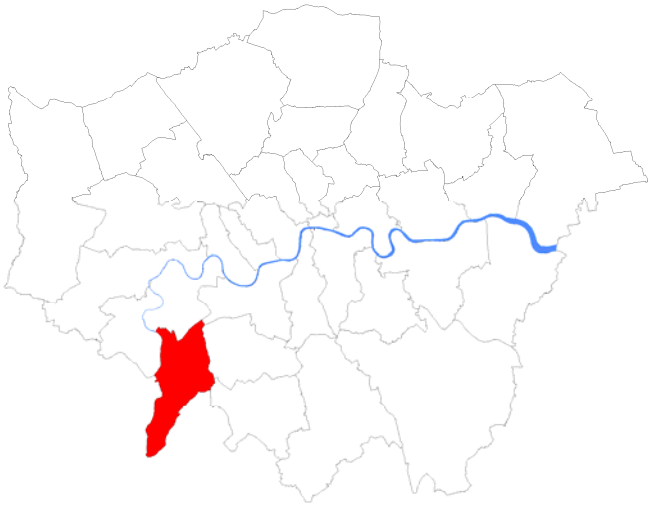
# SURFACE WATER MANAGEMENT PLAN



*DRAIN LONDON*

ROYAL BOROUGH OF KINGSTON UPON THAMES

GREATERLONDONAUTHORITY

Thames Water

LONDON COUNCILS

Environment Agency

Royal Kingston

# Quality Management

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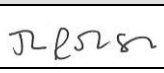
| Jon Robinson | [PD of Author Organisation] |  | 22.06.2011 |
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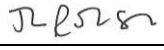
| Jon Robinson | URS/Scott Wilson Approver |  | 22.06.2011 |

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# Executive Summary

This document forms the Surface Water Management Plan (SWMP) for the Royal Borough of Kingston upon Thames which has been delivered as part of the Tier 2 package of works of the Drain London Project. This document is a plan which outlines the preferred surface water management strategy for the Royal Borough of Kingston upon Thames including consideration of flooding from sewers, drains, groundwater and runoff from land, small watercourses and ditches that occurs as a result of heavy rainfall.

The SWMP builds upon previous work undertaken with the Borough, including the First Edition SWMP for the Royal Borough of Kingston upon Thames and London Borough of Richmond upon Thames prepared by Jacobs in 2009, and has been undertaken following a four phased approach; Phase 1 – Preparation; Phase 2 – Risk Assessment; Phase 3 – Options; and Phase 4 – Implementation and Review.

**Phase 1 Preparation**

Phase 1 builds upon work formerly undertaken during Tier 1 of the Drain London Project (as well as the First Edition SWMP completed in 2009) to collect and review surface water data from key stakeholders and build partnerships between stakeholders responsible for local flood risk management. As part of this phase of work, the Royal Borough of Kingston upon Thames has started to actively forge partnerships with the Environment Agency, Thames Water and neighbouring London Boroughs in south west London. This will facilitate the sharing of resources and best practice to enable each local authority to discharge their responsibilities as Lead Local Flood Authority (LLFA) under the Flood and Water Management Act (FWMA) 2010.

**Phase 2 Risk Assessment**

As part of Phase 2 Risk Assessment, pluvial modelling has been undertaken across the entire Borough for five specified return periods, using a uniform methodology agreed by the Drain London Programme Board for the whole of the Greater London Authority area. The results of this modelling have been used to identify Local Flood Risk Zones (LFRZs) within the Borough, where flooding affects houses, businesses or infrastructure. Those areas identified to be at more significant risk have been delineated into Critical Drainage Areas (CDAs) representing one or several LFRZs as well as the contributing catchment area and features that influence the predicted flood extent.

**Figure 1 – CDA Index Map & Surface Water Flood Depth (1% AEP)**

Within the Royal Borough of Kingston upon Thames, fourteen (14) CDAs have been identified; these are shown in Figure 1. The CDAs are spread across the Borough and include the north of Kingston where pluvial modelling shows surface water flowing down steep catchments from Richmond Park and ponding at topographical low points as well as a number of instances of surface water pooling at railway embankments and crossings. The centre of the Borough is characterised by relatively low topography associated with the River Hogsmill corridor. In this area surface water flooding has linkages to the fluvial systems. The Hook CDA is also characterised by pluvial modelling showing surface water flooding of a historical river bed linked to the Surbiton Stream.

High groundwater levels and the limited capacity of the Thames Water surface water sewer network, most notably Alexandra Drive (high groundwater table) and Acre Road, Surbiton Crescent (sewer

network capacity), also contribute to the complex and interlinked mechanisms of flooding within these CDAs.

Surface water flooding across the Borough is largely limited to depths <0.5m and the Borough was not significantly affected by surface water flooding in 2007 (when compared to adjacent Boroughs).

Analysis of the number of properties at risk of flooding has been undertaken for the rainfall event with a 1% AEP (1 in 100 annual probability of occurring in any given year). A review of these statistics coupled with local knowledge of the study area identifies that the following CDAs are at greatest risk of flooding in terms of the number of receptors at risk:

**Table 1 Critical Drainage Areas at greatest risk in Royal Borough of Kingston upon Thames**

| CDA ID & Name | Infrastructure | | | Households | | Commercial | |
|---|---|---|---|---|---|---|---|
| | Essential | Highly Vulnerable | More Vulnerable | Non-Deprived | Non-Deprived (Basements) | All | Basements |
| Group8_008 Acre Road/North Kingston | 6 | 0 | 8 | 2077 | 59 | 155 | 35 |
| Group8_009 New Malden/North Kingston | 6 | 0 | 2 | 1128 | 4 | 4 | 0 |
| Group8_018 Hook/Kelvin Grove | 1 | 0 | 4 | 1714 | 7 | 61 | 35 |
| Group8_010 Kingston Town Centre | 2 | 1 | 9 | 818 | 24 | 114 | 12 |
| Group8_013 Network Rail Mainline | 1 | o | 6 | 1150 | 52 | 104 | 26 |

CDA_008 Acre Road/North Kingston in the north of the Borough crosses into the administrative area of the London Borough of Richmond upon Thames and CDA_022 Worcester Park resides within the London Borough of Sutton but partially crosses into the Royal Borough of Kingston upon Thames to the west of the Borough. These CDAs will need to be jointly managed to implement the potential options and manage surface water flood risk in these areas.

