

# Flooding



*A report of the Flooding Scrutiny Task Group*

**The London Borough of Hammersmith & Fulham**

**July 2012**

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# Foreword

Just like Noah's contemporaries in the flood legend, flooding is not something that seems obvious to most of us to worry about until it happens, or at least until we witness unmitigated rainfall the like of which we have seen this year. Yet when it does happen, it can cause a huge amount of damage. A lot of this damage is preventable, or at least there are ways to mitigate the risks, with the right drainage and household infrastructures in place, people can protect their homes and the local flood authorities can take the right strategic measures to alleviate flooding.

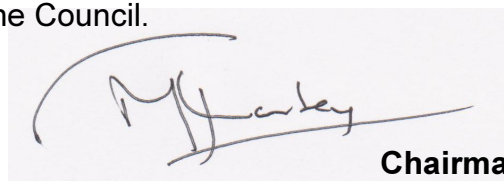
On a household level, this might mean preventing water flows into basement properties, making sure there is the right balance of porous and drainable surfaces or introducing other sustainable drainage and flooding local improvement projects (FLIPs). On a strategic level it might mean making sure that areas of high risk to flooding have been identified, making sure the sewer and drainage systems are fit for purpose, or making sure there is the right mix of drainable surfaces around the borough. Putting all these measures in place needs to be a joint effort between the statutory local flood authorities such as the Council and Thames Water, neighbouring local authorities and local residents, property developers and property management.

According to the Environment Agency, the recent deluges in April to June were the highest rainfall than at any time since 1910 when the first readings were made. The figure is just a fifth of an inch off the total for 2007, which was the wettest June on record dating back more than a century. Once more, global climate change may mean an increased risk of flooding in many parts of the British Isles into the future. So mitigating the risks of flooding as far as possible is an essential goal.

Hammersmith and Fulham Council, as the lead local flood authority, is responsible for the surface water management strategy. This does not include sewer drainage, which is the responsibility of Thames Water, and it does not include river flooding, which is managed separately. So this inquiry has focused on surface water management, working with partners and engaging local residents.

A significant amount of Hammersmith and Fulham is at risk of surface water and groundwater flooding. It is worth highlighting that six inches of fast flowing water can knock someone off their feet and two feet of water is enough to float a car. It is therefore of vital importance that the Council seek to mitigate the risks of surface and groundwater flooding in the borough.

The Task Group have outlined twenty recommendations to the Council in line with its terms of reference. I believe that all these recommendations have strong merit and I hope that this report will provide a useful contribution when given consideration by the Executive of the Council.



**Councillor Matt Thorley**  
**Chairman of the Scrutiny Task Group**

# Members of the Task Group

Councillor Matt Thorley (Chairman)

Councillor Lisa Homan (Vice Chairman)

Councillor Steven Hamilton

## Aims and Objectives

The aims and objectives of the Scrutiny Task Group were to consider:

- i. the key strategic priorities for flood risk management in the borough and
- ii. the appropriate communications with local residents for flood risk management.

The inquiry did not attempt to consider the operation details of flood risk management and instead focus upon the strategic priorities for flood risk planning and the key communications with local residents.

The Specific objectives of the Task Group were:

- ▶ provide feedback into the Local Flood Risk Management Strategy;
- ▶ provide feedback into the Surface Water Management Plan;
- ▶ Interview relevant stakeholders to obtain additional information on flood risk management within the borough;
- ▶ provide input into a plan for flood awareness campaign/public consultation; and
- ▶ review programme of works for 2011/12 and 2012/13 and associated spending.

# Executive Summary

The Flooding Scrutiny Task Group was commissioned by the Overview and Scrutiny Board on 7<sup>th</sup> December 2012, following a referral from the Environment and Residents Services Select Committee, to examine how the Council should discharge of its new responsibilities under the Flood and Water Management Act 2010 as the lead local flood authority for the borough.

The Terms of Reference for the Task Group inquiry were to consider the key strategic priorities for flood risk management in the borough and the appropriate communications with local residents for flood risk management. This has entailed consideration of the strategic objectives for flooding as outlined in the Surface Water Management Plan and other statutory responsibilities related to flood risk management, as well as engagement with the Council's lead partner agency Thames Water and with local residents through an initial consultation exercise and awareness campaign.

The Flooding Scrutiny Task Group met 8 times between January and July 2012 and reported to the Overview and Scrutiny Board on 24<sup>th</sup> July 2012. During the inquiry, the Task Group interviewed a wide range of stakeholders and expert witnesses. It has considered key documents and legislation, including the Flood and Water Management Act 2010, Flood Risk Regulations 2009 and the Surface Water Management Plan.

Witnesses to the Task Group have included the Cabinet Member for Environment and Asset Management (then Councillor Nicholas Botterill), the Head of Policy and Spatial Planning, the Head of Highways and Construction, the Flood Risk Manager the Highways Maintenance Manager, the Senior Environmental Policy and Projects Officer, the Environmental Quality Manager, and other Council officers, including officers from the Parks department.

The Task Group interviewed Simon Jones, Assistant Director-Communication, to discuss communications and engagement with local residents on flooding. Representatives from the Environment Agency, the Association of British Insurers, and representatives from Thames Water.

During the inquiry the Task Group also interviewed Josie Bateman, Project Manager (Flood and Water Management) from Northamptonshire County Council to obtain a perspective and best practice from another lead local flood authority, who was able to provide some useful advice on the relationship and information sharing protocols operating there, as well as a case study of resident engagement of flooding awareness and data collection for flood risk mapping.

The inquiry noted the results of the public consultation, which was promoted in the local media and Council publications and to which people were able to respond online with their views and experiences of local flooding problems. This report identifies the key themes for flood risk management under which its conclusions and recommendations are ordered: surface water and groundwater flood risk mapping, mitigating flood risk and sustainable drainage systems, engagement; information sharing and working together.

The Task Group has put forward 20 recommendations, which are detailed in this report, which also provide the context, findings and observations which it is hoped will be useful to informing the flood risk management strategy for the Council, working in partnership with its statutory partners, both other boroughs, neighbours to the borough and in the regional Drain London partnership and the main water utility company, Thames Water.

A key partner, which cannot be forgotten in the flooding strategy, is the general public, including home owners, landlords, businesses and other local residents who are responsible for managing their properties, who have a part to play in prevention and reporting of flooding of flooding problems. It is hoped that this Scrutiny Task Group has played a significant and useful part of the effort of promoting awareness and engagement with local residents on this issue.

The recommendations of the Task Group are summarised for reference in the next section, which also provides an initial estimate of any financial and resource implications which are anticipated. These implications are minimal and the recommendations are for the most part scoped within existing budgets and resources, whilst also identifying other potential areas of grant funding available for environmental projects linked to flood risk mitigation and environmental sustainability.

These recommendations are commended to Hammersmith and Fulham Council and to Thames Water for consideration.

## Summary of Recommendations

### **SURFACE WATER AND GROUNDWATER FLOODING: Mapping flooding risk**

#### **Recommendation One: Flood Risk Mapping**

**It is recommended that the Council seek to identify high risk flooding areas using historical data and by recording flooding events as they occur.**

#### *Financial & Resource Implications*

*It is proposed to commission an update to the Surface Water Management Plan and Strategic Flood Risk Assessment as a joint commission with the Royal Borough of Kensington and Chelsea (RBKC). The combined cost of the commission is anticipated at approximately £100k, of which it is anticipated H&F will be responsible for approximately £60k. These costs are currently estimates and will be updated upon receipt of tenders. The flooding budget will be used to cover these costs.*

*The work will be undertaken by external consultants, but will be managed by the in-house Flood Risk Manager at H&F and the relevant officer at RBKC.*

#### **Recommendation Two: The Flood Water Management Plan**

**It is recommended that the Council undertake a review of the current Surface Water Management Plan.**

### Financial & Resource Implications

*See Recommendation One.*

#### **Recommendation Three: Pooling Resources**

**It is recommended that the Council assess whether it would be appropriate to pool its resources with neighbouring Local Lead Flood Authorities, either on a pan-London basis or through the tri-borough arrangements, to ensure that the Council has sufficient technical expertise to enable it to discharge its responsibilities under the Flood Water Management Act and the Flood Risk Regulations.**

### Financial & Resource Implications

*There are no direct resource or financial implications for this recommendation, although if working with other authorities, costs may be incurred, although these are unclear at this stage.*

#### **MITIGATING FLOODING RISK: Sustainable drainage systems**

#### **Recommendation Four: Green Roofing**

**It is recommended that the Council approach the Department for Environment Food and Rural Affairs (DEFRA) to enquire about the availability of funding for a pilot programme using financial incentives to encourage the development of new or retrofitted green roofs on pre-selected sites.**

### Financial & Resource Implications

*There are sufficient in-house resources to apply for DEFRA funding to undertake the retrofitting of green roofs.*

*The financial implications would be dependant on the sites identified and are likely to include the cost of external consultants for design. The project could be managed by existing in house resources.*

#### **Recommendation Five: Flood Risk Assessments**

**It is recommended that the Council require planning applicants to provide a detailed flood risk assessment, placing a particular emphasis on any application for a basement development. This assessment should include an acknowledgement from the applicant that they understand surface water flooding risk and also require them to state what sustainable drainage systems (SUDs) they intend to incorporate into their development. If an applicant does not intend to incorporate any SUDs they should be required to explain why their development will not have any detrimental impact on surface water flooding in the borough.**

### Financial & Resource Implications

*No resource implications have been identified, should there be some financial implications however, these are unlikely to be significant and are difficult to quantify at this stage.*

