS Manual.

3. A Collaborative Approach

3.1. Risk Management Authorities

In addition to the designation of upper tier local authorities as LLFAs, the Act entitled several key organisations as Risk Management Authorities (RMAs) relating to flood risk management duties. These included the Environment Agency (EA), water and sewerage companies, and highway authorities. The RMAs have other duties under the Act than those that we have as the LLFA (listed in section 2.1.) but together we aim to better manage flood risk through partnership working and having closer links to each other's strategies and plans. Although no one authority has the responsibility or means to prevent all flooding from occurring, between us we can align our working practices and encourage contributions from all to reduce the effect of flooding and managing future flood risk as best as possible.

Each of the RMAs are introduced below, including their contact details and their responsibilities, but Table 3.1 provides a general summary about which RMA deals with what.

3.1.1. London Borough of Redbridge (LBR)

As the **LLFA** we are responsible for the leadership of local flood risk management, and thus the bringing together of the RMAs and key stakeholders. We are involved in flood risk management more widely which is one of the reasons for including an action about increasing internal knowledge and awareness across the Council.

We also oversee the flood risks from:

- Groundwater
- 'Ordinary Watercourses' (ditches and streams)
- Reservoirs (with a volume of less than 25000 m³ above ground level)
- Surface water flooding

Table 3.1: Summary functions and responsibilities of the flood RMAs in Redbridge

Responsibility	Risk Management Authorities				
	London Borough of Redbridge	Environment Agency	Thames Water	Transport for London	Highways Agency
Highway drainage and asset management of major A-roads				✓	
Highway drainage and asset management of motorways					✓
Highway drainage and asset management of other public roads	✓				
Management of the flood risk and regulation of Main Rivers		✓			
Management of the flood risk and regulation of Ordinary Watercourses	✓				
Management of the public sewer network			✓		
Management of the risk of groundwater flooding	✓				
Management of the risk of statutory reservoir flooding	✓	✓			
Management of the risk of surface water flooding	✓				

You should contact us if you are, or become, aware of any flooding from any of these sources as we have a responsibility to investigate the RMA(s) who are responsible. Flooding could also occur as a result of blockages in a river or in a highway gully which may be reducing or preventing flow, therefore becoming a potential flood risk which we would like to hear about. These blockages may be a build-up of debris or illegally dumped rubbish in a watercourse, but may not cause an immediate risk. However, if such rubbish gets carried downstream it may block up the entrance or exit of the water from under a bridge or in a culvert, causing the water to back up and potentially flood over its banks.

Surface water flooding can also occur because of a lack of capacity in the main sewers. This may be due to a blockage or just because of the sheer volume of water that the sewer network is attempting to hold at that time. Water draining off the surface therefore may be unable to enter the sewers via gullies and drains due to there not being enough space for the water to go, therefore it leads to ponding on the surface. In extreme events water from the sewer could even discharge back out of the highway gullies and drains. Thames Water are responsible for the sewer system and therefore you should contact them first so that they can manage the situation. However we would like you to inform us of any such flooding as well, once it has been reported to Thames Water, so that we can assist in the response to the flood incident if needed and work with Thames Water where necessary to reduce the likelihood of a similar occurrence happening in that location again.

If there is property flooding as a result of any of these sources then you should contact us immediately.

However, if there are similar issues with flooding from 'Main Rivers' (larger brooks and rivers) then you should contact the EA (see section 3.1.2.).

Ordinary Watercourses in Redbridge are the smaller brooks and ditches. If you plan to install any feature or structure in or close to the channel of an Ordinary Watercourse please contact us immediately as you may require our consent as the works or structure may temporarily or permanently increase flood risk either at site or elsewhere up or downstream. If it is deemed a significant asset then we may officially designate the structure to prevent the risk of flooding through misuse or

lack of maintenance. Please note that any similar feature or structure on a Main River will need the consent of the EA prior to work starting.

As a **highways authority** we are responsible for the drainage of surface water and highway flooding on all non-Transport for London and Highways Agency roads. This includes the majority of highway gullies and drains. Each gully is programmed to be cleaned once a year. You can report blocked or damaged gullies to us directly via our online [Report](#) function and we will investigate accordingly.

We have not got any maintenance responsibilities for the following, however we have a responsibility to oversee the investigation of significant flooding incidents from:

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

The former, drainage systems from private estates, are the responsibility of the landowner or estate management team. However, the latter is the responsibility of Thames Water who manage and maintain the drainage pipes and sewers that serve two or more properties, whether they are surface water, foul or combined systems. See section 3.1.3. for Thames Water's contact details.

As a **planning authority** we must take flood risk from any source into account when developing Local Plan policies (including climate change adaptation), allocating development sites and considering planning applications. We analyse flood risk assessments and, once the SAB comes into force, we will be responsible for assessing drainage applications for new developments and existing redevelopments, including changes of use. If permission is granted, the SuDS may be eligible to be adopted by the SAB if all conditions set by the SAB and in the National Standards have been met, this adoption including the maintenance of such drainage assets.

The **Emergency Planning department** respond to any major incidents and emergencies within the borough and develops our resilience of such events, including flooding. They operate the Borough Emergency Control Centre if the Redbridge Major Incident Plan ('RedMIP') is activated, and have developed our *Multi-Agency Flood Plan* in partnership with the Redbridge Emergency Planning

Group. We hold a stock of sand bags, sufficient to be used strategically to protect key infrastructure but not for private use.

Thames Water are responsible for the drainage of public sewers which drain more than one property. Therefore, if drains that only serve one property are blocked then this is a private drain and it is the responsibility of the landowner (see Figure 3.1). More information about private sewers can be found [here](#). Similarly, if flooding occurs in basements and cellars, we have no responsibilities as these are private to the property. If, and only if, a house is Council-owned then the **Housing department** should be contacted if it experiences any flooding.

