

Managing flood risk in Camden

The London Borough of Camden flood risk management strategy



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Foreword



Camden was fortunate to avoid the serious national floods of 2007 and 2012, which caused so much damage and misery for those affected. However we know that Camden is at risk from flooding because we experienced significant floods in both 1975 and 2002.

The probability of such events happening again is only likely to grow as climate change increases the frequency of extreme weather. While Camden will not see flooding as regularly as other parts of the country, when it does happen the impact could be serious due to the topography and densely populated nature of the borough.

Flooding can have major economic impacts too. Camden's 2002 floods caused over £1million worth of damage without even taking into consideration the costs to individual residents.

These costs can include serious social impacts with people unable to return to their homes and suffering stress as a result.

For this reason reducing the long-term risk of flooding is not only a sensible investment but also an important task, not just for the Council but for everyone. It's not something that any one organisation can do on its own, because it needs co-operation between public agencies, businesses and households.

Taking effective steps to reduce flood risk, especially at a time of limited funds, requires an evidence based assessment to ensure that efforts and resources are appropriately focused. Some areas identified as being at risk may not have flooded in living memory, but changes in weather patterns and the landscape of an area could alter this and it is crucial that we take steps now to identify and tackle future problems.

This strategy highlights both the good work we have already done to manage flood risk and the steps we are looking to take. It is impossible to ensure that homes are never flooded, but practical steps can be taken to reduce both the likelihood of severe rainfall leading to flooding and also the impact of any flooding that does occur.

A public consultation ran during February and March 2013. This was a valuable process which helped us to better understand the areas with flooding and the issues that residents want considered as we manage flood risk in Camden.

While flooding is not, and hopefully never will be, an issue that is constantly on the mind of residents, the actions detailed in this strategy will ensure that if and when it does happen, we are as prepared as we reasonably can be.

A handwritten signature in black ink, appearing to read 'Phil Jones', written over a light blue background.

Councillor Phil Jones

Cabinet Member for Sustainability

2. Executive summary

The London Borough of Camden ('the Council') has a new role as the Lead Local Flood Authority (LLFA) for the borough. This strategy states what actions the Council and other key stakeholders will take to manage flood risk in Camden.

The strategy has four key objectives:

1. To understand and explain the level of risk affecting the residents and businesses of Camden
2. To provide an action plan for areas at particular risk from surface water flooding
3. To highlight the actions that all partners, businesses and residents in Camden should be taking to manage flood risk
4. To take a sustainable and holistic approach to flood management, seeking to deliver wider environmental and social benefits.

Understanding the level of risk

The key flood risk to Camden is from surface water flooding. Surface water flooding occurs when the volume and intensity of a rainfall event exceeds the capacity of the drainage system. This was the cause of the two major flooding incidents in Camden in 1975 and 2002.

Camden also has a small risk of groundwater flooding which occurs when the water table rises to ground level and inundates low lying areas.

There is a low risk of flooding from the Regent's Canal and the Hampstead Heath Ponds although if there was a breach in the ponds the effects would be severe. Responsibility for maintaining the Canal and the Ponds lies with the Canal & River Trust and the City of London Corporation respectively. Camden is at no risk of flooding from rivers or the sea.

Action plan for areas at particular risk

For the purpose of developing actions to mitigate the risk of flooding, Camden has been divided into three areas: North, South and West.

- Camden North covers all the areas surrounding Hampstead Heath east of Spaniards Road (ie Hampstead Village, Gospel Oak, Dartmouth Park and Highgate).
- Camden West covers West and South Hampstead as well as Kilburn.
- Camden South covers a large area starting in Belsize Park and Camden Town and going through St Pancras to Holborn and St Giles' Circus.

For each of these areas key actions have been identified to manage the flood risk in the area. Table 2.1 highlights the key actions planned for each of these areas to reduce the level of flood risk. Some of these actions are subject to funding being awarded through partnership funding (see p15). These range from studies identifying the causes and options for an area, through simple maintenance regimes, to full capital schemes to permanently reduce the risk of surface water flooding.

Table 2.1 Actions for reducing flood risk in Camden North, South and West

Area	Action	Deadline
Camden North	Completion of review of risk from Hampstead Heath Ponds	March 2013 (Completed)
Camden North	Delivery of Project Appraisal Reports for Gospel Oak and Hampstead	April 2013 (Completed)
Camden North	Begin investigation of Royal Free Hospital flood risk	June 2013
Camden North/South	Complete modelling of Thames Water sewer system in Highgate and South Camden	July 2013
Camden West	Complete Project Appraisal Report for West Camden	September 2013
Camden North	Complete consultation on preferred option of Hampstead Ponds	September 2013
Camden North	Submission of Detailed Planning Application for Hampstead Heath Ponds by City of London	February 2014
Camden North	Finish assessment of Royal Free Hospital flood risk	March 2014
Camden South	Maintenance of Primrose Hill siphon	On-going

Actions to manage risk

As well as taking specific action to remedy recognised flood risk, there are also important actions that are necessary for flood risk management such as preventing flood risk increasing, improving our understanding of flood risk and ensuring that we are ready to respond should a flood event occur. Table 2.2 highlights the key actions that have already been taken to achieve these goals and what more will be done.

Table 2.2 Actions to improve flood risk management

Area	Action already taken	Actions to be done
Understanding more about risk	<ul style="list-style-type: none"> • Production of Preliminary Flood Risk Assessment • Extended modelling of the borough 	<ul style="list-style-type: none"> • Flood investigations reports for any major new flood incidents • Production of Flood Hazard and Flood Risk Maps
Recording and maintaining assets	<ul style="list-style-type: none"> • Regular maintenance of assets that affect flooding 	<ul style="list-style-type: none"> • Publication of asset register of most significant flood assets in the borough • Designation of significant assets to ensure they are maintained in current form where necessary
Responding to flood incidents	<ul style="list-style-type: none"> • Development of Multi-Agency Flood Plan 	
Approving new developments	<ul style="list-style-type: none"> • Develop planning policy which ensures that new developments are not at flood risk and do not increase it for neighbours 	<ul style="list-style-type: none"> • Prepare for introduction of SuDS Approval Bodies • Assess need for refreshed Strategic Flood Risk Assessment

Communicating with the public on flood risk

Flood risk is an emotive issue and explaining the risk to residents and businesses has to be done carefully. This is especially true in Camden where there are few visible signs that flooding could be a risk. For example, 2012 was an extremely wet year but there was no significant flooding because it rained regularly but never in the intense bursts necessary to cause surface water flooding. The cumulative impact may have led to an increase in the risk groundwater flooding however.

The key messages are:

- Flooding is something that is rare in Camden but when it does occur the impact can be severe and it is crucial that everybody is prepared for it
- It is important that we increase our knowledge of where there is a risk of flooding so that we can look to reduce that risk. Without that knowledge we cannot take action.
- We can never be sure to individual property level where will be affected by flooding and shall not publish maps that suggest we can.
- The council has a programme of work to improve flood risk where practical affordable solutions can be found.

Publicly consulting on this strategy was the first step in engaging with residents about flood risk. All planned schemes will be consulted on through existing groups so as to ensure that people are able to hear about what is planned and raise their concerns early on, in the context of addressing the problem.

As well as consulting on the strategy itself, all planned schemes will be consulted on through existing groups so as to ensure that people are able to hear about what is planned and raise their concerns early on, in the context of addressing the problem.

Deliver wider environmental and social benefits

Flood risk management is an environmental activity and the strategy needs to support both local and national plans for sustainable development i.e. development which recognises the interlinking of social, economic and environmental needs and ensure that it can satisfy the needs of today while making sure that future generations can also look forward to the same quality of life.

It does this by considering key national plans such as the Water Framework Directive and the Strategic Environment Assessment (SEA) directive, as well as local plans such as Camden's environmental sustainability plan (2011-2020) Green Action for Change.

3. Glossary

Acronyms	
DEFRA	Department for Environment, Food and Rural Affairs
FRMS	Flood Risk Management Strategy
LDF	Local Development Framework
GLA	Greater London Authority
SAB	SuDS Approval Body

Acronyms	
SEA	Strategic Environment Assessment
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
LLFA	Lead Local Flood Authority
PFRA	Preliminary Flood Risk Assessment
CPG	Camden Planning Guidance

Terms	
Adoption (of SuDS and watercourses)	The process of taking ownership and assuming the associated responsibilities.
Asset record	A database of designated local flood risk assets, including a map of assets across Camden, available for public use.
Asset register	A database of designated assets, including further information on each asset and ownership, for use by Risk Management Authorities.
Designating (of flood or coastal erosion assets)	If an asset becomes 'designated' its owner cannot alter or remove it without first consulting the designating risk management authority.
Drain London	A project by the Greater London Authority which helped Lead Local Flood Authorities in London to meet their requirements around understanding flood risk.
Flood hazard map	Maps which show the flood extent, water depths or levels and where appropriate the flow velocity, or the relevant water flow for a particular rainfall event.
Flood risk management plan	A requirement of flood risk regulations producing a plan for each of the 10 indicative flood risk areas every six years beginning in 2015.
Flood risk map	Map which shows the potential adverse implications of a particular rainfall event including the number of people affected as well as infrastructure and businesses.
Groundwater	All water which is below the surface of the ground and in direct contact with the ground or subsoil.
Indicative flood risk area	10 large urban areas which have been identified as having the largest cumulative risk of surface water flooding. Camden is part of the Greater London Indicative Flood Risk Area.
Initial assessment	A high level study to determine what locations might be suitable for flood alleviation schemes. If the Initial Assessment is successful then a project appraisal report for each location will be commissioned.
Partnership funding	DEFRA funding mechanism for flood alleviation schemes which calculates a set amount of funding for any scheme based on cost-benefit ratio. Any further funding required to deliver the scheme must be found locally.

Terms	
Lead Local Flood Authority	The Lead Local Flood Authority is the organisation with strategic responsibility for managing groundwater and surface water flooding. In Camden that organisation is the council
Project appraisal report	A feasibility study which considers potential capital schemes to alleviate flood risk. If a suitable option is found it is used as the business case for partnership funding.
Risk Management Authority (RMA)	District and borough councils, lead local flood authorities, the Environment Agency, water companies, highways authorities and internal drainage boards.
Siphon	A tube in an inverted U shape which causes a liquid to flow uphill, above the surface of the reservoir, without pumps.
Surface Water	Rainwater (including snow and other precipitation - which is on the surface of the ground (whether or not it is moving), and has not entered a watercourse, drainage system or public sewer
Sustainable Drainage Systems	Drainage systems which look to store rainwater on site before slowly draining out to the ground and sewer system. This helps to prevent surface water and sewer flooding and can also bring amenity and water quality benefits

4. Introduction

The Flood and Water Management Act, 2010, gave the Council strategic responsibility for managing flood risk in the borough. This Flood Risk Management Strategy (FRMS) explains how we and other stakeholders will manage flood risk. It identifies the likelihood of flood risk in the borough and the responsibilities all stakeholders have to manage it. It also states specific actions to reduce the risk of flooding in areas at greatest risk.

The work identified in this strategy will help to reduce the risk of flooding but cannot stop flooding occurring. All stakeholders will work to decrease both the probability and the impact of flooding but it may still happen. This is why it is important that all residents, businesses and other institutions are aware of their responsibilities. Information about their responsibilities will be published on our website and can be found in Appendix C.

4.1 Strategy objectives

The objectives of the FRMS are as follows:

1. To understand and explain the level of risk affecting the residents and businesses of Camden
2. To provide an action plan for areas at particular risk from surface water flooding
3. To highlight the actions that all partners, businesses and residents in Camden should be taking to manage flood risk
4. To take a sustainable and holistic approach to flood management, seeking to deliver wider environmental and social benefits.

4.2 Guiding principles

Underpinning the FRMS are guiding principles which inform our overall approach to flood risk management in Camden:

- 1) Flooding is a natural event that will sometimes occur despite all efforts to prevent it. It is important to focus not just on measures to prevent it but also on reducing the disruption that flooding causes when it does happen.
- 2) Effective flood risk management can reduce long-term flood damage costs and is a worthwhile investment for both the public and private sector.
- 3) Decisions on where local resources are focused should be evidence-based and made against clear criteria.
- 4) Improving the level of knowledge about flood risk across all stakeholders is a vital process which needs to be continued.
- 5) No single organisation can effectively manage flood risk alone and co-operation is needed from public agencies, the private sector and households.

4.3 Why are we doing this?

Camden was fortunate to avoid the national floods of 2007, which affected over 55,000 homes and businesses across the UK and caused £3 billion worth of damage, showing what a serious risk flooding is. After the 2007 floods, the Flood and Water Management Act (2010) was introduced to provide legislation for the management of risks associated with flooding and coastal erosion.

The Flood and Water Management Act gives the Council two new major responsibilities. We are now the Lead Local Flood Authority (LLFA) for our area, with a range of new local flood risk management duties, as well as the SuDS Approval Body, responsible for assessing the drainage implications of new building developments.

In our role as the LLFA, we must develop, maintain, apply and monitor a strategy so as to manage surface runoff and groundwater flooding in Camden.

Appendix A provides information about other documents which affect flood risk management and Appendix B provides a brief guide to other Acts that are relevant to flood risk management.

A review of the strategy will take place by December 2015 in consultation with key stakeholders. A fuller review with public consultation will then take place to coincide with the Greater London Flood Risk Management Plan 2021. In the event of either a major flooding incident or a significant change in the legislation, the timing of this may be reviewed.

4.4 Supporting the environment

Flood risk management is an environmental activity and the strategy needs to support both local and national plans for sustainable development (i.e. development which recognises the interlinking of social, economic and environmental needs) and ensure that it can satisfy the needs of today while making sure that future generations can also look forward to the same quality of life.

It does this by considering key national plans such as the Water Framework Directive and the Strategic Environment Assessment (SEA) directive, as well as local plans such as Camden's environmental sustainability plan (2011- 2020), Green Action for Change. More information about these plans can be found on Appendix A.

¹ LLFAs are also responsible for managing ordinary watercourses (i.e. open streams and ditches which are not considered main rivers) but there are no ordinary watercourses in Camden.

² The Flood Risk Regulations 2009 require Flood Risk Management Plans every six years starting in 2015. See p14 for more details

4.5 Stakeholders

The Flood and Water Management Act 2010 identifies the Council, the Environment Agency and Thames Water as the risk management authorities (RMAs) for the area with new responsibilities.

In addition, the following stakeholders have been identified:

- Residents and businesses
- Greater London Authority/Transport for London
- City of London Corporation
- Neighbouring London boroughs
- Network Rail
- Canal & River Trust

Appendix C gives an overview of stakeholders' responsibilities. The responsibilities of residents and businesses will be published on the Camden website.