### **Recommendation Six: Rainwater Retention**

**It is recommended that the Council assess what mechanisms it can introduce to either temporarily or permanently hold back rainwater, with a particular emphasis on limiting water flowing rapidly from the north of the borough to the south of the borough.**

#### Financial & Resource Implications

*Existing resources can be used to continue to assess what mechanisms could be introduced to hold back rainwater, there are no additional costs associated with this. The update to the Surface Water Management Plan will include the identification of any actions to be implemented to hold back rainwater. The resource and financial implications of the SWMP update are covered in recommendation 1.*

*The resource and financial implications of any schemes that are identified would need to be assessed on an individual basis and would be dependent on the schemes identified.*

### **Recommendation Seven: Bio-diversity**

**It is recommended that the Council set biodiversity targets over a five year period. These targets should include, but not be limited to, the number of new trees planted, the number of swales introduced and the amount of new meadow grass added to the borough.**

#### Financial & Resource Implications

*The resource and financial implications of this recommendation would be dependent on the targets identified.*

### **Recommendation Eight: Environmental Grants**

**It is recommended that the Council consider approaching environmental trusts and agencies, including the Western Riverside Environmental Fund, the SITA Trust, the Million Ponds Project, the Forestry Commission, the Woodland Trust, London Orchard Project, the Capital Growth Fund, the Heritage Lottery Fund and the Environment Agency, to apply for support towards for any project the Council intends to undertake which has an emphasis on biodiversity and green infrastructure.**

#### Financial & Resource Implications

*The resource and financial implications of any schemes that are identified would need to be assessed on an individual basis and would be dependent on the schemes identified.*

### **Recommendation Nine: Porous Paving**

**It is recommended that the Council undertake a feasibility and cost assessment as to whether porous surfaces would be a suitable material to use on (i) highways, (ii) footpaths and (iii) hard standing areas and if the Council deems porous paving a feasible and cost-effective alternative, establish**



**annual targets for replacing existing paving in line with ongoing regeneration and maintenance work.**

*Financial & Resource Implications*

*Some external assistance through consultants may be required to undertake the feasibility and cost assessment, with the project managed by in-house officers. The cost of external consultants advice are anticipated to be in the region of £10-30k*

**ENGAGEMENT: Information sharing and working together**

**Recommendation Ten: Information Sharing**

**It is recommended that the Council engage directly with Thames Water to seek to come to arrangement to allow for the sharing of all relevant information to enable both parties to better fulfil their responsibilities under the Flood Water Management Act and the Flood Risk Regulations.**

*Financial & Resource Implications*

*There are no financial implications of this recommendation; however the resources, whilst covered by in-house officers could be significant.*

**Recommendation Eleven: Flooding Data Format**

**It is recommended that Thames Water and the Council agree upon a uniform data format for data collection.**

*Financial & Resource Implications*

*There are no financial implications of this recommendation; however the resources, whilst covered by in-house officers could be significant.*

**Recommendation Twelve: Flood Contacts**

**It is recommended that, in order to facilitate a better working relationship between the Council and Thames Water, each organisation identify an individual point of contact for operational matters.**

*Financial & Resource Implications*

*There are no resources or financial implications of this recommendation.*

**Recommendation Thirteen: Information Sharing Systems**

**It is recommended that the Council and Thames Water examine the website operated by Northamptonshire County Council and seek to implement a similar system to allow both responsible parties to report flooding events and share information. Additionally they should explore the possibility of incorporating the flooding asset register into this system. This system should be for internal use only and not for public use.**

*Financial & Resource Implications*

*It is likely that external resources would be required to prepare a website; this would also have financial implications. The financial implications of this are unknown at this stage.*

#### **Recommendation Fourteen: Flood Risk Management Assets**

**Thames Water, in order to abide by their obligations under the Flood Water Management Act should share all information in respect to the sewer system in and around the London Borough of Hammersmith and Fulham, with particular emphasis and urgency given to any part of the sewer network identified on the public register of Flood Risk Management Assets.**

#### *Financial & Resource Implications*

*There are no financial implications of this recommendation; however the resources, whilst covered by in-house officers could be significant*

#### **Recommendation Fifteen: Planning Applications Assessments**

**It is recommended that the Council and Thames Water undertake a review into how they share information on planning applications, how planning applications flood risk assessments are processed, prioritised for comment and referred. This should include agreeing the criteria for referral to Thames Water for consultation on specific applications that warrant a surface water flooding perspective. Additionally both the Council and Thames Water, if making representations, should take into account the interlinking nature of their respective flooding roles and make any representations they see fit in this light.**

#### *Financial & Resource Implications*

*There are no resources or financial implications of this recommendation.*

#### **Recommendation Sixteen: Flooding Insurance**

**It is recommended that the Council make a representation to the Department for Environment Food and Rural Affairs (DEFRA) stating that the insurance industry should take greater account of any sustainable drainage systems (SUDs) or other property protection measures incorporated into a property when calculating its insurance premium.**

#### *Financial & Resource Implications*

*There are no resources or financial implications of this recommendation.*

#### **Recommendation Seventeen: A Flood Fair**

**It is recommended that the Council hold a Flood Fair. The aim of the Flood Fair should be to collect historical information on flooding incidents, increase awareness of flooding risks and clarify responsibilities between the responsible flooding parties. Other stakeholders, such as Thames Water, the Environment Agency, the Department for Environment Food and Rural Affairs (DEFRA), and companies that provide sustainable drainage systems (SUDS) and other flooding prevention systems should be invited along. All residents that the Council is aware have suffered from flooding in the past should be**

invited, as well as community groups. Ideally the event would be held over a number of days in different parts of the borough.

#### Financial & Resource Implications

Funding has been confirmed from Drain London for a flood fair. This is in the form of match funding up to a total of £10k. The Council are therefore proposing to use £10k of funding from the existing flooding budget to cover the total £20k for the flood fair.

This work will be undertaken by in-house resources, with assistance from the Council press office and external parties such as Thames Water, the Environment Agency etc who will be invited to contribute to the fair.

#### **Recommendation Eighteen: Community Engagement**

It is recommended that the Council seek to engage with residents through Residents Associations and other community forums.

#### Financial & Resource Implications

There are no resources or financial implications of this recommendation.

#### **Recommendation Nineteen: Flooding Advice**

It is recommended that the Council continue to offer advice to residents online about flood risk. In addition, at times when it is felt flooding risk is more likely to concern the public; the Council should promote the possible sustainable drainage systems (SUDs) available to residents via local and social media. The council should encourage local residents to maintain and increase the permeability of back gardens by providing advice and guidance, particularly in those areas most at risk of surface water flooding.

#### Financial & Resource Implications

There are no resources or financial implications of this recommendation.

#### **Recommendation Twenty: Flooding Incidents**

It is recommended that, when the Council is alerted to a flooding incident in the borough they should attempt to make direct contact with those affected and advise them of the possible sustainable drainage systems (SUDs) available to them. They should follow up with these residents after a six month period to see what steps they have taken to mitigate future flooding problems.

#### Financial & Resource Implications

This recommendation will need to tie in with the Council's policy on investigating flooding. The resource and financial implications of this would be dependent on the scale of flooding incident.



# Introduction

The Flooding Scrutiny Task Group was established by the Overview and Scrutiny Board on 7<sup>th</sup> December 2011 after a referral from the then Environment and Residents Services Select Committee. The overall aim of the Task Group was to consider the key strategic priorities for flood risk management and the appropriate communication arrangements with local residents for flood risk management in the borough.

The Task Group heard evidence from a range of expert witnesses, partner organisations and local residents, including the Environment Agency, Northamptonshire County Council, the Association of British Insurers, and Thames Water. An online public consultation was also held seeking to hear the views and experiences of local residents, especially those who had experienced flooding themselves, to help form a detailed picture of flooding risk in Hammersmith & Fulham.

The Task Group has made a number of recommendations which it feels should be seriously considered by the Council's executive body. The Task Group believes that should these recommendations be enacted, Hammersmith and Fulham will be in a significantly stronger position to fulfil its obligations as a Local Lead Flood Authority.

The then Labour Government asked Sir Michael Pitt to undertake a comprehensive review of the lessons to be learned from the summer floods of 2007. The floods that struck much of the country during June and July 2007 were extreme, affecting hundreds of thousands of people in England and Wales. The floods were the most serious inland floods since 1947. In the exceptional events that took place, 13 people lost their lives, approximately 48,000 households and nearly 7,300 businesses were flooded and billions of pounds of damage was caused. To put the events into context, during 2007 there were over 200 major floods worldwide, affecting over 180 million people. The human cost of all the floods in 2007 was more than 8,000 deaths and over \$23 billion worth of damage<sup>1</sup>.

Sir Michael Pitt presented his report, the Pitt Review, in June 2008 and made a number of recommendations to the Government. He noted in his report that perhaps the most significant feature of the 2007 summer floods was the high proportion of surface water flooding compared with flooding from rivers. Of the 55,000 properties damaged in the summer of 2007, two-thirds were flooded by surface runoff overloading drainage systems<sup>2</sup>. Surface water flooding is complex and affected by many factors, such as the capacity of the sewerage/drainage system, saturated ground and high river levels that prevent the system from discharging. Many of the recommendations made by the Pitt Review were enacted through primary legislation via the Flood Risk Regulations of 2009 (FRR) and the Flood and Water Management

<sup>1</sup> Figures from the Centre for Research on the Epidemiology of Disaster, Université Catholique de Louvain at [www.cred.be](http://www.cred.be)

<sup>2</sup> Figures from the consultation on the Implementation of the Sustainable Drainage Systems provisions in Schedule 3, Department for Environment, Food and Rural Affairs, [www.defra.gov.uk](http://www.defra.gov.uk)

Act of 2010 (FWMA). Under the FWMA all London boroughs were designated Lead Local Flood Authorities. As a Lead Local Flood Authority Hammersmith and Fulham Council has the responsibility to manage local flood risk, which is defined as flood risk originating from surface runoff, groundwater and ordinary watercourses; tidal flood risk from the River Thames is not the responsibility of the Council but of the Environment Agency (EA).