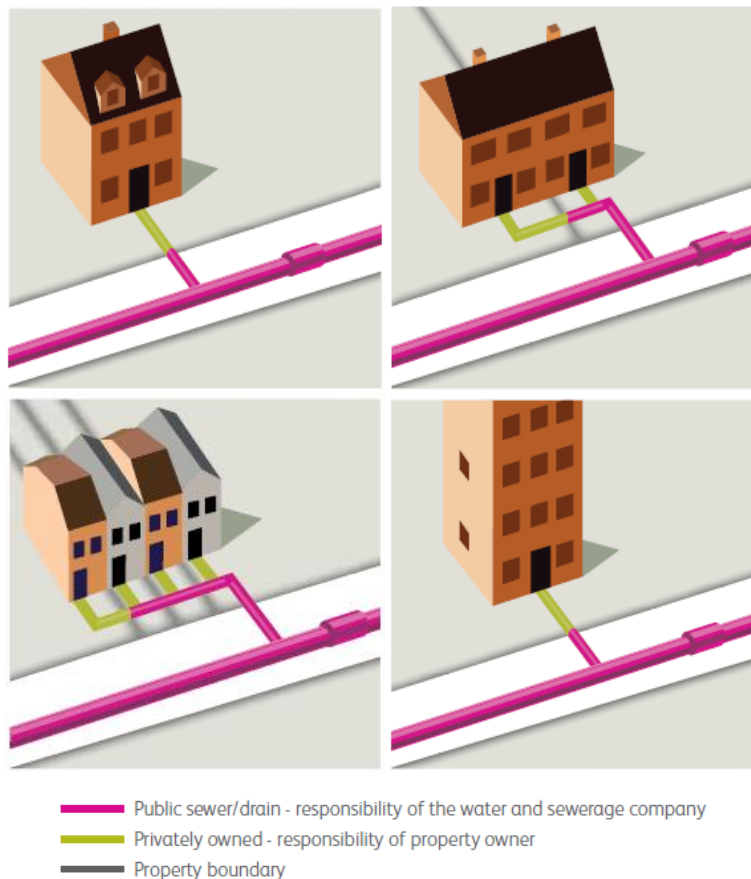


Figure 3.1: Public and private drain and sewer responsibilities

Parks and open spaces are managed by [Vision - Redbridge Culture and Leisure](#) and they oversee the routine maintenance associated with these across the borough.

You can inform us of any flood risk issues via our Customer Contact Centre:

- Telephone: 020 8554 5000
- Email: customer.cc@redbridge.gov.uk

Additionally you can also use our online *Report* function:

www.redbridge.gov.uk/Report

3.1.2. Environment Agency (EA)

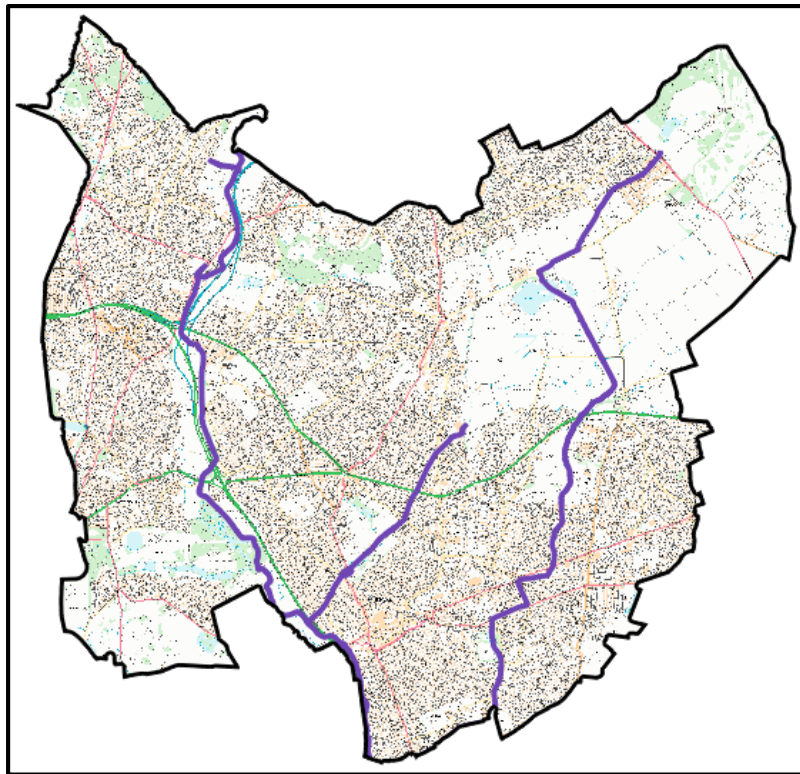
The EA is the responsible body for the strategic overview of all flood and coastal erosion risk management across England. It is through the EA that Defra implements the policies relating to flood risk and they assist LLFAs with application bids for funding through a number of funding streams. The EA publishes nationwide flood risk and hazard maps, including the most recent updated Flood Map for Surface Water, all of which are available on their [website](#). They will also be working closely with LLFAs to produce the Flood Risk Management Plans by December 2015. Additionally, the EA provides the flood warning and Floodline Warnings Direct services which detail the up-to-date status of potential flooding from 'Main Rivers' (larger brooks and rivers) and the sea.

As stated in the Act, the EA is also responsible for the management of flood risk from the following sources:

- 'Main Rivers'
- Reservoirs (with a volume of at least 25000 m³ above ground level)
- The sea

This includes the routine maintenance schedules and regulation (consenting and enforcement of works) of Main Rivers, and it undertakes any flood alleviation construction work through the management of the long term plans for flood risk management projects and schemes.

'Main Rivers' in Redbridge include the River Roding plus its tributaries and the largely culverted Cran Brook and Seven Kings Water. There is also the River Ching that flows along the northwest borough boundary. Figure 3.2 shows all of the Main Rivers within our administrative boundary, and these can also be viewed on the EA's [Flood Maps for Planning \(Rivers and Sea\) website](#).



Key

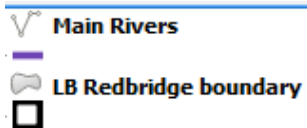


Figure 3.2: A map showing the Main Rivers in Redbridge

You can contact the Environment Agency through the following processes:

- Website: www.gov.uk/environment-agency
- Floodline: 0345 988 1188
- Incident hotline: 0800 80 70 60, specifying as to whether it's a flood which is occurring or potentially a risk

3.1.3. Thames Water Utilities Ltd. (TW)

Thames Water is responsible for the maintenance and upkeep of the public sewer network in Redbridge. This includes the surface water, foul water and combined sewers and [drains that serve more than one property](#). It also investigates and records information about properties at risk of sewer flooding and has a duty to report findings to OFWAT.

Historically the surface water drainage network of sewers has only been designed to cope with a maximum capacity of water from up to 1 in 30 year probability events. This could result in water laying on the highway following a severe storm (as shown in Figure 3.3), though it should drain away a short period after the end of the storm. This also helps to demonstrate the reason as to why surface water flooding can be such an issue when longer or more intense storm events occur, as well as highlighting the reason as to why it is important that surface water flooding is reported to us as well as Thames Water.