Case study – working with stakeholders on project appraisal reports

We produced feasibility studies for flood alleviation schemes for Hampstead Town and Gospel Oak to tackle the potential risk of surface water flowing off Hampstead Heath and into properties south of it. While this would only happen in an extreme rainfall event, the potential impact is significant enough for it to be worth investigating whether preventative action could take place.

In developing this feasibility study, we have worked with the following stakeholders:

- The City of London Corporation which is responsible for the Hampstead Heath ponds and whose plans for changes to the ponds have fed into the feasibility study
- Network Rail which manages the London Overground line which would be severely affected in this event
- Thames Water, which is providing important information about the drainage system for the area
- The Environment Agency, which has expertise in flood risk management and potential funding for the scheme
- English Heritage, which is advising on ensuring any changes preserve the Mansfield and Dartmouth Park Hill conservations areas

By bringing all of these parties together early on in the development of the plans, we are able to quickly identify potential problems as well as opportunities to link the scheme with any other projects in the area. This gives us the confidence that, when we consult residents, we will be putting forward options that have considered all the major concerns and are effective and realistic proposals.

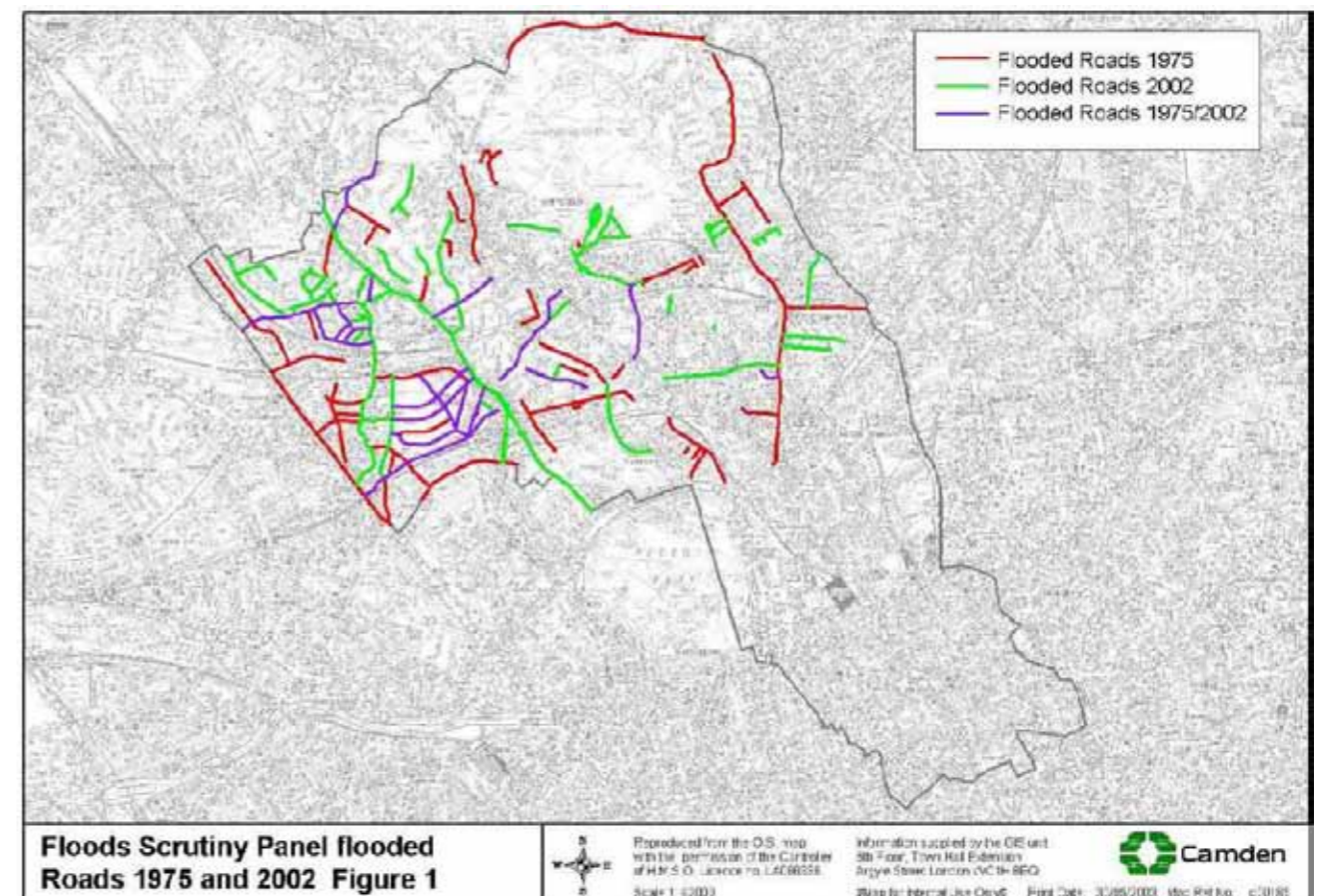
5. Flood risk in Camden

5.1 History of flooding

There have been two major flooding incidents recorded in recent history in Camden, taking place in 1975 and 2002.

The 1975 flood was caused by a severe storm between 5.30pm and 8.00pm on 14 August 1975. It caused extensive flooding in West and South Hampstead as well as Gospel Oak, Kentish Town, Belsize Park and Camden Town. It was the heaviest and most concentrated rainfall event since records began for this part of Camden, with 150mm falling in two and a half hours. The drainage capacity of drain pipes, road gullies and sewers was unable to cope with the volume of surface water runoff involved.

Fig. 5.1 - Map of flooded roads in 1975 and 2002 floods



The 2002 flood was less severe but still saw 60mm fall in just under an hour during the evening of 7 August 2002. This rainfall event had a 1% chance of happening in any year or 1 in 100 year return period. The resultant flooding inflicted considerable damage on Camden residents and their homes, public services and facilities, and private businesses. Nearly all the flooding occurred north of the Euston Road, and primarily in West and South Hampstead (NW2 and NW6 postcode areas), although there was also flooding in parts of the NW3 postcode area, in Kentish Town (NW1 and NW5), and on a few other roads elsewhere. These floods caused at least £1 million without including costs to individual residents .

5.2 Surface runoff, groundwater and sewer flooding

Camden is not at risk from flooding from the sea or rivers. It is primarily at risk from surface water runoff (i.e. rainwater that is on the surface of the ground and has not entered a watercourse, drainage system or public sewer), groundwater or flooding from sewers which have been filled beyond capacity due to heavy rainfall. All of these situations are only likely to occur in extreme rainfall events such as 1975 and 2002.

The risk from groundwater flooding in Camden is uncertain and more information is required to build up an understanding of it. Groundwater flooding occurs when the water table rises to the ground surface and inundates low lying areas. There are a small number of recorded incidents of groundwater flooding in basements and cellars. This has become more prevalent following the heavy winter rainfall of 2012-13 but much of it may still be unrecorded. The Environment Agency has published a map of areas most susceptible to Groundwater (Map 4 in Appendix D). However there have been several reports of flooding in areas not included in the map.

There is also the risk of water main pipes bursting, causing flooding as happened in July 2012 on Kilburn High Road. These are not caused by rainfall events and are the responsibility of Thames Water who maintain the water supply network in Camden.

5.3 Risk from bodies of water

While there is no flood risk from rivers or the sea, Camden does have a number of water bodies which pose a very low risk. The Regent's Canal is owned by the Canal and River Trust (see Appendix C). This has been identified as low risk in the Camden Multi-Agency Flood Plan.

The Maiden Lane Reservoir in Islington is a covered service water reservoir owned by Thames Water which could pose a risk to Camden residents if there was a breach. Thames Water has declared the risk of failure at Maiden Lane to be low. It is regularly checked and should any fault be detected it can be safely and rapidly emptied before any off site response is required.

The Hampstead Heath ponds consist of two chains of earth banked reservoirs and ponds situated on Hampstead Heath and are predominately owned by the City of London Corporation and English Heritage. All are managed by the City of London Corporation, except the top two ponds in the Highgate Chain which are managed by English Heritage.

Work by the City of London Corporation has identified that there is the potential for significant loss of life in the unlikely event that one of the major dams on either of the chains were to be breached. A specific on-site emergency plan has been developed by the City of London Corporation. Work to further reduce this risk is currently being considered by the City of London Corporation, see p.20.

While historically Camden had a number of rivers including the Fleet and the Tyburn running through it, these were incorporated into the sewerage system in the 19th century. More information on Camden's lost rivers can be found on the website www.camden.gov.uk.

5.4. Increasing understanding of flood risk

As extreme rainfall events do not happen regularly but cause serious damage when they do occur, it is necessary to model the effect of such rainfall events on the borough. This is particularly important because climate change has been predicted to increase the likelihood of major rainfall events. However it would be risky to rely fully on modelling, which is why it is important that any significant flood events are fully investigated as well.

Modelling surface water flood risk

We have commissioned extensive modelling to fully understand the surface water flood risk to the borough. This is not detailed enough to determine which individual properties would be affected, but can be used to identify areas where we should focus our resources. There will always be factors that cannot be captured on a model which will prevent models being fully accurate to property level.

This modelling process was begun by Drain London, the GLA programme to improve understanding of surface water flood risk in Greater London. Drain London helped deliver Preliminary Flood Risk Assessments and Surface Water Management Plans for every London borough. This process helped provide a consistent baseline across the whole London which Camden has now expanded on with its own detailed modelling (see Case Study-Modelling the Flood Risk in Camden).

In addition to this modelling, Camden will be undertaking work to meet its responsibilities under the Flood Risk Regulations 2009. Camden completed the Preliminary Flood Risk Assessment in December 2011. As part of the work to develop the Preliminary Flood Risk Assessment, Greater London was identified as one of the 10 major surface water flood risk zones in England.

As a result, Flood Hazard and Flood Risk Maps for Greater London will need to be published by December 2013. Camden is in discussion with the Environment Agency about these maps and will agree both the information shown and the level of confidence with them before they are published.

There is also a requirement for a Flood Risk Management Plan for Greater London to be published in December 2015. The Department for Environment and Rural Affairs (DEFRA) has been consulting on how this should be produced and will publish its proposals on how this will be delivered in 2013.

³ Report of the Flood Scrutiny Panel, London Borough of Camden, June 2003

Case study – modelling the flood risk in Camden

The GLA's Drain London programme produced Surface Water Management Plans (SWMPs) for all the London boroughs. These documents provided the first detailed modelling showing the areas in each borough most at risk of surface water flooding. However, because they were done at a pan-London level, they were unable to take account of local variation. For example in Camden, the drainage capacity is greater than in much of the country due to the incorporation of the river Fleet into the drainage system.

Consequently, we worked with Thames Water to produce a model (see Fig 5.2) that accounted not just for the flows of water above the ground, but also the drainage system below it. We were one of the first boroughs to produce such advanced local modelling which provided the evidence necessary to secure funding for feasibility studies in both the north and west of the borough. As a result of investing in this detailed modelling, Camden could become one of the first London boroughs to see a flood alleviation scheme brought in to tackle surface flood risk.

Fig 5.2 Model of a 1.33% probability storm



Flood investigation reports

As the LLFA, we have a responsibility to produce a flood investigation report for any significant flood events.

The decision of whether a flood event is significant or not is at the discretion of the LLFA. Current policy is that the following two criteria should be met:

- The incident resulted in internal flooding of a property
- There is ambiguity surrounding the source or responsibility of the flood (e.g. it is not clearly the result of a burst mains pipe)

Investigations will involve consultation with the relevant stakeholders, residents, landowners and private organisations involved, all of whom we expect to cooperate with us and provide comments. There will be a single Flood Investigation Report for each incident, even if it covers multiple properties.

The aim is for flood investigation reports to bring all useful information together in one place, providing an understanding of the possible causes of flooding and potential long-term solutions. Further recommendations will also be made to highlight potential flood risk management actions.

Reports will seek to provide a clear and thorough understanding of the flooding situation, but our duty to investigate does not guarantee that problems will be solved. Decisions to take action must be taken by the responsible parties and we cannot force other authorities into action. However the investigations can act as a catalyst for change.

Flood Investigation Reports will normally be published on our website within three months of an incident being reported to us. However, there may be cases where this timeframe will be extended (e.g. widespread flooding across the borough).

6. Delivering flood risk alleviation schemes

There is no obligation on any organisation to deliver flood defence or mitigation schemes to residents or businesses that are at risk of flooding.

New developments should be designed to be resilient to major flood events and will not receive any government support for flood mitigation schemes in the future. For existing homes and offices, there is limited central government funding available to support flood risk mitigation projects when there is a strong benefit to cost ratio.

6.1 Funding flood risk alleviation schemes

DEFRA plans to spend £1 billion over 4 years (2011-2015) on capital schemes through a new system called Partnership Funding whereby all flood risk alleviation schemes are offered a fixed subsidy based on the benefits delivered by the scheme. Following the 2012 floods, this was increased by a further £120 million.

In order to access this funding, the Council must apply to the Environment Agency's Thames Regional Flood and Coastal Committee with schemes to reduce flood risk in the borough.

If the funding provided is enough for the scheme to go ahead, then work can begin. If more funding is required then the Council will either have to reduce project costs or find alternative sources of funding. Alternative sources of funding include private contributions from residents and businesses that would benefit from the scheme, Thames Water if the proposed scheme fits with their plans to alleviate flood risk from sewer flooding or the Thames Local Levy which is a fund that all local authorities in the Thames region pay into.

The purpose of the partnership funding model is to promote further private investment rather than simply have a greater number of accessible public funding sources. The scheme aims to encourage communities to take more responsibility for the flood risk that they face and aims to deliver more benefit by encouraging total investment to increase beyond the levels that DEFRA alone can afford.