The FWMA 2010 and the FRR 2009 placed new statutory duties on the Council which include:

- ▶ managing flood risk in a co-ordinated way and creating effective partnerships with adjacent Local Lead Flood Authorities and other key stakeholders such as Thames Water, the Environment Agency and Transport for London (TfL);
- ▶ investigating flood events in the borough;
- ▶ developing and managing a public register of Flood Risk Management Assets;
- ▶ approving, maintaining and adopting sustainable drainage systems,
- ▶ the production of a number of documents which include:
  - Preliminary Flood Risk Assessment (PFRA);
  - flood risk and flood hazard maps;
  - a Local Flood Risk Management Strategy,
  - a Local Flood Risk Management Plan.

Over 60% of the area of the borough and about 75% of the population is potentially at risk of tidal flooding from the River Thames. Whilst the likelihood of tidal flooding is low due to London's flood defences, were it to occur, the consequences would be very severe. In addition to tidal flooding much of the borough is at risk of surface water flooding, including sewers surcharging to unprotected basement properties. Climate change, including more frequent extreme weather events and an increase in impermeable areas, are expected to increase the frequency and severity of this type of flooding. Thames Water records show that almost 700 properties have been flooded from sewer flooding events over the last 10 years; all of which were associated with heavy rainfall. Most of these have been basement properties. The Task Group is of the view that, in reality, significantly more properties have been affected over the last 10 years but many of those people affected have not reported being flooded for reasons which will be outlined later in this report.

Flood risk can be calculated by combining the probability of flooding occurring with the consequences of that level of flooding. The likelihood of flooding occurring is often expressed either in terms of a chance (1 in 100 chance of flooding occurring in any one year) or as a probability (1 per cent annual probability of flooding). In the past, flood risk has been described by a 'return period' (such as 1 in 100 years), which could cause confusion when people who have already been flooded believe that they will not be flooded again for a long time. In reality, even when flooding is calculated as a 1 in 100 year event, there is still a 1 per cent chance of flooding the following year.



The PFRA, which was completed in June 2011, indicated that over 8,000 properties could be at risk of surface water flooding in a 1 in 30 year rainfall event. This could rise to between 13,000 and 29,000 properties in a 1 in 200

year rainfall event. If such an event were to occur the consequences would be extremely grave for residents, businesses and the borough as a whole. It is vital, therefore, that steps are taken to mitigate the risk of surface water flooding now.



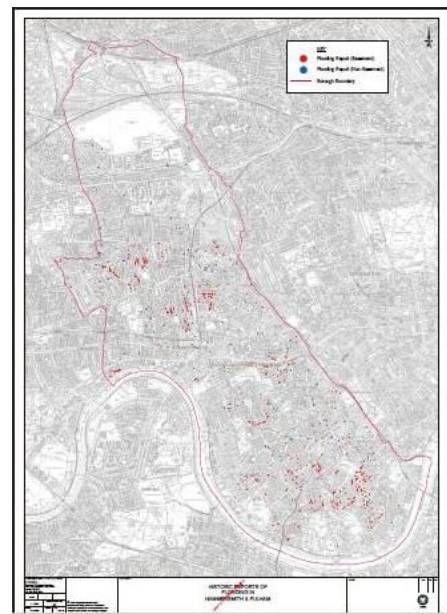
# 1. Mapping Flooding Risk

## SURFACE WATER FLOODING: Overview

- 1.1. In contrast to river and coastal flooding, capabilities to map and model (and hence provide warnings for) surface water flooding are very limited. Surface water flooding can be defined as flooding that occurs due to extreme rainfall and the inability of the water to drain away quickly enough, hence forming pools of water. Pools may also form due to water coming out of drains at other locations. However, the reasons behind the inferior drainage capability of an area can be quite varied and are often interlinked. For example, an urban sewerage system (designed to convey surface water runoff into a nearby watercourse) might be unable to discharge water if the watercourse levels are too high, which was the case in certain areas of Sheffield during the summer floods of 2007.
- 1.2. Many factors affect the likelihood of surface water flooding:
- ▶ **Intensity of rainfall:** Rainwater drains away naturally over long periods of time, but if rain falls in intense bursts, the drainage system may be unable to cope. The probability of this type of intense rainfall occurring in the future is likely to increase due to climate change.
  - ▶ **The location of the rainfall:** The direction of travel of surface water is directly influenced by the topography of an area. Small changes in the location of rainfall can have a significant impact on where the water ends up.
  - ▶ **The capacity and condition of the sewerage and drainage system:** This will obviously affect the rate at which rainwater can drain away. Most of the UK sewerage system was built before the Second World War, and so deterioration is another key issue.
  - ▶ **The type of surface material:** The permeability of surface material affects the amount of runoff. Urban areas, such as Hammersmith and Fulham, are more susceptible to surface water flooding than rural areas because they are characterised by a significant quantity of built-up (and hence impermeable) areas.
  - ▶ **The saturation (or the soil moisture deficit) of the ground:** If the ground is saturated, or in fact too dry, large amount of rain that falls will be converted into runoff.
  - ▶ **River levels:** High river levels will hinder the sewerage systems ability to discharge water.
  - ▶ **Planning and development:** Permitting additional homebuilding and other development will reduce the amount of permeable space available and is also likely to reduce the number of open watercourses. Sustainable drainage systems can be incorporated into new property developments to help to reduce the surface water runoff.

## SURFACE WATER FLOODING: Mapping

- 1.3. As noted above the capabilities to map and model surface water flooding are currently very limited. At present the Council is reliant upon information provided by Thames Water, as well



as from information provided by residents and businesses that have suffered from flooding in the past, in order to map and model surface water flooding, and hence identify high risk flooding areas. The Task Group were concerned that this data was insufficient as it was not a true reflection of the actual flooding risk in the borough. This concern arose from the fact that the Task Group were made aware that many people affected by flooding chose not to report it, primarily but not solely because of concerns relating to the potential impact on property prices and insurance premiums.

- 1.4. The Pitt Review commissioned analysis of a number of different approaches to modelling surface water flooding; examining their effectiveness and undertaking a basic cost-benefit analysis. The results of this work are set out below.
- 1.5. The five approaches considered by the Pitt Review were:
  - i **Topographic index analysis** – This is a basic terrain model with no rainfall input. There is no correlation between the model's outputs and areas of known flooding, and so it would be of little use.
  - ii **2D overland routing of uniform rainfall event** – This model makes no allowance for differences in rainfall, and assumes that every area has a uniform capacity to drain water. It could be used for high level analysis but significantly overestimates the extent of flooding.
  - iii **Decoupled sewer model and 1D overland routing** – This model takes account of the effect of drainage by using a detailed sewerage network model. It is the most accurate method of identifying properties on water company registers but underestimates the spatial extent of flooding.
  - iv **Decoupled sewer model and 2D overland routing** – This model includes 2D surface runoff data and detailed sewerage network data, but does not include assessment of below-ground flooding mechanisms. It produces a much better estimate of the spatial extent of flooding but fails to identify some properties on water company registers.
  - v **Coupled sewer model and 2D overland routing** – This model combines surface runoff data, detailed sewerage network data and a full 2D model of above-ground flooding. It does not include below-ground flooding mechanisms but this could be added. It gives a very accurate assessment of the spatial extent of flooding but fails to identify some properties on the water company registers.
- 1.6. The Pitt Review made a number of comments regarding the modelling approaches:
  - i. Tools exist that can reliably and accurately model surface water flooding in urban areas.
  - ii. The cost of the different models can vary widely owing to the information and detail required. Additionally the cost of accurate modelling can be high if models of sewerage networks have to be built from scratch.
  - iii. Simplified modelling is possible at relatively low cost but is far less reliable and probably only suitable for high level risk assessments on an area wide basis. Such approaches are not suitable for assessment at the level of detail of individual streets or for producing solutions to flooding.
  - iv. Surface water flooding can be accurately modelled and mapped but further work is required to understand user needs and the costs associated with meeting those needs.