Several adjacent gullies which appear blocked after a rainfall event may indicate a blockage in the main sewer system rather than blockages in the gullies. If this type of flooding remains an issue without showing any signs of the water receding we advise that you report it to ourselves as well as Thames Water so that we can investigate, if necessary, and use our LLFA status to work in partnership to better manage any issues.

Thames Water are not responsible for any drainage which serves one property only or any other private drainage systems.



Figure 3.3: Photograph of an overflowing manhole due to overcapacity in the Thames Water sewer

You can contact Thames Water through the following processes:

- Website: www.thameswater.co.uk
- Sewer flooding emergency number: 0845 920 0800

3.1.4. Transport for London (TfL)

Transport for London is the highways authority for the red route network of roads in London (the *Transport for London Road Network*, as shown in Figure 3.4) and therefore are responsible for the highway drainage from these roads, including associated pedestrian subways. In addition to this, TfL is the authority who manage the London Underground network, including the Central Line which partly runs through the borough.

The associated pedestrian subways that TfL are responsible for are:

- Aldborough Road (A12)
- Gants Hill (A12)
- Royal Crescent (A12)
- Somerville Road (A12)
- Stanforth Road (A12)
- Redbridge roundabout (A12/A406)
- Elmcroft Avenue (A406)
- Maybank Road (A406)
- Lord Avenue (A1400)
- Roding Lane North / South (A1400)

You can contact Transport for London through the following processes:

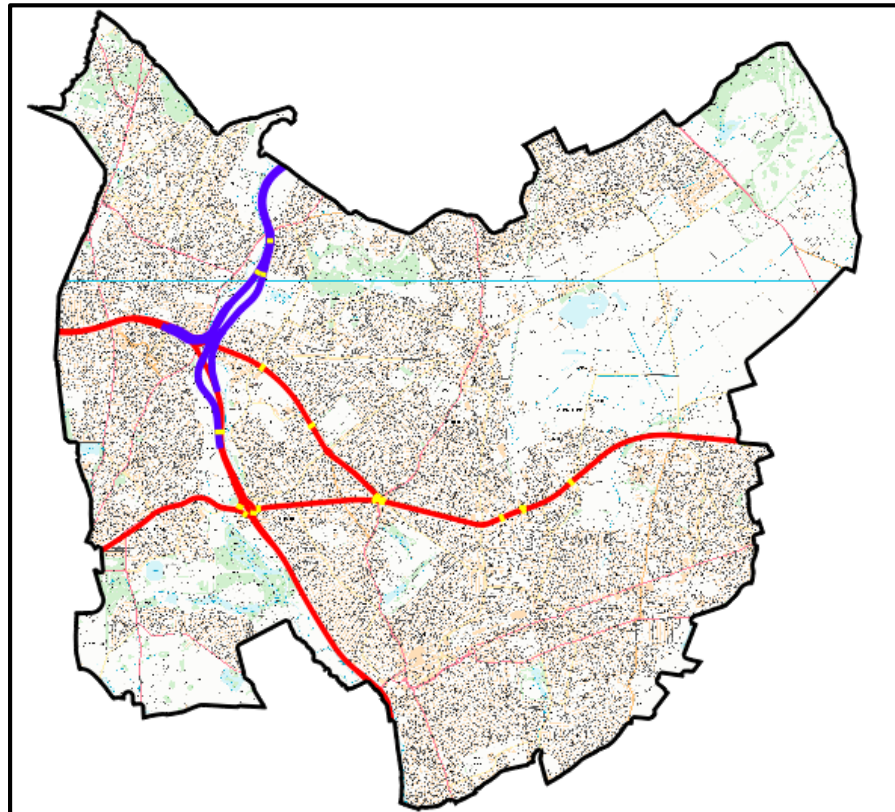
- Website: www.tfl.gov.uk
- TfL red route Travel Enforcement number: 0343 222 3333
- TfL Customer Enquiries: 0343 222 1234

3.1.5. Highways Agency (HA)

The Highways Agency are the highways authority who manage the primary road network, including the M11 motorway which starts in South Woodford, as shown in Figure 3.4. They are part of the Department for Transport and have highway and pedestrian subway drainage responsibilities just like TfL has for its roads. The M11 associated pedestrian subways that HA are responsible for are located between Uplands Road and Chigwell Road.

You can contact the Highways Agency through the following processes:

- Website: www.highways.gov.uk
- General enquiries number: 0300 123 5000



Key

- LB Redbridge boundary
- TfL and HA Subways
- Highway Agency Motorway
- TfL Red Route network

Figure 3.4: A map showing the roads and associated subways that Transport for London and the Highways Agency are responsible for

3.2. Other Key Stakeholders and Responsibilities

Although not designated Risk Management Authorities, it is important to highlight some additional stakeholders so as to aid flood risk management going forward (in addition to the Emergency Services). These are listed below along with a brief statement about who they are:

- **City of London Corporation:** Management of [Epping Forest](#), which accounts for much of the open space in the west of the borough. The Corporation also manages the reservoirs and watercourses that are on forest land.
- **Essex and Sussex Water:** Part of Northumbrian Water Ltd., the water supplier to part of the east side of the borough.
- **National Grid:** Owner of the electrical and gas energy network across England and Wales.
- **Network Rail:** Owner and operator of railway infrastructure across Great Britain except for the majority of TfL's London Underground network of track. The River Roding flows beneath Network Rail track just outside of Ilford Station.
- **Residents and businesses:** Everyone has flood risk responsibilities of their own, to protect their own property as best as possible from potential local flooding, and to report flooding to the relevant RMA.

Internally we have a **London Borough of Redbridge flood group** which meets to address drainage planning and policy issues and we also discuss strategic flood risk management issues at East London LLFA group meetings. From these we have close links with our neighbouring councils, the London Boroughs of Havering and Barking & Dagenham, as well as the Environment Agency and Thames Water.

Partnership working is key to enable closer links between parties who have interests in flood risk management projects, as no one authority has the power or means to prevent all flooding. In addition to our responsibilities as the LLFA with other RMAs, we want to work more with local communities and businesses to better manage the risks associated with flooding. **Every single resident and business has flood risk responsibilities**, including the responsibility to protect your own property against flooding. This includes basements which should be properly tanked to reduce the potential risk of flood damage. Similarly, everyone has a responsibility to report flooding to us and relevant RMAs. Without your reports and information we cannot fully manage Redbridge from flooding as we are reliant on the general public and local communities to inform us of any incidents.