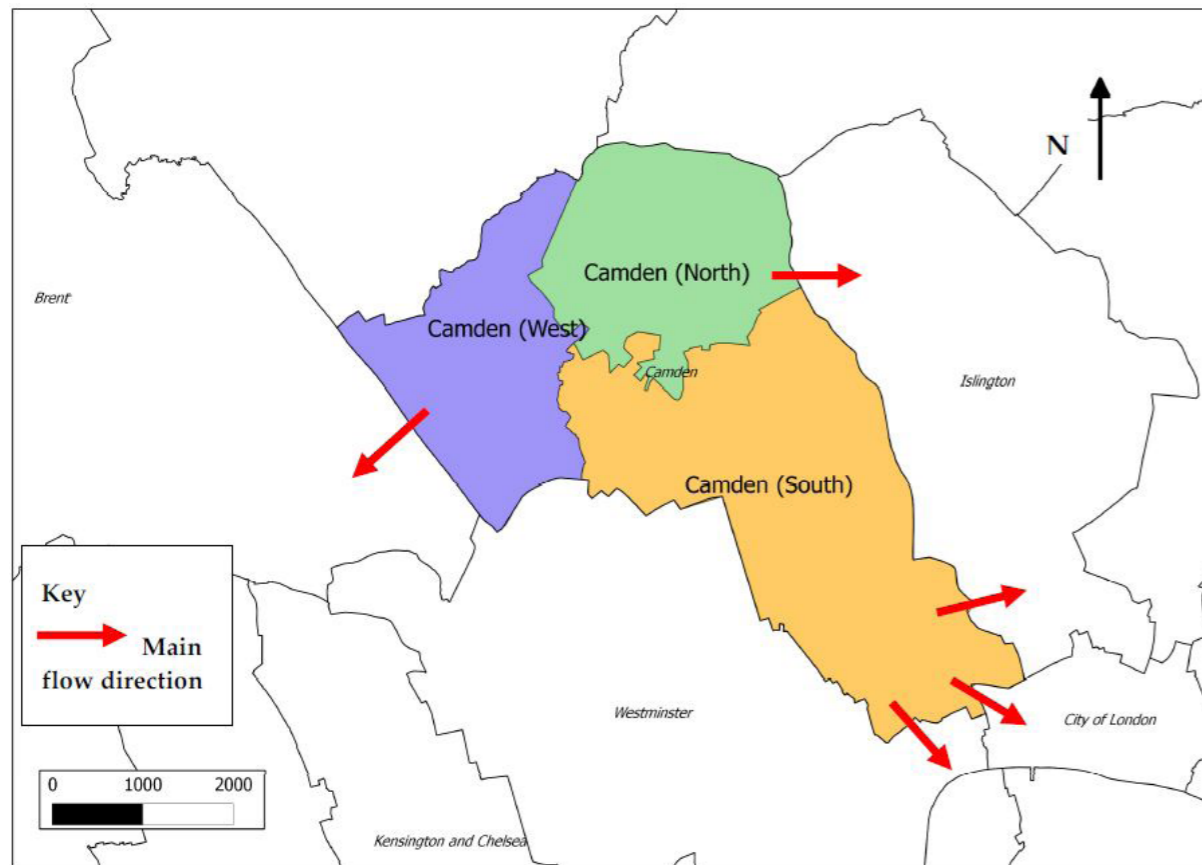
6.2 Delivering flood risk alleviation schemes

Once funding has been secured and the business case has been developed, the Council will lead on the project management of the scheme as well as community engagement.

The extensive modelling that we have commissioned (see p14) has identified areas of surface water flood risk throughout the borough with the most significant areas being largely to the north and west of the borough.

To help frame our approach to flood risk mitigation, Camden has been divided into three areas: North, South and West. Camden North covers all the areas surrounding Hampstead Heath east of Spaniards Road (i.e. Hampstead Village, Gospel Oak, Dartmouth Park and Highgate). Camden South covers a large area starting in Belsize Park and Camden Town and going through St Pancras to Holborn and St Giles' Circus. Camden West covers West and South Hampstead as well as Kilburn.

Figure 6.1 - Map of Camden flood areas and flows into neighbouring boroughs



6.3 Flood Alleviation schemes in Camden North

This area is at risk of surface water runoff in an extreme rainfall event, and to a lesser extent, of the Hampstead Heath ponds overflowing or breaching. The Royal Free Hospital is a piece of critical infrastructure which has been recognised as being at risk from flooding.

The more likely event to take place in the north of the borough is surface water flooding. Because of the steep hills, there is a risk that, in an extreme rainfall event, water will rush down the slope causing significant flooding at the bottom.

There are nine key locations in the north of the borough where flood water is likely to gather should there be an extreme rainfall event. These have been grouped into three areas for potential flood alleviation schemes: Gospel Oak, Hampstead Town and Highgate.

Table 6.1 Key locations at risk of flooding in Camden North

Location	Flood Alleviation Scheme
Heath Street area	Hampstead Town
Hampstead Heath Street area	Hampstead Town
Willow Road area	Hampstead Town
Pond Street area	Hampstead Town
Haverstock Hill area	Hampstead Town
Mansfield Road area	Gospel Oak
Gordon House Road area	Gospel Oak
York Rise area	Highgate
St. Albans Road area	Highgate
Highfields Grove area	Highgate
Dartmouth Park Hill area	Highgate

6.3.1 Gospel Oak

The Gospel Oak area was subject to surface water flooding in 1975. The original modelling identified the Gospel Oak area as the highest risk area in North Camden.

The council produced preliminary work for flood mitigation schemes for Gospel Oak which showed that, due to the flood relief sewer constructed in 1987, the flood risk was significantly reduced. While there is still some residual flood risk in the area, it is not as significant as originally believed. This is confirmed by the lack of significant flooding in 2002, even when nearby South End Road was heavily flooded.

Due to the reduced number of properties at risk, a flood alleviation scheme is not viable based solely on the number of properties. However the London Overground rail line is at risk and Camden will have discussions with Network Rail and London Overground to investigate the investigation of a joint project involving source control on Hampstead Heath and will also consider property level protection where appropriate.

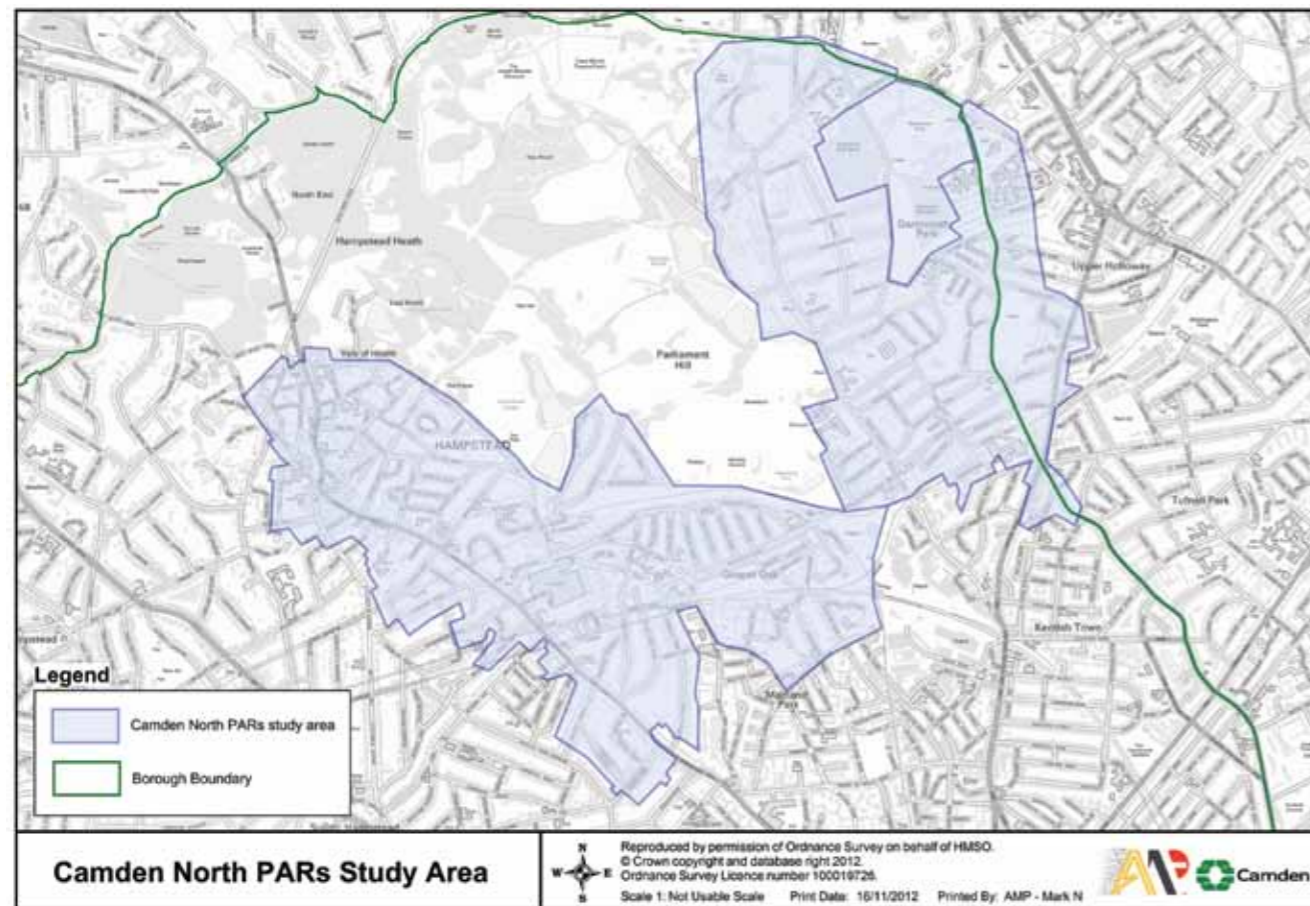
6.3.2 Hampstead Town

This area covers a range of different locations to the west and south of Hampstead Heath. Enhanced modelling estimates large numbers of properties may be within the Very Significant and Significant risk bands. Flooding is generally caused by direct rainfall on impermeable surfaces generating relatively high surface runoff velocities over roads and water collecting at low points.

Five different locations have been identified as having flood risk and they were investigated for the Project Appraisal Report which was completed in spring 2013. This report looked at schemes involving embankments, Sustainable Drainage Systems (SuDS) retrofits and increasing the number of gullies to let more water into the sewer while controlling it with a hydrobrake.

⁴ Risk bands defined by Environment Agency. Very significant risk means there would be flooding in a rainfall event with a 3.3% chance of occurring. Significant means flooding in a 1.3% probability rainfall event.

Figure 6.2 Camden North PARs Study Area



6.3.3 Highgate

This area covers Highgate ward to the east of Hampstead Heath. There are records of flooding here and it is considered an area of significant flood risk. Detailed modelling of the flood risk here is dependent on an improved understanding of the Thames Water sewers. Thames Water are expecting to finish this process by July 2013, after which point modelling can begin. This will be combined with records of flooding to ascertain more accurately the level of risk.

6.3.4 Hampstead Heath Ponds

As identified in the Flood Risk in Camden section, the Hampstead Heath Ponds pose a small risk to residents south of the Heath. While the impact of the Hampstead Heath Ponds breaching could be extremely severe, this event is unlikely and the City of London Corporation is taking steps to improve the ponds defences to ensure that the chances of it happening are reduced still further. The City of London Corporation published a review in March 2013 and will consult on its preferred option from November 2012 to February 2013. It will then look to apply for planning permission in 2014.

6.3.5 Royal Free Hospital

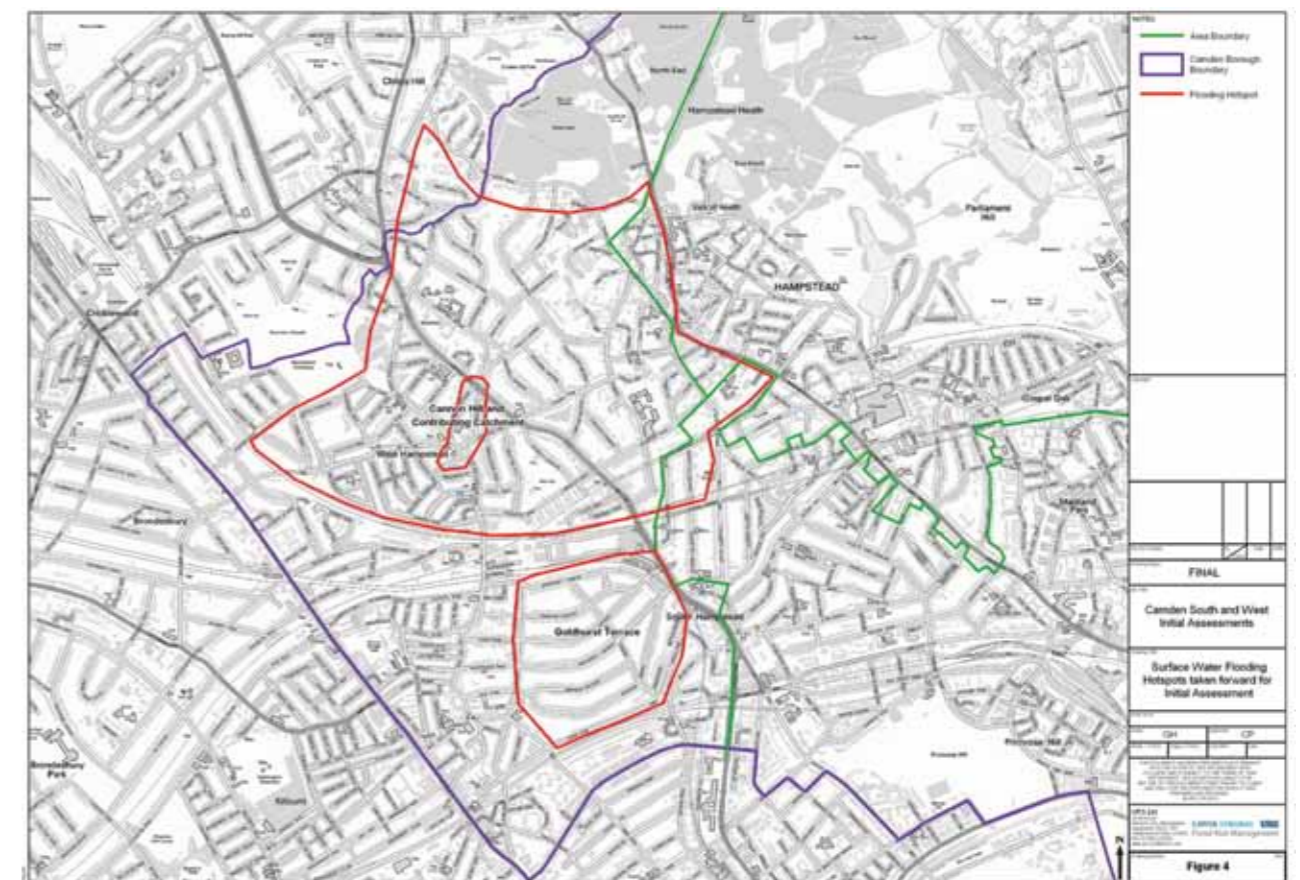
The Royal Free Hospital has been identified by Drain London as one of the London hospitals which needs to manage its surface water flood risk. It will be part of a detailed investigation by Drain London 2013-14 which will be used as a test approach to assess risks to other strategic infrastructure.

6.4 Flood alleviation schemes in Camden West

The history of flooding in this area is significant with a number of areas in South and West Hampstead affected in both 1975 and 2002. However after the 2002 floods, Thames Water invested in significant new flood risk infrastructure as part of the West Hampstead Flood Relief Scheme. The project involved larger diameter sewers and a holding tank both of which have substantially reduced flood risk in the area.

An Initial Assessment was commissioned to look at potential flood risk locations in Camden West and assess those which required action. They identified two key locations around South Hampstead and West Hampstead.

Figure 6.3 Camden West proposed PARs study area



South Hampstead experienced surface water flooding in 2002 and Thames Water has records of sewer flooding from 1987 although all but one of them were deemed to have been alleviated by subsequent work.

