Local Flood Risk Management Strategy: 2015-2020

London Borough of Croydon




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Limitations

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FOREWORD

In response to the flood events during 2007, the Government commissioned Sir Michael Pitt to undertake a review. The outcome of this, *Learning Lessons from the 2007 Floods* outlined the need for changes in the way England is adapting to the increased risk of flooding and the role different organisations have to deliver this function.

The Flood and Water Management Act 2010, enacted by Government in response to the recommendations of The Pitt Review, designated unitary and county councils as Lead Local Flood Authorities with new responsibilities for leading and co-ordinating the management of local flood risk; namely the flood risk arising from surface water runoff, groundwater and smaller watercourses and ditches, known as ordinary watercourses. This includes a statutory duty to develop, maintain, apply and monitor a strategy for the management of local flood risk.

Croydon Council is the Lead Local Flood Authority for the London Borough of Croydon. This Local Flood Risk Management Strategy (the "Strategy) offers the first opportunity for us to formalise our longer term vision and flood risk management priorities to shape a Strategy that delivers the greatest benefit to the people, property and environment of Croydon.

Croydon has a history of severe flooding. Most recently Purley and Kenley experienced significant flooding from the Caterham Bourne due to extremely high groundwater during January to March 2014, when properties and businesses were impacted and an emergency situation was declared. Severe surface water flooding during July 2007 flooded into properties and brought Purley town centre to a standstill. Croydon is at risk of flooding predominantly from surface water and groundwater sources and it is predicted that this will increase in the future; influenced by climate change and increasing pressures on development and housing need.

Since April 2011 we have been working closely with communities, businesses, and other risk management authorities, including our neighbouring boroughs, the Environment Agency and Thames Water, to improve our understanding of flood risk in Croydon and deliver measures that improve community resilience alongside nationally funded strategic schemes that deliver flood and environmental benefits to communities, businesses and infrastructure.

In developing this Strategy, we have consulted with communities, businesses, neighbouring boroughs and risk management authorities to develop a coordinated Strategy for local flood risk management across Croydon. The Strategy outlines the priorities for local flood risk management and provides a delivery plan to manage the risk over the next six years. We have given consideration to the roles and responsibilities of other risk management authorities in Croydon, including the Environment Agency, which has responsibility for managing the risk arising from Main Rivers, including the River Wandle, Norbury Brook and Chaffinch Brook, and Thames Water, which has responsibility for managing sewer flooding. Both these sources of flooding interact and influence ordinary watercourse, surface water and groundwater flood risk within Croydon.

Our Strategy complements and supports the *National Strategy* published by the Environment Agency which outlines a National framework for flood and coastal risk management. The Environment Agency has a strategic overview role of all flood and coastal erosion risk management. We have taken the guiding principles from this strategy into account when setting the following objectives for the management of local flood risk:

- Continue to build our evidence base on flood mechanisms, incidents and assets and improve how it is communicated internally and externally,
- Maximise use of resources in targeted flood management,
- Ensure evidence of historic floods and ongoing studies effectively feed into planning policy and decision-making,
- Support sustainable growth and development by understanding the needs of all parties,
- Work effectively with Risk Management Authorities in and around Croydon to jointly manage the risks,
- Improve awareness of the causes of flooding with the general public and encourage proactive management,
- Take a more holistic view of asset management in Croydon, improving priorities and addressing source control more effectively, and,
- Maximise opportunities to learn, improve and review flood management procedures based on lessons learnt.

The Strategy is accompanied by an Action Plan setting out how we will deliver the objectives of the Strategy over the next five years and a Strategic Environmental Assessment (SEA) assessing the impacts of the Strategy on the environment.

Over the next six years we will continue to work with communities and businesses to help them understand the risks they face and what can be done to manage them. A range of individual, community and council-led actions and improved awareness will help manage both the likelihood and impact of flooding and consequently lead to social, economic and environmental benefits to Croydon's communities.

Longer term strategic development across Croydon will integrate consideration of flood risk and sustainable drainage into planning and development control systems. Inappropriate development which could increase flood risk will be avoided, as will inappropriate development in areas of significant flood risk.

The Local Flood Risk Management Strategy will be updated periodically to ensure that its content and emphasis remains relevant.

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1. INTRODUCTION

1.1 Flood Risk in South West London

In England, 5.2 million properties are at risk of flooding. Of these, 1.4 million are at risk from rivers or the sea, 2.8 million are at risk from surface water and 1 million are at risk from both[1]. This risk was realised in many parts of the country during the summer floods of 2007, which resulted in 55,000 properties flooding, 7,000 rescues by emergency services, 13 deaths and an estimated £3billion of damages. The severity of this event generated changes in the way flooding should be managed by local and national organisations.

Across South West London there are risks of flooding from a range of sources, including surface water runoff and ponding, groundwater, sewer surcharging and flooding from main rivers and ordinary watercourses, and reservoirs. In some cases more than one of these sources of flooding can combine to cause a flood event.

Risks from tidal and river flooding associated with the River Thames, Hogsmill, Beverley Brook, River Wandle and River Graveney are relatively well understood and have been managed at a national scale for many years by the Environment Agency. However, flood risk from more local sources, including surface water runoff and ponding, groundwater and small ditches and land drains are less well understood; these are typically very localised events which are often difficult to predict, and with sparse historical records available to provide supporting evidence.

Parts of South West London have a particular susceptibility to surface water and sewer flooding due to the urbanised nature of the area and the aging Victorian sewer system. Over recent years, severe groundwater and surface water flooding has been experienced across the area causing damage to property and disruption to businesses and services. Flooding in Croydon in early 2014 was declared an emergency and required an extensive multi-agency response and clean-up operation. It highlighted the real threats that flooding from multiple sources can pose and reinforces the need to regularly review local flood risk management. Details of historic flood records are provided in Section 2.

In December 2013 the Environment Agency published its latest surface water flood mapping, the updated Flood Map for Surface Water (uFMfSW). The uFMfSW represents a refinement of the modelling undertaken as part of the London Borough of Croydon Surface Water Management Plan (SWMP)[2], and initial high-level, borough-wide property counts undertaken to support this Strategy indicate a reduction in the flood risk by comparison although the risk of surface water flooding in Croydon remains considerable. As part of Croydon's ongoing local flood risk management work, further assessment of the uFMfSW will be carried out in order to increase understanding of local surface water flood risk and identify and prioritise those areas at greatest risk.

1.1.1 The high level assessment identified the number of properties at the following risk bands:

- At High Risk: 3,714 residential properties, 578 commercial and industrial properties, 35 schools/education facilities, 12 surgeries/health care properties, three emergency service facilities, two hospitals and one residential home,
- At Medium Risk: 10,440 residential properties, 1,272 commercial and industrial properties, 72 schools/education facilities, 32 surgeries/health care properties, six emergency service facilities, three hospitals and one residential home, and,

[1] Environment Agency (2009) Flooding in England: A National Assessment of Flood Risk http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/geho0609bqds-e-e.pdf
[2] Capita URS for London Borough of Croydon (2011) London Borough of Croydon Surface Water Management Plan http://www.croydon.gov.uk/contents/departments/planningandregeneration/pdf/swplan.pdf?bcsi_scan_AB11CAA0E2721250=hJz+QHaPXXp+oD93rrgS7KnTaI9HAQAAudqVPA==&bcsi_scan_filename=swplan.pdf

- At Low Risk: 33,614 residential properties, 2,455 commercial and industrial properties, 134 schools/education facilities, 67 surgeries/health care properties, 11 emergency service facilities, three hospitals and five residential homes.

Typically, reactive mitigation measures have been implemented in response to past flood events, usually with the construction of new drainage infrastructure. However, climate change and continued urbanisation are likely to increase flood risks in the future unless action is taken to mitigate or adapt to that risk.

1.2 Flood Risk Management in South West London

In response to the severe flooding across large parts of England and Wales in summer 2007, the Government commissioned Sir Michael Pitt to undertake a review of flood risk management. The Pitt Review – Learning Lessons from the 2007 Floods[3] and subsequent progress reviews outlined the need for changes in the way the UK is adapting to the increased risk of flooding and the role different organisations have to deliver this function.

The Flood and Water Management Act 2010 (The Act)[4] and the Flood Risk Regulations 2009[5], make provision for unitary authorities and county councils, including all London Boroughs, as Lead Local Flood Authorities (LLFAs). As LLFA, each London Borough, including Croydon Council, has a number of duties and responsibilities in relation to managing local flood risk, as required by the The Act and the Flood Risk Regulations 2009. Local flood risk is defined as the risk of flooding from surface water runoff, groundwater and small ditches and watercourses (collectively known as Ordinary Watercourses).

The Act also formalises the flood risk management roles and responsibilities for other organisations including the Environment Agency, water companies and highways authorities. The responsibility to lead and co-ordinate the management of flood risk from main rivers, the sea and other tidal sources (such as estuaries) (tidal) remains that of the Environment Agency. Further details regarding responsibilities and functions in relation to their flood risk management in South West London is provided in Section 3.

As LLFAs, each of the unitary authorities across South West London has a statutory duty to develop, maintain, apply and monitor a strategy for local flood risk management ('the Strategy').

The six LLFAs covering South West London, (namely, London Borough of Croydon, The Royal Borough of Kingston upon Thames, London Borough of Merton, London Borough of Sutton, London Borough of Richmond upon Thames and London Borough of Wandsworth), have chosen to partner together to commission the preparation of their Strategies in a coordinated manner. This partnership approach will encourage collaboration and enable flood risk across South West London to be managed more effectively and holistically. Further details of the South West London Flood Group are included in Section 5.

1.3 The London Borough of Croydon Strategy

The purpose of the London Borough of Croydon Strategy is to set out the approach to managing flood risk from local sources (i.e. surface water, groundwater and ordinary watercourses) in both the short and longer term, with proposals for actions that will help to manage the risk in a way that delivers the greatest benefit to its residents, businesses and the environment.

[3] Cabinet Office (2008) Sir Michael Pitt Report 'Learning lessons learned from the 2007 floods' http://www.environment-agency.gov.uk/research/library/publications/33889.aspx
[4] HMSO (2010) The Flood and Water Management Act 2010 http://www.legislation.gov.uk/ukpga/2010/29/contents
[5] HMSO (2009) The Flood Risk Regulations 2009 http://www.legislation.gov.uk/uksi/2009/3042/made

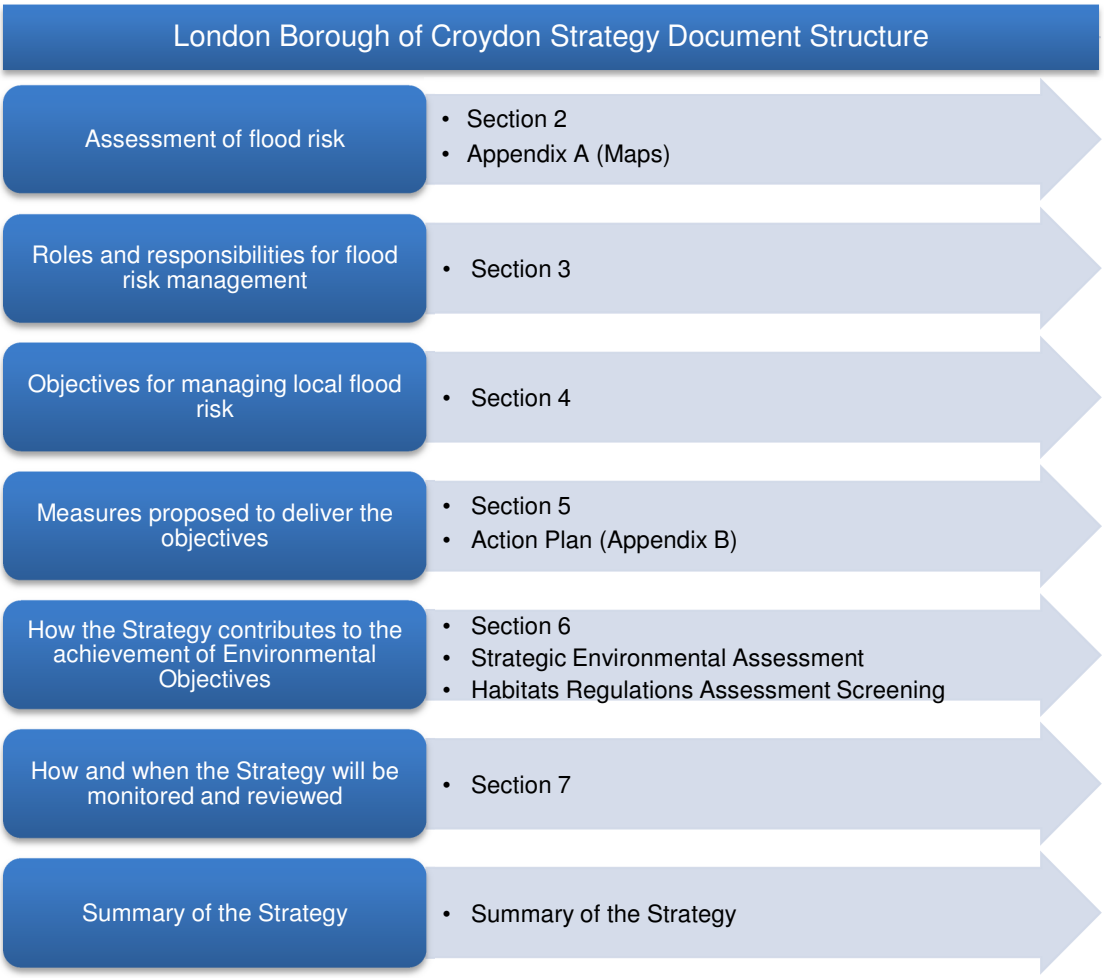


Figure 1-1 Structure of the Strategy

The Strategy complements and supports the National Strategy[6], published by the Environment Agency in 2011, which outlines a National framework for flood and coastal risk management, balancing the needs of communities, the economy and the environment.

This Strategy has been developed by Croydon Council in partnership with Risk Management Authorities (RMAs), including the Environment Agency and Thames Water, as well as local communities and neighbouring boroughs. Further details of RMAs and other organisations with responsibilities for local flood risk management are provided in Section 3.

In delivering flood risk management, Croydon Council have the opportunity to deliver wider environmental objectives and requirements, as set out in European legislation including the Water Framework Directive[7] (WFD). The WFD was transposed into UK national law through The Water Environment Regulations 2003[8], and states that Croydon Council should have regard to the River Basin Management Plans (RBMPs) when exercising its functions as a public body. The approach for addressing this, including the preparation of a Strategic

[6] Defra, Environment Agency (2011) The National Flood and Coastal Erosion Risk Management Strategy for England https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england
[7] European Union (2000) Water Framework Directive http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT
[8] HMSO (2003) The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 http://www.legislation.gov.uk/uksi/2003/3242/contents/made

Environmental Assessment (SEA) and Habitats Regulations Assessment Screening exercise, is outlined in Section 6.

1.4 Community Engagement and Consultation

A community engagement exercise was undertaken between January and March 2014 offering residents and businesses the opportunity to shape the development of the Strategy and future flood risk management priorities. Details of the outcomes from the community engagement activities are included in Appendix C.

This report forms the draft Strategy which will undergo a period of public consultation, offering the opportunity for residents, businesses and risk management stakeholders to provide feedback. Following the public consultation, the Strategy will be updated in line with comments received and finalised before being adopted and published by Croydon Council.

1.5 Supporting Plans and Documents

Over recent years, a number of documents have been prepared detailing the assessment and management of flood risk within the London Borough of Croydon. As indicated in Figure 1-2, it is intended that the Strategy forms a key document in this suite of flood risk management plans, drawing together existing flood risk studies and plans into a single document that outlines how Croydon Council will manage local flood risk going forwards.

As part of the assessment of flood risk, the Strategy draws on technical information and historic records of flooding presented in the Surface Water Management Plan (SWMP)[9], Strategic Flood Risk Assessment (SFRA)[10] and Preliminary Flood Risk Assessment (PFRA)[11].These same documents and the partnerships forged between RMAs during their preparation are also built upon and formalised as part of the Strategy.

The Strategy also draws from wider environmental plans covering Thames catchment including the Thames River Basin District Management Plan[12] and the Thames Catchment Flood Management Plan[13]to ensure a coordinated approach to flood risk management across South West London.

[9] Capita URS for London Borough of Croydon (2011) Croydon Surface Water Management Plan
http://www.croydon.gov.uk/contents/departments/planningandregeneration/pdf/swplan.pdf?bcsi_scan_AB11CAA0E2721250=hJz+QHaPXXp+oD93rrgS7KnTaI9HAQAAudqVPA==&bcsi_scan_filename=swplan.pdf
[10] Scott Wilson (2008) London Boroughs of Wandsworth, Merton, Sutton and Croydon Strategic Flood Risk Assessment
http://www.croydon.gov.uk/contents/departments/planningandregeneration/pdf/evidence/climate/sfralevel1final
[11] Capita Symonds Scott Wilson (2011) London Borough of Croydon Preliminary Flood Risk Assessment
http://www.croydon.gov.uk/contents/departments/planningandregeneration/pdf/preliminaryflood-assessment.pdf
[12] Environment Agency (2009) Thames River Basin District Management Plan
https://www.gov.uk/government/publications/thames-river-basin-management-plan
[13] Environment Agency (2009) Thames Catchment Flood Management Plan
https://www.gov.uk/government/publications/thames-catchment-flood-management-plan

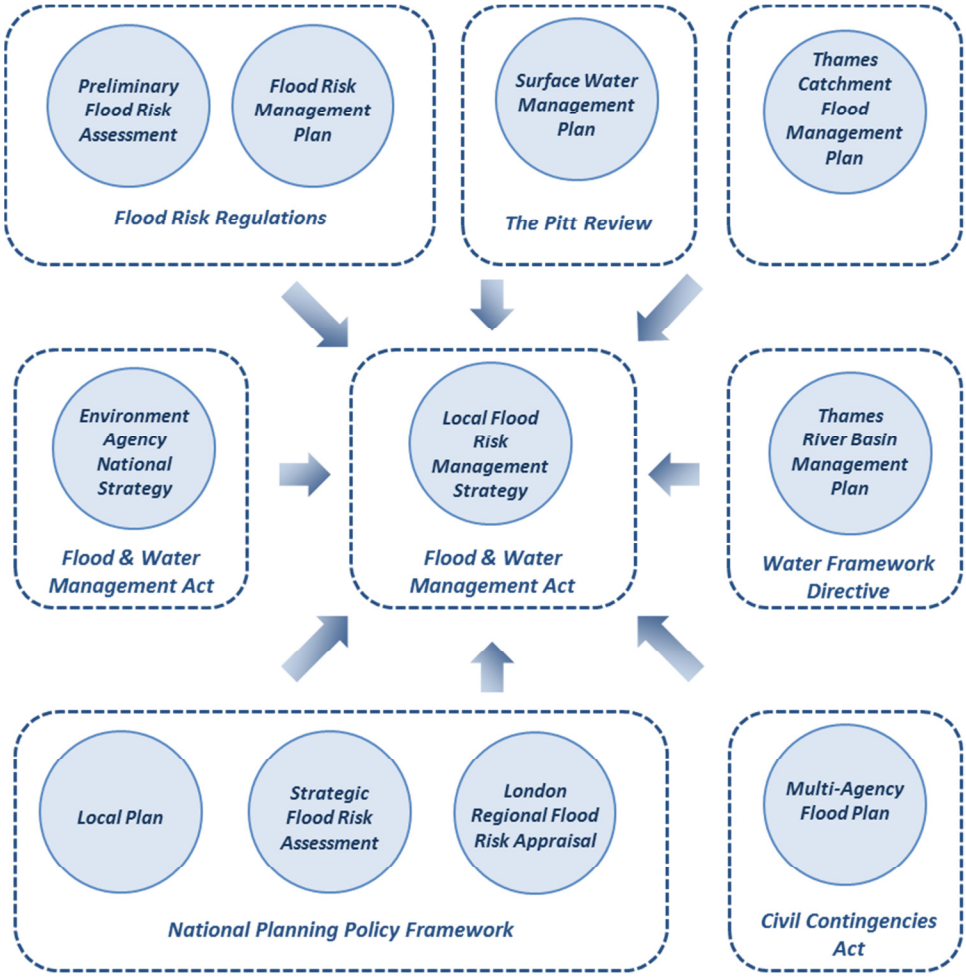


Figure 1-2 Legislative Drivers and Supporting Documents for the Strategy

Flood Risk Management Plan

As well as the duties under the Act to prepare the Strategy, Croydon Council have legal obligations under the EU Floods Directive[14], which was transposed into UK Law through the Flood Risk Regulations 2009[15] ('the Regulations').

As part of the Greater London Flood Risk Area, the London Borough of Croydon is required to contribute to the preparation of a Flood Risk Management Plan (FRMP) for the Thames River Basin District outlining significant flood risk, receptors and consequences across their administrative area. The consultation on the Draft Thames FRMP closed on 31st January 2015 and it is due for publication by December 2015

This Strategy has been prepared to meet the requirements of the Regulations as well as the Act, and thereby avoid duplication of work.

[14] European Union (2007) EU Floods Directive http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32007L0060:EN:NOT
[15] HSMO (2009) The Flood Risk Regulations http://www.legislation.gov.uk/uksi/2009/3042/contents/made

2. ASSESSMENT OF LOCAL FLOOD RISK

2.1 What is Flood Risk?

Flood risk is not just the likelihood of flooding occurring, but also the potential damage a flood could cause. Assessing risk in quantifiable, financial terms can help prioritise where available funding should be directed, as well as support applications for additional external funding.

However, it should also be borne in mind that the consequences of flooding can be far reaching and not always easy to value, particularly the social impacts of displacement, loss and fear of repeat events. All available information and past experiences have been considered in developing our objectives for managing future flood risk.

What is Flood Risk?

Flood Risk is the likelihood of a particular flood happening (probability) e.g. 'there is a 1 in 100 chance of flood in any given year in this location', multiplied by the impact or consequence that will result if the flood occurs.

The evaluation of risk takes into account the severity of impacts from a flood event, which can be highly variable in terms of social, economic and environmental consequences. Consequences are often measured by number of properties flooded and level of economic damage. It will also be influenced by vulnerability (i.e. a basement flat or a key emergency service station is more vulnerable than a commercial warehouse)

There will only be a risk if there is a means (pathway) of connecting the source of the flood with the people, property and land that may be affected (receptors). Source, pathway and receptor must all be present for there to be a risk.

2.1.1 *Influencing the risk*

Flooding is a natural phenomenon linked to the volume, intensity and duration of rainfall received in a geographical area. Urban development has complicated the consequences of flooding by altering the route of watercourses or culverting them and creating hard surfaces where water ponds or flows quickly instead of infiltrating naturally to ground. Although we cannot stop the rain, there are multiple ways in which we can all influence the risk both positively and negatively. This is discussed further in Section 5.

2.2 Local Sources of Flood Risk

This Section of the Strategy sets out the assessment of flood risk from *local* sources, i.e. groundwater, surface water and ordinary watercourses.

For each of these sources a description of the source and mechanism of flooding has been provided and an assessment of the risk has been made drawing on historical records, outcomes from the community engagement (refer to Appendix C), as well as assessments

detailed in existing technical studies addressing both current and future risk. Appendix A provides a series of maps showing the historic records of flooding and modelled potential future impacts of flooding from local sources, where information is available.

Groundwater

Table 2-1 Flooding from Local Sources – Groundwater	
Description of Source	Groundwater flooding occurs as a result of water rising up from the underlying aquifer or from water flowing from springs. This tends to occur after much longer periods of sustained high rainfall and can be sporadic in both location and time often lasting longer than a fluvial or surface water flood. High groundwater level conditions may not always lead to widespread groundwater flooding; however, they have the potential to exacerbate the risk of surface water and flooding from rivers by reducing rainfall infiltration capacity, and to increase the risk of sewer flooding through sewer / groundwater interactions.
Supporting Documents	London Borough of Croydon Surface Water Management Plan London Borough of Croydon Preliminary Flood Risk Assessment Caterham Bourne Flood Investigation: January – March 2014

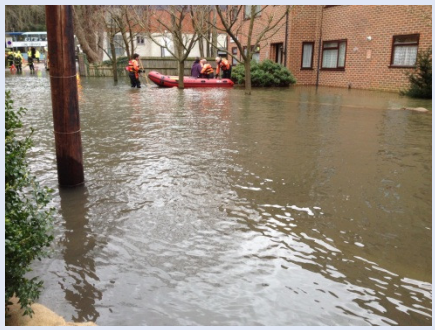
Table 2-1 Flooding from Local Sources – Groundwater	
Historic Flooding	Basements and other below ground level installations are particularly vulnerable to groundwater flooding, although property and land above ground level can be at risk. Instances of groundwater flooding have been reported in a number of areas in Croydon with some regular hotspots in the north of the Borough including areas around Upper Norwood, Thornton Heath and Ashburton. These can be highly localised usually affecting basements or gardens. The chalk geology in the South of the Borough increases vulnerability to groundwater emergence on a larger scale particularly in the valley routes through Kenley, Purley and Coulsdon. The most significant recent flooding event occurred in February and March 2014 when an unprecedented period of rainfall caused groundwater levels to rise leading to flood incidents around the Borough. The rising groundwater led to a significant flow in the Caterham Bourne, a watercourse which is largely dry for most of the time and follows a route from Tandridge in Surrey along the A22 / Godstone Road through Kenley and Purley. The 2014 floods caused significant disruption, threatening homes, essential infrastructure and transport networks. An emergency situation was declared as multiple agencies worked to keep water out of homes along the A22 and surrounding roads in Kenley and Purley. The Caterham Bourne has a history of rising approximately every 7 years although the last significant event prior to 2014 is recorded in 2000-01 following another exceptionally wet winter. Appendix A Figure 1 shows records of historic flooding from local sources including groundwater. Around a third of respondents to the online survey cited groundwater as a main source of flooding in Croydon. This is likely to have been influenced by the Caterham Bourne being in flood as the survey ran in early 2014.   *Flooding in Dale Road, Purley during Caterham Bourne flood February 2014*
Future Flood Risk	Groundwater flooding can be particularly difficult to predict due to the 'hidden' nature of the source of flooding and relatively longer period of build-up and emergence, often several days or weeks after heavy rainfall has fallen and river levels have receded. Existing efforts to predict groundwater flooding events are based on monitoring water levels in boreholes in areas known to be at risk. These systems can give notice (typically days or weeks ahead) of impending events. Groundwater models can be used to provide early warning systems that can alert authorities to possible groundwater flooding in advance allowing authorities to plan their response and possibly even to implement mitigating measures. However, the monitoring of boreholes and development of groundwater flood models can be costly, and are only normally undertaken in those areas of greatest risk. For the London Borough of Croydon SWMP, an 'Increased Potential for Elevated Groundwater' dataset was derived from British Geological Survey, Environment Agency and Defra groundwater flooding datasets (Figure 3, Appendix A). The dataset identifies areas where there is increased potential for groundwater levels to raise

Table 2-1 Flooding from Local Sources – Groundwater	
	within 2 m of ground surface following periods of higher than average recharge and is intended as a high-level risk assessment, rather than detailed modelling of groundwater flood risk across the borough. The Southern half of the borough is dominated by chalk and has distinctly different geology to the London Clay in the North. A number of groundwater flooding mechanisms were identified in the SWMP, the most significant being associated with River Terrace Deposits associated with the River Wandle and elevated groundwater levels in the chalk aquifer.
Figures - Appendix A	Figure 1: Historic Flooding Figure 3: Flood Risk from Groundwater

Surface Water Runoff

Table 2-2 Flooding from Local Sources –Surface Water Runoff	
Description of Source	Surface water flooding usually occurs when high intensity rainfall generates runoff which flows over the surface of the ground and ponds in low lying areas, before the runoff enters a watercourse or sewer. It can be exacerbated when the soil is saturated and natural drainage channels or artificial drainage systems have insufficient capacity to cope with the additional flow.
Supporting Documents	London Borough of Croydon Surface Water Management Plan[16] London Borough of Croydon Preliminary Flood Risk Assessment[17]
Historic Flooding	The Preliminary Flood Risk Assessment (PFRA) and Surface Water Management Plan (SWMP) identify parts of Croydon to be particularly susceptible to surface water flooding, including Brighton Road through Purley up to Central Croydon and the A22 Godstone Road. The publication of the updated flood map for surface water by the Environment Agency[18] has refined these risk areas further. Specific episodes of surface water flooding are recorded in the following locations and numerous others across the borough, as shown in Figure 1, Appendix A: • Purley Cross roundabout & Brighton Road • Kenley Lane and Kenley Station • Brighton Road, Coulsdon • Hamsey Green • Purley Oaks Road and station • Norbury & Thornton Heath The London Borough of Croydon has experienced a number of surface water flood events, the most notable of which was the 20th July 2007, where intense periods of rainfall caused flash floods and the capacity of the existing drainage system to be exceeded in numerous locations across the borough. Purley town centre experienced some of the worst flooding with significant flooding to property and the transport network. Responses to the Croydon Strategy community engagement highlight areas where people feel the drains are regularly surcharging due to blockage or insufficient capacity

[16] Capita Symonds URS (2011) London Borough of Croydon Surface Water Management Plan http://www.croydon.gov.uk/contents/departments/planningandregeneration/pdf/swplan.pdf
[17] Capita Symonds URS (2011) London Borough of Croydon Preliminary Flood Risk Assessment http://www.croydon.gov.uk/contents/departments/planningandregeneration/pdf/preliminaryflood-assessment.pdf
[18] Environment Agency, Flood Risk from Surface Water mapshttp://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?&topic=ufmfsw#x=357683&y=355134&scale=2

Table 2-2 Flooding from Local Sources –Surface Water Runoff	
	and in certain locations this has been happening for many years such as Kenley Lane, King Henry's Drive & and Purley Oaks Road. With steep topography in the South of the Borough, many roads follow the natural line of water flow, creating pressure on the drainage at the lowest points. Concerns are raised over continued paving of gardens exacerbating the problem. There is also considerable concern relating to water flowing off open land towards properties. Further information on the engagement outcomes are provided in Appendix C.  Kenley Lane after heavy rain in December 2012
Future Flood Risk	The Environment Agency has undertaken national modelling of the risk of flooding from surface water and published the mapping outcomes on their website in December 2013. The Flood Risk from Surface Water map[19],identifies the risk of surface water flooding at a strategic scale and bands flood risk as follows: • High Risk – at risk of flooding for a for a rainfall event with a 1 in 30 probability of occurrence in any given year • Medium Risk – at risk of flooding for a for a rainfall event with a 1 in 100 probability of occurrence in any given year • Low Risk – at risk of flooding for a for a rainfall event with a 1 in 1000 probability of occurrence in any given year, and, • Very Low Risk – at risk of flooding for a for a rainfall event with less than a 1 in 1000 probability of occurrence in any given year. Appendix A Figure 2 shows the Flood Risk from Surface Water mapping for the London Borough of Croydon. The Flood Risk from Surface Water map improves on modelling and mapping undertaken as part of the Croydon SWMP in 2011. The mapping shows relatively good correlation with the surface water modelling presented in the SWMP, but shows surface water to be more constrained within roads and watercourse, which in part reflects the improved resolution of the modelling. Based on available historic information, the dataset is considered to be more reflective of flood risk across the London Borough of Croydon and will be used as the surface water flood risk map for the borough until such time as further updates or improved modelling of risk is undertaken. An assessment of the risk to properties, critical infrastructure, transport, heritage and the environment has been undertaken for the Strategy using the Environment Agency's National Receptor Database to provide an indication of the level of risk facing Croydon. This is presented in the table below and Figures 7 and 8 in Appendix A.

[19] Flood Risk from Surface Water maps, also known as the updated Flood Map for Surface Water (uFMfSW) dataset.

Table 2-2 Flooding from Local Sources –Surface Water Runoff

No. Properties at Risk of Flooding in Croydon (based on Environment Agency 'Flood Risk for Surface Water' mapping)			Risk		
			Low	Medium	High
Residential			33,614	10,440	3,714
Non Residential	Commercial & Industrial		2,455	1,272	578
	Critical Infrastructure	Emergency Services (Fire, Police & Ambulance Station)	11	6	3
		Hospitals	3	3	2
		Schools and Education Facilities	134	72	35
		Surgery or Health Care	67	32	12
		Residential Home	5	1	1
		Sewage Treatment	3	2	1
		Electricity Sub Station or Building	68	27	14
	Other		147	63	34
	Non Residential Total		**2,893**	**1,478**	**680**
Total			**36,507**	**11,918**	**4,394**

The areas at greatest risk within Croydon have been identified as Critical Drainage Areas (CDAs). Sixteen specific CDAs have been identified in Croydon (see Figure 6).

The areas considered to be at greatest risk of surface water flooding within the London Borough of Croydon are:

- South and Central Croydon (CDA 042),
- Brighton Road (CDA 041),
- Purley Cross (CDA 040),
- Old Lodge Lane (CDA 036),
- A22 Godstone Road (CDA 038), and
- Chipstead Valley Road (CDA 039).

The risk of future flooding from surface water can be influenced through changes in planning and urban design as well as better education about the functions of ditches and drains. The approaches to managing these within Croydon are discussed further in Section 5.

