

# MUNICIPAL YEAR 2013/2014 REPORT NO. 233

## MEETING TITLE AND DATE:

Cabinet – 9th April 2014

## REPORT OF:

Director - Regeneration &  
Environment

Agenda – Part: 1

Item: 10

**Subject: Management of Flood Risk to  
Protect Residents and Businesses in  
Enfield.**

**KD No: KD 3885**

**Wards: All**

**Cabinet Member consulted: Cllr Chris  
Bond**

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## 1. EXECUTIVE SUMMARY

This report describes the extent and range of activities undertaken by Enfield Council and its partners to protect residents and businesses from flooding both locally and to those areas downstream that could potentially be affected by runoff from Enfield, it also considers the impact of flood risk management measures in areas further upstream that drain into Enfield.

## 2. RECOMMENDATIONS

- 2.1 That Enfield Council continues to support the actions described in this report to manage flood risk and reduce it where possible.
- 2.2 That Council note the additional investment in flooding mitigation measures during the last few years and note the continued investment outlined in the Highways Capital Programme.
- 2.3 To support the ongoing use of Council capital and other external funding streams identified for flood mitigation, maintenance and monitoring works including the development of a programme for the planned extension of CCTV cameras and monitoring equipment to critical locations in order to assess flooding risk during storm events.

### **3. BACKGROUND**

- 3.1 This report describes the extent and range of activities undertaken by Enfield Council and its partners to reduce flood risk both locally and to those areas downstream that could potentially be affected by runoff from Enfield.
- 3.2 The primary sources of flooding in Enfield are main rivers and surface water. There are three main rivers that flow across Enfield towards the River Lee on the eastern side of the borough – Turkey Brook, Salmons Brook and Pymmes Brook. Surface water flooding occurs when intense rainfall generates runoff that overwhelms the drainage system leading to ponding and overland flows. Further sources of flooding include sewers, groundwater and flooding from ordinary watercourses.
- 3.3 The Environment Agency manages flooding from main rivers while Thames Water is responsible for public sewers. The Flood and Water Management Act 2010 defines Enfield Council as a Lead Local Flood Authority (LLFA) with responsibilities for the management of all forms of local flood risk including surface water, groundwater and ordinary watercourses.
- 3.4 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. The number of properties at risk of flooding in Enfield is one of the highest in the country – this is based on the risk of existing defences being overwhelmed for a 1 in 100 year flood event. For such an event it is estimated that 10% of the total area of Enfield would be flooded. This would affect just over 5,000 properties, which is 4% of the total number in the borough, most of these are in the Lee valley. 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 channelled rivers, floodwalls and flood storage areas.
- 3.5 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 over 200 properties in Edmonton were flooded by Salmons Brook. Recently, many areas of the UK have been affected by flooding. In general each of these storms has not been extreme enough to cause flooding in their own right. Large catchments such as the River Thames have very prolonged response times and consequently repeated storms of this nature can lead to a build-up of flows that eventually cause flooding. However, the river catchments in Enfield are far smaller and therefore less vulnerable to rainfall of this nature.
- 3.6 Maintenance to keep flood risk at existing levels is a continuous process, partly to ensure they are in a serviceable condition, but also because the risk of flooding is increasing due to climate change and urban creep. In addition,

opportunities to reduce flood risk further are continually being sought. This is now feasible because of the availability of new techniques such as the computational hydraulic modelling. Applying these techniques as part of Enfield's Surface Water Management Plan has improved our understanding of flood risk across the borough; this allows identification of the highest risk areas and provides tools to evaluate the most effective flood risk management measures.

- 3.7 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 almost certainly outweigh the cost of continuing to manage flood risk.
- 3.8 It is recommended that Enfield Council continues to support the actions described in this report to manage flood risk and reduce it where possible.

### **Flood Risk Management Activities**

- 3.9 In partnership with risk management authorities, such as the Environment Agency and Thames Water, Enfield Council carries out a wide range of activities to manage flood risk. Enfield Council is an active member of organisations that facilitate partnership working such as Drain London and the London Drainage Engineers Group (LoDEG). Enfield staff meet regularly with neighbouring boroughs to ensure ongoing projects provide complimentary mitigation and share best practice. Within Enfield the Flood Working Group meets every three months 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.
- 3.10 Enfield has retained a team of Engineers with expertise in drainage and flood risk within Highway Services, which is partly a reflection of the fact that Enfield has more watercourses than any other London Borough. Since implementation of the Flood and Water Management Act, all London Boroughs have created a flood risk role or team of some form. Enfield has benefited from the continuity of service, experience and local knowledge of officers derived by maintaining an existing team with expertise in this field. This has enabled Enfield to be at the forefront of the recent changes to local flood risk management setting an example for neighbouring boroughs in many areas such as asset management and emergency planning procedures.