West Hampstead also experienced surface water flooding in 2002, although there are no recorded sewer flooding incidents since 1991. The area around the Fire Station and Lymington Road are areas of particular concern where surface water flooding is known to occur, and with several of the roads contributing to these locations during heavy rainfall. The contributing 'catchment' in terms of roads leading to the location is large and includes other areas which have had flooding problems in the past. All will be considered as part of the scheme.

⁵ City of London Strategic Flood Risk Assessment 2012 - Map D6 Flood depth with flow direction for 1 in 30 years. <http://www.cityoflondon.gov.uk/services/environment-and-planning/planning/heritage-and-design/Pages/Flood-test.aspx>

A Project Appraisal Report is due to be completed in summer 2013 which will look particularly at softer measures, such as improved asset maintenance or the introduction of flood wardens or community groups, will be investigated as part of these feasibility studies.

6.5 Flood alleviation schemes in Camden South

Camden South does not have the same level of flood risk as the north of the borough, although significant numbers of properties in Belsize and Kentish Town were affected in the 2002 floods. Much of this area shares a catchment with parts of Islington and the City of London and there are important links that need to be made with neighbouring boroughs to avoid actions in this area having detrimental effects in Islington and the City of London.

An Initial Assessment was commissioned to look at potential flood risk locations in the south of the borough to determine those at risk. In the south of the borough only the Primrose Hill area was identified as having any significant risk. Royal Parks have already implemented actions in place to improve flood risk at Primrose Hill Park and our engineering department have improved the gullies at the intersection of Fitzroy Road and Chalcot Road in 2011/2012. This means the only remaining risk is the inverted siphon under the Grand Union canal along Gloucester Avenue, managed by Thames Water, which has previously resulted in flooding. The siphon will be put on the asset register and updates on its condition and maintenance will be requested annually from Thames Water.

No other areas in Camden South were identified as either being at serious risk of flooding or of contributing significantly to flood risk in other areas. The Regent's Canal will be added to the asset register. No further population of the asset register is deemed necessary for the south of the borough at this point although the Council will look to include Sustainable Drainage Systems (SuDS) from any new developments.

Surface water run-off from significant areas of Camden drains into the former Fleet River, which has now been fully incorporated into the Fleet sewer. Overloading of this sewer during an event with a 3.3% chance of happening in any one year (1 in 30 year rainfall event) could result in localised sewer flooding in Farringdon Street and New Bridge Street in the City of London and the Cowcross Street area of Islington. Actions in Camden which minimise rainwater run-off into the sewer network will assist in reducing flood risk in neighbouring boroughs. This could include the incorporation of sustainable drainage systems (SuDS) into buildings, open spaces and the public realm.

Should new evidence of flooding or the risk of flooding be revealed, the plans for the south of the borough will be reassessed.

7. Improving flood risk management

This section explains how flood risk management will be managed through the following on-going activities:

- Recording and maintaining assets
- Responding to flood incidents
- Funding and delivering flood mitigation schemes
- Approving new developments

7.1 Recording and maintaining assets

Flood risk assets refer to all structures or physical features that have an effect on flood risk in an area. These include everything from the Hampstead Heath Ponds to highways gullies. DEFRA has provided full guidance on what constitutes a flood risk asset. This can be found in Appendix D.

The recording and maintenance of flood risk assets is an important element of flood risk management because well maintained assets, such as drainage systems, ensure that water flows are directed away from buildings and important local infrastructure.

Well maintained assets cannot prevent flooding happening but they can lessen its impact and probability. For example, Thames Water sewers have been designed to cope with events which have a 3.3% chance of happening in any one year. When a rainfall event happens which is less probable than this, such as the 2002 floods, they are likely to overflow causing flooding.

Asset register and record

As the LLFA, the Council is obliged to establish and maintain a **register** of structures or features which are likely to have a significant effect on flood risk in its area. This must be available for inspection at all reasonable times. We must also produce a **record** detailing the ownership and state of repair of each asset, which is not publically accessible.

The LLFA must determine the criteria for deeming an asset as having a significant effect. In Camden an asset is deemed to be significant if it is:

- Of such significant size that its failure could cause drainage problems on its own; OR
- Located within an area considered to be at a relatively high probability of flood risk

The **register** stating the key assets in the borough will be published on our website in 2013 and will be updated annually with new assets and changes in ownership recorded. The **record** will be shared with all the organisations which have contributed data to it.

Maintaining assets

All asset owners are responsible for maintaining their own assets. Council assets are maintained by a variety of teams (e.g. Engineering, Housing, Parks and Open Spaces) and each team is responsible for maintaining and checking their condition.

⁶ Thames Water record flooding incidents due to sewer flooding onto their DG5 register. However they will only put on properties that have signed a form confirming that they have suffered flooding, which makes the register incomplete in its coverage. When the 2002 LBC historical record showed a flooded street, it was rare that there was also a DG5 flooded property from sewers in the same year. When the risk of an incident happening again is deemed to have been reduced due to subsequent work, the incident is closed. The DG5 register is not available to the public.

Case study – highways asset maintenance

We are responsible for maintaining over 9,500 gullies covering all the roads in Camden except the 'Red Routes', which are maintained by Transport for London. Gully cleansing is carried out by the Engineering team on cyclical basis with all gullies cleaned at least once a year and the most important gullies being cleaned four times a year. The frequency with which gullies are cleansed is based on best practice guidance and historic data which has identified the gullies in known flooding areas or where the impact of a blocked gully would have a serious impact, for instance at the bottom of a hill. When a report of a blocked gully is made, the team will respond within 24 hours to investigate the problem.



Designation of assets

The Council and the Environment Agency are the 'designating' authorities of assets. That is, we may 'designate' features or structures. If an asset becomes designated, its owner cannot alter or remove it without first consulting the designating authority. The aim of designating flood risk assets is to safeguard them against unchecked works which could increase flood risk in the area. It is not possible to designate assets owned by a risk management authority so no Thames Water or City of London Corporation assets (including the Hampstead Heath Ponds) can be designated although this does not diminish their responsibilities for maintaining them as asset owners.

A process for designating assets will be designed in partnership with neighbouring authorities to ensure that there is consistency across the different boroughs. An agreement on this will be published by June 2013.

7.2 Responding to flood incidents

Flooding comes in a variety of forms with varying levels of seriousness. For the sake of clarity, flood incidents will be divided into the following types:

- **Ponding** - This is a common occurrence after heavy rain and is characterised by puddles of water on roads and sometimes footpaths which have neither drained away nor

evaporated. The water is neither causing serious disruption nor threatening buildings or critical infrastructure.

- **Disruptive flooding** - This is flooding which is making it harder for people to carry on as normal by blocking roads and pathways or forcing the cordoning off of parks and other open spaces. It is not threatening buildings or critical infrastructure.
- **Damaging or Dangerous flooding** - This is flooding that enters buildings or critical infrastructure causing damage or is flowing at such rates as to cause serious danger to people.

Preparation for responding to "damaging or dangerous flooding" is part of 'emergency planning'. Emergency planning is the general term for the work that the government, the emergency services (i.e. fire and rescue, police and ambulance services), the health services and the Council does in preparing plans and procedures for dealing with any emergency that might affect large numbers of people. It has two main elements: response and recovery.

Response to a major flooding incident

In order to prepare for a flood event, the council's Emergency Management team, worked with the local emergency services to produce the Camden Multi-Agency Flood Plan (see Appendix A) which provides a co-ordinated multi-agency response to a major flooding event to reduce the impact on the public.

The Met Office's national severe weather warning service provides warnings of severe or hazardous weather to the public.

There are two categories:

- Alerts which indicate the risk of severe weather over the next 2 to 5 days.
- Warnings which indicate the risk of severe weather during the next 24 hours.

These warnings are available on the Met Office website www.metoffice.gov.uk. The warnings are for broad areas and there is very little warning time for how it will affect specific neighbourhoods. Due to the uncertainty and very short timeframe for warnings there is very little the Council can do other than to be ready to respond to reports of flooding and be proactive in areas where flooding is taking place.

In a flooding event, overall responsibility for activating the flood plan lies with either Camden Police or the Council's Emergency Management team. Upon activation of the plan, all relevant organisations would be notified and they would decide on the level of response required.

In a major rainfall event, the ability of local emergency services to be able to help everybody is limited and will focus on preservation of life. In major flood events, we will look to help those who are vulnerable and cannot help themselves through family and friends by organising short term temporary shelter in respite centres.

⁷ The red routes are: A41 (Finchley Road), the A400 (Hampstead Road, Camden Street and Camden High Street), the A501 (Euston Road and Grays Inn Road), the A201 Farringdon Road and the A503 (Camden Road).

Case study – responding to the 2002 floods

The floods of 7 August 2002 required swift and immediate action by both the emergency services and the council.



The London Fire Brigade dealt with 245 calls that evening. It used its 'Batch Mobilising' procedure which allows it to prioritise life threatening calls and deal with less urgent calls in turn. Much of the work on the ground consisted of small-scale pumping of premises, damage control and general assistance to householders. Attending a call after the rain had stopped, the crew lifted a manhole cover on the pavement outside 15 Fairhazel Gardens and used a ceiling hook to clear a blockage, which made the flood water fall rapidly. The police were only required to attend to a single call although they passed on over 120 calls to the London Fire Brigade.

The Council's gully cleansing crew and their vehicle worked through the night to clear gullies and sewers blocked by the debris deposited by the floods. The housing department also responded speedily to a large number of problems in the two most affected housing districts, Gospel Oak and Hampstead; repairs officers at Hampstead District Housing Office issued 75 instructions to contractors in the period 7 - 14 August 2002 for remedial works to be undertaken.

Not everything went smoothly however. Residents could not get through to the council or could only leave a message on an answering machine because the Emergency Telephone Service (ETS) was inundated with telephone calls. There was also an initial delay of some hours in granting free bulk rubbish removal. However, once the widespread nature of the problem was appreciated by the Environment Department, free collections were arranged, at an approximate cost of £10,000 to the Council.

Recovery after a flood incident

Recovery from an incident will begin as soon as possible. As the floodwater recedes, the emergency response may still be on-going while the recovery phase begins. If it is a minor flood, recovery activities such as cleaning of streets will usually form part of normal operations without special arrangements. If it is a severe flood affecting many people and properties, it will require a co-ordinated response through a specifically established Recovery Coordinating Group which will determine local strategies in recovery, prioritising needs and allocating resources appropriately so that the community returns to normality as soon as possible. The Council will take the lead role in chairing and managing the recovery process.

7.3 Approving new developments

It is vital for good flood risk management that new developments are safe from flood risk and do not increase it elsewhere. Planning policy is led by the Council in its role as the local planning authority. The Environment Agency and Thames Water advise planning authorities on very large sites.

Planning policy

Core Strategy Policy CS13 of Camden's development plan, the Local Development Framework, states that we will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

We will require major developments or development that increases the amount of impermeable surfacing to adequately manage the increases in surface water or sewage discharge. Development will also be required to take account of known sewer flooding problems by including appropriate mitigation measures to avoid increased drainage problems and flood risk downstream. Where possible, they should look to reduce the flood risk.

In particular, developments in areas which have been identified as being at risk of surface water flooding must be designed to cope with storm events with a 1% chance of happening in any one year/ 1 in 100 year return period (including an appropriate allowance for climate change). This is in order to limit the flooding of, and damage to, property.

Camden Planning Guidance (CPG) has been prepared to support the policies in our Local Development Framework (LDF). This guidance forms a Supplementary Planning Document (SPD) which is an additional material consideration in planning decisions. CPG 4 (Basements and lightwells) and CPG 3 (Sustainability) provide further information on surface water flooding as well as how to minimise the risk of flooding within development.

Paving front gardens

Camden Development Policy DP19 states that, as well as damaging the character and biodiversity of a neighbourhood, large areas of paving can also increase the volume and speed of water run-off (especially when formerly porous surfaces such as front garden areas are paved), which adds to the pressure on the drainage system and increases the risk of flooding from surface water.

Camden Planning Guidance CPG1 states that Planning Permission will not be granted for hard standings greater than five square metres that do not incorporate sustainable urban drainage systems (SUDS) into the design and no more than 50% of the frontage area should become hard landscape. SUDS are particularly appropriate in the parts of the borough north of Euston Road as this area has predominantly clay soils.

Basements

Camden Planning Guidance 4 (CPG4) explains the Council's policies on basements and lightwells. It states that the Council will only permit basement and underground development that does not:

- Cause harm to the built and natural environment and local amenity;
- Result in flooding; or
- Lead to ground instability.

All planning applications for basements should produce a site specific Basement Impact Assessment (BIA) with information relating to these issues. These assessments must be done by a Hydrologist or Civil Engineer with either a Chartered Engineer (CEng) or Chartered Institution of Water and Environment Management (CIWEM) qualification. Assessments for groundwater must be done by a Hydrogeologist with a Chartered Geologist (CGeol) qualification.

In line with Development Policy DP27, the Council will not allow habitable rooms and other sensitive uses for self-contained basement flats and other underground structures in areas at risk of flooding.

Strategic Flood Risk Assessment

As a planning authority, the Council is required to produce a Strategic Flood Risk Assessment (SFRA) to provide evidence for the Local Development Framework. We produced a joint SFRA with the other seven north London boroughs in the North London Waste Partnership. This was published in 2008.

There are no plans for the North London Waste Partnership to produce another SFRA. Once the Flood Hazard and Flood Risk Maps have been produced, mapping of the flood risk in Camden will be complete. At that point a decision will be taken whether another Strategic Flood Risk Assessment is necessary.

SuDS (Sustainable Drainage Systems)

In addition to existing planning policies, the Flood and Water Management Act 2010 gave the Council new powers as a SuDS (Sustainable Drainage Systems) Approval Body. SuDS Approval Bodies (SABs) will assess the drainage implications of all new developments, and can refuse SAB approval for the development if flood risk mitigation is not adequately considered. This approvals process will be separate from the Planning Application process. In order to ensure flood risk does not increase, developers will need to introduce SuDS such as green roofs, permeable surfaces and storage tanks. If these SuDS affect more than one property then they must be 'adopted' and maintained by the council. If they affect only a single property, then it is the responsibility of the property owner to maintain them.

These new powers have not yet been enacted. However, DEFRA will publish an implementation timetable in 2013. Once confirmed, information will be published on our website. We will explore the possibility of working with other neighbouring councils to share expertise and resources.

We are required to consult the Mayor of London on planning applications of potential strategic importance. The Mayor is able to overturn our decisions on these applications but cannot overrule a SuDS Approval Body decision.

Case study – King's Cross Central

The King's Cross Central development by Argent St. George is the largest area of urban redevelopment in Europe covering 47 acres, 50 new buildings and an area where 45,000 people will live, work and study. With this many people and its proximity to critical infrastructure it is crucial to ensure that flood risk is not increased by the development.