Figures - Appendix A

Figure 1: Historic Flooding

Figure 2: Flood Risk from Surface Water

Figure 6: Surface Water Critical Drainage Areas

Figure 7: Flood Risk from Surface Water: Critical Services & Transport

Figure 8: Flood Risk from Surface Water: Environment & Heritage

Ordinary Watercourses (including small ditches and land drains)

Table 2-3 Flooding from Local Sources – Ordinary Watercourses (incl. small ditches and land drains)	
Description of Source	Ordinary watercourses include every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows, above ground or culverted, which is not designated as a Main River (see Section 2.3 Other Sources of Flood Risk). The responsibility for managing and maintaining ordinary watercourses falls to riparian owners who typically own land on either bank and therefore are deemed to own the land to the centre of the watercourse. Under the Act, Croydon Council, as the LLFA, has responsibility to manage the risk of flooding arising from the watercourses through engagement with riparian owners and enforcing maintenance responsibilities in accordance with the Land Drainage Act 1991[20] (see Section 3.2 for further information); prior to the Act the responsibility was shared between the Environment Agency and the Council. According to Environment Agency records, the mapped ordinary watercourses in Croydon include the upstream section of the Norbury Brook, near Selhurst in the north of the borough, and the tip of the Beck, which flows into the London Borough of Bromley. A number of other watercourses have been identified, including ephemeral bournes, which only flow when the groundwater is high. There is a requirement for some of these watercourses to be mapped and riparian responsibilities clarified for future management. Figure 5 in Appendix A shows the location of watercourses within Croydon.
Supporting Documents	London Borough of Croydon Surface Water Management Plan London Borough of Croydon Preliminary Flood Risk Assessment
Historic Flooding	Appendix A Figure 1 shows records of historic flooding from local sources including ordinary watercourses. The Surface Water Management Plan outlines details of past floods from Park Hill Park where overflow from a drainage ditch on the park's boundary has been reported to contribute to flooding to the railway line below. A further investigation into drainage at the park in 2013 identified the ditch had capacity for a 1 in 5 year rainfall event but there are multiple influences on flooding[21]. A number of respondents to the public engagement refer to problems with flooding from ordinary watercourses, with particular reference to the Merstham Bourne which flowed in early 2014 and the drainage ditch running behind Wharfedale Gardens in Norbury. A number of problems have been noted with flooding at Heavers Meadow allotments, which sit alongside the Norbury Brook in an open section where it is an Ordinary Watercourse.

[20] HMSO (1991) The Land Drainage Act 1991 http://www.legislation.gov.uk/ukpga/1991/59/contents. As amended by the Flood and Water Management Act 2010
[21] URS (2013) Park Hill Recreation Ground: Flood Remediation Assessment. August 2013

Table 2-3 Flooding from Local Sources – Ordinary Watercourses (incl. small ditches and land drains)	
Future Flood Risk	No modelling of the flood risk from ordinary watercourses has been undertaken across Croydon. To date, where funding has been available, this has been directed towards flood risk modelling of main rivers and surface water, in partnership with other boroughs and the Environment Agency. There are a large number of ordinary watercourses in Croydon, and little information is available in terms of their channel dimensions, water levels and flow to inform detailed modelling of these watercourses. Estimation of future flood risk is the potential risk that could arise based on knowledge of known flooding hotspots and mechanisms for flooding. Often ordinary watercourses in combination with other sources of flooding, such as surface water or Main River flooding can combine to exacerbate flood risk. Therefore it is important to consider risk from ordinary watercourses in combination with these, as shown in Figures 2 and 4 in Appendix A. Within Croydon, significant lengths of ordinary watercourse are culverted, with trash screens often located on the upstream end of culverts. Trash screens and culverts have the potential to become blocked by items such as plant debris and rubbish. Blockages can restrict the natural flow of water, increasing the chance of water flowing out of bank and causing local flooding due to the reduced conveyance potential of the associated watercourse. Therefore the risk of flooding from ordinary watercourses can be very localised and is dependent on adopting appropriate inspection and maintenance regimes to ensure this risk is minimised where possible. Croydon Council is aware of some known flooding problems associated with ordinary watercourses. The Merstham Bourne, an ephemeral watercourse has an open section near Coulsdon South Station, which recently caused flooding to residents' gardens during the wet weather of winter 2014. Numerous other open ditches and streams around the borough can cause problems where trash screens or downstream culverts get blocked. Problems associated with a drainage ditch in Park Hill Park in recent years have led to flooding threatening the main London to Brighton railway line. These issues have been exacerbated by a blockage in the downstream culvert and a burst water main in addition to local geography and capacity of the ditch itself.
Figures - Appendix A	Figure 1: Historic Flooding Figure 2: Flood Risk from Surface Water Figure 5: Main Rivers & Ordinary Watercourses

2.3 Other Sources of Flood Risk

Parts of Croydon are also at risk of flooding from *other* sources including Main Rivers, sewer surcharging and artificial sources. It should be noted that the focus of the Strategy is purely the management of *local* sources of flooding, however it is recognised that mechanisms of flooding may arise from interlinked sources of flooding and therefore other sources of flooding present in LBC have been identified to aid understanding and management of local flood risk in the area.

Main Rivers

Table 2-4 Flooding from Other Sources – Main Rivers	
Description of Source	River flooding occurs when water levels rise as a result of high or intense rainfall which flows into them, resulting in watercourses overflowing or bursting their banks. A Main River is defined by the Environment Agency on its Main River Map and is usually a larger river or stream. In Croydon, much of the natural routes have been culverted underground to make way for development. The following Main Rivers are present within London Borough of Croydon; • **The River Wandle** – rises from natural springs at Waddon Ponds. It has recently been de-culverted to flow in an open section through Wandle Park. It then becomes culverted and flows west into the London Borough of Sutton and on downstream through the London Boroughs of Merton and Wandsworth before joining the River Thames. • **The Norbury Brook** – a tributary of the River Wandle, the Norbury Brook begins as an ordinary watercourse in Selhurst with a short open stretch in Heavers Meadow then culverted underground before emerging as an open channel in Norbury flowing northwest to become the River Graveney in London Borough of Lambeth. • **The Caterham Bourne** – an ephemeral watercourse which is believed to flow approximately every 7 years. The Bourne rises in Caterham in Surrey, and roughly follows the course of the A22 to Purley Cross in Croydon, where it becomes a sewer flowing north under Brighton Road to eventually join the River Wandle. • **The Chaffinch Brook** – flows in the north-east of the borough with some open sections close to the boundary with London Borough of Bromley, eventually joining the Pool River and River Ravensbourne
Supporting Documents	London Borough of Croydon Strategic Flood Risk Assessment[22] Thames Catchment Flood Management Plan[23] Environment Agency Flood Map for Planning (Rivers and Sea)[24]
Historic Flooding	Significant flood events have occurred in recent memory associated with the Caterham Bourne in January – March 2014 and also in the winter of 2000-01, when disruption lasted over several months due to the links with high groundwater, causing the waters to recede very slowly. Records exist of a number of similarly damaging floods during the 20th century, when the Bourne is in flow. Historic flood records dating back to the 1960s also indicate numerous incidents associated with the Norbury Brook through overtopping in open sections but also through surcharging of manholes and culverts in its culverted sections. A number of flood incidents have been recorded in the vicinity of the Chaffinch Brook and although not specifically attributed to the brook overtopping, these events are likely linked to the hydrology of the watercourse. The Chaffinch Brook has a significant number of tributaries which are classed as ordinary watercourses in the Ashburton area which also have some localised flood incidents associated with them.

[22] Scott Wilson (2009) London Boroughs of Wandsworth, Merton, Sutton and Croydon Strategic Flood Risk Assessment http://www.croydon.gov.uk/contents/departments/planningandregeneration/pdf/evidence/climate/sfralevel1final
[23] Environment Agency (2009) Thames Catchment Flood Management Plan https://www.gov.uk/government/publications/thames-catchment-flood-management-plan
[24] Environment Agency, Flood Map for Planning (Rivers and Sea) http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=floodmap

Table 2-4 Flooding from Other Sources – Main Rivers	
Future Flood Risk	In December 2013, the Environment Agency published a new set of mapping called the Risk of Flooding from Rivers and the Sea, which shows the risk of flooding from rivers and the sea banded into High, Medium and Low Risk, in a consistent format with the Risk of Flooding from Surface Water and Reservoir Maps (see Table 2-1 and Table 2-6). Whilst this dataset is readily available to the public to understand their own flood risk, the Strategy uses the Flood Map for Planning (Rivers and Sea), also published by the Environment Agency, as the basis to determine future flood risk from rivers. The Flood Map for Planning (Rivers and Sea) defines Flood Zones and is used by Croydon Council, as the Local Planning Authority, to make planning decisions in line with national legislation The National Planning Policy Framework (NPPF)[25] defines Flood Zones associated with tidal and river flooding based upon the probability of flooding. The extent of land adjacent to main rivers within Flood Zone 2 (between a 1 in 100 and 1 in 1000 chance of flooding in any given year (1% AEP - 0.1% AEP) and Flood Zone 3 (greater than 1 in 100 chance of flooding in any given year (>1% AEP)) varies throughout the borough, as shown in Figure 4 in Appendix A. Areas within Flood Zones 2 and 3 are as follows: • Properties along Godstone Road in Kenley and Purley associated with the Caterham Bourne. • All of Brighton Road from just south of Purley Cross roundabout running north through Waddon is located in Flood zone 3. The Caterham Bourne becomes culverted at Purley Cross and flows north until joining the Wandle, which first emerges at Wandle Park so the watercourse is entirely culverted through this area. • Properties in adjacent streets to the Norbury Brook in Thornton Heath and Norbury also fall within Flood zone 2 and 3. • Areas of South Norwood Country Park and nearby streets in Shirley are also at risk associated with the Chaffinch Brook. According to the Environment Agency[26], there are approximately 5,100 properties in areas at risk of fluvial (river) flooding in Croydon; around 3% of all properties in the borough. The Environment Agency's National Flood Risk Assessment (Nafra) shows that around 93% of the properties are in areas where likelihood of flooding is low due to protection from defences. The Environment Agency offers a free flood warning service[27], which gives advance warning of flooding via telephone, mobile SMS text, e-mail or fax. As of March 2013, 1,258 properties in Croydon were registered to receive flood warnings[28]. This does not include all properties at risk, though other media, such as local radio, the Environment Agency and Croydon Council website also broadcast the warnings.
Figures - Appendix A	Figure 1: Historic Flooding Figure 4: Flood Risk from Rivers Figure 5: Main Rivers & Ordinary Watercourses

[25] CLG (2012) National Planning Policy Framework.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf
[26] Environment Agency (August 2013), Croydon London Borough Environmental Fact Sheet - compiled as an extension to the London State of the Environment Report
[27] https://www.gov.uk/sign-up-for-flood-warnings
[28] Environment Agency (August 2013), Croydon London Borough Environmental Fact Sheet - compiled as an extension to the London State of the Environment Report

Sewers

Table 2-5 Flooding from Other Sources – Sewers	
Description of Source	During heavy rainfall flooding from the sewer system may occur if (a) the rainfall event exceeds the capacity of the sewer system / drainage system, (b) the system becomes blocked by debris or sediment and/or (c) the system surcharges due to high water levels in receiving watercourses. Sewer flooding generally results in localised short term flooding. Management of sewer flooding is the responsibility of Thames Water as the sewerage undertaker, although it is often difficult to disassociate from surface water runoff. On the whole, the sewers are designed to cope with the vast majority of storms but occasionally rainfall can be so heavy that it overwhelms the system. When this happens, sewage can overflow from manholes and gullies and flood land, rivers and gardens. In the worst cases, sewage can even flood homes.
Supporting Documents	London Borough of Croydon Surface Water Management Plan
Historic Flooding	As part of the Croydon SWMP, Thames Water provided information (through their DG5 register) on the total number of properties at risk of sewer flooding (both internally and externally) by postcode district based on historic flooding over the previous 10 years. Thames Water focus their efforts on removing properties from the DG5 register and therefore this dataset may not accurately represent those properties currently at risk. The information provided at the time highlighted the wards of Bensham Manor, Addiscombe, Ashburton and Waddon as being at greatest risk of sewer flooding. Numerous incidents in the historic flood register are attributed to surcharging sewers around the borough although evidence is anecdotal and it is not always clarified whether highway drainage or culverted watercourses have influenced the incident. A significant number of incidents are recorded in Thornton Heath and Broad Green in close proximity to the Norbury Brook as well as known surface water hotspots in Coulsdon.
Future Flood Risk	Climate change is anticipated to increase the potential risk from sewer flooding as summer storms become more intense and winter storms more prolonged. This combination is likely to increase the pressure on the existing efficiency of sewer systems, thereby reducing their design standard and leading to more frequent localised flooding incidents. Any sewer flooding that may occur could be exacerbated as a result of surface water runoff during extreme rainfall events. However the risk from sewer flooding in the London Borough of Croydon is low as the majority of Croydon is served by separate foul and surface water sewers. Thames Water will monitor the risk of sewer flooding and put plans in place to manage this, as required, based on their business plan and priorities. The London Borough of Croydon will work with Thames Water to identify flooding hotspots and locations of known sewer capacity issues where risk could be exacerbated. Thames Water will prioritise investment for potential flood alleviation schemes depending on the severity and frequency of flooding, but this can only be identified where affected property owners report the incident to the water company.
Figures - Appendix A	Figure 1: Historic Flooding

Artificial Sources

Table 2-6 Flooding from Other Sources – Artificial Sources	
Description of Source	Artificial sources include any water bodies not covered under other categories and typically include canals, lakes and reservoirs. Croydon Council own and manage one open reservoir; South Norwood Lake in the north-east of the borough close to the border with London Borough of Bromley. Russell Hill Reservoir is a covered reservoir in the West of the Borough managed by Thames Water Ltd.
Supporting Documents	Environment Agency Risk of Flooding from Reservoirs
Historic Flooding	There have been no recorded incidents of reservoir flooding within London Borough of Croydon.
Future Flood Risk	Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers on a yearly basis. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency are responsible for ensuring that reservoirs are inspected regularly and essential safety work is carried out. In the unlikely event that a reservoir dam failed, a large volume of water would escape at once and flooding could happen with little or no warning. The Environment Agency's Risk of Flooding from Reservoirs map shows the area and depths of flooding and flow velocities that could occur if a large reservoir were to fail and release the water it holds. A large reservoir is one that holds over 25,000 cubic metres of water, equivalent to approximately 10 Olympic sized swimming pools. Since this is a worst case scenario, it's unlikely that any actual flood would be this large. Within Croydon, if the Russell Hill Reservoir were to fail it would impact areas of West Croydon and Waddon although impact would be greater in London Borough of Sutton to the West including Wallington and Hackbridge around the route of the River Wandle. If South Norwood Lake were to fail then the impact would be almost entirely within London Borough of Bromley, affecting areas of Penge, Beckenham and Lower Sydenham. As the undertaker for South Norwood Lake, Croydon Council is required to ensure that inspections are carried out by a qualified (panel) engineer and that necessary safety work is completed as required to reduce the likelihood of any failure.

2.4 Impact of Climate Change

Current predictions of future rainfall indicate that we should expect increasing numbers of severe and extreme weather events in the future. Intense storms are the main cause of surface water flooding, which would also increase in frequency. It is predicted that the frequency of heavy rainfall events could double by the 2080s according the UK Climate Projections 2009[29]. By the 2080s, it is predicted that there could be around three times as many days in winter with heavy rainfall (defined as more than 25mm in a day) and that the amount of rain in extreme storms (with a 1 in 5 annual chance or rarer) could increase locally by 40%. Consequently, the number of properties, business and critical infrastructure at risk will also increase.

[29] United Kingdom Climate Projections 2009 http://ukclimateprojections.defra.gov.uk//

Implications for Flood Risk

Climate changes can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability. Wetter winters and more of this rain falling in wet spells may increase river flooding in both rural and heavily urbanised catchments. More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so we need to be prepared for the unexpected.

Rising sea or river levels may increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses. There is a risk of flooding from groundwater-bearing chalk and limestone aquifers. Recharge of the aquifers may increase in wetter winters, or decrease in drier summers.

Where appropriate, local studies are needed to understand climate impacts in detail, including effects from other factors like land use. Sustainable development and drainage will help to adapt to climate change and manage the risk of damaging floods in future.

Adapting to Change

Past emission means some climate change is inevitable. It is essential we respond by planning ahead. We can prepare by understanding our current and future vulnerability to flooding, developing plans for increased resilience and building the capacity to adapt. Regular review and adherence to these plans is key to achieving long-term, sustainable benefits.

Although the broad climate change picture is clear, we have to make local decisions against deeper uncertainty. We will therefore consider a range of measures and retain flexibility to adapt. This approach, embodied within flood risk appraisal guidance, will help to ensure that we do not increase our vulnerability to flooding.

Including allowances for Climate Change in Flood Risk Management

Existing flood risk studies, covering London Borough of Croydon and the wider catchment, have assessed the impacts of climate change and flood risk and provide the evidence base for understanding how this may impact current and future communities and businesses. Further information on how the Strategy takes into account the impacts of climate change is outlined in Section 5.4.

2.5 Summary

This Section has afforded a summary of past and future flood risk associated with local sources in the London Borough of Croydon which are the primary focus of the Strategy. A summary of the past and future risk associated with other sources of flooding has also been provided to ensure a comprehensive appreciation of flood risk across the borough. The sources of flood risk that are of most significance to the London Borough of Croydon are considered to be surface water and groundwater.

3. RESPONSIBILITIES FOR LOCAL FLOOD RISK MANAGEMENT

3.1 Overview

Flood events are often a complex interaction of flood source(s), pathway(s) and receptor(s), the responsibility for managing which can often lie with a number of different organisations or individuals. As a result, a clear definition of responsibilities and effective communication across these organisations and individuals is vital if the risk to people, property and the environment is to be managed effectively.

The Flood and Water Management Act 2010 designates the following organisations as Risk Management Authorities (RMAs) and sets out the legal responsibilities these organisations have for managing local flood risk:

- Lead Local Flood Authority i.e. London Borough of Croydon
- Environment Agency
- Water Company i.e. Thames Water Utilities
- Highways Authority i.e. London Borough of Croydon and Transport for London

All Risk Management Authorities have a duty to cooperate with the LLFA, and other RMAs when exercising their flood risk management functions.

In addition, other legislation (such as the Highways Act 1980[30], Land Drainage Act 1991[31], Water Resources Act 1991[32], Civil Contingencies Act 2004)[33] place duties and powers upon specific organisations and individuals of relevance to local flood risk management.

This Section provides an overview of the legal responsibilities and functions held by different organisations and individuals under all the legislation.

3.2 Responsibilities of Risk Management Authorities

London Borough of Croydon

…as the Lead Local Flood Authority

Croydon Council are a RMA under the Act as both the LLFA and the Highways Authority. Figure 3-1 presents the duties and powers they have as the LLFA. Where multiple sources of flooding occur, Croydon Council as the LLFA will coordinate response and ensure all RMAs are aware of their responsibilities.

…as a Highways Authority

The highway drainage system is integral in the management and behaviour of surface water during heavy rainfall events. As a Highways Authority, the Highways Act 1980 requires that Croydon Council ensure that highways are drained of surface water and where necessary maintain all drainage systems.

…as a Category 1 Responder

Croydon Council is a Category 1 Responder under the Civil Contingencies Act 2004 and therefore has a responsibility, along with other organisations for developing emergency plans, contingency plans and business continuity plans to help reduce, control or ease the effects of

[30] HSMO (1980) Highways Act http://www.legislation.gov.uk/ukpga/1980/66/contents
[31] HSMO (1991) Land Drainage Act http://www.legislation.gov.uk/ukpga/1991/59/contents
[32] HMSO (1991) Water Resources Act http://www.legislation.gov.uk/ukpga/1991/57/contents
[33] HSMO (2004) Civil Contingencies Act http://www.legislation.gov.uk/ukpga/2004/36/contents

an emergency. The complex and diverse nature of flooding and the consequences that arise, require a comprehensive and often sustained response from a wide range of organisations, and as such Croydon Council has prepared a Multi-Agency Flood Plan[34] to allow all responding parties to work together on an agreed coordinated response to severe flooding.

…as a Local Planning Authority

As a Local Planning Authority Croydon Council has a responsibility to consider flood risk in their strategic land use planning and the development of their Local Plan. Croydon Council is the 'decision maker' on flood risk for planning applications for development, taking into consideration technical advice from other risk management authorities as consultees (statutory).

The National Planning Policy Framework[35] (NPPF) and supporting guidance[36] require Local Planning Authorities to undertake a Strategic Flood Risk Assessment (SFRA) and to use their findings, and those of other studies, to inform strategic land use planning. This includes a requirement to steer development towards areas of lowest flood risk (the Sequential Test) before considering development in areas more prone to flooding. The London Boroughs of Merton, Croydon, Sutton, and Wandsworth SFRA Level 1[37] was produced in December 2008 to support the Local Plan[38]. When considering applications for development, site-specific flood risk assessments are a requirement of the NPPF. Local requirements for these are outlined in the Croydon Level 2 SFRA[39].

….as Regulator of Ordinary Watercourses

Croydon Council has been given the powers of ordinary watercourse consent under the Land Drainage Act 1991[40], which were transferred from the Environment Agency to LLFAs as of the 6th of April 2012. Any works (either temporary or permanent), that may alter or impact the flow or storage of water within an ordinary watercourse will require consent from the Council prior to any work being carried out. Croydon Council therefore have:

- The power to serve notice on riparian landowners along ordinary watercourses who need to carry out maintenance to reduce flooding.
- The power to serve notice on a person to abate a nuisance in relation to an ordinary watercourse where that nuisance is an obstruction erected, raised or altered or any culvert erected or altered without prior consent as required under Section 23 of the Land Drainage Act 1991.

[34] London Borough of Croydon (2013) Croydon Multi-Agency Flood Plan 2013
[35] Communities and Local Government (2012) National Planning Policy Framework
http://www.communities.gov.uk/documents/planningandbuilding/pdf/2116950
[36] Communities and Local Government (2014) Planning Practice Guidance: Flood Risk and Coastal Change:
http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/
[37] Scott Wilson (2008) Merton, Croydon, Sutton, Wandsworth Level 1 Strategic Flood Risk Assessment, December 2008
http://www.croydon.gov.uk/contents/documents/meetings/806358/609905/2008/2008-01-04/706672/flood1.pdf
[38] See Croydon Council website for latest version of Local Plan
http://www.croydon.gov.uk/planningandregeneration/framework/localplan/
[39] Scott Wilson (2009) Croydon Level 2 Strategic Flood Risk Assessment, April 2009
https://www.croydon.gov.uk/sites/default/files/articles/downloads/sfralevel2final.pdf
[40] HMSO (1991) Land Drainage Act http://www.legislation.gov.uk/ukpga/1991/59/contents as amended by the Flood and Water Management Act

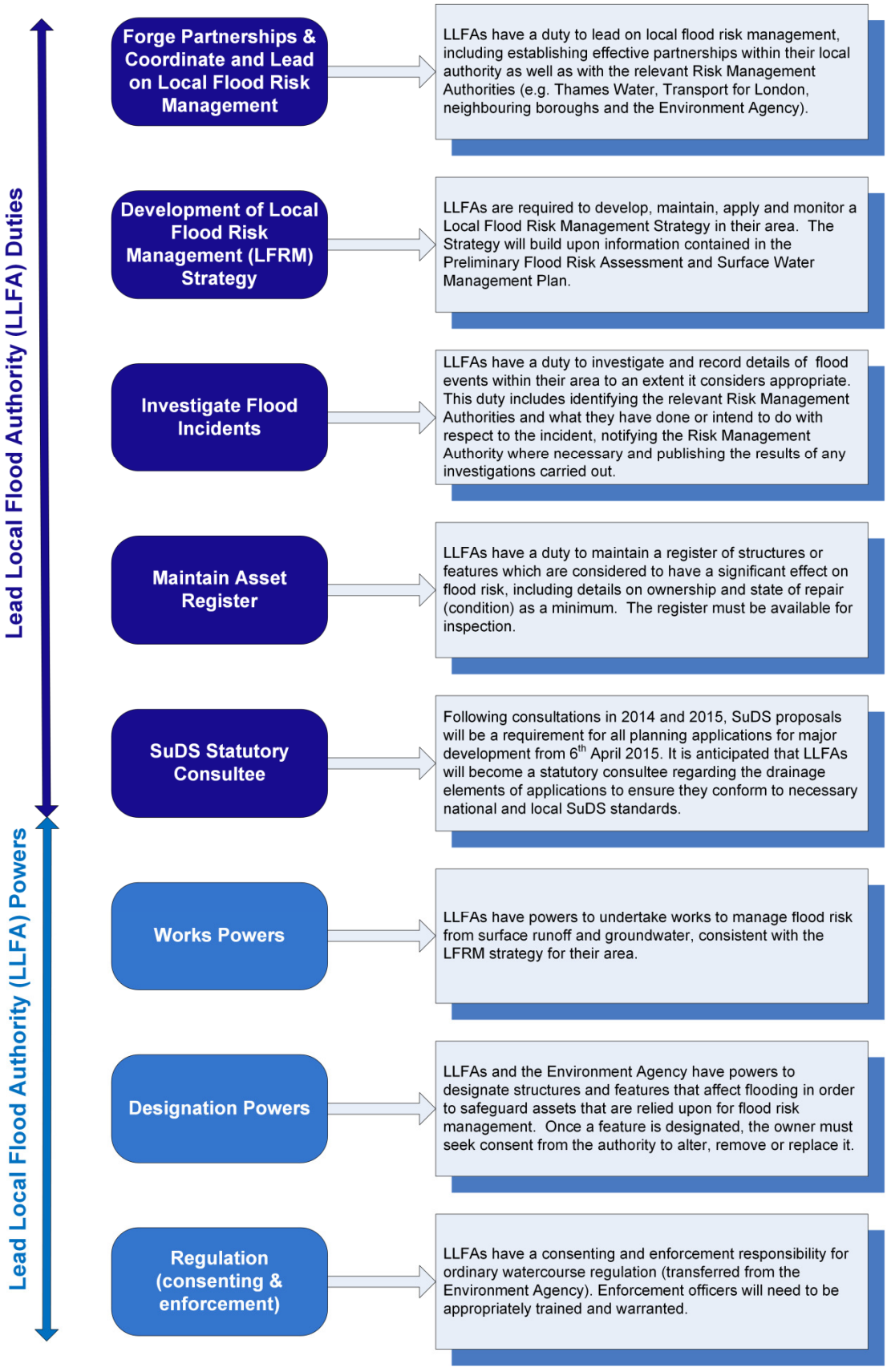


Figure 3-1 Duties and Powers for London Borough of Croydon under the Act

Environment Agency

The Environment Agency is designated a RMA under the Act. The Environment Agency is responsible for managing flooding from main rivers and the sea and has a responsibility to provide a strategic overview for all flooding sources and coastal erosion.

Thames Water Utilities Ltd

As the Sewerage undertaker serving London Borough of Croydon, Thames Water is designated a RMA under the Act.

Thames Water is responsible for surface water drainage from development via adopted sewers and for maintaining public sewers into which much of the highway drainage (both London Borough of Croydon and TfL routes) connects.

In October 2011 water and sewerage companies in England and Wales became responsible for private sewers which were previously the responsibility of property owners. However, not all private sewers were included; there are some cases where the property owners remain responsible for the sections of pipe between the property and the transferred private sewer. Further information is available via Thames Water's website[41].

Transport for London

As a Highways Authority, Transport for London (TfL) is designated a RMA under the Act.

Under the Highways Act 1980, TfL have responsibilities for the effectual drainage of surface water from adopted roads along red routes insofar as ensuring that drains, including kerbs, road gullies and ditches and the pipe network which connect to the sewers, are maintained.

3.3 Roles and Responsibilities of Other Organisations / Individuals

Individuals, communities and businesses have an important role to play in managing local flood risk, alongside defined Risk Management Authorities.

- **Property owners** are responsible for maintaining a proper flow of water in any watercourse running through their land and protecting their property (through property level resilience and resistance measures).
- **Businesses** can reduce flood risk by ensuring their activities do not lead to blockages of drains or watercourses and ensuring waste is stored and disposed of correctly.
- **Individuals** can reduce flood risk by taking action such as disposing of leaf litter rather than letting it block drains, ensuring ditches and drains are kept free from litter or waste and getting involved in local flood risk management activities.

Additionally there are significant roles for larger organisations or businesses who are not classified as Risk Management Authorities;

- **Major infrastructure providers** must consider how works to their assets or within their land boundaries may impact on wider flood risk, and work with Croydon Council to identify multiple benefits and maximise the value of financial investment.
- **Property developers** must ensure that new development does not increase flood risk to the surrounding area, prioritising sustainable drainage techniques and water sensitive urban design.

[41] Thames Water Utilities website http://www.thameswater.co.uk/

Croydon Council recognise the vital role individuals, communities and businesses have in managing flood risk and the requirement for more information to be available to support these initiatives. The Strategy, therefore, aims to promote and encourage personal responsibility by raising awareness of flood risk and how this can be reduced and by supporting community-based actions.

Property Owners and Residents

It is the responsibility of householders and businesses to look after their property, including protecting it from flooding. It is important that householders, whose homes are at risk of flooding, take steps to ensure that their home is protected. Practical guidance can be found in the publication 'Prepare your property for flooding' available on the Environment Agency website[42].

Property Level Protection

Property Level Protection (PLP) can include a range of measures that can be taken to protect a property or make it more resilient to flood damage. The National Flood Forum website[43] provides guidance about PLP and details of suppliers of resilience measures such as air brick covers, flood boards or water resilient doors. Further links can be found in Table 5-2.

Riparian Owners

If you own land which is adjacent to a watercourse or land which has a watercourse running through it, you are a riparian owner and you have certain legal responsibilities to maintain the watercourse. Where a watercourse marks the boundary between adjoining properties, it is normally presumed the riparian owner owns the land up to the centre line of the watercourse.

RMAs have powers and responsibilities to manage flood risk and work with others to improve river environments. This may often affect riparian owners, who must also adhere to certain responsibilities including;

- To maintain the watercourse and to clear any obstructions (natural or otherwise) so the normal flow of water is not impeded,
- To maintain the banks and bed of the watercourse and any flood defences that exist on it,
- To accept the natural flow from your upstream neighbour and transfer it downstream without obstruction, pollution or diversion,
- To maintain any structures on your stretch of watercourse including culverts, weirs and mill gates, and
- To apply to Croydon Council for formal consent for any works in or adjacent to an ordinary watercourse, or to the Environment Agency for works within 8m of a Main River.

Croydon Council has permissive powers to carry out flood defence works for ordinary watercourses at their discretion, in a similar manner to those powers used by the Environment

[42] Environment Agency website - 'Prepare your property for flooding' https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/451622/LIT_4284.pdf
[43] National Flood Forum website www.nationalfloodforum.org.uk

Agency for Main Rivers. Further information for riparian owners is available in the Environment Agency publication 'Living on the Edge'[44].

Sutton and East Surrey Water

Sutton and East Surrey Water (SESW) provide drinking water only and do not have any sewerage responsibilities within the London Borough of Croydon. Their responsibilities therefore are as a riparian owner and property owner for their assets including the Kenley Water Treatment Works. During periods of flooding from the Caterham Bourne and high groundwater, water abstractions and site activity at the Kenley works can directly influence local flood risks and these activities should be managed in liaison with the Environment Agency and Croydon Council as the LLFA.

Property Developers

It is essential that much-needed new homes in Croydon are forward-looking in their drainage design; not simply replacing what is there but reducing the risk, and designing buildings with a full understanding of local flood sources so that existing risks can be mitigated and future risks minimised. All new development should be prioritising sustainable drainage techniques in line with the NPPF, the London Plan[45] and its accompanying Sustainable Design and Construction SPD[46]. Drainage design and maintenance should follow best practice industry guidance available via www.susdrain.org including;

- The SuDS Manual (C697)[47],and any subsequent updates
- Planning for SuDS – making it Happen (C687)[48]
- Retrofitting to manage surface water (C713)[49]

Additionally developers should take note of any local guidance produced by London Borough of Croydon and the most up to date flood risk information by consulting www.croydon.gov.uk/flooding. Section 5 of this strategy looks at some of the actions the council are taking to address flood risk in property development.

[44] Environment Agency (2012) 'Living on the Edge' https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/454562/LIT_7114.pdf
[45] Greater London Authority (2011) The London Plan. July 2011 https://www.london.gov.uk/priorities/planning/publications/the-london-plan
[46] Greater London Authority (2014) Sustainable Design and construction supplementary Planning Guidance https://www.london.gov.uk/sites/default/files/Sustainable%20Design%20%26%20Construction%20SPG.pdf
[47] CIRIA (2007) The SuDS Manual (C697) http://www.ciria.org/Resources/Free_publications/the_suds_manual.aspx
[48] CIRIA (2010) Planning for SuDS – Making it Happen (C687) http://www.ciria.org/Resources/Free_publications/Planning_for_SuDS_ma.aspx
[49] CIRIA (2012) Retrofitting to manage surface water (C713) http://www.ciria.org/Resources/Free_publications/Retrofitting_manage_surface_water.aspx

4. OBJECTIVES FOR MANAGING LOCAL FLOOD RISK

4.1 London Borough of Croydon Local Objectives

The objectives for the London Borough of Croydon Strategy have been developed in line with the Environment Agency's National Flood and Coastal Erosion Risk Management Strategy for England[50], the outcomes from the public engagement exercise undertaken to inform to the Strategy and discussions with Croydon Council and RMA officers.

London Borough of Croydon Local Strategy Objectives

1. Continue to build our evidence base on flood mechanisms, incidents and assets and improve how it is communicated internally and externally.
2. Maximise use of resources in targeted flood management.
3. Ensure evidence of historic floods and ongoing studies effectively feed into planning policy and decision-making
4. Support sustainable growth and development by understanding the needs of all parties
5. Work effectively with Risk Management Authorities in and around Croydon to jointly manage the risks.
6. Improve awareness of the causes of flooding with the general public and encourage proactive management
7. Take a more holistic view of asset management in Croydon, improving priorities and addressing source control more effectively.
8. Maximise opportunities to learn, improve and review flood management procedures based on lessons learnt

Figure 4-1 Local Flood Risk Management Objectives

4.2 Guiding Principles for Setting Objectives

National Flood Risk Management Objectives

The Environment Agency's National Flood and Coastal Erosion Risk Management Strategy for England[51] sets out the following national objectives for flood risk management;

- **Understand the risks** – understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them,

[50] Environment Agency (2011) National flood and coastal erosion risk management strategic for England http://www.environment-agency.gov.uk/research/policy/130073.aspx
[51] Environment Agency (2011) National flood and coastal erosion risk management strategic for England http://www.environment-agency.gov.uk/research/policy/130073.aspx

- **Prevent inappropriate development** – avoiding 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 flooding** – building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society,
- **Help people to manage their own risk** – increasing public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient, and
- **Improve flood prediction, warning and post-flood recovery** – improving the detection, forecasting and issue of warnings of flooding, planning for and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.