- 1.7. The Environment Agency has carried out research into developing a surface water flooding alert system. The Environment Agency is well placed to provide a modelling and warning system to cover surface water flooding. Whilst surface water modelling is still in its infancy the Environment Agency is working with its partners to develop the tools and techniques required to model surface water flooding and it is hoped that a significantly more sophisticated modelling system will emerge from this process.
- 1.8. The Task Group did not feel it would be appropriate, at this time, for the Council to seek to develop and implement its own surface water flooding modelling, other than the modelling required as part of the update of the Surface Water Management plan, which will also be used to fulfill the Council's requirements to map Flood Risk Areas by 2013, as required under the Flood Risk Regulations. This work will be undertaken by the consultants as part of the Surface Water Management Plan update commission. The result of this modelling will also be used by the Environment Agency to develop further modelling techniques. The Task Group took this view in light of the costs of establishing and implementing an effective flood risk modelling system, both in terms of the costs of designing a modelling system and in terms of the costs of engaging with third party consultants to assist existing in-house expertise put such a model together.
- 1.9. The Council has appointed Clare Share as Flood Risk Manager and, in addition to her, has other officers who have some experience and expertise in flood risk, particularly in the planning department. The Task Group were impressed that the Council has already appointed a Flood Risk Manager and noted that other Lead Local Flood Authorities had not been as pro-active as the Council in recruiting additional flood risk expertise. The lack of flood risk engineers in public sector organisations was identified by the Institution of Civil Engineers in their report entitled Engineering Skills for Flood Risk Management<sup>3</sup> (2004).
- 1.10. The Pitt Review, through discussions with local authorities and engineering professions, recognised four key factors as to why this was the case.
- i. Low salary levels for flood risk engineers, particularly in the public sector.
  - ii. The lack of perceived value given to working for local authorities.
  - iii. The requirement in many posts to carry out a broad range of roles, such as stakeholder engagement, rather than focusing on core engineering skills.
  - iv. The simple shortage of suitably qualified graduates.
- 1.11. The Task Group acknowledge that the Council is able to rely upon consultant engineers but notes that in the long run there may be very real benefits to having additional in-house expertise.
- 1.12. The Task Group felt that the Council should maintain a close working relationship with the Environment Agency. The Environment Agency currently engages with numerous parties who are responsible for different aspects of the drainage and sewerage systems – including water companies, internal drainage boards, highways authorities, navigation authorities and riparian owners. This will help the Environment Agency understand how surface water runoff is discharged by the

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<sup>3</sup> <http://www.ice.org.uk/Information-resources/Document-Library/Engineering-skills-for-flood-risk-management>

system, what knowledge and data gaps are present and what steps need to be taken to fill them.

### **GROUNDWATER FLOODING: Overview**

- 1.13. Groundwater flooding is caused by the emergence of water on the surface due to the water table rising. It can result in the flooding of surface or sub-surface infrastructure and can cause damage to foundations by reducing their load-bearing capacity.
- 1.14. The Environment Agency has established monitoring and warning arrangements for the chalk aquifers in its South-West, Southern and Thames regions but there are significant technical problems associated with groundwater flood risk assessment. This is because the models that have been designed for conventional hydrological events have a limited applicability to groundwater.
- 1.15. The Council, as the Local Flood Authority, has the lead role in assessing the risk of groundwater flooding. This includes collecting historic groundwater flooding information, extending the monitoring and warning systems and awareness-raising activities.

### **GROUNDWATER FLOODING: Mapping**

- 1.16. The Preliminary Flood Risk Assessment indicated that surface water flooding is far more frequent in the borough. Nonetheless there is a substantial number of historical groundwater flooding events identified through information provided by the Environment Agency and Thames Water. The damage associated with groundwater flooding is believed to be significantly greater than that associated with river and surface flooding, due to the fact that the water can remain above the surface for long periods of time.

#### **Recommendation One: Flood Risk Mapping**

It is recommended that the Council seek to identify high risk flooding areas using historical data and by recording flooding events as they occur.

#### **Recommendation Two: The Flood Water Management Plan**

It is recommended that the Council undertake a review of the current Surface Water Management Plan.

#### **Recommendation Three: Pooling Resources**

It is recommended that the Council assess whether it would be appropriate to pool its resources with neighbouring Local Lead Flood Authorities, either on a pan-London basis or through the tri-borough arrangements, to ensure that the Council has sufficient technical expertise to enable it to discharge its responsibilities under the Flood Water Management Act and the Flood Risk Regulations.

# 2. Mitigating Flooding Task

## Sustainable Drainage systems (SUDs): Overview

- 2.1. SUDs are designed to mimic the natural movement of water and slow down the process of the water getting into the watercourse. They can channel the flow of water aboveground and reduce the burden on the sewerage system.
- 2.2. SUDs fall into three main categories:
  1. **Source control and prevention techniques:** These are designed to reduce the volume of water discharged from a developed site as close to the source as possible. They can help restore underground water resources. They include green roofs, permeable pavements, rainwater harvesting, and infiltration trenches and basins.
  2. **Permeable conveyance systems:** These channel the runoff slowly towards the watercourses through a process of filtering and storage and through the reduction of water through evaporation and infiltration. They include filter drains and swales.
  3. **Passive treatment systems:** These use natural processes to break down pollutants from surface water runoff. They usually involve storage of water and include filter strips, detention basins, retention ponds and wetlands.

SUDs can be incorporated at different levels.

- ▶ At an individual property level: e.g. Water butts, green roofs, permeable driveways.
  - ▶ At a community level: e.g. Swales, detention basins and porous paving of highways.
  - ▶ At a strategic level: e.g. Large balancing ponds and wetlands.
- 2.3. Schedule 3 to the FWMA requires that construction work which has drainage implications cannot commence unless the drainage system has been approved by the SUDs Approving Body (SAB). The Government is currently reviewing the consultation responses it received as part of its consultation into how the SAB should operate. Part of this consultation covers the development threshold for which the SABs are required. The consultation ran for twelve weeks between 20<sup>th</sup> December 2011 and 13<sup>th</sup> March 2012. The Government hopes that the SAB will be established and operational from April 2013. ,
  - 2.4. The Task Group felt that one of the most effective ways of mitigating the risk of surface water flooding was through the planning process. Hammersmith and Fulham's Local Development Framework, in particular the Core Strategy which was adopted in October 2011, does stipulate that the "the council will strive to reduce the risk of flooding from surface water and foul water and its contribution to fluvial flooding by requiring development proposals to include appropriate sustainable drainage systems and systems to reduce the amount of water discharged to the foul water drainage.<sup>4</sup>" The document goes on to add that "where SUDs are proposed, details of how they will be effectively managed to retain their effectiveness will be

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<sup>4</sup> [http://www.lbhf.gov.uk/Images/Core%20Strategy\\_tcm21-165496.pdf](http://www.lbhf.gov.uk/Images/Core%20Strategy_tcm21-165496.pdf)

required. The aim of all development should be to achieve 50% attenuation of the undeveloped sites surface water run-off at peak times and where possible achieve 100% attenuation.<sup>5</sup>

- 2.5. In addition to this any new development in the borough must adhere to Planning Policy Statement 25 (PPS25). PPS25 states that, following the application of the sequential test (this test is essentially a means of avoidance planning; development should be directed to areas with the least risk of flooding), if there is no suitable land in lower risk zones, development may go ahead in exceptional cases; the so-called 'exception test'. However, in applying this test the Council must demonstrate that other sustainability criteria outweigh the flood risk, that the risk can be mitigated and that the site is safe.
- 2.6. The Task Group welcomed the measures the Government and the Council had put in place to mitigate the risk of surface water flooding in new developments. However the Task Group felt that the Council, and other relevant parties such as the Environment Agency and Thames Water, could do more to encourage new developments to adopt SUDs. The Task Group considered what SUDs it felt would be most appropriate for each level of development individual property level, community level and a strategic level, and has detailed its findings and recommendations below.

#### **SUDs: Individual Property Level**

- 2.7. Urban creep refers to the cumulative impact that paving over front and rear gardens is having, not only in Hammersmith and Fulham, but across London and other towns and cities. This can have a significant impact on the natural drainage of surface water, as water that previously soaked into the ground has nowhere to go and can increase the risk of surface water flooding. Home improvements, such as side returns or conservatories, can also increase demands on surface water drainage systems.
- 2.8. Householders are no longer permitted to lay impermeable surfaces in front gardens greater than 5 square metres without planning permission. However residents are still permitted to lay impermeable surfaces in their back gardens. It makes sense to retain as much natural drainage as possible in the borough. The Task Group came to the conclusion that, should the Council identify areas in the borough that are at particular risk of surface water flooding, the Council should encourage applicants to incorporate SUDs to mitigate the impact their development would have on surface water flooding. Residents should be encouraged to undertake a flood risk assessment.
- 2.9. The Task Group noted that many residents in the borough had, in the past, applied for side or rear extensions to their properties. In addition a significant number of local residents had also applied for basement extensions. The Task Group took the view that it was highly likely that this trend would continue over the coming years. The Task Group noted the advice from the Environment Agency that it was important not to overlook the cumulative impact that smaller improvements to properties across an

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<sup>5</sup> Ibid.

area can make; further noting that spatial planning was key as well as looking at opportunities arising from re-developments.

- 2.10. The Task Group were concerned about the impact that both side and rear extensions had on the natural drainage of rainwater. Whilst the Task Group acknowledged that applicants currently were encouraged to compensate for any permeable land they built on by creating a comparable amount of permeable land on their property, by, for example, removing a garden shed and replacing it with a permeable surface, the Task Group felt such an approach was not really practical in Hammersmith and Fulham.
- 2.11. The Task Group felt that local residents should be encouraged to be more pro-active in combating the risk of surface water flooding by incorporating various forms of SUDs into their building plans. For example in small scale developments it was felt it would be appropriate for local residents to consider adding water butts where space and downpipes permitted. For larger scale developments, such as building improvements to housing blocks, it was felt that green roofs were an attractive and viable solution to addressing the problems of surface water flooding.
- 2.12. “Green roofs” are roof-tops that are intentionally vegetated to some degree. These can vary from a full-blown roof garden, through to grassy swards or sedum roofs. They fall into three main categories:
- ▶ Extensive: Using a relatively thin, lightweight substrate. They are designed to be virtually self-sustaining and should require only a minimum of maintenance, perhaps a once-yearly weeding or an application of slow-release fertiliser to boost growth.
  - ▶ Semi-Intensive: Using a lightweight shallow soil structure to support a wider variety of plants including herbs.
  - ▶ Intensive: Intensive roofs are more park-like with easy access and may include anything from kitchen herbs to shrubs and small trees. They are often designed to be accessible for recreational use and require regular irrigation and regular maintenance.
- 2.13. In oral evidence from Mr Stefan Czeladzinski, the Grounds Maintenance Monitoring Officer at Hammersmith and Fulham Council, the Task Group heard that it was felt that sedum matting was not an appropriate green roof solution as it has too shallow a substrate to support it properly and does not provide a diversity of plants.
- 2.14. The Task Group heard that in addition to mitigating storm water run-off at source, as they can potentially retain up to 90% of rainfall within the substrate, green roofs also offered other benefits. These include:
- ▶ Improving the biodiversity on all new and retro fitted sites; thereby also ensuring building proposals adhered to PPS9, which relates to biodiversity and geological conservation. They also improve the development for ecology.
  - ▶ Help ensure that developments are designed to adapt to climate change, ensuring compliance with the UK Climate Policy Change programme.
  - ▶ Reduces urban heat. Green roofs act as ‘mini air conditioners’, cooling and humidifying the surrounding air with beneficial effects on the immediate area. This also has the effect of increasing insulation values and reducing the need for air conditioning.

