

Section 19 Flood Investigation Report: Runnymede

28 October 2015



SURREY

Section 19 Report

Purpose

This document has been prepared specifically for the purpose of meeting the requirements of Section 19 of the Flood and Water Management Act 2010.

The report investigates which risk management authorities (RMAs) had relevant flood risk management functions during the flooding that took place in the winter of 2013/14. The report also considers whether the relevant RMAs have exercised, or propose to exercise, their flood risk management functions. It does not address wider issues beyond that remit.

The supporting data has been put together based on records of internal property flooding and road closure information from a variety of sources. Whilst every effort has been made to verify the locations of the Section 19s identified, the nature of the data and the methods used to collate this information mean that it does not include every occurrence of flooding. This data only identifies where flooding has been reported and is indicative only.

| | |
|-----------------------|---|
| Location Name | Runnymede; Egham and Thorpe, Chertsey and Addlestone. |
| Date(s) of Incidents | Winter 2013/14 |
| Section 19 Trigger(s) | Internal property flooding at multiple addresses Road closures |

Glossary

The table below defines some of the frequently used terminology within the flood risk management industry and within this document.

| Acronym/Term | Definition |
|--------------------------------|---|
| Annual Probability | Throughout this document, flood events are defined according to their likelihood of occurrence. The term 'annual probability of flooding' is used, meaning the chance of a particular flood occurring in any one year. This can be expressed as a percentage. For example, a flood with an annual probability of 1 in 100 can also be referred to as a flood with a 1% annual probability. This means that every year there is a 1% chance that this magnitude flood could occur. |
| EA | Environment Agency |
| Flooding Asset Register | The register is a record of all structures or features designated by the Environment Agency, the Lead Local Flood Authority, the district and borough councils or the Internal Drainage Board which have an effect on flood risk. More information on the Flooding Asset Register can be found on Surrey County Council's website and in Schedule 2 of the Flood and Water Management Act (2010). |
| Flood Risk Management Function | A flood risk management function is a function listed in the Act (or related Acts) which may be exercised by a risk management authority for a purpose connected with flood risk management. |
| Very Low Flood Risk | Area with a very low probability of flooding from rivers (< 1 in 1,000 annual chance of flooding or <0.1%). |
| Low Flood Risk | Area with a low probability of flooding from rivers (between a 1 in 1000 and 1 in 100 annual chance of flooding or between 0.1% and 1%). |
| Medium Flood Risk | Area with a medium probability of flooding from rivers (between a 1 in 100 and 1 in 30 annual chance of flooding or between 1% and 3.33%). |
| High Flood Risk | Area with a high probability of flooding from rivers (> 1 in 30 annual chance of flooding or greater than 3.3%). |
| IDB | Internal Drainage Board |
| LLFA | Lead Local Flood Authority |
| Main River | Main Rivers are usually larger streams and rivers, but some of them are smaller |

| | |
|----------------------|--|
| | watercourses of local significance. Main Rivers indicate those watercourses for which the Environment Agency is the relevant risk management authority. |
| Ordinary Watercourse | Ordinary Watercourses are displayed in the mapping as the detailed river network. An Ordinary Watercourse is any watercourse (excluding public sewers) that is not a Main River, and the Lead Local Flood Authority, District/Borough council or Internal Drainage Board are the relevant risk management authority. |
| RBC | Runnymede Borough Council |
| RMA | Risk Management Authority |
| SCC | Surrey County Council |
| TW | Thames Water |
| uFMfSW | Updated Flood Maps for Surface Water |

Sources of Flooding

The following report considers the flooding which occurred in the winter of 2013/14. The table below describes different sources of flood risk.

| Source | Description |
|-----------------------------|---|
| Fluvial flooding | Exceeding of the flow capacity of river channels (whether this is a Main River or an Ordinary Watercourse), leading to overtopping of the river banks and inundation of the surrounding land. Climate change is expected to increase the risk of fluvial flooding in the future. |
| Tidal flooding | Propagation of high tides and storm surges up tidal river channels, leading to overtopping of the river banks and inundation of the surrounding land. |
| Surface water flooding | Intense rainfall exceeds the available infiltration capacity and / or the drainage capacity leading to overland flows and surface water flooding. Climate change is expected to increase the risk of surface water flooding in the future. This source is also referred to as pluvial flooding. |
| Groundwater flooding | Emergence of groundwater at the surface (and subsequent overland flows) or into subsurface voids as a result of abnormally high groundwater flows, the introduction of an obstruction to groundwater flow and / or the rebound of previously depressed groundwater levels. |
| Sewer flooding | Flooding from sewers is caused by the exceeding of sewer capacity and/or a blockage in the sewer network. In areas with a combined sewer network system there is a risk that land and infrastructure could be flooded with contaminated water. In cases where a separate sewer network is in place, sites are not sensitive to flooding from the foul sewer system. |
| Other sources of flood risk | Flooding from canals, reservoirs (breach or overtopping) and failure of flood defences. |

Flood Risk Data Sources

The following sources of data have been used in preparing this report and its associated mapping:

- Fluvial Flood Risk
 - Flood Risk Mapping (Risk of Flooding from Rivers and Sea; EA)
 - Flood Warning and Alert areas (EA)
- Surface Water Flood Risk
 - Updated Flood Maps for Surface Water (uFMfSW) (EA)
- Groundwater
 - Susceptibility to Groundwater Flooding (British Geological Survey)
- Historic Flood Evidence
 - Historic Flood Map (EA)
 - Wetspots (SCC)
 - Property Flooding Database (SCC)
 - Historic Flooding Incidents Database (SCC)

If you are aware of any historical flooding in the area which is not highlighted on the mapping please report it, with any evidence you have (for example photos or videos), to flooding.enquiries@surreycc.gov.uk.

Other Data Sources

The following sources of data have been used in preparing this report and its associated mapping:

- Geological information
 - Superficial geology (Geology of Britain Viewer; British Geological Survey)
 - Bedrock geology (Geology of Britain Viewer; British Geological Survey)

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1. Executive Summary

The purpose of this report is to investigate which RMAs had relevant flood risk management functions during the flooding that took place within the boundary of Runnymede Borough Council (RBC) in the winter of 2013/14. The report also considers whether the relevant RMAs have exercised, or propose to exercise, their risk management functions (as per Section 19(1) of the Flood and Water Management Act 2010). It does not address wider issues beyond that remit.

The flooding in Runnymede was predominately due to fluvial sources. This was caused by unprecedented rainfall during the winter 2013/14 period (275% compared with an average winter). There were approximately 1170 incidents of internal property flooding in Runnymede during winter 2013/14.

The Environment Agency (EA) is the lead RMA for incidents of fluvial flooding from Main Rivers, though Thames Water (TW), Surrey County Council (SCC) and RBC also performed other functions during that event, some of which were under different legislation including the Civil Contingencies Act 2004 and the Water industry Act 1991. The actions of the authorities are summarised below:

1.1. Environment Agency

- Operated Flood Alert and Flood Warning service.
- Sent out flood ambassadors and flood data recorders to the areas affected by flooding.
- In Chertsey, an *AquaDam* defence was installed along Bridge Road.
- Supported National Flood Forum engagement events in Egham and Chertsey, amongst other locations after the flooding.
- Cleared 22 large trees and other large blockages from the River Thames Navigation in Surrey that were brought down during the winter floods
- The Norlands Lane Culvert, into which the Meadlake Ditch enters Fleet Lake, was cleared of silt, tree roots and other debris in October 2014.
- Further vegetation and silt works removal works were also undertaken just upstream of the Norlands Lane Culvert in November 2013 – February 2015.
- As part of the Recovery Project, the EA carried out maintenance work after the flooding along the Meadlake Ditch, in particular.
- Review of flood warning threshold levels in areas where flooding took place to ensure that the Flood Warning Service is as timely and accurate as possible.
- Obstructions removal and vegetation management in a number of locations across the borough.
- Maintenance work along the Thames.

1.2. Thames Water

- Main focus during event was on maintaining customer services, on protecting assets vital for the ongoing delivery of service, and on ensuring that where there was service disruption they were able to resume it as soon as possible.

1.3. Surrey County Council

- Surrey Fire and Rescue Service pumped water away from properties during the flooding to reduce the damage caused.
- Staff assisted residents on the ground, working in partnership with RBC and the Army to help inform residents, answer their queries (also via the call centre), deploy signs and sandbags

to inform the community of risks, such as road closures and reduce flooding to the highway respectively.