### **Routine and Reactive Maintenance**

- 3.11 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, the Council's contractors aim to clean each of these once a year (twice a year on Principal Roads). The Council's contractors aim to respond within 2 hours to

unplanned reactive gully cleaning required to alleviate flooding problems on the highway.

- 3.12 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. The Highways Services Contractor carries out unscheduled cleaning when blockages or other issues are reported. 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. Where properties or business are threatened by flooding, Enfield's Emergency Management 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 supply of sandbags for the purpose of protecting critical infrastructure. Enfield Council continue to review contingency arrangements for flooding situations including the use of alternatives to sandbags such as temporary flood barriers and aqua-sacs.
- 3.13 Parks Operations staff also undertake routine and reactive maintenance of drainage features such as grilles and drains.

### **Emergency Planning Procedures**

- 3.14 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 (MAFP). This document was prepared by Enfield's Emergency Planning Team in 2010 in partnership with a number of external agencies including the Metropolitan Police, the London Fire Brigade and the Environment Agency. The MAFP also includes a risk assessment for critical infrastructure across the borough, this ensures that the risks are well understood and can be managed accordingly.
- 3.15 Council officers in the Emergency Planning and Structures and Watercourses teams monitor Flood Warnings issued by the Flood Forecasting Centre. 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.
- 3.16 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.

3.17 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.

3.18 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. It 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, fortunately the risk of failure is extremely low – the annual probability is estimated to be less than 1 in 10,000.

### **Planning Policy and Development Management**

3.19 Planning policy and development management play a key role in managing flood risk by ensuring that new developments are not built in flood risk areas and that they do not exacerbate flood risk elsewhere by increasing surface water runoff from hard-standing areas. This is achieved by implementing the policies and recommendations made in the Strategic Flood Risk Assessment, (2008) and the Surface Water Management Plan (2012).

3.20 These policies have been encapsulated in the Development Management Document. This is now part of the Council's Local Development Framework.

3.21 New developments, in particular the re-development of brownfield sites, provide opportunities to reduce overall flood risk, principally through the use of Sustainable Drainage Systems (SuDS) and 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 out dated techniques that rely on hard defences such as concrete walls and channels.

3.22 The Development Management Document includes policies that require all new developments to use SuDS. 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.

- 3.23 Although the implementation of SuDS can be more challenging in some respects, this is primarily 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.
- 3.24 The Flood and Water Management Act 2010 includes requirements for all new developments to use SuDS. It is proposed that local authorities such as Enfield will be designated as SuDS Approval Bodies (SAB) and will approve and adopt the SuDS. Although this element of the Act is yet to be implemented by the Government it is anticipated that it will come in to effect during 2014.

### **Asset Management**

- 3.25 The Flood and Water Management Act 2010 also requires LLFAs such as Enfield to establish and maintain a register of flood risk management assets. Enfield has been at the forefront of implementing this new requirement through close involvement with LoDEG in the development of Flood Station. This new, web-based software allows LLFAs to record information about assets including ownership and condition. It will also have a facility for recording information about maintenance requirements, critical infrastructure and flood incidents.
- 3.26 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, potentially saving money as well as reducing risks to property and infrastructure, individuals and communities.

### **Recent and Ongoing Works**

- 3.27 Enfield Council has carried out a number of flood alleviation schemes in recent years, some of which have been initiated in response to recent flood events. For example, the exceptionally high rainfall experienced in the latter half of 2012 identified a number of locations on Enfield's highway network that were vulnerable to flooding, these included key roads such as The Ridgeway, Whitewebbs Lane and Meridian Way. In response to this, a series of projects were undertaken in 2013 to increase the resilience of the highway drainage systems serving these roads. Though it is recognised that further work is still required, the measures implemented to date have performed well during the recent wet period.
- 3.28 In 2012 works to improve the safety of two statutory reservoirs that are owned by the Council were carried out in Grovelands Park and Trent Park. These works were designed in-house by the Structures and Watercourses team and required the construction of wide, open spillways in combination with

embankment raising works. The spillways allow extreme flood flows to pass over the reservoir embankments without the risk of erosion. If erosion did occur, the embankments could be destabilised and fail, which would lead to flooding of thousands of properties downstream. Both sites are ornamental lakes set in listed landscapes, hence it was necessary to design and implement a solution that would be in keeping with the character of the parks whilst meeting the requirements of the Reservoir Act 1975, this was generally considered to have been achieved very successfully at both sites.

