

London Borough of Enfield

Local Flood Risk Management Strategy



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Prepared by Ian Russell

Checked by Trevor Pennell

London Borough of Enfield

Civic Centre, Silver Street, Enfield, EN1 3XA

Tel 020 8379 3499

ian.russell@enfield.gov.uk

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1.0 Introduction

- 1.1 The Government has given local authorities powers to manage local flood risk in a more coordinated way. Enfield Council is now a Lead Local Flood Authority (LLFA) with responsibilities relating to local flood risk from surface water runoff, groundwater and small rivers, streams and ditches. Flooding from main rivers remains the responsibility of the Environment Agency.
- 1.2 The [Flood and Water Management Act 2010](#) requires LLFAs such as Enfield to develop and apply a Local Flood Risk Management Strategy (LFRMS) that:
- Specifies the roles of the different authorities that have responsibilities for managing flood risk in Enfield;
 - Describes how Enfield is working with partners to reduce flood risk;
 - Provides an overall assessment of local flood risk;
 - Sets out the objectives for managing local flood risk; and
 - Outlines what actions are to be taken to meet those objectives.

Further information regarding the legislative context to local flood risk management and a more detailed description of the strategy requirements are provided in Appendix 1.

- 1.3 The rise in extreme weather conditions, the presence of existing buildings in areas of flood risk, and limited public funding, mean that flood incidents cannot be prevented completely. However, through implementation of the strategy, local services can be coordinated to ensure that the frequency and impact of flood events are reduced. The strategy also provides an opportunity to work with local residents and businesses to minimise risk and prepare for the effects of climate change.
- 1.4 The London Borough of Enfield Local Flood Risk Management Strategy sets out how Enfield Council as LLFA and partnership organisations work together to improve the management of local flood risk.

Partner Responsibilities

- 1.5 Enfield Council works with several partners to reduce the risk and impact of flooding across the borough. The strategy sets out the responsibilities of these bodies so it is clear how the partnership will work together and so that local residents and businesses know what to expect of the different organisations involved. Risk Management Authorities, as defined by the Flood and Water Management Act 2010, include:
- **The Environment Agency** – strategic overview role for all sources of flooding with specific responsibilities for flood and coastal erosion risk management activities on main rivers and the coast (this designation gives the Environment Agency powers to carry out works but not a duty to do so – maintenance and operation is the responsibility of the owner), regulating reservoir safety, and working in partnership with the Met Office to provide flood forecasts and warnings

- **Thames Water** – responsible for managing the risk of flooding from the public sewer network, both for surface water and foul; Thames Water also own much of the River Lee Flood Relief Channel through Enfield for water supply purposes – this gives them an important role in managing fluvial flood risk in the Lee Valley
- **Highway Authorities** – trunk roads in Enfield are managed by Transport for London while the Highways Agency are responsible for the M25 motorway, it is the responsibility of these agencies to ensure that flood risk affecting their networks is managed effectively
- **Neighbouring LLFAs** – for Enfield these are the London Boroughs of Barnet, Haringey and Waltham Forest, and Hertfordshire and Essex County Councils; these authorities are responsible for the management of local flood risk within their areas; as flood water crosses boundaries, and the impacts of flooding on residents, transport and other utilities can have a significant impact on surrounding areas, it is critical for neighbouring LLFAs to work together to manage flood risk

1.6 The following key partners are not formally defined as Risk Management Authorities but nevertheless play critical roles in the management of flood risk in Enfield:

- **Canal and Rivers Trust** – own and operate the Lee Navigation which runs along the eastern boundary of Enfield, there are several important active and passive flood risk management structures on this water body which convey flood flows from the Small River Lee and Turkey Brook across the valley to the River Lee Flood Relief Channel
- **Drain London** – purpose is to share knowledge and, where possible, adopt a common approach to flood risk management across London; Drain London is overseen by the Greater London Authority, other members include all 33 London Boroughs, the Environment Agency, Thames Water and Transport for London; it is supported by the London Drainage Engineering Group (LoDEG) which looks at technical matters relating to drainage issues
- **Rail Authorities** – Network Rail and London Underground are responsible for managing critical transport infrastructure, it is the responsibility of these agencies to ensure that flood risk affecting their networks is managed effectively
- **Emergency Services** – responsible for minimising the impact of extreme flood events and responding to emergency situations

1.7 A more comprehensive description of the roles and responsibilities of the various different authorities that manage flood risk in Enfield can be found in Appendix 2.

1.8 Local residents and businesses also have a role to play in managing flood risk. People and properties in any known areas of flood risk should be prepared for flood incidents. Landowners whose properties are next to watercourses have a responsibility to ensure the unobstructed flow of water. It is also essential that local residents and businesses report any incidents of flooding of property, open spaces or roads. This helps to build up knowledge of flooding patterns, which then improves future risk management.

2.0 Assessment of Local Flood Risk

- 2.1 Flooding is defined as inundation by water that threatens life or injury, or causes damage or disruption to property or services. The combination of extensive man-made surfaces and under-lying impermeable geology in Enfield mean that local rivers respond rapidly to rainfall and are liable to sudden flooding; these factors also increase the risk of surface water flooding.
- 2.2 There are three main river valleys that flow across Enfield towards the River Lee on the eastern side of the borough – Turkey Brook, Salmons Brook and Pymmes Brook. These rivers all rise in or near the higher ground in the western half of Enfield. The majority of the runoff that contributes to these rivers is generated within Enfield. The River Lee is the main source of potential flooding from outside the borough.

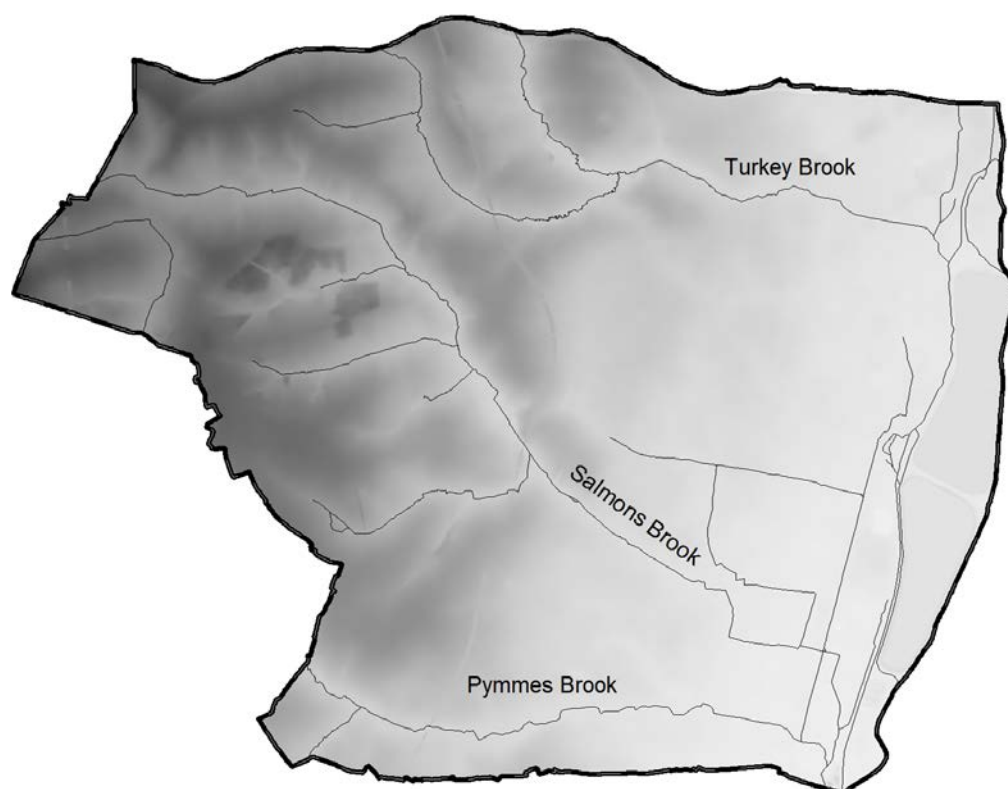


Figure 2.1 Digital Terrain Model of Enfield, developed using Lidar data; low to high altitudes (10 mAOD to greater than 100 mAOD) range from light to dark

- 2.3 The number of properties at risk of flooding in Enfield is high compared to most other local authorities. This is mainly due to the geography and layout of Enfield – most of the properties at risk of flooding are in the Lee valley area, which was historically an area of marshland.
- 2.4 Consequently, a wide range of flood defence systems are required to manage flooding and ensure that Enfield's residents and businesses are not faced with unacceptable risks or disruption. These defences include all aspects of the drainage network from simple road gullies to large channelised rivers, floodwalls and flood storage areas.

Sources of Flooding

- 2.5 The most significant sources of flooding in Enfield are main rivers and surface water. River flooding can be caused by rain falling far away from the location where flooding actually occurs. The rate of onset of flooding depends on the size and nature of the river catchment. For example, the time lag between the start of a storm event and peak flow in Salmons Brook is approximately 6 hours, whereas for the River Lee it is closer to 24 hours – this means that heavy rainfall in Hertfordshire could lead to flooding in the Lee valley in Enfield the following day.