The drainage system has been designed to ensure that there would be no surface water ponding in a rainfall event with a 0.03% chance of happening in any one year and, in more extreme events, areas such as roads and car parks would take the overflow. Through SuDS features such as green and brown roofs there will be a 10% reduction in the surface water flowing into the sewers compared to before the development took place. This would take into account the expected increase in peak run-off as a result of changing rainfall patterns. These designs will also improve the quality of water run-off from the developed site.

8. Key actions for 2013-2014

Stakeholder	Action	Deadline
City of London Corporation	Completion of review of risk from Hampstead Heath Ponds	March 2013 (Completed)
Camden Council	Delivery of Project Appraisal Reports for Gospel Oak and Hampstead	April 2013 (Completed)
Camden Council	Publication of Asset Register	May 2013 (Completed)
DEFRA	Announce implementation timetable for SuDS Approval Body	June 2013 (tbc)
Camden Council	Publication of advice to residents on Camden Council website	June 2013
Camden Council	Submit appropriate local data to be incorporated into flood risk and flood hazard maps	June 2013
GLA	Begin investigation of Royal Free Hospital flood risk	June 2013
Thames Water	Complete modelling of Thames Water sewer system in Highgate and South Camden	July 2013
Camden Council	Complete Project Appraisal Report for West Camden	September 2013
City of London Corporation	Complete consultation on preferred option of Hampstead Ponds	September 2013
Camden Council	Determine whether new Strategic Flood Risk Assessment for Camden is required	September 2013
Environment Agency	Publish Flood Hazard and Flood Risk Maps	December 2013
City of London Corporation	Submission of Detailed Planning Application for Hampstead Heath Ponds by City of London	February 2014
GLA	Finish assessment of Royal Free Hospital flood risk	March 2014
GLA	Publish London SuDS Guidance	March 2014
Camden Council	Commence SuDS Approval Body	April 2014 (tbc)

Appendices to the Camden flood risk management strategy

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National documents

1. National Strategy for Flood and Coastal Erosion Management

The National Strategy for Flood and Coastal Erosion Management is a statutory document required by the Flood and Water Management Act 2010. The Environment Agency is responsible for delivering it and produced the first strategy in June 2011.

The overall aim of the strategy is to ensure the risk of flooding and coastal erosion is properly managed by using the full range of options in a co-ordinated way. The strategy is designed to provide a framework so that all sources of flooding as well as coastal erosion are managed in a co-ordinated way. It is designed as a resource for all the risk management authorities in England as well as other stakeholders.

It sets out a series of high level principles which all risk management authorities are expected to apply when making difficult decisions around flood risk management. These are:

- **Community focus and partnership working**- This includes giving communities a bigger say in what action is taken, ensuring that decisions are taken at the lowest appropriate level and guaranteeing that risk is managed in a co-ordinated way beyond authority boundaries through strong partnership working.
- **A catchment and coastal “cell” based approach**- This ensures that the impacts on other areas downstream of the catchment or coast are fully considered.
- **Sustainability**- Flood risk and coastal erosion management authorities should support communities by managing risks in ways that take account of all impacts (environmental, economic and social) and the whole-life costs of any investment should be considered.
- **Proportionate, risk-based approaches**- Because it is not technically, economically or environmentally feasible to prevent flooding and coastal erosion altogether, a risk-based management approach is required to target resources to those areas where they have greatest effect.
- **Multiple benefits**- FCERM can bring significant economic, environmental and social benefits such as contribute to regeneration and economic growth and protect infrastructure and transport links. It is important that these benefits are considered and taken advantage of in any flood risk management schemes and that no damage is inflicted on the natural or historic environment.
- **Beneficiaries should be encouraged to invest in risk management**- when flood and coastal erosion risks are managed the benefits achieved are in many cases localised and lead to personal or private gain through the protection of specific individuals, communities and businesses. Because of this, it is important that contributions, in all forms, are found locally as otherwise it can become an unfair burden on taxpayers and redistribute resources in an inequitable way.

The strategy looks to achieve these outcomes through five key activities:

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

2. The UK Climate Change Risk Assessment

The UK Climate Change Risk Assessment consists of a Government Report and an Evidence Report both of which were laid before Parliament on 25 January 2012. The Evidence Report sets out the main risks and opportunities for the UK, arising from climate change, over the coming years while the Government Report outlines the UK Government's views on the main issues raised in the Evidence Report.

The reports are the product of the Climate Change Act 2008 which requires:

1. A UK-wide **climate change risk assessment** (CCRA) that must take place every five years;
2. A **national adaptation programme** (NAP) which must be put in place and reviewed every five years, setting out the Government's objectives, proposals and policies for responding to the risks identified in the CCRA;
3. **Adaptation Reporting Powers** (not applicable in Northern Ireland) which enable the Secretary of State to direct "reporting authorities" to prepare climate change adaptation reports.

The Climate Change Risk Assessment looks at over 100 risks from a number of disparate sectors, focussing on risks where decisions need to be made in the near future (i.e. the next five years). It focuses on the impact on five sectors: Agriculture and Forestry, Business, Health and Wellbeing, Buildings and Infrastructure and the Natural Environment. It does not consider societal change to make the baseline more reliable.

The key risks identified which relate to flooding are:

- Crop losses and other impacts on high quality agricultural land due to flooding and agricultural land lost to coastal erosion.
- Possible decrease in output for UK businesses due to an increase in supply chain disruption as a result of extreme events.
- Risk of increase in monetary losses as a result of interruption to business from flooding.
- Increased flooding would increase the risk of deaths, injuries and people suffering from mental health effects as a result of the impacts of flooding.

- Increased temperatures and changed rainfall patterns may lead to an increased health risk from water, vector and food borne diseases.
- Energy Infrastructure at significant risk of flooding.
- Road and railways at significant risk of flooding.
- Scouring of road and rail bridges.
- Damage to property due to flooding and coastal erosion.
- Flooding and coastal erosion impacting on key coastal habitats and other ecosystem services (including the extent of beaches and nature sites for tourism).

3. National Planning Policy Framework

The National Planning Policy Framework is a new document published by the Department for Communities and Local Government in March 2012. It consolidates all Planning Policy Statements into one document with additional technical guidance.

The key section on flooding states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary, they should be designed to make the development safe from flood risk without increasing flood risk elsewhere

It states that local plans should be supported by Strategic Flood Risk Assessments and apply a sequential, risk-based approach to the location of development. This is to avoid, wherever possible, development in areas of potential flood risk to people and property and, where it is necessary, to manage any residual risk, taking account of the impacts of climate change. This should be done through the Sequential Test, which is explained in more detail in the technical guidance.

Although the NPPF focuses mainly on the risk from river and coastal flooding it does expect new iterations of the Strategic Flood Risk Assessment to include surface water flood risk as well and for this to be considered in future site allocations.

Regional documents

4. North London Strategic Flood Risk Assessment

The North London Strategic Flood Risk Assessment was produced by the North London Waste Partnership in 2008 which consists of the London Boroughs of Barnet, Camden, Enfield, Hackney, Haringey, Islington and Waltham Forest.

The Primary aims of the SFRA were:

- Identify the areas within North London that are at risk of flooding for all Flood Zones identified in table D1 in PPS25, and within Flood Zone 3, the variations in the actual flood risk including the effect of any formal or informal flood defences.
- Identify the risk of flooding due to surface water either in the form of flash flooding due to surface water run-off, rising groundwater, inadequate drain/sewer capacity or inadequate drain/sewer maintenance

- Identify the likely effects of climate change on flood risk
- Identify catchment areas and the potential for development to affect flood risk in areas beyond the individual Borough boundaries
- Provide the basis for allocating sites in the Local Development Framework (LDF) including, if necessary, applying the sequential test approach to site allocation within the indicative flood plain.
- Provide a clear rationale for assessing the merits of potential development allocations based on a sequential flood risk assessment, taking into account the flood risk vulnerability of proposed uses (table D2, PPS25)
- Recommend policy options for dealing with the range of flood risks and provide guidance for developers
- Recommend appropriate monitoring and review methods

It brought together information from the Environment Agency, the North London Boroughs, the London Fire Brigade and Thames Water but was produced before the Drain London Project and as a result does not have the most up to date flood maps and should be used in reference with the Surface Water Management Plan and the maps in Appendix D.

5. Managing risks and increasing resilience: The Mayor's climate change adaptation strategy

The Mayor of London published a Climate Change Adaptation Strategy in October 2011. It looks not just at flooding but also at drought and overheating. The aim of the Strategy is to assess the consequences of climate change on London and to prepare for the impacts of climate change and extreme weather to protect and enhance the quality of life of Londoners. When the Localism Bill becomes law, a new London Environment Strategy will replace this strategy and amalgamate it with the other statutory strategies and plans concerning the environment that the Mayor is required to publish under the GLA Act (1999).

The Strategy identifies the actions detailed in Figure A.1 to be taken by London Boroughs and other organisations in London with regards to flood risk.

Figure A.1

Action	Lead	Partners	Dates
To improve our ability to predict and manage flood risk			
3.1. The Mayor will work with the Environment Agency, boroughs and other partners to improve the mapping of who and what is at flood risk from all sources of flooding today, and to predict future flood risk for all flood sources.	GLA	EA, LRP, TfL, MPS, Boroughs	On-going
3.2. The Drain London Forum will develop a surface water management plan for London which identifies and prioritises areas at risk and develops more detailed plans for priority areas.	Drain London	Boroughs	Winter 2011

Action	Lead	Partners	Dates
3.3. The Drain London Forum will create an online data portal to allow flood risk management partners to more effectively share information.	Drain London		Winter 2011
3.4. The Drain London Forum will create a flood incident reporting system and encourage its adoption across London.	Drain London		Winter 2011
To enable coherent cost-effective working			
3.5. The Mayor will maintain the Drain London Forum as a mechanism to facilitate information exchange, project identification and development.	GLA	Drain London Forum	On-going
3.6. The Mayor will encourage each borough to form a cross-departmental flood group	GLA	Boroughs	On-going
3.7. The Mayor will work with Thames Water, the Environment Agency and the boroughs to trial an intensive urban greening retrofitting pilot project to manage surface water flood risk.	GLA	TW, EA, Boroughs	Summer 2013
To prioritise flood risk management actions we need to identify the most vulnerable communities and critical assets			
3.8. The Mayor will work with the London Resilience Partnership and the London Climate Change Partnership to identify and prioritise critical infrastructure and vulnerable communities at flood risk.	GLA	LCCP, LRP	Spring 2012
3.9. To reduce the risk of local surface water flooding, the Mayor will work with TfL, the London boroughs and Thames Water to review their drain and gully maintenance programme, particularly in high-risk areas.	GLA	TfL, TW, boroughs	Autumn 2012
To raise individual and community-level awareness and capacity to cope and recover			
3.10. The Mayor will work with the Environment Agency to increase the number of Londoners signing up to the Floodline Warning Direct scheme and to raise awareness of the measures that individuals and communities can undertake to reduce the risks and manage the consequences of flooding.	EA	GLA, boroughs	On-going
3.11. The Drain London Forum will identify two communities at significant flood risk and work with them to develop bespoke community flood plans to build their capacity to manage flood risk. The Mayor will then encourage the boroughs and communities to roll this approach out to areas at high flood risk.	Drain London	Boroughs	Spring 2012

¹ Precursor to National Planning Policy Framework

6. London Strategic Flood Framework

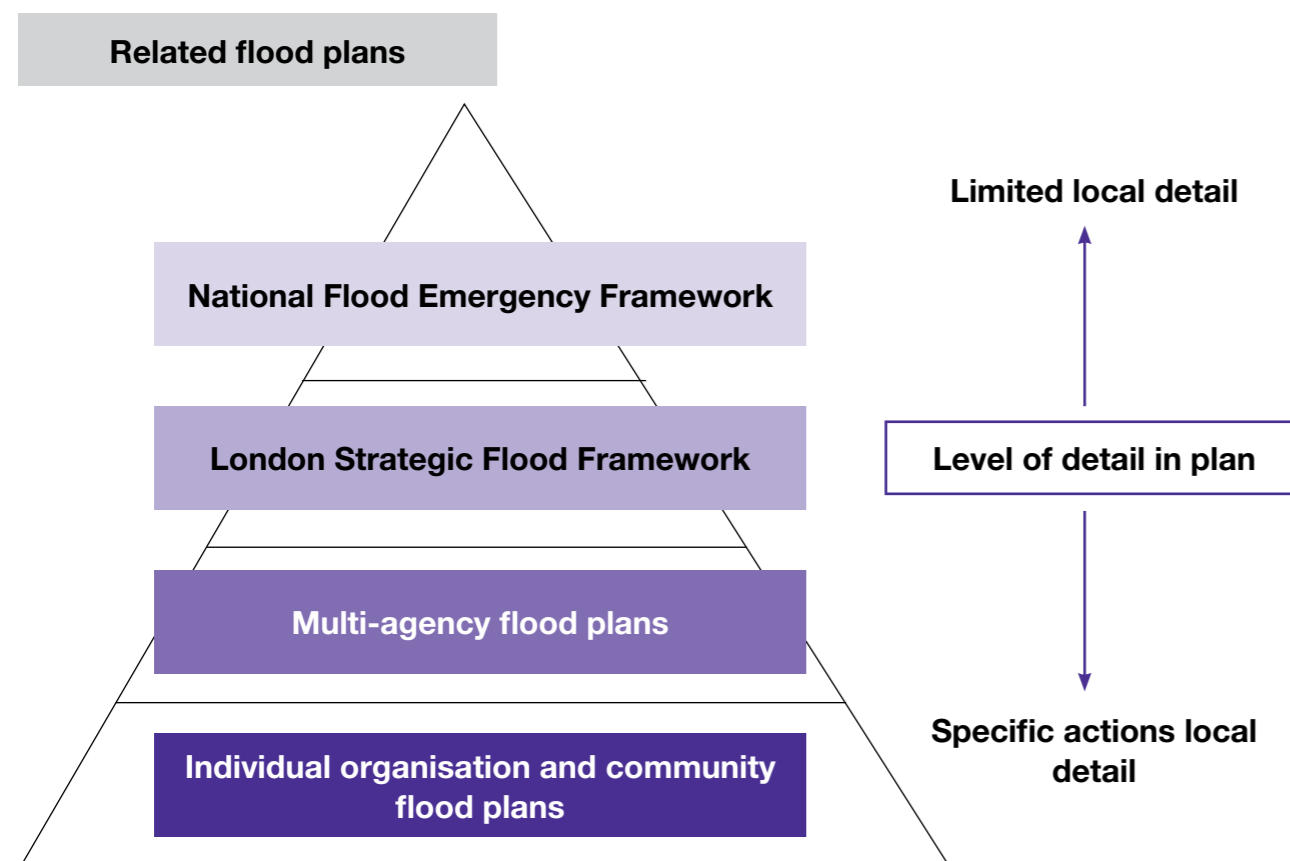
The London Strategic Flood Framework is part of the Mayor of London's emergency plans under the umbrella of the London Strategic Emergency Plan. It was published in April 2012.