- Will be undertaking an asset condition inspection of the Norlands Lane culvert which carries the Meadlake Ditch
- Since the flooding the affected highways and their drainage assets have been inspected and repairs carried out or a programme of works developed to address the damage caused.
- Administered the Repair and Renew Grant to help protect properties from flooding in the future.

1.4. Runnymede Borough Council

- Carried out a programme of works for the maintenance of the ordinary watercourse network across the borough.
- Undertook works, prior to the flooding, on the ordinary watercourse network such as clearing blockages and trash screens to prevent or mitigate flooding.
- Provided residents with sandbags and skips across the flood incident.
- Administered council tax rebates to residents and businesses that were affected by flooding.

2. Introduction

2.1. Section 19 Investigation Requirement

Under the Flood and Water Management Act 2010 the Lead Local Flood Authority (LLFA) must (to the extent that it considers it necessary or appropriate) undertake an investigation upon becoming aware of a flood incident within its area.

An LLFA is defined under Section 6(7) of Flood and Water Management Act as being the county council for that area. Section 19(1) requires that the investigation determines the RMAs that have relevant flood risk management functions and whether each of those authorities have exercised or propose to exercise those functions.

Section 19(2) requires that the LLFA publishes the results of its investigation and notify the relevant RMAs accordingly.

This report covers flooding during the winter of 2013/14 only. As flooding was widespread across Surrey, multiple reports have been produced.

2.2. Locations of the Investigations

This report addresses sites that flooded within the RBC area. There are 115 sites in total, spread across three sub areas. There were approximately 1170 incidents of internal property flooding in Runnymede.

Due to the sensitivities in publishing property flooding information, this report does not contain a comprehensive list of the S19 sites but supporting maps showing the sub areas in more detail are available.

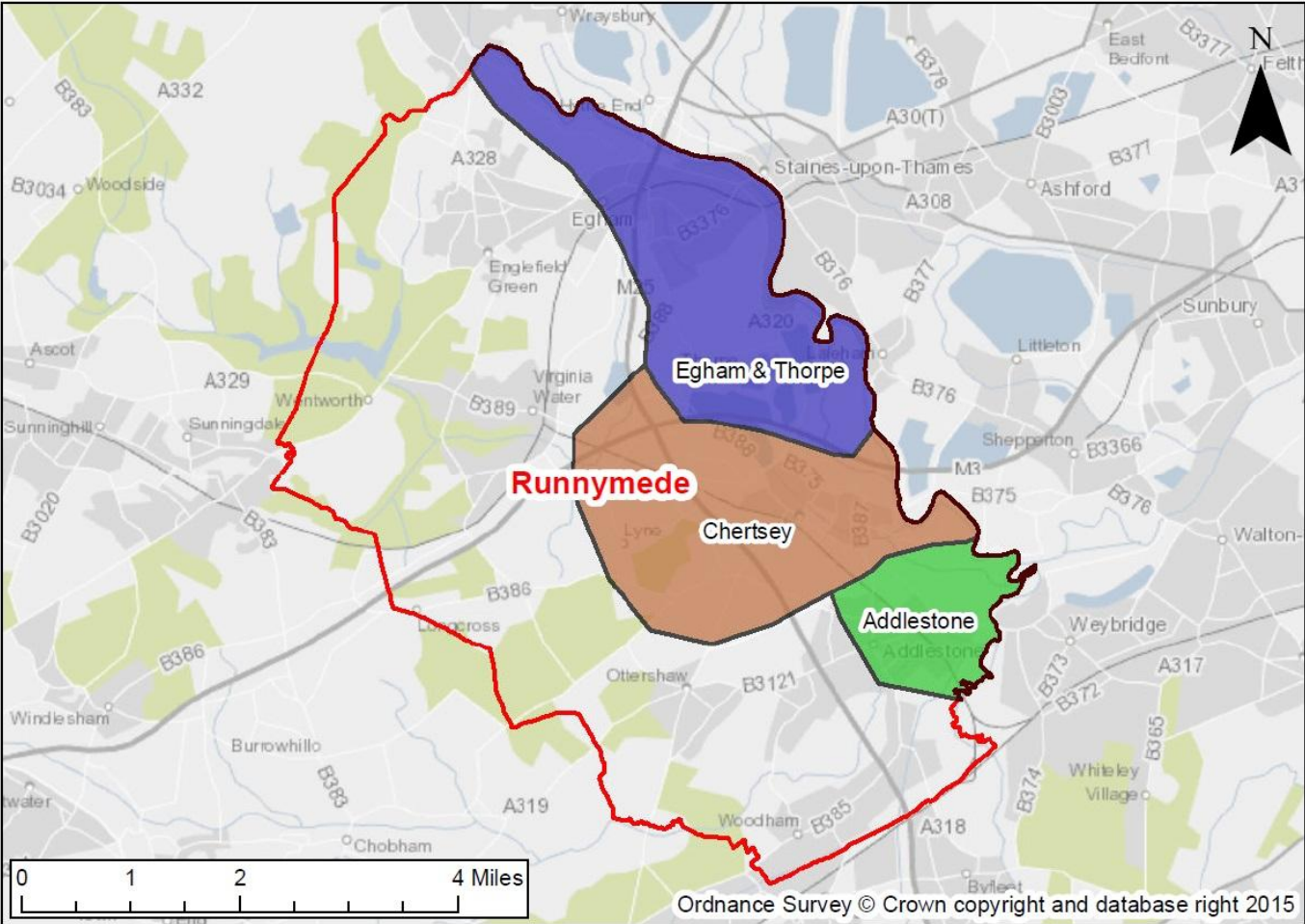


Figure 2-1 Location of Sub areas within Runnymede Borough for this report

3. Background Weather and Catchment Conditions

3.1. Weather Conditions

The overall amount of rainfall recorded during the winter 2013/14 period was exceptional: on average, 446mm across the South East of England. This set new records for each of the individual months and for the season as a whole. The totals represented a significant proportion of the average annual rainfall. As indicated in Table 3-1, they were more than double what would normally be expected during winter.

Parts of South East England received around two and a half times the amount of rainfall that they would normally expect at this time of year. This caused wide-spread flooding across Surrey from a range of sources, including groundwater as the levels across the region had risen so high. In some areas of South East England they exceeded records set in 2000/01, the last time significant disruption from groundwater flooding was recorded.

Table 3-1 Winter 2013/14 Rainfall

| County | Winter 2013/14 rainfall (mm) | Winter long term average rainfall (mm) | Winter 2013/14 rainfall compared with winter average |
|-----------------|------------------------------|--|--|
| Oxfordshire | 350 | 170 | 205% |
| Berkshire | 415 | 190 | 220% |
| Hampshire | 570 | 225 | 255% |
| Surrey | 560 | 205 | 275% |
| Buckinghamshire | 420 | 185 | 230% |

Storm events hit the UK on the 18 to 19, 23 to 27 and 30 to 31 December 2013, followed by 3 and 5 of January 2014. These storms came from the Atlantic and were characterised by unusually large and deep areas of low pressure, which brought rainfall and very strong winds. The period was also notable for the absence of exceptional rainfall from any single storm during January and February 2014. The highest daily total recorded at any of the 41 EA rain gauges across West Thames was 57mm in December, 37mm in January and 28mm in February. The additional runoff to watercourses already flowing at rates above typical winter maximum levels caused rivers to exceed channel capacities in a number of locations.

3.2. Catchment Conditions

The River Thames and several of its tributaries flow through Runnymede Borough, including the River Wey, the River Wey Navigation, the Addlestone Bourne, the Chertsey Bourne, the Meadlake Ditch and the Abbey River.

Figure 3-1 shows the local rainfall data recorded at two gauging stations; Iver Heath and Heathrow. The daily rainfall totals achieved in February were not as significant as those seen during the Christmas Eve storm in December 2013 but, due to the ground already being saturated from previous rainfall events, the February rainfall caused the largest river flows. Figure 3-2 shows the observed river flow hydrographs for the River Thames at Kingston for the same time span.

Following the intensive rainfall at the end of December 2013, the River Thames reached its highest point at Datchet to Teddington on the 11 January. River levels dropped slowly during the rest of January. Further rainfall, though not as exceptional as December's storms, fell at the end of January and February and the levels in the Thames rose over the following two weeks as each catchment slowly discharged into the already swollen Thames. The February rain was falling on saturated land so the resulting river flows and levels were greater than in January. This resulted in the highest levels seen on the Lower Thames for more than 65 years. These levels were estimated to have a return period of a 1 in 15 to 20 annual chance probability.