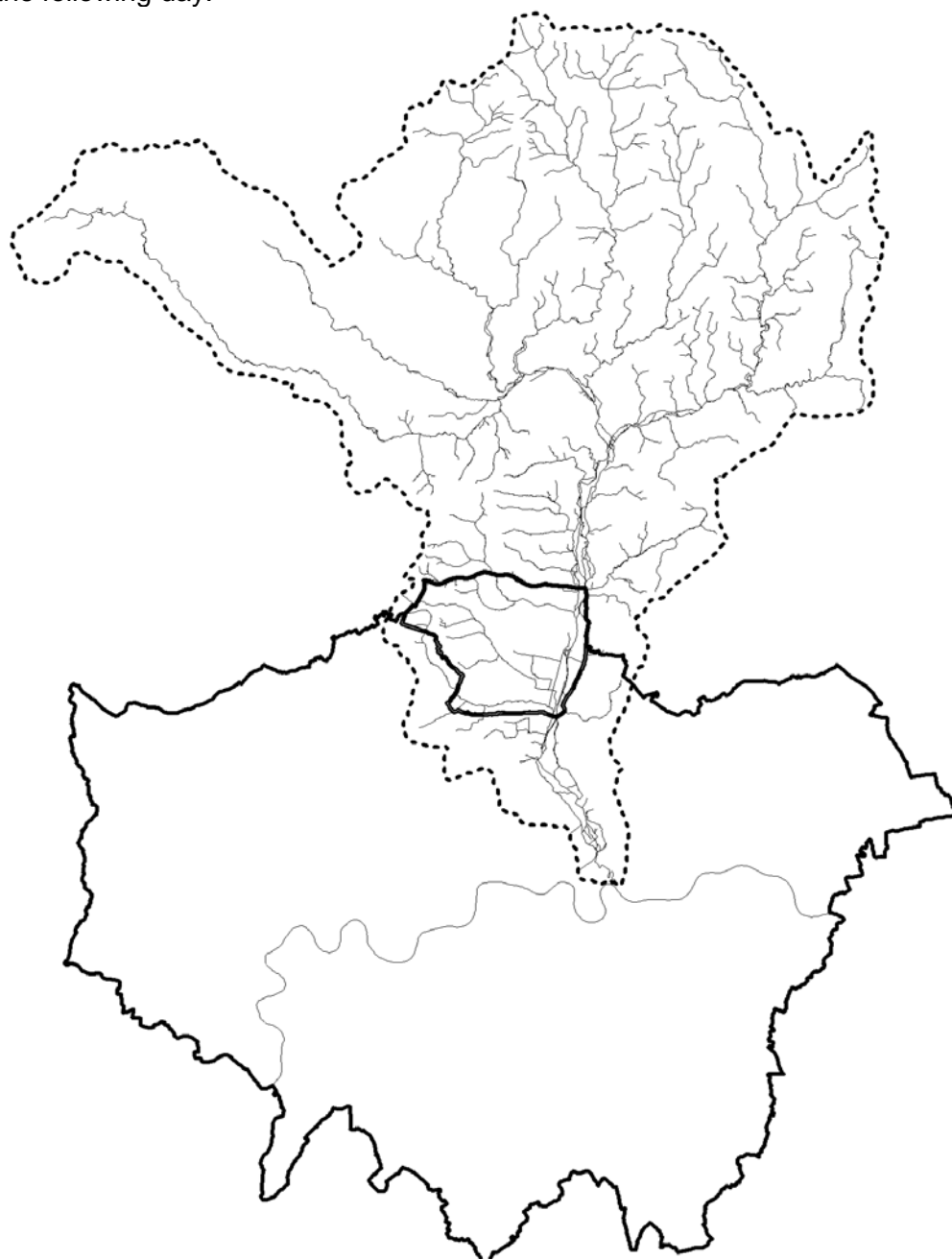


Figure 2.2 The catchment area of the River Lee (dotted line), with the boundaries of Enfield and London superimposed (thick solid lines), the River Thames is also shown (thin solid line)

- 2.6 Surface water flooding occurs when intense rainfall generates runoff that overwhelms the drainage system leading to ponding and overland flows. Consequently surface water flooding can be highly localised and the onset of flooding is rapid.
- 2.7 Further sources of flooding include sewers, groundwater and flooding from ordinary watercourses, Table 2.1 below describes each type of flooding and the relevant risk management authority associated with each of them.

Flood Sources	Definition	Authority
Main Rivers (fluvial flooding)	Flooding caused by overtopping of banks or defences, main rivers are defined by the Environment Agency and are considered to be capable of causing significant flooding	Environment Agency
Tidal	Flooding from the sea or tidal rivers (there is no risk of tidal flooding in Enfield)	Environment Agency
Groundwater	Water rises from the ground where permeable rock formations exist; although the bedrock of Enfield is London Clay, one-third of the borough is covered by permeable deposits such as sand and gravel	Enfield Council
Ordinary Watercourses	Flooding caused by rivers, streams or ditches that are not classed as main rivers	Enfield Council
Surface Water Runoff	Water that cannot enter the drainage system because it has been overwhelmed or blocked, leads to ponding and overland flows	Enfield Council
Sewers	Water flows out of sewers due to blockages or lack of capacity	Thames Water
Reservoirs	Reservoir failure leads to sudden inundation of downstream areas	Environment Agency

Table 2.1 Different types of flooding and relevant Risk Management Authorities

- 2.8 Although these flood types are managed separately, it is important to note that they are all inter-related – surface water drains into sewers, sewers and ordinary watercourses flow into main rivers, rivers flow in and out of reservoirs, and so on. Therefore management of the overall system must account for these various interactions.

Flood Risk

- 2.9 Flood risk is a combination of the probability of flooding and the impact of flooding. The probability of flooding is commonly referred to using terms such as a 1 in 100 year flood event, this means that the probability of that flood occurring (or being exceeded) in a given year is 1 in 100 or 1%. This is a statistical expression that is used as a means of quantifying the degree of risk. It does not mean that flooding will only occur once every 100 years. If a flood with an annual probability of 1 in 100 occurs in a particular year, it is just as likely to occur again the next year or even within the same year.
- 2.10 The impact of flooding is assessed in computer models by calculating the depth of flooding in a particular area; this can then be related to property damage or disruption to infrastructure allowing the overall consequences of potential flooding to be assessed.

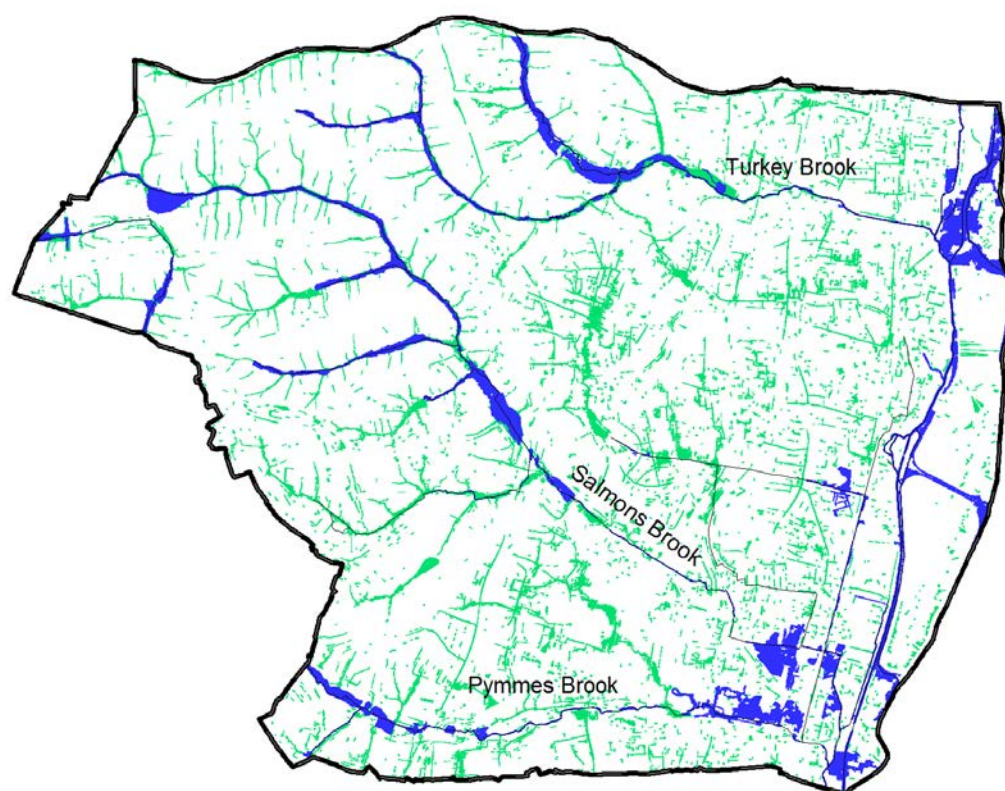


Figure 2.3 Fluvial (blue) and surface water (green) 1 in 100 year flood map

- 2.11 Figure 2.3 demonstrates the difference in spatial extent between fluvial and surface water flood risk in Enfield. While fluvial flooding is generally restricted to fairly well defined river valleys and floodplains, surface water flooding is more widespread and is not confined to river valleys. The surface water flood map also represents the best available source of information for flood risk relating to ordinary watercourses, which in most cases have not been studied independently. It is important to note that these maps show the expected maximum extent of flooding for an event with an annual probability of 1 in 100. Within these areas there are varying degrees of risk – some areas are far more likely to flood than others and some areas will be subject to more severe flooding than others. See paragraph 2.19 for further sources of information.

- 2.12 Groundwater flooding in Enfield is not considered to be a significant risk to people or property. Due to the local geological conditions, groundwater flooding incidents tend to be fairly low impact. In most cases the impacts can be addressed by the relevant landowner without requiring a multi agency response.

History of Flooding in Enfield

- 2.13 In recent years, Enfield has been fortunate not to experience the severity of rainfall that has led to flooding in many parts of the country. The last significant flood event in Enfield occurred in October 2000 when approximately 200 residential properties and businesses were flooded in the Montagu Road area of Edmonton.
- 2.14 The largest recorded flood event in Enfield occurred in 1947. During this event, major flooding of the River Lee and its tributaries led to wide scale flooding across much of the eastern-half of Enfield. The River Lee Flood Relief Channel was constructed in the 1970s to reduce the risk of this occurring again. Although the capacity of this channel has not been exceeded since, it has been close to full on several occasions.

Flood Risk Management

- 2.15 Existing drainage systems and other flood defences are under constant pressure due to processes such as climate change and urban creep – urban creep is the process whereby the impermeability of an urban area increases over time, due to modifications to individual properties. Continual maintenance and improvements of flood defences are required just to keep flood risk at existing levels.
- 2.16 Opportunities to reduce flood risk further are continually being sought. This is increasingly feasible because of the availability of new techniques such as computational hydraulic modelling. Applying these techniques as part of Enfield's Surface Water Management Plan has improved the understanding of flood risk across the borough. Several studies have recently been carried out in high-risk areas that look in detail at the interactions between rivers, surface water and sewers. This allows identification of the highest risk areas and provides tools to evaluate the most effective flood risk management measures.
- 2.17 If no action were taken to manage flood risk, increased flooding would occur and the consequences could be severe. The cost of this damage and disruption would outweigh the cost of continuing to manage flood risk. The cost effectiveness of flood risk management measures is tested by calculating the costs and benefits for the proposals. Only proposals that demonstrate a sufficiently high benefit to cost ratio are implemented.
- 2.18 The most effective types of measures are those that reduce runoff rates either by storing water in open spaces upstream of flood risk areas or by reducing the amount of impermeable surfacing which is the main generator of runoff in urban areas. Reducing runoff rates benefits all types of flood risk throughout the catchment whereas alternative measures such as constructing flood walls on rivers benefit only a specific area and can have negative impacts elsewhere.