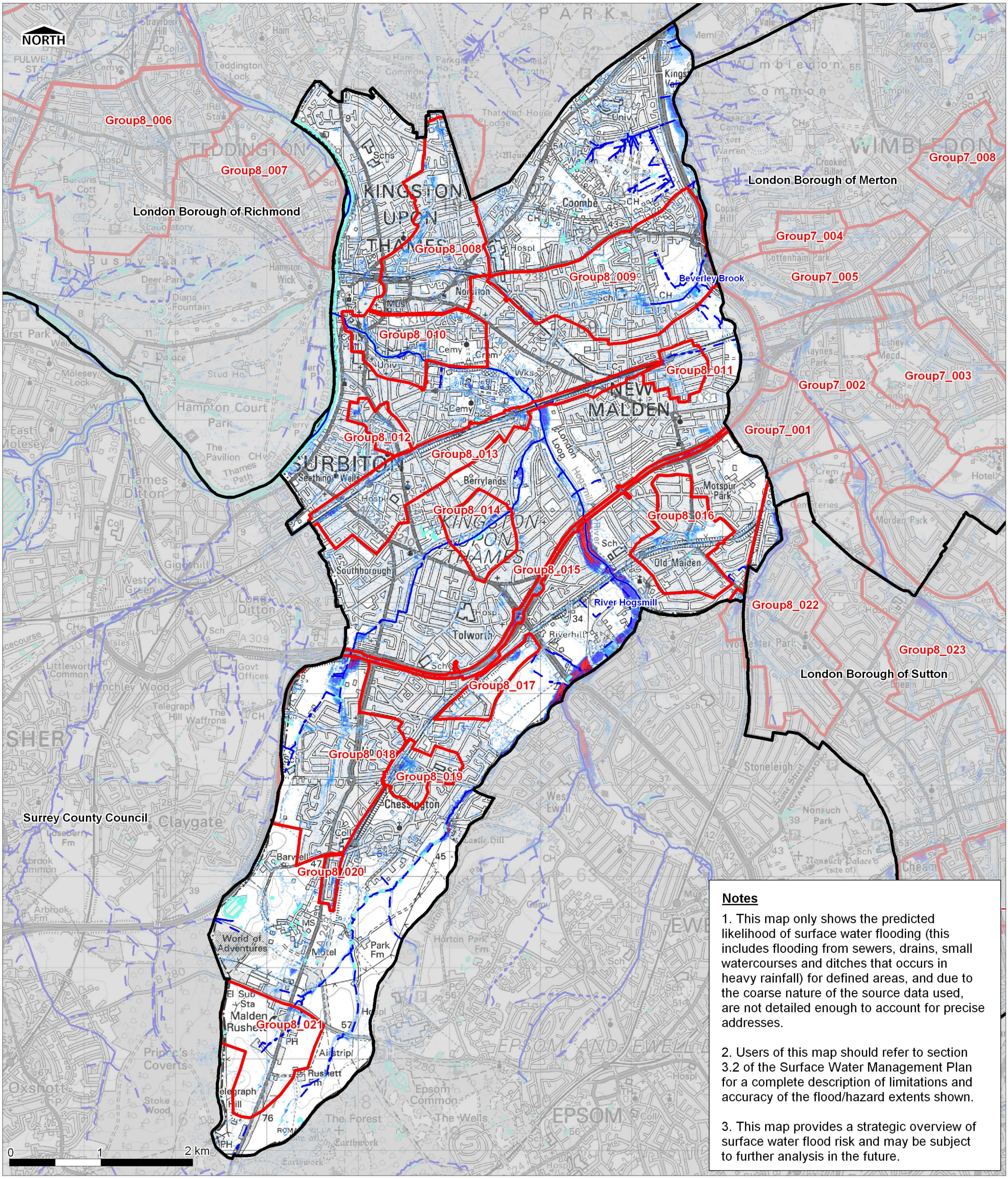
### Phase 3 Options Assessment

There are a number of opportunities for measures to be implemented across the Borough to tackle surface water flood risk. Ongoing maintenance of the drainage network and small scale improvements are already undertaken as part of current operations of the Borough. In addition, opportunities to raise community awareness of the risks and responsibilities for residents and businesses should be sought, and the Royal Borough of Kingston upon Thames is seeking to implement a Communication Plan to assist with this.

A single Policy Area has been delineated for the whole Borough. The Policy Area describes generic measures that can be implemented through the establishment of a policy position such as the widespread use of water conservation measures including water butts and rainwater harvesting technology, use of soakaways, permeable paving and green roofs. In addition, there are Borough-wide opportunities to raise community awareness.

For each of the CDAs identified within the Borough, site-specific measures have been identified that could be considered to help alleviate surface water flooding. These measures were subsequently shortlisted to identify a potential preferred option for each CDA.

For the purposes of this SWMP, CDAs with a predominantly fluvial source of flooding from Main Rivers have not been taken forward for consideration of capital schemes, as the primary responsibility for these CDAs lies with the Environment Agency. This includes CDA 010 Kingston Town Centre and CDA 014 Berrylands/Alexandra Drive.




**Notes**

1. This map only shows the predicted likelihood of surface water flooding (this includes flooding from sewers, drains, small watercourses and ditches that occurs in heavy rainfall) for defined areas, and due to the coarse nature of the source data used, are not detailed enough to account for precise addresses.

2. Users of this map should refer to section 3.2 of the Surface Water Management Plan for a complete description of limitations and accuracy of the flood/hazard extents shown.

3. This map provides a strategic overview of surface water flood risk and may be subject to further analysis in the future.

THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED

**Legend**

- Borough Administrative Boundary
- Critical Drainage Area
- Permanent Water Bodies
- Main River
- Ordinary Watercourse
- Culverted Watercourse

**Flood Depth**

- <0.1m
- 0.1m to 0.25m
- 0.25m to 0.5m
- 0.5m to 1.0m
- 1.0m to 1.5m
- >1.5m

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# Royal Borough of Kingston upon Thames

## Surface Water Management Plan

## Surface Water Depth (m) 1 in 100 Chance of rainfall event occuring in any given year (1% AEP)



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Environment Agency · Thames Water · LONDON COUNCILS · GREATERLONDONAUTHORITY

| Scale at A3 | Date | Drawn by | Approved by |
|---|---|---|---|
| 1:40,000 | 20/07/2011 | D.SKILTON | E.CRAVEN |

**FIGURE 1**

Whilst property counts have been used to summarise risk across the Borough, local knowledge has been used to identify the Acre Road area as an area where investment to drainage infrastructure should be made as a matter of preference. Potential mitigation measures include the creation of storage areas and use of swales, in addition to drainage infrastructure improvements by increasing the number of gullies and capacity within the underground pipe network. This should be completed in collaboration with Thames Water.

**Phase 4 Implementation & Review**

Phase 4 establishes a long-term Action Plan for the Royal Borough of Kingston upon Thames to assist in their role under the FWMA to lead in the management of surface water, groundwater and ordinary watercourse flood risk across the Borough. The purpose of the Action Plan is to:

- Outline the actions required to implement the preferred options identified in Phase 3;
- Identify the partners or stakeholders responsible for implementing the action;
- Provide an indication of the priority of the actions and a timescale for delivery; and,
- Outline actions required to meet the requirements for Royal Borough of Kingston upon Thames as LLFA under the FWMA

# Glossary

| Term | Definition |
|---|---|
| Aquifer | A source of groundwater comprising water bearing rock, sand or gravel capable of yielding significant quantities of water. |
| AMP | Asset Management Plan |
| Asset Management Plan | A plan for managing water and sewerage company (WaSC) infrastructure and other assets in order to deliver an agreed standard of service. |
| AStSWF | Areas Susceptible to Surface Water Flooding |
| 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. |
| CDA | Critical Drainage Area |
| CFMP | Catchment Flood Management Plan |
| CIRIA | Construction Industry Research and Information Association |
| Civil Contingencies Act | This Act delivers a single framework for civil protection in the UK. As part of the Act, Local Resilience Forums must put into place emergency plans for a range of circumstances including flooding. |
| CLG | Government Department for Communities and Local Government |
| Climate Change | Long term variations in global temperature and weather patterns caused by natural and human actions. |
| Critical Drainage Area | Areas of significant flood risk, characterised by the amount of surface runoff that drains into the area, the topography and hydraulic conditions of the pathway (e.g. sewer, river system), and the receptors (people, properties and infrastructure) that may be affected. |
| Culvert | A channel or pipe that carries water below the level of the ground. |
| Defra | Department for Environment, Food and Rural Affairs |
| DEM | Digital Elevation Model |
| 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. |
| DTM | Digital Terrain Model |
| EA | Environment Agency |
| Indicative Flood Risk Areas | Areas determined by the Environment Agency as indicatively having a significant flood risk, based on guidance published by Defra and WAG and the use of certain national datasets. These indicative areas are intended to provide a starting point for the determination of Flood Risk Areas by LLFAs. |
| FMfSW | Flood Map for Surface Water |
| 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). |
| Flood Risk Area | An area determined as having a significant risk of flooding in accordance with guidance published by Defra and WAG. |
| Flood Risk Regulations | Transposition of the EU Floods Directive into UK law. The EU Floods Directive is a piece of European Community (EC) legislation to specifically address flood risk by prescribing a common framework for its measurement and management. |
| Floods and Water Management Act | Part of the UK Government's response to Sir Michael Pitt's Report on the Summer 2007 floods, the aim of which is to clarify the legislative framework for managing surface water flood risk in England. |
| Fluvial Flooding | Flooding resulting from water levels exceeding the bank level of a main river |
| FRR | Flood Risk Regulations |
| IDB | Internal Drainage Board |
| IUD | Integrated Urban Drainage |