The framework relates to flooding with "London-wide" impacts. This may be severe flooding in one location requiring a London-wide response, or a greater number of less severe flooding incidents in multiple locations within London. The framework also covers the "pre-flooding" or "potential flooding" phases, meaning that it can be activated prior to any impacts occurring on the ground, and may be activated in preparation even if impacts do not occur. The reason for having a specific flood framework in place is due to the complex nature of flooding and the consequences that arise, requiring a comprehensive and often sustained response from a wide range of organisations.

This plan aims to:

- Provide strategic direction to London responders, before, during and after a significant flooding incident in London
- Provide the necessary links to existing plans and procedures
- Identify triggers and mechanisms for invoking a London-wide response
- Provide responders with guidance about warning the public before, during and after a flood
- Confirm the actions responders should take at each stage of a flooding incident

As the figure below shows, the London Strategic Flood Framework sits between the Multi-Agency Flood Plan and the National Flood Framework



The plan is designed to be used by all the following agencies

Mayor of London	Environment Agency	London Resilience Team
Metropolitan Police Service	London Local Authorities	National Health Service
City of London Police	Greater London Authority	Network Rail
British Transport Police	Health Protection Agency	Port of London Authority
London Ambulance Service	London's Business Community	Transport for London
London Fire Brigade	London Councils	London's Utility Companies
Association of Train Operating Companies	London Coroners	London's Voluntary Organisations
City of London Corporation	London District Military	British Airport Authority
Met Office	London's Faith Communities	

Local documents

7. Preliminary Flood Risk Assessment

The preliminary flood risk assessment is a statutory document required by the Flood Risk Regulations 2009. This legislation requires that Lead Local Flood Authorities prepare a preliminary assessment report in relation to flooding from surface runoff, groundwater and ordinary watercourses in its area.

The PFRA is a high level screening exercise based on already available information about historic flooding and modelling for potential future flooding.

The PFRA was delivered as part of the wider Drain London project, which involves the delivery of Surface Water Management Plans (SWMP) and Preliminary Flood Risk Assessments (PFRA) for each of the thirty three London Boroughs. Camden was part of Group 3 which consisted of Hammersmith & Fulham, Kensington & Chelsea, Westminster, Camden, Islington and the City of London. A specific consultant was assigned to deliver PFRAs and SWMPs for all of these boroughs as they were recognised as broadly sharing a catchment.

The PFRA was delivered to the Environment Agency for approval in June 2011 and published in December 2011 on their website here <http://www.environment-agency.gov.uk/research/planning/135542.aspx>.

The study used Environment Agency maps which identified Greater London as one of 10 Surface Water Flood Risk Areas within England. It was by far the largest with 290,000 people identified as being potentially at surface water flood risk in an extreme rainfall event with a 0.5% chance of happening in any one year. This includes approximately 19,000 in Camden.

Although the PFRA recognised the serious impact of the floods in 1975 and 2002, it considered these floods not to have had 'significant harmful consequences'. This is because, for the purposes of national records, only events which were reported at a national level are considered to have 'significant harmful consequences'.

The PFRA will be reviewed in 2017 by which point significantly more information will be available, allowing it to be a more thorough document.

8. Surface Water Management Plan

Surface Water Management Plans (SWMPs) are non-statutory documents, which outline the preferred surface water management strategy for a particular area. Lead Local Flood Authorities can choose to produce them in order to better understand their surface water flood risk and inform the local flood risk management strategies.

The Camden Surface Water Management Plan was completed in July 2011 as part of the Drain London project. The Surface Water Management Plan will be published on the website alongside the final version of the strategy in summer 2013.

The SWMP had the following objectives:

- **Develop a robust understanding of surface water flood risk** in and around the London Borough of Camden, taking into account the challenges of climate change, population and demographic change and increasing urbanisation in London;
- **Identify, define and prioritise Critical Drainage Areas**, including further definition of existing local flood risk zones and mapping new areas of potential flood risk (see definitions in Section 3.8);
- **Make holistic and multifunctional recommendations for surface water management** which improve emergency and land use planning, and enable better flood risk and drainage infrastructure investments;
- **Establish and consolidate partnerships** between key drainage stakeholders to facilitate a collaborative culture of data, skills, resource and knowledge sharing, and closer coordination to utilise cross boundary working opportunities;
- **Undertake engagement with stakeholders** to raise awareness of surface water flooding, identify flood risks and assets, and agree mitigation measures and actions;
- **Identify outputs to enable a real change on the ground** rather than just reports and models, whereby partners and stakeholders take ownership of their flood risk and commit to delivery and maintenance of the recommended measures and actions;

The generic actions can be grouped as follows:

- Communications/partnerships actions to communicate risk internally or externally to LLFA or create/improve flood risk related partnerships
- Flood and Water Management Act (FWMA)/Flood Risk Regulations (FRR) duties and actions as required by the FRR and FWMA – Refer to Appendix A of the LGA ‘Preliminary Framework to assist the development of the Local Strategy for Flood Risk Management’ (February 2011) for minimum requirements.
- Financial/resourcing/capacity building actions to secure funding internally/externally to support works or additional resources to deliver actions.
- Policy action spatial planning or development control actions.

The SWMP is a one off project with the actions from it being incorporated into the Local Flood Risk Management Strategy. The actions from it will be reviewed in line with the rest of the strategy.

9. Local Development Framework

The Local Development Framework (LDF) is a collection of planning documents that, in conjunction with national planning policy and the Mayor’s London Plan, sets out Camden’s strategy for managing growth and development in the borough, including where new homes, jobs and infrastructure will be located.

It consists of a core strategy, development policies, a Site Allocations document, Area Action Plans, a Proposals Map and the North London Joint Waste Plan (which includes the North London Strategic Flood Risk Assessment).

The Core Strategy Policy CS13 focuses on ‘tackling climate change through promoting higher environmental standards’. This includes ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

It also states that Camden will minimise the potential for surface water flooding by requiring development to avoid harm to drainage systems and prevent or mitigate local surface water and down-stream flooding, especially in areas up-hill from, and in, areas known to be at risk from surface water flooding.

The development policy **DP22 – Promoting sustainable design and construction** states that the council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as limiting run-off and including pervious surfaces to enable water to infiltrate the ground to reduce clay shrinking and flooding.

In addition **DP23 – Water** requires developments to reduce their water consumption, the pressure on the combined sewer network and the risk of flooding by limiting the amount and rate of run-off and waste water entering the combined storm water and sewer network through capturing, retaining and re-using surface water and grey water on-site as well as other methods. It will also ensure that developments are assessed for upstream and downstream groundwater flood risks in areas where historic underground streams are known to have been present.

Finally **DP27 – Basements and lightwells** states that in determining proposals for basement and other underground development, the Council will require an assessment of the scheme’s impact on drainage, flooding, groundwater conditions and structural stability, where appropriate. The Council will only permit basement and other underground development that does not cause harm to the built and natural environment and local amenity and does not result in flooding or ground instability. The Council will not permit basement schemes which include habitable rooms and other sensitive uses in areas prone to flooding.

10. Green Action for Change

The London Borough of Camden's environmental sustainability strategy to 2020 Green Action for Change outlines the council's sustainability ambitions and focuses on the key environmental issues which the Council and its partners can effectively influence them. Effective flood risk management can help with two of these issues:

- Adapting to a changing climate
- Enhancing biodiversity, improving green spaces and involvement in gardening and food growing.

Adapting to a changing climate

Green Action for Change identifies "less risk of flooding" explicitly as one of its key outcomes. But flood risk management can also help achieve other outcomes:

- A clear strategy which explains the risk to residents and their personal responsibilities and options will help ensure that more residents, organisations and communities are informed of the role they can play in helping us adapt to a changing climate. For instance, the use of drive and pathway materials which allow water to soak into the ground rather than flowing into the sewers
- Identifying green spaces as areas where flood water can run to in extreme rainfall events can improve the business case and the available funding for better 'cool' zones such as parks, green spaces and the public realm.
- Introducing rainwater harvesting can reduce the demand of households and businesses for mains water and hence decrease the impact of water shortages.
- The new role as a SuDS Approval Body will ensure more buildings are designed and retrofitted to cope with the changing climate.

Enhancing biodiversity, improving green spaces and involvement in gardening and food growing.

Green spaces provide many good opportunities for helping environmental policies. They can enhance biodiversity, help tackle urban heat islands (the phenomenon whereby inner cities are much hotter than the surrounding countryside) and provide opportunities for communities to become involved in gardening and food growing.

However they are also important for flood management. In extreme rainfall events, there will be too much surface water for the drainage system to cope with and areas where the excess water can safely flow need to be identified. Open green spaces are a very effective place to temporarily store surface water and by creating wetlands can potentially improve the biodiversity and amenity of those green spaces. An additional benefit of designing facilities which enhance biodiversity is that local residential groups may be happy to take on responsibility for some element of the on-going costs of maintenance of the asset, providing extra value to asset and reducing liabilities.

11. Camden Multi-Agency Flood Plan

The aim of a multi-agency flood plan (MAFP) is to provide a co-ordinated multi-agency response to a major flooding event minimising impact to the public and key infrastructure. It is prepared, maintained and updated by the London Borough of Camden's Emergency planning and business continuity team. This plan will be updated every two years or if new information or events require it.

The following organisations were consulted in the development of the plan

London Borough of Camden	London Ambulance Service	NHS North Central London
London Fire Brigade	Camden Police	British Red Cross
Environment Agency	Thames Water	Transport for London
Royal Free Hospital	University College London Hospital	

The Camden Multi-Agency Flood Plan has the following objectives:

- Provide a framework for response activities.
- Manage the wider impact of borough flooding events to reduce disruption to the communities, utilities and environment.
- Manage precautionary actions to preserve life for the highest impact flood risks.
- To prioritise the identification and required responses to protect the vulnerable within the community.
- To support the Environment Agency in the provision of warnings to communities at flood risk although that has no direct application within the geography of Camden.
- Provide accurate and timely information to public and local business on flood response.
- Prepare key parts of the community susceptible to flooding through the provision of advice and information.
- Provide a framework for recovery activity to support the recovery of communities and business.

Appendix B - Guide to related legislation

Contents

- The Climate Change Act 2008
- The Civil Contingencies Act 2004
- The Strategic Environmental Assessment (SEA) Directive 2001
- The Land Drainage Act 1991
- The Water Framework Directive 2000
- Reservoirs Act 1975
- The Water Industry Act 1991
- The Highways Act 1980
- The Flood Risk Regulations 2009

1. The Climate Change Act (2008)

This act requires a UK-wide Climate Change Risk Assessment every five years, the first of which was published in 2012 (see Appendix A). This is to be accompanied by a National Adaptation Programme to tackle the risks identified in the climate change risk assessment. Once it is published it will also be reviewed every five years. The Act has given the Government powers to require public bodies and statutory organisations such as water companies to report on how they are adapting to climate change.

2. The Civil Contingencies Act (2004)

This legislation provides a single framework for civil protection in the UK and sets out the actions that need to be taken in the event of a flood. The CCA is separated into two substantive parts: local arrangements for civil protection (Part 1) and emergency powers (Part 2).

The Civil Contingencies Act is the legislative basis for the Multi-Agency Flood Plan and the London Strategic Flood Framework

3. The Strategic Environmental Assessment (SEA) Directive (2001)

This legislation aims to increase the consideration of environmental issues during decision making related to strategic documents such as plans, programmes or strategies. The SEA identifies the significant environmental effects that are likely to result due to the implementation of a plan, programme or strategy.

An SEA has been produced for this work and can be found alongside the Strategy on the website.

4. The Land Drainage Act (1991)

This act outlines the duties and powers to manage land drainage for a number of bodies including the Environment Agency, Internal Drainage Boards, local authorities, navigation authorities and riparian owners. However as there are no ordinary watercourses or open rivers in Camden this act has less impact than it does in other parts of the country. The Regent's Canal is fully owned by the Canal & River Trust and is not affected by this act.

5. The Water Framework Directive (2000)

This is the most substantial piece of European Commission water legislation to date and is designed to improve and integrate the way water bodies are managed throughout Europe. It came into force on 22 December 2000 and was transposed into UK law in 2003. Member States must aim to reach good chemical and ecological status in inland and coastal waters by 2015.

The Water Framework Directive establishes new and better ways of protecting and improving rivers, lakes, groundwater, transitional (where freshwater and sea water mix) and coastal waters. It is designed to:

- prevent deterioration in the classification status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- achieve at least good status for all waters. Where this is not possible, good status should be achieved by 2021 or 2027;
- promote sustainable use of water as a natural resource;
- conserve habitats and species that depend directly on water;
- progressively reduce or phase out release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
- contribute to mitigating the effects of floods and droughts.

To deliver this, the Environment Agency has embarked on river basin management planning with the aim to develop new and better ways of protecting and improving the water environment. It is important that measures to manage local flood risk do not cause deterioration of water bodies and should consider opportunities to improve water bodies in conjunction with local flood risk management.

6. Reservoirs Act (1975)

This act focuses on the management of reservoirs and provides the following definitions:

- a reservoir is a "raised reservoir" if it is designed to hold, or capable of holding, water above the natural level of any part of the land adjoining the reservoir; and
- a raised reservoir is a "large raised reservoir" if it is designed to hold, or capable of holding, more than 25,000 cubic metres of water above that level.

² Ordinary watercourses are defined as any ditch, drain or stream through which water flows which is not part of a main river or sewer system.

The undertaker of a reservoir is the person who controls the use of the reservoir. They are obliged to produce onsite reservoir flood plans. The Environment Agency is responsible for regulating this. The Flood and Water Management Act changed the legislation so that all reservoirs over 10,000m³ must have flood plans.

7. The Water Industry Act 1991

This act outlines the roles of Water Supply and Water and Sewerage Companies. The relevant section for Flood Risk Management is Part IV which deals with sewerage services. It also looks at the general powers and duties of water companies including concerning water supply and their ability to charge for services.

The act was principally amended by The Water Industry Act 1999 and the Water Act 2003.

8. The Highways Act 1980

The Highways Act covers a large range of activities and responsibilities that Highways Authorities have. In Camden, the two highways authorities are Transport for London for the 'red routes' and Camden Council for all other roads.

The Highways Act states that the highway authority may construct drains and take actions to divert surface water into them for the purpose of draining the highways. Highways have a responsibility for ensuring that the highways drain fully and can take actions to clean out drains and watercourses which prevent this happening.