The total volume of water discharged over a two month period ranked as the highest recorded at Kingston since records began in 1885. In the same way that the highest levels were assessed against historic levels, the volume of water was also compared with previous records. This showed that the chance of recording a similar volume of water over a two month period was less than 1% in any one year. In other words, the flood volume had a return period of more than 100 years.

Flooding from the River Thames caused wide spread issues across Runnymede and backing up in many of the tributaries.

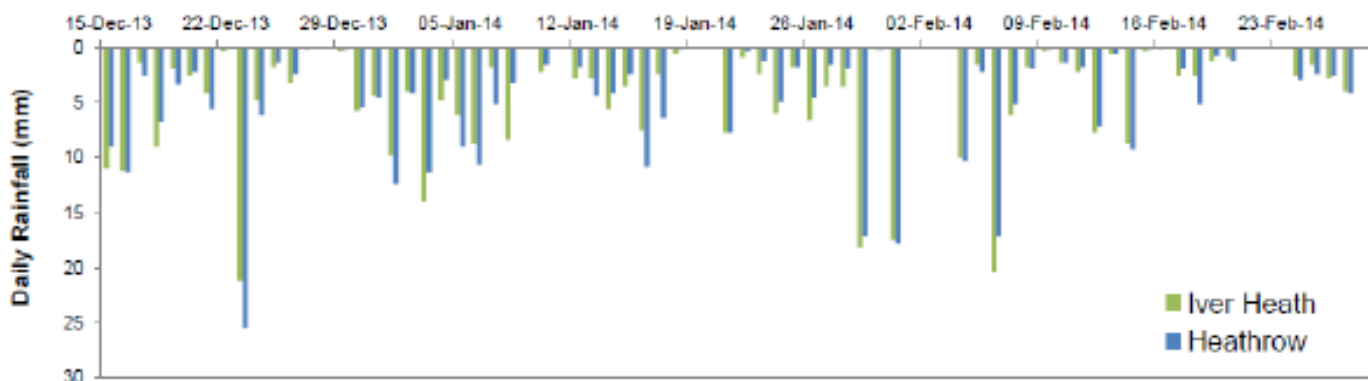


Figure 3-1 Daily Rainfall at Iver Heath and Heathrow - Winter 2013/14

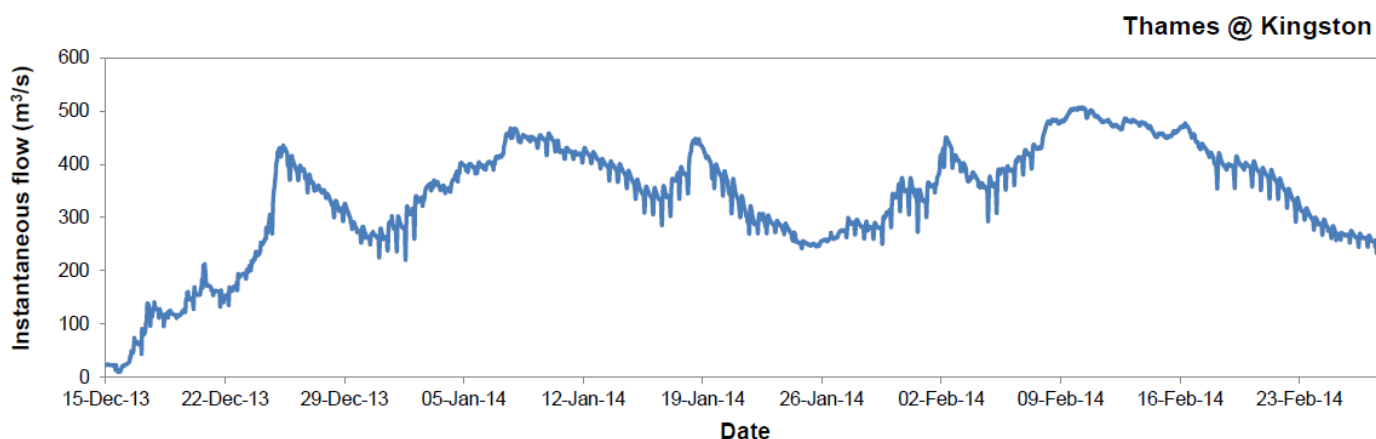


Figure 3-2 Daily River Flow on the River Thames at Kingston (downstream of Runnymede)

3.3. Historic conditions

Figure 3-3 shows the historic river levels on the River Thames, downstream of Penton Hook. Historic flooding on the River Thames occurred in 1984, 1947, 2003 and 2014. The 2013/2014 flood event had the lowest river levels recorded after the 2003 flooding. However, the river levels in during the 2013/2014 were at a significantly greater level than the years between 2003 and 2013.

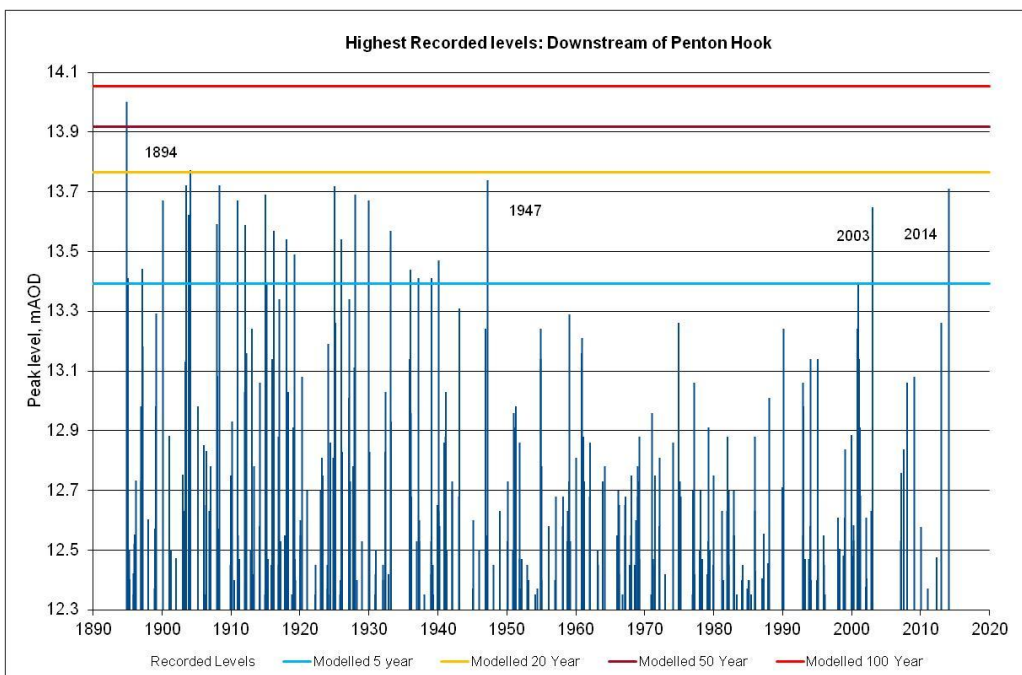


Figure 3-3 River levels (mAOD) on the River Thames, downstream of Penton Hook

Figure 3-4 is a graph showing a comparison of the flows on the River Thames, at Kingston, for the 1894, 1947 and 2014 floods. Compared to the 1894 and 1947 events the 2014 flood event had a higher volume of water over a longer period of time, leading to a total of 2,014 million tonnes of water passing through the river in 66 days, a significantly greater volume than in the previous flooding events.

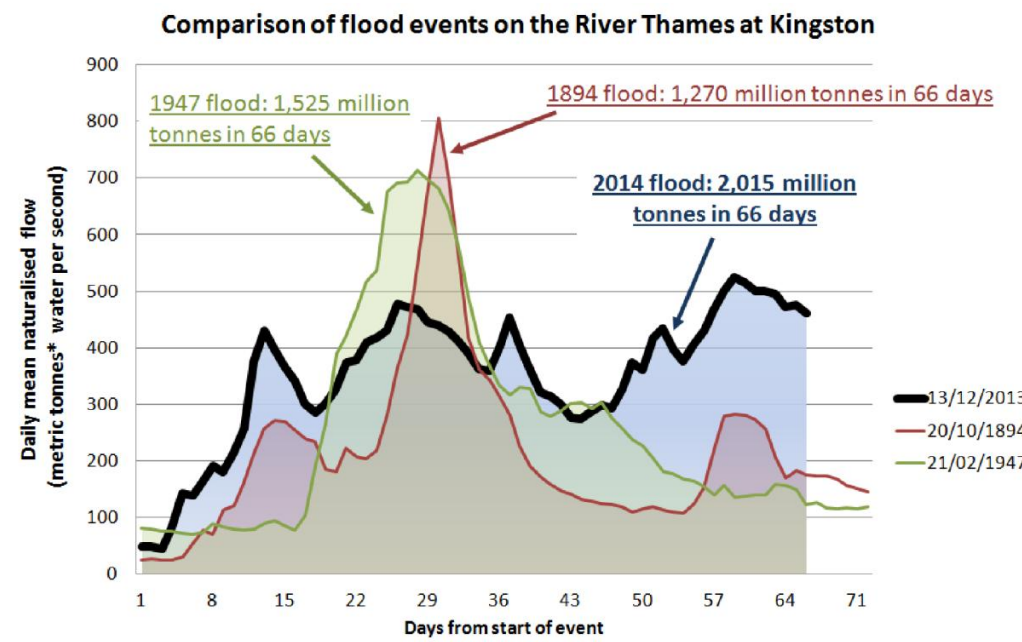


Figure 3-4 Comparison of the flows on the River Thames for the 1894, 1947 and 2014 floods.