| Term | Definition |
|---|---|
| LB | London Borough |
| LDF | Local Development Framework |
| Lead Local Flood Authority | Local Authority responsible for taking the lead on local flood risk management |
| LiDAR | Light Detection and Ranging |
| LLFA | Lead Local Flood Authority |
| Local Resilience Forum | A multi-agency forum, bringing together all the organisations that have a duty to cooperate under the Civil Contingencies Act, and those involved in responding to emergencies. They prepare emergency plans in a co-ordinated manner. |
| LPA | Local Planning Authority |
| LRF | Local Resilience Forum |
| Main River | A watercourse shown as such on the Main River Map, and for which the Environment Agency has responsibilities and powers |
| NRD | National Receptor Dataset – a collection of risk receptors produced by the Environment Agency |
| Ordinary Watercourse | All watercourses that are not designated Main River, and which are the responsibility of Local Authorities or, where they exist, IDBs |
| Partner | A person or organisation with responsibility for the decision or actions that need to be taken. |
| PFRA | Preliminary Flood Risk Assessment |
| Pitt Review | Comprehensive independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England. |
| Pluvial Flooding | Flooding from water flowing over the surface of the ground; often occurs when the soil is saturated and natural drainage channels or artificial drainage systems have insufficient capacity to cope with additional flow. |
| PPS25 | Planning and Policy Statement 25: Development and Flood Risk |
| Resilience Measures | Measures designed to reduce the impact of water that enters property and businesses; could include measures such as raising electrical appliances. |
| Resistance Measures | Measures designed to keep flood water out of properties and businesses; could include flood guards for example. |
| Risk | In flood risk management, risk is defined as a product of the probability or likelihood of a flood occurring, and the consequence of the flood. |
| Risk Management Authority | As defined by the Floods and Water Management Act |
| RMA | Risk Management Authority |
| Sewer flooding | Flooding caused by a blockage or overflowing in a sewer or urban drainage system. |
| SFRA | Strategic Flood Risk Assessment |
| Stakeholder | A person or organisation affected by the problem or solution, or interested in the problem or solution. They can be individuals or organisations, includes the public and communities. |
| SuDS | Sustainable Drainage Systems |
| Sustainable Drainage Systems | Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques. |
| Surface water | Rainwater (including snow and other precipitation) which is on the surface of the ground (whether or not it is moving), and has not entered a watercourse, drainage system or public sewer. |
| SWMP | Surface Water Management Plan |
| TfL | Transport for London |
| TWUL | Thames Water Utilities Ltd |
| WaSC | Water and Sewerage Company |

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# 1. Introduction

## 1.1 What is a Surface Water Management Plan?

1.1.1 A Surface Water Management Plan (SWMP) outlines the preferred surface water management strategy in a given location. In this context surface water flooding describes flooding from sewers, drains, groundwater, and runoff from land, small water courses and ditches that occurs as a result of heavy rainfall.

1.1.2 This SWMP study has been undertaken as part of the Drain London Project[1] in consultation with key local partners who are responsible for surface water management and drainage in the London area. These include the Greater London Authority, Thames Water, the Environment Agency and Transport for London. The Partners have worked together to understand the causes and effects of surface water flooding so that they can agree the most cost effective way of managing surface water flood risk for the long term.

1.1.3 This document also establishes a starting point for a long-term action plan to manage surface water and will influence future capital investment, maintenance, public engagement and understanding, land-use planning, emergency planning and future developments.

## 1.2 Background

1.2.1 In May 2007 the Mayor of London consulted on a draft Regional Flood Risk Appraisal (RFRA). One of the key conclusions was that the threat of surface water flooding in London was poorly understood. This was primarily because there were relatively few records of surface water flooding and those that did exist were neither comprehensive nor consistent. Furthermore the responsibility for managing flood risk is split between Boroughs and other organisations such as Transport for London, London Underground, Network Rail the Environment Agency and Thames Water. Relationships between surface water flooding and other sources of flood risk were also found to be unclear. To give the issue even greater urgency it is widely expected that heavy rain storms will increase in frequency with climate change.

1.2.2 The Greater London Authority, London Councils, Environment Agency and Thames Water commissioned a scoping study to test these findings and found that this was an accurate reflection of the situation. The conclusions were brought into sharp focus later in the summer of 2007 when heavy rainfall resulted in extensive surface water flooding in parts of the UK such as Gloucestershire, Sheffield and Hull causing considerable damage and disruption. It was clear that a similar rainfall event in London would have resulted in major disruption. The Pitt Review examined the flooding of 2007 and made a range of recommendations for future flood management, most of these have been enacted through the Flood and Water Management Act 2010 (FWMA).

1.2.3 DEFRA recognized the importance of addressing surface water flooding in London and fully funded the Drain London project. The Drain London project is delivered through 3 'Tiers' as shown in Figure 1-1 and Table 1-1. This SWMP is part of Tier 2 package of works.

[1] Further information on the Drain London Project can be found here http://www.london.gov.uk/drain-london

**Figure 1-1 Drain London Project 'Tier' Structure**

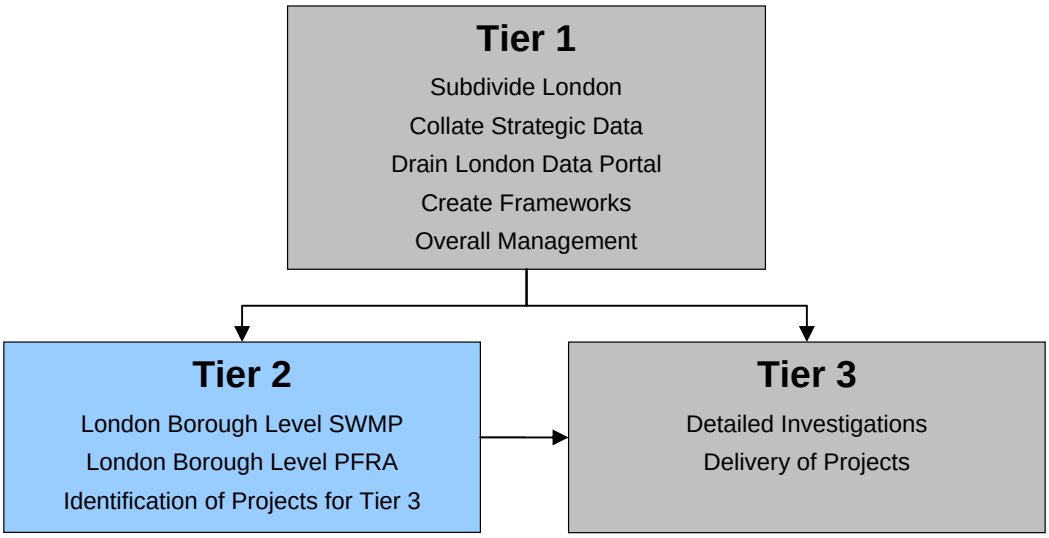
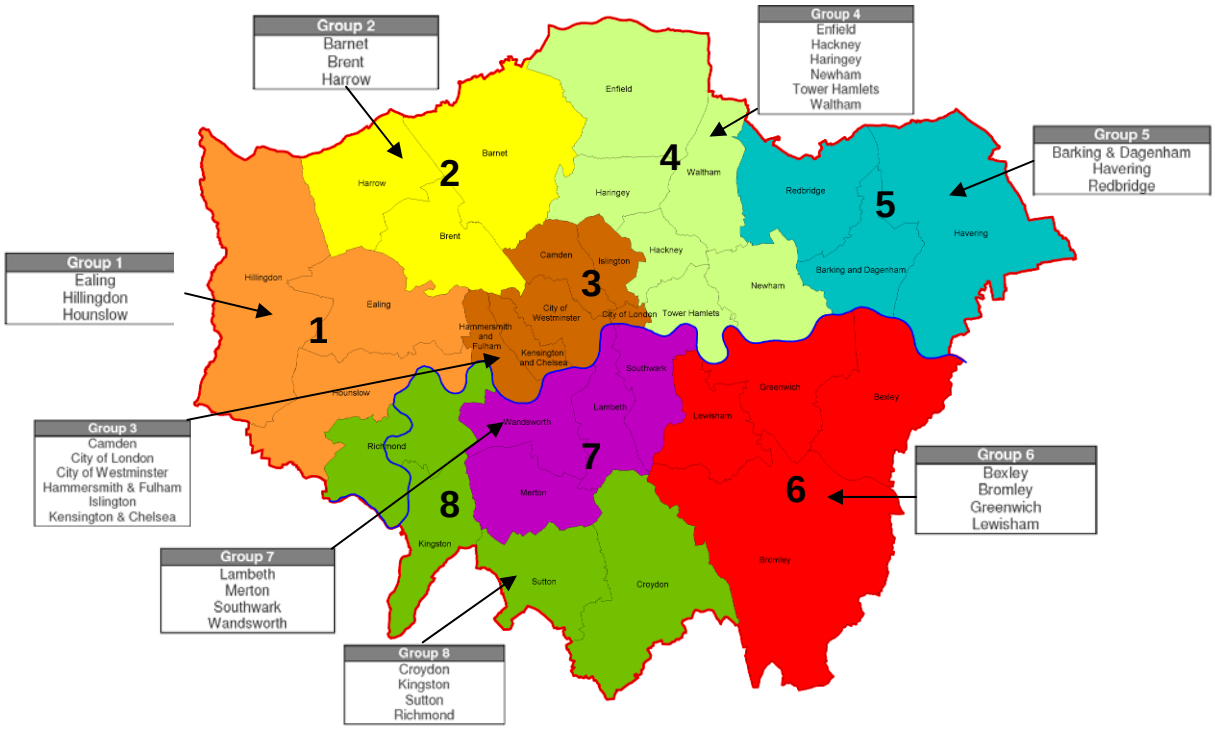