Residents or businesses that own land either adjacent to a watercourse or with a watercourse running through it are classed as **riparian owners**. Such owners have the rights and responsibilities to keep their stretch of watercourse free-flowing through river bed and bank maintenance when necessary, including the control of invasive species. For further information, see the Environment Agency's [Living on the Edge](#) guidance document.

By working more closely with local residents and businesses, we will all gain greater understanding and awareness of local flood risk issues. Partnership funding may be available to address some of these issues where the risk to properties and infrastructure is high. Community action groups enable such links to be made and can be used to raise awareness and generate collaborative working. The **Woodford Flood Forum** is one such group.

4. Flood Risk in Redbridge

4.1. Potential Causes of Flooding

Flooding often occurs as a result of a combination of factors and can never truly be predicted at a local scale because of the vast number of potential variables which could interact to cause it. Flooding directly caused by water levels in rivers or smaller watercourses rising, known as **fluvial flooding**, is arguably the most commonly thought of when flooding is discussed. The River Roding has two sets of bank sides along the majority of its length and normally at lower flows it is contained within the lower banks, but if it rises it is usually retained within the upper banks, which are set behind the lower banks so as to provide additional capacity. Water levels in Main Rivers such as the Roding will respond to rainfall higher in the river catchment, i.e. not so much from local rainfall. It may sometimes take two to three days after a heavy rainfall event for water to drain from higher up the river nearer its source and from elsewhere in the catchment.

Flooding that occurs more rapidly, normally starting within an hour of the rainfall event, tends to be surface water flooding, which is also known as **pluvial flooding**. These flash floods occur when the water runs over the surface as a result of the ground being unable to drain the water effectively. Frequent rainfall events in a short space of time increase the chance of flooding. This is commonly because the ground may be saturated and drainage systems already inundated, therefore unable to drain any further water. Urban environments such as Redbridge can increase the risk further due to reduced amounts of permeable surfaces. As a result this often causes main sewers to reach their capacity, causing water to flow along the surface.

Tidal flooding is also a potential flood risk in Redbridge due to the River Roding draining directly into the tidal River Thames. There is the Barking Flood Barrier on the Roding before it flows into the Thames. This forms part of the Thames' tidal defences along with tidal walls and embankments downstream from Ilford Bridge.

Reservoirs are a further potential cause of flooding and in March 2014 the Environment Agency updated the [reservoir inundation maps](#) on their website.

Groundwater is heavily related to the local geological ground conditions which vary across Redbridge. Groundwater flooding is difficult to assess due to unpredictability as to when or where it might occur, but there is not thought to be a major risk of groundwater flooding in Redbridge. Some areas of the borough may be more susceptible to possible groundwater flooding, particularly where shallow permeable (superficial) deposits overlie largely impermeable deposits. Further information and associated maps are included in the 2010 Surface Water Management Plan (SWMP).

4.2. Recent History of Flooding in Redbridge

Redbridge has experienced limited flooding in recent years, with some significant events during the past couple of decades.

Fluvial and pluvial flooding combined in **2000** alongside parts of the River Roding. This followed prolonged rainfall events in the upper Roding catchment and an intense period of rainfall in the Woodford catchment. This led to the river levels rising above the height of surface water flap valves which failed to correctly close (an example of a flap valve is shown in Figure 4.1). This resulted in flooding caused by water from the Roding back-flowing through the flap valves and surface water sewer and out of highway gullies. Overtopping of the river banks also occurred elsewhere on the Roding. The flooding was worsened by local rainfall in Woodford being unable to flow into the river because of the high river levels. The failure in the river bank and the defective flap valves were repaired following this event and are maintained regularly.



Figure 4.1: Photograph of a typical flap valve in Redbridge

Another significant event occurred in **2009**, although just on the highway and not into any properties. This occurred due to heavy rainfall combined with snowmelt higher up the River Roding's catchment. The Roding took two days before its water levels peaked in Redbridge. Water was observed flowing back out of gullies. An investigation discovered that two flap valves had been missed during the post 2000 flooding repair programme. These flap valves have since been repaired and during a recent 2014 flood event it was noted that there was no flooding in other areas where flap valves had been repaired after the 2000 event.

During the floods experienced in summer **2012** and **February 2014** there were some cases of gardens becoming waterlogged or flooded but we have no record of any property flooding. It should be noted that preventing the flooding of properties or critical infrastructure is key and thus should be prioritised over the mitigation of flooding of gardens and open spaces elsewhere in the catchment area. Through the Strategy's objectives we want to raise awareness that source control techniques, such as the retention of water in gardens and open spaces, are key in the management of flooding.

4.3. Flood Risk Modelling

Hydraulic modelling techniques have improved since Redbridge's 2010 SWMP and 2007 Strategic Flood Risk Assessment (SFRA) were developed, giving greater confidence in the output. Further enhanced modelling has been implemented to give better detail in areas identified at risk in the SWMP.

The recent remodelling work has been improved through the addition of Thames Water's main sewer assets. The modelling of these assets, combined with the fluvial flows from major watercourses, has significantly reduced the amount of surface water flooding predicted in the SWMP.

Areas where remodelling has now been completed include the Cran Brook catchment and the Wanstead and Woodford areas. These updated models have been included in the Environment Agency's [updated Flood Map for Surface Water](#), which was published in December 2013 (see Figure 4.2). Figure 4.3 shows the largely reduced flood risk following the recent remodelling. The Clayhall area has also been completed and the modelled outputs will be included in the next revision of the updated Flood Map for Surface Water. Presently nearing completion is the remodelling of the two other most at risk areas, the catchments of the Mayes Brook and Seven Kings Water. We aim to use the improved mapping to progress our future detailed modelling studies.