- ▶ Reducing air pollution as the vegetation on green roofs helps to filter out dust and smog particles. Nitrates and other airborne pollutants are absorbed out of the air and rainfall and bound in the soil.
- ▶ Protecting the roof. It is a common misconception that a green roof can damage the roof structure. In fact a green roof can significantly increase the life span of the roof. Temperature ranges on a standard roof can be very wide with temperatures reaching 80°C, whereas on a green roof they will reach about 25°C.
- ▶ Noise reduction. The sound insulation benefits of green roofs will vary depending on water levels, but they can reduce reflective sound by up to 3dB and improve sound insulation by up to 8dB.

2.15. The main disadvantage of green roofs is the higher initial cost. However the Task Group heard that these costs can be off-set by savings in other areas, such as ground level storm solutions and energy demand. Whilst it is not within the remit of the Task Group, a discussion did take place over the potential for abuse of green roofs. In particular there was a concern that some applicants may seek to incorporate green roofs as a way of circumventing the rules in relation to roof terraces. The Task Group felt that this was something that should be considered in more detail by the planning department.

2.16. The Task Group were impressed with the potential of green roofs and heard that between 150 to 200 hectares of green roofing could be generated in London each year. It was highlighted to the Task Group that the green roof at Westfield could absorb up to 90% of rainfall on their area. In addition, the Task Group heard how the London Borough of Islington has retrofitted some of its municipal offices with green roofing.

#### **Recommendation Four: Green Roofing**

It is recommended that the Council approach the Department for Environment Food and Rural Affairs (DEFRA) to enquire about the availability of funding for a pilot programme using financial incentives to encourage the development of new or retrofitted green roofs on pre-selected sites.

2.17. As noted at the start of this report Thames Water records show that almost 700 properties suffered the effects of flooding over the last 10 years; all of which were associated with heavy rainfall. Most of these have been basement properties. The Task Group believe that basement properties are the most at risk from sewer, groundwater and surface water flooding. As a result the Task Group felt any person wishing to apply for a basement extension should be encouraged in the strongest possible terms to install SUDs. In addition it was also felt that any person wishing to apply for a basement extension, given the substantial evidence that such extensions are the most at threat from flooding, should be required to submit a more detailed flood risk assessment. Such a flood risk assessment should include an acknowledgment that the applicant understands the potential flooding risk to a basement extension. In addition it should require them to submit what steps they propose to take to protect their property and the surrounding area due to the impact flooding can have on adjacent properties.

2.18. The Task Group noted that Thames Water, as part of their sewer flooding alleviation in the Counters Creek catchment area, were undertaking a number of flooding local

improvement projects (FLIPs). FLIPs are essentially a mini pumping station concealed within a manhole chamber, protecting one or more properties from flooding. Waste water from the property is pumped to levels above the maximum water level in the main trunk sewer at times of heavy storm rainfall. A FLIP device prevents raw sewage from backing up from the main sewer and flooding basements. To date Thames Water have installed and commissioned 263 FLIPs units<sup>6</sup>. The Task Group was impressed with the work Thames Water were undertaking on FLIPs, although were disappointed that the take up rate amongst residents was not higher.

#### **Recommendation Five: Flood Risk Assessments**

It is recommended that the Council require planning applicants to provide a detailed flood risk assessment, placing a particular emphasis on any application for a basement development. This assessment should include an acknowledgement from the applicant that they understand surface water flooding risk and also require them to state what sustainable drainage systems (SUDs) they intend to incorporate into their development. If an applicant does not intend to incorporate any SUDs they should be required to explain why their development will not have any detrimental impact on surface water flooding in the borough.

#### **SUDs: Community Level**

- 2.19. At a community level SUDs can be implemented, for example, through swales or porous paving of highways. An artificial swale is a low tract of land designed to manage water runoff, filter pollutants and increase rainwater infiltration. Mr Stefan Czeladzinski told the Task Group consideration was currently being given to creating a swale to help facilitate the borough's flood risk management plan to the north of the borough at Wormwood Scrubs Commons. Topographical studies have highlighted flood risk zones which can be excavated and act as naturalised attenuation containers. This will not only accommodate increased volumes of rainfall, but increase biodiversity and habitat within a very urban borough with high levels of deprivation to the north, which will in turn increase the quality of life for local residents and other site users. The swales could be designed to store up to one year of rainfall (about 650 mm) in one go for over 70 hectares of land, thus protecting the north of the borough and reducing potential sewer overflow in the south of the borough.

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<sup>6</sup> <http://www.thameswater.co.uk/cps/rde/xbcr/corp/counters-creek-public-meeting-presentation-14-november-2011.pdf>

**TABLE 1**

<b>DEMONSTRATION OF RAINFALL ABSORPTION, INFILTRATION AND EVAPOTRANSPIRATION RATES</b>	
<b>Clay infiltration rates (mm per hour)</b>	< 50
<b>Loam infiltration rates (mm per hour)</b>	< 15-20
<b>Sands infiltration rates (mm per hour)</b>	> 50
<b>Green Roof absorption rates (mm per hour)</b>	> 30-50 mm
<b>Tarmacadam absorption rates (mm per hour)</b>	> 15-50 mm
<b>Volume of attenuation tank required per m<sup>2</sup> of open roof, to hold one year of rainfall</b>	0.65 m <sup>3</sup>
<b>Broadleaf trees evapotranspiration (estimates) per annum</b>	400-640 mm
<b>Volume of rain per annum per m<sup>2</sup></b>	54-1715 mm
<b>Wettest month on average in London, October (mm)</b>	61.5 mm over 9.3 days
<b>London average rainfall per annum (mm)</b>	583.6 mm
<b>Estimated LBHF rainfall per annum (mm)</b>	550-650 mm

2.20. Table 1 illustrates the comparable infiltration rates of different surfaces in the borough. The north of the borough is higher in clay deposits and therefore has lower infiltration rates. This is because clay soil has smaller particle sizes and so water permeates far slower than through sandy soil, which is the predominate type of soil in the south of the borough. As a result, during heavy rainfall, a significant amount of rainwater flows down from the north of borough into the south of borough, increasing the risk of surface water flooding as well as increasing pressure on the sewer system in the south of the borough. Due to this the Task Group felt it was vital that the Council consider what mechanisms it can introduce to either temporarily or permanently hold back rainwater in the north of the borough. It was felt that the proposal to introduce a swale as part of the redevelopment of Wormwood Scrubs Commons was an excellent example of the type of action the Council could take to address the problems outlined above.

2.21. The Council planted an additional six hectares of tree cover in 2010-2011, which should help to reduce storm water runoff and also usage through evapotranspiration. Please see Table 1 for more details. Interception of rainfall by broadleaf trees is 10-25% from broadleaves. If both interception and transpiration are considered together, and assuming an annual rainfall of 1,000 mm, conifers could be expected to use some 550-800 mm of water compared with 400-600 mm from broadleaves. As detailed in the London Plan the Mayor has laid out an ambitious strategy to plant “an additional two million trees in London by 2025 to help with both mitigation of and adaptation to climate change<sup>7</sup>” as well help alleviate storm water runoff. The Task Group felt this was a lauded aim and hoped that Council would play its part in delivering this goal.

2.22. The Task Group heard that in the last three years 30 hectares of meadow grass had been introduced in the Council which has not only increased aesthetic and biodiversity values but also increased the infiltration rates of water and the evapotranspiration rates of areas. The Task Group also heard about measures other

<sup>7</sup> <http://www.london.gov.uk/sites/default/files/LP2011%20Chapter%205.pdf>



boroughs had taken to mitigate storm water runoff. For example the London Borough of Lewisham had de-culverted lengths of river, allowing for water to pass into the surrounding soil and increase vegetation cover and biodiversity values for the surrounding area. One park in Lewisham, Ladywell Fields, has become a flood attenuation zone. The Olympic Park along the River Lea has been designed as an attenuation zone, forecast to relieve up to 5,000 homes from flooding in the surrounding area. The Task Group felt that the Council could learn a lot from these projects and thought it would be highly beneficial to engage with these and other lead Local Flood Authorities to share experiences and learn from each other.

**Recommendation Six: Rainwater Retention**

It is recommended that the Council assess what mechanisms it can introduce to either temporarily or permanently hold back rainwater, with a particular emphasis on limiting water flowing rapidly from the north of the borough to the south of the borough.