Guiding Principles for Local Flood Risk Management

The National Strategy strategic aims and objectives are supported by six high-level principles, to guide decisions on risk management activities, and the process by which they are taken, at both a national and local level. Croydon Council has used these to guide the development of objectives and identification of measures to deliver local flood risk management within Croydon.

Table 4-1 Guiding Principles for Local Flood Risk Management in Croydon

Proportionate and risk based approach	Flood risk management activities should be proportionate to the risk that is faced. It is not possible to prevent flooding altogether. To try and do so would be technically unfeasible, environmentally damaging and uneconomical. A risk based approach to managing flooding targets investment to areas where the risk is greatest by examining both the likelihood and consequences of a flood occurring.
A catchment based approach	To manage flood risk effectively, it is important to understand the interactions with the wider area over the entire catchment. This means ensuring that activities are coordinated and working closely with neighbouring authorities to ensure that activities do not adversely affect other areas.
Community focus and partnership working	Working closely with communities provides a clearer understanding of the issues and appreciation of the community perspective of flooding. Giving communities a greater say in what activities take place and helping them to manage their own risk will result in better decisions being made and allows greater flexibility in the activities that take place. It is also vital to work in partnership with other authorities to ensure that risk is managed in a coordinated way beyond the boundaries and responsibilities of individual authorities and organisations.
Beneficiaries encouraged to invest	If funding for flood risk management activities relies on central and local government alone, then those activities will be significantly limited by the funds available. They will also be constrained by national controls and reduce the scope for local influence. Those that benefit should therefore be encouraged to invest in order to maximise flood risk management activity and allow innovative solutions to take place.
Sustainability	More sustainable approaches to flood risk management should be sought to consider wider sustainability issues such as the environment, whole-life costs, and the impact of climate change. Wherever possible, solutions to flooding problems should work with natural processes and aim to enhance the environment.
Multiple benefits	Flood risk management solutions can often provide additional social, economic and environmental benefits. For example the use of sustainable drainage systems (SuDS) can reduce the pollution of watercourses by minimising urban storm water runoff. The potential to achieve multiple benefits should be considered in all flood risk management activities.

Public Priorities for Local Flood Risk Management

A community engagement exercise was undertaken to capture community objectives and priorities for flood risk management in the London Borough of Croydon (Appendix C). These were used to inform the development of the local objectives for local flood risk management. Respondents were particularly concerned about maintenance of existing drainage, particularly in areas known to flood regularly during heavy rainfall. The council are looking to build on increased gully cleaning by improving awareness of flood hotspots and feeding it into the maintenance programme for targeted use of resources.

Respondents also expressed particular concern about the potential impacts of new development on local flood risk as well as localised issues such as paving over of driveways and inappropriate drainage at property level. Through the internal flood group, planning and development have improved communications with other teams in the council and plan to actively promote information sharing about local flood risk and up-skilling between teams to ensure accurate local flood risk information is informing decision-making and the development of planning policy.

5. DELIVERY OF LOCAL FLOOD RISK MANAGEMENT

5.1 Overview

This section sets out how the local flood risk management objectives will be delivered over the next six years. A number of measures and actions have been identified to achieve this, and these are set out in the Action Plan that accompanies the Local Strategy as provided in Appendix B. These will help to improve the understanding of flood risk across the Borough and inform the way flood risk is reduced and planned for, to increase resilience against the impacts of climate change.

In delivering flood risk management, Croydon Council has the opportunity to deliver wider environmental objectives and requirements, as set out in European Legislation including the Water Framework Directive. A Strategic Environmental Assessment and a Habitats Regulations Assessment Screening exercise has been undertaken to inform the Strategy development; further details are provided in Section 6.

Specifically this section outlines:

- The delivery of local flood risk management in the London Borough of Croydon to date (Section 5.2),
- How Croydon Council will deliver their legislative duties under the Flood and Water Management Act 2010 (Section 5.3),
- How the London Borough of Croydon local flood risk management objectives will be delivered (Section 5.4),
- How local flood risk management measures will be prioritised (Section 5.5),
- How local flood risk management measures will be funded (Section 5.6),
- Steps communities, residents and businesses can take to prepare for flooding (Section 5.7), and

Further information on the Local Flood Risk Management Action Plan can be found in Section 5.7.

The Croydon Council website[52] provides the latest information on flood risk management in Croydon.

5.2 Delivery of Local Flood Risk Management to Date

In identifying the measures for the management of local flood risk in Croydon it is important to recognise where Croydon Council are starting from in order to understand the key steps that will need to be taken.

As Lead Local Flood Authority (LLFA) for the London Borough of Croydon, , Croydon Council has already undertaken a number of activities to deliver duties under the Act and take a proactive approach to delivering local flood risk management in Croydon. Some of the key activities undertaken to date include:

- Undertaking cleansing of gullies in identified 'high risk' areas on an annual basis – the high risk areas were based on those roads that were reported as flooding during the July 2007 surface water flooding event.

[52] Croydon Council flood pages: www.croydon.gov.uk/flooding

- Production of the London Borough of Croydon Surface Water Management Plan,
- Production of the London Borough of Croydon Preliminary Flood Risk Assessment,
- Setting up and attending quarterly meetings of South West London Flood Group (see Section 5.3 for further information),
- Setting up of the Croydon Internal Flood Group to enable close working between council departments on flood risk management (see Section 5.3 for further information),
- Applying for funding through the Drain London project, administered by the Greater London Authority, and the Environment Agency (FCRM GiA and Local Levy – see Section 5.6) to undertake investigations into flooding risk, mechanisms and potential mitigation schemes in Critical Drainage Areas,
- Improving understanding of local flood risk through collating historic and emerging information on local flood risk and mechanisms, working with neighbouring authorities and RMAs, and attending capacity building workshops run by Defra and the Environment Agency,
- Setting up procedures and delivering legislative duties as required under the Act (see Section 5.3), and,
- Undertaking a joint commission, with the South West London Flood Group, to deliver the South West London Flood and Water Management Act 2010 Roadmap, identifying the required legislative duties, proposed delivery route for these and opportunities for joint working across South West London boroughs.
- Forming a five-borough groundwater flood group to help develop a multi-agency solution to reduce the impacts of groundwater flooding.

5.3 Delivery of Legislative Duties

Under the Act, Croydon Council have a number of duties and powers relating to the management of local flood risk. The existing procedures in place and the proposed measures to deliver these are outlined below.

Forge Partnerships and Lead on Local Flood Risk Management

Internal Flood Group

Local flood risk management for London Borough of Croydon is being led by the Highways team within the Development and Environment directorate. The internal flood group was set up in early 2013 to encourage a more joined up approach across the council and is chaired by Highways. The group is attended by representatives from multiple functions of the council including emergency planning, development management, parks & green spaces, public health enforcement, ICT services, building control and spatial planning.

Local Stakeholders

There are a number of local residents groups with particular interest in flooding, particularly in those areas being regularly affected. The Purley Flood Group was established in 2011 as part of a pilot scheme to get communities more involved in their own flood management. The group

has its own community flood plan[53] and are in regular communication with the Council about how flood risks can be alleviated in the area.

Residents associations in Kenley, Norbury and Addiscombe have also expressed concerns relating to local flooding hotspots through the recent online survey, meetings, Facebook groups and other communication mediums in recent years. As part of this strategy, Croydon Council will be looking to improve communications on flood management with these local communities.

Working in partnership is key to achieving maximum benefit with limited resources. Most infrastructure and utilities companies operating within London Borough of Croydon have assets under threat from increasing flood risk. Croydon Council needs to work closely with organisations such as Network Rail, Transport for London, Thames Water, Sutton and East Surrey Water and EDF energy to maximise any joint funding opportunities for schemes with multiple benefits.

South West London Flood Group

The South West London Flood Group was formed in 2011 and reports to the Thames Regional Flood and Coastal Committee. The South West London Flood Group comprises the six LLFAs covering South West London, namely, London Borough of Croydon, The Royal Borough of Kingston upon Thames, London Borough of Merton, London Borough of Sutton, London Borough of Richmond upon Thames and London Borough of Wandsworth, and the Environment Agency and Thames Water Utilities Ltd.

The Group meet quarterly to share best practice and understanding of flood risk across South West London, and, where possible, provide coordinated and collaborative management of flooding.

Groundwater Solution Cell

This group was set up in 2014 during a period of unprecedented rainfall where rapidly rising groundwater was realised as a significant threat, and which needs to be approached at a regional scale. At the time of writing, the group is chaired by a member of London Fire Brigade, Bexley and comprises the Environment Agency and five LLFAs in South London, namely London Borough of Bexley, London Borough of Bromley, London Borough of Croydon, Royal Borough of Greenwich and London Borough of Sutton (although there is intention to involve further authorities as plans progress). The group has been formed to try to establish sustainable operational solutions for groundwater flooding at a regional scale through a multi-agency partnership and therefore reduce risk to people and property across the region.

Regional Flood and Coastal Committee

The Thames Regional Flood and Coastal Committee[54] (RFCC) was established in accordance with the Act and is composed of elected members appointed by each LLFA and independent members appointed by the Environment Agency with relevant experience in the Thames Region. The Committee has three primary functions:

- To ensure there are coherent plans for identifying, communicating and managing flood and coastal erosion risks across catchments,

[53] Purley Community Flood Plan http://www.croydon.gov.uk/contents/departments/planningandregeneration/pdf/purleyflood-plan.pdf
[54] Environment Agency Website: Thames Regional Flood and Coastal Committee https://www.gov.uk/government/groups/thames-regional-flood-and-coastal-committee

- To promote efficient, targeted and risk-based investment in flood and coastal erosion risk management that optimises value for money and benefits for local communities, and

- To provide a link between the Environment Agency, Lead Local Flood Authorities, other RMAs, and other relevant bodies to engender mutual understanding of flood and coastal erosion risks in its area.

The South West London Flood Group is represented on the Thames RFCC by a Councillor from one of the six boroughs.

Investigate Flood Incidents

Under Section 19 of the Flood and Water Management Act, Croydon Council must, "*to the extent that it considers it necessary or appropriate, investigate*

a) *Which risk management authorities have relevant flood risk management functions, and*

b) *Whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood."*

In order to assist decision-making under this duty, Croydon Council has developed a protocol and guidance to determine thresholds over which an investigation should be carried out under the terms of the Act. The protocol is in living draft form pending review following the 2014 floods. Some key thresholds from the draft protocol include;

- **Human safety**: There has been a fatality or serious injury as a direct result of flooding

- **Residential property**: Depth greater than 0.10m over ground floor threshold or more than 3 properties

- **Critical Infrastructure**: flooding has prevented the operation of the critical infrastructure for more than 2 hours

- **Commercial Property**: more than 3 properties been affected by flooding *or* the flooding is deemed to have caused significant economic disruption.

- **Flood Management responsibility**: It is unclear which Risk Management Authority is responsible or whether the appropriate duties have been carried out.

- **Public Duty**: The weight of public interest justifies the need for investigation (to be decided internally after review)

Maintain an Asset Register

Records of significant assets and associated information have been gathered via the Internal Flood Group and collated in spreadsheet format. These assets are being uploaded onto a London wide database system called FloodStation to map the data to help aid future maintenance and management decisions and sharing of information with neighbouring LLFAs and Risk Management Authorities.

Undertake a Statutory Consultee Role for SuDS for New Developments

Schedule 3 of the Act includes a commitment to bring in further legislation to introduce sustainable drainage systems (SuDS) into new or redevelopments. In September 2014, an

alternative approach was proposed on the delivery of SuDS through the existing planning system which then underwent consultation[55]. The Department for Communities and Local Government issued a Written Statement in December 2014[56] outlining the Government's response and intentions going forward to implement new SuDS policy.

From 6 April 2015 Local Planning Authorities (LPAs), including Croydon Council, will be expected to ensure that local planning policies and decisions on planning applications relating to major development[57] include SuDS for the management of run-off, unless demonstrated to be inappropriate. Minor developments with drainage implications would continue to be subject to existing planning policy (Section 103 of the NPPF) and smaller developments in flood risk areas should still give priority to the use of SuDS.

The Statement sets out that the LPA should consult with the LLFA with regards to surface water management to ensure the SuDS will be operated to appropriate standards and arrangements are in place for their maintenance over the full lifetime of the development.

Further consultation has been carried out on the proposal to make LLFAs statutory consultees for planning applications with regards to surface water management. The result of this consultation is anticipated prior to 6th April 2015.

Powers to do Works and Designate Structures

The Flood and Water Management Act 2010 gives Croydon Council powers as an LLFA to designate a structure or feature where it is felt to be significant in influencing flood risk management. The owner may then not alter, remove or replace it without prior consent of the Council. Private owners will be consulted prior to any designation and have the right to appeal against initial designation.

Regulation of Ordinary Watercourses

Croydon Council has been given certain powers to enforce local flood risk management practices in its administrative area. This includes the powers of ordinary watercourse consent under the Land Drainage Act 1991[58], which were transferred from the Environment Agency to LLFAs as of the 6th of April 2012. This means that any works (either temporary or permanent), that may alter or impact the flow or storage of water within an ordinary watercourse will require consent from the council prior to any work being carried out.

Croydon Council has set up a consenting process for works affecting an ordinary watercourse within the borough. Application forms and guidance can be downloaded from the Council website[59]

5.4 Delivery of Local Flood Risk Management Objectives

Overview

Keeping people safe and protecting life is always the priority for flood management. Beyond this there are a number of measures that can be taken to manage the risk and impacts of flooding on local communities, businesses, infrastructure, heritage and the environment.

[55] Defra (September 2014) Delivering Sustainable Drainage Systems Consultation Document
[56] Department for Communities and Local Government (Dec 2014) House of Commons Written Statement (HCWS161) Sustainable Drainage Systems.
[57] The definition for Major and Minor developments are set out in the Town and Country Planning Order 2010 http://www.legislation.gov.uk/uksi/2010/2184/contents/made
[58] Land Drainage Act 1991: http://www.legislation.gov.uk/ukpga/1991/59/contents
[59] Ordinary watercourse consenting in Croydon http://www.croydon.gov.uk/environment/flood-water/watercourse

For each of the local flood risk management objectives, potential measures were identified for further consideration. These were informed by council staff and RMAs attending workshops throughout the strategy development and the outcomes from the online survey undertaken as part of the community engagement exercise described in Appendix C.

Public Priorities for Future Flood Risk Management in Croydon

As part of the public engagement undertaken in developing this Strategy (Appendix C), residents, communities and businesses were asked to identify how they thought the local flood management priorities they identified could be achieved within Croydon. The following were preferred by respondents:

- Maintaining drainage / flood defence assets to reduce surface water flooding.
- Focussing on areas that have experienced flooding
- Working to ensure that new developments do not have an impact on flooding

Identification of Local Flood Risk Measures

Table 5-1 outlines the measures identified to deliver the local flood risk management objectives for the London Borough of Croydon and the Flood risk management guiding principles that they achieve.

Table 5-1 London Borough of Croydon Local Flood Risk Management Objectives and Measures

Objective	Measures to achieve the objective	Guiding Principles
Continue to build our evidence base on flood mechanisms, incidents and assets and improve how it is communicated internally and externally.	• Improving in-house information management • Establish ways to keep the evidence base up to date and feeding into policy • Raise profile and understanding of groundwater as a flood risk	• Proportionate and risk based approach
Maximise use of resources in targeted flood management.	• Up skilling and training for existing staff on new areas of responsibility • Communication about targets and objectives between teams • Monitoring funding streams available for flood remediation measures • Use best current understanding and available funding to prioritise flood alleviation work • Review effectiveness of emergency procedures and ensure our capabilities are known throughout the council and our commissioned services	• Proportionate and risk based approach • Beneficiaries encouraged to invest
Ensure evidence of historic floods and ongoing studies effectively feed into planning policy and decision-making	• Maintain regular communication between highways and planning • Establish a borough-wide understanding of the future flood risk, including the likelihood of future flood events. • Establish the impact of planned growth on flooding hotspots/CDAs in collaboration with development plans	• Sustainability • Multiple benefits • Catchment-based approach
Support sustainable growth and development by understanding the needs of all parties	• Prepare for carrying out SuDS approvals in-house • Create tools / guidance for developers to help them to easily consider the most appropriate types of drainage • Review how we consider flood risk to and from minor developments and ways to encourage more sustainable design.	• Sustainability • Multiple benefits

Table 5-1 London Borough of Croydon Local Flood Risk Management Objectives and Measures		
Work effectively with Risk Management Authorities in and around Croydon to jointly manage the risks	• Meet with Network Rail / Thames Water / TfL to discuss areas where their infrastructure falls in Croydon's flood hotspots • Work with multi-agency partners to enhance local arrangements for flood planning and response. • Continue to meet regularly and work with the other five South West London Boroughs	• Community focus and partnership working • Catchment based approach
Improve awareness of the causes of flooding with the general public and encourage proactive management	• Engaging with the public through various means of communication • Encourage residents to help themselves with small-scale initiatives • Targeting riparian owners and educating on responsibilities • Develop our capability to warn and to provide information and advice to the public with partner organisations	• Community focus and partnership working • Beneficiaries encouraged to invest
Take a more holistic view of asset management in Croydon, improving priorities and addressing source control more effectively.	• Seek to achieve multiple benefits in water management schemes • Seek out opportunities for de-culverting	• Proportionate and risk based approach • Multiple Benefits
Maximise opportunities to learn, improve and review flood management procedures based on lessons learnt	• Clarify flood recovery process • Establish Lessons Learnt review procedure	• Multiple benefits • Community

In the short term, local flood risk management will focus on communication and education and building flooding evidence and understanding. As the flooding evidence and understanding increases, projects and schemes will be identified, developed and progressed, where funding allows, to address local flood risk in those areas at greatest risk.

Croydon Council has already successfully secured first stage funding to address some of the borough's flooding hotspots including;

- Flood and Coastal Erosion Risk Management Grant in Aid (FCERM GiA) funding[60] for approximately £1m over 5 years to model, design and implement flood alleviation measures for the Caterham Bourne. The total figure is subject to change pending outcomes of the first stage (modelling and options appraisal) of the project and funding availability.

- FCERM GiA funding for up to £327,000 over 4 years to model and implement surface water alleviation for localised flooding in Kenley. The total figure is subject to change pending outcomes of the first stage (modelling and options appraisal) of the project and funding availability.

- Drain London funding[61] of approximately £23,000 towards modelling and options assessment to alleviate surface water flooding along the A23 / Brighton Road area.

[60] Allocation of government funding for which LLFAs can apply annually from the Environment Agency towards the cost of building new flood and coastal re-erosion defences

[61] *The Drain London Project was commenced in 2010 by the Greater London Authority to bring together all London boroughs and risk management authorities to help manage and reduce surface water flood risk, through development of*

The council has also committed some internal funding to ensure the progression of these projects. Further information on the funding sources, and details relating to the specific projects mentioned above, are included in Section 5.6.

Future schemes and mitigation for the different sources of flooding are likely to include those outlined in Table 5-2, though this list is not comprehensive.

Table 5-2 Example Measures for Managing Local Flood Risk

Source of Flooding	Example Measures
Surface Water	• Communication and Education • Property Level Protection & Resilience Measures – Guidance on Property Level Flood Resilience for Property Owners[62] is available, and further information is provided through independent organisations including the National Flood Forum and the Environment Agency. • Planning control and policies, e.g. controlling paving of front gardens • Individual actions, e.g. depaving of front gardens • Defined schemes or projects for specific areas of highest flood risk, which could include Sustainable Drainage Systems (particularly with new developments). SuDS aim to manage the risk of flooding at source and can range from small to large scale measures and can deliver a number of additional benefits such as improving water quality. Examples include, green roofs, soakaways, swales, permeable paving, rainwater harvesting and detention basins.

Groundwater	Groundwater is particularly difficult to mitigate and manage. Engineering solutions to mitigate groundwater flooding are limited because of the large volumes of water and spatial areas involved, and because it is not contained or channelled.
	Potential measures could include:
	• Controlling groundwater levels in the subsurface through pumping.
	• Controlling groundwater levels at the surface by channelling and diverting the flow of water at the surface away from sensitive downstream receptors and dealing with pinch point where water is forced through a narrow corridor, such as an existing culvert, to avoid water backing up.
	• Dealing with the consequences of groundwater flooding through:
	  • Strategic level actions, such as establishing a Community Flood Action Group of household level protection, or,
	  • Site specific (property owner) actions, such as sealing floors, lower parts of walls and opening and installing sump and pump systems.
	Guidance on how property owners can help themselves to reduce the impact of flooding from groundwater[63] is available via the Environment Agency website.

Ordinary Watercourses	Poor maintenance of ordinary watercourses has the potential to increase the risk of flooding in the future. Due to an expected lack of funding for maintenance of ordinary watercourses in the future, prioritisation of ordinary watercourses within

Surface Water Management Plans and Preliminary Flood Risk Assessments for each borough and delivery of further investigations for areas at greatest risk across London. Further information is available through the GLA website: http://www.london.gov.uk/priorities/environment/looking-after-londons-water/drain-london

[62] White, I., O'Hare, P., Lawson, N., Garvin, S., and Connelly, A (2013) Six Steps to Property Level Flood Resilience – Guidance for Property Owners. Manchester, UK. http://www.bre.co.uk/filelibrary/pdf/projects/flooding/Property_owners_booklet_v2_web_(2).pdf

[63] Environment Agency (2011) Flooding from groundwater: Practical advice to help you reduce the impact of flooding form groundwater https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/297421/flho0911bugi-e-e.pdf

Table 5-2 Example Measures for Managing Local Flood Risk	

	the borough, along with gullies and other flood risk assets will be central to maximising the positive impact of flood risk management activities carried out by Croydon Council. As such, appropriate measures might be:
	• Work with landowners and riparian owners to ensure they are aware of their rights and responsibilities and fulfil those.
	• Management and maintenance of watercourses, e.g. keeping watercourses clear of debris and vegetation to ensure that the flow of water is not impeded.
	• Ensuring culverts and trash screens are not blocked through regular inspection, particularly when heavy rainfall is expected.
	• Undertaking works to:
	  • increase the size of culverts,
	  • develop additional storage for flood water, and
	  • deculvert watercourses, where feasible to do so.

Planning for Climate Change

Croydon Council will seek to use the best available information and evidence on climate change to inform ongoing local flood risk management.

In taking forward local flood risk management measures Croydon Council will:

- Seek to understand how climate change might impact flood risk to communities and businesses,
- Assess how climate change impacts on flood risk may affect the London Borough of Croydon objectives for managing flooding over the longer term,
- Explore what options could be used to manage those impacts of climate change on flood risk, and
- Educate communities and businesses on the causes and potential impacts of climate change and how they can reduce these by taking action now.

5.5 Prioritising Local Flood Risk Management Measures

It is not possible to prevent all flooding, and with limited resources and funding flood risk management work will need to be prioritised. Each measure in this strategy has been split into a number of actions (as outlined in the Action Plan in Appendix B) and these have been prioritised as High, Medium or Low based on current understanding of local flood risk and resources and funding available to address this across the borough. The majority of actions are based on:

- improving communication and education of residents and property owners to enable them to help themselves, and
- putting procedures in place within the council to improve understanding and future management of local flood risk across the borough.

As understanding of flood risk improves specific mitigation schemes and activities will be developed to address flood risk in those areas at greatest risk. This will require a clear protocol in terms of identifying which actions or schemes should be taken forward given the

limited local and national funding streams. In these cases the following will be important considerations:

- **Risk** – the risk of doing nothing in terms of economic, social and environmental terms,
- **Consequence** – how many people or properties the measure or scheme could impact, e.g. an individual property, ward or the borough as a whole, and
- **Deliverability** – including costs and technical deliverability, e.g. providing information on flood resilience measures via the council website would be cheaper and technically easier to implement than designing and implementing a large flood alleviation scheme.

Moving forward, to ensure funding and resources are targeted to those areas and actions of highest importance we will prioritise our activities based on the following, where:

- There is a historic and ongoing flood risk from local flooding sources (surface water, groundwater and smaller watercourses and ditches),
- Funding is available,
- There is an identified benefit to properties, communities, businesses and / or infrastructure,
- Funding is made available by partners, where perhaps traditional funding sources are not available or cannot fully fund the cost of the measure,
- The measure delivers benefit and mitigation to areas identified as being at risk through London Borough of Croydon's Local Flood Risk Management Strategy, Surface Water Management Plan, Strategic Flood Risk Assessment or Preliminary Flood Risk Assessment, and
- Schemes deliver multiple benefits, including wider environmental benefits.

The prioritisation of schemes and actions will be reviewed annually based on available funding, resources and local priorities, and published on the Croydon Council website.

Quick Wins

Following the outcomes of the public engagement exercise, the following actions have been prioritised for delivery in the first 2 years of the Strategy:

- **Improve in-house information management**. By improving how information is collected by telephone in the call centre, as well as from email and the council website, and disseminated to council officers,
- **Raise profile and understanding of groundwater as a flood risk** through improving groundwater information on the council website,
- **Focus on flooding hotspots and Critical Drainage Areas in collaboration with development plans by establishing the impact of planned growth through** creating a 'living list' of high priority CDAs and smaller hotspots,
- **Meet with Network Rail, Thames Water & TfL to discuss areas where their infrastructure falls in Croydon's flood hotspots** and collate evidence of problem areas relating to other RMA's infrastructure, and

- **Encourage residents to help themselves and improve resilience to their properties** by providing information on available funding sources for measures and providing links to independent organisations who can provide guidance and advice

5.6 Funding for Local Flood Risk Management

Local flood risk management measures will require funding from a variety of sources, both internal and external to the Council. The primary funding sources to date have been through central government funding, however, there are significant pressures on these funding sources in the current economic climate, and in the future there will be greater emphasis on LLFAs to fund activities and schemes from their own or alternative local sources of funding. There are a number of routes through which central government funding may contribute towards flood risk management activities, as detailed in Figure 5-1 and summarised below.

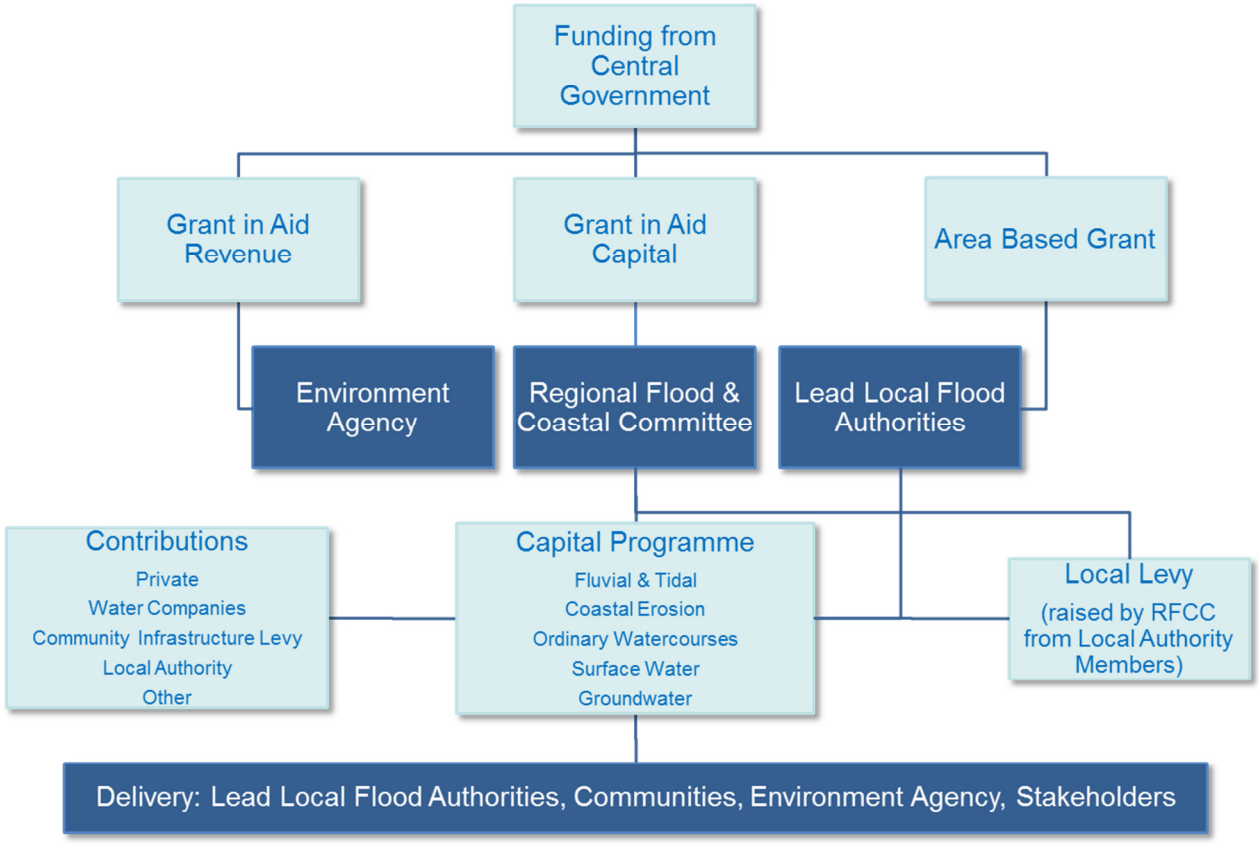


Figure 5-1 Summary of Lead Local Flood Authority Potential Funding Streams

Funding for Lead Local Flood Authorities Responsibilities

The Government has committed funding annually to support LLFAs in their 'new' flood management roles up to March 2016. The funding is provided through 'Area Based Grants', which have been allocated by the Department for Environment and Rural Affairs (Defra) based on the individual flood risk each local authority faces. Beyond this period funding commitments are unclear and there are likely to be pressures on further funding given the significant challenges local government faces within the current spending review. Details of the allocations since implementation of the Act are included in Table 5-3. The funding is not ring-fenced and 2015/16 will see a reduction of this funding source.

Table 5-3 Defra funding allocation for LLFA duties to Croydon Council	
Financial Year	Approximate Grant Allocation
2011/12	£142,000
2012/13	£250,000
2013/14	£250,000
2014/15	£250,000
2015/16	£215,000

Funding for Lead Local Flood Authorities SuDS Approving Body Preparation

Defra made additional funding available, for 2014-2015. This was initially provided to assist LLFAs in setting up and preparing for their role as a SuDS Approving Body (SAB) under Schedule 3 of the Flood & Water Management Act 2010. The funding was intended to assist LLFAs to put the required systems, procedures and resources in place to fulfil their duties as a SAB, when they were enacted. It is now being utilised to prepare for new SuDS implementation through the planning system. The funding is a one-off payment. It is not presently confirmed whether additional funding will be available from central government for the additional duty for planning authorities or statutory consultee function of Croydon Council as an LLFA.

Funding for Flood Risk Management Studies and Schemes (Projects)

In the main, flood risk management projects are funded by a combination of the following funding streams:

- National funding – Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA),
- Regional funding – Local Levy, and
- Local / other funding contributions.

It should be noted that the mechanism for attracting the national (FCRM GiA) and regional (Local Levy) funding gives priority to the protection of residential properties.

Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Flood and Coastal Risk Management Grant in Aid (FCRM GiA) is the capital budget set aside by central government for flood defence projects across England. Following consultation during 2011, Defra introduced a new approach to the funding of flood risk management capital projects. This approach was termed the 'Flood and Coastal Resilience Partnership Funding' approach. The key benefits of the new approach are:

- Communities, through their Regional Flood and Coastal Committees (RFCCs), can take decisions on which projects should progress, based on local willingness to contribute towards the benefits that would be delivered,
- The programme of capital works will be prioritised based on the damage being prevented by the project, and
- A higher proportion of capital projects can be eligible for some government funding, subject to resources being available.

Caterham Bourne Flood Alleviation Scheme

In April 2014, the Thames RFCC approved the first stage of a funding application (through FCRM GiA) for a catchment wide investigation and flood alleviation scheme for the Caterham Bourne. The application was led by Croydon Council in partnership with Surrey County Council and Tandridge District Council for a total sum of approximately £1m over 5 years. This figure will be subject to change pending the outcomes of the first stage of work and funding availability.

Flooding from the Caterham Bourne in Warlingham, Surrey, February 2014

During 2014, a consultant was procured to carry out the first stage catchment modelling and feasibility which will investigate surface water and groundwater mechanisms in the catchment.

The catchment study will inform the most appropriate forms of flood management in both Tandridge and Croydon for maximum benefit to local residents.

Kenley Flood Alleviation Scheme

In April 2013, approval was granted for an FCRM GiA application for the first stage of funding of up to £327,000 to address long-standing localised surface water flooding problems in the Welcomes Road / Kenley Lane area of Kenley. The first stage funding allocation commenced in the 2014-15 financial year and total funding will be subject to change pending the outcome of initial modelling and options appraisal. A consultant has been procured to carry out the first stage of refined modelling of the area alongside stakeholder engagement with local residents to develop an evidence base for detailed design of flood alleviation options in the area. This stage of the project is programmed for completion by December 2015.

Local Levy

This funding is raised by way of a levy on local authorities within the boundary of each RFCC. The Local Levy is used to support, with the approval of the committee, flood risk management projects that are not considered to be national priorities and hence do not attract full national funding through the FCRM GiA. As both the Caterham Bourne and Kenley FCRM GiA projects have surpassed the 100% partnership funding score due to the high number of properties at risk in Croydon, no Local Levy funding has been allocated to these projects to date.

The Local Levy allows locally important projects to go ahead to reduce the risk of flooding within each committee's area. In addition to prioritising where Local Levy is to be spent, each RFCC annually sets the level of local levy funding that each local authority will contribute in the following year.

Other Sources of Funding

In order to maximise the benefits of the new approach to funding of flood risk management capital projects, LLFAs should work closely with partnering organisations and other bodies to attract alternative sources of funding. It is important to note that the likelihood of securing FCRM GiA of Local Levy can significantly increase when other sources of funding are secured.

In taking forward flood risk management activities Croydon Council will need to consider securing funding from alternative sources, including Central Government, other RMAs and stakeholders and private beneficiaries. Working to maximise multi-beneficial outcomes of new schemes or activities could open up more avenues of internal revenue than purely flood risk management, particularly where measures address existing core activities for the Council. There are also opportunities for European grants or environmental grants for schemes delivering multiple benefits.