Further Information on Flooding

2.19 Enfield Council has published several reports in recent years that provide further information regarding flood risk, these include:

- [Strategic Flood Risk Assessment](#) (SFRA) – looks at flood risk across the borough and provides information for decision making regarding future development
- [Preliminary Flood Risk Assessment](#) (PFRA) – a high-level study of flood risk across the borough using all available information including surface water flood risk maps developed specifically for this purpose
- [Surface Water Management Plan](#) (SWMP) – extends the scope of the PFRA by assessing options for reducing flood risk and sets out an Action Plan for future work

The surface water flood model developed for the PFRA and SWMP has now been superseded by the Environment Agency's Updated Flood Map for Surface Water Flooding (uFMfSW) – this currently represents the best available information on surface water flood risk. It will be updated periodically to incorporate detailed, localised mapping where available.

3.0 Objectives for Managing of Local Flood Risk

- 3.1 This section sets out the strategy's objectives for managing local flood risk and describes the specific actions and measures proposed to achieve them.

Local Flood Risk Management Strategy Objectives

1. **Flood Risk Information** – provide up to date information regarding the level of flood risk within Enfield taking account of emerging climate change impacts, improve understanding and awareness of flood risk
2. **Maintain Flood Risk Management Assets** – ensure the continued serviceability of existing flood risk management assets by carrying out regular inspections and maintenance as required following best practice principles
3. **Flood Risk and Development** – ensure new development is safe from flooding, does not increase flood risk elsewhere and, through the re-development of previously developed land, reduces overall flood risk
4. **Reduce Runoff Rates** – retrofit sustainable drainage to existing developments, store flood waters in parks and other open spaces during extreme flood events and apply natural flood management techniques where opportunities exist
5. **Protect Existing Properties from Flooding** – improve protection against flooding for all properties to a 1 in 100 year standard where possible, identify areas where flood protection is sub-standard and implement flood alleviation schemes where opportunities exist
6. **Preparedness and Resilience** – promote flood resistance and resilience measures to properties at risk of flooding where an adequate standard of protection cannot otherwise be achieved, ensure that residents in flood risk areas are adequately prepared
7. **Emergency Response to Flooding** – respond effectively in the event of flooding providing emergency assistance to those in need
8. **Partnership** – continue to work collaboratively with fellow risk management authorities to ensure flood risk management activities are coordinated across the borough and surrounding areas

- 3.2 It is considered that these actions are consistent with and further support the objectives of the [National Flood and Coastal Erosion Risk Management Strategy](#) (Defra/Environment Agency, September 2011). Table 3.1 overleaf provides a summary of the National Strategy objectives and how these are addressed within the objectives of Enfield's LFRMS.

National Strategy Objective	Link with LFRMS Objectives
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	1, 5, 8
Avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks	3, 4
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	2, 4, 5, 6
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	1, 6, 7
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	1, 7

Table 3.1 Comparison of National Strategy objectives and LFRMS objectives

Objective 1 – Flood Risk Information

Provide up to date information regarding the level of flood risk within Enfield taking account of emerging climate change impacts, improve understanding and awareness of flood risk

Flood Modelling

- 3.3 As mentioned in the previous chapter, the Environment Agency’s Updated Flood Map for Surface Water Flooding (uFMfSW) currently represents the best available information on surface water flood risk. It is based on a higher resolution than the previous surface water model developed for the SWMP and has been found to correlate better with recorded flood incidents.
- 3.4 It models overland flows on the surface that result from extreme rainfall events but it does not explicitly model the underground drainage system – it accounts for this by ‘losing’ a certain amount of water below ground. In general this works well as in most cases fairly reliable assumptions can be made regarding the drainage system. However it does not work well in certain cases, particularly where flood alleviation schemes have previously been implemented in response to known flood problems or where interaction with rivers plays a key role.
- 3.5 Consequently Enfield Council has initiated a series of detailed modelling studies looking at high-risk areas that explicitly model the interactions between above and below ground drainage systems including main rivers, ordinary watercourses, sewers and surface water.
- 3.6 The results of these studies will be used to update future versions of the uFMfSW. This will then be adopted as the standard surface water flood map and be published on the Council website and on the Environment Agency website under ‘Risk of Flooding from Surface Water’.

Flood Incidents

- 3.7 It is vital to collect and record detailed information when flood incidents occur. Flooding in this context is defined as an inundation by water that causes damage to property or disruption to services. Recording flood incidents enhances understanding of flood risk and can be used to validate and improve models, as well as providing firsthand evidence of flooding. Enfield record flood incident information on a database. Members of the public can report flood incidents to the Council using the following methods:
- Telephone Customer Services Centre – 020 8379 1000
 - Email – flooding@enfield.gov.uk

A tool for recording and uploading information regarding flood incidents is being developed for the Council website.

Flood Incident Investigations

- 3.8 The Flood and Water Management Act 2010 requires LLFAs to investigate reported flood incidents to the extent it considers necessary or appropriate. Enfield Council will carry out an investigation and prepare a report where significant flooding occurs – this is defined as internal property flooding that affects more than one property or flooding that causes the closure of critical transport infrastructure (main roads or railways) for more than one hour.

Strategic Flood Risk Assessment

- 3.9 Enfield published the SFRA in 2008, it provides information relating to flood risk from all sources across the borough. As the information relating to surface water flooding has improved significantly in recent years it is recommended that the SFRA be updated with respect to surface water flood risk as soon as the forthcoming updates to the uFMfSW have been implemented. Recent updates to fluvial flood maps should also be included in this review.

Actions

- Improve understanding of flood risk in Enfield by carrying out detailed modelling studies in high-risk areas
- Work with partners to ensure national datasets such as the uFMfSW are updated with the results of these local studies
- Provide up to date information regarding the level of flood risk within Enfield taking account of emerging climate change impacts by publishing flood risk data on the Council website where appropriate
- Record flood incidents in a consistent manner
- Carry out flood investigations and prepare reports when significant flooding occurs
- Review the SFRA with respect to surface water flood risk and other sources of flooding

Objective 2 – Maintain Flood Risk Management Assets

Ensure continued serviceability of existing flood risk management assets by carrying out regular inspections and maintenance as required following best practice principles

Maintenance Responsibilities

- 3.10 Maintenance of flood risk management assets is the responsibility of the asset owner. A large number of such assets are on or under the highway network. Most of these are looked after by Enfield Council although trunk roads in Enfield such as the A10 and A406 are the responsibility of Transport for London while the M25 Motorway is maintained by the Highways Agency.
- 3.11 The most common privately owned assets are rivers or streams that pass through or alongside private property. In these cases it is the responsibility of the land owner (or 'riparian' owner) to ensure the unobstructed flow of water. Depending on whether the watercourse is a main river or an ordinary watercourse it is the responsibility of either the Environment Agency or LLFA respectively to ensure that the riparian owner carries out their duties.

Ordinary Watercourse Consents

- 3.12 Where a land owner wishes to carry out modifications to an ordinary watercourse that will have an impact on the flow of water, the owner must obtain Ordinary Watercourse Consent from Enfield Council – consent forms can be obtained from the Council website.

Routine and Reactive Maintenance

- 3.13 Routine maintenance includes day-to-day activities such as cleaning highway gullies and removing litter and other detritus from the streets. These actions help to ensure that important features of the drainage network such as gullies, pipes and grilles are less likely to become blocked and thereby lead to flooding. There are approximately 28,000 highway gullies in Enfield, these are cleaned once a year (twice a year on Principal Roads).
- 3.14 Reactive maintenance involves responding to incidents where some degree of flooding has already occurred. This is often due to blockages caused by litter, fallen trees or collapsed pipes affecting the functionality of the drainage system. Enfield's contractors carries out unscheduled cleaning when blockages or other issues are reported.

Asset Register

- 3.15 The Flood and Water Management Act 2010 requires LLFAs to establish and maintain a register of significant flood risk management assets including information on ownership and condition. Enfield has worked closely with other LoDEG members to develop new web-based software for this purpose. This system allows LLFAs to record information about assets, it also has a function for recording flood incidents.

- 3.16 Recording details of flood incidents and linking these to specific assets where relevant, as well as monitoring the condition of significant flood assets, will enable London Boroughs to manage risks and prioritise resources effectively, reducing risks to communities, property and infrastructure.
- 3.17 It is up to individual LLFAs to define what a significant flood risk management asset is. Enfield Council considers any asset that has the potential to cause flooding through individual failure to be significant. Therefore large assets such as culverted watercourses, raised flood defences, flood storage areas and underground tanks are considered to be significant whereas individual highway gullies are not.

Inspections

- 3.18 Enfield Council will carry out regular inspections of all significant flood risk management assets whether public or privately owned – not including main river assets and reservoirs which already have established inspection regimes that are overseen by the Environment Agency. The purpose of carrying out inspections is to ascertain the condition of each asset and determine if remedial action is required.
- 3.19 The frequency of inspection depends on the type of asset. High-risk assets that are prone to blockage, such as grilles at the entrances to culverts, will be inspected at monthly intervals and also following Flood Guidance Statements issued by the Flood Forecasting Centre. Low risk assets may only require inspection every few years.
- 3.20 Where private assets are found to require repairs or improvements the owner will be informed of their responsibilities. If maintenance is not carried out enforcement action will be considered and carried out as a last resort

Actions

- Review and issue ordinary watercourse consents, and ensure the works are carried out in accordance with requirements
- Carry out routine and reactive maintenance of highway drainage assets and land drainage features in parks
- Maintain the flood risk management asset register
- Carry out planned maintenance of Council owned assets
- Ensure that privately owned, non-main river assets are adequately maintained, through the use of enforcement action where necessary

Objective 3 – Flood Risk and Development

Ensure new development is safe from flooding, does not increase flood risk elsewhere and, through the re-development of previously developed land, reduces overall flood risk

- 3.21 Planning policy and development management play a key role in managing flood risk by ensuring that new developments are not at risk of flooding and that they do not exacerbate flood risk elsewhere by increasing surface water runoff from hard-standing areas, or by displacing flood water through the raising of land within flood risk areas. This is achieved by implementing the policies and recommendations made in the SFRA and the SWMP.
- 3.22 These policies are in line with the [National Planning Policy Framework](#) and [The London Plan](#), they have been encapsulated in the [Development Management Document](#), which forms part of Enfield's [Local Plan](#).

Safe Development

- 3.23 To be classed as safe any development in or near flood risk areas must:
- Provide a dry access route above the 100 year plus climate change flood level or, where appropriate modelled data exists, an access route within the low hazard area of the floodplain (as defined by the Environment Agency's Flood Risk Assessment Guidance for New Development R&D Technical Report FD2320) to and from any residential development should be provided;
 - Finished floor levels should be set at least 300mm above the 100 year plus climate change flood level; to achieve this without increasing flood risk elsewhere, it must be shown that there will be no net loss of flood storage and that overland flow routes will not be obstructed;
 - For surface water flooding, a 100mm freeboard instead of 300mm may be considered.

These documents also contain policies that avoid locating vulnerable uses, such as basement dwellings or essential infrastructure, in areas that are at risk of flooding.