**Recommendation Seven: Bio-diversity**

It is recommended that the Council set biodiversity targets over a five year period. These targets should include, but not be limited to, the number of new trees planted, the number of swales introduced and the amount of new meadow grass added to the borough.

**Recommendation Eight: Environmental Grants**

It is recommended that the Council consider approaching environmental trusts and agencies, including the Western Riverside Environmental Fund, the SITA Trust, the Million Ponds Project, the Forestry Commission, the Woodland Trust, London Orchard Project, the Capital Growth Fund, the Heritage Lottery Fund and the Environment Agency, to apply for support towards for any project the Council intends to undertake which has an emphasis on biodiversity and green infrastructure.

2.23. Most hard surfaces are considered as Effective Impervious Areas (EIA). Some EIA can be replaced with materials better designed to allow for permeability. The approximate rates of permeation are found in Table 1 for concrete and tarmacadam. Replacing old paving and tarmacadam with more porous ones can help to reduce sewer volumes at peak rates of flow. There are several types of permeable paving including:

- ▶ Gaps between the concrete/stone slabs to allow water to drain through to a porous sub surface.
- ▶ Porous concrete paving to allow water to drain directly through the paving slabs to a porous sub surface.
- ▶ Grass paving which has a mesh cover to ensure rigidity.
- ▶ Gravel or other similar products overlaying a porous surface.

2.24. The Task Group was informed that, over time, the effectiveness of porous paving and tarmacadam was reduced due to small particles and organic matter building up in and on the paving. Nonetheless where self draining footpaths have been piloted they have been found to be successful in limiting surface water runoff. They were found to be cheaper to install in some cases, easier to maintain, renovate and repair and have a lower carbon footprint. However Mr Stefan Czeladzinski did caution the Task Group that the installation of permeable paving required careful planning to

consider if it was a feasible and a cost effective alternative. It was estimated that about 11,172 m<sup>3</sup> of water could be saved from going into the sewerage system if all park surfaces were permeable.

**Recommendation Nine: Porous Paving**

It is recommended that the Council undertake a feasibility and cost assessment as to whether porous surfaces would be a suitable material to use on (i) highways, (ii) footpaths and (iii) hard standing areas and if the Council deems porous paving a feasible and cost-effective alternative, establish annual targets for replacing existing paving in line with ongoing regeneration and maintenance work.

**SUDs: Strategic Level**

**TABLE 2**

<b>ESTIMATED BREAKDOWN OF SURFACE AREAS WITHIN THE BOROUGH</b>		
<b>DESCRIPTION</b>	<b>AREA (SQM)</b>	<b>% OF BOROUGH</b>
Roads and paths	3,460,780	20.2%
Railway	1,146,444	6.7%
Natural (Green spaces E.g. Parks)	3,173,604	18.5%
Building	4,441,832	25.9%
Manmade (Likely to be hard standing areas)	1,818,172	10.6%
Multiple surface (Back & Front Gardens)	3,032,614	17.7%
Unknown (Usually sites under construction)	63,965	0.4%
<b>TOTAL FOR BOROUGH</b>	<b>17,137,411</b>	<b>100%</b>

2.25. Table 2 provides an estimated breakdown of the surface areas within the borough. It can be seen that over 25% of the surface of the borough is covered by buildings, and over 20% by roads and paths and nearly 20% by multiple surfaces, likely to be back and front gardens. Nearly another 20% of the borough is covered by green spaces. The Task Group has made recommendations for how it feels the Council can significantly reduce the risk of surface water flooding in these areas. Each recommendation should not be considered in isolation, but viewed as a strategic package of solutions to mitigate surface water flooding risk.

2.26. The Pitt Review noted that in the German state of North Rhine-Westphalia, a programme of financial incentives had been used to encourage the development of new or retrofitted green roofs. This scheme has proved successful in encouraging homeowners to install SUDs<sup>8</sup> and indicates that financial incentives can be effective. During evidence from the Environment Agency the Task Group were told that due to changes in funding arrangements made in 2011, there was funding available from the Department for Environment Food and Rural Affairs (DEFRA) for surface water flooding management projects. Additionally, the Environment Agency noted that small schemes were more likely to attract funding. The Environment Agency suggested that the Council submit a bid to DEFRA for funding a surface water

<sup>8</sup> G. Lawlor et al, Green Roofs: A Resource Manual for Municipal Policy Makers, 2006

flooding management project and they agreed to provide the Council with advice about how best to go about this.

# 3. Engagement

## ENGAGEMENT: Overview

- 3.1. The Pitt Review noted that all parties responsible for tackling the risk of flooding must be willing to work together and share information. The review further noted that, whilst it recognised that there were issues of commercial confidentiality and security, it felt that the public interest is best served by closer cooperation and a presumption that information will be shared. It stated that responsible authorities had a duty to be “open, honest, and direct about risk” and move from a “culture of ‘need to know’ to one of ‘need to share.’<sup>9</sup>” The Task Group strongly agreed with these observations and believes residents will be best served by responsible parties, such as Thames Water, the Council, the Environment Agency, insurance companies and DEFRA, working in greater harmony to tackle flood risk in the borough.

## ENGAGEMENT: Thames Water

### Information Sharing

- 3.2 Under the FWMA, water authorities have a statutory duty to provide information to Local Lead Flood Authorities. During evidence from Josie Bateman, Project Manager (Flood and Water Management) of Northamptonshire County Council, the Task Group heard about her experiences of engaging and working with water companies. There are three water companies that operate in Northamptonshire; Anglian Water, Thames Water and Severn Trent. Ms. Bateman was asked specifically about information sharing with water companies. She noted that when she initially tried to engage directly with all three water companies on the topic of information sharing they were resistant to her approaches and suggestions. However she felt her persistent approach eventually rendered results, although she did state that it took over six months of solid persistence to achieve this.
- 3.3 The Task Group believes it is vital that Thames Water become more willing to cooperate and engage with the Council to assist them in their role as a Lead Local Flood Authority. Thames Water acknowledged when they came before the Task Group that they hold a significant amount of historical data on flooding events in the borough. They have provided some of this data to the Council; but with the last two digits of the post codes removed. In the view of the Task Group this makes the data significantly less valuable and hinders the Council’s ability to map and target high risk areas, and hence fulfil its obligations under the FWMA and FRR.
- 3.4 Thames Water told the Task Group they were hesitant about sharing full post code data with the Council, citing problems with the Data Protection Act and the Freedom of Information Act. It was suggested to the Task Group that Thames Water would be under an obligation, if it were to provide full post code data to the Council, to contact all Thames Water customers advising them of their actions and potentially asking for their consent. Thames Water had concerns about undertaking such a process on the grounds of cost and also felt that it would result in customers being less willing to provide information to Thames Water.

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<sup>9</sup> <http://webarchive.nationalarchives.gov.uk>

- 3.5. The Pitt Review noted that other countries are far more willing to share information about critical infrastructure than the United Kingdom. In France, there is a general openness about risk information. Local city mayors, responsible for public safety, have access to potentially sensitive information on critical infrastructure in order to develop suitable local emergency plans in which utility operators are also involved. Even countries which were previously reluctant to disclose information on critical infrastructure, and the impact of its failure from flooding, are beginning to see the counterargument for putting information in the public domain. The United States Army Corps of Engineers (USACE), the federal body whose responsibilities include engineering projects to mitigate flooding, has recently overcome its previous reluctance to publish inundation maps of dams. Maps are now published because this enables the USACE to warn the public to take the risk of dam failure seriously and prepare themselves accordingly.
- 3.6. The Task Group believes cooperation and the sharing of information to be vital to effective flood risk management. The Task Group heard from various responsible parties that much work had already been done to collect and record datasets relating to flood forecasting and modelling. These now need to be integrated to fully realise the benefits. Thames Water is a fundamental part of this process. The Task Group were somewhat disappointed that Thames Water was not more forthcoming in offering to share meaningful information with the Council, particularly when compared to their more cooperative approach with Northamptonshire County Council. Nonetheless the Task Group appreciated the commercial and legal problems faced by Thames Water, although felt these problems were surmountable. The Task Group noted with interest the success Northamptonshire County Council had by agreeing a Memorandum of Understanding between themselves and responsible parties, including Thames Water, as well as employing the Chatham House Rule to promote open and frank discussions.
- 3.7. The Task Group was not only concerned about what data could be shared between responsible parties, but also what format this data would be provided in. The Task Group heard from Ms. Bateman that Northamptonshire County Council had requested data in “mapping pro-layer” format as this was compatible with the software management tool they had developed, funded by a grant from DEFRA. However the data they were provided was not in this format, forcing them to extract the data into the format they needed, which took six months. The Task Group heard how Thames Water used a geographic information system (GIS) to identify areas of risk in London.

#### **Recommendation Ten: Information Sharing**

It is recommended that the Council engage directly with Thames Water to seek to come to arrangement to allow for the sharing of all relevant information to enable both parties to better fulfil their responsibilities under the Flood Water Management Act and the Flood Risk Regulations.

- 3.8. It is suggested that the Council and Thames Water examine in detail the Memorandum of Understanding used by Northamptonshire County Council as a basis for this information sharing, and that Chatham House Rules are used in discussions between the parties.

### **Recommendation Eleven: Flooding Data Format**

It is recommended that Thames Water and the Council agree upon a uniform data format for data collection.

### **Recommendation Twelve: Flood Contacts**

It is recommended that, in order to facilitate a better working relationship between the Council and Thames Water, each organisation identify an individual point of contact for operational matters.