9. The Flood Risk Regulations (2009)

The Flood Risk Regulations came into force in December 2009 and transposed the EU Floods Directive into law for England and Wales. The Flood Risk Regulations require three main pieces of work:

- **Preliminary Flood Risk Assessment (PFRA)** – This involves collecting information on past and future floods from surface water, groundwater and small watercourses, assembling the information into a PFRA report (the report for the London Borough of Camden can be found on the Environment Agency website (www.environment-agency.gov.uk) and identifying Indicative Flood Risk Areas. There is an Indicative Flood Risk Area which covers the whole of Greater London.
- **Flood Hazard and Flood Risk Maps** – Following the identification of Flood Risk Areas, the Environment Agency and Lead Local Flood Authorities are required to produce hazard and risk maps for Indicative Flood Risk Areas by 22nd December 2013.
- **Flood Risk Management Plans** – The final stage is for the Council to produce a Flood Risk Management Plan for the Indicative Flood Risk Areas by 22nd December 2015. This will be based on the Local Strategy and the Surface Water Management Plan

All of these actions will then be repeated on a six yearly cycle with a new PFRA expected in 2017, new Flood Hazard and Flood Risk Maps in 2019 and a new Flood Risk Management Plan in 2021.

Appendix C: Stakeholder responsibilities

Risk Management Authorities

The flood and water management act recognises the following organisations to be risk management authorities:

- Lead Local Flood Authorities
- The Environment Agency
- Water Companies
- Highways Authorities
- Internal Drainage Boards (not applicable in Camden)
- District and Borough Councils (not applicable in Camden).

In Camden, the four organisations who are risk management authorities are the London Borough of Camden, Thames Water, the Environment Agency and Transport for London.

All risk management authorities have the following duties and powers:

1. Duty to be subject to scrutiny from lead local flood authorities' democratic processes. They can be called to account for their actions by the Culture and Environment Scrutiny Committee.
2. Duty to co-operate with other risk management authorities in the exercise of their flood and coastal erosion risk management functions, including sharing flood risk management data.
3. Power to take on flood risk functions from another risk management authority when agreed by both sides

1. London Borough of Camden

The Flood and Water Management Act 2010 identified Camden as the Lead Local Flood Authority for its administrative area. This gives Camden a strategic role in overseeing the management of surface water runoff and groundwater flood risk as well as the following new powers:

- Power to do works to manage flood risk from surface runoff or groundwater;
- Power to designate structures and features that affect flooding;
- Powers to request information from any person in connection with the authority's flood and coastal erosion risk management functions;

It also gives the Lead Local Flood Authority new responsibilities which can be divided into the following areas:

- Strategic Leadership- bringing together stakeholders and leading on developing a strategy to manage flood risk in the borough.

- Meeting the Flood Risk Regulations
- Producing Flood Investigation Reports
- Maintaining Register and Record of Assets
- Designating Assets
- Recording Flood Incidents
- Implementing the SuDS Approval Body

As well as these new roles, some of Camden's longstanding responsibilities have important roles to play in flood risk management. These include:

- Responsibilities as a planning authority
- Responsibilities as a highways authority
- Responsibilities for emergency planning
- Responsibilities for parks and open spaces
- Responsibilities for social housing

2. Thames Water

Thames Water is responsible for both the supply and drainage of water in the borough. It has the following responsibilities around flood risk management:

- Provide, maintain and operate systems of public sewers and works for the purpose of effectively draining an area, including maintenance of all drains which serve more than one property or which extend beyond the property boundary.
- Respond to flooding incidents involving their assets.
- Undertake capacity improvements to alleviate sewer flooding problems with priority being given to more frequent internal flooding problems
- Adopt all new lateral drains and sewers that are to connect to a public sewer from 1 April 2013.
- Statutory consultee to the SuDS (Sustainable Drainage System) Approval Body when the drainage system is proposed to communicate with the public sewer.
- Maintains its reservoirs according to the standards of the reservoir act.

N.B. Thames Water does not have:

- responsibility for highway drainage or land drainage until it reaches the sewer network;
- responsibility for drainage within the property boundary and serving one property

3. Environment Agency

The Environment Agency has an important strategic role in flood risk management across England including the following tasks:

- Publishing the National Strategy which provides a clear national framework for all forms of flood risk management
- Managing the Regional Flood and Coastal Committees (RFCCs) and support their decisions in allocating funding for flood defence and flood resilience schemes.
- Reviewing and supporting Lead Local Flood Authority activities
- Providing the data, information and tools to inform government policy and aid risk management authorities in delivering their responsibilities.
- Reporting and monitoring flood and coastal erosion risk management.

The Environment Agency also has a large operational role which mainly focuses on flooding from main rivers and the sea, which do not affect Camden. However the following two operational roles do affect Camden:

- Statutory consultee for all planning applications (other than minor development) in areas where there is a risk of flooding and for any site greater than 1 hectare in size. The Agency will provide advice on Flood Risk and help the local planning authority to technically interpret developer's flood risk assessments that have been submitted as part of the evidence base in support of a planning application.
- Enforcement authority for reservoirs that are greater than 10,000m³ ensuring they have flood plans although reservoir owners are responsible for carrying out work to manage reservoir safety. The Environment Agency is also responsible for establishing and maintaining a register of reservoirs, and making this information available to the public.

4. Transport for London

Transport for London (TfL) is the local government body responsible for most aspects of the transport system in Greater London. It is responsible for the London Underground and its gullies and culverts and for ensuring that these assets do not cause flood risk. TfL are undertaking a climate risk assessment of its assets and operations and develop a prioritised action plans for key climate risks. As a highways authority it is identified by the Flood and Water Management Act as a risk management authority with all the responsibilities that role entails.

Other key stakeholders

5. Residents and businesses

It is the responsibility of residents and businesses to look after their homes and properties, including protecting them from flooding. While in some circumstances other organisations or property owners may be liable due to neglect of their own responsibilities, there will be many occasions when flooding occurs despite all parties meeting their responsibilities.

For this reason there are some easy steps that all those with ground floor and basement homes or in premises in areas susceptible to surface water flooding should consider doing:

- Ensure they have flood insurance
- Put important documents out of flood risk and protect in polythene

³ More information about Environment Agency's operational role can be found here: <http://www.environment-agency.gov.uk/aboutus/work/35696.aspx>

- Identify what you would need to take with you if you had to leave your home
- Identify who can help you/ who you can help
- Make a flood plan and prepare a flood kit

A flood plan is a short plan providing important contact details and a checklist of actions you should take when at risk of flooding. The Environment Agency has designed one which can be found on the Environment Agency website www.environment-agency.gov.uk.

Some residents will be at greater risk of flooding in a major rainfall event than others. It is important that you understand your level of risk. Those who are based in areas of greater flood risk may also wish to consider protection measures for their home to stop flood water coming in or resilience measures to stop it causing lasting damage. More information can be found in the Preparing for flood events section.

The council will seek to deliver capital schemes to alleviate flood risk in areas identified as most at risk. The council will ensure that the affected communities are engaged early with the issues and are able to discuss it and share their concerns, interests and priorities and will rely on residents taking an active interest in order to make this process a success.

6. The Greater London Authority

The Greater London Authority (GLA) is the strategic regional authority with powers over transport, policing, economic development and fire and emergency planning. Transport for London is a delivery agency of the GLA.

The GLA is not a lead local flood authority and has no statutory role in flood risk management. However it developed the Drain London project to improve knowledge of flood risk in London. It helped Camden produce a Surface Water Management Plan and Preliminary Flood Risk Assessment as required by the Flood Risk Regulations.

The Drain London project divided up boroughs into groups, loosely based on catchments. Camden is in a group with Hammersmith & Fulham, Islington, Westminster, Kensington & Chelsea and the City of London. This group continues to meet to discuss joint work.

7. City of London Corporation

The City of London Corporation is the local government for the City or 'Square mile' and as such is a Lead Local Flood Authority with responsibilities for flood risk management in its area. It is also the manager of Hampstead Heath and is responsible for management of the Hampstead and Highgate ponds which are impacted by the Reservoirs Act. Under the new legislation all of these ponds are considered reservoirs and hence require flood plans. If the ponds are in a chain then, should any one of the ponds be a reservoir, a plan is needed for the entire chain. More information about their potential risk can be found in the flood risk section.

8. Canal & River Trust

The Canal & River Trust, formerly British Waterways, are the owners of Regent's Canal which goes through Camden from the top of Regent's Park to York Way via Camden. The canal has a number of locks (Camden, Hawley, Kentish Town Road, and St Pancras) within Camden which are maintained by the Canal & River Trust. It is the responsibility of the Canal & River Trust to ensure that no flooding occurs from the canals network.

9. Network Rail

Network Rail is responsible for three mainline stations in Camden: Euston, St Pancras and King's Cross. All other stations are managed by either Transport for London or the mainline railway company. However Network Rail does manage the entire track from national rail services and the London Overground including cuttings, culverts and tunnels which can be crucial for flood risk. They are not risk management authorities but are responsible for ensuring that their assets are maintained and do not increase flood risk.

10. Neighbouring London boroughs

All London boroughs are Lead Local Flood Authorities for their area, with the same responsibilities as Camden. However water, of course, flows across organisational boundaries and so it is crucial to work closely with neighbouring boroughs to recognise where issues in Camden are caused by the situation in other boroughs and vice versa.

As well as the boroughs directly surrounding Camden (Islington, Westminster, Haringey, Brent and the City of London), Camden will also be working with Hammersmith & Fulham and Kensington & Chelsea because although they are not neighbours, they are part of the same catchment. This means water can potentially run from Camden through Westminster into both of these boroughs and so it is possible we may be able to contribute to solutions to their problems.

Summary of responsibilities

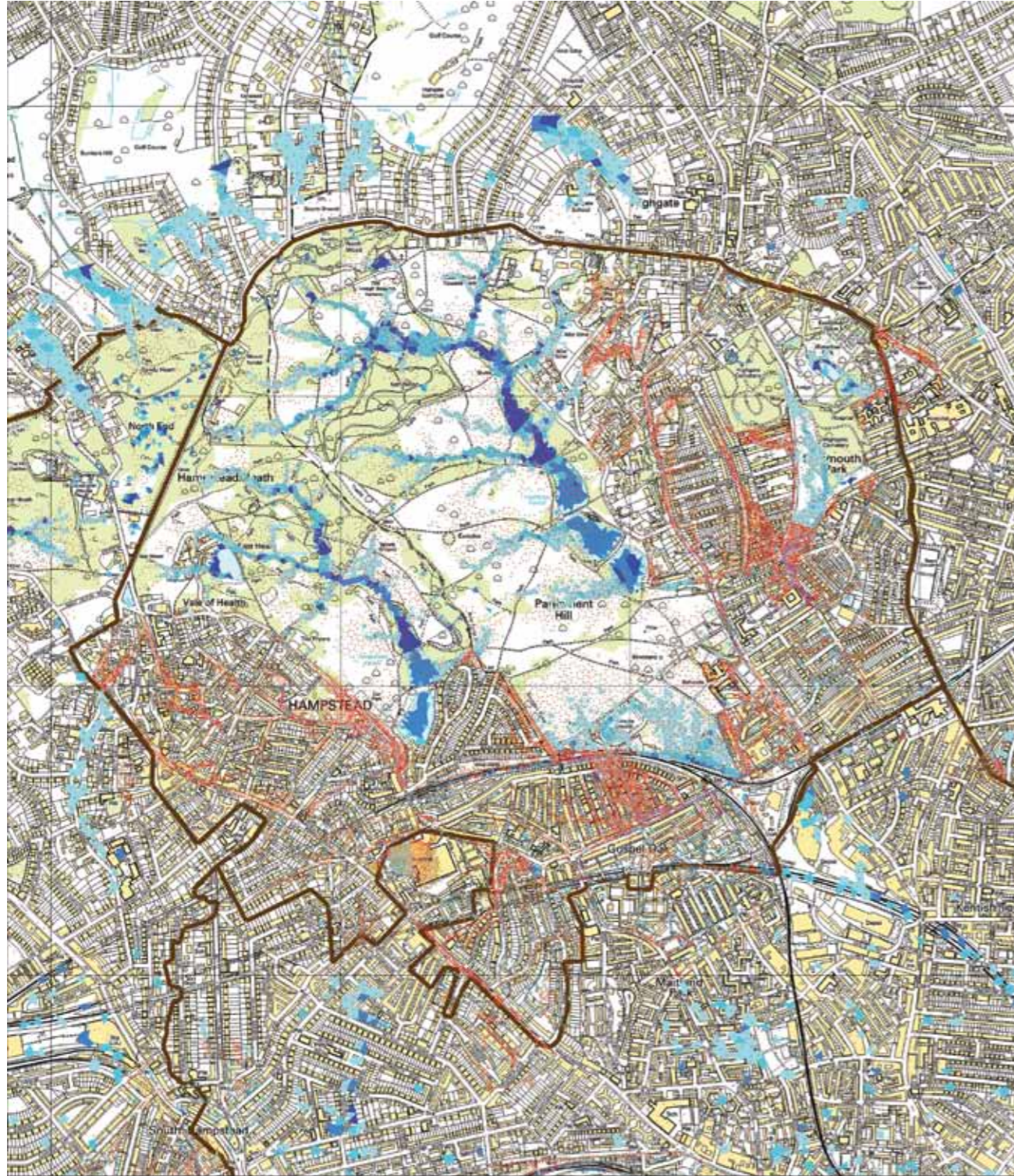
Responsibility	Stakeholder	Action	Timeline
Actions to increase understanding of flood risk	Camden Council	Produce Flood Investigation Reports	When criteria met
Actions to increase understanding of flood risk	Camden Council / Environment Agency	Publish Flood Risk Management Plan	December 2015
Actions to fund and deliver flood defence schemes	Camden Council	Put forward schemes for inclusion on Thames RFCC medium term plan	On-going
Actions to fund and deliver flood defence schemes	Camden Council	Engagement with residents on flood defence schemes	On-going
Actions to fund and deliver flood defence schemes	Thames Water/ Private Stakeholders	Contribute to flood defence schemes which provide them with private benefit if extra funding necessary for project to go ahead	When required








Responsibility	Stakeholder	Action	Timeline
Actions to fund and deliver flood defence schemes	Thames Regional Flood and Coastal Committee	Determine which schemes will receive central government and local levy funding	Final decisions taken in February of each year
Actions to record and maintain assets	All asset owners	Inspection, maintenance and repair of own assets	On-going
Actions to record and maintain assets	Camden Council	Maintenance of the Asset Register and Record	On-going
Actions to record and maintain assets	Camden Council	Publish the Asset Register	May 2013
Actions to record and maintain assets	Camden Council	Refresh the Asset Register	Every March
Actions to record and maintain assets	Thames Water and Camden Council	Determine ownership of a disputed pipe	On request
Actions to report and respond to flood incidents	All stakeholders	Reporting a flood incident	When required
Actions to report and respond to flood incidents	Metropolitan Police, the London Fire Brigade, the London Ambulance Service, Camden Council NHS North Central London, Environment Agency, Thames Water and British Waterways	Attendance at all Silver and Gold meetings	When required
Actions to report and respond to flood incidents	Camden Police	Chair of any Silver or Gold meetings	When required
Actions to report and respond to flood incidents	Camden Council	Produce a new Multi-Agency Flood Plan	Every 2 years or when there is a significant change. Last updated Summer 2012
Actions to report and respond to flood incidents	Camden Council and Camden Police	Activation of Multi-Agency Flood Plan	When required
Actions to report and respond to flood incidents	Camden Council	Co-ordination of a Recovery Co-ordinating Group	When required
Actions to report and respond to flood incidents	Camden Council	Provision of respite centres	If required/ The capability to do this involves support from other boroughs.