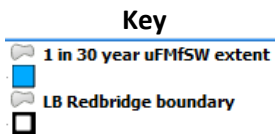
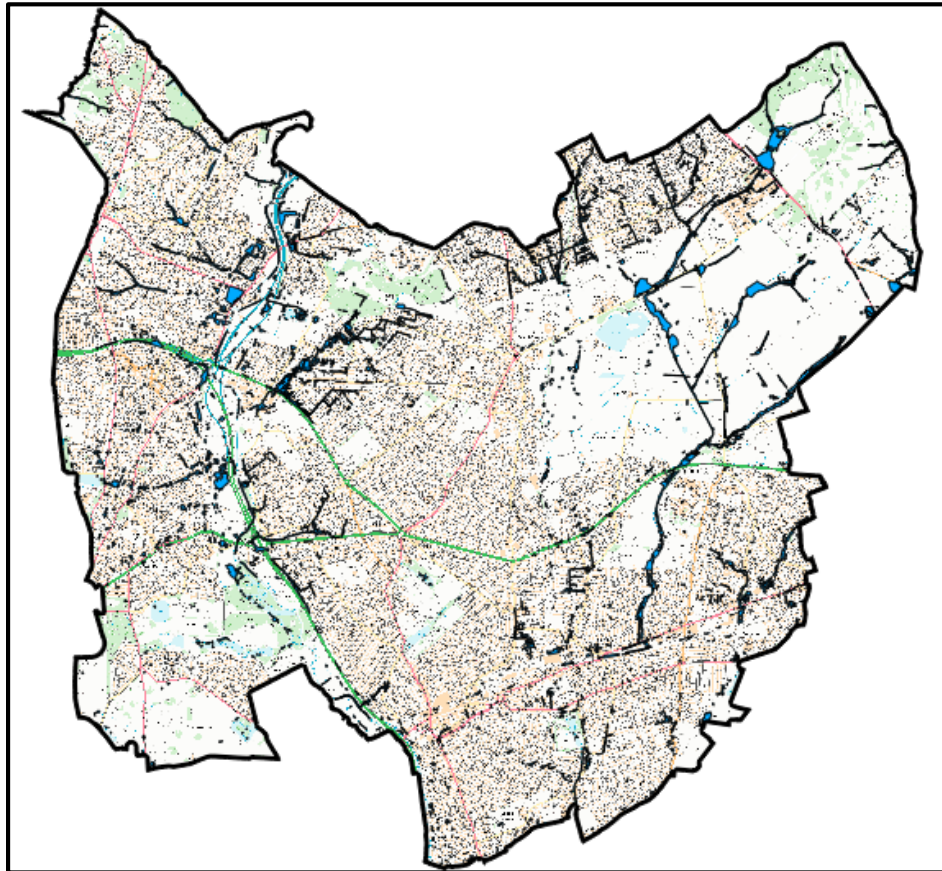


Figure 4.2: The 2013 updated Flood Map for Surface Water at a borough-wide scale across Redbridge showing areas at risk of flooding from a 1 in 30 year storm

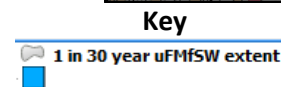
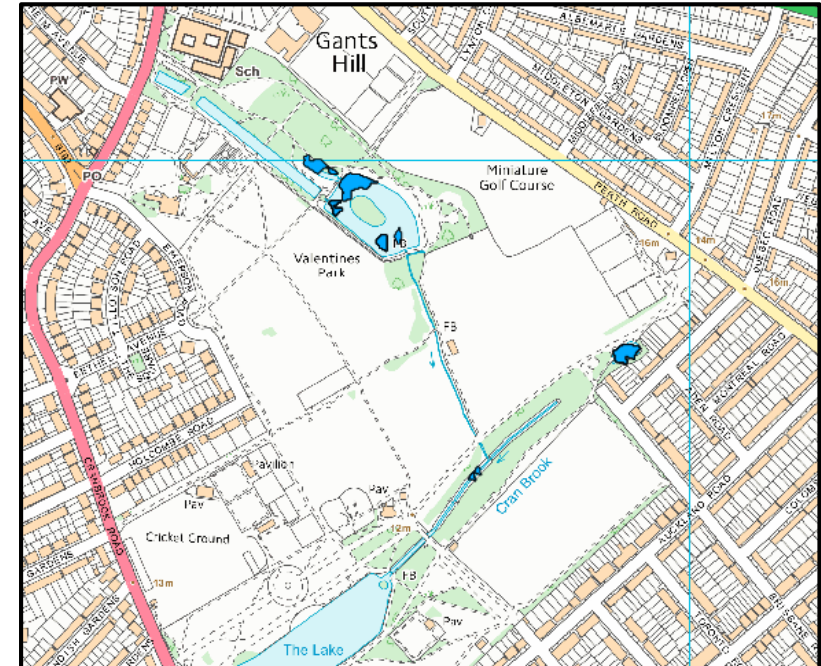


Figure 4.3: The 2013 updated Flood Map for Surface Water for part of the Cran Brook study area showing 1 in 30 year flood risk

4.4. Prioritising Risk

There is no single definition for ‘locally significant’ flood risk in the Act because significance varies with location and context. Therefore, so as to best manage flood risk in Redbridge we have defined some thresholds to aid the prioritisation of assessing flood risk.

We will prioritise flood alleviation schemes to where groups of four or more properties are identified as at risk to more than 200mm of flooding in a 1 in 30 year probability event. Work is presently ongoing to identify these properties through detailed hydraulic modelling and integration with the EA’s updated Flood Map for Surface Water. Schemes will also be prioritised where there is a combined risk of flooding from both fluvial and pluvial sources, furthering the understanding of interactions between the two.

As stated in section 2.1., we have a duty to investigate flood incidents and will publish a report detailing the nature of the event, the relevant RMAs and possible causes on our website.

We have defined a **flood incident** to be when:

- One or more properties are flooded internally
- Highway flooding impedes pedestrians and/or vehicles from passing on more than three occasions within a one year period

All flooding has a detrimental impact but through localised controlled highway flooding it may be acceptable if it prevents property flooding. This is the idea of designing for exceedance. Therefore we want to prioritise the combination of highway work with flood risk reduction measures where possible.

Any future work schemes or projects to alleviate flooding may require individual Strategic Environmental Assessments and Habitats Regulations Assessments to build upon those produced as part of the Strategy.

5. Objective 1 – Increase the knowledge and understanding of flood risk in Redbridge

5.1. Work So Far

5.1.1. Current flood risk knowledge

As previously stated, the Strategy builds upon the flood risk management work we have done so far and develops the progress made in the SFRA, PFRA and SWMP documents that we have produced. From these documents, and using internal records of flooding, we have been able to bid for additional funding to supplement our own funds to enable, amongst other work, the remodelling of certain at risk areas. We aim to continue with this through increasing the breadth of local knowledge about flood risk in Redbridge. The more knowledge we acquire the better we are able to manage flood risk, both internally across the Council and externally through the sharing of knowledge with stakeholders and RMAs.