**Table 1-1 Drain London Project 'Tier' Structure**

| Tier | Summary |
|---|---|
| **Tier 1** | a) A high level strategic investigation to group the 33 separate Boroughs into a smaller number of more manageable units for further study under Tiers 2 and 3 in order to develop and refine a surface water management plan (SWMP) for each.<br>b) Development of a web based 'Portal' to provide data management, data storage and access to the various data sets and information across the 'Drain London Forum' (DLF) participants and to Tier 2 & 3 consultants.<br>c) Provide programme management support for the duration of the Drain London project, including Tiers 2 and 3. |
| **Tier 2** | a) Delivery of 33 Borough-level **Surface Water Management Plans** (SWMPs) to identify Local Flood Risk Zones (LFRZ) and Critical Drainage Areas (CDAs).<br>b) Creation of 33 Borough-level **Action Plans** including capital and maintenance actions and programmes of work for each partner/stakeholder as well as actions required to meet the responsibilities as Lead Local Flood Authority required by the Flood and Water Management Act 2010.<br>c) Preparation of 33 Borough-level **Preliminary Flood Risk Assessments** to meet the requirements of the Flood Risk Regulations 2009 on Lead Local Flood Authorities.<br>d) List of prioritised CDAs for potential further study or capital works in Tier 3 using the Drain London Tier 1 **Prioritization Matrix**. |
| **Tier 3** | a) Detailed investigations into high priority CDAs to further develop and prioritise mitigation options.<br>b) Development of cross-organisational action plans that include a costed list of identified flood risk management mitigation measures and community level flood plans. |

1.2.4 As described in Table 1-1, Tier 2 of the Drain London project involves the preparation of SWMPs for each London Borough. Through the subsequent enactment of the Flood Risk Regulations 2009 (FRR2009). ,Boroughs are also required to produce Preliminary Flood Risk Assessments (PFRA). The Drain London project has therefore been adjusted to deliver both a PFRA and an SWMP for each London Borough. This will be a major step in meeting Borough requirements as set out in the FWMA. Another key aspect of the Act is to ensure that Boroughs work in partnership with other Local Risk Authorities. Drain London assists this by creating sub-regional partnerships as set out in Figure 1-2.

**Figure 1-2 Drain London sub-regional partnership**




## 1.3 OBJECTIVES

1.3.1 The objectives of the SWMP are to:

*PHASE I – PREPARATION*

- Identify the specific needs for a SWMP in the Royal Borough of Kingston upon Thames and determine the local project drivers (further details below);
- Build upon knowledge contained within the Borough to develop a Strategic Flood Group, to facilitate a collaborative culture of data, skills and resource sharing between key drainage stakeholders;
- Use the Flood Group and SWMP to create closer coordination between Boroughs to enable future cross boundary working opportunities.

*PHASE II – RISK ASSESSMENT*

- Undertake a suitable modelling approach to enable a robust understanding of surface water flood risk in and around the study area, taking into account the challenges of climate change, population and demographic change and increasing urbanisation in London;
- Identify, define and prioritise CDAs (Section 3.2.2), including further definition of existing local Flood Risk Zones (Section 3.2.1) and mapping new areas of potential surface water flood risk;
- Communicate flood risks to relevant bodies both within the Borough and to the wider South London Strategic Flood Group (including members from the Environment Agency and Thames Water).

*PHASE III – OPTIONS*

- Make holistic and multifunctional recommendations for surface water management which improve emergency and land use planning and enable better surface water flood risk and drainage infrastructure investments;
- Undertake engagement with stakeholders to raise awareness of surface water flooding, identify flood risks and assets and agree mitigation measures and actions;
- Advise on 'early actions' or practical solutions that can be implemented;
- Advise on the potential for Integrated Drainage Strategies for strategic development sites.

*PHASE IV – IMPLEMENTATION AND REVIEW*

- Deliver outputs to enable a real change on the ground rather than just reports and models, whereby partners and stakeholders take ownership of their surface water flood risk and commit to delivery and maintenance of the recommended measures and actions;
- Prepare an Action Plan;
- Facilitate preliminary discussions relating to wider issues of future flood risk management including each Councils responsibility as Lead Local Flood Authority for the Councils to then take forward with local stakeholders.

1.3.2 The Royal Borough of Kingston upon Thames specific aims and objectives were discussed at various meetings held throughout the development of the SWMP. The Borough had been part of a first edition Surface Water Management Plan completed in August 2009 and therefore had a good understanding of Local Flood Risk Zones across their Borough. This meant that the key requirements of the SWMP were more clearly stated including:

- Mapping of surface water flood depths across the whole Borough using one technique so that the Borough wide risk can be clearly assessed and compared to historic records of flooding;
- Guidance on the potential costs and impacts of mitigation measures within the Borough;

- Advice on planning policy measures;
- Using the SWMP to facilitate collaborative working with adjacent Boroughs and stakeholders;
- Guidance on roles and responsibilities moving forward under their new role as Lead Local Flood Authority;
- Information on potential funding for future flood risk mitigation schemes.

## 1.4 STUDY AREA

1.4.1 The Royal Borough of Kingston upon Thames is situated in the south-west of London and is bordered by Richmond to the north-west; Wandsworth and Merton to the north-east, Sutton to the south-east and the Surrey districts of Epsom & Ewell, Elmbridge and the Mole Valley to the south.

### *TOPOGRAPHY AND LAND USE*

1.4.2 The Borough covers an area of 38.66 square kilometres and is the seventh smallest London Borough in terms of its geographical area. The Borough comprises 16 wards which form 4 neighbourhoods of Kingston Town, Maldens and Coombe, Surbiton and South of the Borough, and the population is estimated at 160,000 (2008 estimates)[2]. Over a third of the Borough is open space[3] including Richmond Park, Wimbledon Common, Hampton Court and Bushy Park as well as smaller green spaces. See Figure 1.4.2 for land uses.

1.4.3 The River Thames forms the north western boundary with Richmond upon Thames, the Beverley Brook is the north eastern boundary and the River Hogsmill flows through the centre of the Borough in a north westerly direction.