Sustainable Drainage

- 3.24 New developments, particularly the re-development of brownfield sites, provide opportunities to reduce overall flood risk, through the use of Sustainable Drainage Systems (SuDS) and by allowing space for flood storage and overland flows. It is widely recognised that sustainable forms of flood alleviation, such as providing more space for rivers to flow and flood naturally, are preferable to outdated techniques that rely on hard defences such as concrete walls and channels.

- 3.25 Enfield's Development Management Document includes policies that require all new developments to maximise the use of SuDS and restrict surface water runoff rates to greenfield rates where possible. These systems include measures such as green roofs, permeable paving and rainwater harvesting that mimic natural drainage systems by increasing storage and infiltration, and slowing down the rate of runoff. This reduces the rate and volume of surface water runoff and therefore the risk of flooding further downstream.
- 3.26 Although the implementation of SuDS can be more challenging in some respects, this is often due to a lack of experience and expertise in the building industry. Well-designed SuDS can be more economic and robust than conventional drainage systems. In addition, SuDS offer a wide range of ancillary benefits including improved water quality, increased tolerance of droughts and enhanced amenity and habitat features.
- 3.27 To ensure the potential multiple benefits of SuDS are realised, it is recommended that above ground, green infrastructure SuDS (such as swales, rain gardens and wetland features) are preferred to below ground measures such as underground storage tanks. Green infrastructure SuDS deliver wider benefits than below ground systems which provide flood storage benefits but little else. As well as enhancing the aesthetic value of our surroundings, green infrastructure SuDS can contribute to improving air quality and well-being. Enfield Council is developing an air quality action plan, which is due to be published in 2016. Above ground systems are also easier to inspect and maintain and are therefore less prone to failure.
- 3.28 This recommendation aligns with the drainage hierarchy in the London Plan which requires above ground systems to be considered first. It also addresses requirements in paragraphs 109 and 114 of the National Planning Policy Framework to recognise the wider benefits of ecosystem services and plan positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure. It is proposed to develop an Enfield SuDS Guide that provides further information regarding the use of SuDS with specific reference to Enfield's urban character and local geographical conditions.
- 3.29 In recognition of the benefits of SuDS, the Government have included a requirement for all new development to prioritise SuDS in the National Planning Policy Framework. LLFAs are now designated as statutory consultees for matters relating to surface water drainage for all major developments – this is to ensure that SuDS proposals are evaluated as part of the planning process.

Actions

- Apply the National Planning Policy Framework policies on flood risk and the local flood risk policies in Enfield's Local Plan
- Require use of sustainable drainage techniques for all new development in accordance with local and national policies
- Prioritise the use of green infrastructure SuDS to achieve multiple benefits
- Develop and publish Enfield SuDS Guide

Objective 4 – Reduce Runoff Rates

Retrofit sustainable drainage to existing developments, store flood waters in parks and other open spaces during extreme flood events and apply natural flood management techniques where opportunities exist

- 3.30 Increased surface water runoff is the main cause of higher flood risk in urban areas. Consequently, measures that seek to reduce runoff rates, either by enabling more infiltration or providing storage of excess water, are the most effective techniques of managing flood risk.

Retrofitting Sustainable Drainage

- 3.31 To maximise the multiple benefits of sustainable drainage in existing communities it is essential to identify and implement opportunities to retrofit SuDS. There are many situations where such measures can be carried out cost effectively, for example:
- Regeneration projects – projects to enhance public spaces create opportunities to improve drainage by implementing multi-functional measures such as rain gardens and permeable paving
 - Footway schemes – works on the footway often provide opportunities to implement SuDS, for example by converting conventional highway verges and planted areas, which are usually raised, to rain gardens which are shallow depressed areas of vegetation that can accept, store and drain rainwater runoff; opportunities to install permeable paving should also be exploited both on footways and carriageways however such schemes can be limited by existing constraints such as buried services and the high cost of full re-construction
 - Traffic calming schemes – works that involve restricting traffic in some way to promote safety measures can often be combined with SuDS implementation at minimal additional cost
 - Car parks – these often have potential to be converted to store shallow depths of flood water during extreme flood events without significantly affecting their serviceability; for example creating a 100mm high kerb or bund around a fairly flat car park whilst leaving the conventional drainage system intact can store relatively large volumes of water at low cost; such schemes can be enhanced further by replacing the conventional drainage systems with additional SuDS features
 - Refurbishment of large estates – large sites such as hospitals, schools, business and industrial areas implement routinely carry out refurbishment and renewal works, such schemes create opportunities to implement SuDS

Enfield's [Streetscape Policy and Guidance](#) document provides information for developers and highway designers. The information on SuDS in this document is currently fairly limited. Consequently it is proposed to provide more comprehensive information including detailed specifications for commonly used SuDS features such as permeable paving and rain gardens.

- 3.32 Schools present a number of opportunities for SuDS, which can be used to enhance the school landscape design and provide a range of educational and play opportunities. The [SuDS for Schools](#) project that was recently carried out at several schools in the Pymmes Brook catchment demonstrates the wide range of measures that can be successfully employed. Schools typically have significant external spaces, both hard and soft landscaped, which are ideal for retrofitting sustainable drainage features. An additional benefit of delivering SuDS in schools is the opportunity to integrate the measures with the school curriculum and thereby provide first-hand educational opportunities.

Natural Flood Management

- 3.33 As mentioned previously, most of the main rivers in Enfield rise in or near the higher ground in the western half of the borough. These green, upland areas are predominantly used for agricultural purposes but also include other substantial parks and other open spaces such as Trent Park, Whitewebbs Golf Course and several Garden Centres in the Crews Hill area.
- 3.34 Consequently, another option to reduce flooding in Enfield is to look at land management practices in the rural areas of the borough where much of the runoff is generated. Natural flood management refers to the alteration, restoration or use of landscaped features to slow runoff rates and reduce flood risk downstream, this involves using techniques such as:
- Providing woodland – increases infiltration and evapotranspiration;
 - Creating vegetated buffer strips alongside watercourses – reduces runoff and soil erosion;
 - Changing land management practices – for example avoiding leaving fields bare over the winter when storms are most likely to cause erosion, even changing the direction of ploughing in fields can have a significant impact on surface water runoff rates (runoff is reduced by ploughing fields in a perpendicular direction to the slope of the land);
 - Restricting the capacity of drainage channels – restores natural flood storage features
 - Retaining woody debris in rivers – natural obstacles such as fallen trees and branches should be retained in rural rivers unless they are causing a specific problem, they restore natural flood storage and reduce flows downstream, they also deliver biodiversity improvements by creating slow flowing areas beneficial to fish and macroinvertebrates;
 - Restoring river meanders – slows water and reduce flood peaks;
 - Creating flood storage areas in parks and open spaces – this often involves restoring natural floodplains, through careful design such areas can be used to maximise storage during extreme flood events while remaining serviceable for day-to-day use.

These measures slow water, increase storage and infiltration, and reduce erosion. The enhanced biodiversity and management of water benefits compensate for a small reduction in farmland. Reducing erosion reduces the silt in Enfield's rivers that is deposited in culverts and channels in downstream urban areas increasing flood risk and creating an expensive maintenance liability. Such techniques also reduce the impact of droughts by allowing the soil to take up and store additional water.



Figure 3.1 Restored watercourse at Grovelands Park



Figure 3.2 River restoration works in progress at Firs Farm Playing Fields

- 3.35 It is important to recognise that any upstream measures to store floodwaters or slow down runoff, whether from small SuDS schemes or large-scale flood storage areas, have a positive benefit on flood risk downstream. For example, storing water at upstream locations such as Enfield Golf Club has a positive impact on areas further down the catchment such as Edmonton.

Actions

- Identify and implement opportunities to retrofit Sustainable Drainage Systems
- Provide detailed SuDS information in Enfield's Streetscape Policy and Guidance document
- Retrofit SuDS measures in schools and link to educational opportunities
- Promote Natural Flood Management techniques in Enfield

Objective 5 – Protect Existing Properties from Flooding

Improve protection against flooding for all properties to a 1 in 100 year standard where possible, identify areas where flood protection is sub-standard and implement flood alleviation schemes where opportunities exist

Flood Modelling

- 3.36 As mentioned under Objective 1 Flood Risk Information – Enfield has initiated a series of detailed modelling studies looking at high-risk flood areas that explicitly model the interactions between above and below ground drainage systems including main rivers, ordinary watercourses, sewers and surface water. This work builds on the flood modelling carried out for the SWMP.
- 3.37 Having identified and prioritised the areas with most significant flood risk, known as Critical Drainage Areas, the next step is to test possible measures to reduce flood risk to an acceptable standard. The aim is to provide a 1 in 100 year standard of protection – this means that the property at risk is protected against a storm with an annual probability of 1 in 100. It should be noted that this is not always possible.

Flood Alleviation Schemes

- 3.38 Flood models can be adjusted to test the impact of possible flood alleviation measures. The results of several different scenarios can be compared with the existing situation. The implementation cost of the proposals is then compared with the estimated value of the damages avoided by carrying out the scheme. The proposal with the most favourable cost-benefit ratio is then selected to be taken forward. If no suitable option can be identified, then other steps such as individual property protection measures will be considered – these are discussed further in the following section.

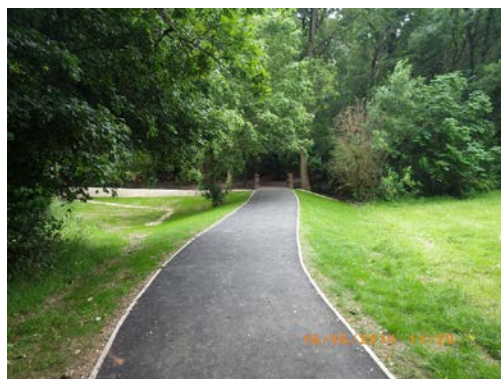


Figure 3.3 Flood defence embankment at Grovelands Park installed in 2014



Figure 3.4 Flood defence wall at Grovelands Park

- 3.39 Enfield is developing a programme of sustainable measures going forward to manage risks and protect properties and businesses. Where suitable, open spaces such as playing fields and parks can be used to temporarily store water during extreme rainfall events and ensure that developed areas and critical infrastructure are protected from flooding.

- 3.40 Where flood risk is identified in densely built-up areas, retrofitting SuDS measures to existing buildings may be the only option to reduce risks – these can include measures such as installing underground flood storage tanks.