5.1.2. Flood reports and asset register

Although we have not yet had the need to generate any flood investigation reports which highlight any responsible RMAs, we do collate all the information we receive regarding flooding incidents and drainage issues. For example, when our Customer Contact Centre receive reports of blocked gullies these are passed through to our Highways department and given to the gully cleaner drivers to schedule into the routine cleansing programme already in place. Should further work be required if the gully cannot be cleaned these are logged and investigated further.

We do not deem blocked gullies to be a significant potential cause of flood risk in Redbridge, however flap valves have shown that they are key flood risk management assets. Through the Drain London programme an asset register, known as FloodStation, has been populated which displays information about any infrastructure that is considered to have an influence on flood risk and its management. It records the type of asset, the location, the owner and the condition.

Further work that we have achieved thus far is explained in the 'Work So Far' sections of the following chapters related to Objectives 2 to 5, including the detailed remodelling and public engagement work we have undertaken.

5.2. Future Actions

Table 5.1: Summary of the actions we are proposing to achieve Objective 1

Action Number	Action	Responsible RMA / Department(s)	Timescale	Links to Guiding Principles
1.1	Implement a clear and consistent process for the detailed modelling of at risk areas	LBR (LLFA)	Ongoing	(iv) & (v)
1.2	Creation of new flood risk hotspots to enable future update to LBR's Strategic Flood Risk Assessment	LBR (LLFA, Planning)	By December 2016	(iv) & (v)
1.3	Form strong working relationships with other Risk Management Authorities and neighbouring councils to share knowledge	All RMAs and neighbouring LLFAs	Ongoing	(i) & (ii)

Action 1.1 provides the basis of the holistic process of how we aim to manage the risks of flooding across the borough. We want to build upon the work we've done up to this point and progress through a continued improved understanding of the local flood risks and issues. One of the main ways we propose to achieve this is through analysis of the remodelling work currently being completed and those already finished which are included in the Environment Agency's updated Flood Map for Surface Water. Through this we propose in **action 1.2** to review and update our SFRA so that it includes the most up to date flood risk datasets available. Further detailed remodelling of areas at more risk may be required and will provide further enhancement of our knowledge of the flood risks.

An updated SFRA will provide improvements to the standards of confidence that we, as a planning authority, assess planning applications against. Historically there has been more of a focus on the fluvial flood risks from Main River sources but

following the Act there has been a greater shift in the focus to pluvial flooding caused by surface water sources. Enabling the SFRA to acknowledge the latter will inform sustainable development in Redbridge, thereby also creating economic and social benefit to the borough as well as flood risk mitigation.

As a LLFA we want to involve RMAs and key stakeholders to prevent flood risk management from being a standalone part of the Council. Through **action 1.3** we want to deliver joined up projects where there are cross boundary issues and gain and share as much local knowledge as possible. We plan to pursue this by continuing our involvement with the East London LLFA group meetings and through the Drain London partnership.

6. Objective 2 – Prevent any increase in flood risk from new developments and reduce flood risk at existing sites where possible

6.1. Work So Far

6.1.1. SuDS Design and Adoption Guide

We have produced a SuDS Design and Adoption Guide in preparation of the establishment of the SAB under Schedule 3 of the Act (since superseded in April 2015 by LLFAs becoming statutory consultees for major planning applications with surface water implications). This guidance document is for the use of both internal officers assessing drainage applications and also for the developers who submit applications. It addresses the process by which future drainage applications will have to be assessed, whilst complying with criteria set out in the National Standards for SuDS. In addition to the latter the guide also sets out some local standards which we want proposals to achieve and highlights the key benefit of early discussions between a developer and ourselves prior to the detailed design stage. If the drainage design is approved we will adopt the SuDS features, if all the standards specified by the SAB have been met, therefore the guide specifies what we are expecting in a SuDS application for the proposed future management schedule through operational and maintenance plans.

SuDS are an alternative to traditional drainage systems and provide multiple benefits. They allow for the control of surface water runoff on the surface which improves the ease and ability for routine maintenance of the features. SuDS best work by mimicking the natural drainage of a site, enabling infiltration of surface water, and groundwater recharge where the geology permits, rather than releasing the runoff away from the site and potentially causing flooding elsewhere. Attenuation can also provide a storage facility during periods of intense or prolonged rainfall, thereby reducing the amount of water flowing off a site and not increasing flood risk further down the catchment.

6.2. Future Actions

Table 6.1: Summary of the actions we are proposing to achieve Objective 2

Action Number	Action	Responsible RMA / Department(s)	Timescale	Links to Guiding Principles
2.1	Promotion of sustainable drainage techniques to mimic natural drainage flows as best as possible at new development sites	LBR (LLFA and Planning)	Ongoing	(iii) & (v)
2.2	Introduce retrofitting of the drainage of existing sites where possible to control surface water at source	LBR (LLFA and Planning)	Ongoing	(ii), (iii) & (v)

Through the use of SuDS, **action 2.1** will enable wider environmental benefits in addition to flood risk ones. Although the SAB has yet to come into force, through raising awareness of suitable techniques we will be better prepared to begin our SAB duties and functions for when it is passed into law. It will also provide our Planning officers with further understanding of the benefits of SuDS and where certain types of SuDS features will be better introduced into sites. Through greater understanding it will enable sustainable drainage to be promoted more widely, with the aim being that SuDS features will become more commonplace and therefore reduce the risk of additional flooding caused by new development. Developers too will also gain greater experience of using sustainable drainage techniques within Redbridge, as well as generating closer working links with planning and drainage staff who currently, or are likely to in the future when the SAB comes in, assess new development applications.

Action 2.2 focuses on using the theory of source control techniques as the driver for retrofitting existing sites, i.e. replacing traditional drainage systems with

sustainable methods such as SuDS. Such techniques involve the controlling of surface water runoff at its source so as to prevent flood risks from being passed on elsewhere in a catchment. The cumulative effect of increased numbers of SuDS across the borough at existing sites will reduce the associated flood risks, not only at the site but also elsewhere downstream across the catchment. Successful retrofitting will lead to such schemes becoming the norm across Redbridge, thereby widely reducing the risk of flooding. As part of any retrofitting exercises we will take care to take the potential implications that all mitigation measures to reduce flooding may have on local heritage into account, particularly where water flows may be diverted through the proposed work. SuDS will be carefully designed to prevent any detrimental impacts on heritage assets and archaeology, and can also provide positive benefits through the enhancement of streetscapes and local amenities. For further guidance about the impact flooding could have on historical assets please see the [Flooding and Historic Buildings](#) document which was published by English Heritage in 2010. For both new and retrofitted SuDS, the potential for land contamination will also need to be taken into account when determining whether SuDS would be appropriate.