4. Identification of Relevant Risk Management Authorities

There are a range of RMAs which together cover all sources of flooding.

The EA is responsible for taking a strategic overview of the management of all sources of flooding and coastal erosion in England and Wales. They have prepared strategic plans which set out how to manage risk, provide evidence (for example their online flood maps), and provide advice to the Government. They provide support to the other RMAs through the development of risk management skills and provide a framework to support local delivery. The EA also has operational responsibility for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea, as well as being a coastal erosion RMA. Main Rivers are defined through an agreed map which is updated annually. These tend to be the larger rivers in the country and the EA have permissive powers to carry out maintenance works on them.

LLFAs are responsible for developing, maintaining and applying a strategy for local flood risk management in their areas. As part of this, the LLFA liaises regularly with the EA as well as the other RMAs to ensure that all sources of flooding in their area are being properly managed. They need to produce reports when there is a reported flood, and they have to keep a register of flood risk management assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses. Ordinary watercourses are rivers which are not designated as 'Main Rivers'.

District and Borough Councils can carry out flood risk management works on minor watercourses, working with the LLFA. Through the planning processes, they control development in their area, ensuring that flood risks are effectively managed. If they cover part of the coast, then district and unitary councils also act as coastal erosion RMAs.

Internal Drainage Boards (IDBs) are responsible for water level management in low lying areas. Not all areas require an IDB, and they currently cover approximately 10% of England. They work in partnership with other authorities and land owners to actively manage and reduce the risk of flooding.

Water and sewerage companies are responsible for managing the risks of flooding from drainage systems, including both their surface water only systems and combined sewer systems.

Highway Authorities are responsible for providing and managing highway drainage and roadside ditches, and must ensure that road projects do not increase flood risk.

Table 4-1 below summarises the RMAs responsible for the sites within this report. The ticks indicate which authorities have responsibility for which function. SCC is the LLFA. Thames Water (TW) is the water company that has responsibility for all sources of sewer flooding. There are no IDBs in Runnymede.

Table 4-1 Risk Management Authorities

| Flood Source | Environment Agency | Lead Local Flood Authority | Land Drainage Authority | | Water Company | Highway Authority |
|--|--------------------|----------------------------|-------------------------|--------------------------|---------------|-----------------------|
| | | Surrey County Council | | Borough/District Council | Thames Water | Surrey County Council |
| Main River | ✓ | | | | | |
| Surface Water | | ✓ | | | | ✓ |
| Surface Water (on or coming off the highway) | | | | | | ✓ |
| Sewer flooding | | | | | ✓ | |
| Ordinary Watercourse | | | ✓ | ✓ | | |
| Groundwater | | ✓ | | | | |
| Reservoirs | ✓ | | | | | |

5. Strategic Actions and Flood Risk Management Functions

RMA's have defined flood risk management functions under the Flood and Water Management Act (2010). A flood risk management function is a function listed in the Act (or related Acts) which may be exercised by an RMA for a purpose connected with flood risk management. The following section sets out the strategic actions and relevant flood risk management functions that were carried out before, during and after the flooding that occurred across Surrey and particularly in Runnymede during the winter of 2013/14.

Environment Agency

The EA have a number of flood risk management functions, which include (but are not limited to); undertaking and maintaining flood mitigation works/defences, strategic responsibility for managing the risk of reservoir flooding, consenting and enforcement, the provision of strategic flood risk management plans, operation of flood alerts, flood warnings and flood risk management assets and designation of structures and features that affect flood risk. The relevant functions undertaken are listed below:

- Operated Flood Alert and Flood Warning service.
- Operated flood risk management assets during the flooding; along the River Thames the operation of the Jubilee River and the Thames Barrier reduced flooding to thousands of properties.
- Carried out flood risk mitigation works.
- Carried out maintenance works along the Meadlake Ditch.
- The EA carried out obstructions removal and vegetation management in a number of locations across the borough.

In addition, the EA carried out the following actions across the County:

- Participated in the Strategic and Tactical Command Groups once a major incident had been declared to respond to the flooding across Surrey.
- Opened their Area Incident Room (AIR) in Wallingford, Oxfordshire on 23 December 2013 to coordinate their response to the winter floods in the West Thames region. It was in operation for 46 days in total. For the majority of the incident it was manned 24 hours a day, and over the 46 days involved over 600 staff. It closed on 28 February 2014.
- After the flood level reduced the Environment Agency went out with the National Flood Forum, the local authority (SCC) and Thames Water to locations that flooded. This was to meet with local residents, answer any questions they may have and gather information about the flooding that occurred.
- Cleared 860 blockages and storm damage incidents reported 1087 pollution incidents reported
- 125 Flood Ambassadors visited 95 locations
- 70 flood data recorders sent to more than 100 locations
- Supported (and are supporting) community groups to help develop their community flood/emergency plans.
- Sent out newsletters to inform residents of their site investigation works and are finalising plans for a regular community newsletter.
- Met with local people to discuss their ideas and are now studying these proposals in more detail.

The EA also carried out maintenance work along the Thames which included:

- The removal of 200 tonnes of debris from the Thames weirs that were washed on to the weirs as a result of the floods.
- Weir maintenance to Penton Hook Weir Gates and Penton Hook Weir.
- Removal of sunken boats from the River Thames, including a boat located upstream of Staines Bridge.
- Carrying out tree works to the River Thames towpaths that the EA own.
- Carrying out asbestos surveys to EA weir sites across the borough.
- Carrying out 6 year electrical inspections to EA lock and weir sites.
- Carrying out yearly mechanical and electrical maintenance inspections on the Thames Weirs.
- Worked with government and partners to secure the first stage of funding to develop the River Thames Scheme. The EA are working to secure final contributions needed for construction.
- Updated and improved flood forecasting modes and flood warning areas. The aim of this is to provide a more targeted service to customers in properties closer to the river.
- Worked with local communities and emergency services to produce a major flood protocol for the River Thames, which covered the county of Surrey.
- Surveyed the bed of the River Thames after the 2014 flood and removed shoals that had been left after the floods. This work was completed in autumn 2014.
- Met regularly with residents, local and parish councils, community groups and landowners.

After the 2013/2014 flooding incident, the EA reviewed flood warning threshold levels in areas where flooding took place to ensure that the Flood Warning Services is as timely and accurate as possible in the future. All incident procedures were reviewed and updated where necessary.

Thames Water

TW have flood risk management functions under the Water Resources Act (1991). Relevant actions of water companies include; the inspection, maintenance, repair and any works to their drainage assets which may include watercourses, pipes, ditches or other infrastructure such as pumping stations.

No specific flood risk management functions have been identified as being directly relevant to the 2013/2014 flooding incident in Runnymede. However, this investigation has identified other relevant actions carried out by TW which are described below.

TW put in place winter arrangements for responding to winter weather conditions. This included triggers for the scaling up of resources and management for a range of foreseeable weather conditions. TW reported that during the event their main focus was on maintaining customer services, protecting assets vital for the ongoing delivery of service and ensuring that where there was service disruption we were able to resume it as soon as possible. To these ends TW carried out the following actions within Surrey:

- Physical protection measures – deployment of flood barriers and sandbags to TW sites (both water and wastewater).
- Regular physical checks of unmanned sites to ensure that they were working and in workable condition.
- Optimisation of use of the sewerage network – where possible work such as investigations and sewer cleaning was carried out to ensure that sewers and pumping stations were working to optimum capacity.