## **Working Together**

- 3.9. Under the FWMA the Council has an obligation to establish and maintain a flooding asset register. The flooding asset register includes key assets (structures and features such as a wall, ditch or bridge) that are known to cause or allow the major flooding of properties, critical infrastructure or block major roads when the asset is not functioning to an adequate level. The Task Group heard from Ms. Bateman that compiling this register had taken over eight months and cost over £12,000, excluding her time, but had resulted in a better understanding of the flooding risks in a given area.
- 3.10. The Task Group recognised that the sewer infrastructure would be a key competent of the flooding asset register. Whilst the local Lead Flood Authority has responsibility for surface water flooding, it is not responsible for monitoring or maintaining the sewer system. There are about 320,000 km of public sewers and around 150,000 km of private sewers in England and Wales. Around 7% were built before 1885 and the majority were built before the Second World War<sup>10</sup>. While 'no flooding in a 1-in-30 storm' is generally seen as a goal for urban public sewer systems, it has only become common from 2006. Given that less than 1% of the national sewerage network is newly built each year, it means that relatively little will have been built since 2006 and so the overwhelming majority of public sewers will be at much lower standards.
- 3.11. The Task Group felt that it was vital that a good working relationship is established between the Council and Thames Water in order to effectively manage and mitigate surface water flooding risk in the borough. In particular the Task Group felt that there was significant scope for improvement in the working relationship between these two parties in relation to (i) reporting of flooding events (ii) sharing of information in relation to the existence, maintenance and monitoring of the sewer system and (iii) a more collaborative approach to the planning process.

## **Reporting of Flooding Events**

- 3.12. As has already been noted, due to the current limitations with respect to mapping surface water flooding risk, the Council is heavily reliant upon residents and businesses in the borough reporting flooding events when they occur. The Task Group felt that it was highly likely that those people who suffered from flooding, if they did report the event, would either report it to Thames Water or the Council, not both. Therefore the Task Group felt it was vital that a system was designed so that any incidents that were reported were shared as soon as possible between the two

<sup>10</sup> <http://webarchive.nationalarchives.gov.uk>

organisations. The Task Group heard that Northamptonshire County Council had developed a website which all responsible parties, including all three water companies, could use to report flooding events. The Task Group felt that a similar system could be implemented between Thames Water and the Council.

**Recommendation Thirteen: Information Sharing Systems**

It is recommended that the Council and Thames Water examine the website operated by Northamptonshire County Council and seek to implement a similar system to allow both responsible parties to report flooding events and share information. Additionally they should explore the possibility of incorporating the flooding asset register into this system. This system should be for internal use only and not for public use.

**Sewer System**

- 3.13. Perhaps the clearest demonstration of the importance of Thames Water and the Lead Local Flood Authority working together is through the sewer system. If the Lead Local Flood Authority takes minimal steps to address the problems of surface water run-off it is likely that the sewer system will be regularly overwhelmed resulting in flooding in the borough. Likewise, regardless of the steps taken to mitigate surface water run-off above ground, if the sewer system is unable to cope with less than a 1 in 30 flood event, then properties and associated areas in the borough will suffer from flooding.
- 3.14. The Task Group heard how Thames Water were building up an increasingly sophisticated model of the sewer system including information on the different reasons for blockages in different areas. The Task Group believes that Thames Water should share this information with the Council at the earliest opportunity. In particular, it is particularly important that Thames Water provide detailed information on parts of the sewer network identified on the public register of Flood Risk Management Assets.

**Recommendation Fourteen: Flood Risk Management Assets**

Thames Water, in order to abide by their obligations under the Flood Water Management Act, should share all information in respect to the sewer system in and around the London Borough of Hammersmith and Fulham, with particular emphasis and urgency given to any part of the sewer network identified on the public register of Flood Risk Management Assets.

**The Planning Process**

- 3.15. Thames Water stated to the Task Group that they were proactively engaged in the planning process. They stated that they aimed to review all local planning applications, although acknowledged that this was not always possible due to resource limitations. The Task Group acknowledged that Thames Water were an important part of the planning process and appreciated the role they played. Nonetheless they felt that Thames Water could play a more substantial, and perhaps more targeted role, in the planning process. The Task Group felt that they needed to work more closely with the Council in order to bring this about. The Task Group acknowledged, due to time and resources, that it was not feasible for Thames Water to review every planning application submitted.



3.16. The Task Group did note that the Council has an obligation under the Local Development Framework to assess the impact of flooding risk. It was felt that any application the Council felt merited additional scrutiny in terms of its impact on flooding risk should be passed onto Thames Water for their comments. In addition the Task Group felt it would be highly beneficial if Thames Water conducted a review into their role in the planning process. The Task Group heard that in many cases Thames Water had not supported the Council when the planning department had expressed reservations in respect to what steps applicants had taken to address the problems of surface water flooding. Thames Water instead focused on whether the sewer system had sufficient capacity for the proposed development. Unless there is a more joined up approach in respect to planning representations the Task Group were concerned that planning applications which did not to include appropriate sustainable drainage systems, and systems to reduce the amount of water discharged to the foul water drainage, would be permitted due to a lack of representations.

### **Recommendation Fifteen: Planning Applications Assessments**

It is recommended that the Council and Thames Water undertake a review into how they share information on planning applications, how planning applications flood risk assessments are processed, prioritised for comment and referred. This should include agreeing the criteria for referral to Thames Water for consultation on specific applications that warrant a surface water flooding perspective. Additionally both the Council and Thames Water, if making representations, should take into account the interlinking nature of their respective flooding roles and make any representations they see fit in this light.

## **ENGAGEMENT: LOCAL RESIDENTS**

### **Overview**

3.17. A study by Norwich Union of 1,500 UK residents living in areas hit by the summer 2007 floods revealed that people had done little or nothing to reduce the risk of future damage. Some 83% of people living in Gloucester, Tewkesbury, Hull, Sheffield and Rotherham took the view that there was nothing they could do to protect their homes from flooding, and 95%, at the time of the survey, had not taken any measures to protect their properties from flooding. Some 46% of people surveyed said that they had chosen not to make any changes to their property because they “wanted their home put back exactly as it was before”. 46% said that they did not think it was their responsibility to make changes and that this responsibility lay with their local council or with the Government. These findings are especially alarming as the survey was undertaken in severely flood-hit areas not long after the event. Additionally the Pitt Review found evidence which showed that public awareness diminishes greatly following a year or so without any flooding – highlighting how difficult it is to get people to change their behaviour.





3.18. Recent research commissioned by DEFRA also looked into the nature of some of the barriers to change. The survey indicated that, whilst householders and small business could often recognise the benefits, including reductions in the disruption caused by floods, long-term financial savings and feelings of greater safety, the main factors deterring take-up were:

- ▶ Low awareness of the available measures, with only one in ten householders being able to think of a flood resilient measure.
- ▶ Concerns about impacts on the appearance of the property.
- ▶ Not wishing to be reminded of the risk.
- ▶ Concern that such measures might adversely affect property values or make them hard to sell.

### **Information Sharing**

3.19. From the evidence above and the oral evidence given to the Task Group it is clear that there is much that needs to be done in order to better engage and educate the public about flooding risk. In order for the Task Group to hear from residents about their ideas, stories and the problems they have encountered with flooding in the borough a public consultation was established. The consultation was put online and was also available for Council staff via the staff intranet. Advertisements for the scrutiny consultation on flooding were placed, including in the Chronicle newspaper and in the Council newsletter, which has a distribution of around 20,000 people. However, despite this wide advertisement, only 23 people responded to the consultation. The low level of responses was disappointing but perhaps further reinforces the difficulties facing the Council in with engaging with the public on flooding risk. It may also explain why the take up of FLIPs, despite wide publicity, has been nominal. Nonetheless the responses from residents were very helpful to the Task Group in gaining a greater insight into the problems experienced by residents with flooding in the borough and their ideas about how to mitigate flooding risk.

3.20. The great majority of respondents had suffered from flooding, with a substantial majority being affected by flooding in their basements. This is in line with the oral evidence presented to the Task Group. A number of residents expressed deep reservations about the amount of impermeable surfaces that were being permitted in borough, raising particular concern about people extending into their gardens. Some respondents also highlighted the problems caused by people paving over the front of their properties. There was broad agreement that Thames Water needed to do more to maintain and enhance the sewer network. In addition some respondents wished to see an increased number of FLIPs installed. Respondents offered a number of solutions to mitigating surface water flood risk. These included rainwater harvesting, porous paving, water attenuation areas, banning non-porous paving for front and back gardens, green roofs, increased tree planting, higher capacity sewers and more regular and thorough clearing and cleaning of gullies.

3.21. One respondent, who claimed to have suffered from basement flooding as a result of a blocked highway drain, noted that although their insurance company had been “good” their insurance premiums had risen as a result. The Task Group have already noted their concern that many residents are fearful of reporting flooding incidents

due to the belief it will be detrimental to the sell on value of their property and also will result in increased insurance premiums.