For both of these actions we are unable to put precise costs to them because they are not scheme specific and are ongoing. Once the SAB legislation comes into force we should be in more of a position to agree some associated costs and possible funding streams. However, by achieving these actions we will not only be making savings from reducing flood risk to certain areas and properties but also be enabling partnership working with developers. Over time this will build up the knowledge base for what is and is not acceptable for sustainable drainage, but the delay in the enactment of the SAB legislation should not preclude retrofitting from happening in the meantime. Future reviews of these actions could seek to focus retrofitting to sites of critical infrastructure as well as development sites.

7. Objective 3 – Increase residents’ and businesses awareness of flood risk and actions that should be taken

7.1. Work So Far

7.1.1. Woodford public consultation

We included information about flood risk management for the borough in the July 2013 edition of the Redbridge magazine and requested for members of the public to inform us of local flooding that we may not have been aware of.

During December 2013 we did a consultation exercise in the Woodford area to raise awareness of flood risk management in Redbridge and local at risk issues. As this was the first sample area which we visited it gave us the chance to highlight what we have done and are doing as the LLFA, its aim also being to increase our knowledge about flooding in the area. Although the response feedback was low it has proved to be a useful learning exercise from which we aim to further build upon for future consultations with local communities, as well as those presently being undertaken in at risk areas.

7.1.2. LBR flood risk website information

We have improved our flood risk management website pages in recent years to aid the awareness of flooding and drainage procedures and the methods via which incidents can be reported to us. We were also one of the first councils to introduce the Environment Agency’s flood warnings widget onto our [Flooding webpage](#). This provides real-time accurate information about the number of flood alerts and warnings which are currently in force in the south east region of England. The webpages also provide advice on how best to protect your home and what to do during a flood event. There are direct links to the Environment Agency’s flood maps and information about how to sign up to receive their flood warnings from the Floodline service.

To complement the Strategy we have provided further information online about highway flooding as well as an introduction to our LLFA duties. There are also details about how to [report blocked gullies](#) and you can read our PFRA in full [here](#).

7.2. Future Actions

Table 7.1: Summary of the actions we are proposing to achieve Objective 3

Action Number	Action	Responsible RMA / Department(s)	Timescale	Links to Guiding Principles
3.1	Establish proportionate engagement processes to highlight potential flood risk in at risk areas to members of the public and local stakeholders	LBR (LLFA), EA & TW	Ongoing	(i) & (vi)
3.2	Update our flood risk website pages and review customer contact processes to promote better understanding of flooding	LBR (LLFA)	By June 2016	(i)

Action 3.1 involves the promotion of flood risks to residents and businesses that live and work in the borough, using the new hotspots identified through action 1.2 as a method for prioritising areas which should be targeted first. This is heavily dependent on the availability of staff resources and funding which may be available should the hotspot analysis give greater detail to specific areas that are at risk. Through local community engagement we aim to clearly explain the flood risk responsibilities individuals all have. Through this action we plan to work with existing groups in addition to identifying other communities which will benefit from involvement with flood risk management projects in Redbridge. Effective engagement to raise awareness will enable closer links between ourselves and local residents and businesses.

We are also going to update our website information and will check that the process for customers to report flood risk incidents and issues works efficiently. Through **action 3.2** we plan to increase the information provided on our website, detailing our responsibilities as the LLFA and the best contact methods for ourselves and the other RMAs.

8. Objective 4 – Promote flood alleviation schemes where the potential benefits are significant

8.1. Work So Far

8.1.1. Detailed further remodelling

Since the completion of the SFRA and SWMP we have undertaken further flood risk modelling in greater detail, so as to increase the information base available to aid the prioritisation of future work schemes. Although modelling will always include assumptions and never be 100% accurate it is important that we continue to improve our knowledge. Greater detail in the models enables us to be more certain as to which areas are at risk of flooding during different storm events. This means we can provide more information to those at risk and propose methods for mitigating risks as best as we can. It also allows us to bid for funding from Defra and the Environment Agency due to the increased confidence of the datasets generated through the modelling. For further information about the remodelling work we have done see section 4.3.

8.1.2. Woodford Flood Alleviation Scheme

We are also involved in the development of the Woodford Flood Alleviation Scheme which is presently at a feasibility stage. The remodelling of the Wanstead and Woodford areas has provided part of the evidence base being used to determine the next steps for this project which also involves the Environment Agency and Thames Water and makes up part of the Roding Flood Risk Management Strategy.

Section 4.2. presents information about alleviation work completed following flood events that Redbridge experienced in recent years.

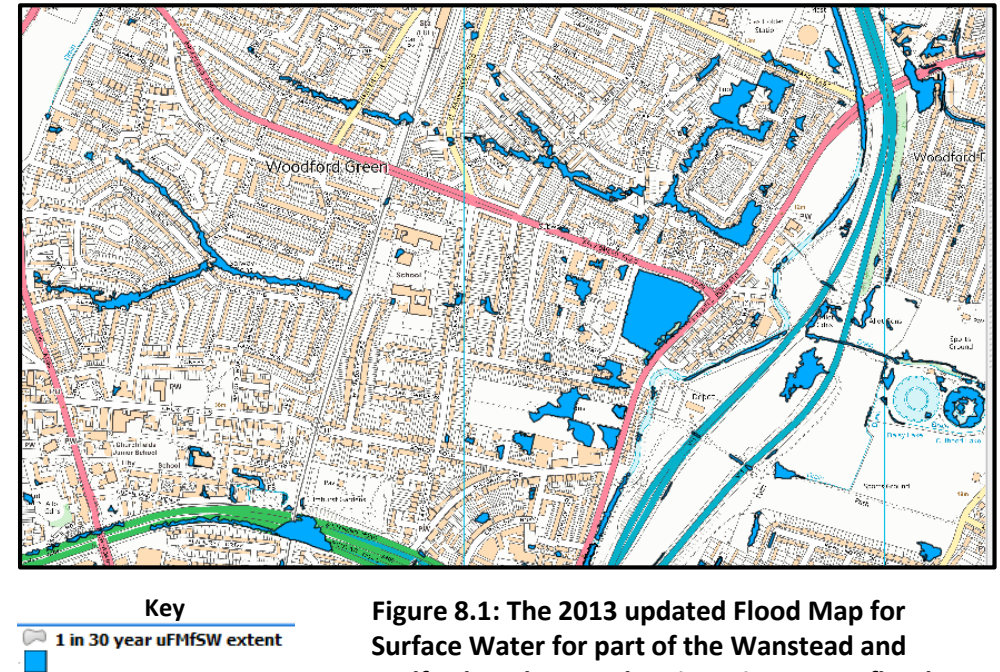


Figure 8.1: The 2013 updated Flood Map for Surface Water for part of the Wanstead and Woodford study area showing 1 in 30 year flood risk