Responsibility	Stakeholder	Action	Timeline
Actions to ensure new developments meet flood risk requirements	Prospective planning applicants	Refer to Camden Planning Guidance 3 and Camden Planning Guidance 4 for information on good practice for flood risk management	On-going
Actions to ensure new developments meet flood risk requirements	Prospective planning applicants	Use the flood risk management strategy and strategic flood risk assessment (when refreshed) to inform Flood Risk Assessments	On-going
Actions to ensure new developments meet flood risk requirements	SuDS Approval Body	Ensure that all major and large scale construction projects have sustainable drainage approval	Not known
Actions to ensure new developments meet flood risk requirements	SuDS Approval Body	Ensure that all construction work with drainage implications have sustainable drainage approval	Not known

Appendix D - Maps of flood risk areas

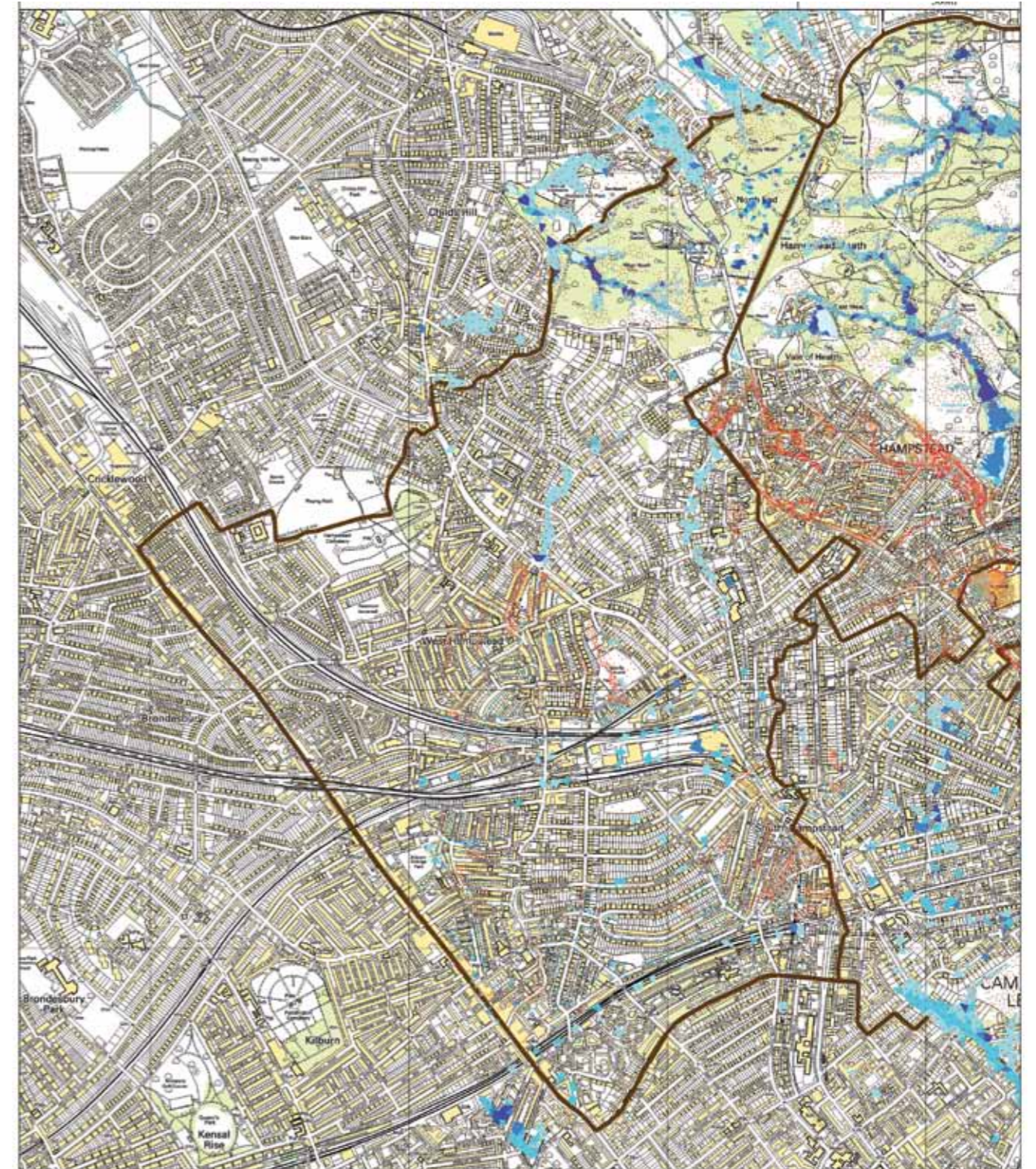
Map of surface water runoff in Camden North



KEY
 Flood velocity (how quickly the water is travelling)  $\geq 0.05\text{m/s}$  $\geq 0.05\text{m/s}$
 $\geq 0.01\text{m}$  $\geq 0.02\text{m}$  $\geq 0.03\text{m}$  $\geq 0.1\text{m}$  $\geq 1\text{m}$

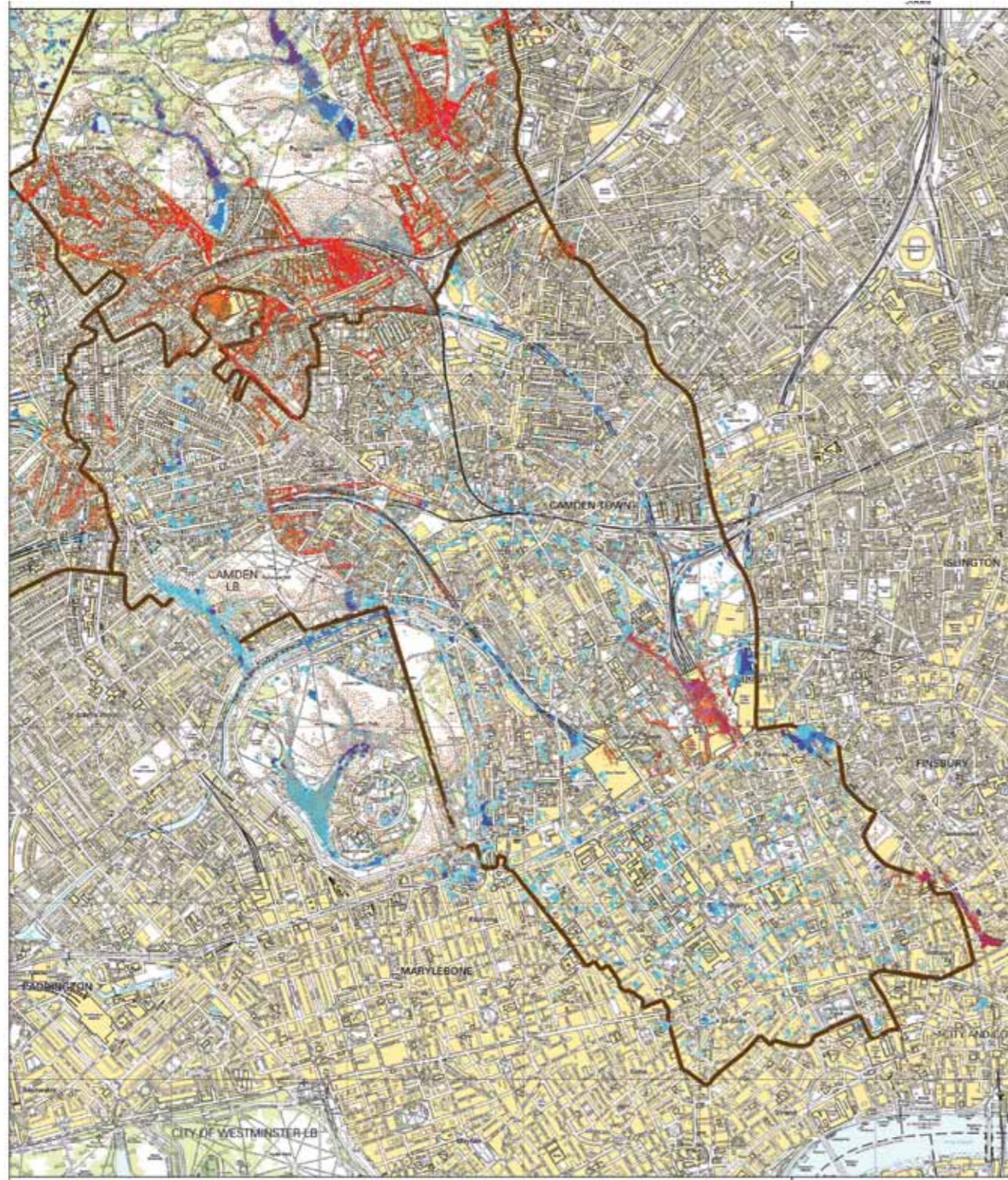
These are initial maps showing potential flows and areas of ponding for a flood event with a 1.33% chance of occurring in any one year (a 1 in 75 year return period). It is an indicative map and may be superseded by more area specific maps. It is not accurate to property level. More accurate modelling on Gospel Oak can be found in the Royal Haskoning report on the area.

Map of surface water runoff in Camden West



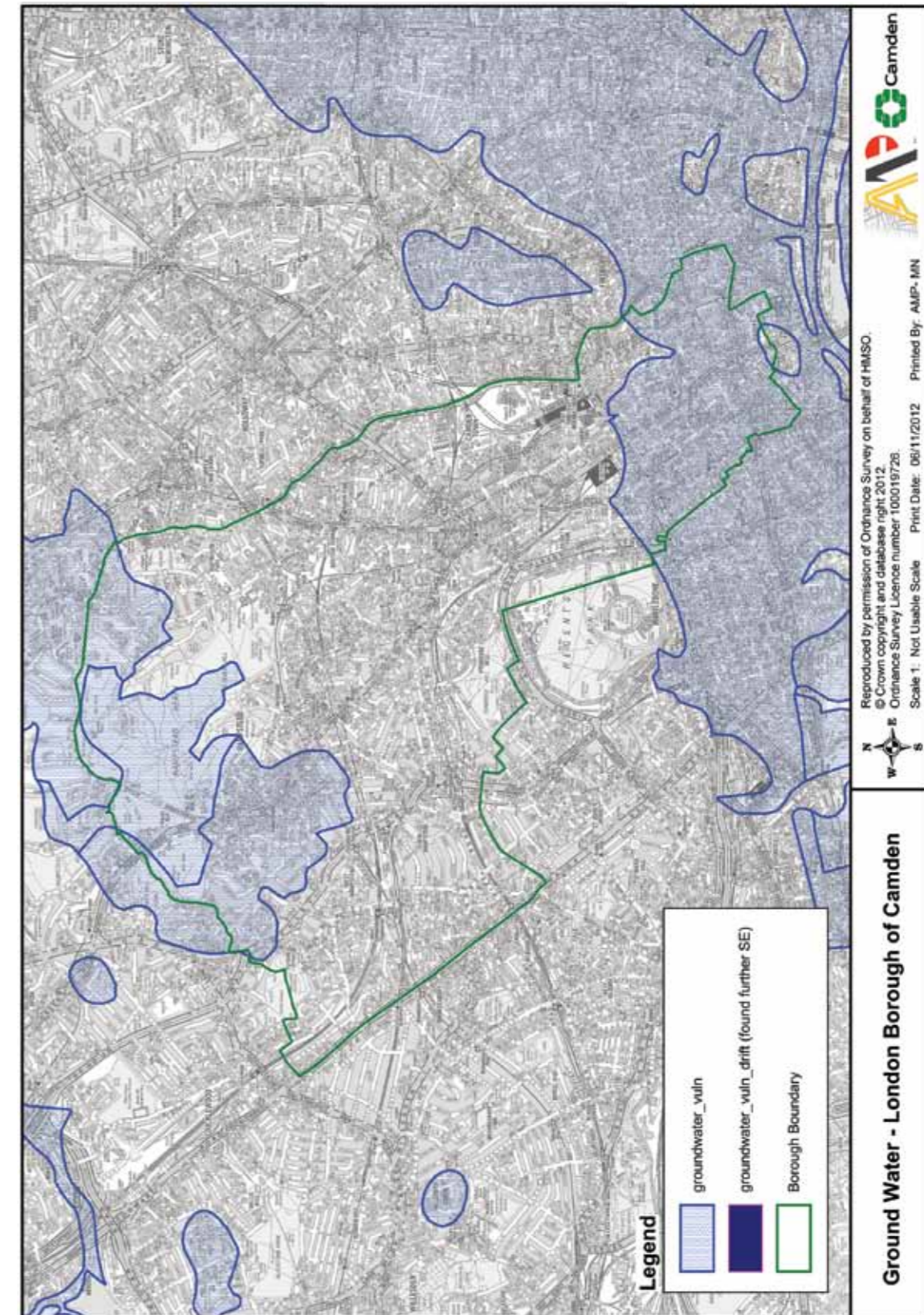
These are initial maps showing potential flows and areas of ponding for a flood event with a 1.33% chance of occurring in any one year (a 1 in 75 year return period). It is an indicative map and may be superseded by more area specific maps. It is not accurate to property level.

Map of surface water runoff in Camden South



These are initial maps showing potential flows and areas of ponding for a flood event with a 1.33% chance of occurring in any one year (a 1 in 75 year return period). It is an indicative map and may be superseded by more area specific maps. It is not accurate to property level and is considered inaccurate for the King's Cross area.

4. Map of groundwater flood risk



This is an Environment Agency map showing areas believed to be especially vulnerable to groundwater flooding. Records show that groundwater is not exclusive to these areas and surveys are recommended for anyone wishing to better understand the groundwater risk in their areas.

Appendix E - Asset types to be recorded on register

Category	Links	Nodes	Polygons
Type of structures or features	Open channel	Manhole	Reservoir, including lakes and ponds
	Culvert	Inlet	Flood storage pond
	Sewer	Outlet	Swale
	Drain, including highway drain	Pumping stations	Soakaway/filter strip
	Rising main	Gully	Permeable paved area
	Flood defence bank	Inspection chamber	
	Flood defence wall	Junction	
	Permeable pavement	Change of physical character or direction	

Contact

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