Water Framework Directive

- 3.41 The Water Framework Directive requires local authorities and other stakeholders to take actions to improve the status of water bodies based on a wide range of measures including biological and chemical indicators. Most of the rivers in Enfield are classed as 'heavily modified' due to the extent of urbanisation and associated modifications to watercourses in the borough.
- 3.42 Poor water quality caused by urban pollution is a serious and widespread issue afflicting Enfield's rivers. As well as causing loss of wildlife, unsightly polluted watercourses and unpleasant odours can blight nearby areas and in some cases affect the health and well-being of local residents. Sources of pollution include highway runoff, industrial areas and litter. A major pollution source that is very challenging to control is misconnected sewers. These often involve small DIY installations such as kitchen sinks and washing machines that are 'misconnected' to the wrong sewer outfall, the result is that the effluent from these devices is delivered straight to the nearest river instead of going to the sewage treatment works. Enfield Council work with Thames Water to identify and rectify misconnections; however, it is not possible to identify and eliminate all misconnected properties. In some areas wetlands planted with reeds can be used to mitigate the impacts of residual pollution and contribute to meeting Water Framework Directive objectives.
- 3.43 The Water Framework Directive objectives defined by the [Thames River Basin Management Plan](#) can be summarised as follows:
- Prevent deterioration of water bodies
 - Aim to achieve good ecological and good surface water chemical status in water bodies, or good ecological potential for water bodies that are designated as artificial or heavily modified
 - Reduction of pollution and hazardous substances in surface water and groundwater
 - Achieve standards and objectives set for protected areas
- 3.44 The Council aims to maximise opportunities to restore or enhance water features and achieve the following key benefits for all flood alleviation schemes under consideration:
- Reduce flood risk
 - Improve water quality
 - Enhance amenity value for local residents
 - Create or improve wildlife habitats
 - Protect or restore river corridors by naturalising heavily modified watercourses where opportunities exist



Figure 3.5 Wetland features at Enfield Town Park



Figure 3.6 Bioretention SuDS cells at Glenbrook, Lonsdale Drive

Sustainable Development

- 3.45 The Flood and Water Management Act 2010 requires LLFAs to aim to make a contribution towards the achievement of sustainable development. This is often defined as:

“Development which meets the needs of the present without compromising the ability of future generations to meet their own needs”

There are several objectives and actions in this strategy that contribute towards this achievement. For example ensuring that new development is safe from flooding and does not increase flood risk elsewhere, allowing for the possible impacts of climate change and maintaining existing flood risk management assets.

- 3.46 Further measures that should be taken to contribute towards this achievement include:
- Use of sustainable building materials, includes using recycled materials where appropriate and using robust materials with a suitable design life
 - Prioritise solutions to manage flooding that work with natural processes, encourage biodiversity enhancements and minimise adverse effects to the local environment, as opposed to over-engineered solutions which are often less sustainable to construct and maintain

The potential impacts on Natura 2000 sites, such as the Lee Valley Special Protection Area, must be evaluated for all flood alleviation works.

Actions

- Continue programme of work to identify and test possible flood alleviation schemes across the borough
- Implement schemes where the economic assessment of costs and benefits demonstrates that the proposals are feasible
- Identify and maximise opportunities to achieve multiple benefits, including water quality, biodiversity, river restoration and amenity benefits, through the implementation of flood alleviation schemes

Objective 6 – Preparedness and Resilience

Promote flood resistance and resilience measures to properties at risk of flooding where an adequate standard of protection cannot otherwise be achieved, ensure that residents in flood risk areas are adequately prepared

Preparedness

- 3.47 It is vital to recognise that even with a wide range of flood defences in place, residual flood risk will still exist; this is due primarily to two factors:
- Exceedance events – extreme storms can occur that exceed the design standards of the flood defences;
 - Structural failure – flood defences have the potential to fail either through blockages or structural collapse, such failures are often associated with inadequate maintenance.

In areas where significant residual flood risk remains it is important that communities and businesses are adequately prepared.

- 3.48 Where specific communities are at significant risk of flooding consideration should be given to the development of Community Flood Plans, Enfield's Emergency Planning Team can assist with these where required. They are also able to assist businesses with the development and exercising of business continuity and emergency plans. Further information about accessing this support can be found on the Council website.
- 3.49 Information relating to flood warnings is covered in the next section.

Flood Resistance and Resilience

- 3.50 Where residual flood risk remains and no other suitable flood risk reduction measures can be identified, individual property protection measures can be used as a last resort to minimise the potential consequences of flooding. Properties of all types can be modified to be flood resistant or flood resilient, though it should be noted that such measures are not normally appropriate for historic buildings unless fully justified in heritage terms.
- 3.51 Flood resistance measures aim to prevent floodwaters from entering properties in the first place; examples include fitting flood-proof airbrick covers and non-return valves to drainage systems or constructing flood walls or other barriers around individual properties.
- 3.52 Flood resilience measures allow water to enter properties but aim to reduce the damage caused when it does. Examples of flood resilient design measures include raising electrical circuits and other services, and using waterproof floor and wall coverings such as tiles or concrete rather than timber or plaster. Such properties may need to be vacated temporarily during flood events but can be re-entered relatively quickly. Conventional properties that experience flooding can require many months, and large financial sums, to be returned to their pre-flood condition. These measures are not ideal; however, they can significantly reduce the costs and disruption caused by flooding.

Flood Insurance

- 3.53 Property insurance claims for flood damage across the UK have increased significantly over recent years and are likely to increase further due to the impacts of climate change. Since 2000, flood insurers have been providing cover under a 'Statement of Principles' agreement with the Government, which ensures that flood insurance is available to householders and small and medium sized enterprises (SMEs). Large commercial properties are not covered by the Statement of Principles and therefore need to arrange for flood risk insurance at market rates. The Statement of Principles expired in June 2013.
- 3.54 The Government and the insurance industry made an agreement in 2013 to take forward the Flood Reinsurance Scheme (Flood Re) as the preferred approach to addressing the availability and affordability of flood insurance. The Flood Re scheme is a not-for-profit flood reinsurance fund, owned and managed by the insurance industry, and established to ensure that those domestic properties in the UK at the highest risk of flooding can receive affordable cover for the flood element of their household property insurance.
- 3.55 The Government and Association of British Insurers (ABI) are working to implement Flood Re in April 2016. In the meantime the insurance industry has voluntarily agreed to continue providing cover under the Statement of Principles. The Flood Re scheme is intended to be a transitional scheme which would gradually evolve over the next 25 years at which time a free market for all flood risk insurance would take over.

Actions

- Identify properties where an acceptable standard of protection cannot be achieved
- Promote Community Flood Plans and Business Continuity Plans where significant residual flood risk remains
- Promote individual property protection measures including flood resistance and resilience measures where significant residual flood risk remains

Objective 7 – Emergency Response to Flooding

Respond effectively in the event of flooding providing emergency assistance to those in need

Multi-Agency Flood Plan

- 3.56 Enfield Council aims to take action before, during and after flooding in order to mitigate the effects of any extreme rainfall or fluvial flood events. The procedures to be followed are set out in detail in the Multi-Agency Flood Plan. This document was prepared by Enfield's Emergency Planning Team in partnership with a number of external agencies including the Metropolitan Police, the London Fire Brigade and the Environment Agency. It includes a risk assessment for critical infrastructure across the borough, this ensures that the risks are well understood and can be managed accordingly.
- 3.57 Council officers in the Emergency Planning and Structures and Watercourses teams monitor Flood Guidance Statements issued by the Flood Forecasting Centre and the Environment Agency's Flood Alerts and Warnings – the latter are based primarily on river levels rather than surface water flood risk.
- 3.58 In addition these teams use telemetry and CCTV cameras to monitor live conditions across Enfield. River level monitors and rainfall gauges send SMS and email alerts when pre-determined thresholds are breached. CCTV cameras at high-risk locations can be used to make immediate assessments of risks. Depending on the level of risk, a 'Floodwatch' inspection may be implemented. This involves one or more officers from the Structures and Watercourses team visiting a number of significant locations to further assess the risk.
- 3.59 During this process information from other Council officers, members of the public and partnership agencies is fed back to the Emergency Planning team who monitor the event and determine if and when to activate the Multi-Agency Flood Plan. If this decision is made, the first step is to open the Borough Emergency Control Centre (BECC). There are several possible triggers for this:
- Flooding has already occurred and there is significant risk to life, property and/or infrastructure
 - A major incident is declared by the emergency services
 - Responding organisations are unable to cope with the demand placed upon them to respond to a flooding incident
- 3.60 Where necessary, several evacuation centres are available for use by residents during emergencies. The Emergency Planning procedures for flooding were tested in 2012 to ensure the system functioned effectively and that all relevant officers were aware of their individual responsibilities.

- 3.61 Another potential major source of flood risk is reservoir failure. The William Girling and King George V reservoirs in the Lee valley are considered to be two of the highest risk reservoirs in the country due to their size and proximity to densely populated areas. Although these reservoirs are owned and managed by Thames Water it is Enfield Council's responsibility to develop an off-site plan, which is to be activated in the event of reservoir failure. This is essentially an evacuation plan as if these reservoirs were to fail there would be insufficient time to protect properties or infrastructure, the aim would be to move people to safety as quickly as possible. The severity of such an event would be catastrophic; however, the risk of failure is extremely low – the annual probability is estimated to be less than 1 in 10,000.

Communications

- 3.62 There are a number of ways flood warnings are communicated to residents and businesses. The Environment Agency offers a Floodline Warnings Direct service for homes and businesses. Flood warning messages are sent out to numbers registered with this service, which includes tenants and landlords.
- 3.63 In addition to this service, the Council, in partnership with the police, provide a similar system known as CommunitySafe. This offers the opportunity for residents and businesses to register for an emergency warning and informing service. This service would cover a major incident only.
- 3.64 The Council also provides up to date information via its website and the local press to keep residents and businesses informed.

Emergency Flood Defence Measures

- 3.65 Enfield's Highway Works Contract includes emergency activities that may be required in response to flooding. These reactive maintenance operations on the highway network include provision of sandbags, emergency pumps and traffic management measures.
- 3.66 Where properties or business are threatened by flooding, Enfield's Emergency Planning Team will consider what level of assistance it is able to provide; however, it is not standard practice to provide sandbags to members of the public for the protection of private property. Enfield Council maintains a limited supply of sandbags for the purpose of protecting critical infrastructure.

Actions

- Apply the emergency response measures described in the Multi-Agency Flood Plan
- Review the Multi-Agency Flood Plan with respect to surface water
- Encourage residents and businesses in flood risk areas to sign up to the Environment Agency's Floodline Warnings Direct service and/or Enfield Council's CommunitySafe system
- Continue to improve network of remote flood monitoring equipment and CCTV cameras, make this information publicly available where possible

Objective 8 – Partnership

Continue to work collaboratively with fellow risk management authorities to ensure flood risk management activities are coordinated across the borough and surrounding areas

- 3.67 Flooding does not stay within local authority boundaries, it is therefore essential that LLFAs work in partnership with neighbouring authorities and with a range of agencies to create a comprehensive understanding of flood risk and determine a suitable plan of actions to manage that risk. This is particularly relevant in the case of Haringey Council where there are a number of cross-border flood risk issues shared with Enfield.