Table 5-3 highlights possible sources of funding that could contribute to the delivery of flood risk management projects or schemes.

Table 5-3 Possible sources of alternative funding for local flood risk management

Funding Source	Description
Private Contributions	Voluntary contributions from private organisations / individuals who benefit from flood risk management projects. This could include local businesses & landlords.
Water Company Investment	Water companies are able to contribute to some types flood risk management projects where it can be demonstrated that joint benefits can be obtained and/or there is increased resilience for their assets.
Community Infrastructure Levy (CIL)[64]	A locally set general charge which local planning authorities can choose to implement. Levied on developers, per square metre of certain types of development across an authority's area. Local communities set their own priorities on how the majority of this funding is allocated.
Developer Contributions through Section 106 Agreements	Planning obligations or 'Section 106 Agreements' are a well-established mechanism for securing funding for agreed issues arising from a development proposal.
Other	There are a multitude of alternative funding sources available depending on the type of activity or scheme being proposed. For example, this could include delivery of Water Framework Directive (WFD) objectives, and will be dependent on the activity or scheme seeking funding.

It is clear from the above that funding to deliver capital projects will need to be sought from a variety of sources as government funding will be limited each year and is likely, in many cases, to be a contribution towards project costs rather than full funding. Any projects are therefore likely to be developed through partnership working, with partners and organisation with relevant flood risk responsibilities or assets relating to the project engaged in the production of the scheme. Partnership working may also provide opportunities for reduction in costs through shared benefits.

[64] Inside Government Website, Community Infrastructure Levy https://www.gov.uk/government/policies/giving-communities-more-power-in-planning-local-development/supporting-pages/community-infrastructure-levy

Timeframes for accessing funding sources will strongly influence decisions to implement particular measures as well as the viability of certain options. Particular types of funding will also require engagement of additional partners to maximise the likelihood of accessing them.

Further information on the different funding sources is available in the Defra guidance document 'Partnership Funding and Collaborative delivery of local flood risk management'[65].

Maintenance Activities

In the current financial climate, there are significant pressures on Council budget and funding for maintenance activities. Using the Strategy Action Plan, historic flood evidence and communication with residents, Croydon Council will look to prioritise maintenance for those assets which have the greatest effect on local flood risk and in those areas most at risk to maximise effectiveness of limited funding. At the same time, Croydon Council will seek to maximise income from external sources, including asset owners and riparian owners, for flood risk management.

5.7 London Borough of Croydon Action Plan

5.7.1 An Action Plan has been developed that details the measures and actions that will be taken to deliver the Local Objectives. For each measure a number of actions have been identified and for each of these the proposed funding route, timescale for implementation, and delivery lead and partners have been identified. The Action Plan will be the key mechanism through which progress in meeting the Local Objectives will be monitored.

The London Borough of Croydon Action Plan is included in Appendix B.

The actions outlined in the Action Plan are indicative and will be reviewed annually based on available funding, resources and local priorities.

[65] Halcrow Group Ltd for Defra (2012) Partnership funding and collaborative delivery of local flood risk management. http://randd.defra.gov.uk/Document.aspx?Document=9958_FD2643_Partnershipfundingguide.pdf

6. DELIVERY OF WIDER ENVIRONMENTAL OBJECTIVES

6.1 Overview

The Act states that the Strategy must specify how it contributes to the achievement of wider environmental objectives. In order to address this requirement a Strategic Environmental Assessment (SEA) of the Strategy has been undertaken in accordance with the European Union adopted Directive 2001/42/EC[66] on the assessment of the effects of certain plans and programmes on the environment (the 'SEA Directive'). Alongside this a Habitats Regulations Assessment[67] (HRA) Screening has been undertaken to assess the impacts of implementing the Strategy policies and measures on European Designated Sites within 10km of London Borough of Croydon.

Both the HRA and the SEA were developed alongside this Strategy and have been used to inform sustainable decision making throughout

6.2 Strategic Environmental Assessment (SEA)

Overview

SEA involves the systematic identification and evaluation of potential environmental impacts of specified plans and programmes before deciding which are adopted. Consideration should be made with regards to both the positive and negative impacts of options on wildlife and habitats, populations and health, soil, water, air, climate factors, landscape, cultural heritage and the inter-relationships between these receptors.

The first stage of the SEA was to produce a combined Scoping Report for all six South West London Local Flood Risk Management Strategies[68] to set out the framework for undertaking a SEA for the Strategies and the scope of the assessment. The next step was to produce the SEA Environmental Report[69] for the London Borough of Croydon, which identifies the likely significant effects of the implementation of the Strategy on relevant environmental receptors. It also identifies how the Strategy can contribute to the achievement of wider environmental objectives, including Water Framework Directive (WFD) objectives.

Figure 7 and Figure 8 in Appendix A show the critical infrastructure and the environment and heritage sites, respectively, in the London Borough of Croydon and their potential interaction with local sources of flooding (surface water).

SEA Outcomes

The key findings of the SEA process are set out in the Environmental Report for the Strategy. This broadly outlines how the objectives and the identified measures might be expected to affect a number of different aspects of the environment (referred to as 'receptors'). The SEA demonstrates that the London Borough of Croydon's Strategy is predicted to have positive impacts on the environment in the short term and in the long term (i.e. beyond the life of the Strategy), since the Strategy takes a proactive approach to reducing and managing local flood risk within the London Borough of Croydon. Each of the Strategy objectives successfully supports the range of environmental objectives identified within the SEA framework, achieving a positive outcome for each SEA objective.

[66] European Union (2001) Strategic Environmental Assessment Directive http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32001L0042:en:NOT
[67] Capita URS for the London Borough of Croydon (2014) South West London Local Flood Risk Management Strategy – HRA for the London Borough of Croydon
[68] Capita URS for the South West London Flood Group (2014) South West London Local Flood Risk Management Strategy SEA - Scoping Report
[69] Capita URS for the London Borough of Croydon (2014) South West London Local Flood Risk Management Strategy SEA - Environmental Report for the London Borough of Croydon

The majority of Strategy objectives are likely to have indirect beneficial effects on the environment as they relate to improving knowledge and understanding, and promote high level management of local flood risk rather than actual works or actions that could have an effect on the ground.

Overall, the combined Strategy objectives and measures are considered to be beneficial for the environment, due to the likely outcomes of improved local flood risk management and subsequently reduced local flood risk to the natural and built environment within the London Borough of Croydon.

6.3 Habitats Regulations Assessment (HRA)

A Habitats Regulations Assessment (HRA) screening assessment (as required by Article 6 of the EC Habitats Directive 1992 (92/44/EEC)[70], and Regulation 48 of the Conservation (Natural Habitats &c) Regulations 1994[71]) was undertaken as part of the Strategy development. This screening exercise assessed the impacts of implementing the Strategy objectives and measures on European Designated Sites (Special Areas of Conservation, Special Protection Areas and Ramsar sites) within 10km of Croydon. Where the HRA determines that the Strategy would give rise to significant environment effects on a European site designated for its biodiversity value a full HRA will be required.

Figure 8 in Appendix A shows the potential interaction of local sources of flooding (surface water) with the environment in the London Borough of Croydon.

HRA Outcomes

The key findings of the HRA Screening assessment are set out in the Habitats Regulations Assessment for the Strategy. It concluded that the Strategy for the London Borough of Croydon has been screened out as having no likely effects on any European sites due to a lack of pathways linking them to local flood risk management in the borough and therefore no further HRA is required.

6.4 Water Framework Directive (WFD)

The Strategy will complement work that is currently underway to comply with the requirements of the European Water Framework Directive (WFD) (2000/60/EC)[72]. Although a formal WFD assessment (WFDa) is not a statutory requirement of the Strategy, WFD requirements have been considered as part of the SEA process, including where opportunities to improve WFD status exist.

The Environment Agency is responsible for preparing management plans for river basin districts in England and Wales. The plans outline the characteristics of the river basin district, identify the pressures that the local water environment faces, and specify the actions that will be taken to address any problems before 2015.

For the Thames River Basin District, the density of the population together with relatively low rainfall means that the water environment is stressed, with less water per person than many Mediterranean regions. This leads to over-extraction, and the high risk of pollution. Many of the rivers within the Thames river basin have been heavily modified as a consequence of development, flood risk management and for navigation. As a result only 23% of the assessed water bodies covered by the Thames River Basin Management Plan are regarded having an

[70] European Union (1994), The Habitats Directive, http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
[71] HMSO (1994), The Conservation (Natural Habitats &c) Regulations 1994, http://www.legislation.gov.uk/uksi/1994/2716/contents/made
[72] European Union (2000) Water Framework Directive 2000/60/EC, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT

ecological status of at least “good”. There are no water bodies in the Thames river basin that were considered to exhibit “high” ecological status.

Flood risk management activities are expected to have a significant impact on the ability of the UK to comply with the requirements of the WFD, as flood protection can involve substantial alteration to the natural properties of a river. The Thames River Basin Management Plan encourages the use of sustainable drainage systems as a means of reducing the physical impact of flood risk management works on the ecological status or potential of water bodies.

Outcomes

Within Croydon, the River Wandle has been assessed to have poor ecological status under the WFD[73]. The waterbody is defined as being ‘Heavily Modified’ and must reach good ecological status by 2027.

The Strategy seeks to alleviate local flood risk by encouraging best practice for the maintenance of flood prevention and drainage assets, however this practice may sometimes have adverse effects on biodiversity, for example clearance of vegetation may lead to habitat loss along river corridors and deterioration in water quality. There may be opportunities for multi beneficial schemes which have positive effects on water quality and subsequently biodiversity from small-scale measures such as implementation of SuDS or changes in drainage. There may also be cumulative benefits to biodiversity and water quality through strategic management of local flood risk, as enabling natural flood patterns to continue or extend in some areas can improve wetland habitats.

Other plans and strategies provide mitigation to avoid impacts on designated sites, protected species and habitats as part of flood prevention measures. However, cumulative impacts may arise where a number of measures combine to alter hydrological systems or land use. For instance, many small changes to water levels may result in overall gains or losses in freshwater habitats or there may be cumulative effects on a particular species or type of habitat.

New requirements for major developments to demonstrate prioritisation of SuDS as part of their planning applications and the potential for Croydon Council as an LLFA to become statutory consultee on drainage elements of applications will play an important role in contributing to the delivery of the Thames River Basin Management Plan and WFD objectives. Increased communications with riparian owners and improved mapping of Croydon’s drainage ditches will also contribute to the WFD by improving management of local watercourses that drain into larger river systems.

In assessing this Strategy for WFD compliance, the measures proposed are unlikely to have environmental effects and will not cause deterioration to water bodies. However, as projects and schemes are developed these may require site specific environmental assessment to identify any potential environmental effects (positive and negative).

[73] Environment Agency (2009) Thames River Basin District River Basin Management Plan

7. STRATEGY MONITORING & REVIEW

7.1 Overview

The Act requires the LLFA to specify how and when the Strategy will be reviewed, and, where considered appropriate, to update their identified objectives and measures for flood risk management on a regular basis.

7.2 Annual Monitoring

Croydon Council propose to monitor progress against the Strategy Action Plan annually. This will involve assessing which actions have been delivered, and determining whether there has been any change to the prioritisation of actions. Findings from this monitoring process will be presented to the Croydon Flood Group and the South West London Flood Group.

Progress against the Strategy Action Plan will be reported to Elected Members through an Annual Monitoring Report submitted to the Scrutiny and Strategic Overview Committee.

7.3 Review

The Strategy has been developed to deliver a short to medium (6-year) improvement plan to establish a sound evidence and knowledge base upon which to develop a longer-term investment plan for local flood risk management activities in Croydon.

It is proposed that a review of the Strategy should be scheduled for 2020, and thereafter every six years (as a minimum) to coincide with the requirement under the Flood Risk Regulations 2009 to revise the Flood Risk Management Plan.

However, the Strategy should be viewed as a dynamic strategy and may require review more regularly to recognise specific changes. Potential triggers for a review of the Strategy may include:

- Occurrence of a significant and widespread surface water flood event,
- Significant changes to datasets or information which may alter the understanding of risk within the study area,
- Significant amendments to the legal responsibilities and/or roles and functions of Risk Management Authorities and/or other organisations,
- Annual Monitoring identifies that the Strategy is not achieving its objectives, or,
- Change in funding availability which has a significant effect on the Strategy Action Plan.

GLOSSARY & ABBREVIATIONS

Term	Definition
Annual Exceedance Probability (AEP)	Chance of occurrence in any one year, expressed as a percentage. For example, a 1% annual probability event has a 1 in 100 chance of occurring in any given year.
Aquifer	A source of groundwater comprising water bearing rock, sand or gravel capable of yielding significant quantities of water.
Attenuation	In the context of this strategy – the storing of water to reduce peak discharge of water.
Catchment Flood Management Plan	A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Category 1 Responders	As defined under Schedule 1 of the Civil Contingencies Act, Category 1 responders are “core responders” in the event of an emergency and include emergency services, local authorities, health bodies and Government agencies including the Environment Agency.
Civil Contingencies Act 2004	Aims to deliver 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 Civil Contingencies Act is separated into two substantive parts: local arrangements for civil protection (Part 1) and emergency powers (Part 2).
Climate Change	Long term variations in global temperature and weather patterns caused by natural and human actions.
Critical Drainage Area	A discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding during severe weather thereby affecting people, property or local infrastructure.
Culvert / culverted	A channel or pipe that carries water below the level of the ground.
DG5 Register	A water-company held register of properties which have experienced sewer flooding due to hydraulic overload, or properties which are 'at risk' of sewer flooding more frequently than once in 20 years.
Flood Zone 1	Low Probability of Flooding. In accordance with the NPPF, land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year.
Flood Zone 2	Medium Probability of Flooding. In accordance with the NPPF, land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1-0.1%), or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5-0.1%) in any year.
Flood Zone 3a	High Probability of Flooding. In accordance with the NPPF, land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of sea flooding (>0.5%) in any year.
Flood Zone 3b	Functional Floodplain. In accordance with the NPPF, land where water has to flow or be stored in times of flood.
Environment Agency	Environment regulator for England and Wales. Risk Management Authority responsible for management of flood risk from fluvial (main rivers), tidal and coastal sources of flooding and Reservoirs.
Flood Defence	Infrastructure used to protect an area against floods as floodwalls and embankments; they are designed to a specific standard of protection (design standard).
Floodplain	Area adjacent to river, coast or estuary that is naturally susceptible to flooding.

Term	Definition
Flood Resilience	Resistance strategies aimed at flood protection.
Flood Risk	The level of flood risk is the product of the frequency or likelihood of the flood events and their consequences (such as loss, damage, harm, distress and disruption).
Flood Risk Assessment	Considerations of the flood risks inherent in a project, leading to the development actions to control, mitigate or accept them.
Flood Storage	A temporary area that stores excess runoff or river flow often ponds or reservoirs.
Flood Resilience	Resistance strategies aimed at flood protection.
Flood Zone	The extent of how far flood waters are expected to reach.
Fluvial	Relating to the actions, processes and behaviour of a watercourse (river or stream).
Fluvial flooding	Flooding by a river or a watercourse.
Functional Floodplain	Land where water has to flow or be stored in times of flood.
Greenfield	Previously undeveloped land.
Groundwater	Water that is in the ground, this is usually referring to water in the saturated zone below the water table.
Highways Act 1980	Sets out the main duties (management and operation of the road network) of highways authorities in England and Wales. The Act contains powers to carry out functions / tasks on or within the highways such as improvements, drainage, acquiring land etc.
Hydraulic Modelling	A computerised model of a watercourse and floodplain to simulate water flows in rivers too estimate water levels and flood extents.
Infiltration	The penetration of water through the grounds surface.
Infrastructure	Physical structures that form the foundation for development.
Land Drainage Act 1991	Sets out the statutory roles and responsibilities of key organisations such as Internal Drainage Boards, local authorities, the Environment Agency and Riparian owners with jurisdiction over watercourses and land drainage infrastructure. Parts of the Act have been amended by the Flood and Water Management Act 2010.
Local Flood Risk	Defined in the Flood and Water Management Act as flooding from surface runoff, ordinary watercourses and groundwater.
Lead Local Flood Authority (LLFA)	The statutory body defined under the Flood and Water Management Act responsible for the management of local flood risk, namely surface water runoff, groundwater and ordinary watercourses.
Local Planning Authority	Body that is responsible for controlling planning and development through the planning system.
Main River	Watercourse defined on a ‘Main River Map’ designated by DEFRA. The environment Agency has permissive powers to carry out flood defence works, maintenance and operational activities for Main Rivers only.
Mitigation Measure	An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere.

Term	Definition
Multi-Agency Flood Plan (MAFP)	Plan outlining how responding parties under the Civil Contingencies Act and key voluntary response organisations will work together on an agreed coordinated response to severe flooding in London Borough of Croydon.
National Strategy	National Flood and Coastal Erosion Risk Management (FCERM) Strategy for England, developed by the Environment Agency.
National Planning Policy Framework (NPPF)	National Planning Policy Framework (NPPF) for England, published by the Development for Communities and Local Government. This sets the government's planning policies for England and how these are expected to be applied.
Ordinary Watercourse	A watercourse that does not form part of a Main River. This includes “all rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows” according to the Land Drainage Act 1991.
Overland Flow	Flooding caused when intense rainfall exceeds the capacity of the drainage systems or when, during prolonged periods of wet weather, the soil is so saturated such that it cannot accept any more water.
Ramsar Site	Wetlands of international importance designated under the Ramsar Convention.
Residual Flood Risk	The remaining flood risk after risk reduction measures have been taken into account.
Return Period	The average time period between rainfall or flood events with the same intensity and effect.
Riparian Owner	Anyone who owns land or property alongside a river or other watercourse. Responsibilities include maintaining river beds/banks and allowing flow of water to pass without obstruction.
Risk	The probability or likelihood of an event occurring.
River Catchment	The areas drained by a river.
Sewer Flooding	Flooding caused by a blockage or overflowing in a sewer or urban drainage system.
Standard of Protection	The flood event return period above which significant damage and possible failure of the flood defences could occur.
Sustainability	To preserve /maintain a state or process for future generations.
Sustainable Drainage System (SuDS)	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations meeting their own needs.
Swale	A grass-lined channel designed to control the flow rate and quality of water as it drains from a site.
Tidal	Relating to the actions or processes caused by tides.
Tributary	A body of water, flowing into a larger body of water, such as a smaller stream joining a larger stream.
1 in 30 year event	Event that has a 1 in 30 probability of occurring in any given year. Also expressed as an event, which has a 3.33% Annual Exceedance Probability.
1 in 100 year event	Event that has a 1 in 100 probability of occurring in any given year. Also expressed as an event, which has a 1% Annual Exceedance Probability.

APPENDIX A – FLOOD RISK MAPS

NORTH

0 1 2
kilometres

Notes

Flooding incidents have been mapped based on Council records available at the time of the production of the Local Flood Risk Management Strategy.

In many cases incidents of flooding may not been reported to the Council and will therefore not be shown on this map.

LEGEND

LB Croydon boundary

Reported Flooding Incidents

- Surface water (420)
- Groundwater (37)
- Sewer (54)
- Multiple (2)

Purpose of Issue

FINAL REPORT

Revision Details | By Chk | Date | Suffix

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

Scale at A3: 1:45,000

Drawn Craig Boorman | Checked Sarah Kelly

Approved Jon Robinson | Date October 2015

Job Title

LONDON BOROUGH OF CROYDON
LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title

HISTORIC FLOODING

Client

Wandsworth | merton | London Borough of Richmond upon Thames | CROYDON www.croydon.gov.uk | Sutton | Royal Kingston

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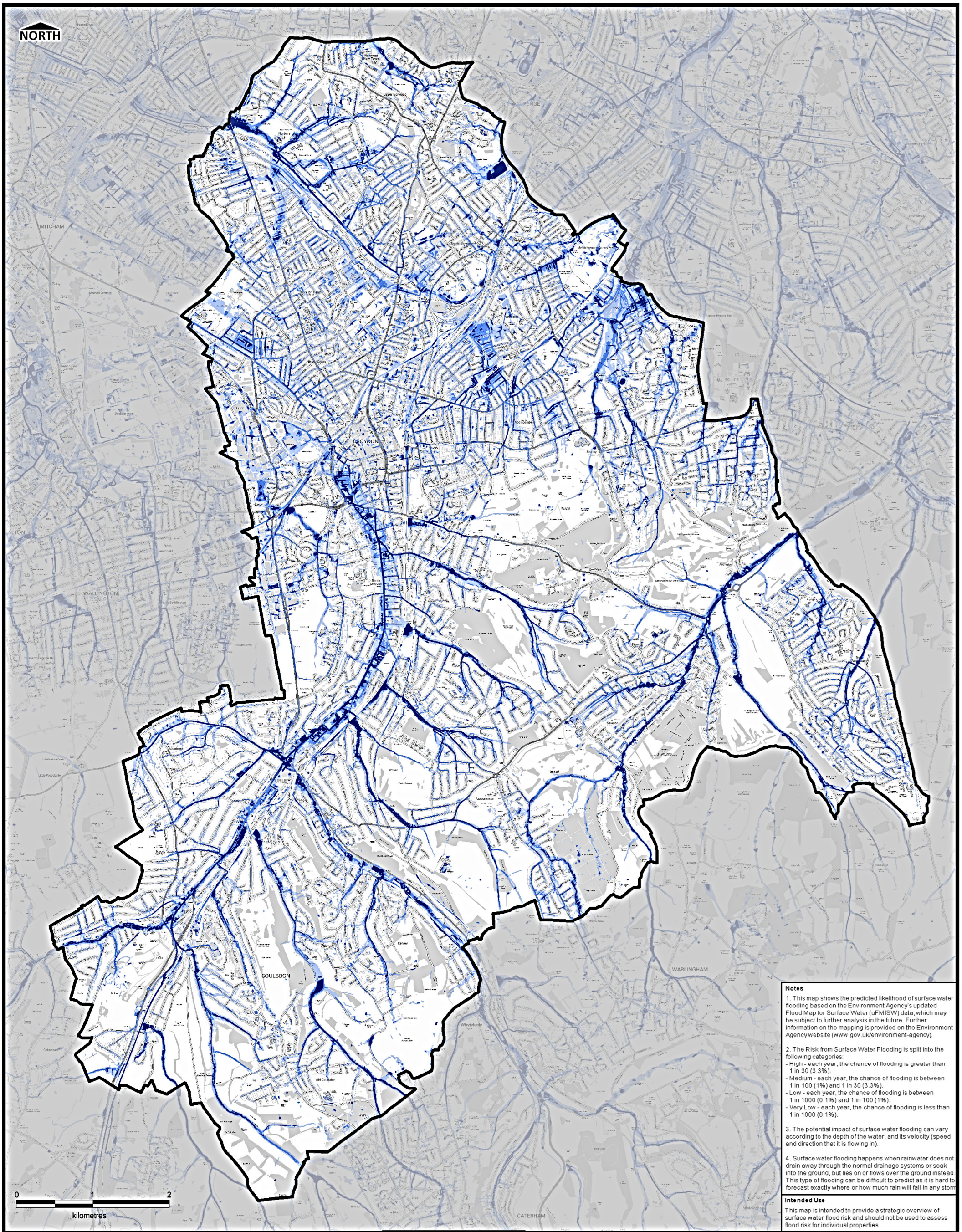
Drawing Number

FIGURE 1

Rev

01



Notes

1. This map shows the predicted likelihood of surface water flooding based on the Environment Agency's updated Flood Map for Surface Water (uFMfSW) data, which may be subject to further analysis in the future. Further information on the mapping is provided on the Environment Agency website (www.gov.uk/environment-agency).

2. The Risk from Surface Water Flooding is split into the following categories:
- High - each year, the chance of flooding is greater than 1 in 30 (3.3%).
- Medium - each year, the chance of flooding is between 1 in 100 (1%) and 1 in 30 (3.3%).
- Low - each year, the chance of flooding is between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Very Low - each year, the chance of flooding is less than 1 in 1000 (0.1%).

3. The potential impact of surface water flooding can vary according to the depth of the water, and its velocity (speed and direction that it is flowing in).

4. Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. This type of flooding can be difficult to predict as it is hard to forecast exactly where or how much rain will fall in any storm.

Intended Use

This map is intended to provide a strategic overview of surface water flood risk and should not be used to assess flood risk for individual properties.

LEGEND

LB Croydon boundary

Risk of Flooding from Surface Water

- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)
- Very Low (<0.1% AEP)

Purpose of Issue

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Approved Jon Robinson | Date October 2015

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Job Title

LONDON BOROUGH OF CROYDON
LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title

POTENTIAL FUTURE FLOOD RISK: SURFACE WATER

Client

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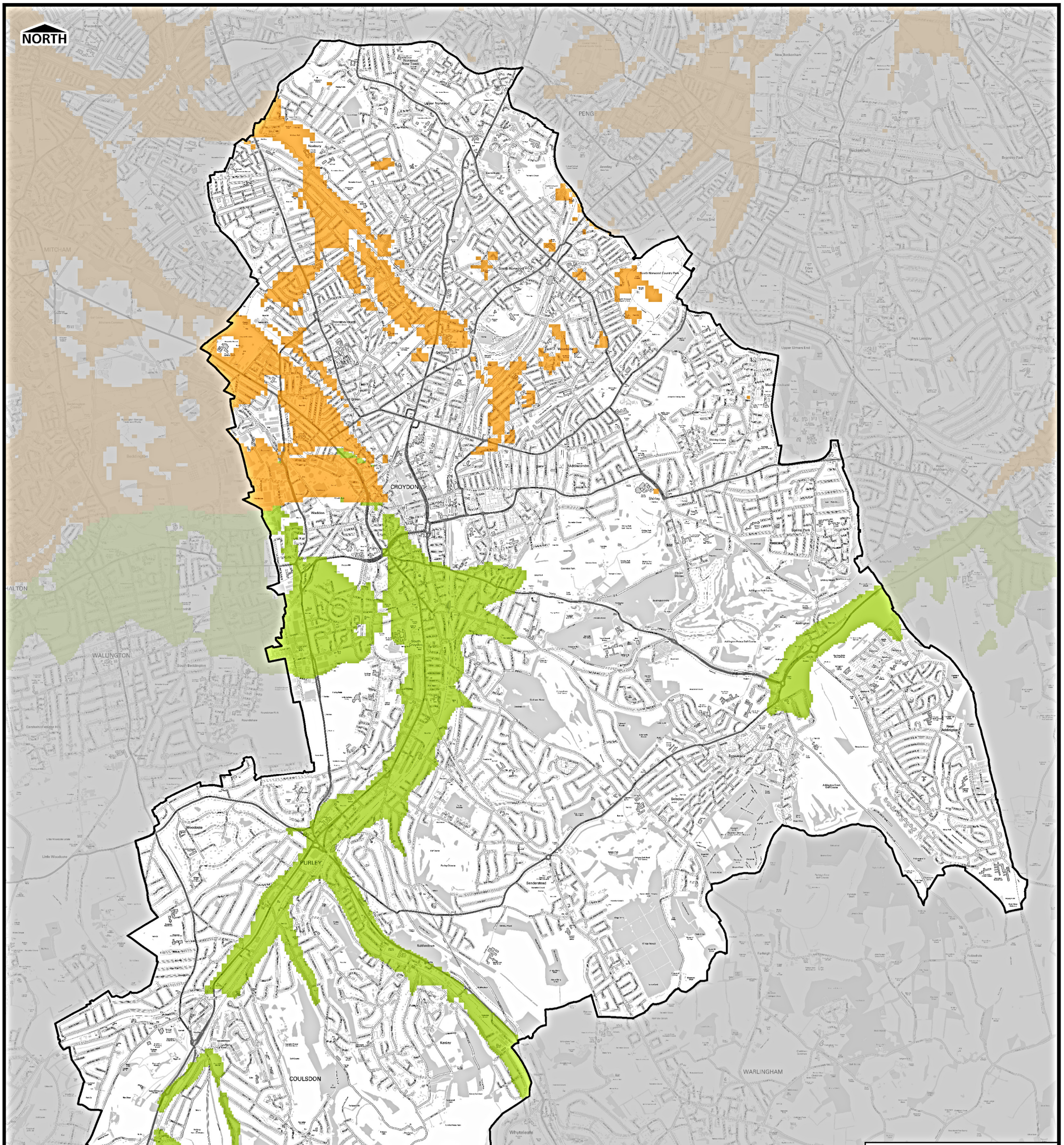
Drawing Number **FIGURE 2**

Rev **01**



Notes

1. The increased Potential for Elevated Groundwater map shows those areas where there is an increased potential for groundwater to rise sufficiently to interact with the ground surface or be within 2m of the ground surface.

2. Such groundwater rise could lead to the following:
- Flooding of basements of buildings below ground level;
- Flooding of buried services or other assets below ground level;
- Inundation of farmland, roads, commercial, residential and amenity areas;
- Flooding of ground floors of buildings above ground level; and
- Overflowing of sewers and drains.

3. Areas not shown to have increased potential for elevated groundwater should be considered to have a low potential for elevated groundwater - Lack of information does not imply 'no potential' of elevated groundwater in that area.

4. This dataset was produced for the Drain London Project and production of Surface Water Management Plans (SWMP) for each London Borough. Please refer to the SWMP for further information on the use and limitations of the dataset.

LEGEND

LB Croydon boundary

Increased Potential for Elevated Groundwater in

Permeable Superficial Deposits

Consolidated Aquifers

Purpose of Issue

FINAL REPORT

Job Title

LONDON BOROUGH OF CROYDON
LOCAL FLOOD RISK MANAGEMENT STRATEGY

Client

Wandsworth · merton · London Borough of Richmond upon Thames · CROYDON www.croydon.gov.uk · Sutton · Royal Kingston

Revision Details	By / Chk	Date	Suffix

Scale at A3: 1:45,000

Drawn Joanna Bolding | Checked Sarah Kelly

Approved Jon Robinson | Date October 2015

Drawing Title

FLOOD RISK FROM GROUNDWATER

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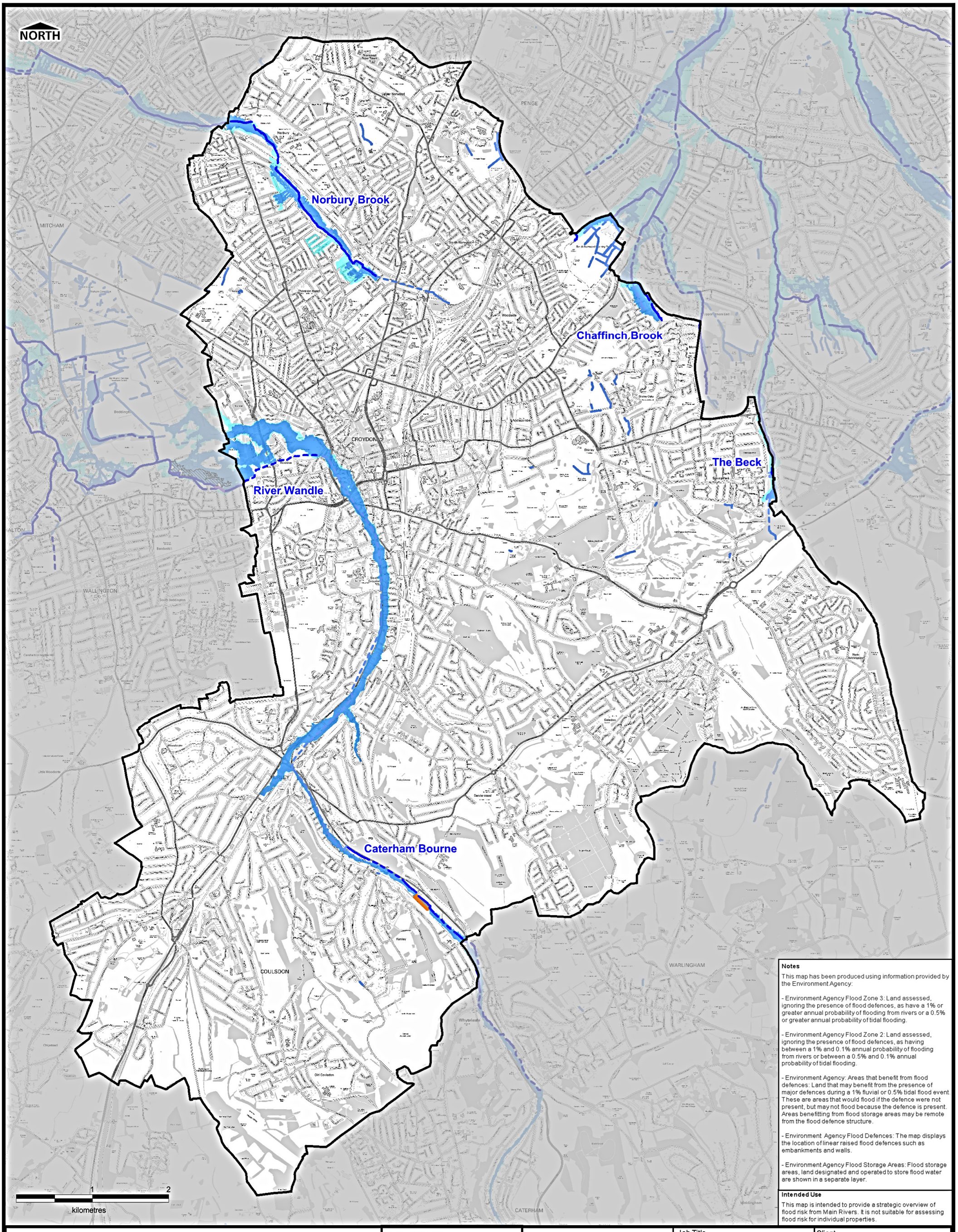
Drawing Number

FIGURE 3

Rev

01



Notes

This map has been produced using information provided by the Environment Agency:

- Environment Agency Flood Zone 3: Land assessed, ignoring the presence of flood defences, as have a 1% or greater annual probability of flooding from rivers or a 0.5% or greater annual probability of tidal flooding.