- Increased the number of engineers and staff on the ground to investigate flooding reports - Network Engineers visited internally flooded properties where sewer flooding was the primary cause.
- Undertook wide scale clean ups of properties.
- Provided a sewer flooding information leaflet for general distribution to properties affected and attended a number of local flood meetings.
- Provided support to Affinity Water with risk assessments and contingency planning for their sites in Surrey which were at risk of inundation.

In Runnymede, TW carried out works after the flood event to replace all the valves in the chambers at the Hamm Court and Penton Hook pumping stations. Both stations failed during the floods and these replacement valves are more robust if they are submerged again. Both pumping station buildings have also been waterproofed and flood resilient doors have been installed.

Surrey County Council

SCC, as LLFA, has flood risk management functions, which include (but are not limited to): the provision of a Local Flood Risk Management Strategy (LFRMS), designation and maintenance of a register of structures or features that have a significant effect on flood risk, consenting and enforcement works on ordinary watercourses, undertaking works to mitigate surface water and groundwater flooding and undertaking Section 19 investigations. SCC also has responsibilities as a Highways Authority and as an Emergency Responder (under the Land Drainage Act 1991 and the Civil Contingencies Act 2004 respectively) which may relate to flooding. Surrey's relevant flood risk management functions undertaken are listed below:

- The LFRMS was published in December 2014.
- Some key drainage assets have been identified in Runnymede and added to the Flooding asset register. This includes the Norlands Lane culvert section of the Meadlake Ditch.
- Section 19 reports have been produced for the flooding experienced across the county in Winter 2013/14.

In addition SCC carried out the following activities across Surrey;

- Officers inspected flood affected roads, after which defect repairs were undertaken by SCC's contractors; Kier. Where extensive areas of carriageway were damaged by the flooding, they were assessed for inclusion into the Project 400 programme; a targeted programme to resurface and repair roads which were damaged by the Winter 2013/14 floods.
- All flood affected roads in Surrey were assessed for potential schemes which may be included in the Project 400 programme.
- Cleansed and re-opened roads as quickly as possible after the flooding.
- Surrey Fire and Rescue Service (SFRS) pumped flood waters away to protect residents, property and infrastructure during the flooding.
- The Surrey Strategic and Tactical Coordination Groups met for a response meeting in advance of the February 2014 event to set up coordination between authorities.
- Provided sandbags to slow down the ingress of water into properties, and recycled the sandbags after the event.
- Staff attended resident engagement events after the flooding to hear their concerns and gather additional information.
- After the storms and flooding, cleared trees, debris and carried out ditching works to enable the drainage systems to function normally again.

- Operated a call centre throughout the flooding which dealt with residents queries and have since hired a Community Resilience Officer to support communities in becoming more resilient to flooding amongst other issues.
- Administered the Repair and Renew Grant which provided up to £5000 for residents and businesses that were flooded in order to protect their property from flooding in the future.

Specifically in Runnymede, SCC carried out the works below:

- Provided a grab lorry and gully tanker to assist RBC with cleaning operations. Woking Borough Council (WBC) also provided a sweeper to assist Runnymede in the clean-up operations.
- Completed a programme of additional gully and drainage system cleaning on all flood affected roads in Runnymede on Friday 28 March.

Runnymede Borough Council

RBC has the following flood risk management functions: to designate structures and features that affect flood risk and they may also undertake works on ordinary watercourses to reduce flood risk, however this is a permissive power. RBC's relevant functions and other actions that were undertaken are listed below:

- Has continued to exercise its discretionary powers to undertake a programme of land drainage maintenance works on ordinary watercourses across the Borough.
- Where appropriate, undertook additional works on the ordinary watercourse network, such as clearing blockages and trash screens, to prevent or mitigate flooding.
- Took action to receive evacuated residents affected by the flooding and managed re-housing for them both during and after the flooding.
- Works were undertaken prior to the flooding, on the ordinary watercourse network such as clearing blockages and trash screens to prevent or mitigate flooding.
- Provided skips for residents and volunteer groups to dispose of flood affected property.
- Continues to engage with communities that were affected by the flooding.
- Administered council tax rebates to residents and businesses that were affected by flooding.
- Provided residents with sandbags during the flood incident.

All RMAs

All RMAs under the Flood and Water Management Act (2010) have a responsibility to cooperate and coordinate with regards to their flood risk management functions, including raising awareness of flood risk and the sharing of information. Landowners also have riparian responsibilities under the Flood and Water Management Act (2010) to maintain and undertake any necessary works on assets on their land (with consent from the relevant RMA) which may have an effect on flood risk including watercourses and drainage assets.

6.Format of Subsequent Sections

The sites in this report have been grouped into sub areas based on location.

There are three sub areas in this report, all within RBC.

Each sub area will be introduced and information relevant to the whole sub area presented. Responsible RMAs will be identified at sub group level, and their response to the flood event summarised:

Individual site information has predominantly come from existing SCC information (collated from a variety of sources) and the EA datasets. No site visits were undertaken as there are over 500 to report on in Surrey; however borough and district councils were consulted to collect any further information in relation to the flood events at the relevant sites. If further information is required in relation to any of the sites, requests should be submitted to SCC via flooding.enquiries@surreycc.gov.uk.

7. Sub Area: Addlestone

7.1. Sub Area Definition

This sub area covers the area of Addlestone.

7.2. Location and Catchment Description

The major watercourses in the Addlestone sub area are the River Wey, the River Wey Navigation, the Addlestone Bourne and the Chertsey Bourne to the north. The Addlestone Bourne and Chertsey Bourne join together in Woburn Park in the northeast of the sub area and are tributaries of the River Thames. The River Thames forms the northern boundary of RBC and of this Addlestone sub area. Minor watercourses include Woburn Park Stream, located close to Addlestone Railway Station.

In January 2014 flooding was from the River Thames near its confluence with the River Wey where 8 properties in the Hamm Court area were reportedly flooded though not confirmed by Environment Agency officers.

According to the EA online fluvial flood risk maps, a significant proportion of Addlestone is at risk of fluvial flooding from the River Wey, the River Wey Navigation, the Addlestone Bourne, the Chertsey Bourne and the Thames. The northernmost part of the sub area is predominantly located within an area with a high chance of flooding from fluvial sources (greater than 1 in 30 year annual chance).

The EA's online Updated Flood Maps for Surface Water indicate that parts of the sub area are also at risk from surface water flooding. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps. However, they can be used to identify general flow routes.

The flood risk maps do not take into account climate change. They are designed only to give an indication of flood risk to an area of land and are not sufficiently detailed to show whether an individual property is at risk of flooding.

Parts of the Addlestone sub area are within Flood Warning and Flood Alert Areas. These are areas for which the EA provides free flood warnings.

Addlestone is underlain by Bagshot Sand Formation (sand). The Addlestone sub area is underlain also by superficial deposits of; alluvium, Kempton Park Gravels and Shepperton Gravels. These are all associated with fluvial environments and can convey flood waters. Only the south-east of the Addlestone sub area has the potential for groundwater flooding to occur at the surface.

7.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area have been identified as being the EA, SCC, RBC and TW.

7.4. Exercised Flood Risk Management Functions

Environment Agency

Actions prior to and during the flood incident

Informing the public and monitoring the flooding incident

Prolonged and heavy rainfall over the autumn and winter of 2013/14 led to raised river levels across Surrey including on the River Wey. The EA operated their Flood Warning and Alert Service throughout the flood incident. A Flood Alert was issued for the River Wey on 23 December 2013. Continuing rain and rising river levels led to a Flood Warning being issued for the Wey on 25 December. River levels peaked around the 25 and 26 December and some property flooding occurred at Wey Meadows, Addlestone. The Flood Warning was lifted on 2 January 2014.

Further rainfall led to river levels on the River Wey rising again and further flooding was predicted for the Lower Wey at Weybridge on the weekend of 4 and 5 January. However, the flood peak was lower than anticipated and the predicted Flood Warning was not issued.

To respond to this flooding, as well as the flooding on the River Thames and across Surrey, Silver Command was set up at Addlestone Police Station to co-ordinate the multi-agency response. River levels on the Wey started to fall and the Flood Alert was removed on 12 January 2014. A further period of rainfall led to another Flood Alert being issued on the 17 January, which was lifted on 21 January.

Further heavy rain across the whole of the South of England between the end of January and the beginning of February caused the river levels to rise again. A Flood Alert was issued for the Lower Wey on 1 February and a Flood Warning was issued on 9 February.

Between 9 and 21 February the river levels on the River Wey fluctuated as each further band of rain affected the catchment. However, unlike the Thames, river levels in the Wey did not reach the peak experienced on the 25 and 26 December. The Flood Warning was removed on 21 February and the Flood Alert was finally removed on 23 February.