Drain London

- 3.68 Enfield Council is an active member of organisations that facilitate partnership working such as Drain London and the London Drainage Engineering Group (LoDEG). Enfield officers attend regular meetings with neighbouring boroughs through the Drain London Forum to share best practice and ensure ongoing projects provide complimentary flood risk mitigation.

Flood Working Group

- 3.69 The Flood Working Group is a forum within Enfield to discuss ongoing activities and policy development. This provides an opportunity for officers from different departments that have responsibilities for flooding to share information and coordinate activities across the Council.

Environment Agency

- 3.70 The Environment Agency provides a significant level of support to Enfield's programme of detailed modelling investigations of Critical Drainage Areas and identification of potential flood risk management measures. The funding for these works is derived from Defra's Flood Defence Grant in Aid and the Thames Regional Flood and Coastal Committee's local levy – in both cases the funding allocation is administered by the Environment Agency, who work closely with Enfield to ensure the programme can be implemented in the most effective manner.
- 3.71 Enfield also works collaboratively with the Environment Agency to continuously assess flood risk using the latest available techniques and information, sharing data and resources where applicable, and contributing to flood risk plans and other documents.

Utility and Transport Providers

- 3.72 Thames Water is an important partner in the implementation of flood mitigation and resistance measures. Thames Water has a remit through the utilities regulator OFWAT to reduce the number of properties affected by sewer flooding. OFWAT impose strict criteria and will only fund projects where there is a history of internal sewer flooding of premises during 1 in 10 year rainfall events.

- 3.73 Other utility companies and transport providers, such as Transport for London, London Underground and Network Rail, need to be aware of the flood risks affecting their networks. Flood risk strategies provide an opportunity for engagement with these organisations.

Technical Bodies

- 3.74 London Drainage Engineering Group (LoDEG), Association of Thames Drainage Agencies (ATDA) and Construction Industry Research and Information Association (CIRIA) provide technical support and training related to flood risk and SuDS.

Emergency Services

- 3.75 In the event of an emergency, Enfield will work together with other agencies including the emergency services and neighbouring local authorities to respond as set out within the Multi-Agency Flood Plan.

Actions

- Continue to actively engage in the Drain London Forum to contribute to a coordinated London-wide approach to flood risk management
- Continue to hold Flood Working Group meetings
- Work with the Environment Agency to deliver flood alleviation schemes, and improve knowledge and understanding of flood risk
- Work with Thames Water to identify opportunities for jointly funded projects
- Provide utility and transport companies with the latest available information on flood risk so they can assess the potential impact on their infrastructure and build resistance and resilience to flooding where necessary, ensuring a prompt recovery following a flood incident
- Work with transport companies to identify opportunities for jointly funded projects

4.0 Actions to Reduce Local Flood Risk

Funding and Resources

- 4.1 This section sets out the strategy’s objectives for managing local flood risk and describes the specific actions and measures proposed to achieve them.
- 4.2 As LLFA, Enfield Council will take the lead role in implementing this strategy and coordinating activities with other risk management authorities to address flood risk across the borough. Enfield will carry out many of the actions identified in the action plan using existing resources. Enfield is allocated an annual budget for LLFA activities; the Structures and Watercourses team in Highway Services carry out most of these. Some actions will require additional funding for staff resources, expert consultancy fees and direct project funding. A number of other external sources of funding and resources will be utilised where available:
- Funding can be obtained from Defra’s **Flood Defence Grant in Aid (FDGiA)** and the Thames Regional Flood and Coastal Committee’s **local levy**, both administered by the Environment Agency, for local flood risk investigations and for implementation of flood alleviation schemes that deliver suitable reductions in flood risk;
 - **Thames Water** can fund flood alleviation works on the sewer network where the appropriate criteria are fulfilled;
 - **Utility companies** and **property owners** are responsible for site specific flood risk alleviation, resistance and resilience of their premises;
 - **Developers** are required to ensure that flood risks are addressed and to implement SuDS as part of new developments, contributions to flood alleviation schemes can be achieved through Community Infrastructure Levy payments or Section 106 agreements.

Flood Risk Action Plan

Objective 1 – Flood Risk Information

Action	Who	When	Funding
Improve understanding of flood risk in Enfield by carrying out detailed modelling studies in high-risk areas	Structures & Watercourses	2016 to 2018	FDGiA Local Levy LLFA
Work with partners to ensure national datasets such as the uFMfSW are updated with the results of these local studies	Structures & Watercourses Environment Agency	2016 to 2018	LLFA

Action	Who	When	Funding
Provide up to date information regarding the level of flood risk within Enfield taking account of emerging climate change impacts by publishing flood risk data on the Council website where appropriate	Structures & Watercourses	Ongoing	LLFA
Record flood incidents in a consistent manner	Structures & Watercourses	Ongoing	LLFA
Carry out flood investigations and prepare reports when significant flooding occurs	Structures & Watercourses	Ongoing	LLFA
Review the SFRA with respect to surface water flood risk and other sources of flooding	Planning Policy	2017	Planning Policy

Objective 2 – Maintain Flood Risk Management Assets

Action	Lead	Timescale	Funding
Review and issue Ordinary Watercourse Consents, and ensure the works are carried out in accordance with requirements	Structures & Watercourses	Ongoing	LLFA
Carry out routine and reactive maintenance of highway drainage assets	Highway Services	Ongoing	Highway Services
Carry out routine and reactive maintenance of land drainage features in parks	Parks	Ongoing	Parks
Maintain the flood risk management asset register	Structures & Watercourses	Ongoing	LLFA
Carry out planned maintenance of Council owned assets	Structures & Watercourses	Ongoing	Borough capital

Ensure that privately owned, non-main river assets are adequately maintained, through the use of enforcement action where necessary	Structures & Watercourses	Ongoing	LLFA
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Objective 3 – Flood Risk and Development

Action	Lead	Timescale	Funding
Apply the National Planning Policy Framework policies on flood risk and the local flood risk policies in Enfield's Local Plan	Development Management Structures & Watercourses	Ongoing	Planning LLFA
Require use of sustainable drainage techniques for all new development in accordance with local and national policies	Development Management Structures & Watercourses	Ongoing	Planning LLFA
Prioritise the use of green infrastructure SuDS to achieve multiple benefits	Structures & Watercourses	Ongoing	LLFA
Develop and publish Enfield SuDS Guide	Structures & Watercourses	2016	LLFA

Objective 4 – Reduce Runoff Rates

Action	Lead	Timescale	Funding
Identify and implement opportunities to retrofit Sustainable Drainage Systems	Structures & Watercourses	Ongoing	Refer to section on Objective 4
Provide detailed SuDS information in Enfield's Streetscape Policy and Guidance document	Structures & Watercourses	2016	LLFA
Retrofit SuDS measures in schools and link to educational opportunities	Structures & Watercourses	Ongoing	Refer to section on Objective 4

Promote Natural Flood Management techniques in Enfield	Structures & Watercourses Parks Property Services	Ongoing	LLFA
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Objective 5 – Protect Existing Properties from Flooding

Action	Lead	Timescale	Funding
Continue programme of work to identify and test possible flood alleviation schemes across the borough	Structures & Watercourses	2016 to 2020	FDGiA Local Levy LLFA
Implement schemes where the economic assessment of costs and benefits demonstrates that the proposals are feasible	Structures & Watercourses	2016 to 2020	FDGiA Local Levy Borough capital
Identify and maximise opportunities to achieve multiple benefits, including water quality, biodiversity, river restoration and amenity benefits, through the implementation of flood alleviation schemes	Structures & Watercourses	2016 to 2020	FDGiA Local Levy Borough capital

Objective 6 – Preparedness and Resilience

Action	Lead	Timescale	Funding
Identify properties where an acceptable standard of protection cannot be achieved	Structures & Watercourses	2018	LLFA
Promote Community Flood Plans and Business Continuity Plans where significant residual flood risk exists	Emergency Planning	Ongoing	Emergency Planning

Promote individual property protection measures including flood resistance and resilience measures where significant residual flood risk remains	Structures & Watercourses Emergency Planning	Ongoing	Government grant (where available) Housing Private
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Objective 7 – Emergency Response to Flooding

Action	Lead	Timescale	Funding
Apply the emergency response measures described in the Multi-Agency Flood Plan	Emergency Planning	Ongoing	Emergency Planning
Review the Multi-Agency Flood Plan with respect to surface water	Structures & Watercourses	2018	LLFA
Encourage residents and businesses in flood risk areas to sign up to the Environment Agency's Floodline Warnings Direct service and/or Enfield Council's CommunitySafe system	Emergency Planning	Ongoing	Emergency Planning
Continue to improve network of remote flood monitoring equipment and CCTV cameras, make this information publicly available where possible	Structures & Watercourses	Ongoing	Borough capital

Objective 8 – Partnership

Action	Lead	Timescale	Funding
Continue to actively engage in the Drain London Forum to contribute to a coordinated London-wide approach to flood risk management	Structures & Watercourses	Ongoing	LLFA
Continue to hold Flood Working Group meetings	Structures & Watercourses	Ongoing	LLFA

Action	Lead	Timescale	Funding
Work with the Environment Agency to deliver flood alleviation schemes, and improve knowledge and understanding of flood risk	Structures & Watercourses	Ongoing	FDGiA Local Levy LLFA
Work with Thames Water to identify opportunities for jointly funded projects	Structures & Watercourses	Ongoing	Thames Water LLFA
Provide utility and transport companies with the latest available information on flood risk so they can assess the potential impact on their infrastructure and build resistance and resilience to flooding where necessary, ensuring a prompt recovery following a flood incident	Structures & Watercourses Emergency Planning	Ongoing	LLFA
Work with transport companies to identify opportunities for jointly funded projects	Structures & Watercourses	Ongoing	Transport companies LLFA

5.0 Strategy Monitoring and Review

- 5.1 This section describes how and when the strategy will be reviewed.

Public Consultation

- 5.2 The Local Flood Risk Management Strategy has been subject to public consultation. This was carried out in 2015 by publishing the draft document on the Council website and providing paper copies at public buildings including the Civic Centre and libraries. The strategy was also publicised at community events such as Ward Forums, Friends of Parks meetings and other relevant public meetings.

Approval Process

- 5.3 The Local Flood Risk Management Strategy has been considered and approved by the Cabinet Member for Environment.