- 3.29 Another change brought about by the Flood and Water Management Act 2010 is that LLFAs can now bid for Flood Defence Grant in Aid (FDGiA) funding and the local levy funding that is managed by Regional Flood and Coastal Committees (RFCCs) – previously both these were administered by the Environment Agency only. By submitting funding applications at the earliest stage possible, Enfield Council has been amongst the first local authorities to benefit from this new source of income attracting £200,000 in the first year. £55,000 of this funding has been allocated to support the Grovelands Park Flood Alleviation Scheme with further funding from Enfield Council's Structures and Watercourses budget. This scheme will restore over 200 metres of a watercourse within Grovelands Park that is currently buried underground and create flood storage areas that protect a number of properties downstream.
- 3.30 In 2013 Enfield carried out a drainage improvement scheme at Whitewebbs Golf Course. As well as protecting and enhancing an important Council owned asset, the works were designed to mitigate flood risk further downstream by incorporating storage features such as ditches and ponds. The excess spoil from the scheme was used to modify the floodplain within Whitewebbs Park thus storing more floodwater and increasing protection to populated locations such as the area around Turkey Street.
- 3.31 The Salmons Brook Flood Alleviation Scheme is the largest flood risk management scheme that is currently being constructed within London. This Environment Agency led scheme is due to be completed in 2015 and will reduce the risk of flooding to 2,000 properties in the Edmonton area.
- 3.32 Enfield Council has supported the scheme by providing land for flood storage at Cheney Walk Open Space and Montagu Road Recreation Ground. As part of a planned programme of works, Enfield Council de-silts culverts in the vicinity of Montagu Road to ensure that flood water is carried away from this high-risk area as efficiently as possible. The Council is now working with Thames Water as part of the Deephams Sewage Treatment Works re-development to ensure that this flow can continue through the site and make a significant contribution to the overall success of the Salmons Brook scheme.
- 3.33 Enfield Council is also currently working with Thames21 to implement the Salmons Brook Healthy River Challenge. The aim of the project is to develop techniques for reducing the impact of diffuse pollution that arises through urban land use. It will see the creation of up to six community centred bio-remediation and large-scale SuDS within the Salmons Brook catchment, demonstrating best practice and innovative techniques.

- 3.34 These SuDS will intercept diffuse urban pollution from surface water sewers before or close to where they discharge into open watercourses. They will also provide attenuation and create new areas of bio-diverse habitat and amenities for local people. One of the key aspects of the project is to work closely with Friends of Parks Groups, residents and other local organisations.

### **Communications**

- 3.35 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.
- 3.36 To supplement this service, the Council in partnership with the police provide a similar system known as CommunitySafe, which offers the opportunity for residents and businesses to register for an emergency warning and informing service. This service would cover a major incident only.
- 3.37 The Council also provides up to date information via its web-site and the local press to keep residents and businesses informed.

### **Future Work**

- 3.38 The Council published a Surface Water Management Plan (SWMP) in 2012. The SWMP identifies and prioritises areas of high flood risk, this involved flood risk modelling of the entire borough. It was developed as part of the Drain London project and provides the evidence that supports the Council's forthcoming Local Flood Risk Management Strategy. LLFAs are required by the Flood and Water Management Act 2010 to develop, maintain, apply and monitor a strategy for local flood risk management. There is no specific timeframe for this exercise nevertheless it is proposed to develop and implement this strategy during 2014.
- 3.39 Many of the actions recommended by the SWMP are already underway. In the last two years detailed modelling studies have been carried out for a number of Critical Drainage Areas in the borough. These studies extend the SWMP by analysing high-risk areas in greater detail and identifying suitable flood risk management measures. Enfield has developed 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. Where flood risk is identified in densely built-up areas, SuDS measures can be retrofitted to existing buildings to reduce risks. In some cases measures to protect individual properties may be most appropriate. Enfield's use of CCTV cameras to monitor flood risk is planned to be increased to all high priority locations, the estimated cost of achieving this is £200,000. Additionally, Enfield Council continually monitors watercourses in



Enfield for build-up of silt and carries out dredging works at high risk locations when required.

- 3.40 Another option to reduce river 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 techniques that slow runoff rates can reduce flood risk downstream by increasing wooded areas and restricting the capacity of drainage channels. A small reduction in farmland is compensated for by enhanced biodiversity and management of water. As well as reducing the runoff that causes flooding, such techniques increase infiltration and reduce the impact of droughts. It is important to recognise that any upstream measures to store flood waters 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 and Meridian Water.

#### **4. ALTERNATIVE OPTIONS CONSIDERED**

The option of doing nothing is not considered appropriate as it would lead to increased flooding, threatening Enfield's residents and businesses.