During the period between 23 December and 23 February 2014, a number of properties were reported to have been internally flooded due to fluvial sources. The long period of wet weather also led to further properties being recorded as having been internally flooded from surface or groundwater.

Table 7-1 below shows the Flood Warnings issued by the EA during Winter 2013/14 in the Addlestone sub area.

Table 7-1. Flood Warnings issued by the Environment Agency in the Addlestone sub area in Winter 2013/14

| Flood Warning area | Date | Time | Number warned |
|----------------------------|------------|----------|---------------|
| River Wey at Weybridge | 25/12/2013 | 09:57 | 363 |
| River Wey at Weybridge | 09/02/2014 | 21:52 | 383 |
| River Thames at Hamm Court | 09/02/2014 | 15:32:56 | 171 |

The EA opened their Area Incident Room in Wallingford, Oxfordshire on 23 December to coordinate their response to the winter floods. It was in operation for 46 days in total. For the majority of the incident it was manned 24 hours a day, and over the 46 days involved over 600 staff. It closed on 28 February.

The EA also sent out both flood ambassadors and flood data recorders to the areas affected by flooding in January and February 2014. Locations visited by flood ambassadors included Weybridge, Chertsey (including Flood Recovery Centre), Chertsey Bourne, Egham Hythe Flood Recovery Centre and Runnymede.

Locations visited by flood data recorders included Weybridge, Chertsey, Chertsey Bourne, Runnymede, Egham and Egham Hythe. Flood data recorders were trained to verify river levels at gauging stations, record property flooding and capture the physical extents of flooding on the

ground. The information they logged was tracked by the EA's Area Incident Room in order to help build a picture of the flooding extent. This detail will help support the EA in increasing the accuracy and timeliness of their flood warnings in the future.

Actions since the flood incident

The EA has now adjusted flood warning trigger levels for properties in Hamm Court.

The EA carried out obstructions removal and vegetation management in a number of locations, including Addlestone Bourne (Addlestone).

As part of the annual Wey Dredging programme, shoal removal was carried out on the River Wey at Bridge Road, Addlestone.

The EA carried out maintenance work along the River Thames including:

- Carrying out asbestos surveys to EA weir sites, including Shepperton Weir (on the Addlestone sub area boundary)
- Carrying out six yearly Electrical Inspections to EA lock and weir sites; Shepperton (on the border of the Addlestone sub area)

Section 5 provides details of the EA's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

Runnymede Borough Council

No flood risk management functions relevant to RBC have been identified as specific to the flood incident in this sub area.

Section 5 provides details of RBC's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

Surrey County Council

No flood risk management functions relevant to SCC have been identified as specific to the flood incident in this sub area.

Section 5 provides details of SCC's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

Thames Water

No flood risk management functions relevant to TW have been identified as specific to the flood incident in this sub area.

Section 5 provides details of TW's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

8. Sub Area: Chertsey

8.1. Sub Area Definition

This sub area covers the area of Chertsey.

8.2. Location and Catchment Description

During the winter of 2013/14 there were a number of instances of internal property flooding and road closures in the Chertsey sub area.

The major watercourses in the Chertsey sub area are the Chertsey Bourne and the Abbey River, which are tributaries of the River Thames, and the Thames itself, which forms the eastern boundary of the sub area.

According to the EA online fluvial flood risk maps, a significant proportion of Chertsey is at risk of fluvial flooding from the Chertsey Bourne, Abbey River and the Thames. The northernmost part of the sub area is predominantly located within an area with a high chance of flooding from fluvial sources (greater than 1 in 30). Some parts of the sub area are located within an area with a low chance of flooding from fluvial sources (between 1 in 1000 and 1 in 100).

The EA's online Updated Flood Maps for Surface Water indicate that parts of the sub area are also at risk from surface water flooding. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps. However, they can be used to identify general flow routes.

The flood risk maps do not take into account climate change. They are designed only to give an indication of flood risk to an area of land and are not sufficiently detailed to show whether an individual property is at risk of flooding.

Parts of the Chertsey sub area are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings.

By January the River Thames had risen to high levels. The highest water levels during the winter 2013/14 floods on the River Thames at Chertsey have a return period of 15 to 20 years and were seen in February 2014. This was higher than recent previous event, for example the 2007 floods had an estimated return period of less than 2 years and winter 2003 floods were estimated at a 10 to 20 year return period.

Chertsey is underlain by Bagshot Sand Formation (sand). Chertsey is also underlain by superficial deposits of Head, Shepperton Gravels and Alluvium which are associated with fluvial environments and can convey flood waters. The north-west areas of the Chertsey sub area have the potential for groundwater flooding to occur at the surface, including parts of Staines Road, St. Anns Road and Lyne Lane.

The river flooding and raised groundwater tables also led to water infiltrating the public foul sewage system. This caused surcharging of the foul sewers and foul water flooding across the whole of the investigation area. TW's Stepgates foul sewage catchment was particularly affected by this infiltration and properties in Eastworth Road were severely affected. The infiltration also led to restricted use of sanitary appliances. These effects on the foul sewer network continued for an extended period beyond the time of peak river flooding.

8.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area have been identified as being the EA, SCC, RBC and TW.

8.4. Exercised Flood Risk Management Functions

Environment Agency

Actions prior to and during the flood incident

Informing the public and monitoring the flooding incident

Prolonged and heavy rainfall over the autumn and winter of 2013 led to raised river levels across Surrey including on the Chertsey Bourne and Thames. The EA operated their Flood Warning and Alert Service throughout the flood incident. A Flood Alert was issued for the Chertsey Bourne on 23 December 2013. This alert remained in force until 9 March 2014.

By January, the River Thames had risen to high levels. A flood warning was issued for properties closest to the River Thames from Littleton Lane, Shepperton Green to Shepperton and the River Thames at Chertsey on 7 January. No properties were reported flooded by this point in the winter. To respond to the flooding across the borough of Runnymede and across Surrey, Silver Command was set up at Addlestone Police Station to co-ordinate the multi-agency response.

River levels on the Chertsey Bourne started to fall and the Flood Warning was removed on 11 January. Further heavy rain across the whole of the south of England between the end of January and the beginning of February caused the river levels to rise again.

River levels on the Thames receded briefly in late January only to rise to even higher levels in February. In the Chertsey area, the Thames was at a higher level than in 2003. 90 properties flooded in the Chertsey area from the River Thames and the Chertsey Bourne.

Flood warnings were issued for the River Thames on 5 February: that is two days before property flooding started. As the situation worsened, a severe flood warning was issued for the River Thames at Chertsey on 9 February. As reports came in of the Thames backing up the Chertsey Bourne, a flood warning was also issued on 9 February for the area of Chertsey closest to the Chertsey Bourne.

Between the 9 and 17 February the river levels on the Chertsey Bourne fluctuated as each further band of rain affected the catchment. Roads closest to the Chertsey Bourne were flooded and some groundwater flooding occurred in Chertsey and Thorpe. During this period a number of roads were also affected by surface water or highway drainage flooding.

The Flood Warning was removed on 17 February. The Flood Alert was finally removed on the 9 March.

Table 8-1 and Table 8-2 below show the Severe Flood Warning and Flood Warnings issued by the EA during Winter 2013/14 in the Chertsey sub area.

Table 8-1. Severe Flood Warnings issued by the Environment Agency in the Chertsey sub area in winter 2013/14

| Flood Warning area | Date | Time | Number warned |
|--------------------------|------------|----------|---------------|
| River Thames at Chertsey | 09/02/2014 | 15:32:56 | 518 |

Table 8-2. Flood Warnings issued by the Environment Agency in the Chertsey sub area in Winter 2013/14

| Flood Warning area | Date | Time | Number warned |
|--|------------|-------|---------------|
| River Thames at Chertsey | 07/01/2014 | 11:13 | 618 |
| Chertsey Bourne at Chertsey | 08/01/2014 | 10:52 | 1549 |
| River Thames at Chertsey | 05/02/2014 | 17:50 | 641 |
| Areas of Chertsey closest to the Chertsey Bourne | 09/02/2014 | 20:16 | 173 |

The EA opened their Area Incident Room in Wallingford, Oxfordshire on 23 December to coordinate their response to the winter floods. It was in operation for 46 days in total. For the majority of the incident it was manned 24 hours a day, and over the 46 days involved over 600 staff. It closed on 28 February.