- Environment Agency Flood Zone 2: Land assessed, ignoring the presence of flood defences, as having between a 1% and 0.1% annual probability of flooding from rivers or between a 0.5% and 0.1% annual probability of tidal flooding.

- Environment Agency: Areas that benefit from flood defences: Land that may benefit from the presence of major defences during a 1% fluvial or 0.5% tidal flood event. These are areas that would flood if the defence were not present, but may not flood because the defence is present. Areas benefitting from flood storage areas may be remote from the flood defence structure.

- Environment Agency Flood Defences: The map displays the location of linear raised flood defences such as embankments and walls.

- Environment Agency Flood Storage Areas: Flood storage areas, land designated and operated to store flood water are shown in a separate layer.

Intended Use

This map is intended to provide a strategic overview of flood risk from Main Rivers. It is not suitable for assessing flood risk for individual properties.

LEGEND

- LB Croydon boundary

Risk of flooding from fluvial / tidal sources

- Flood Zone 3
- Flood Zone 2
- Flood Defences
- Areas Benefitting from Flood Defences
- Flood Storage Areas
- Main River
- Ordinary Watercourse
- Culverted Main River
- Culverted Ordinary Watercourse

Notes: This map has been produced using the Environment Agency Detailed River Network data.

Purpose of Issue: FINAL REPORT

Revision Details | By / Chk | Date | Suffix

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Scale at A3: 1:45,000

Drawn: Joanna Bolding | Checked: Sarah Kelly

Approved: Jon Robinson | Date: October 2015

Job Title: LONDON BOROUGH OF CROYDON LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: FLOOD RISK FROM RIVERS

Client: Wandsworth, merton, London Borough of Richmond upon Thames, CROYDON www.croydon.gov.uk, Sutton, Royal Kingston

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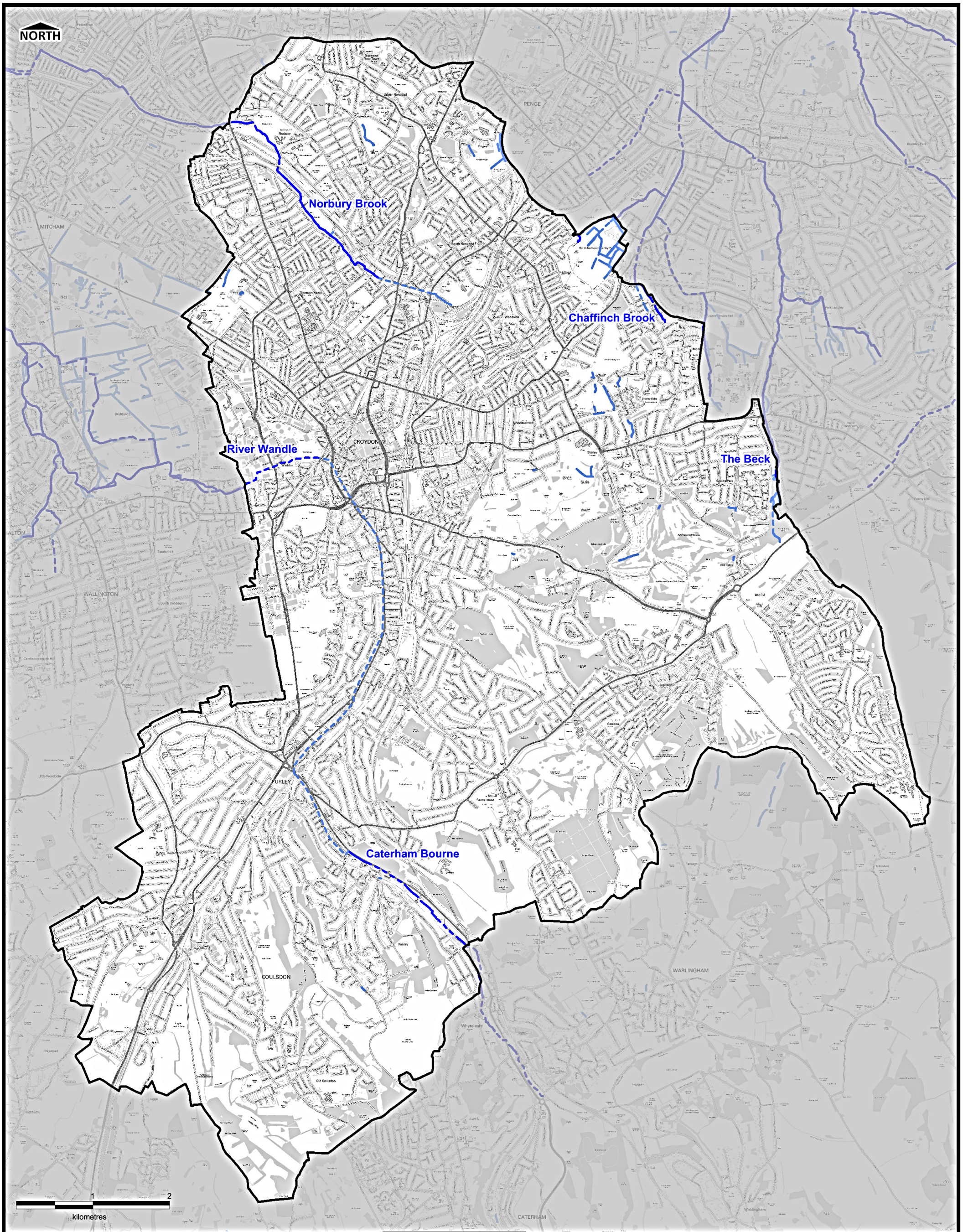
Drawing Number: FIGURE 4

Rev: 01



LEGEND

- LB Croydon boundary
- Main River
- Ordinary Watercourse
- Culverted Main River
- Culvert / Sewer

Notes: This map has been produced using the Environment Agency Detailed River Network data.

Purpose of Issue

FINAL REPORT

Revision Details	By / Chk	Date	Suffix

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Scale at A3: 1:45,000

Drawn Joanna Bolding | Checked Sarah Kelly

Approved Jon Robinson | Date October 2015

Job Title

LONDON BOROUGH OF CROYDON
LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title

MAIN RIVERS & ORDINARY WATERCOURSES

Client

Wandsworth, merton, London Borough of Richmond upon Thames, CROYDON www.croydon.gov.uk, Sutton, Royal Kingston

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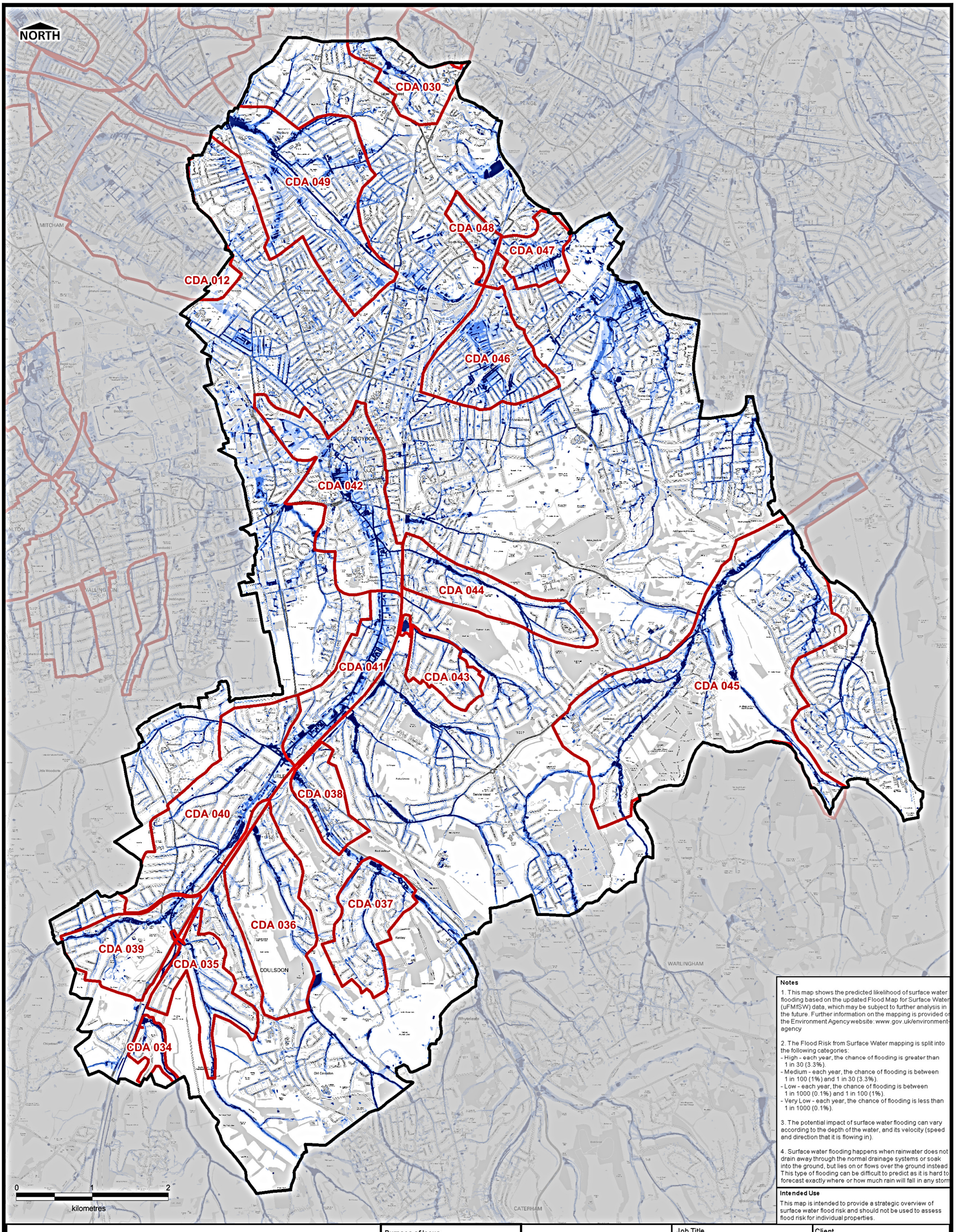
Drawing Number **FIGURE 5**

Rev **01**

\\ba-wip-00114700 - WaterWaterProjects & Jobs\47064\47069163 - SW London LFRMS\06 WIP\068 GIS



Notes

1. This map shows the predicted likelihood of surface water flooding based on the updated Flood Map for Surface Water (uFMfSW) data, which may be subject to further analysis in the future. Further information on the mapping is provided on the Environment Agency website: www.gov.uk/environment-agency

2. The Flood Risk from Surface Water mapping is split into the following categories:
- High - each year, the chance of flooding is greater than 1 in 30 (3.3%).
- Medium - each year, the chance of flooding is between 1 in 100 (1%) and 1 in 30 (3.3%).
- Low - each year, the chance of flooding is between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Very Low - each year, the chance of flooding is less than 1 in 1000 (0.1%).

3. The potential impact of surface water flooding can vary according to the depth of the water, and its velocity (speed and direction that it is flowing in).

4. Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. This type of flooding can be difficult to predict as it is hard to forecast exactly where or how much rain will fall in any storm

Intended Use

This map is intended to provide a strategic overview of surface water flood risk and should not be used to assess flood risk for individual properties.

LEGEND

- LB Croydon boundary
- Critical Drainage Area Boundary

Risk of Flooding from Surface Water

- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)
- Very Low (<0.1% AEP)

Purpose of Issue

FINAL REPORT

Revision Details	By / Chk	Date	Suffix

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Scale at A3: 1:45,000

Drawn Joanna Bolding | Checked Sarah Kelly

Approved Jon Robinson | Date October 2015

Job Title

LONDON BOROUGH OF CROYDON
LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title

SURFACE WATER CRITICAL DRAINAGE AREAS

Client

Wandsworth · merton · London Borough of Richmond upon Thames · CROYDON www.croydon.gov.uk · Sutton · Royal Kingston

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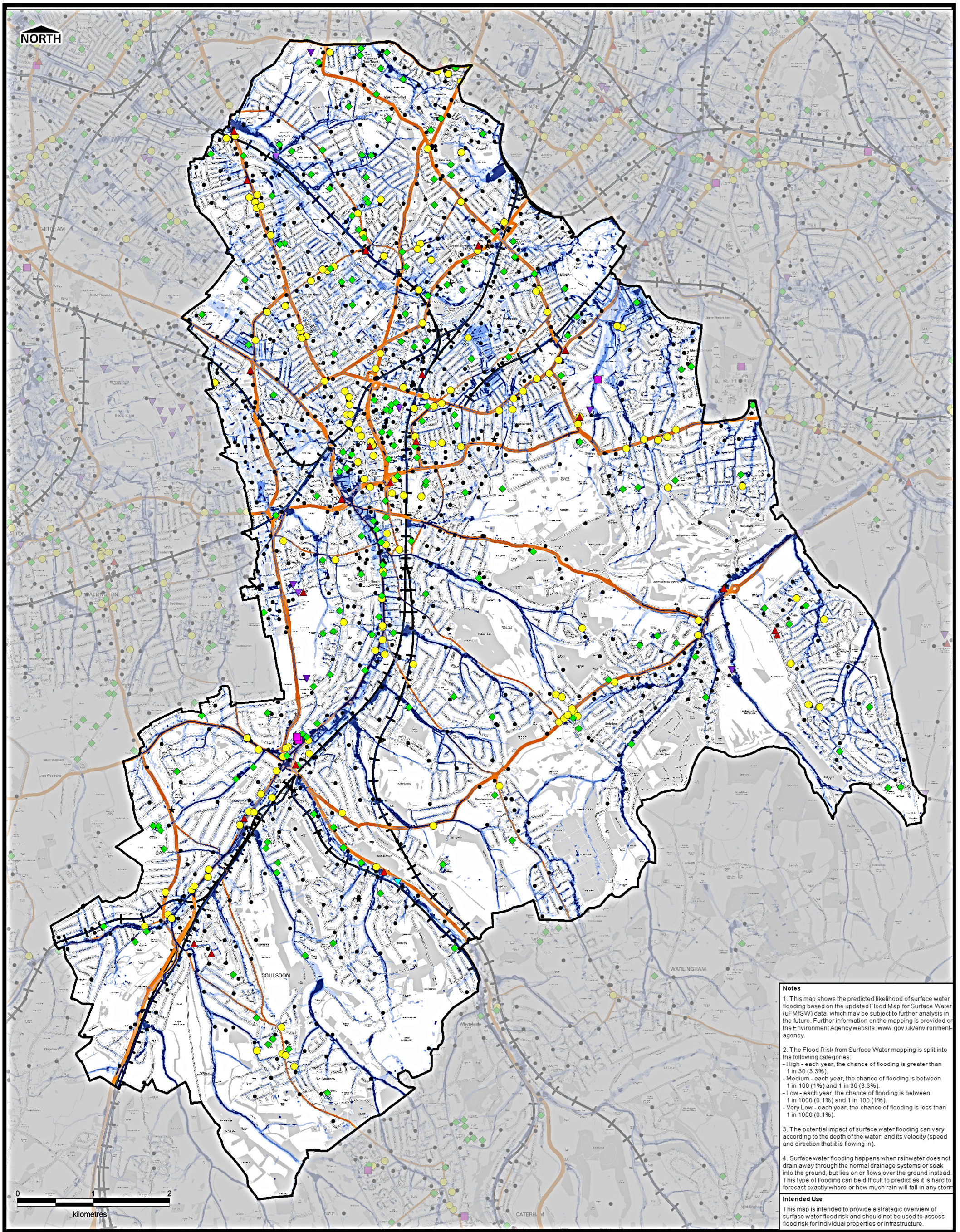
Drawing Number **FIGURE 6**

Rev **01**



Notes

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- Low - each year, the chance of flooding is between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Very Low - each year, the chance of flooding is less than 1 in 1000 (0.1%).

3. The potential impact of surface water flooding can vary according to the depth of the water, and its velocity (speed and direction that it is flowing in).

4. Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. This type of flooding can be difficult to predict as it is hard to forecast exactly where or how much rain will fall in any storm

Intended Use

This map is intended to provide a strategic overview of surface water flood risk and should not be used to assess flood risk for individual properties or infrastructure.

LEGEND

Risk of Flooding from Surface Water
- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)
- Very Low (<0.1% AEP)
- LB Croydon boundary

Critical Infrastructure
- Emergency Services (Fire, Police and Ambulance Station)
- Hospital
- School, Nursery, College or University
- Surgery or Health Care Centre
- Nursing / Care Home
- Sewage Treatment
- Water Treatment
- Electricity Installation

Major Road
- A Road
- B Road
- Railway Line

Purpose of Issue: FINAL REPORT

Job Title: LONDON BOROUGH OF CROYDON LOCAL FLOOD RISK MANAGEMENT STRATEGY

Client: Wandsworth, merton, Royal Kingston, CROYDON www.croydon.gov.uk, Sutton

Revision Details	By / Chk	Date	Suffix

Scale at A3: 1:45,000

Drawn: Joanna Bolding | Checked: Sarah Kelly

Approved: Jon Robinson | Date: October 2015

Drawing Title: FLOOD RISK FROM SURFACE WATER: CRITICAL INFRASTRUCTURE & TRANSPORT

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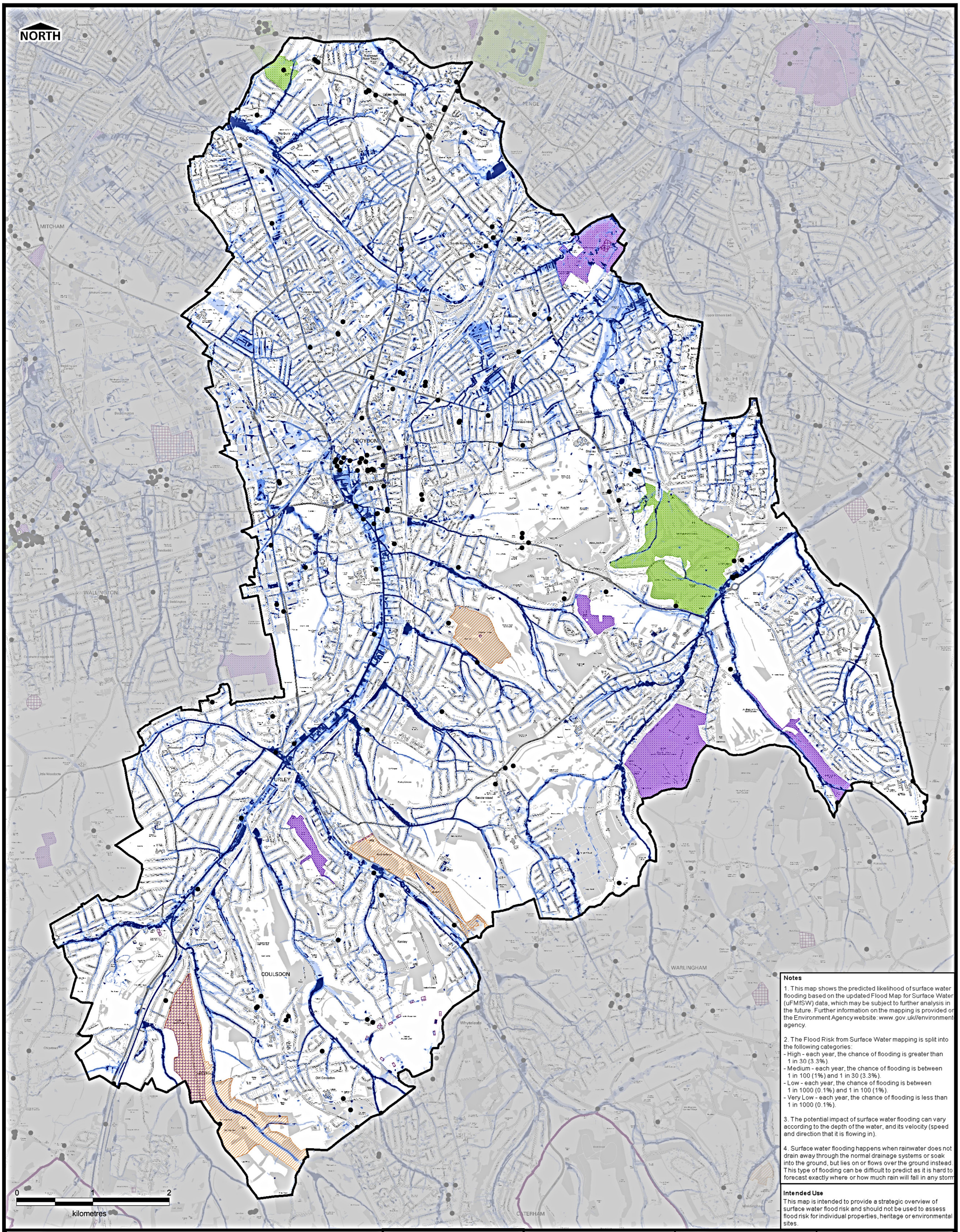
Drawing Number: FIGURE 7

Rev: 01



Notes

1. This map shows the predicted likelihood of surface water flooding based on the updated Flood Map for Surface Water (uFMfSW) data, which may be subject to further analysis in the future. Further information on the mapping is provided on the Environment Agency website: www.gov.uk//environment-agency.

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- High - each year, the chance of flooding is greater than 1 in 30 (3.3%).
- Medium - each year, the chance of flooding is between 1 in 100 (1%) and 1 in 30 (3.3%).
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- Very Low - each year, the chance of flooding is less than 1 in 1000 (0.1%).

3. The potential impact of surface water flooding can vary according to the depth of the water, and its velocity (speed and direction that it is flowing in).

4. Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. This type of flooding can be difficult to predict as it is hard to forecast exactly where or how much rain will fall in any storm

Intended Use

This map is intended to provide a strategic overview of surface water flood risk and should not be used to assess flood risk for individual properties, heritage or environmental sites.

LEGEND

Risk of Flooding from Surface Water
- High (3.3% AEP)
- Medium (1% AEP)
- Low (0.1% AEP)
- Very Low (<0.1% AEP)
- LB Croydon boundary

Environmental Sites
- Site of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar Site
- National Nature Reserve (NNR)
- Local Nature Reserve (LNR)
- Area of Outstanding Natural Beauty (AOB)

Heritage Sites
- World Heritage Site
- Schedule of Ancient Monuments
- Parks & Gardens of Special Historic Interest
- Listed Building

Purpose of Issue

FINAL REPORT

Revision Details | By / Chk | Date | Suffix

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Scale at A3: 1:45,000

Drawn Joanna Bolding | Checked Sarah Kelly

Approved Jon Robinson | Date October 2015

Job Title

LONDON BOROUGH OF CROYDON LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title

FLOOD RISK FROM SURFACE WATER: ENVIRONMENT & HERITAGE

Client

Wandsworth, merton, London Borough of Richmond upon Thames, CROYDON www.croydon.gov.uk, Sutton, Royal Kingston

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Drawing Number **FIGURE 8** | Rev **01**

APPENDIX B – ACTION PLAN

London Borough of Croydon Local Flood Risk Management Strategy Action Plan

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Version: *5.0*
Revision Date: *01 September 2015*
Next Review Date: *01 December 2015*

Measure / Scheme						Delivery		Programme				Funding			Priority	Comments
ID	Objective		Measure		Actions	Lead	Partners	Start	Finish	Review	Status	Est. Cost (£)	Source	Status		
1.1	1 Continue to build our evidence base on flood mechanisms, incidents and assets and improve how it is communicated internally and externally.	1.1	Improving in-house information management	1.1.1	Map all of Croydon's ordinary watercourses in GIS	Highways	Environment Agency	2014-2015	*2015-2016*	Sep-15	Implementation	£5001 - £25,000	Area Based Grant	Allocated	Moderate	
				1.1.2	Create inventory of what asset information is held in house and in what format.	Highways	All Croydon teams	2015-2016	*2015-2016*	Dec-15	Not yet commenced	<£5000	Internal (Maintenance)	To be confirmed	Moderate	
				1.1.3	Collate asset information into one system	ICT	All Croydon teams	2015-2016	*2015-2016*	Mar-16	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
				1.1.4	Mapping of all flood assets in GIS	Highways & ICT		2015-2016	*2016-2017*	Sep-15	In Progress	<£5000	Area Based Grant	To be confirmed	Low	
				1.1.5	Meet with the comms team to develop 'report it' for better recording of different flood types	Highways & BC		2014-2015	*2015-2016*	Dec-15	In Progress	<£5000	Internal (Other)	To be confirmed	Low	
				1.1.6	Meet with Contact Centre to make changes where the right information is not being received	Highways	All Croydon teams	2014-2015	*2015-2016*	Sep-15	In Progress	<£5000	Internal (Other)	To be confirmed	Low	
				1.1.7	Download monthly reports from CRM of flood reports coming into contact centre for high level discussion at quarterly flood group	Highways		2015-2016	*2015-2016*	Dec-15	Not yet commenced	<£5000	Internal (Other)	To be confirmed	Moderate	
				1.1.8	Ensure most up to date flood mapping is accessible to all teams in the flood group including surface water	ICT services		2014-2015	*2014-2015*	Sep-15	In Progress	<£5000	Internal (Other)	Allocated	High	
				1.1.9	Establish understanding of costs of fitting of highways SuDS and maintenance compared to conventional drainage	Highways		2014-2015	*2015-2016*	Sep-15	In Progress	£5001 - £25,000	Defra SuDS funding	To be confirmed	Moderate	
1.2		1.2	Establish ways to keep the evidence base up to date and feeding into policy	1.2.1	Regular reports on study outcomes or new data to the flood group	All Croydon teams	Environment Agency, Thames Water	2013-2014	*2020 onwards*	Dec-15	In Progress	<£5000	Internal (Other)	Allocated	Low	
				1.2.2	Maintain regular communication with members and RFCC representative through the South West Flood Group	Highways		2011-2012	*2020 onwards*	Dec-15	In Progress	<£5000	Internal (Other)	Allocated	Moderate	
				1.2.3	Complete Flood group area on SharePoint where all flood management documents can be viewed.	Highways		2014-2015	*2014-2015*	Dec-15	In Progress	<£5000	Internal (Other)	Secured	High	
1.3		1.3	Raise profile and understanding of groundwater as a flood risk	1.3.1	Ensure emergency planning procedures consider response to groundwater events	Emergency Planning		2014-2015	*2015-2016*	Mar-15	Implementation	<£5000	Internal (Other)	Allocated	Moderate	
				1.3.2	Investigate strategy for cross borough groundwater management through 5 borough 'solution cell'	Highways		2014-2015	*2020 onwards*	Jun-15	In Progress	<£5000	Area Based Grant	Allocated	Moderate	
				1.3.3	Carry out detailed study of groundwater presence and flood mechanisms in Croydon	Highways		2015-2016	*2017-2018*	Dec-15	Not yet commenced	£5001 - £25,000	To be confirmed	To be confirmed	Moderate	
				1.3.4	Improve groundwater information on council website and develop a leaflet/flyer for residents	Highways & Em. Planning		2014-2015	*2015-2016*	Dec-15	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
2.1	2 Maximise use of resources in targeted flood management.	2.1	Upskilling and training for existing staff on new areas of responsibility	2.1.1	Identify ways to increase awareness of SuDS in more teams across the council and roll out technical guidance on implementing the right SuDS	Dev Mgmt, Highways, Building Control		2014-2015	*2015-2016*	Sep-15	In Progress	<£5000	Internal (Other)	To be confirmed	High	
				2.1.2	Provide training needed for existing staff to assess SuDS applications	Dev Mgmt, Highways, Building Control		2014-2015	*2014-2015*	Sep-15	In Progress	<£5000	Area Based Grant	To be confirmed	High	
2.2		2.2	Communication about targets and objectives between teams	2.2.1	Report on team targets through quarterly flood group	All Croydon teams		2013-2014	*2020 onwards*	Dec-15	In Progress	<£5000	Internal (Other)	Secured	Moderate	
				2.2.2	Identify where regular maintenance of highways / footways / open spaces could have flood management or SuDS incorporated	Highways & Parks		2014-2015	*2016-2017*	Sep-15	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
2.3		2.3	Monitoring funding streams available for flood remediation measures	2.3.1	Develop list of flood alleviation schemes of differing scales using priority / hotspot list to enable easy population of funding applications	Highways & Parks	Environment Agency	2014-2015	*2020 onwards*	Dec-15	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
				2.3.2	develop list of funding streams, types of applications required and dates for submission of applications	Highways	Environment Agency	2015-2016	*2015-2016*	Sep-15	Not yet commenced	<£5000	Area Based Grant	To be confirmed	Moderate	
2.4		2.4	Use best current understanding and available funding to prioritise flood alleviation work	2.4.1	Commence first stage of Kenley flood alleviation scheme in CDA Group8_037	Highways		2014-2015	*2014-2015*	Sep-15	Planning	£25,001- £50,000	FDGiA	Secured	High	
				2.4.2	Develop flood alleviation scheme for Caterham Bourne	Highways	Environment Agency, Surrey CC, Tandridge DC	2013-2014	*2017-2018*	Dec-15	Investigation	>£1m	FDGiA	Secured	Very High	
				2.4.3	Continue to review and improve gully maintenance based on reported problem areas & communicate changes to the public	Highways		2012-2013	*2020 onwards*	Sep-15	In Progress	£25,001- £50,000	Internal (Other)	To be confirmed	High	
				2.4.4	Investigate localised flood problems around the Chaffinch Brook in Ashburton	Highways	Parks, Environment Agency	2015-2016	*2016-2017*	Dec-15	In Progress	£5001 - £25,000	Area Based Grant	To be confirmed	Moderate	
				2.4.5	Investigate influences of regular flooding hotspots	Highways & Parks		2015-2016	*2020 onwards*	Sep-16	Not yet commenced	>£50,000	Multiple	To be confirmed	Moderate	
2.5		2.5	Review effectiveness of emergency procedures and ensure our capabilities are known throughout the council and our commissioned services	2.5.1	Review emergency procedures following flooding in early 2014	Emergency Planning		2014-2015	2014-2015	-	Completed	<£5000	Internal (Other)	To be confirmed	High	
				2.5.2	Share findings of review with other council teams at flood group	Emergency Planning		2014-2015	2014-2015	-	Completed	<£5000	Not Applicable	Secured	Moderate	
				2.5.3	Identify actions to take forward following review	Flood Group		2014-2015	*2014-2015*	Sep-15	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
3.1	3 Ensure evidence of historic floods and ongoing studies effectively feed into planning policy and decision-making	3.1	Maintain regular communication between highways and planning	3.1.1	Continue to attend quarterly flood group meetings	Flood Group		2013-2014	*2020 onwards*	Dec-15	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
				3.1.2	Ensure flooding documents on the website correspond between planning and highways	Highways, Spat. Planning & Em. Planning		2015-2016	*2015-2016*	Sep-15	Not yet commenced	<£5000	Internal (Other)	To be confirmed	Low	
3.2		3.2	Establish a borough-wide understanding of the future flood risk, including the likelihood of future flood events.	3.2.1	Investigate how climate change is predicted to affect flood risk to inform long-term planning	Spatial Planning		2015-2016	*2015-2016*	Dec-15	Not yet commenced	<£5000	Internal (Other)	To be confirmed	Moderate	
				3.2.2	Update SFRA to ensure planned growth areas are informed by known hotspots and CDAs.	Spat. Planning, Em. Planning		2014-2015	*2016-2017*	Sep-15	Implementation	£5001 - £25,000	Internal (Other)	Secured	Moderate	
				3.2.3	Use updated SFRA to inform production of 'Croydon Local Plan: Detailed Policies and Proposals' using understanding of future flood risk to inform site allocations	Spatial Planning		2015-2016	*2016-2017*	Sep-15	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
3.3		3.3	Establish the impact of planned growth on flooding hotspots/CDAs in collaboration with development plans	3.3.1	Create 'living list' of high priority CDAs and smaller hotspots	Highways		2014-2015	*2014-2015*	Sep-15	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
				3.3.2	Include a layer of living list hotspots on internal GIS	Highways		2015-2016	*2015-2016*	Sep-15	Not yet commenced	<£5000	Internal (Other)	To be confirmed	Low	
4.1	Support sustainable growth and development by understanding the needs of all parties	4.1	Prepare for carrying out SuDS approvals in house	4.1.1	Quantify additional resource time needed to process SuDS applications as part of planning applications	Dev Mgmt	Highways, Building Control, Parks	2014-2015	*2015-2016*	Sep-15	In Progress	<£5000	Defra SuDS funding	To be confirmed	High	
				4.1.2	Review employment orprocurement to meet SuDS obligations	Dev Mgmt	Highways	2014-2015	*2015-2016*	Dec-15	In Progress	<£5000	Defra SuDS funding	To be confirmed	Moderate	
				4.1.3	Develop a data submission criteria for developers submitting applications	Dev Mgmt	Highways, Building Control, Parks	2014-2015	*2015-2016*	Sep-15	In Progress	<£5000	Defra SuDS funding	To be confirmed	High	
				4.1.4	Create stronger ties between known surface water flood hotspots and planning decisions by evolving local policy	Dev Mgmt & Highways		2015-2016	*2015-2016*	Mar-16	Planning	<£5000	Internal (Other)	Allocated	Moderate	
				4.1.5	Investigate how processes can be shared with neighbouring boroughs	Highways	Dev Mgmt,	2014-2015	*2015-2016*	Sep-15	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	

London Borough of Croydon Local Flood Risk Management Strategy Action Plan

Version: *5.0*
Revision Date: *01 September 2015*
Next Review Date: *01 December 2015*