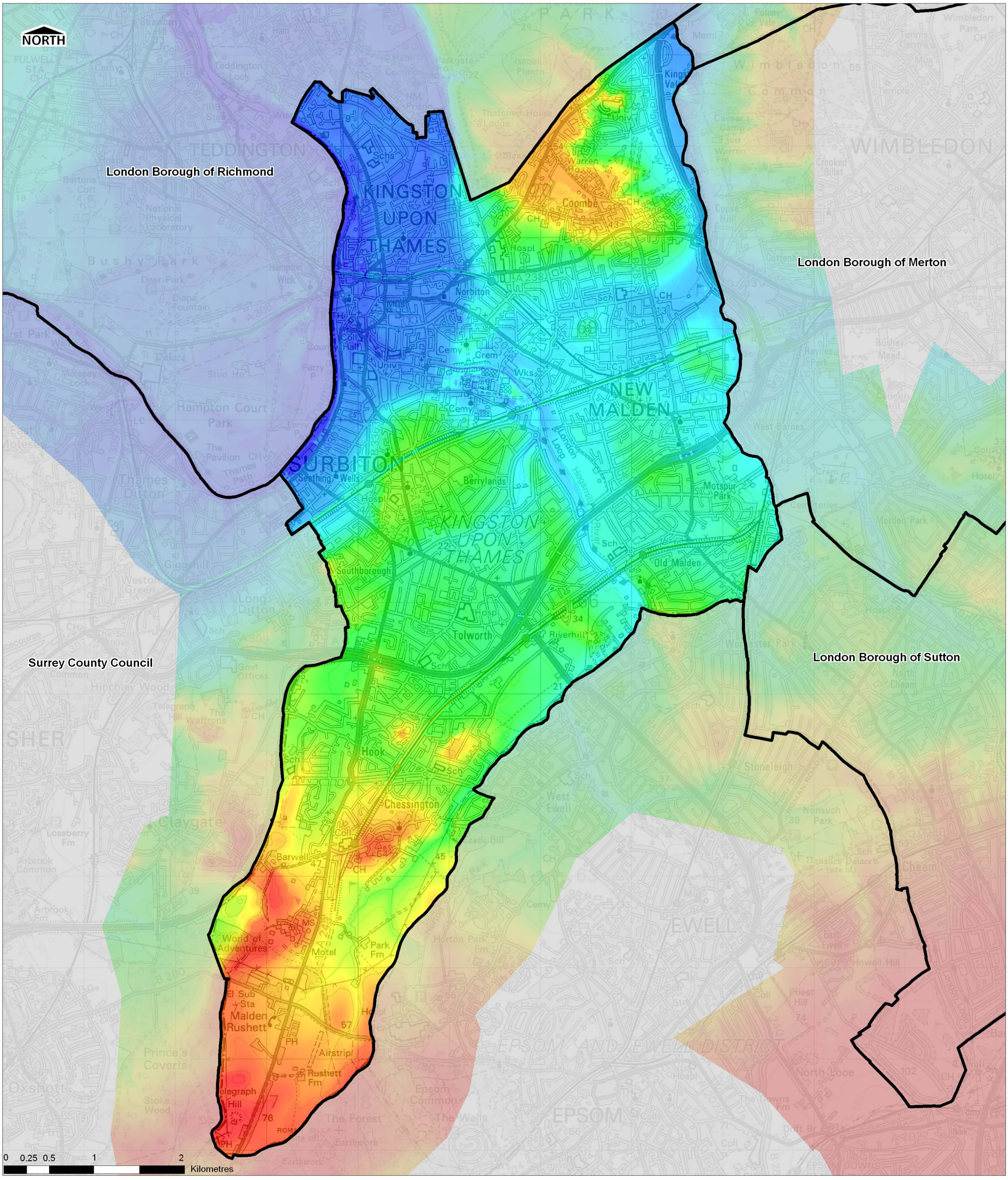
1.4.4 The Royal Borough of Kingston upon Thames is one of five London Boroughs which has no London Underground station. It has nine National Rail stations and two centrally located bus stations. Kingston Hospital (located close to Norbiton Station) is the largest single site District General Hospital in London. The A3 is a strategically important highway, linking south west London with the M25 and Portsmouth. The A3 follows the north eastern boundary of the Borough before travelling through the centre in a southerly direction through Chessington. This highway is a designated red route operated by TFL.

1.4.5 The west of the Borough is relatively flat being influenced by the River Thames fluvial floodplain with ground levels between 6mAOD and 10mAOD (including Kingston Town Centre). Ground levels quickly rise to the north as you approach Coombe Hill where elevations are in the range of 30mAOD to 55mAOD. This results in some steep slopes which can form surface water flow paths creating a surface water flood risk to the lower elevations described above.

1.4.6 The River Hogsmill is located in the centre of the Borough flowing in a westerly direction towards the River Thames. Ground levels associated with this watercourse are typically 12mAOD to 15mAOD.

1.4.7 Ground levels towards the south of the Borough rise towards Chessington where the ground elevation ranges from 40mAOD to 50mAOD.

[2] Royal Borough of Kingston upon Thames Borough Profile 2009
[3] Local Development Framework, Core Strategy RBK Jan 2011




THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED

**Legend**

Borough Administrative Area

m AOD

- 5
- 15
- 30
- 45
- 60
- 75

# Royal Borough of Kingston upon Thames

## Surface Water Management Plan



## LiDAR Topographic Survey

Consultants
CAPITA SYMONDS Flood Risk Management
URS / Scott Wilson
6 - 8 Greencoat Place
London
SW1P 1PL

Drain London Programme Board Members

Environment Agency · Thames Water · LONDON COUNCILS · GREATERLONDONAUTHORITY

| Scale at A3 | Date | Drawn by | Approved by |
|---|---|---|---|
| 1:40,000 | 20/07/2011 | D.SKILTON | E.CRAVEN |

**FIGURE 1.4.1**

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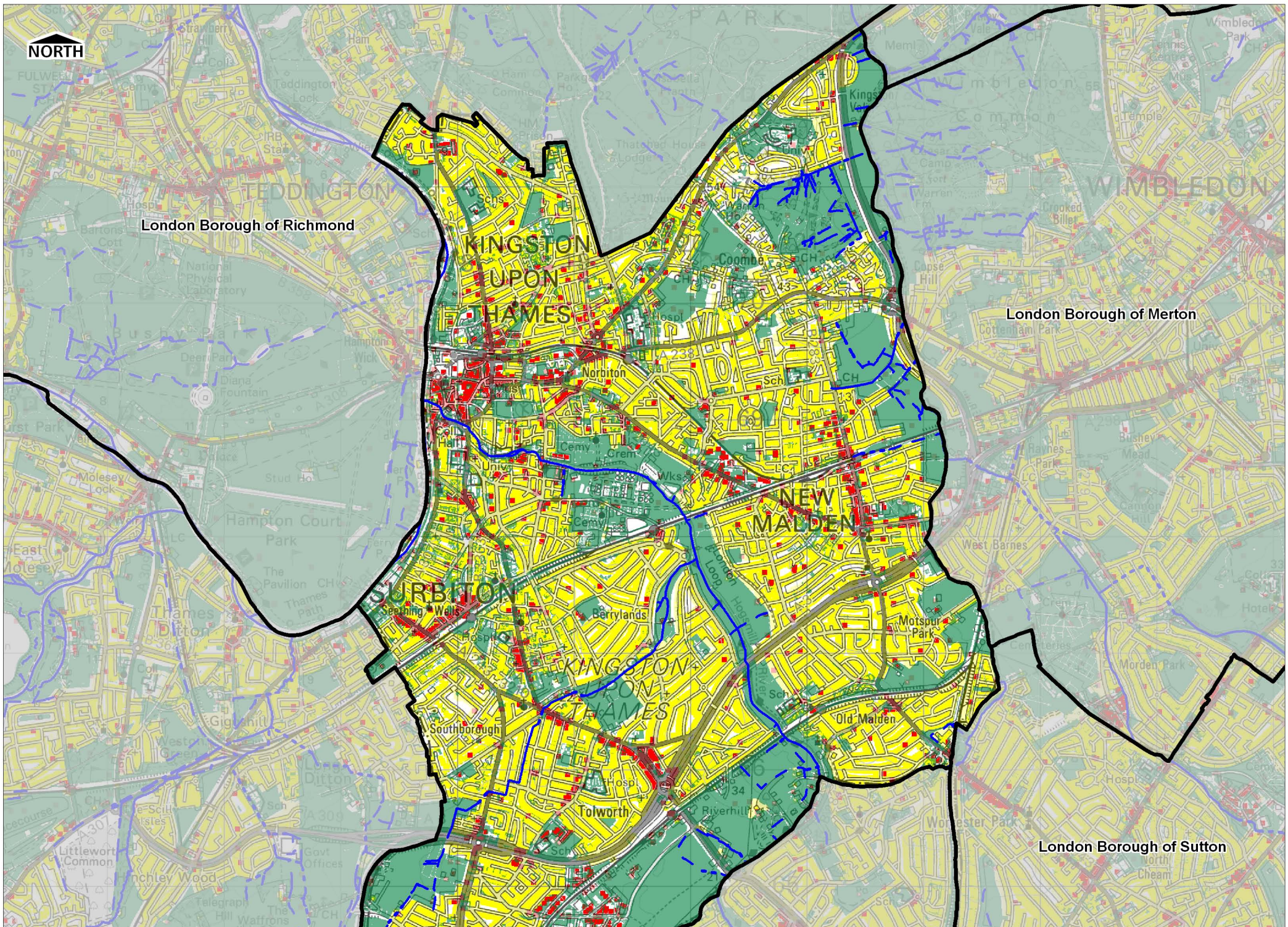


THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED

**Legend**

- Borough Administrative Boundary
- Residential (Derived from EA NRD Dataset)
- Commercial / Industrial (Derived from EA NRD Dataset)
- Open Land & Park Land (Derived from OS Master Mapping)
- Main River
- Ordinary Watercourse
- Culverted Watercourse

# Royal Borough of Kingston upon Thames

## Surface Water Management Plan



## Land Use Areas

Consultants
CAPITA SYMONDS
Flood Risk Management
Scott Wilson
URS / Scott Wilson
6 - 8 Greencoat Place
London
SW1P 1PL

Drain London Programme Board Members

Environment Agency · Thames Water · LONDON COUNCILS · GREATERLONDONAUTHORITY

| Scale at A3 | Date | Drawn by | Approved by |
|---|---|---|---|
| 1:40,000 | 20/07/2011 | D.SKILTON | E.CRAVEN |

**FIGURE 1.4.2**

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**Figure 1.4.1 – LiDAR Topographic Survey**
**Figure 1.4.2 – Land Use Areas**

*HISTORIC FLOODING*

1.4.8 According to national research undertaken by Defra[4], the Royal Borough of Kingston upon Thames is ranked the 58th settlement in England most susceptible to surface water flooding, with as many as 5,000 properties estimated to be at risk.

1.4.9 Kingston upon Thames was in places severely affected in July 2007 by surface water flooding. The Met Office reported rainfall intensities in excess of 25mm/hr at many locations in the south and west, with daily totals exceeding 100mm (compared to a monthly average rainfall of 44mm for July in the period 1971 to 2000).

1.4.10 This short duration high intensity storm led to substantial overland flow and ponding of surface water in low lying areas. Drainage systems were overwhelmed in several locations across the Borough including Acre Road in north Kingston. In addition, widespread damage was caused to schools, commercial properties and disruption was experienced on the transport systems connecting the Borough with central London.

1.4.11 Table 1-2 below includes details of past flood events experienced within the Borough.

**Table 1-2 Historic flood Events in the Royal Borough of Kingston upon Thames**

| Flood Event | Description |
|---|---|
| May 2004 Surface Water Flooding | Excessive rain fell in the Borough causing localised flooding of residential properties. |
| August 2004 Surface Water Flooding | In 2004 flooding was experienced in Kingston Town Centre which caused property flooding, severe traffic disruption and loss of revenue for local businesses. |
| September 2005 Surface Water Flooding | One and a half inches (approx 40mm) of rain fell in one hour which led to flooding across the Borough. |
| August 2006 Surface Water Flooding | Flooding was experienced in the Berrylands area |
| July and November 2007 Surface Water Flooding | Severe heavy rainfall caused localised surface water flooding and led to property flooding and disruption to transport systems (see Figure 1-3 below). |

[4] National Rank Order of Settlements Susceptible to Surface Water Flooding, Defra 2009

**Figure 1-3 Surface Water Flooding in Acre Road, North Kingston July 2007**

1.4.12 Under UKCIP02, predictions for future rainfall up to 2050 suggest an increase in winter precipitation of up to 15%. Heavier winter precipitation is expected to become more frequent with 0.25-0.75 more days of 'intense' rainfall (i.e. over 20mm). The risk of exceedance of the urban drainage system and surface water flooding in the Borough is therefore likely to increase into the future unless steps are taken to manage and mitigate this form of flooding.

*CROSS BOUNDARY INTERACTIONS WITH NEIGHBOURING LOCAL AUTHORITIES*

1.4.13 As shown in Figure 1-2, the Royal Borough of Kingston upon Thames shares boundaries with LLFAs in Groups 8 and 7 as well as with Surrey County Council which lies outside of the Greater London Authority study area. A summary of the cross boundary interactions with these LLFAs is provided below.

**Interactions with the London Borough of Richmond upon Thames (Group 8)**

1.4.14 The Royal Borough of Kingston upon Thames has well established links with the London Borough of Richmond upon Thames with joint studies being commissioned in the past. The Drain London project has provided opportunity for this partnership to expand to include collaborative working with the London Boroughs of Sutton, Croydon, Wandsworth and Merton. The River Thames forms the north western Borough boundary between Richmond and Kingston therefore no surface water flow paths are present in this location.

**Interactions with London Borough of Sutton (Group 8) and London Boroughs of Merton and Wandsworth (Group 7)**

1.4.15 The London Boroughs of Sutton, Merton and Wandsworth lie to the east of the Royal Borough of Kingston upon Thames. The chief interaction between these Boroughs is the Beverley Brook, an Environment Agency Main River, which forms the boundary between these three Boroughs and the Royal Borough of Kingston upon Thames. Measures to alleviate flooding on the Boundary of these Boroughs will require collaborative cross-working between Boroughs as well as other stakeholders.

**Interactions with Surrey County Council**

1.4.16 The Royal Borough of Kingston upon Thames adjoins the administrative area of Surrey County Council to the south of the Borough. Flows of surface water have been identified around the edge of the Borough, including overland flow paths feeding into the catchment of the River Hogsmill from Epsom and Ewell at the Borough boundary. Any source control and attenuation measures to manage the flood risk in these areas will require collaborative working between London Borough of Sutton and Surrey County Council (or the relevant District Council, where responsibilities have been delegated from Surrey County Council).

*FUTURE URBANISATION AND DEVELOPMENT*

1.4.17 The Royal Borough of Kingston upon Thames are currently creating a suite of documents called their Local Development Framework which will guide how the Borough will change over the next 15 years in terms of the built environment e.g. housing, offices, shops etc while balancing the need to protect the environment, open spaces and the Borough's character. Public consultation on the Core Strategy is currently underway with adoption planned for May 2012.

1.4.18 The Core Strategy identifies seven local areas where local changes are promoted. These comprise three 'Key Areas of Change' including:

- Kingston Town Centre (guided by a specific Area Action Plan);
- Tolworth Regeneration Area; and,
- Hogsmill Valley.

1.4.19 In addition, the Core Strategy identifies four Neighbourhoods where local changes are promoted, these include:

- Maldens and Coombe Neighbourhood;
- Kingston Town Centre Neighbourhood;
- Surbiton; and,
- South of the Borough.

## 1.5 INTERACTION BETWEEN SOURCES OF FLOODING

1.5.1 In the context of SWMPs, surface water flooding incorporates flooding from sewers, drains, groundwater, and runoff from land, small watercourses (often referred to as ordinary watercourses) and ditches occurring as a result of heavy rainfall. These sources may operate independently or through a more complex interaction of several sources.

1.5.2 An initial overview of the flooding issues in the Royal Borough of Kingston upon Thames reveals areas that are affected by multiple sources of flood risk and complex interactions between urban watercourses, direct surface water ponding, overland flow paths and the surface water sewer system. One such area is the Old Malden area which is susceptible to surcharge of the surface water drainage system and direct surface water flooding from rainfall, which also contributes to overland flow in addition to fluvial flooding from the River Hogsmill.

1.5.3 In order for the flooding mechanisms to be adequately assessed, a holistic approach to surface water management is required. The SWMP approach will seek to ensure that all sources and mechanisms of surface water flood risk are assessed and that solutions are considered in a holistic manner so that measures are not adopted that reduce the risk of flooding from one source to the detriment of another.

1.5.4 While fluvial flood risk is not modelled in this study, its influence cannot be ignored as when receiving watercourses are in flood or during high tide conditions, surface water drainage outfalls may become blocked causing surface water flooding elsewhere. Fluvial flood risk caused by fluvial systems within the Borough is well understood and has been documented in the Kingston Town Centre Strategic Flood Risk Assessment, 2007. For the purposes of this study, fluvial watercourses have been represented in pluvial modelling as being 'bank full' as detailed within Appendix C which contains the pluvial modelling methodology.