The EA also sent out both flood ambassadors and flood data recorders to the areas affected by flooding in January and February 2014. Locations visited by flood ambassadors included Weybridge, Chertsey (including Flood Recovery Centre), Chertsey Bourne, Egham Hythe Flood Recovery Centre and Runnymede.

Locations visited by flood data recorders included Weybridge, Chertsey, Chertsey Bourne, Runnymede, Egham and Egham Hythe. Flood data recorders were trained to verify river levels at gauging stations, record property flooding and capture the physical extents of flooding on the ground. The information they logged was tracked by the EA's Area Incident Room in order to help build a picture of the flooding extent. This detail will help support the EA in increasing the accuracy and timeliness of their flood warnings in the future.

Flood ambassadors attended Flood Assistance Centres run by local authorities during the flooding in Chertsey, amongst other locations.

In March, once river levels were subsiding, the EA supported National Flood Forum engagement events in Egham and Chertsey, amongst other locations.

Flood barriers and sandbags

In Chertsey, an *AquaDam* defence was installed along Bridge Road on 13 February by the EA. Two pumps were used to pump water from behind the defences. The defence was able to protect approximately 155 properties from a flood event with a 1 in 100 (1%) chance of occurring in any given year. Fortunately, river levels did not reach a height at which the defence would have come into operation. A sandbag wall, erected by the EA's professional partners and the Armed Forces at Chaseside Gardens, was designed to afford 25 properties the same amount of protection: two pumps were also used on site.

Actions since the flood incident

The EA carried out obstructions removal and vegetation management in a number of locations, including Rutherwyck Road Ditch (Chertsey).

The EA have also carried out channel capacity works along the Chertsey Bourne, since the 2013/2014 flooding incident.

The EA carried out maintenance work along the River Thames including:

- Weir maintenance to Penton Hook weir gates, Penton Hook Weir (on the boundary of the Chertsey sub area).
- Asbestos surveys to EA weir sites including Chertsey Weir and Penton Hook Weir (on the boundary of the Chertsey sub area)
- Six yearly Electrical Inspections to EA lock and weir sites, Chertsey including Penton Hook (on the boundary of the Chertsey sub area)
- Yearly mechanical and electrical maintenance inspections of the Thames Weirs including Chertsey and Penton Hook (on the boundary of the Chertsey sub area)

Section 5 provides details of the EA's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

Runnymede Borough Council

Actions prior to and during the flood incident

In the early stages of the floods RBC distributed chemical toilets. During the later stages of the flooding it was agreed that SCC would pay for portaloos and the Districts would arrange for their deployment.

In addition, RBC assisted SCC in carrying out survey work and jetting of the highway drainage system in Chaseside Gardens and its connection into Bridge Road.

Section 5 provides details of RBC's borough-wide flood risk management functions prior to, during and since the flood incident.

Surrey County Council

SCC closed a number of roads in Chertsey in the interests of public safety, including; Dockett Eddy, Almnors Lane, Chaseside Gardens, St Anns Road and Lyne Lane.

In the early stages of the floods RBC distributed chemical toilets. During the later stages of the flooding it was agreed that SCC would pay for portaloos and the districts would arrange for their deployment.

Section 5 provides details of SCC's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

Thames Water

No flood risk management functions relevant to TW have been identified as specific to the flood incident in this sub area.

Section 5 provides details of TW's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

9. Sub Area: Egham & Thorpe

9.1. Sub Area Definition

This sub area covers the area of Egham and Thorpe.

9.2. Location and Catchment Description

During the winter of 2013/14 there were a number of instances of internal property flooding and road closures in the Egham & Thrope sub area.

The major watercourses in the Egham and Thorpe sub area are the River Thames, which forms the eastern boundary of most of the sub area, and the Meadlake Ditch, which runs northwest to southeast through the sub area.

According to the EA online fluvial flood risk maps, a significant proportion of the sub area is at risk of fluvial flooding from the Thames and Meadlake Ditch. Some parts of the sub area are located within an area with a low chance of flooding from fluvial sources (between 1 in 1000 and 1 in 100 annual chance), but much is at high risk of fluvial flooding (more frequent than a 1 in 30 year annual chance).

The EA's online Updated Flood Maps for Surface Water indicate that parts of the sub area are also at risk from surface water flooding. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps. However, they can be used to identify general flow routes.

The flood risk maps do not take into account climate change. They are designed only to give an indication of flood risk to an area of land and are not sufficiently detailed to show whether an individual property is at risk of flooding.

Parts of Egham and Thorpe are within Flood Warning and Flood Alert Areas. These are areas for which the EA provides free flood warnings.

The Egham and Thorpe sub area is predominantly underlain by London Clay Formation (clay, silt and sand), with Claygate Member (sand, silt and clay) in the southernmost part of the sub area. Egham and Thorpe is also underlain by superficial deposits of Shepperton and Kempton Park Gravels which are associated with fluvial environments and can convey flood waters. Much of the Egham and Thorpe sub area has the potential for groundwater flooding to occur at the surface.

The river flooding and raised groundwater tables also led to water infiltrating into the public foul sewage system. This caused surcharging of the foul sewers and foul sewage flooding across the whole of the investigation area. It also led to restricted use of sanitary appliances. These effects on the foul sewer network continued for an extended period beyond the time of peak river flooding.

9.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area have been identified as being the EA, SCC, RBC and TW.

9.4. Exercised Flood Risk Management Functions

Environment Agency

Actions prior to and during the flood incident

Informing the public and monitoring the flooding incident

Prolonged and heavy rainfall over the autumn and winter of 2013 led to raised river levels across Surrey including on the River Thames. The EA operated their Flood Warning and Alert Service throughout the flood incident. A Flood Alert was issued for the reaches of the River Thames from Datchet to Shepperton Green on 24 December 2013. This alert remained in force until 9 March 2014.

Continuing rain and rising river levels led to Flood Warnings being issued for those reaches along the Thames in Runnymede between 6 and 8 January 2014. To respond to this flooding Silver Command was set up at Addlestone Police Station to co-ordinate the multi-agency response not only in Runnymede but also across the whole of Surrey.

River levels on the Thames started to fall around 11 January and the Flood Warnings were reduced to Flood Alerts between 14 and 16 of January. Further heavy rain across the whole of the south of England between the end of January and the beginning of February caused the river levels to rise again. Flood Warnings were again issued on this reach of the Thames on 7 February. The situation continued to deteriorate and on the 9 February Severe Flood Warnings were issued for all of the Thames reaches in Runnymede. At this time a Major Incident was declared and military assistance was requested.

Overnight on 10 and 11 February the Thames started to flood from Chertsey Lane into the Meadlake Ditch catchment. This led to flooding of the Egham Hythe and Pooley Green Areas directly from the River Thames. This flood water also drained into the Meadlake Ditch causing it to back up and flood this area as well as the roads to the west of Chertsey Lane.

The flood levels on the Thames peaked around 12-13 February and then started to fall. The flood levels continued to fall to the end of February. The Severe Flood Warnings on the reaches of the Thames within Runnymede were removed on 17 February. The Flood Warnings were removed on 21 February and on 9 March all Flood Alerts were removed.

A Groundwater Flood Alert was issued for the Egham Area on 9 January and this remained in force until it was removed on 12 March.

It is estimated that in the region of 4,000 properties throughout the Borough were impacted by the floods. Most of the flooding was caused by fluvial flooding. In some areas the flooding was not directly connected to the river floods and this flooding has been categorised as groundwater flooding, although in reality the floods were due to subterranean connectivity between these areas and the river through the gravels.

Table 9-1, Table 9-2 and Table 9-3 below show the Severe Flood Warning, Flood Warnings Flood Warnings and Groundwater Flood Alerts issued by the EA during winter 2013/14 in the Egham and Thorpe sub area.

Table 9-1. Severe Flood Warnings issued by the Environment Agency in the Egham and Thorpe sub area in Winter 2013/14

| Flood Warning area | Date | Time | Number warned |
|--|------------|----------|---------------|
| Properties closest to the River Thames from Runnymede Pleasure Grounds, Staines to Penton Hook | 09/02/2014 | 15:18:01 | 319 |
| River Thames at Staines and Egham | 09/02/2014 | 15:22:31 | 5815 |

Table 9-2. Flood Warnings issued by the Environment Agency in the Egham and Thorpe sub area in winter 2013/14

| Flood Warning area | Date | Time | Number warned |
|--|------------|-------|---------------|
| Properties closest to the River Thames from Runnymede Pleasure Grounds, Staines to Penton Hook | 06/01/2014 | 19:37 | 382 |
| River Thames at Staines and Egham | 08/01/2014 | 13:27 | 7152 |
| River Thames at Staines and Egham | 07/02/2014 | 08:13 | 7257 |

Table 9-3. Groundwater Flood Alerts issued by the Environment Agency in the Egham and Thorpe sub area in winter 2013/14

| Flood Warning area | Date | Number warned |
|-------------------------------|------------|---------------|
| Groundwater flooding in Egham | 09/01/2014 | 237 |

The EA opened their Area Incident Room in Wallingford, Oxfordshire on 23 December to coordinate their response to the winter floods. It was in operation for 46 days in total. For the majority of the incident it was manned 24 hours a day, and over the 46 days involved over 600 staff. It closed on 28 February.