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Measure / Scheme							Delivery		Programme				Funding			Priority	Comments
ID	Objective		Measure		Actions		Lead	Partners	Start	Finish	Review	Status	Est. Cost (£)	Source	Status		
4.2			4.2	Create tools / guidance for developers to help them to easily consider the most appropriate types of drainage	4.2.1	Create a hierarchy of preferred mitigation specific to Croydon or areas of Croydon - as part of SFRA update	Highways & Dev Mgmt		2014-2015	*2015-2016*	Dec-15	In Progress	<£5000	Internal (Other)	Secured	Moderate	
					4.2.2	Develop or collate guidance on costs of installing and maintaining different SuDS types	Highways & Dev Mgmt		2014-2015	*2015-2016*	Sep-15	In Progress	£5001 - £25,000	Defra SuDS funding	To be confirmed	High	
4.3			4.3	Review how we consider flood risk to and from minor developments and ways to encourage more sustainable design	4.3.1	Produce standing advice on consideration of local flood risk for smaller minor developments such as driveways and extensions	Development management, highways		2015-2016	*2015-2016*	Dec-14	Not yet commenced	<£5000	Defra SuDS funding	To be confirmed	Moderate	
					4.3.2	Review Local Plan to identify how to give stronger weight to consideration of flood risk in all development.	Spatial Planning	Highways & Dev Mgmt	2015-2016	*2016-2017*	Dec-14	In Progress	£5001 - £25,000	Internal (Other)	Allocated	Moderate	
	4				4.3.3	Review stance on allowing non-permeable paving	Development management,		2015-2016	*2016-2017*	Dec-15	Not yet commenced	<£5000	Internal (Other)	To be confirmed	Moderate	
5.1	5	Work effectively with Risk Management Authorities in and around Croydon to jointly manage the risks.	5.1	Meet with Network Rail / Thames Water / Sutton & East Surrey Water / TfL to discuss areas where their infrastructure falls in Croydon's flood hotspots	5.1.1	Collate evidence of problem areas relating to other RMA's infrastructure	Highways & Parks		2014-2015	*2015-2016*	Dec-15	In Progress	<£5000	Area Based Grant	To be confirmed	Moderate	
					5.1.2	Timetable meetings to discuss prioritisation and management responsibilities with Thames Water or engage them within internal flood group	Highways		2015-2016	*2015-2016*	Sep-15	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
					5.1.3	Engage with Network Rail regarding planned maintenance to their assets along route of the Caterham Bourne	Highways		2014-2015	*2020 onwards*	Dec-15	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	CM investigating
					5.1.4	Engage with Sutton & East Surrey Water regarding their Flood Action Plan for Kenley Water Treatment works.	Highways		2014-2015	*2020 onwards*	Dec-14	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
5.2			5.2	Work with multi-agency partners to enhance local arrangements for flood planning and response.	5.2.1	Formalise and / or record successful partnership approaches, applied in February 2014	Em. Planning & Highways		2014-2015	2015-2016	-	Completed	<£5000	Internal (Other)	To be confirmed	High	
					5.2.2	Clarify lines of communication between agencies	Em. Planning & Highways		2014-2015	*2015-2016*	Sep-15	In Progress	<£5000	Internal (Other)	To be confirmed	High	
					5.2.3	Pursue collaborations through LoDEG to develop ways of anticipating and managing flooding in London.	Highways		2015-2016	*2020 onwards*	Dec-15	In Progress	<£5000	Internal (Other)	To be confirmed	Low	
5.3			5.3	Continue to meet regularly and work with the other five South West London Boroughs	5.3.1	Continue to attend SW Flood Group meetings	Highways		2012-2013	*2020 onwards*	Sep-15	In Progress	<£5000	Internal (Other)	Allocated	Low	
					5.3.2	Monitor opportunities to jointly address cross-border flood management	Flood Group	Neighbouring LLFAs, Thames Water	2013-2014	*2020 onwards*	Sep-15	In Progress	<£5000	Not Applicable	Allocated	Moderate	
6.1	6	Improve awareness of the causes of flooding with the general public and encourage proactive management	6.1	Engaging with the public through various means of communication	6.1.1	Expand information available on the council website	Flood Group		2013-2014	*2016-2017*	Dec-15	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
					6.1.2	Encouraging sign up to EA flood warning service	Em. Planning & Hhighways		2013-2014	*2020 onwards*	Dec-15	In Progress	<£5000	Not Applicable	Secured	Moderate	
					6.1.3	explore initiatives from other local authorities/districts for promoting resilience work in schools	Em. Planning		2015-2016	*2020 onwards*	Dec-15	Not yet commenced	<£5000	To be confirmed	To be confirmed	Low	
					6.1.4	Promote available advice and guidance documents e.g. Thames Water, Environment Agency, Water UK	Em. Planning & Highways	Environment Agency	2013-2014	*2020 onwards*	Dec-15	In Progress	<£5000	Internal (Other)	To be confirmed	Moderate	
6.2			6.2	Encourage residents to help themselves with small-scale initiatives	6.2.1	Work together with insurers on community resilience activities to promote flood risk awareness and flood property mitigation measures	Em. Planning & Highways	Zurich	2015-2016	*2020 onwards*	Dec-15	Not yet commenced	<£5000	To be confirmed	To be confirmed	Moderate	
					6.2.2	Encouraging sign up to contents insurance	Em. Planning & Highways		2013-2014	*2020 onwards*	Sep-15	In Progress	<£5000	Not Applicable	Secured	Moderate	
					6.2.3	Investigating part-funding options to help residents and communicate these more widely with groups such as neighbourhood watch	Highways		2015-2016	*2017-2018*	Dec-15	In Progress	<£5000	To be confirmed	To be confirmed	Low	
					6.2.4	Support formation of community groups and volunteering intiatives	Em. Planning & Highways		2013-2014	*2020 onwards*	Dec-15	In Progress	<£5000	Multiple	To be confirmed	Low	
6.3			6.3	Targeting riparian owners and educating on responsibilities	6.3.1	Producing a local 'riparian owner' guidance	Highways	Parks	2015-2016	*2015-2016*	Dec-15	In Progress	<£5000	Area Based Grant	To be confirmed	Low	
					6.3.2	Targeted engagement with residents living near watercourses	Highways	Environment Agency	2015-2016	*2020 onwards*	Mar-16	Not yet commenced	<£5000	Area Based Grant	To be confirmed	Moderate	
					6.3.3	Undertake regular surveys of watercourses to identify riparian owners and ensure they are maintaining their channels and assets as required.	Highways		2015-2016	*2020 onwards*	Dec-15	Not yet commenced	<£5000	Internal (Maintenance)	To be confirmed	Moderate	
6.4			6.4	Develop our capability to warn and to provide information and advice to the public with partner organisations	6.4.1	Increase number of groundwater & rainfall monitoring points	Highways	Environment Agency	2015-2016	*2020 onwards*	Mar-16	In Progress	£6000 - £25,000	To be confirmed	To be confirmed	Low	
					6.4.2	Explore how Croydon can build on findings of Rain Gain project	Em. Planning & Highways		2015-2016	*2016-2017*	Dec-15	Not yet commenced	<£5000	Internal (Other)	To be confirmed	Low	
7.1	7	Take a more holistic view of asset management in Croydon, improving priorities and addressing source control more effectively.	7.1	Seek out opportunities for de-culverting	7.1.1	Generate list of potential locations	Parks	Environment Agency	2014-2015	*2016-2017*	Dec-15	In Progress	<£5000	Internal (Other)	To be confirmed	Low	
					7.1.2	Assess potential for multiple benefits of de-culverting in identified locations	Parks	Environment Agency, Natural England	2015-2016	*2017-2018*	Dec-15	Not yet commenced	£5001 - £25,000	To be confirmed	To be confirmed	Moderate	
7.2			7.2	Seek to achieve multiple benefits in water management schemes	7.2.1	Communicate with Environment Agency about pollution problem areas	Parks & Highways	Environment Agency	2015-2016	*2015-2016*	Dec-15	Not yet commenced	<£5000	Internal (Other)	To be confirmed	Low	
					7.2.2	Identify opportunities where highways can work with green space and climate change officers to combine targets	Highways, Parks & Climate Change		2015-2016	*2020 onwards*	Mar-16	Not yet commenced	<£5000	To be confirmed	To be confirmed	Moderate	
					7.2.3	Review Planning policy to enhance the importance of environmental considerations in planning decisions.	Spatial Planning		2015-2016	*2016-2017*	Dec-15	Not yet commenced	<£5000	Internal (Other)	To be confirmed	Low	
8.1	8	Maximise opportunities to learn, improve and review flood management procedures based on lessons learnt	8.1	Clarify flood recovery process	8.1.1	Review flood recovery in summer 2014 & determine any changes required	Em. Planning & Highways		2014-2015	2014-2015	-	Completed	<£5000	Internal (Other)	Secured	High	
					8.1.2	Generate new actions following review if required	Em. Planning		2014-2015	2015-2016	-	Completed	<£5000	Internal (Other)	Allocated	Moderate	
					8.1.3	Investigate the options for future management in Dale Road including clarification of asset ownership and downstream implications of changing the culvert size.	Highways	Thames Water, TfL, SESW	2014-2015	*2015-2016*	Dec-15	Planning	£5001 - £25,000	Internal (Maintenance)	Allocated	High	
					8.1.4	Develop a management approach for future protection of the Kenley WTW, which does not increase risk to other parts of the catchment.	Highways & Em. Planning	Environment Agency, TfL SESW	2014-2015	*2015-2016*	Dec-15	In Progress		Internal (Other)	To be confirmed	High	
8.2			8.2	Establish Lessons Learnt review procedure	8.2.1	Nominated responsibility for leading review procedure	Highways		2014-2015	2014-2015	-	Completed	<£5000	Not Applicable	To be confirmed	High	
					8.2.2	Produce detailed report of emergency response to 2014 floods	Highways & Em. Planning		2014-2015	2014-2015	-	Completed	<£5000	Internal (Other)	Secured	High	
					8.2.3	Highlight areas where improvements could be made and review with internal flood group or sub-group of responders	Highways & Em. Planning	LFB, Environment Agency, TW, SESW	2014-2015	2015-2016	-	Completed	<£5000	Internal (Other)	To be confirmed	Moderate	

APPENDIX C – SUMMARY OF COMMUNITY ENGAGEMENT

Purpose, Methodology and Response

Purpose

Croydon Council wished to engage with the local community at an early stage in developing their Local Flood Risk Management Strategy to gather information on local flooding incidents, flood preparedness, perceptions of flooding and local priorities for local flood risk management. The information collated through this exercise has been used to provide an evidence base to inform the Local Flood Risk Management Strategy.

Engagement Approach

A survey was developed to gather views and evidence, which was available online between 6th January 2014 and 31st March 2014. It should be noted that this coincided with a range of flooding incidents within Croydon and across the country and a high level of public interest in flooding issues.

Questions included in the survey covered 5 broad areas:

- Current understanding of flooding in Croydon,
- Previous experiences of flooding,
- Communication of flood risk information,
- Priorities for flood risk management, and
- Funding for flood risk management.

To promote the survey, Croydon Council undertook the following engagement activities:

- Link emailed to resident associations,
- Twitter announcement,
- Dedicated page created on the council website,
- Banner ads on the council website, and
- Email sent to elected members.

Response Rate

In total the council received 113 completed surveys in response to this engagement process.

Survey responses were received from across the borough. Respondents were asked to indicate the area of Croydon, as set out in the Local Plan, in which they lived as displayed in Figure C-1. Figure C-2 illustrates the distribution of respondents across the 16 different areas of Croydon. As may be expected with the timing of the survey, the greatest numbers of respondents were located in the south of the borough which was affected by serious flooding in early 2014 such as Kenley, Purley and Coulsdon. However, the numbers are not significantly greater than some northern parts of Croydon including South Norwood and Norbury.

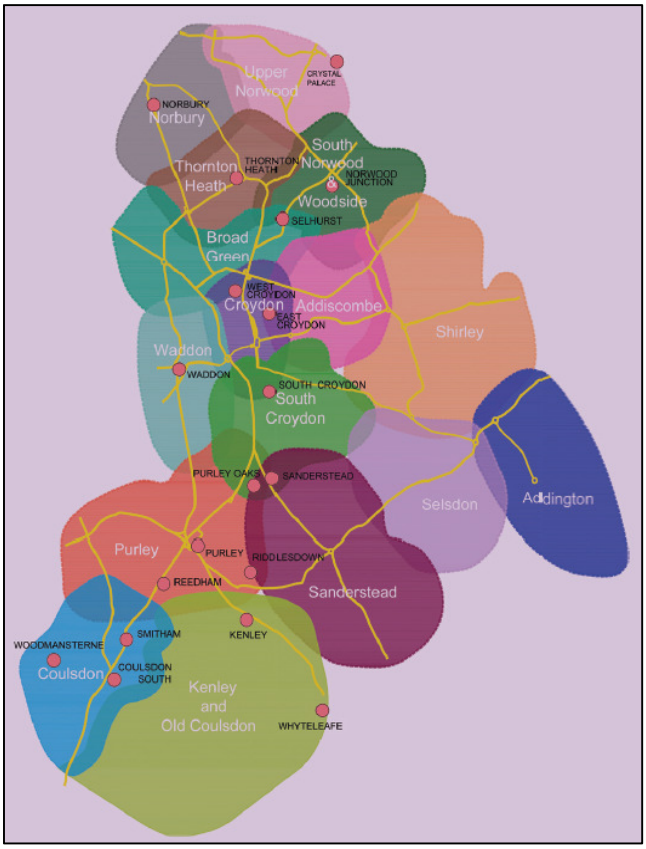

Figure C-1: Areas of Croydon as described in the Local Plan

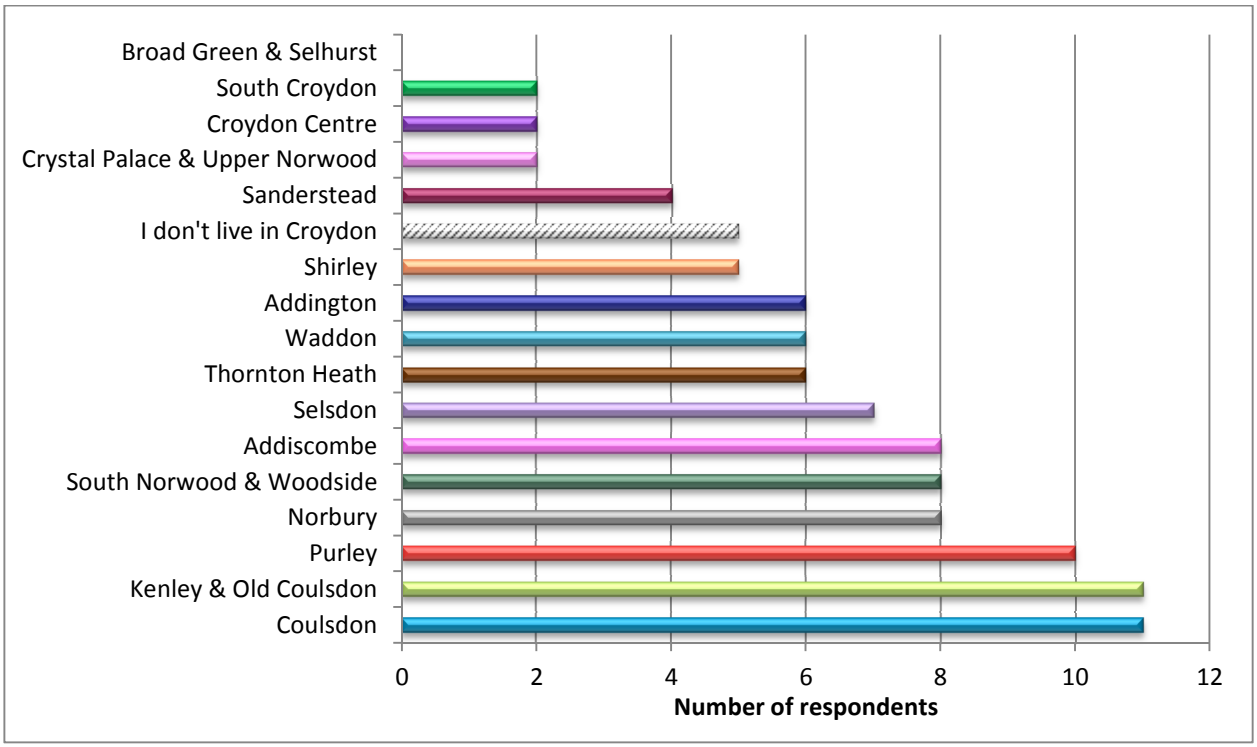

Figure C-2: Croydon Local Flood Risk Management Strategy Survey Responses

General Caveats

The results of this engagement are not statistically representative for the views of London Borough of Croydon residents due to the nature of the methodology used. The level of response, information gathered and views obtain provide a useful indicator of wider opinion and any important issues that will need to be considered.

Due to the software used and the different response options open to respondents, it was possible for people to submit more than one response. This has been monitored during the engagement period and analysis and it does not appear to have been abused or be a significant issue affecting the response.

Percentages used in this analysis have been rounded and may not add up to exactly 100%. For some survey questions, respondents could select more than one response which also means that percentages, if added together, can total more than 100%.

Current Understanding of Flood Risk in London Borough of Croydon

Respondents were asked to identify what they thought were the main sources of flooding in their local areas. Figure C-3 illustrates the perceived greatest sources of flooding in Croydon.

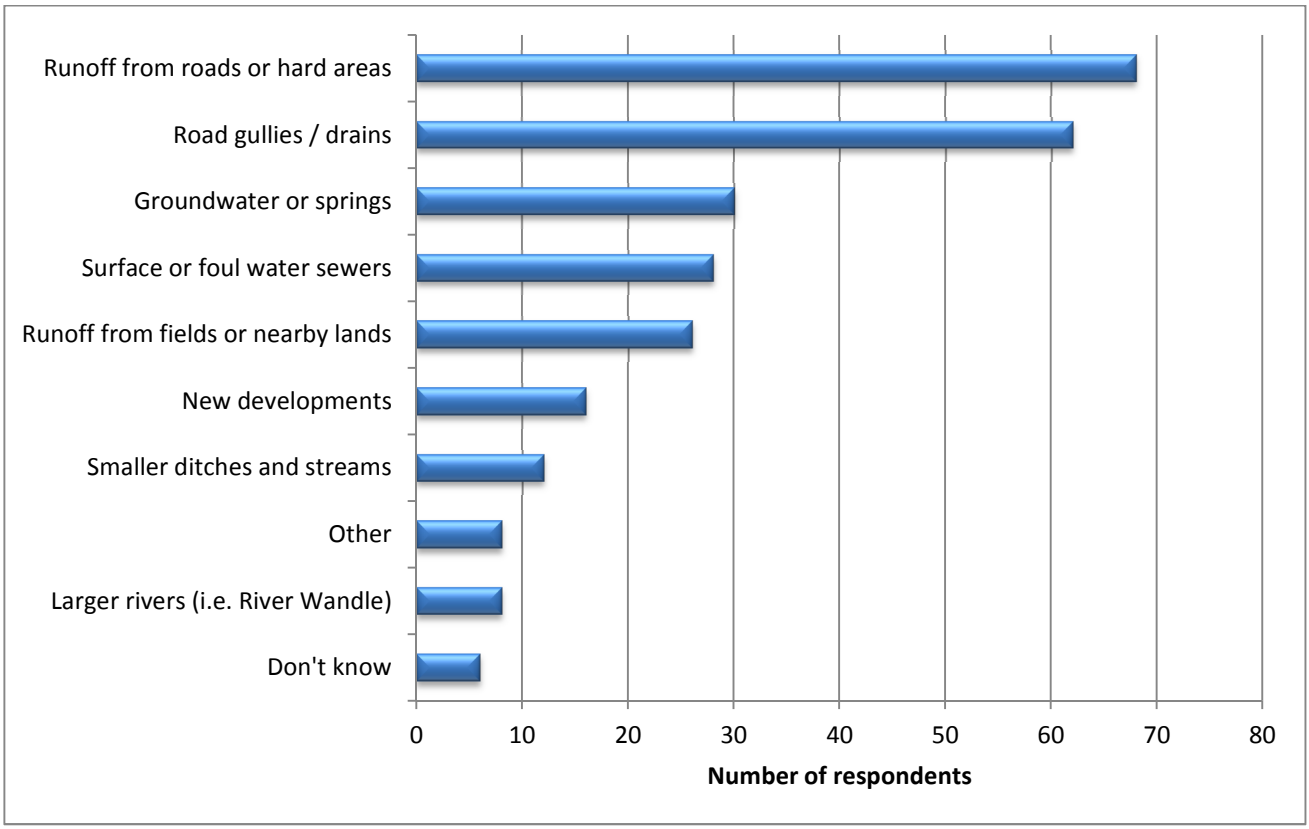

Figure C-3: Sources of local flooding identified by survey respondents

A notable majority of respondents felt surface runoff from roads and blocked drains are the greatest cause of flooding. Surface water flooding is one of Croydon's most significant flood risks and the historic flood register does indicate significant flooding of roads particularly at topographical low points.

Historic records held by Croydon suggest that flooding from surface water is the most prevalent source of flooding throughout the borough. This is reflected in the survey, with runoff from roads or impermeable surfaces, new development and blocked road gullies identified by a large percentage of respondents as sources of flooding.

A significant number of respondents have noted groundwater as a main cause of flooding. This is likely to be linked to the very wet weather experienced at the time of the survey causing high groundwater in multiple locations and causing the Caterham Bourne to flow. Thirty respondents, who stated groundwater as the main flooding source, resided predominantly in the following areas:

- Norbury,
- Purley,
- Kenley & Old Coulsdon, and
- Shirley.

Historic records support these parts of the borough as more prone to these sources of flooding

It should be noted that of the eight people who responded 'other', five specifically mention the Caterham Bourne or 'underground river' as the greatest cause.

Experiences of Flooding in Croydon

Respondents were asked to provide information about previous flooding incidents. 47 (44%) respondents advised that they had experienced flooding and most provided details of the event. The causes of the flooding were not always known and responses were varied, although the largest number stated heavy rainfall as the main cause.

Reported flooding sources		
Heavy rainfall	22	47%
Blocked road drains	6	13%
High groundwater	4	8.5%

Respondents who had experienced flooding were asked to indicate how they were affected by the flooding incident. The most commonly affected receptors were:

Most commonly affected receptors	Number of respondents	% of respondents
Local Roads	15	32%
Property (Internally)	12	26%
Gardens	7	15%

Communication of flood risk information

A key outcome from the survey was that respondents would like to receive more information on a number of topics, for example the existing local flood risk, how this is being managed and how to better protect themselves and their property from flooding. Figure C-4 illustrates the key topics which respondents would like to receive greater information on.

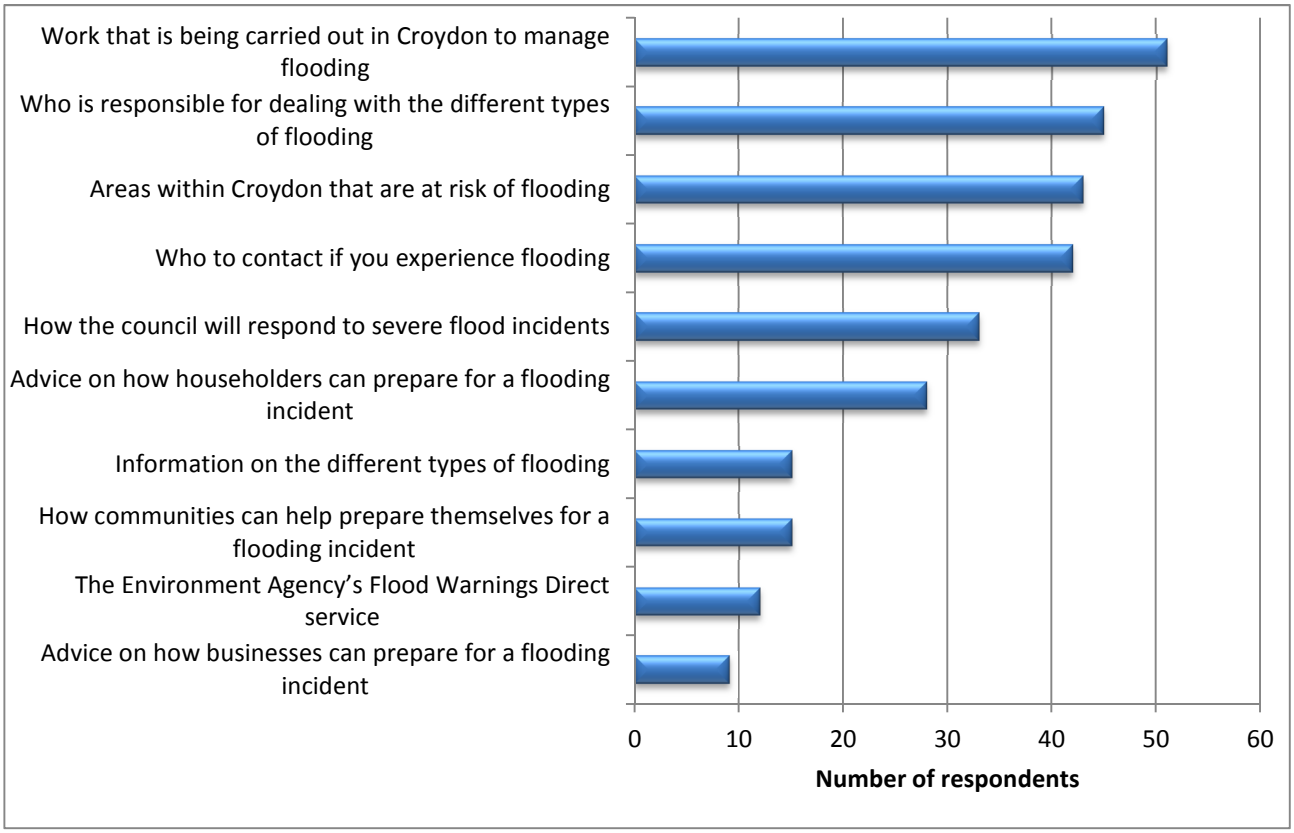

Figure C-4: Key topics which respondents would like to receive further information on

Respondents were asked what their preferred method of communication would be regarding flood risk information. Responses were varied and this is illustrated in Figure C-5. In summary, the preferred methods of communication were;

Method	Number of respondents	% of respondents
Council Website	49	43%
Leaflets / Newsletter	47	42%
Your Croydon magazine	26	23%

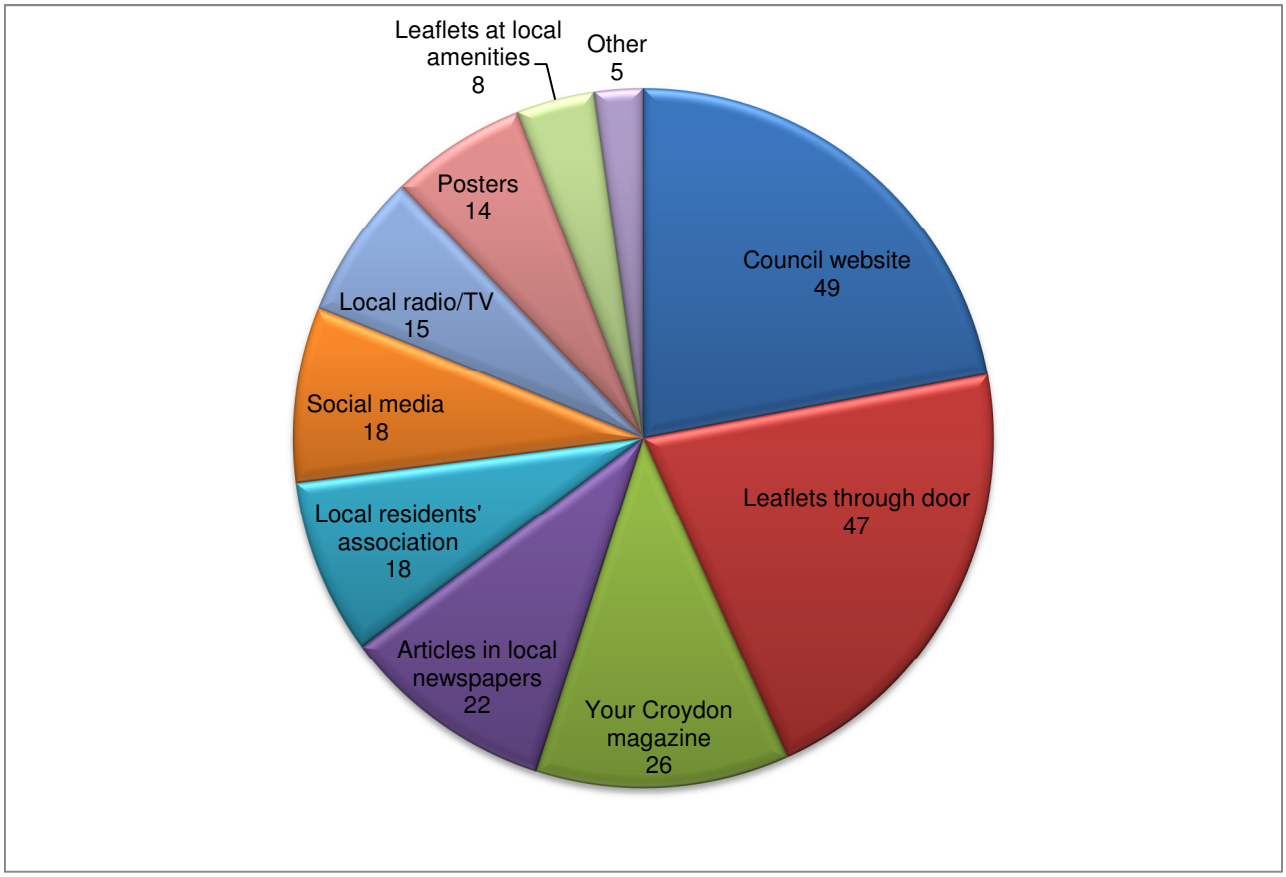

Figure C-5: Preference of communication methods

Priorities for Flood Risk Management

Respondents were asked to indicate how concerned they were about different consequences of flooding, ranging from not at all concerned to very concerned. Respondents are most concerned about maintenance of drainage and or flood prevention assets as well as the effect new development may be having on flood risk.

Concern	Number of respondents	% of respondents
Maintenance of drainage / flood prevention assets	51	48%
Effect of new developments on flooding	38	36%
Protecting my property against flooding	32	30%

Keeping people safe and protecting life is always the priority for flood management. Beyond this respondents were asked to identify what the priority for flood risk management within the borough should be. Figure C-6 indicates that respondents believe that reducing the risk of flooding to homes is a first priority. Reducing the risk of flooding to critical infrastructure is considered to be the next priority, followed by reducing flood risk to local services.

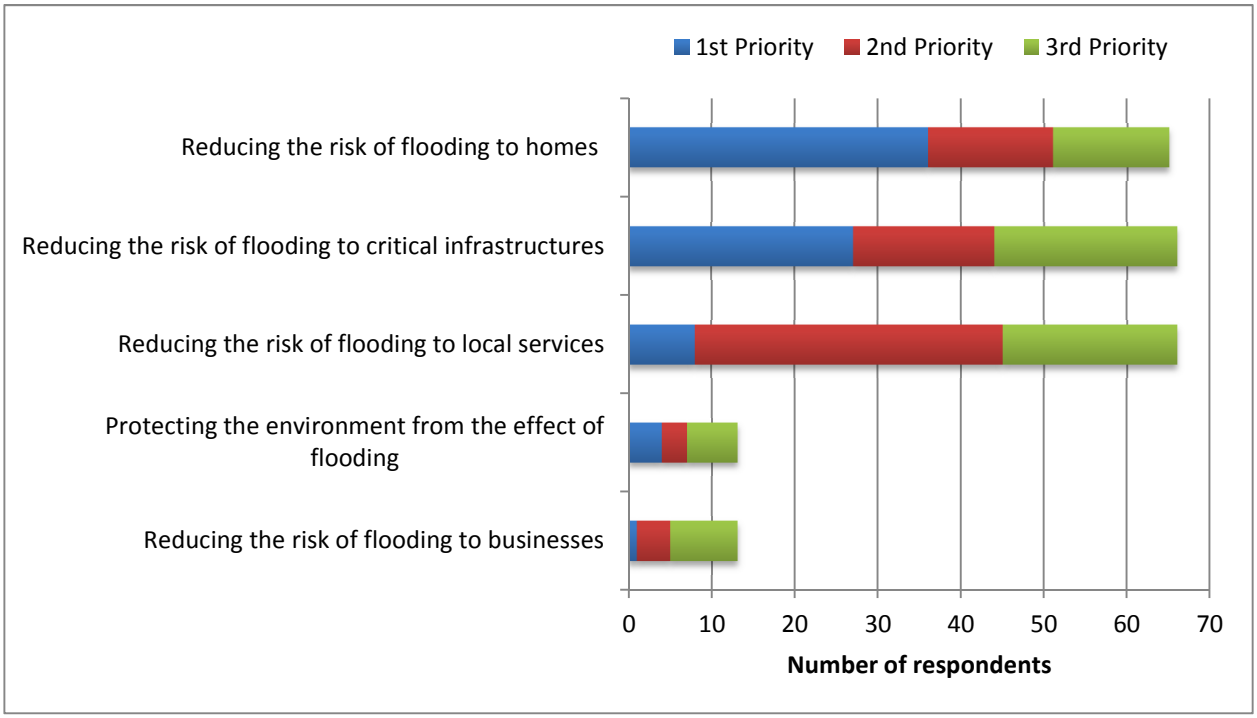

Figure C-6: Flood risk management priorities for residents and businesses in Croydon

Having identified the priorities for flood risk management within Croydon, respondents were subsequently asked how they thought that flood risk management would be best achieved in Croydon. Figure C-7 illustrates the approaches preferred by respondents on how best to achieve flood risk management.