#### **5. REASONS FOR RECOMMENDATIONS**

The recommendations are made to ensure that Enfield complies with statutory duties in relation to flood risk management – in particular the requirements set out in the Flood and Water Management Act 2010 to reduce the risk of flooding to private properties and businesses.

#### **6. COMMENTS OF THE DIRECTOR OF FINANCE, RESOURCES AND CUSTOMER SERVICES AND OTHER DEPARTMENTS**

##### **6.1 Financial Implications**

- 6.1.1 Funding streams for flood mitigation includes £200,000 Enfield Council capital funding per annum for watercourse maintenance. This has recently been supplemented by an additional £100,000 Enfield Council capital funding per annum for the maintenance of ditches and other drainage improvements.
- 6.1.2 In addition, The Council has successfully gained £220,000 per annum from Defra for its role as a Lead Local Flood Authority, but this is only guaranteed until 2014/15. Through Defra's Flood Defence Grant in Aid (FDGiA) funding and the Regional Flood and Coastal Committee, the Council received £191,000 in 2013/14 and has been awarded £175,000 in 2014/15. It is recommended that Enfield Council continue to seek this external funding until the programme of works described in the SWMP is fully implemented.

## **6.2 Legal Implications**

The recommendation is within the powers of the Council. The Council has statutory duties under the Highway Act 1980 and the Flood and Water Management Act 2010 in relation to flood prevention. In addition, the Civil Contingencies Act 2004 requires the Council to maintain arrangements to support the emergency services in responding to emergencies to protect life and prevent damage to the environment or communities.

## **6.3 Property Implications**

- 6.3.1 A number of the Flood Management measures and initiatives covered in this report have implications for the Council's property and landholdings, and the management and potential disposal of sites and buildings.
- 6.3.2 Significant areas of the eastern part of the Borough within the Lee Valley are located within Flood Zone 2 and 3, and consequently, the monitoring and Flood Management measures for existing property and new development proposals needs to take full account of the policies and recommendations set out in the Strategic Flood Risk Assessment and related studies. The regeneration of brownfield sites, such as Meridian Water, will provide opportunities to reduce overall flood risk, with the introduction of sustainable drainage systems, more permeable surfaces and soft landscaping, and specific areas for flood storage.
- 6.3.3 Other potential development sites and property disposals are likely to be affected by the sustainable drainage requirement stemming from the Flood and Water Management Act 2010, more detailed site specific flood assessment and other due diligence precautions. These investigations and measures will inevitably add to development costs, and may place restrictions on the development yield from sites. For properties generally, there will be higher insurance premiums across the board, and potential limitations on insurance cover in some of the areas at greatest risk of flooding.
- 6.3.4 The register of flood risk management assets, referred to in para 3.25 above, will be an important and useful resource to monitor the condition of critical infrastructure. It is understood this resource will be accessible to Property interests generally.

## **7. KEY RISKS**

The key risks to the Council are:

- Failure to comply with the new statutory duties set out by the Flood and Water Management Act 2010 and the Flood Risk Regulations 2009;
- Increased flood risk arising from failure to implement appropriate flood risk management policies at the local level, risks include damage to life and property, disruption to transport infrastructure and Council services.

## **8. IMPACT ON COUNCIL PRIORITIES**

### **8.1 Fairness for All**

Implementation of the new statutory duties set out by the Flood and Water Management Act 2010 and the Flood Risk Regulations 2009, and the actions recommended by the SWMP will help to ensure that Enfield's residents are not unnecessarily exposed to local sources of flood risk that could otherwise be mitigated.

### **8.2 Growth and Sustainability**

Adoption of appropriate flood risk and sustainable drainage policies will promote future developments that are safe from flooding and prevent increased flood risk elsewhere.

### **8.3 Strong Communities**

Future actions could include development of Community Flood Plans for areas that are at risk from local sources of flooding.

## **9. EQUALITIES IMPACT IMPLICATIONS**

Corporate advice has been sought in regard to equalities and an agreement has been reached that an equalities impact assessment/analysis is not relevant or proportionate for the approval of this report as no reduction in service is being proposed.

## **10. PERFORMANCE MANAGEMENT IMPLICATIONS**

The delivery programmes for works to mitigate flooding are monitored within Divisional and Service plans. The Council also has a Flood Working Group, chaired by Councillor Levy, which has an overview of flood mitigation undertaken by the Council and other agencies, in so far as their work affects the borough of Enfield.

## **11. PUBLIC HEALTH IMPLICATIONS**

Flooding has serious public health implications both in the short and long term. Efforts to prevent flooding are therefore of utmost importance to the borough. It will be imperative that the risk of flooding is constantly monitored, particularly given changing weather patterns.

## **Background Papers**

None.

## 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

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

**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 of main rivers maintained by Defra

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

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