## 1.6 Linkages with Other Plans

1.6.1 The increased focus on flood risk over recent years is an important element of adaptation to climate change. It is important that the SWMP is not viewed as an isolated document, but one that connects with other strategic and local plans. Drain London links to a number of regional and local plans which are discussed in more detail below.

### *Regional Flood Risk Appraisal (RFRA)*

1.6.2 This is produced by the Greater London Authority and gives a regional overview of flooding from all sources. The RFRA will be updated in 2012 to reflect the additional information on local sources of flood risk (surface water, groundwater and ordinary watercourses) provided by Drain London. This may also generate new policies that could be incorporated into the London Plan when it is reviewed.

**Table 1-3 RFRA Strategic recommendations relevant to the Royal Borough of Kingston upon Thames**

**Recommendation 5** Developments all across London should implement the Drainage Hierarchy set out in Policy 4A.5vii of the FALP.

**Recommendation 6** Regeneration and redevelopment of London's fluvial river corridors offer a crucial opportunity to reduce flood risk. Strategic Flood Risk Assessments and policies should focus on making the most of this opportunity through appropriate location, layout and design of development as set out in PPS25 and the Thames Catchment Flood Management Plan. In particular opportunities should be sought to:

i. Set back of development from the river edge to enable sustainable and cost effective flood risk management options (FALP Policy 4A.5vi).
ii. Ensure that the buildings with residual flood risk are designed to be flood compatible or flood resilient (FALP Policy 4A.5vi).
iii. Use open spaces within developments which have a residual flood risk to act as flood storage areas

**Recommendation 8** Organisations responsible for development with large roof areas should investigate providing additional surface water run-off storage.

**Recommendation 18** Operators of London's emergency services should ensure that emergency plans for flooding incidents are kept up to date and suitable cover arrangements are in place in the event of a flood effecting operational locations.

### *THAMES CATCHMENT FLOOD MANAGEMENT PLAN (CFMP)*

1.6.3 The Thames CFMP was published in 2008 by the Environment Agency and sets out policies for the sustainable management of flood risk across the whole of the Thames catchment over the long-term (50 to 100 years) taking climate change into account. More detailed flood risk management strategies for individual rivers or sections of rivers may sit under these.

1.6.4 The Plan emphasises the role of the floodplain as an important asset for the management of flood risk, the crucial opportunities provided by new development and regeneration to manage risk, and the need to re-create river corridors so that rivers can flow and flood more naturally.

1.6.5 This Plan will be periodically reviewed, approximately five years after publication, to reflect any changes in the catchment. There are links to Drain London where there are known interactions between surface water and fluvial flooding.

**Table 1-4 CFMP Policy Unit**

**Beverley Brook Policy Unit**

The Beverley Brook Policy Unit comprises highly developed floodplains with little open space and modified river channels. The preferred policy is Policy 4 – accept the risk – but in the long term take action to ensure that risk does not increase from current level.

Key messages for Policy 4 are as follows:

- Redevelopment rates in some areas are very high and offer the opportunity to reduce the risk and the current reliance on flood defences. This includes making the urban environment more resilient and with a layout that offers more options for managing future flood risk and the impacts of climate change.
- Generally the existing river corridors in these areas provide an opportunity to be able to adapt to the impacts of climate change and we are seeking to safeguard them from inappropriate development. We are seeking to maintain existing assets at least until redevelopment takes place.
- Climate change will mean that we need to adapt the existing defences over time. Rather than replacing them like for like, we will be seeking a different combination of flood storage, river defences and floodplain attenuation.
- Some of these areas are susceptible to rapid flooding from thunderstorms. Emergency response and flood awareness are particularly important.

**River Hogsmill Policy Unit**

This Policy Unit includes Kingston and includes largely urban catchment where the river corridor has not been over developed and there is not an over dependence upon flood defence structures. The preferred policy is Policy 6 – use natural protection already provided in the river channel and open spaces of the floodplain. This needs to be complimented by improvements to other parts of the drainage network.

Key messages for Policy 6 are as follows:

- Maintain and where possible improve the capacity of the floodplain to store water
- Work with planning authorities to prevent loss of open spaces
- Manage urban runoff and increase the resistance and resilience of buildings through re development.
- Develop emergency planning response to deal with extreme events including raising public awareness and work with key partners to identify critical infrastructure at risk.

### *Preliminary Flood Risk Assessment (PFRA)*

1.6.6 PFRAs are required under the FRR 2009 which implement the requirements of the European Floods Directive (2009). Drain London has produced a PFRA for each LLFA, to give an overview of all local sources of flood risk. In London, PFRAs will benefit from an increased level of information relating to surface water from the Drain London SWMPs. Boroughs will need to review these PFRAs every 6 years as a requirement of their responsibilities as LLFA (see Section 1.7).

### *Surface Water Management Plans (SWMP)*

1.6.7 Drain London is producing a SWMP for each London Borough. They provide probabilistic 2-dimensional modelling data which is more accurate and detailed than the national data sets which are available from the Environment Agency. In addition they contain an Action Plan that has been developed in conjunction with both the Borough and relevant other Risk Management Authorities. This data and actions and associated policy interventions will

need to feed directly into the operational level of the Borough across many departments, in particular into spatial and emergency planning policies and designations and into the management of local authority controlled land.

*STRATEGIC FLOOD RISK ASSESSMENTS (SFRA)*

1.6.8 Each local planning authority is required to produce a SFRA under Planning Policy Statement 25 (PPS25). This provides an important tool to guide planning policies and land use decisions. Current SFRAs have a strong emphasis on fluvial flooding from main rivers and the sea and are relatively weak in evaluating flooding from other local sources including surface water, groundwater and ordinary watercourses. The information from Drain London will improve this understanding and the Council may wish to update their SFRA for Kingston Town Centre completed in May 2007 where necessary.

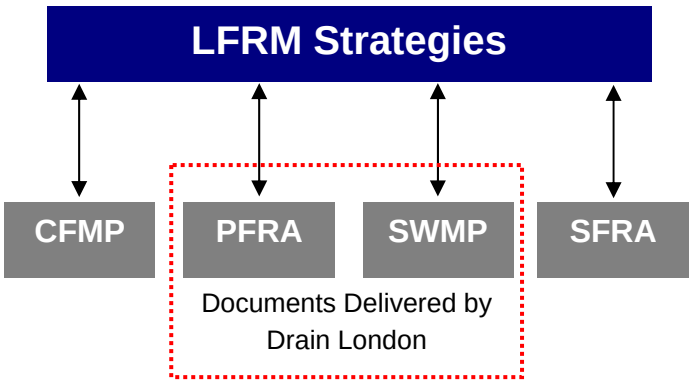
*LOCAL DEVELOPMENT DOCUMENTS (LDD)*

1.6.9 LDDs including the Core Strategy and relevant Area Action Plans (AAPs) will need to reflect the results from Drain London. This may include policies for the whole Borough or for specific parts of Boroughs, for example CDAs. There may also be a need to review AAPs where surface water flood risk is a particular issue. The updated SWMP will assist with this as will the reviewed RFRA and any updated London Plan policies. In producing Opportunity Area Planning Frameworks, the GLA and Boroughs will also examine surface water flood risk more closely.

*LOCAL FLOOD RISK MANAGEMENT STRATEGIES (LFRMS)*

1.6.10 The FRR2009 requires each LLFA to produce a Local Flood Risk Management Strategy (LFRMS) by December 2012. Whilst Drain London will not actually produce these, the SWMPs, PFRAs and their associated risk maps will provide the necessary evidence base to support the development of LFRMS. No new modelling is anticipated to be required to produce these strategies. Figure 1-4 illustrates how the CFMP, PFRA, SWMP and SFRA link to and underpin the development of a LFRMS.

**Figure 1-4 Linkages between Flood Risk Management Documents**




## 1.7 EXISTING LEGISLATION

1.7.1 The FWMA 2010 presents a number of challenges for policy makers and flood and coastal risk management authorities identified to co-ordinate and deliver local flood risk management (surface water, groundwater and flooding from ordinary watercourses). 'Upper Tier' local authorities have been empowered to manage local flood risk from surface water and groundwater through their new responsibilities as LLFAs.