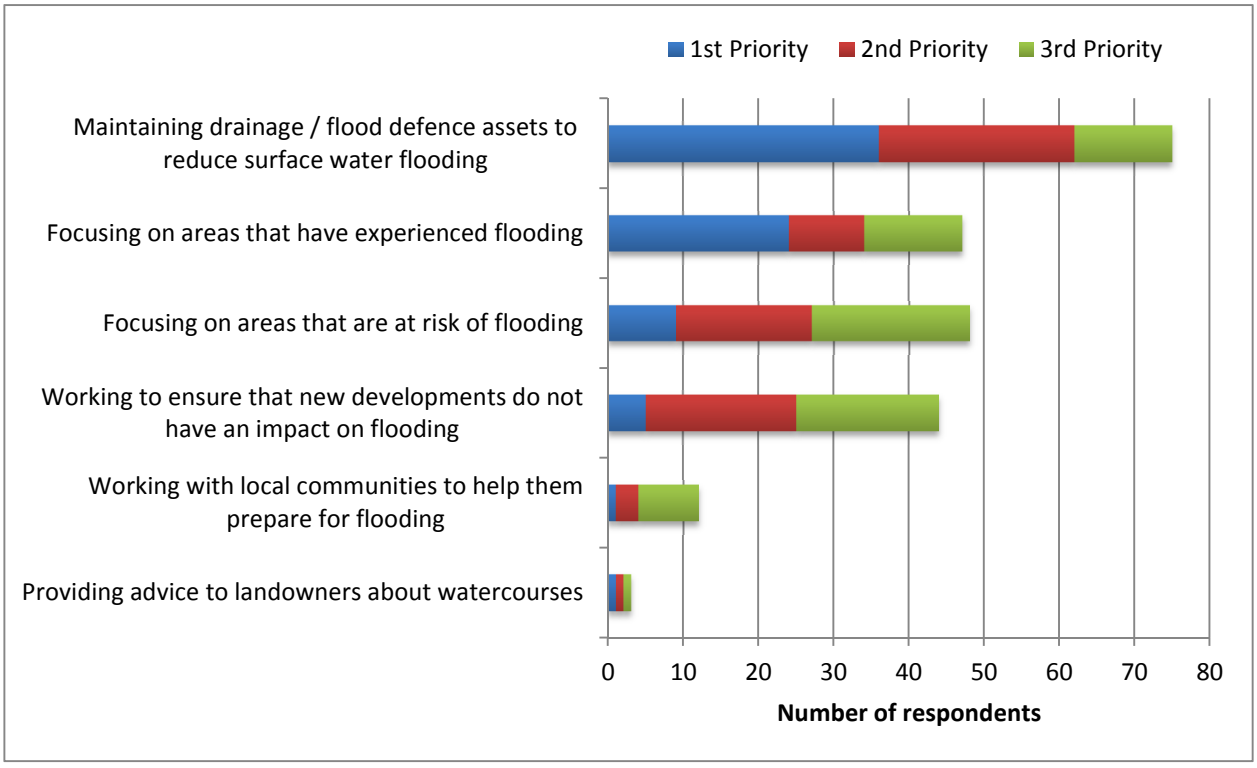

Figure C-7: Preferred approaches to flood risk management in Croydon

Funding for Flood Risk Management

The Department for Environment, Flood and Rural Affairs (Defra) is the main source of funding for flood prevention measures, The funding available is normally divided across projects across the country on a cost / benefit basis. This means that where local businesses and communities are to benefit from flood prevention measures, the government asked for contributions from those who benefit, which can greatly improve the likelihood of a project receiving funding.

Respondents were asked to what extent they agreed or disagreed that the following should contribute financially to flood alleviation scheme. As illustrated in Figure C-8, respondents most strongly agreed with the following contributing financially to flood alleviation schemes:

- Central Government,
- Environment Agency,
- Water companies, and
- Property developers.

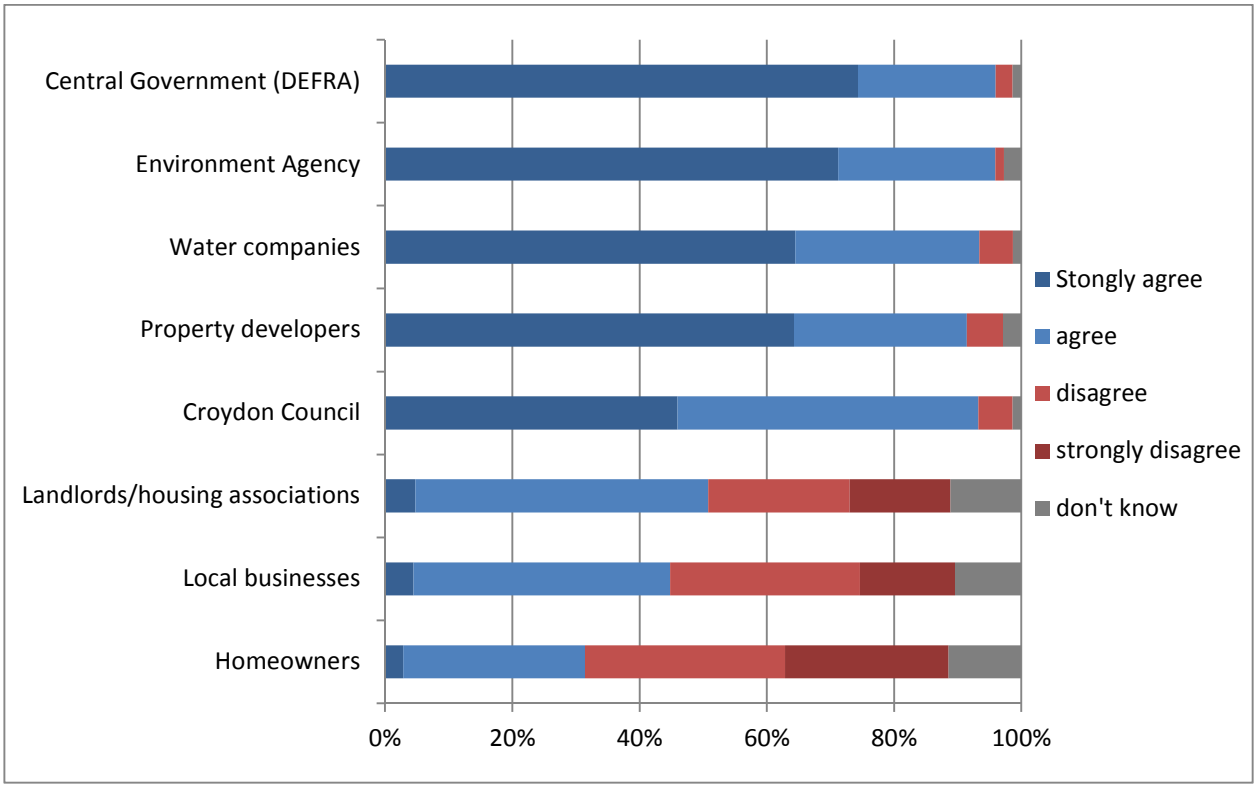

Figure C-8: Respondent support for funding source options

How has this feedback influenced the strategy?

- Respondents to the survey indicated that they would like to receive more information on the flood risk in their local area and what work is being carried out in Croydon to manage flood risk. Croydon Council is committed to increasing understanding of local flood risk and prioritising flood risk management work in areas of highest flood risk to maximise the effectiveness of available funding.
- In order to improve public awareness about the sources of flooding in Croydon, the council is committed to publishing more information on local flood risk and what residents, businesses and communities can do to better prepare themselves for flooding through property-level resilience and other local measures.

- The council has taken on board respondent's concerns regarding road drainage through establishing measures to prioritise gully cleansing work in areas of highest flood risk, and by committing to focus resources in known flooding hotspots through effective prioritisation and maximising external funding opportunities.
- Respondents showed concern about the impact of local development, as well as the paving over of gardens on surface water runoff. An objective of the London Borough of Croydon Strategy is to work with planners to minimise the impact of flooding from new development. The council will continue to hold regular meetings of the Croydon Flood Group to understand and manage local flood risk across the borough and will seek to improve information sharing between council departments, RMAs and local stakeholders.

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Appendix 2 item 9
Cabinet 16.11.15

London Borough of Croydon
Local Flood Risk Management Strategy

Summary

2014 - 2020

CAPITA | URS

Introduction

In response to the severe flooding across large parts of England and Wales in summer 2007, the Government has recently enacted the Flood and Water Management Act 2010 giving local authorities new powers to manage local flood risk in a more co-ordinated way. As a Lead Local Flood Authority, Croydon Council's responsibilities relate to 'local' flood risk from surface water, groundwater and small rivers, streams and ditches.

Nationally, around 5.2 million properties are at risk of flooding; 1.4 million are at risk from rivers or the sea, 2.8 million at risk from surface water and 1 million are at risk from both (Environment Agency, 2009)

We have a legal requirement under the Flood and Water Management Act 2010 to develop, maintain, apply and monitor a Local Flood Risk Management Strategy ('Local Strategy') that:

- Provides an overview of flood risk management work being undertaken and planned throughout the borough,
- Explains how partners are working together to reduce flood risk, and,
- Clearly sets out which organisations are responsible for different types of flooding in the borough to ensure a common understanding of roles, responsibilities and priorities within the Borough.

Local flood risk is defined as…

"The risk of flooding from local sources including surface water, groundwater and Ordinary Watercourses (small ditches and watercourses)"

This Strategy outlines how we, Croydon Council, will manage flooding from local sources in our area, now and in the future.

The rise in extreme weather conditions, the presence of existing buildings in areas of flood risk, and limited public funding, means that we cannot prevent all flood incidents happening in the borough. However, through the strategy we can coordinate our services so that flood risk is reduced and the impact of any flood incidents is minimised. The strategy also provides us with an opportunity to work together with local residents, businesses and stakeholders to minimise risk and prepare for the effects of climate change.

This document is a summary of the London Borough of Croydon Local Strategy, setting out our plan for the management of local flood risk across the Borough during the period 2014 - 2020.

The full Local Flood Risk Management Strategy is available on the Council's website:
http://www.croydon.gov.uk/flooding

The development of the Strategy

The Strategy has been developed by Croydon Council in partnership with the Environment Agency and Thames Water, as well as local communities and neighbouring boroughs. It has been informed by local, regional and national policy, including the Environment Agency's National Strategy for flood and coastal risk management, to ensure a coordinated approach to flood risk management within Croydon.

A community engagement exercise was undertaken between January and March 2014. The outcomes from this have been used to shape the development of the Strategy and future flood risk management priorities.

The purpose of the Local Strategy

The aim of the Strategy is to work in partnership with local communities, and organisations responsible for managing flooding, in order to better understand and reduce local flood risk in Croydon where it is economically, technically, socially, and environmentally feasible to do so.

To achieve this aim a number of key objectives have been identified:

1. Continue to build our evidence base on flood mechanisms, incidents and assets and improve how it is communicated internally and externally.
2. Maximise use of resources in targeted flood management.
3. Ensure evidence of historic floods and ongoing studies effectively feed into planning policy and decision-making.
4. Support sustainable growth and development by understanding the needs of all parties.

Firefighters attending Dale Road during flooding in February 2014

5. Work effectively with Risk Management Authorities in and around Croydon to jointly manage the risks.
6. Improve awareness of the causes of flooding with the general public and encourage proactive management
7. Take a more holistic view of asset management in Croydon, improving priorities and addressing source control more effectively.
8. Maximise opportunities to learn, improve and review flood management procedures based on lessons learnt.

Roles and Responsibilities

Several organisations have a role to play in minimising the risk and impact of flooding in the Borough. The Strategy clarifies the responsibilities of the different organisations involved in flood risk management in the Borough including how they work together and what you should expect of them.

Croydon Council

We have a number of roles and responsibilities relating to flood risk management in the London Borough of Croydon, including:

- **As the Lead Local Flood Authority and a Risk Management Authority** – we have legal duties and powers to investigate significant flooding events, maintain a register of significant flood risk assets and manage flood risk from ordinary watercourses,
- **As the Highways Authority** – ensuring that highways are drained of surface water and where necessary maintain all drainage systems,
- **Emergency Responder** - Along with other organisations, developing emergency plans and business continuity plans for use during an emergency, and,
- **Local Planning Authority** - To consider flood risk in the development of the Local Plan, to be the decision maker on flood risk for planning application for development and to undertake a Strategic Flood Risk Assessment to inform strategic land use planning, and,

- **Asset Owner** – as the asset owner for a number of flood risk assets, we have responsibility to manage and maintain these to ensure they operate as required and do not increase flood risk.

Risk Management Authorities

Risk Management Authorities, as defined by the Flood and Water Management Act (2010), include Croydon Council, other London Authorities, the Environment Agency, Thames Water (as the sewerage undertaker) and Transport for London.

The multi-agency South West London Strategic Flood Group has been established that includes representatives from each of the six boroughs, the Environment Agency and Thames Water. The Local Strategy has been developed through this Partnership Group to ensure that a joined up approach is adopted throughout South West London.

Other flood risk management organisations

There are a number of other relevant organisations that have a key role to play in managing flood risk in the borough. (e.g. Network Rail, Natural England). These organisations will be involved as required to support flood alleviation projects, or to provide information, support and input on a project-by-project basis.

Public and community groups

The public, community groups and businesses also have a role to play in the management of flood risk The Strategy highlights that people and properties in known flood risk areas should be prepared for flood incidents. Anyone who owns land adjoining a watercourse, known as a Riparian Owner, also has certain responsibilities to ensure the unobstructed flow of water.

Our aim is that the public and local community groups are aware of the flood risks they face, take action to reduce their vulnerability to flooding, and are actively involved in flood risk management. To achieve this vision, we will work in two ways:

- Raising awareness of local flood risk and encouraging local communities to take action, and,
- Targeting at risk communities as part of flood studies or development of a flood alleviation scheme.

Flood Risk in the London Borough of Croydon

The Council's responsibility, and the focus of this Local Strategy, is the management of 'local' flooding. By this we mean flooding from:

Surface water – this occurs when heavy rainfall cannot be absorbed into the ground or enter the drainage systems,

Ordinary watercourses – this occurs when smaller watercourses, such as streams, ditches, drains, cuts, dykes and sluices cannot hold the volume of water flowing through them and overflow their banks onto surrounding land, and,

The Norbury Brook is an ordinary watercourse at Heavers Meadow, Selhurst

Groundwater – this occurs when water levels in the ground rise above surface levels which is most likely to occur in areas underlain by permeable rocks, and is likely to occur after seasonal periods of prolonged rainfall.

However, the most severe flooding is often caused when different types of flooding combine. Whilst developing the Local Strategy we have considered the impact of river, sewer and other

forms of flooding which are the responsibility of other risk management authorities and we are working in partnership with the Environment Agency and local water and sewerage companies where there are combined sources of flooding.

Other sources of flooding include:

Rivers – this occurs when a watercourse cannot cope with the volume of water draining into it and overflows its banks onto surrounding land. Large ('Main') rivers in Croydon include the River Wandle, Norbury Brook, Caterham Bourne and the Chaffinch Brook

Sewer – this occurs when combined or surface water sewers are overwhelmed by a heavy rainfall event which exceeds the capacity of the sewer / drainage system, the system becomes blocked by debris or sediment, and/or the system surcharges due to high water levels in receiving watercourses. Flooding from the foul sewer can also occur through blockage, illegal connections or under capacity.,

Reservoirs – this occurs when reservoirs which hold large volumes of water above ground water, overtop i.e. cannot contain the amount of water flowing into them, or when part of the reservoir fails resulting in a fast release of water. Within Croydon, South Norwood Lake is designated as a Reservoir in addition to Russell Hill Reservoir, managed by Thames Water.

South Norwood Lake, Croydon

Historic Flooding

Historically, Croydon has been affected by flooding from surface water, rivers, groundwater and sewers. The most significant recent flooding event occurred in February and March 2014 when an unprecedented period of rainfall caused groundwater levels to rise leading to flood incidents around the Borough. The rising groundwater led to a significant flow in the Caterham Bourne, a watercourse which is largely dry for most of the time and an emergency situation was declared as multiple agencies worked to keep water out of homes along the A22 and surrounding roads in Kenley and Purley.

Surface water flooding at Purley Cross, July 2007

In the summer of 2007, extremely heavy rainfall fell in a short period of time causing widespread surface water flooding across the borough. This was felt most severely in Purley, where the Purley cross roundabout and areas of Brighton Road were completely submerged and numerous properties were flooded. Incidents of property, garden and road flooding were reported across the borough.

Croydon has records of surface water flooding dating back to the 1950s. Localised hotspots occur across the Borough, often in low lying areas when rainfall from steep surrounding areas flows down and overwhelms the road drainage such as Kenley Lane, Chipstead Valley Road and Marlpit Lane in Coulsdon. Major flooding from rivers is less common in Croydon. Although the Caterham Bourne is designated as a main river, the flooding in 2014 is predominantly attributed to groundwater although a number of factors contributed to the flooding as is frequently the case in Croydon.

Historic records indicate incidents of the Norbury Brook overtopping and culverts surcharging, with a sizeable event in 1968 and further recorded incidents through the 1970s and 1980s. Not all river flooding is caused by overtopping. High water levels in the rivers can block drainage outfalls causing the water to back up the road drainage. Numerous incidents are recorded in roads close to the Norbury Brook in Thornton Heath and Norbury and parts of South Norwood close to the Chaffinch Brook, although recorded evidence of the cause is only anecdotal.

Flood Risk

Croydon is at greatest risk of flooding from surface water and groundwater sources and it is predicted that this will increase in the future; influenced by climate change and increasing pressures on development and housing need. Runoff from roads or impermeable areas and flooding from road gullies were identified as the main sources of flooding perceived by local communities. This does not, however, indicate that the future flood risk from other sources is insignificant.

Significant lengths of river within Croydon have been long culverted underground, which has lowered the risk of rivers overtopping. However the valley shapes where rivers once flowed still exist and frequently form hotspots of surface water flooding when heavy rainfall flows to the lowest points putting the drainage under extra pressure

Residential Properties at Risk of Surface Water Flooding in Croydon:

High Risk	3,714 Houses
Medium Risk	10,440 Houses
Low Risk	33,614 Houses

Based on Flood Map for Surface Water (Environment Agency, December 2013)

Risks from river flooding associated with the open sections of The Norbury Brook, River Wandle and Chaffinch Brook are relatively well understood and have been managed at a catchment level for many years by the Environment Agency. These risks are mapped and delineated into Flood Zones, which are available through the Environment Agency's website and are used to guide planning decisions. However, flood risk from local sources, are less well understood; these are typically very localised events which are often difficult to predict, and with sparse historical records available to provide supporting evidence.

Non Residential Properties at Risk of Surface Water Flooding in Croydon:

High Risk	578 Businesses 35 Education Facilities 15 Hospital / Surgery/ Care Home 3 Emergency Service Facilities
Medium Risk	1,272 Businesses 72 Education Facilities 36 Hospital / Surgery/ Care Home 6 Emergency Service Facilities
Low Risk	2,455 Businesses 134 Education Facilities 75 Hospital / Surgery/ Care Home 11 Emergency Service Facilities

Based on Flood Map for Surface Water (Environment Agency, December 2013)

Parts of Croydon have a particular susceptibility to surface water and sewer flooding due to the urbanised nature of the area and the complexity of the sewer system leading to a high potential for constrictions, blockages and failure. Over recent years, severe surface water flooding has been experienced across the area causing damage to property and disruption to businesses and services.

The most recent information available from the Environment Agency shows that areas identified to be particularly susceptible to surface water flooding include Brighton Road, particularly around Purley Cross and up to south and Central Croydon, The A22/Godstone Road and areas around Old Lodge Lane, Kenley and Chipstead Valley Road in Coulsdon.

Flood risk from groundwater is less well understood within the Borough than that from surface water, rivers or sewers. Groundwater flooding can be particularly difficult to predict due to the 'hidden' nature of the source of flooding and relatively longer period as the water table rises and emerges, often several days or weeks after heavy rainfall has fallen and river levels have dropped. The Caterham Bourne is fed by high groundwater so the area along the A22/Godstone road is a known risk area. Analysis of Croydon's geology provides a high-level indication of risk being greatest in the chalky areas in the southern half of the Borough as well as areas of river terrace deposits associated with the River Wandle. Although detailed records are sparse, numerous incidents in the north of the borough support the presence of springs and perched groundwater, which can cause gardens and basements to flood.

No modelling of the flood risk from ordinary watercourses has been undertaken to date across Croydon. Therefore future flood risk is based on the potential risk that might arise using knowledge of known flooding hotspots and potential mechanisms for flooding. Within Croydon, significant lengths of ordinary watercourse are culverted underground, with trash screens often located on the upstream end of culverts. These can get blocked by plant debris or rubbish increasing localised risks of flooding. Better understanding is required of the location and risks from smaller watercourses and ditches in the borough. Known flooding issues exist relating to the Merstham Bourne in Coulsdon and the upstream end of the Norbury Brook through Heavers Meadow.

February 2014, Garden flooding from the Merstham Bourne, Coulsdon

Sewer flooding is recorded and mapped by Thames Water in Croydon. Climate change is anticipated to increase the potential risk from sewer flooding as summer storms become more intense and winter storms more prolonged. This combination is likely to increase the pressure on the existing efficiency of sewer systems, thereby reducing their design standard and leading to more frequent localised flooding incidents. Sewer flood risk is complex in Croydon. It can often be influenced by other sources of flooding such as groundwater or high river levels as suggested by anecdotal records around the Norbury Brook in Thornton Heath. A combined sewer system can be vulnerable to flood during very heavy rain, which can cause the system to overflow.

How will we deliver local flood risk management?

We have identified a number of measures and actions over future years to deliver the objectives of the Local Strategy. These will inform the way we reduce flood risk across the Borough and how we plan for resilience against the impacts of climate change.

The Strategy is accompanied by an Action Plan setting out how we will deliver the objectives of the Strategy over the next six years.

Croydon Local Flood Risk Management Strategy Objectives and Actions

Objective	Actions to achieve the objective
Continue to build our evidence base on flood mechanisms, incidents and assets and improve how it is communicated internally and externally.	• Improving in-house information management • Establish ways to keep the evidence base up to date and feeding into policy • Raise profile and understanding of groundwater as a flood risk
Maximise use of resources in targeted flood management.	• Training for existing staff on new areas of responsibility • Communication about targets and objectives between teams • Monitoring funding streams available for flood remediation measures • Use best current understanding and available funding to prioritise flood alleviation work • Review effectiveness of emergency procedures and ensure our capabilities are known throughout the council and our commissioned services
Ensure evidence of historic floods and ongoing studies effectively feed into planning policy and decision-making	• Maintain regular communication between highways and planning • Establish a borough-wide understanding of the future flood risk, including the likelihood of future flood events. • Focus on flooding hotspots / Critical Drainage Areas in collaboration with development plans by establishing the impact of planned growth.
Support sustainable growth and development by understanding the needs of all parties	• Establish the SuDS Approving Body • Create tools / guidance for developers to help them to easily consider the most appropriate types of drainage
Work effectively with Risk Management Authorities in and around Croydon to jointly manage the risks	• Meet with Network Rail / Thames Water / TfL to discuss areas where their infrastructure falls in Croydon's flood hotspots • Work with multi-agency partners to enhance local arrangements for flood planning and response. • Continue to meet regularly and work with the other five South West London Boroughs
Improve awareness of the causes of flooding with the general public and encourage proactive management	• Engaging with the public through various means of communication • Encourage residents to help themselves with small-scale initiatives • Targeting riparian owners and educating on responsibilities • Develop our capability to warn and to provide information and advice to the public with partner organisations
Take a more holistic view of asset management in Croydon, improving priorities and addressing source control more effectively.	• Seek to achieve multiple benefits in water management schemes • Seek out opportunities for de-culverting
Maximise opportunities to learn, improve and review flood management procedures based on lessons learnt	• Clarify flood recovery process • Establish Lessons Learnt review procedure

How will we prioritise flood risk management actions?

It is not possible to prevent all flooding, and with limited resources and funding it is not possible to carry out work in every area at risk of flooding. The approach must be proportionate and risk based and all authorities have to ensure that environmental consequences are taken into account.

Projects are likely to fall under three broad categories:

- Schemes with highest eligibility for national funding,
- Local priorities with lower eligibility for national funding, and,
- Ongoing programmes of work and maintenance schedules.

As our understanding of flood risk improves and evidence is forthcoming, specific mitigation schemes and activities will be developed to address flood risk in those areas at greatest risk.

How will flood risk management be funded?

In April 2012 the way that the Government funds flood risk management projects changed. Funding levels for each scheme now relate directly to the number of households protected, damage prevented and other benefits such as the environmental or business benefits that will be delivered. There is now also an extra emphasis on protecting households in deprived areas. We are developing our understanding of areas in Croydon that have the highest eligibility for national funding.

In the future we will need new ways of working to make sure we can successfully reduce the risk of flooding as well as finding new ways to pay for the improvements. Whilst it may be possible to fully pay for some projects using national sources of funding available such as the Flood and Coastal erosion Risk Management Grant in Aid (FCRM GiA), it is likely they will require a wider range of funding sources (including contributions from local communities and businesses as beneficiares).

The primary funding sources to date have been through central government funding, however, there are significant pressures on these funding sources in the current economic climate, and in the future there will be greater emphasis on Lead local Flood Authorities to fund activities and schemes from their own or alternative local sources of funding. The Strategy provides detail on the additional funding options that will be considered in the Borough. This includes seeking contributions from developers.

Funding will be focussed on the areas of the Borough most vulnerable to local flooding. However, any scheme can be put forward, regardless of the level of flood risk if enough money is available (including contributions from local communities) and the work meets the principles of the Strategy.

Delivery of wider environmental objectives

In delivering flood risk management, Croydon Council has the opportunity to deliver wider environmental objectives and requirements, as set out in European Legislation including the Water Framework Directive. A Strategic Environmental Assessment (SEA) and a Habitats Regulations Assessment Screening exercise has been undertaken to inform the Strategy development.

What happens next?

Although there is no formal deadline for the Strategy to be produced or updated, we believe that continued monitoring, review and development are essential to ensure that local flood risk management is responsive to changes. This is especially important in these early years when there are expected to be substantial changes in the planning system, new requirements for sustainable drainage, changes in funding and design of flood management schemes and improvements in our knowledge of flood risk across the Borough.

The draft Strategy will undergo a period of public consultation, offering the opportunity for residents, businesses and risk management stakeholders to provide feedback. Following the public consultation period, we will consider what you have told us and will use it to update the Local Strategy, where necessary. The Council will then adopt the Local Strategy and use it as the basis for local flood risk management in the future. The final Local Strategy will be available on our website in early 2015.

The Local Strategy will be reviewed periodically to ensure that its content and emphasis remains relevant.

For further information on the Local Strategy please contact us:

Website: www.croydon.gov.uk/flooding

Email: floodandwater@croydon.gov.uk

Post: Flood and Water management, Highways, London Borough of Croydon, Bernard Weatherill House, 8 Mint Walk, Croydon,CR0 1EA

Telephone: 0208 255 2864

Summary of the LFRMS consultation / Proposed changes to the Strategy

Introduction

This report is a summary of the responses to the public consultation about the draft LFRMS and associated documents, and the proposed changes to the draft strategy and 'Action Plan' as a result of those responses.

Methodology

In order to comply with the requirement of the Flood and Water Management Act (FWMA) 2010, to consult risk management authorities and the public about our local flood risk management strategy, the Council undertook an online consultation via *SurveyMonkey* for 6 weeks between 8 July and 12 August 2015. To raise public awareness about the online consultation, it was advertised through a variety of methods including:

- Adverts placed on plasma screens within the Council buildings
- Alerts released via twitter and Facebook
- A banner advert at the top of the Council website home page
- A direct link to the consultation questionnaire was emailed to risk management authority representatives
- A direct link to the consultation questionnaire was uploaded to the 'get involved' platform to engage with resident and community representatives

Findings

At the closing of the online consultation exercise, 77 responses were received and these are analysed below, showing the consultation questions, number of responses/response percentage to each question and the proposed changes to the draft LFRMS and 'Action Plan' as a consequence of those responses.

Where respondents have raised points which were about specific incidents or locations and are not appropriate to be included in the revised strategy and 'Action Plan', a summary document which addresses or clarifies these points will be produced subsequently to this report and publish on the Council website. Those points to be addressed or clarified are identified in the analysis below.

Qn1. Are you completing this consultation as a:-		
Answer Options	**Response Percent**	**Response Count**
Resident	92.2%	71
Local business	0.0%	0
Person who works in Croydon	5.2%	4
Community group representative	5.2%	4
Local councillor	0.0%	0
Risk Management Authority	1.3%	1
Other	1.3%	1
Other (please specify)		2
answered question		**77**
skipped question		**0**

Other (please specify) were Monks Orchard Residents' Association and London Resilience Team.

- **Qn1. Proposed changes to Strategy:** *This is information only and no changes required. Majority of the respondents (92.2%) advised they were resident of Croydon. The remainder were representatives of community groups, risk management authorities or worked in Croydon but lived outside the borough.*

Qn2. If you answered as a risk management authority, please tell us below your details and the name of the authority		
Answer Options	**Response Percent**	**Response Count**
Full Name	100.0%	1
Job Title	100.0%	1
Name of risk management authority	100.0%	1
answered question		**1**
skipped question		**76**

- **Qn2. Proposed changes to Strategy:** *This is information only and no changes required. One response received from Transport for London.*

Qn3. Please select the neighbourhood which best represents where you live from the selection below. If you live outside of the borough, please tell us where you do live in the box below:		
Answer Options	**Response Percent**	**Response Count**
Crystal Palace and Upper Norwood	1.3%	1
Norbury	5.3%	4
South Norwood and Woodside	2.7%	2
Central Croydon	2.7%	2
Thornton Heath	6.7%	5
Addiscombe	5.3%	4
Broad Green and Selhurst	0.0%	0
South Croydon	8.0%	6
Waddon	1.3%	1
New Addington	1.3%	1
Sanderstead	6.7%	5
Selsdon	8.0%	6
Shirley	5.3%	4

Coulsdon	2.7%	2
Purley	25.3%	19
Kenley and Old Coulsdon	14.7%	11
I don't live in Croydon (please specify below)	2.7%	2
If you don't live in Croydon, please tell us where you live		4
	answered question	75
	skipped question	2

Respondents not living in Croydon were from Wallington, Transport for London Road Network, representative of residents in Shirley & Ashburton and Clapham.