- 3.22. Mr Matt Cullen, Policy Advisor at the Association of British Insurers (ABI) with responsibility for flooding and climate change policy, gave evidence to the Task Group. He noted, due to the current limitations with modelling flood risk for individual properties, that insurance companies tended to not take into account of any SUDs, or property protection measures, owners had put in place when calculating their insurance premium. However insurance companies did take into account any historical data they had on record of flooding of individual properties when calculating insurance premiums.
- 3.23. The Task Group were concerned that this stance was likely to dissuade homeowners from installing SUDs, or property protection measures, in their properties, as they were unlikely to receive a financial benefit by way of a lower insurance premium, and also discourage them from reporting flooding incidents, as they were fearful of incurring a higher insurance premium, thereby making it harder to identify high risk flooding areas. The Task Group hoped, as modelling became more sophisticated, that insurers would take into account any positive measures homeowners took to protect their properties and reflect this in their premiums.
- 3.24. In the UK flood risk insurance is currently provided under the Statement of Principles on the provision of flood insurance as per the agreement between the ABI and the Government. The statement binds insurers to offer flood insurance to homes and small businesses where the risk of flooding is lower than a 1 in 75 year event and where the property is already insured. For properties at a greater risk, insurance is available on the condition that flood defences are planned to be built to reduce the risk below that limit within 5 years.
- 3.25. The Statement of Principles will come to an end on 1<sup>st</sup> July 2013. At present the insurance industry is arguing it needs to see more commitment from the Government on spending on flood defences before it is willing to commit itself to providing flood insurance beyond 1<sup>st</sup> July 2013. Additionally they claim that that, at present, people in lower risk flood areas pay more in premiums than would otherwise be the case to subsidise those at higher risk.

**Recommendation Sixteen: Flooding Insurance**

It is recommended that the Council make a representation to the Department for Environment Food and Rural Affairs (DEFRA) stating that the insurance industry should take greater account of any sustainable drainage systems (SUDs) or other property protection measures incorporated into a property when calculating its insurance premium.

- 3.26. In oral evidence from the then Deputy Leader of the Council, Councillor Nick Botterill, and Simon Jones, Assistant Director for Communications, the Task Group heard that the Council had sought to publicise the risks of flooding and potential SUDs solutions through advertisement in the local press and leaflet drops in perceived high risk flooding areas. The limited take up of FLIPs by local residents, despite the fact that Thames Water currently installs them at no cost, indicates that this method of communication is not effective.

- 3.27. When the Task Group enquired about how Northamptonshire County Council had sought to engage with local residents the Task Group heard how Ms. Bateman had organised a 'Flood Fair,' held over three days and attended by over 240 people, in partnership with a wide range of other stakeholders including local community groups, water companies and the Environment Agency. This three day event had proved successful in collecting information on historical flooding incidents, increasing awareness of flooding risk and clarifying responsibilities.
- 3.28. The Task Group were impressed with the success of this event and hoped it could be replicated in the LBHF. In particular the Task Group felt it could help educate attendees as to the new responsibilities for the Council. For example as a Lead Local Flood Authority the Council has a duty to "determine whether, in its opinion, there is a significant flood risk in its area and identify the part of the area affected by the risk."<sup>11</sup> In the view of the Task Group a significant flood risk is any area in the borough which would be disproportionately affected by a 1 in 30 flooding event.
- 3.29. The Task Group feels it would be useful to consult with local community groups, residents and other interested parties through the forum of a 'Flood Fair' to see whether they agree with such a stance. In addition, if a Flood Fair can be arranged after the public register of Flood Risk Management Assets has been completed, it would offer attendees an opportunity to take note of those assets which had been identified and suggest additional assets. Attendees could also be made aware that the Council now has a responsibility to investigate significant flooding events, perhaps making them more willing to engage with the Council and report flooding events. The Task Group felt it was important to re-assure people, in a bid to encourage them to share information they have on flooding in the borough, that any information provided was for high level strategic planning and their individual data will not be shared.

#### **Recommendation Seventeen: A Flood Fair**

It is recommended that the Council hold a Flood Fair. The aim of the Flood Fair should be to collect historical information on flooding incidents, increase awareness of flooding risks and clarify responsibilities between the responsible flooding parties. Other stakeholders, such as Thames Water, the Environment Agency, the Department for Environment Food and Rural Affairs (DEFRA), and companies that provide sustainable drainage systems (SUDS) and other flooding prevention systems should be invited along. All residents that the Council is aware have suffered from flooding in the past should be invited as well as community groups. Ideally the event would be held over a number of days in different parts of the borough.

#### **Working Together**

- 3.30. As has been stressed earlier in this report, due to the current limitations in surface water and groundwater mapping, the Council, in order to identify high risk flood areas, is reliant upon people living and working in the borough reporting flooding events as they occur. As has already been discussed many people are unwilling to provide this information to the Council or other responsible parties. Additionally the majority of residents in the borough are either unaware of the flooding risk in the

<sup>11</sup> The Flood Risk Regulations 2009.

borough or chose to disregard the risk. This is demonstrated most strongly through the limited installation of FLIPs, despite their wide publicity from the Council and Thames Water about their free availability. The Task Group therefore concluded that there is a deficiency in the current communication approach being pursued by the Council.

- 3.31. It should be stressed that this deficiency, in the view of the Task Group, was not unique to the Council and was a UK wide problem. It was further noted by the Task Group that the Council had been more pro-active than other lead Local Flood Authorities in attempting to highlight the risk of flooding to residents. Nonetheless it was felt that it would be appropriate for the Council to explore alternative ways in engaging and working with residents. The Task Group felt, in light of the current difficulties in accurately identifying high risk flood areas, that instead of attempting to reach all residents through, for example, articles in the Chronicle, that a more targeted approach should be adopted. During evidence the Task Group heard how Thames Water were undertaking a sustainable drainage pilot in the borough and were currently seeking to identify suitable sites for this pilot. The Task Group felt this pilot presented a good opportunity to engage with Thames Water and local residents.
- 3.32. The Task Group also believed that the Council should make greater efforts to engage with resident associations and other community forums, such as neighbourhood watch schemes, to highlight flood risk. This could be achieved either through briefing the Chair of relevant association or by Local Councillors or Council officers attending meetings and informing residents directly of the risks and possible solutions available to them. It was hoped that such an approach would result in a greater understanding and appreciation of the flooding risks in the borough.
- 3.33. The Council should continue to promote information about flooding risk on its website. In addition it should seek to use either local media, such as via the Council's section in the Chronicle, or social media such as the borough's Twitter feed, to promote flooding prevention measures available to local residents during times when flooding risk is more likely to capture residents attention because, for example, there have been flooding events in the borough or in the UK. The Task Group notes that the day the public consultation was launched was the same day that Thames Water introduced its hosepipe ban. It is suggested that the hosepipe ban may have meant people were less concerned about the impact of flooding, and hence can partly explain the limited number of consultation responses.
- 3.34. Finally, if the Council is contacted by residents to report flooding incidents, they should use the opportunity to engage directly with residents and alert them to possible SUDs and other protection measures, they could implement either themselves or via Thames Water and their FLIPs programme. The Council should endeavour to follow up with these residents some time after the flooding event, six months for example, to see what steps if any have been taken and understand why, if no steps have been taken, this is the case. The Task Group felt, given the high proportion of residents who rent in the borough, that such an approach may help identify landlords who are not fulfilling their responsibilities to their tenants.

**Recommendation Eighteen: Community Engagement**

It is recommended that the Council seek to engage with residents through Residents Associations and other community forums.

**Recommendation Nineteen: Flooding Advice**

It is recommended that the Council continue to offer advice to residents online about flood risk. In addition, at times when it is felt flooding risk is more likely to concern the public; the Council should promote the possible sustainable drainage systems (SUDs) available to residents via local and social media. The Council should encourage local residents to maintain and increase the permeability of back gardens by providing advice and guidance, particularly in those areas most at risk of surface water flooding.

**Recommendation Twenty: Flooding Incidents**

It is recommended that, when the Council is alerted to a flooding incident in the borough they should attempt to make direct contact with those affected and advise them of the possible sustainable drainage systems (SUDs) available to them. They should follow up with these residents after a six month period to see what steps they have taken to mitigate future flooding problems.

# Witnesses

The following people and organizations provided oral evidence to the inquiry:

- Councillor Nicholas Botterill – *hitherto* the Cabinet Member for Environment and Asset Management, The London Borough of Hammersmith and Fulham
- Pat Cox - Head of Policy and Spatial Planning, Environment Services Department, The London Borough of Hammersmith and Fulham
- Gordon Prangnell - Head of Highways and Construction, Environment Services Department, The London Borough of Hammersmith and Fulham
- Clare Share – Flood Risk Manager, Environment Services Department, The London Borough of Hammersmith and Fulham
- Mark Hodgson – Highways Maintenance Manager, Environment Services Department, The London Borough of Hammersmith and Fulham
- Paul Baker – Senior Environmental Policy and Projects Officer, Environment Services Department, The London Borough of Hammersmith and Fulham
- Elizabeth Fonseca – Environmental Quality Manager
- Simon Jones - Assistant Director-Communication, The London Borough of Hammersmith and Fulham
- Chris Welsh – Parks Development Officer, Resident Services Department, The London Borough of Hammersmith and Fulham
- Stefan Czeladzinski - Biodiversity & Horticulture Officer, Resident Services Department, The London Borough of Hammersmith and Fulham
- Josie Bateman - Project Manager (Flood and Water Management), Northamptonshire County Council
- Matt Akers, Graham Cowell (Area Flood Risk Manager) - The Environment Agency, South East Region, North East Thames Area
- Tom Sly – The Environment Agency, South East Region, North East Thames Area
- Mark Dickinson, – Thames Water
- Kyle Robins – Thames Water
- David Harding – Thames Water
- Elisabeth Sale – Thames Water
- Matt Cullen - The Association of British Insurers.



Governance & Scrutiny  
London Borough of Hammersmith and Fulham Hammersmith  
Hammersmith Town Hall  
King Street  
London  
W6 9JU

e mail - [Scrutiny@lbhf.gov.uk](mailto:Scrutiny@lbhf.gov.uk)

[www.lbhf.gov.uk/scrutiny](http://www.lbhf.gov.uk/scrutiny)