1.7.2 The FWMA reinforces the need to manage flooding holistically and in a sustainable manner. This has grown from the key principles within Making Space for Water (Defra, 2005) and was further reinforced by the summer 2007 floods and the Pitt Review (Cabinet Office, 2008). It implements several key recommendations of Sir Michael Pitt's Review of the summer 2007 floods, whilst also protecting water supplies to consumers and protecting community groups from excessive charges for surface water drainage.

1.7.3 The FWMA must also be considered in the context of the EU Floods Directive, which was transposed into law by the FRR on the 10th December 2009. The FRR2009 requires LLFAs to provide three main types of assessment / plan:

1) **Preliminary Flood Risk Assessments (PFRAs)**
   i. This process involves collecting information on past and future (potential) floods, assembling the information into a PFRA report and spreadsheet, and identifying Flood Risk Areas.
   ii. LLFAs are only required to undertake a PFRA for local sources of flooding, which principally includes surface water, groundwater and ordinary watercourses.
   iii. It is the responsibility of the Environment Agency to assess the flood risk from the following sources; main rivers, the sea and reservoirs
   iv. The PFRA reports and spreadsheets must be completed by 22nd December 2011.

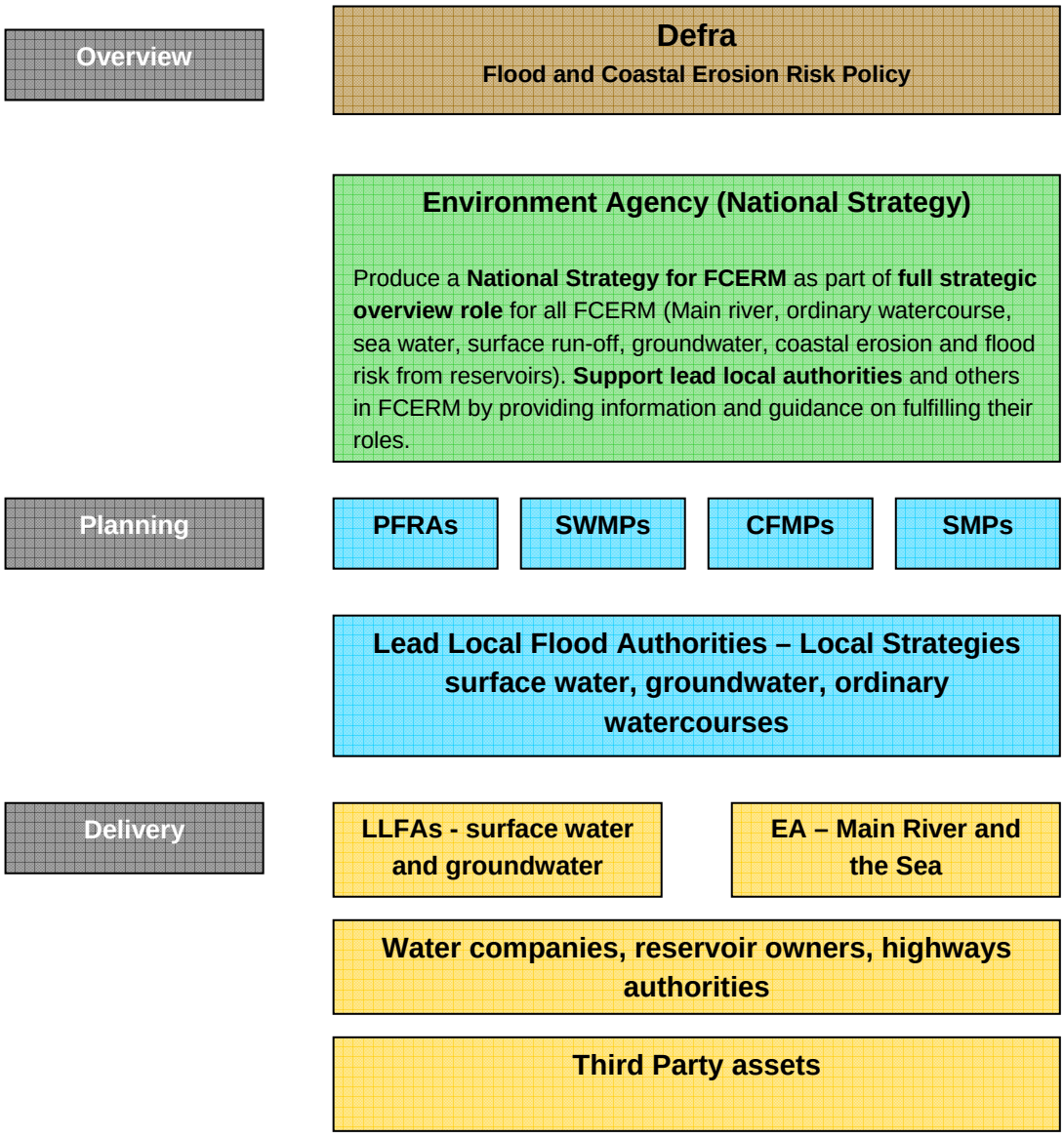
2) **Flood Hazard Maps and Flood Risk Maps.** Following the identification of Flood Risk Areas, the Environment Agency and LLFAs are required to produce Hazard and Risk maps by 22nd December 2013.

3) **Flood Risk Management Plans.** The Environment Agency and LLFAs are required to produce Flood Risk Management Plans by 22 December 2015. It is

likely that the SWMP will contribute significantly to the preparation of a Flood Risk Management Plan by the Royal Borough of Kingston upon Thames.

1.7.4 Figure 1-5 below illustrates how this SWMP fits into the delivery of local flood and coastal risk management, and where the responsibilities for this lie.

**Figure 1-5 Requirements and responsibilities for the delivery of local flood and costal risk management**




1.7.5 Aside from forging partnerships and coordinating and leading on local flood management, there are a number of other key responsibilities that have arisen for LLFAs from the FWMA, and the FRR2009. The preparation of the SWMP and PFRA for Royal Borough of Kingston upon Thames as part of the Drain London Project will enable the Borough to strengthen its understanding of these responsibilities and consider how they can be fulfilled. These responsibilities include:

- **Investigating flood incidents** – LLFAs have a duty to investigate and record details of significant flood events within their area. This duty includes identifying which authorities have flood risk management functions and what they have done or intend to do with respect to the incident, notifying risk management authorities where necessary and publishing the results of any investigations carried out.
- **Asset Register** – LLFAs also have a duty to maintain a register of structures or features which are considered to have a significant effect on flood risk, including details on ownership and condition as a minimum. The register must be available for inspection and the Secretary of State will be able to make regulations about the content of the register and records.
- **SuDS Approving Body** – LLFAs are designated the Sustainable Drainage Systems (SuDS) Approving Body (SAB) for any new drainage system, and therefore must approve, adopt and maintain any new SuDS within their area. This responsibility is anticipated to commence from April 2012.
- **Local Flood Risk Management (LFRM) strategies** – LLFAs are required to develop, maintain, apply and monitor a strategy for local flood risk management in its area. The LFRM strategy will build upon information such as national risk assessments and will use consistent risk based approaches across different local authority areas and catchments.
- **Works powers** – LLFAs have powers to undertake works to manage flood risk from surface runoff and groundwater, consistent with the LFRM strategy for the area.
- **Designation powers** – LLFAs, as well as District Councils and the Environment Agency have powers to designate structures and features that affect flooding in order to safeguard assets that are relied upon for flood risk management. Once a feature is designated, the owner must seek consent from the authority to alter, remove or replace it.

## 1.8 PEER REVIEW

1.8.1 It is essential for the Drain London Project that SWMPs are consistent and comparable across Greater London. This is to facilitate:

1. Fair, transparent and rapid allocation of funds to identified high priority flood risk areas within London;
2. Collaborative working practices between stakeholders; and
3. Building of local capability (Council officers and consultants doing work in the future will be able to make use of outputs regardless of who produced them for each Borough).

1.8.2 To ensure consistency and comparability between London Borough SWMPs produced, a Peer Review process has been used. The process involved the four consultant teams working on the Drain London SWMPs independently reviewing each others work. This has ensured that all outputs result from a consistent technical approach, are of a high technical quality and are communicated in the specified formats. The peer review report for this SWMP is included in Appendix F.