Governance and Monitoring

- 5.4 Implementation of the strategy will be overseen by the Flood Working Group. The Flood Working Group is chaired by the Assistant Director for Planning, Highways and Transportation and includes representation from Highway Services, Emergency Planning, Development Management and Parks.

Review

- 5.5 The strategy is a live document and will be reviewed periodically to reflect advances in the understanding and assessment of flood risk, and emerging policy at national and local levels.

6.0 Wider Environmental Objectives

- 6.1 This section describes how the strategy contributes to wider environmental objectives. The following objectives have been developed based on a review of related documents (such as Enfield's Local Plan) and an assessment of the environmental issues associated with flood risk management activities.

Wider Environmental Objectives

1. **Protect historic landscapes and heritage** – there are a number of historic landscapes and structures in Enfield. Many of these are protected by flood risk management infrastructure; some, such as Grovelands Park Lake, the House Pond at Forty Hall and Clarendon Arch on the New River, form part of that infrastructure. Objectives 1 and 2 in this strategy contribute to the protection of these valued assets
2. **Protect and enhance biodiversity** – the wider use of sustainable drainage and natural flood management techniques promoted under Objectives 3 and 4, and the aim to maximise opportunities to improve biodiversity through habitat creation under Objective 5, contribute to the protection and enhancement of biodiversity
3. **Improve water quality and resources** – water bodies in densely populated areas such as Enfield suffer from increased levels of pollution. The wider use of sustainable drainage and natural flood management techniques (Objectives 3 and 4) contribute to improved water quality in rivers and streams and help to protect this invaluable natural resource
4. **Enhance and restore the river corridor** – the requirement to identify and implement opportunities to restore rivers and streams as part of flood alleviation measures (Objective 5) contributes to this objective
5. **Adapt to the impacts of climate change** – climate change is expected to lead to more extreme weather events; protecting existing properties from flooding and increasing resilience to flooding (Objectives 5 and 6), help adapt to the impacts of climate change
6. **Minimise impact of construction on the environment** – by maintaining existing flood defences (Objective 2), prioritising sustainable flood risk management measures (Objectives 3 and 4), improving the standard of protection to existing properties and contributing towards the achievement of sustainable development through other measures (Objective 5); this strategy contributes to a reduction in the impact of construction works on the wider environment

Glossary

Climate change Long-term variations in global temperature and weather patterns, recent predictions suggest that climate change will lead to an increase in the frequency and intensity of storms that cause river and surface water flooding

Community Flood Plan A plan describing actions to be taken in the event of flooding for a specific community, see Environment Agency [guide](#) for further information

Ecosystem services The benefits people obtain from ecosystems such as food, water, flood control and recreation

Flood Forecasting Centre A working partnership between the Environment Agency and Met Office that provides forecasts for all natural forms of flooding

Flooding Inundation by water that causes damage to property or disruption to services

Green infrastructure A network of multi-functional green space capable of delivering a wide range of environmental and quality of life benefits

Greenfield runoff rate The rate of runoff that would occur from a site in its undeveloped (and therefore undisturbed) state

Groundwater Water in the saturated zone of the ground below the water table, prolonged wet periods cause the water table to rise which can lead to water seeping out of the ground unexpectedly

Main rivers A watercourse designated on a statutory map maintained by Defra

Natural Flood Management The alteration, restoration or use of landscaped features to slow runoff rates and reduce flood risk downstream

Ordinary watercourses A watercourse that is not a designated main river, a private drain or a public sewer

Rain Garden Small detention basins in green spaces that are designed to temporarily store rainfall runoff and increase infiltration, they can be planted with a wide variety of vegetation capable of tolerating wet and dry conditions

Sustainable drainage system A sequence of management practices and control features that are designed to drain surface water in a more sustainable manner than conventional techniques by increasing storage and infiltration, and slowing down the rate of runoff

Sustainable development Development which meets the needs of the present without compromising the ability of future generations to meet their own needs

Urban creep The process whereby the impermeability of the urban area increases over time, mainly due to modifications to individual properties

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Appendix 1 – Legislative Context

Pitt review

The extreme flooding that occurred during the summer of 2007 highlighted the lack of effective management of local flood risk in the UK. This led to publication of the Pitt Review 'Learning Lessons from the 2007 Floods' in December 2008. This report identified that much of the flooding was caused by local sources, such as surface water, rather than river or coastal flooding which have traditionally been the focus of strategic flood risk planning. The review recommended giving local authorities responsibility for coordinating measures to minimise flood risk in their areas.

Flood Risk Regulations 2009

These regulations designate local authorities, such as Enfield, as Lead Local Flood Authorities with new duties including the requirement to:

- Prepare a preliminary flood risk assessment by June 2011, for publication by the Environment Agency in December 2011, showing the probability of flooding and consequences for human health, the environment, cultural heritage and economic activity
- Prepare flood risk maps and flood hazard maps by June 2013, for publication by the Environment Agency in December 2013
- Prepare a flood risk management plan for areas which are at significant risk of flooding by June 2015, for publication by the environment Agency in December 2015

Flood and Water Management Act 2010

This Act gives Lead Local Flood Authorities the following responsibilities relating to the management of local flood risk:

- Develop, maintain, apply and monitor a strategy for local flood risk management in its area, the strategy must specify:
 - The risk management authorities in the authority's area
 - The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area
 - The objectives for managing local flood risk
 - The measures proposed to achieve those objectives
 - How and when the measures are expected to be implemented
 - The costs and benefits of those measures, and how they are to be paid for
 - The assessment of local flood risk for the purpose of the strategy
 - How and when the Strategy is to be reviewed
 - How the strategy contributes to the achievement of wider environmental objectives

- Investigate flooding incidents and report on the findings
- Establish and maintain a register of structures or features which, in the opinion of the authority, are likely to have a significant effect on flood risk in its area, and a record of information about each of those structures or features, including information about ownership and state of repair
- Aim to make a contribution towards the achievement of sustainable development in the discharge of its flood risk duties
- Designate structures or features that affect flooding as designated flood defences which cannot then be altered without consent

Civil Contingencies Act 2004

Local authorities have 7 duties under the Civil Contingencies Act 2004:

- To operate with other local responders to enhance coordination and efficiency
- Ensure information is shared with local responders to enhance coordination
- Carry out risk assessments
- Have emergency plans in place
- Have business continuity management arrangements in place
- Have arrangements in place to warn and inform the public in the event of an Emergency
- Provide advice and assistance to businesses and voluntary organisations regarding business continuity management

Multi Agency Flood Plan

This document describes the roles of the different organisations involved in planning for and responding to severe flood incidents.

National Planning Policy Framework

The National Planning Policy Framework (NPPF) was introduced in 2012 and provides Government guidance on planning. It includes national flood risk policies that describe how flood risk is managed in relation to new development.

Local Plan

The Local Plan for Enfield was adopted in 2014, it sets out the vision for shaping Enfield and contains the policies by which planning decisions will be made. These include policies that set out Enfield's approach to managing local flood risk from new development – avoiding inappropriate development in flood risk areas, ensuring that new development is safe from flooding and does not increase flood risk outside of the development site by increasing runoff or displacing flood water.

Appendix 2 – Flood Risk Management Authorities

The table below describes the functions and responsibilities of the Risk Management Authorities that operate in Enfield, as defined by the Flood and Water Management Act 2010.

Authority	Function	Responsibilities
Enfield Council	LLFA	Strategic role in overseeing the management of local flood risk including responsibility for: <ul style="list-style-type: none"> • Preparing and applying a Local Flood Risk Management Strategy • Investigating flood incidents • Maintaining a register of flood risk management assets • Designating appropriate flood assets
Enfield Council	Local Planning Authority	Ensuring that new development is safe from flooding and does not increase flood risk elsewhere
Enfield Council	Category 1 responder	Ensuring that systems and processes are in place to provide emergency response to flooding
Enfield Council	Highway Authority	Duty to maintain the highway including responsibility for drain and gully maintenance on non-strategic roads
Environment Agency	Strategic role	National strategic responsibility for overseeing flood risk actions with regard to the Flood Risk Regulations 2009 and the Flood and Water Management Act 2010
Environment Agency	Operational role	Responsible for overseeing maintenance of flood defences such as the River Lee Flood Relief Channel Management of flooding from reservoirs, main rivers and the sea Advisory Emergency Planning role in assessment of Multi Agency Flood Plans Advisory Planning role in assessment of flood risk associated with planning policy and development

Authority	Function	Responsibilities
Thames Water	Sewerage undertaker	Responsible for provision and maintenance of the sewer network Upgrade of sewer network to facilitate increased drainage capacity requirements
Transport for London	Transport infrastructure provider	Responsible for provision and maintenance of strategic road network and London Underground and bus networks ensuring their resilience to flood risk
Highways Agency	Transport infrastructure provider	Responsible for provision and maintenance of the M25 motorway, which follows the northern boundary of Enfield, ensuring its resilience to flood risk
Neighbouring boroughs	LLFAs	Strategic role in overseeing the management of local flood risk in their areas and liaison with other LLFAs affected

The following key partners are not formally defined as Risk Management Authorities but nevertheless play critical roles in the management of flood risk in Enfield.

Authority	Function	Responsibilities
Canal and Rivers Trust	Watercourse management	Operation of the Lee Navigation which runs along the eastern boundary of Enfield
Network Rail London Underground	Transport infrastructure providers	Responsible for provision and maintenance of railway network and their resilience to flood risk
Greater London Authority	Drain London	Facilitation of co-ordinated working on flood risk across London including provision of guidance and information
Businesses and residents	Property owners	Responsible for flood resistance and resilience, and emergency and contingency planning associated with properties
Utility companies	Utility providers	Responsible for provision and maintenance of utility infrastructure – electricity, gas telecommunications, etc and ensuring its resilience to flood risk
Emergency Services	Emergency response	Responsible for minimising the impact of extreme flood events and responding to emergency situations

Appendix 3 – Flood Risk Management Programme

Enfield Council manages a continuous programme of sustainable measures to reduce risks and protect properties and businesses, as discussed under Objective 5. This programme addresses high-risk flood areas including Critical Drainage Areas defined in the SWMP. It also highlights locations where opportunities exist to deliver flood risk management measures through the implementation of other projects, such as large re-development proposals and regeneration schemes, or improvements to parks and highways.

This approach recognises that almost everywhere in Enfield is either in a flood risk area or drains towards an area at risk of flooding. High-risk areas are prioritised first.

The table below outlines a wide range of potential flood alleviation or sustainable drainage schemes that have been identified. The proposals are at different stages of development. Flood risk modelling and economic assessment have been carried out for some. Others have currently only been identified as requiring further investigation. Whether or not measures go ahead in the future will depend on the outcome of these proposed studies.