8.2. Future Actions

Table 8.1: Summary of the actions we are proposing to achieve Objective 4

Action Number	Action	Responsible RMA / Department(s)	Timescale	Links to Guiding Principles
4.1	Identification of potential flood alleviation schemes and the development of feasibility studies	LBR (LLFA)	Ongoing	(iv)
4.2	Bid for external funding streams where available using further remodelling outputs	LBR (LLFA)	Ongoing	(iv)
4.3	Investigate potential to access partnership funding from third party stakeholders	LBR (LLFA)	Ongoing	(i) & (vi)
4.4	Work with internal colleagues to incorporate flooding opportunities with other potential schemes	LBR (LLFA, Highways, Culture & Leisure, Planning)	Ongoing	(iv) & (v)

The four actions we have proposed to achieve this objective are all ongoing. Like some of the actions for the other objectives, because there are no specific work schemes identified as yet it is hard to quantify the potential costs associated with any of them. However, we believe these actions, which all potentially lead towards the prioritisation of flood alleviation schemes with significant benefits, will provide substantial evidence to promote them for external funding.

Actions 4.1 and **4.2** will tie-in with the outputs of action 1.2 through further development and promotion of work schemes for areas which become new flood risk hotspots. Once the new hotspots have been identified following comparison analysis of the updated Flood Map for Surface Water with our SFRA, we will need

to assess those at greatest risk. Potential schemes will then be considered and those which will significantly reduce the amount of flooding and disruption to property or critical infrastructure will be developed further. As part of any scoping exercise to identify suitable sites, contaminated land assessments will be performed, including areas where historic and licensed landfills are known to exist. Access to the Environment Agency's Flood Defence Grant in Aid and other possible funding streams will require sufficient evidence to potentially generate funding, and we can base this upon our remodelling work.

We also want to work with local partners and stakeholders and provide investment into flood risk management in Redbridge through **action 4.3**. We aim to promote partnership match funding methods to enable potential schemes to go ahead which may not otherwise be possible due to limited resources. As all individuals and businesses have flood risk responsibilities to protect property and reduce flooding we are looking to raise awareness of such opportunities.

Action 4.4 has already begun through the work we've already achieved following the Act but there is more we can do to promote work schemes which can alleviate flooding in addition to providing other benefits. As the LLFA we will be working more closely with the Planning department through the SAB process to implement SuDS schemes across the borough, and we believe there will be additional internal opportunities with other departments. For example, we will now consider the potential to improve drainage, implement SuDS and reduce flood risk during all planned infrastructure schemes. Similarly we will look to raise awareness of the importance of using permeable materials when paving over front gardens and the benefits of retaining trees, both of which help to reduce the risk of flooding at source and elsewhere.

9. Objective 5 – Ensure flood alleviation schemes deliver environmental benefits where the opportunities exist

9.1. Work So Far

9.1.1. Manford Way SuDS scheme

Currently there are not many examples of SuDS across Redbridge, although one recent example which we constructed in 2013 is on Manford Way where soakaways have been installed into tree pits (see Figure 9.1). This enables any surface water on the service road to drain through the tree pits and into soakaways. The soakaway enables surface water runoff to be cleared from the surface of the service road as easily as a traditional gully would, as well as providing the opportunity for this water to soak into the ground as it would do naturally on a permeable surface. This reduces the amount of water entering the main sewer system and increases the amount of capacity in the sewer to hold more water elsewhere in the network.



Figure 9.1: Photograph of a Manford Way tree pit which incorporates a soakaway and gully connection

9.2. Future Actions

Table 9.1: Summary of the actions we are proposing to achieve Objective 5

Action Number	Action	Responsible RMA / Department(s)	Timescale	Links to Guiding Principles
5.1	Enhance biodiversity where opportunities exist	LBR (LLFA, Planning)	Ongoing	(v)
5.2	Utilise opportunities to enhance public space through flood alleviation schemes by incorporating amenity benefits	LBR (LLFA, Planning)	Ongoing	(v)
5.3	Contribute towards the objectives of improved water quality under the Water Framework Directive	LBR (LLFA, Planning)	Ongoing	(v)

All three of these actions have been proposed to further promote environmental benefits. We aim to use environmental benefits to prioritise flood risk work schemes as much as possible especially as any future projects will be managed in a way that enables wider greener credentials to be fulfilled. We want flood risk works to improve biodiversity and ecology as much as possible, whilst still achieving the required flood risk mitigation role it was intended for. Targets set in the Water Framework Directive (WFD) will also increase the potential for benefitting proposed work schemes to gain funding, and we will work with the Environment Agency when flood alleviation schemes are being screened for WFD and biodiversity benefits.



Figure 9.2: Manor Pond in Chigwell typifies the environmental benefits we look to achieve through SuDS

SuDS play an important part of achieving Objective 5 and we will look for multiple benefits at every opportunity when developing future work programmes. Sustainable drainage has the potential to be a major source for environmental benefits alongside flood risk mitigation improvements and through our promotion of SuDS we will encourage such features which can also be used by the community and add value to the surrounding landscape (as shown in Figure 9.2). Correctly designed SuDS which have treatment trains will provide benefits to water quality improvements through removal of pollutants and materials, simply by filtering and slowing down the flow of runoff. This will directly provide WFD benefits when the water outfalls into watercourses further down the catchment and will contribute towards improvements in the health of the river network and water systems across the borough and London as a whole. SuDS can also provide wetland habitat improvements and enhance other WFD benefits such as morphology and floodplain connectivity.