- **Qn3. Proposed changes to Strategy:** *This is information only and no changes required. Majority of respondents lived in Purley, Kenley and Coulsdon. This is believed to be related to the flooding in these areas in 2014.*

Qn4. Several organisations have a role to play in minimising the risk and impact of flooding in the borough. The draft strategy clarifies the roles and responsibilities relating to flood risk in the borough. Please look at the section of the strategy which looks at roles and responsibilities (pages 20-24) and answer the questions below:

Answer Options	Yes	No	Not sure	Response Count
Do you understand what the council's roles and responsibilities are in minimising the risk & impact of flooding?	32	7	7	46
Do you understand what the roles and responsibilities of other organisations are in minimising the risk & impact of flooding?	28	7	11	46
Do you understand with the roles and responsibilities set out for residents in minimising the risk and impact of flooding?	28	11	7	46
			answered question	46
			skipped question	31

- **Qn4. Proposed changes to Strategy:** *This is a Yes/No question and the comments are in Qn5 below. Therefore, no changes required. 60% of respondents answered this question and majority of these stated that they understand the roles and responsibilities of the Council, other organisations and residents in minimising the risk and impact of flooding. Some of the comments received appeared to suggest a proportion of the respondents did not view the section of the draft Strategy outlining this information.*

Qn5. If you responded 'no' or 'not sure' to any of the questions above, please tell us why in the box below:

Answer Options	Response Count
	12
answered question	12
skipped question	65

- **Qn5. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 16% of respondents answered this question.*

Response Text	Comments	Action
I cannot see where there is a duty for organisations to carry out their minimalizing works in a way that does not impact adversely on other persons?	Unsure of the point being made here. They may be referring specifically to the emergency response in 2014 but it isn't clear	No change required
There are so many caveats and so many quangos involved in the "decision making process" and future responsibility, it is extremely difficult to assess: a) whether this is being done as speedily and efficiently as is reasonable in any "moveable feast", b) whether there is a FIULL understanding of what is currently happening in the Borough, and c) whether any existing or created body will actually (have time?/a future?) in completing the project	Noted. Not direct answer to the question	To be addressed in a subsequent summary document
I do not have the information or knowledge to answer these questions. Where can this be found.	Does not appear to have read the strategy	No change required
My flat in Purley was flooded by using it as a water retaining area in order to reduce the damage to the Kenley Water Treatment works It is now worth less than it was prior to the flooding Who is responsible for compensating me?	This comment does not really relate specifically to the question	To be addressed in a subsequent summary document
Obviously in certain situations roles and responsibilities overlap between organisations, and where they do who has ultimate responsibility?	It depends what is meant by responsibility. Legal / maintenance responsibilities should be distinct not overlapping. If they are looking for responsibility for a flood or flood damage, there is not necessarily someone responsible	Sentence added in section 3.2 of the revised strategy
Information has not been made available to residents who are within areas subject to surface water flash flooding, especially in the Ashburton Ward. Typically, simple first line food defense precaution of availability of "Air Brick" covers to prevent the initial ingress on surface water to properties within areas subject to surface water flash flooding. See Environment Agency Flood Maps for Monks Orchard area.	This does not relate to responsibilities of authorities	Text added in section 3.3 of the revised strategy under riparian owners - more about PLP specifically

I feel the last flooding incident was handle badly roads closed, traffic re-routed no road closures, no thought of how school children would cope too many issues	Not a direct response to this question. Review of the emergency response has been carried out as part of the action plan.	To be addressed in a subsequent summary document
Not seen anything that explains them - nothing that comes through via council tax letter or the annual recycling rota	Does not appear to have read the strategy	No change required
Why do the council continue to allow front gardens to be concreted over?	Not direct response to this question.	New action added as 4.2.3 in the 'Action Plan'. Also, to be addressed in a subsequent summary document
I am somewhat of an amateur boatman myself. My daughters live in Kenley & were affected a lot by the Bourne overflow	This comment does not really relate specifically to the question	No changed required
Because I don't know	Does not appear to have read the strategy	No change required

Qn6. Are there any other organisations which you think should have a role or be responsible for minimising the risk of flooding in the Borough? If you do, please tell us in the box below and why:

Answer Options	Response Count
	12
answered question	12
skipped question	65

- **Qn6. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 16% of respondents answered this question.*

Response Text	Comments	Action
It is all very well trying to get everyone "on side" but unless there is a bespoke party who have the power and authority as well as the delegated/ offloaded responsibility we will continue to have a compot of (at least semi) interested parties furthering their own ideas or covering their own positions	Noted. More of a statement than an answer to the question	To be addressed in a subsequent summary document
Thames Water for keeping drains clean/clear. Business for reducing rubbish and blocking drains/drainage pathway/dumping rubbish in /near waterways. Residents for dumping rubbish in streams, ponds etc/blocking drains		Text added in section 3.3 of the revised strategy

I think the Environmental Agency should look into the damage caused to properties that were deliberately used to contain the water pollution in Croydon	No properties were deliberately flooded but this needs to be clarified through the consultation summary	To be addressed in a subsequent summary document
Thames Water Utilities Environment Agency	These are covered	No change required
Thames 21...Croydon transition town	These are both charities so cannot really be 'responsible' for managing risk. However they are useful signposts for encouraging community involvement and could be mentioned in measures	Changed wording of action 6.2.4 of the 'Action Plan'
The Council Planning Authority should prevent planning applications being permitted in areas subject to surface water flash flooding. Planning applications in areas of subsoil of London Clay should not be allowed to use SuDs Drainage (as shown as unsuitable by the British Geological Survey)	This is not a direct answer to the question	New action 4.1.4 suggested in the 'Action Plan'. Also, to be addressed in a subsequent summary document
Local businesses - As they may contribute or improve the local flooding issue by the development of their infrastructure or running of their business		Text added in section 3.3 of the revised strategy
The gullies need to be cleaned out on a regular basis	This is part of LBC responsibility as highway authority and is already addressed through action 2.4.3 of the 'Action Plan'	No change required
East Surrey Water.	SESW are a water supplier only and not a RMA under the FWMA. They are effectively a Riparian Owner / property owner	Text added in section 3.3 of the revised strategy
Developers - I believe that any development does affect the risk of flooding		Text added in section 3.4 of the revised strategy
Statutory authorities are all very well, but the ordinary public were helpless when faced with the Bourne inundations	Already actions to improve awareness of what residents can do under measure 6.2 in the revised strategy	Text added to section 3.3 of the revised strategy on PLP
Greenpeace		No change required

Qn7. The strategy describes sources of local flooding. This includes details about surface water, ordinary watercourses as well as other sources of flooding such as reservoirs (which the council may not be responsible for). Please read pages 8-19 of the draft strategy and tell us:						
Answer Options	**Very easy**	**Easy**	**Difficult**	**Very difficult**	**Not sure**	**Response Count**
How easy did you find it to understand what the sources of flooding were?	7	19	3	1	3	33
					answered question	**33**
					skipped question	**44**

- **Qn7. Proposed changes to Strategy:** Only 43% of respondents answered this question, *the majority of which stated they found it easy to understand what the sources of flooding were. Therefore, no changes required.*

Qn8. If you answered 'difficult' 'very difficult' or 'not sure' to the question above, please tell us why in the box below:	
Answer Options	**Response Count**
	4
answered question	**4**
skipped question	**73**

- **Qn8. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 4 of the 7 respondents who answered to this question in Qn7 responded.*

Response Text	Comments	Action
The strategy made no reference to additional flooding caused by actions of the various authorities, and how such actions can be improved to prevent such flooding	This is a personal view	To be addressed in a subsequent summary document
It rains/- water builds up - if it has nowhere else to go - there's a flood! Rocket science! Why isn't more being done regarding the cause/ aggravation of the problem?	The strategy outlines action being taken to address problems. This question only refers to the sources	No change required
Because no mention is made of how the Kenley Water Works was protected at the time of the flooding	This doesn't refer specifically to sources of flooding. There is an existing action (8.1.4) to address future protection of Kenley water works	No change required
We found it easy but our residents find in difficult.	Noted	No change required

Qn9. The strategy looks at how we categorise the risk of flooding from different sources (low, medium and high risk). Please read pages 8-19 of the draft strategy. Different types of flooding (e.g. surface water, groundwater) are shown in flood zones, mapped by the Environment Agency. The flood risk maps are available in Appendix A (refer to the document "Draft flood risk management strategy - appendix A").Thinking about how the council measures flood risk, please tell us if you have anything else you'd like to add:

Answer Options	Response Count
	12
answered question	12
skipped question	65

- **Qn9. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 16% of the respondents answered this question.*

Response Text	Comments	Action
The methods used do not seem to take account of the adverse actions of the various authorities	This person is likely to be referring to a specific experience/opinion last year.	To be addressed in a subsequent summary document
If the Council continues to grant planning permission (for whatever - including altruistic - reasons) in areas where the sub soil is London clay and the trees and other water absorbents are continually removed then the "concreting over" of Croydon and the South East will continue, more properties will become uninsurable, more funds will be required for road repairs and the replacement of crucial public water works - getting everyone to "buy in" is fine BUT someone has to lead not be consistently trying to work out whether everyone's NIMBY attitude has been pandered to. Presently there appears to be a lack of understanding of the basic reasons why the problems continue to be exacerbated regardless of what the unpredictable British weather will throw up next.	Noted	Text added in section 2.1 of the revised strategy. Also, to be addressed in a subsequent summary document
If the Council has to deliberately flood properties in order to save the water from pollution in Kenley Treatment Works then should it not compensate the flat owners for their losses	This person is likely to be referring to a specific experience/opinion last year	To be addressed in a subsequent summary document
Nothing to add		No change required
Link to litter dumped in waterways and lack of maintenance of foliage		Text added in section 2.2 of the revised strategy, expansion of action 6.3.3 in the 'Action Plan'

There is no mention of flood risk caused by organisations. During the flooding in February 2014 my home was flooded as a direct result of water being barricaded in Dale Road and the actions taken by the Sutton water company in Kenley to avoid the water supply being contaminated. If Sutton Water company had not overloaded the culvert running through my garden with their pumped water and the fire brigade had not barricaded the water in Dale road we would not have been flooded. The water was not allowed to run naturally from Dale Road down to Tescos and so it backed up into my property and adjoining properties. Where is this kind of flooding addressed in these documents?	This is not a direct response to the question	To be addressed in a subsequent summary document
We do not think sufficient consideration is given to areas on subsoil that does not absorb surface water sufficiently quickly to dissipate surface water during high precipitation. The Chaffinch brook and other watercourses do not dissipate surface water sufficiently quickly to avoid flash flooding. Monks Orchard Primary School is in an area of high risk of flooding and the height of the playground is a significant flooding problem for residents on the north side of Fairford Avenue.	This comment is quite specific about an area.	Proposed new action 2.4.4 in the 'Action Plan'. Also, to be addressed in a subsequent summary document
Yes stop immediately allowing people to concrete over their front gardens in order to park yet more cars in the borough! This causes unnecessary flooding as when it rains the water has nowhere to go!	Not a specific answer to this question. The recurring theme of driveway paving is being addressed	Some text added in section 2.1 and table 2.2 of the revised strategy, new action 4.3.3 added to the 'Action Plan'
Clearer labelling of main roads and local areas. On a pdf these are very difficult to read and if you don't know your local geography it is hard to figure where your house is.	The maps are not meant for location of individual properties and should be used as an overview. However the resolution does appear to have been reduced in the consultation document. The final submitted versions are clearer	Reissue maps at higher resolution
No maps seen on this page just a list of content		No change required
Neighbourhood Watch organisations need to be appraised of self-help schemes.		Amended action 6.2.3 in the 'Action Plan'

The council should be more pro-active about responding to residents' reports of blacked drains. Last year I had to report a blocked drain in Cherry Orchard Road 5 times.....and the drain is now blocked again.	There is an action to continually review gully cleaning	To be addressed in a subsequent summary document

Qn10. Pages 8-19 of the draft strategy describes historical events for different types of flooding. Are there any other historical flooding events that you think the strategy should reference? If so, please describe it / them below:

Answer Options	Response Count
	7
answered question	**7**
skipped question	**70**

- **Qn10. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 9% of respondents answered this question.*

Response Text	Comments	Action
LBC constructed an emergency temporary holding pond on the Roke School (Harris Kenley Academy) playing fields in Spring 2014. Because this pond was constructed across the full width of the fields there was no clear passage for water flowing off the grounds of Yateley Court, upstream of the pond. This created a risk of flooding of Yateley Court which had not previously existed, and should never have been allowed to happen	Not a direct answer to this question but feedback to emergency response team	To be addressed in a subsequent summary document
Essentially I believe the draft has been thoughtfully and carefully prepared NOW we need ACTION.		No change required
The proposed development at 18 Pollards hill West will massively increase the already present flooding of 2 Pollards Hill West to 28 Pollards Hill West, This has been commented upon by two structural engineers and an arborialist who were asked to survey the site vis a vis the proposed development, and their recommendation is clear - that they do not recommend any new building on this site. The Council should take their responsibility to mitigate flood risk and certainly not manifestly increase it to existing housing stock by refusing any planning permission for this site.	Not an answer to the question. Reference made to a specific proposed development site	To be discussed with development management at internal flood group meeting

I am confident that Croydon has captured historical flooding events		No change required
1968	Unable to include without more details	No change required
The council should cease forthwith in allowing residents to concrete over their front gardens to facilitate yet more car parking! When it rains the water has nowhere to go but downhill and cause flooding at the bottom of the hill. I would have thought this was obvious!!!!!	Not an answer to the question. This individual appears to be referring to a specific location which they don't mention. They have made this point on several previous questions	To be addressed in a subsequent summary document
I have encountered flooded roads in Thornton Heath, but not featured in the risk areas of CR7	Thornton heath is mentioned as a location in historic flooding and partly falls into CDA 49. Unclear of the point being made here	No change required

Qn11. If there is anything you think we should change in our objectives to managing flood risk then please tell us what you think we should change and why:

Answer Options	Response Count
	11
answered question	11
skipped question	66

- **Qn11. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 14% of respondents answered this question.*

Response Text	Comments	Action
Include a need to review the effect of all plans on other local people	Unclear of the exact point being made. If they are referring to the Roke academy storage area as before, this will be addressed in the summary	No change required
Any Summary of any plan that concludes with "Establishing Lessons Learnt Review Procedure" is either attempting to create a self - perpetuating role or has learnt nothing from the past that they have managed to include in their deliberations.	Noted	No change required
The last of the three above stated priorities should become an absolute priority, for the sake of existing residents	If this person is referring to the objectives then these are already priorities	No change required

Compensate people who have been deliberately flooded	Not an answer to the question	To be addressed in a subsequent summary document
Nothing		No change required
I think you should have an objective that addresses collateral flooding damage to properties. Who decides who is going to suffer?	Not related to objectives.	To be addressed in a subsequent summary document
More consideration of new developments in areas subject to surface water flooding and areas with high water tables. More information to residential properties in areas subject to surface water flooding; specifically first line of flood defenses, air brick covers, door defenses etc. Use of SuDs Drainage Systems is not appropriate in areas of Clay subsoil as indicated by the British Geological Survey.	This is a repeat of previous comments and is already addressed.	No change required
See answer 9	This individual is referring to the paving over of front gardens for car parking	Action 4.3.3 added to the 'Action Plan'. Also covered under action 6.1.4
Action plan page empty. Doc was dated July 2015		No change required
Take more account of climate change please.	There are a number of actions in the 'Action Plan' to address this. Climate change is continually referred to throughout the Strategy document	No change required
MAINTAINING DRAINAGE needs to be carried out 100%. Every year I report to the council any drains in Ashburton Road that are blocked, including two that are totally and solidly blocked to the point of needing excavation. Every year for as long as I can remember only the drains that can be cleared easily by the drain clearing vehicle have been dealt with and the two solidly blocked drains left. The drains should be inspected by a responsible council officer from time to time or after any complaint.	Covered in existing action 2.4.3. Specific location will be addressed separately.	To be addressed in a subsequent summary document

Qn12. Please use the space below to tell us what (if anything) you think is missing?	
Answer Options	**Response Count**
	10
answered question	**10**
skipped question	**67**

- **Qn12. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 13% of respondents answered this question.*

Response Text	Comments	Action
There must be an embargo on the construction of a full-width holding pond on the Roke School (Harris Kenley Academy) playing fields	This is a repeat of earlier comments about a specific area. General topic is covered under Measure 2.5. Specific topic will be raised directly with emergency planning via the internal flood group	To be addressed in a subsequent summary document
Ownership, Responsibility and Leadership.	No context	No change required
An absolute determination to ensure the prevention of increased flooding to existing housing stock when small [less than 8] developments are proposed on clay ground on a hill above existing housing stock. And the presumption in such cases should not be towards the developer.	Referring to a specific site in Pollards Hill West as noted in previous comments. There is a gap in national policy regarding flood risk from minor developments	Created a new potential measure 4.3 with accompanying actions in the 'Action Plan'
How will the council protect Kenley Water Works in the future?	SESW are responsible for protecting the works. However the Council and the Environment Agency are communicating with them about their plans. This is partially covered in existing action 8.1.4	Amended Measure 5.1 to include Sutton & East Surrey Water. Also added action 5.1.4 in the 'Action Plan', to more specifically engage with SESW. Other comments to be addressed in a subsequent summary document
Work effectively with Thames Water and the Environment Agency to ensure their assets are in good condition, free of debris and working effectively.	This is being addressed in objective 5 and measure 6.3. Some amendments made	Amended action 6.3.3 in the 'Action Plan'. Also, to be addressed in a subsequent summary document. Mention the ordinary watercourse surveys being undertaken to identify ownership

Last year some water pumps were brought in around Dale Road to reduce flooding, several were faulty, or were not being used. What about servicing and maintenance of emergency equipment. Much was said about the wonderful storage ponds that were being used to store flood water round here. Tescos underpass for example only had a few inches of water for a few days and thereafter was not used at all despite councillors saying that it was. Other storage areas such as the Dale Road church car park was never used and the school playing field in Godstone road was not used. In future if storage ponds are going to be utilised they need to be announced and tested and not declared publicly that they are being used, when as was the case last year, it was clear they were not being used. At one point there was the possibility of the water company diverting thousands of gallons of water down Godstone Road, which would have added to the man-made flooding of our property and other properties on Godstone Road. Fortunately this didn't happen, what has the water company done to prevent this risky situation arising again?	These points are very specific about the Kenley flooding last year. The points being made will need to be corroborated and addressed separately as they are not all accurate. Emergency equipment is largely owned by the Fire brigade/EA and Army so not something the council can address through their strategy other than existing actions regarding communication and review of emergency response already being implemented	To be addressed in a subsequent summary document
More joined-up policies across various departments of the Council to mitigate the effects of development in areas subject to increased surface water flash flooding. Consideration of effects of simple changes to levels of school playgrounds etc which have an impact on surrounding and adjacent properties - subject to flooding (e.g. Monks Orchard Primary School).	Covered under Objective 3 and new action 2.4.4 already proposed. The specific Monks Orchard issue will be addressed separately	Linked to new action 2.4.4 in the 'Action Plan'
See answer 9	This individual is referring to the paving over of front gardens for car parking	No change required
-Cleaning of drains. - Ensuring road sweepers, road cleaners, road maintenance men do not dispose of rubbish and large waste objects in street drains. -Ensuring local businesses do not put fat down the drains - implement an exercise to widen or increase depth of Bourne paths when empty	First two points covered under Action 2.4.3. Third point, - existing action 6.1.4 and 6.1.1 for improving guidance and available advice. Maintenance options for the Bourne are being addressed through the emergency recovery review Objective 8 and the Caterham Bourne scheme (action 2.4.2)	Slight amendment to action 6.1.4 in the 'Action Plan'

As I have hinted, residents need to collaborate more with the planners - if they will allow such!	Some of the previous comments made will be discussed with planning via the internal flood group for response in the summary.	No change required

Qn13. Please read the section titled "Delivery of Wider Environmental Objectives" (pages 43-45 of the draft strategy). Please use the space below if there is anything you'd like to add about the way we are delivering and managing the environmental impacts of this draft strategy:

Answer Options	Response Count
	4
answered question	4
skipped question	73

- **Qn13. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 5% of respondents answered this question.*

Response Text	Comments	Action
Nothing to add.		No change required
I think you have got quite enough!		No change required
Experience of recent Local Planning Authority decisions have shown that very scant consideration is given to Environmental, Biodiversity and Ecological Survey issues. The Planning Policies need to be enhanced to include these requirements such that the Planning Committees and Planning Sub-Committees take due consideration of these factors in their deliberations.	This is moving away a little from the remit of the strategy however combining water management with environmental targets will be encouraged	Added an action 7.2.3 to the 'Action Plan'
Plans no doubt relevant but low key. Not exactly a "Noahs flood" scare but general enlightening of the population		No change required

Qn14. How easy / difficult did you find the glossary (page 47-49 of the draft strategy) to use?

Answer Options	Response Percent	Response Count
Very easy	13.0%	3
Easy	56.5%	13
Difficult	8.7%	2
Very difficult	13.0%	3
Not sure	8.7%	2
answered question		23
skipped question		54

- **Qn14. Proposed changes to Strategy:** *This is a range question and comments are addressed in Qn15 below. Therefore, no changes required. Only 30% of respondents answered this question, the majority of which stated that they found the glossary very easy or easy to use.*

Qn15. Is there anything we could add to the glossary of the draft strategy? If so, tell us below:

Answer Options	Response Count
	6
answered question	6
skipped question	71

- **Qn15. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 8% of respondents answered this question.*

Response Text	Comments	Action
You define the 1 in 30/100 year events as " that on average will occur once every ". It would be better to say "is expected to" rather than "will"		Amended text in glossary, slightly altered from suggestion
Nothing to add.		No change required
Limitations of SuDS Drainage Systems dependent on subsoil	Nothing to add to glossary. Action could address previous comments relating to SuDS limitations on clay subsoil	Amended action 2.1.1 in the 'Action Plan'
Swale Ramsar site		Added to glossary
Items missing from appendix A and B	Individual does not appear to have viewed the separate Figures or 'Action Plan'	No change required
I am a technical author, qualified & a usability study needs to be carried out.	The strategy is essentially for 'use' by the council who have shaped it and used it already. However LBC Comms team should review as to whether they think this is required.	No change required

Qn16. Please tell us below if there was anything in the draft strategy document that you found difficult to understand, mentioning the relevant page(s) / section(s). Don't forget to tell us why you found it difficult:

Answer Options	Response Count
	6
answered question	6
skipped question	71

- **Qn16. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 8% of respondents answered this question.*

Response Text	Comments	Action
Too much searching for blue sky not enough attention to picking the low hanging fruit!		No change required
Nothing to add.		No change required
Very wordy.		No change required
None		No change required
The maps in Appendix A were of such poor quality the only area I could locate was "Coulsdon" as that was the only bit of text that was properly visible. As this was the case, and zooming in made it worse it was very difficult to figure out what was actually being shown and what was really relevant to my home.	The maps have been compressed for the online consultation but they are not designed to be so detailed to locate a house. The final versions will be of higher resolution	Final maps issued in higher resolution
I'm 78 & the jargon is not suitable for the general public	Strategy Summary document should address this issue. The strategy is not designed for regular use by the general public	No change required

Qn17. Do you have any views on the way the draft strategy looks? If you do, please tell us below:

Answer Options	Response Count
	5
answered question	5
skipped question	72

- **Qn17. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 6% of respondents answered this question.*

Response Text	Comments	Action
Are you kidding? Please let the good work now produce some action before yet more Rules and Regulations need another draft/ rewrite/ update.		No change required
No		No change required
Need Appendix B - Action Plan		No change required

Artwork is lovely, but in case of emergency one can only ring the Fire Brigade.		No change required
Too much. Needs summerising.	There is a Summary document	No change required

Qn18. Finally, please provide below any additional comments you wish to make about the draft strategy. We are particularly keen to hear any other ideas you may have to address any issues experienced with flooding.

Answer Options	Response Count
	11
answered question	11
skipped question	66

- **Qn18. Proposed changes to Strategy:** *This is indicated in the table below according to each response received. The cells highlighted in yellow are where changes have been made to the draft Strategy and 'Action Plan'. Only 14% of respondents answered this question.*

Response Text	Comments	Action
Yateley Court is situated in Kenley, to the west of Hayes Lane as it meets the Godstone Road; it is efficiently protected against flooding on the north and east and south sides by the embankments of the Godstone Road, Hayes Lane and the railway; it does not have physical protection on the west side, but excellent implied protection exists because the ground falls away from Yateley Court down the valley to central Purley. But LBC constructed an emergency temporary holding pond on the Roke School (Harris Kenley Academy) playing fields in Spring 2014. Because this pond was constructed across the full width of the fields there was no clear passage down the valley for water flowing off the grounds of Yateley Court, upstream of the pond. Thus the normal western protection was undermined by the erection of this holding pond: this created a risk of flooding of Yateley Court which had not previously existed, which should never have been allowed to happen, and which must never be allowed to happen again	This has been covered in previous comments and will be addressed separately in the summary response	To be addressed in a subsequent summary document
I am grateful to have this opportunity to add my thoughts but as someone who always worked in the private sector I do find it difficult to grasp the lengths to which this process has gone - already! You have my sympathies that you have so many parties "moving the goal posts"/ pursuing their own objectives etc. but I	Noted	No change required

think the biggest problem you face is trying to please EVERYONE on EVERY issue - it will never happen!		
Collaboration via LODEG will help to develop ways of anticipating and dealing with flooding.		Added a potential action 5.2.3 to the 'Action Plan'
The maps imply there is a risk of flooding (albeit a small one) in the Longheath Gardens area, which I find curious as we have not experienced any in the fifty odd years that the family has lived in the district. The closest to any flooding was along the Upper Elmers End Road towards Elmers End Green in the late 1960s that turned the road into a river for several hours.	The surface water flood map is 3rd party produced data based on probability not actual incidents	To be addressed in a subsequent summary document
I have already mentioned about the man-made flooding issue. Corralling water, barricading it, putting flood water into the sewerage system and overloading a culvert were all man made. Of course there was heavy rain at the time but the flooding to our property would have been minimal were it not for the man made issues I have mentioned.	These points have been previously raised	To be addressed in a subsequent summary document
Please involve Residents' Associations in your future discussions	RAs are being contacted where local projects are progressing	To be addressed in a subsequent summary document
See answer 9!!!!	This individual is referring to the paving over of front gardens for car parking	To be addressed in a subsequent summary document
It would be sensible to have the EA advice on protecting your property from flooding as an appendix to your document	It's quite a large document and is linked to within the strategy. Also can be downloaded through link on the council website	No change required
There's a lot of waxing lyrical about how the council are apparently going to get better at communicating but nothing firm on what would actually be done. During the flooding in Kenley in 2014 I only found out about the risk of losing my mains water supply via a retweet on Twitter. The original tweet didn't even come from the council. There was nothing put through the letter box, no special mailings made to residents, no-one door knocking to gauge whether everything was okay or if anyone needed assistance. The council need to find some way of making sure that EVERYONE in the borough knows, not just the people in the big houses at one end of the road who I am fully aware	Specific comment about 2014 floods. To be fed back to emergency planning via the internal flood group	To be addressed in a subsequent summary document

were furnished with literature about the situation.		
I like that fact that you have put photos in to break up all the text as otherwise it will be too boring for general public to read!		No change required
The cinch point at Purley Road Bridge - Chinese restaurant for the Bourne needs enlarging substantially. It still looks like a Victorian construction. I went & had a look & took a few frames of cine. Too much of a constriction.	This point will be fed back to the Caterham Bourne project team	To be addressed in a subsequent summary document

The following questions are optional and did not feed into the revised LFRMS and 'Action Plan'. They helped to assess the range of people who responded to the consultation. Only 29% of respondents answered these questions.

Qn19. Are you...

Answer Options	Response Percent	Response Count
Male	63.6%	14
Female	36.4%	8
answered question		22
skipped question		55

- **Qn19. Comment:** *The majority of respondents (63.6%) who answered this question were male.*

Qn20. Which age range best describes you?

Answer Options	Response Percent	Response Count
under 18	0.0%	0
18-24	4.5%	1
25-34	9.1%	2
35-44	4.5%	1
45-54	22.7%	5
55-60	18.2%	4
61+	40.9%	9
answered question		22
skipped question		55

- **Qn20. Comment:** *The majority of respondents (40.9%) who answered this question were over 60 years old.*

Qn21. Which of the following best describes your ethnic background?		
Answer Options	**Response Percent**	**Response Count**
Asian/Asian British	0.0%	0
Black/Black British	0.0%	0
White/White British	81.8%	18
Mixed/multiple ethnic background	0.0%	0
Prefer not to say	13.6%	3
Other	4.5%	1
If you ticked 'other', please specify:		1
answered question		22
skipped question		55

- **Qn21. Comment:** *The majority of respondents (81.8%) who answered this question were White/White British. One 'Other' was English.*

Qn22. Would you describe yourself as disabled?		
Answer Options	**Response Percent**	**Response Count**
Yes	0.0%	0
No	100.0%	22
answered question		22
skipped question		55

- **Qn22. Comment:** *All of the respondents (100%) who answered this question stated that they had no disability.*

Qn23. Please tell us in what way you consider yourself to be disabled (please tick all that apply)?		
Answer Options	**Response Percent**	**Response Count**
Visual impairment	0.0%	0
Hearing impairment	0.0%	0
Mobility disability	0.0%	0
Learning disability	0.0%	0
Communications difficulties	0.0%	0
Mental health illness	0.0%	0
Other	0.0%	0
If you ticked 'other', please specify:		0
answered question		0
skipped question		77

- **Qn23. Comment:** *This question is related to Qn22 and was not answered as all respondents to Qn22 stated they had no disability.*

Conclusions

All responses to the consultation about the draft LFRMS and associated documents have been reviewed and addressed where appropriate in the revised Strategy and 'Action Plan'. Some respondents raised points which were about specific incidents or locations and are not appropriate to be included in the Strategy. The exact comments have been grouped together in '*theme*' boxes where individuals have made comments on a similar topic. A summary document which addresses or clarifies these points will be produced subsequent to this report and published on the Council website.

Some key themes which emerged from the consultation responses include:

- Actions of authorities during the Kenley flooding in 2014
- Clarity of responsibility
- Paving of driveways
- Better consideration of local sources of flooding in new development
- Gully maintenance
- Improved engagement with residents

Consultation respondent's comments:

Responsibilities

"There are so many caveats and so many quangos involved in the "decision making process" and future responsibility, it is extremely difficult to assess:
a) whether this is being done as speedily and efficiently as is reasonable in any "moveable feast",
b) whether there is a FULL understanding of what is currently happening in the Borough, and
c) whether any existing or created body will actually (have time?/a future?) in completing the project"

"It is all very well trying to get everyone "on side" but unless there is a bespoke party who have the power and authority as well as the delegated/ offloaded responsibility we will continue to have a compot of (at least semi) interested parties furthering their own ideas or covering their own positions"

"Work effectively with Thames Water and the Environment Agency to ensure their assets are in good condition, free of debris and working effectively."

The Kenley / Purley Floods in 2014

"My flat in Purley was flooded by using it as a water retaining area in order to reduce the damage to the Kenley Water Treatment works
It is now worth less than it was prior to the flooding
Who is responsible for compensating me?"

"I feel the last flooding incident was handle badly roads closed, traffic re-routed no road closures, no thought of how school children would cope too many issues"

"How will the council protect Kenley Water Works in the future?"

"There's a lot of waxing lyrical about how the council are apparently going to get better at communicating but nothing firm on what would actually be done. During the flooding in Kenley in 2014 I only found out about the risk of losing my mains water supply via a retweet on Twitter. The original tweet didn't even come from the council. There was nothing put through the letter box, no special

mailings made to residents, no-one door knocking to gauge whether everything was okay or if anyone needed assistance. The council need to find some way of making sure that EVERYONE in the borough knows, not just the people in the big houses at one end of the road who I am fully aware were furnished with literature about the situation."

Responsibilities

"Why should it be the responsibility of all residents to ensure that they are protected from flooding when it is the Council's failure to carry out any work over a period of 10+ years that caused the flooding to occur? Ref: flooding in Kenley in 2014."

"I think the Environmental Agency should look into the damage caused to properties that were deliberately used to contain the water pollution in Croydon"

"Have already mentioned about the man made flooding issue. Coralling water, barricading it, putting flood water into the sewerage system and overloading a culvert were all man made. Of course there was heavy rain at the time but the flooding to our property would have been minimal were it not for the man made issues I have mentioned."

Types of flooding

"The cinch point at Purley Road Bridge - Chinese restaurant for the Bourne needs enlarging substantially. It still looks like a Victorian construction. I went & had a look & took a few frames of cine. Too much of a constriction."

"The strategy made no reference to additional flooding caused by actions of the various authorities, and how such actions can be improved to prevent such flooding"

"LBC constructed an emergency temporary holding pond on the Roke School (Harris Kenley Academy) playing fields in Spring 2014. Because this pond was constructed across the full width of the fields there was no clear passage for water flowing off the grounds of Yateley Court, upstream of the pond. This created a risk of flooding of Yateley Court which had not previously existed, and should never have been allowed to happen"

"There must be an embargo on the construction of a full-width holding pond on the Roke School (Harris Kenley Academy) playing fields"

"Yateley Court is situated in Kenley, to the west of Hayes Lane as it meets the Godstone Road; it is efficiently protected against flooding on the north and east and south sides by the embankments of the Godstone Road, Hayes Lane and the railway; it does not have physical protection on the west side, but excellent implied protection exists because the ground falls away from Yateley Court down the valley to central Purley. But LBC constructed an emergency temporary holding pond on the Roke School (Harris Kenley Academy) playing fields in Spring 2014. Because this pond was constructed across the full width of the fields there was no clear passage down the valley for water flowing off the grounds of Yateley Court, upstream of the pond. Thus the normal western protection was undermined by the erection of this holding pond: this created a risk of flooding of Yateley Court which had not previously existed, which should never have been allowed to happen, and which must never be allowed to happen again"

Categorising risk

"The methods used do not seem to take account of the adverse actions of the various authorities"

"There is no mention of flood risk caused by organisations. During the flooding in February 2014 my home was flooded as a direct result of water being barricaded in Dale Road and the actions taken by the Sutton water company in Kenley to avoid the water supply being contaminated. If Sutton Water company had not overloaded the culvert running through my garden with their pumped water and the fire brigade had not barricaded the water in Dale road we would not have been flooded. The water was not allowed to run naturally from Dale Road down to Tescos and so it backed up into my property and adjoining properties. Where is this kind of flooding addressed in these documents?"

"If the Council has to deliberately flood properties in order to save the water from pollution in Kenley Treatment Works then should it not compensate the flat owners for their losses"

Objectives

"Include a need to review the effect of all plans on other local people"

"Compensate people who have been deliberately flooded"

Development, drainage & SuDS

"Why do the council continue to allow front gardens to be concreted over?"

"Yes stop immediately allowing people to concrete over their front gardens in order to park yet more cars in the borough! This causes unnecessary flooding as when it rains the water has nowhere to go!"

"The council should cease forthwith in allowing residents to concrete over their front gardens to facilitate yet more car parking! When it rains the water has nowhere to go but downhill and cause flooding at the bottom of the hill. I would have thought this was obvious!!!!!"

"The Council Planning Authority should prevent planning applications being permitted in areas subject to surface water flash flooding. Planning applications in areas of subsoil of London Clay should not be allowed to use SuDs Drainage (as shown as unsuitable by the British Geological Survey) We do not think sufficient consideration is given to areas on subsoil that does not absorb surface water sufficiently quickly to dissipate surface water during high precipitation."

"The Chaffinch brook and other watercourses do not dissipate surface water sufficiently quickly to avoid flash flooding. Monks Orchard Primary School is in an area of high risk of flooding and the height of the playground is a significant flooding problem for residents on the north side of Fairford Avenue."

"The proposed development at 18 Pollards hill West will massively increase the already present flooding of 2 Pollards Hill West to 28 Pollards Hill West, This has been commented upon by two structural engineers and an arborialist who were asked to survey the site vis a vis the proposed development, and their recommendation is clear - that they do not recommend any new building on this site. The Council should take their responsibility to mitigate flood risk and certainly not manifestly increase it to existing housing stock by refusing any planning permission for this site."

"More consideration of new developments in areas subject to surface water flooding and areas with high water tables. More information to residential properties in areas subject to surface water flooding; specifically first line of flood defences, air brick covers, door defences etc. Use of SuDs Drainage Systems is not appropriate in areas of Clay subsoil as indicated by the British Geological Survey"

"More joined-up policies across various departments of the Council to mitigate the effects of development in areas subject to increased surface water flash flooding. Consideration of effects of simple changes to levels of school playgrounds etc which have an impact on surrounding and adjacent properties - subject to flooding (e.g. Monks Orchard Primary School)."

Drains & gullies

"The council should be more pro-active about responding to residents' reports of blacked drains. Last year I had to report a blocked drain in Cherry Orchard Road 5 times.....and the drain is now blocked again."

"MAINTAINING DRAINAGE needs to be carried out 100%. Every year I report to the council any drains in Ashburton Road that are blocked, including two that are totally and solidly blocked to the point of needing excavation. Every year for as long as I can remember only the drains that can be cleared easily by the drain clearing vehicle have been dealt with and the two solidly blocked drains left. The drains should be inspected by a responsible council officer from time to time or after any complaint."

Other comments

"Information has not been made available to residents who are within areas subject to surface water flash flooding, especially in the Ashburton Ward."

"Typically, simple first line food defence precaution of availability of "Air Brick" covers to prevent the initial ingress on surface water to properties within areas subject to surface water flash flooding."

"See Environment Agency Flood Maps for Monks Orchard area"

"The maps imply there is a risk of flooding (albeit a small one) in the Longheath Gardens area, which I find curious as we have not experienced any in the fifty odd years that the family has lived in the district. The closest to any flooding was along the Upper Elmers End Road towards Elmers End Green in the late 1960s that turned the road into a river for several hours."

Next steps

- The adopted LFRMS and 'Action Plan' would be used by the Council to manage the risk of flooding from surface water, groundwater and watercourses.
- The LFRMS will remain a living document and be reviewed and updated every 6 years.
- The 'Action Plan' will remain a living document and be reviewed and updated quarterly.
- A summary of the LFRMS (including guidance about the availability of relevant information) will be published on the Council website.
- The 'Action Plan' will feed into the Flood Risk Management Plan (FRMP) which the Environment Agency is required to develop under the Flood Risk Regulation (FRR) 2009 and is scheduled to be published in December 2015.
- A summary document which addresses or clarifies points raised in the consultation responses and are not appropriate to be included in the Strategy will be produced subsequent to this report and published on the Council website.