Abbreviations

Benefits:

- FR – flood risk
- WQ – water quality
- Am – amenity
- Bio – biodiversity
- RR – river restoration

Potential funding:

- LBE – London Borough of Enfield
- FDGiA – Flood Defence Grant in Aid
- Redev – redevelopment
- GLA – Greater London Authority
- Regen – regeneration
- TW – Thames Water

Timeframe:

- Short – 1-2 years
- Medium – 3-5 years
- Long – more than 5 years

Location	Description	Benefits	Potential Funding	Timeframe	Lead Organisation	Other Stakeholders	Comments
Albany Park	River restoration and creation of flood storage area, opportunity to enhance public space	FR WQ Am Bio RR	FDGiA LBE	Medium	LBE	EA Friends of Albany Park	Requires feasibility study and public consultation
Alma Road	Opportunity to implement SuDS measures during redevelopment proposals	FR WQ Am Bio	Redev GLA	Short	Developer	LBE Alma Primary School	In progress
Angel Gardens	Creation of overland flow route from Montagu Road into GNER Ditch, restoration of ordinary watercourse	FR WQ Am Bio RR	Regen	Short	LBE	Local residents	In progress
Arnos Park	River restoration and creation of flood storage area	FR WQ Am Bio RR	FDGiA LBE	Long	LBE	EA Friends of Arnos Park	Impact on park requires careful consideration
Boxers Lake	Modify spillway and increase flood storage	FR	LBE	Long	LBE	Local residents	Feasibility study required
Bounces Road	Opportunity to create rain gardens on open space adjacent to residential properties	FR WQ Am Bio	LBE	Long	LBE	Local residents	Requires feasibility study and public consultation
Broomfield Park	Potential to enhance existing ponds, create wetlands and flood storage area	FR WQ Am Bio	LBE	Long	LBE	Friends of Broomfield Park	Requires feasibility study and public consultation

Location	Description	Benefits	Potential Funding	Timeframe	Lead Organisation	Other Stakeholders	Comments
Bury Lodge Wetlands	River restoration and creation of wetlands/flood storage area	FR WQ Am Bio RR	EA LBE	Short	LBE	EA Thames21 Friends of Bury Lodge Park	In progress
Bullsmoor Lane	Flood risk identified in SWMP, flood risk management measures to be identified and implemented	FR	FDGiA LBE	Medium	LBE	Local residents	Detailed investigation of surface water flood risk in progress
Chase Farm Hospital	Opportunity to implement widescale SuDS measures during re-development proposals	FR WQ Am Bio	Redev	Medium	Developer	LBE NHS	In progress
Chase Green	Potential to create wetlands and/or flood storage area upstream of New River Loop	FR WQ Am Bio	LBE TW	Medium	LBE	Thames Water Friends of Chase Green	Requires feasibility study and public consultation
Deephams Sewage Treatment Works	River restoration and creation of flood conveyance route	FR WQ Bio RR	TW	Short	Thames Water	LBE	In progress
Edmonton Green Salmons Brook De-culverting	De-culvert Salmons Brook alongside The Broadway	FR WQ Am Bio RR	Regen	Medium	LBE	EA Local residents and businesses Network Rail	Requires feasibility study and public consultation

Location	Description	Benefits	Potential Funding	Timeframe	Lead Organisation	Other Stakeholders	Comments
Enfield Golf Club	Investigate feasibility of creating flood storage ponds within golf course	FR WQ Am Bio	FDGiA EA	Short	Enfield Golf Club	LBE EA	Requires feasibility study
Enfield Grammar School	Creation of flood storage area and pond/wetlands, flood risk identified in SWMP	FR WQ Am Bio	FDGiA LBE	Short	LBE	Enfield Grammar School	Feasibility study underway
Enfield Town Park	Creation of flood storage area plus enhancement of existing pond and wetlands, identified in SWMP	FR WQ Am Bio	FDGiA LBE	Short	LBE	Friends of Town Park	Feasibility study underway
Enfield Town SuDS	Retrofit SuDS measures to car parks, highway and school playground, identified in SWMP	FR WQ Am Bio	FDGiA LBE	Medium	LBE	Local residents and businesses	Feasibility study underway
Firs Farm Wetlands	River restoration and creation of wetlands/flood storage area, flood risk identified in SWMP	FR WQ Am Bio RR	FDGiA LBE TW GLA	Short	LBE	EA Thames21 Friends of Firs Farm	In progress
Forty Hall East Weir	Opportunity to restore heritage feature and create flood storage area	FR	LBE	Long	LBE	EA Friends of Forty Hall	Requires feasibility study
Glenbrook Wetlands	Investigate opportunities to enhance wetlands and flood storage	FR WQ Am Bio	T21	Short	Thames21	LBE Local residents	Opportunity to create additional capacity

Location	Description	Benefits	Potential Funding	Timeframe	Lead Organisation	Other Stakeholders	Comments
Gough Park	Create overland flow route towards New River (Old Course)	FR WQ Am Bio	FDGiA LBE	Short	LBE	Park users	Existing habitat requires careful consideration
Green Lanes	Flood risk identified in SWMP, create rain gardens and enhanced conveyance features	FR WQ Am Bio	FDGiA LBE	Medium	LBE	TfL Local residents	Detailed investigation of surface water flood risk in progress
Grovelands Park	Investigate opportunities to enhance wetlands and flood storage area	FR WQ Am Bio RR	T21	Short	Thames21	LBE Friends of Grovelands Park	Requires feasibility study and public consultation
Halstead Road	Opportunity to create rain gardens on highway verge	FR WQ Am Bio	FDGiA LBE	Medium	LBE	Local residents	Requires feasibility study and public consultation
Hamilton Crescent	Flood risk identified in SWMP, flood risk management measures to be identified and implemented	FR	FDGiA LBE	Medium	LBE	Local residents	Detailed investigation of surface water flood risk required
Hazelbury School	Consider opportunity to de-culvert watercourse within school grounds and create wetlands/flood storage area	FR WQ Am Bio RR	FDGiA LBE	Long	LBE	Hazelbury School	Requires feasibility study and public consultation
Hertford Road SuDS	Opportunity to retrofit further green infrastructure SuDS along Hertford Road following successful 2014 regeneration works	FR WQ Am Bio	LBE Regen	Medium	LBE	Local residents and businesses	Requires feasibility study and public consultation

Location	Description	Benefits	Potential Funding	Timeframe	Lead Organisation	Other Stakeholders	Comments
Houndsden Gutter The Spinney	Opportunity to create rain gardens on highway verge, consider creation of wet woodlands	FR WQ Am Bio	T21	Medium	LBE	Thames21 Local residents	In progress
Lee Valley Golf Course	Consider diversion of Brimsdown Ditch and/or Lee Navigation into lake during flood events	FR WQ Am Bio	FDGiA LBE	Long	LBE	EA Lee Valley Golf Club	Requires feasibility study and public consultation
Meridian Water	Opportunity to implement widescale SuDS measures during re-development proposals	FR WQ Am Bio	Redev	Medium	Developer	LBE EA	Requires feasibility study and preliminary design
Montagu Road	Opportunity to enhance connectivity between Saddlers Mill Stream and Goodwin Road culvert	FR	FDGiA LBE	Medium	LBE	EA	Requires feasibility study
Montagu Road Recreation Ground	Excavation within recreation ground would increase flood storage volume and improve standard of protection	FR	FDGiA LBE	Long	LBE	EA Park users	Requires feasibility study and public consultation
New Avenue	Opportunity to implement SuDS measures during redevelopment proposals	FR WQ Am Bio RR	Redev	Short	Developer	LBE	In progress
New River Loop	Opportunity to divert surface water runoff into New River Loop at Bush Hill Golf Course	FR WQ Am Bio	LBE TW	Medium	LBE	Bush Hill Golf Club Thames Water	Requires feasibility study

Location	Description	Benefits	Potential Funding	Timeframe	Lead Organisation	Other Stakeholders	Comments
Painters Lane Ditch	Potential to restore watercourse and create flood storage areas	FR WQ Am Bio RR	LBE	Long	LBE	-	Requires feasibility study
Prince of Wales Open Space	Opportunity to create SuDS features near confluence of Turkey Brook and Small River Lea and create rain gardens on Mollison Avenue verge	FR WQ Am Bio	LBE	Short	LBE	Park users Prince of Wales School	Requires feasibility study and public consultation
Pymmes Park Flood Alleviation Scheme	Investigate potential to alleviate flood risk to north-east by diverting flows towards Pymmes Park Lake	FR	FDGiA LBE	Medium	LBE	Friends of Pymmes Park	Requires feasibility study and public consultation
Pymmes Park Wetlands	Creation of wetlands, flood storage could be enhanced by modifying spillway	FR WQ Am Bio	LBE	Short	LBE	Thames21 Thames Water Friends of Pymmes Park	In progress
Riverside Park	Creation of wetlands/flood storage area on Saddlers Mill Stream	FR WQ Am Bio RR	LBE	Long	LBE	Park users	Requires feasibility study and public consultation
Shooters Road	Flood risk identified in SWMP, flood risk management measures to be identified and implemented	FR	FDGiA LBE	Medium	LBE	Local residents	Detailed investigation of surface water flood risk required
Trent Park	Investigate opportunities to create small flood storage areas	FR	LBE	Medium	LBE	Friends of Trent Country Park	Requires feasibility study and public consultation

Location	Description	Benefits	Potential Funding	Timeframe	Lead Organisation	Other Stakeholders	Comments
Trent Park Golf Course	Opportunity to create flood storage area on Merryhills Brook	FR	LBE	Long	LBE	Trent Park Golf Club	Requires feasibility study
Whitewebbs Golf Course	Construct flood defence by raising access road across floodplain by 1.0m	FR	FDGiA LBE	Medium	LBE	Whitewebbs Golf Club	Requires feasibility study and public consultation
Whitewebbs Park	Potential for additional flood storage schemes within the park	FR	LBE	Long	LBE	Park users	Requires feasibility study and public consultation
Painters Lane Pumping Station	Determine standard of protection to underpass	FR	LBE	Medium	LBE	TfL	Flood risk assessment required
Picketts Lock Pumping Station	Determine standard of protection to underpass	FR	LBE	Medium	LBE	TfL	Flood risk assessment required
A406/A10 Pumping Station	Determine standard of protection to underpass	FR	TfL	Medium	TfL	LBE	Flood risk assessment required
Fore Street Pumping Station	Determine standard of protection to underpass	FR	TfL	Medium	TfL	LBE	Flood risk assessment required
Holmesdale Tunnel	Determine standard of protection to underpass	FR	HA	Medium	Highways Agency	LBE	Flood risk assessment required