The EA also sent out both flood ambassadors and flood data recorders to the areas affected by flooding in January and February 2014. Locations visited by flood ambassadors included Weybridge, Chertsey (including Flood Recovery Centre), Chertsey Bourne, Egham Hythe Flood Recovery Centre and Runnymede.

Locations visited by flood data recorders included Weybridge, Chertsey, Chertsey Bourne, Runnymede, Egham and Egham Hythe. Flood data recorders were trained to verify river levels at gauging stations, record property flooding and capture the physical extents of flooding on the ground. The information they logged was tracked by the EA's Area Incident Room in order to help build a picture of the flooding extent. This detail will help support the EA in increasing the accuracy and timeliness of their flood warnings in the future.

In March, once river levels were subsiding, the EA supported National Flood Forum engagement events in Egham and Chertsey, amongst other locations.

Clearing blockages and other actions

The EA cleared 22 large trees and other large blockages from the River Thames Navigation in Surrey that were brought down during the winter floods. Bell Weir lock, on the edge of the Egham area, was one of the most seriously affected locks.

The Norlands Lane Culvert, into which the Meadlake Ditch enters Fleet Lake, was cleared of silt, tree roots and other debris by the EA.

Actions since the flood incident

Following the 2013/2014 flooding further works were undertaken just upstream of the Norlands Lane Culvert. In November 2013 – February 2015 further vegetation clearance and some silt removal works were undertaken.

As part of the Recovery Project, the EA carried out maintenance work after the flooding along the Meadlake Ditch, in particular.

The EA carried out obstructions removal and vegetation management in a number of locations, including:

- Ripley Springs (just outside the Egham & Thorpe sub area)
- Hurst Ditch
- The Moat (Hurst Ditch to St Annes Lake)

The EA have carried out maintenance work along the River Thames including:

- Weir maintenance to Penton Hook Weir Gates and Penton Hook Weir.
- Removing sunken boats from the River Thames including a boat located upstream of Staines Bridge. Staines Bridge is on the Egham & Thorpe sub area boundary.
- Asbestos surveys to EA weir sites including Bell Weir, on the Egham & Thorpe sub area boundary.
- Six yearly Electrical Inspections to EA lock and weir sites including Bell Weir, on the Egham & Thorpe sub area boundary.
- Yearly Mechanical and Electrical maintenance inspections of the Thames Weirs; including Bell Weir, on the Egham & Thorpe sub area boundary.

The EA have also carried out channel capacity works around Mead Lake, since the 2013/2014 flooding incident.

Section 5 provides details of the EA's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

Runnymede Borough Council***Actions prior to and during the flood incident***

After the flooding, RBC undertook desilting works on the Meadlake Ditch at Thorpe Lea Open Space, Charta Road Recreation Ground and behind Holbrook Meadow in their capacity as a riparian owner.

In addition, RBC assisted SCC in carrying out:

- Survey work of the highway drainage systems in Ayebridges Avenue, Park Avenue and South Avenue.
- Investigation and jetting of the highway drains and repair of the small lift pump in Roundway.

Section 5 provides details of RBC's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

Surrey County Council***Actions prior to and during the flood incident***

Surrey Fire and Rescue Service pumped water away from properties during the flooding to reduce the damage caused.

Assisted residents on the ground, working in partnership with RBC and the Army to help inform residents, answer their queries (also via the call centre), deploy signs and sandbags to inform the community of risks, such as road closures and reduce flooding to the highway respectively.

Closed a large number of roads in Egham and Thorpe in the interests of public safety, which are listed in Appendix A.

Actions since the flood incident

SCC will be undertaking an asset condition inspection of the Norlands Lane culvert which carried the Meadlake Ditch and have since inspected the affected highways drainage assets.

Section 5 provides details of SCC's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

Thames Water

No flood risk management functions relevant to TW have been identified as specific to the flood incident in this sub area.

Section 5 provides details of TW's wider flood risk management functions and other relevant actions prior to, during and since the flood incident.

10. Conclusion

The objective of this report is to investigate which RMAs had relevant flood risk management functions during the flooding and whether the relevant RMAs have exercised, or propose to exercise, their risk management functions (as per section 19(1) of the Flood and Water Management Act 2010). It should be noted that this duty to investigate does not guarantee that flooding problems will be resolved and cannot force others into action.

The report has identified that the EA carried out actions in relation to the flooding experienced in Runnymede over winter 2013/14. It has also been established that TW, SCC and RBC did not have any direct flood risk management functions in responding to the flood event, but strategic functions and other supportive actions were taken, which have been outlined in the report.

10.1. Causes

There were approximately 1170 incidents of internal property flooding in Runnymede. The main cause of the widespread flooding across Surrey was the exceptional and unprecedented amount of rainfall that fell over the months of December, January and February 2013/14, which in turn resulted in major flooding from fluvial, sewer, ordinary watercourse and groundwater sources. The River Thames was the main source of fluvial flooding in the borough and is reported to have affected all 3 sub areas.

10.2. Flood Data

While systems are in place to record instances of flooding on a day-to-day basis, it was found that the data format and specific details of flooding records were inconsistent across different organisations. For example, approaches that generically recorded properties as “affected by flooding” did not make clear whether the property was flooded internally. This caused issues when collating the data into a central database, reducing the level of accuracy for some specific flooding records.

LLFAs have a responsibility to manage the risk of groundwater flooding but due to the complex nature of flooding from this source, information on groundwater flood risk is very limited and appropriate only for strategic use and general consideration for specific sites. More information on groundwater flooding incidents and groundwater level monitoring will assist in improving general understanding of groundwater flood risk in Surrey.

The information held by SCC on highway drainage assets and their condition is very limited in many areas, which can make it more difficult to identify the sources and cause of flooding in some instances. Information for smaller watercourses (privately owned or otherwise) is also very limited in some areas.

10.3. Role of Local Communities

In addition to the functions and actions carried out by RMAs, there are many ways in which residents and communities can reduce flood risk. Local flood forums existed in Surrey prior to the winter 13/14 flood event but many more have been set up in the aftermath of this event. The role of RMAs in these local groups is instrumental in educating the public on flood risk and supporting them in implementing their own action plans and resilience measures. These groups also play a vital role in feeding back critical information on localised flooding issues to support the authorities in better understanding local flood risk and identifying potential solutions to mitigate this risk.

There are still widespread occurrences of riparian watercourses and ditches that are not maintained. Keeping all watercourses well maintained will not (in itself) prevent flooding from major

flood events but the lack of maintenance of some riparian owned ditches was certainly a contributing factor on the impact of the flooding experienced from the winter 13/14 flood event.

10.4. Looking Forward

A vast amount of information on historic flooding was gathered as a result of the winter 13/14 flood event. This data will help highlight the areas most at risk of flooding in Surrey, enable the prioritisation of drainage maintenance works and support business cases when bidding for Government contributions towards major flood defence schemes.

10.5. Recommendations

Based on the findings of this Section 19 investigation, it is recommended that:

- The Norlands Lane Culvert will be added into the Flooding Asset Register. A maintenance regime will be agreed with the relevant RMAs.
- All RMAs continue to improve their cooperation, coordination and communication with one another, particularly with regard to their flood risk management functions and during times of emergency.
- All RMAs continue to raise awareness of flood risk and increase the resilience of communities and businesses to flood risk, across Surrey.
- SCC and the EA further develop public awareness and understanding of riparian responsibilities, in order to improve the condition of watercourses across Surrey.
- All RMAs review their current processes for data collection during a flood event, giving consideration to the best practice guidance produced by SCC and the EA.
- All RMAs pass any records of future property flooding in Surrey to SCC for collation in a central database.
- SCC undertake studies where there is significant groundwater flooding to better understand the nature of the flooding and the levels of risk.
- All RMAs review the benefits of proposed flood schemes in the 6 Year Programme of Flood and Coastal Erosion Risk Management Schemes and consider whether partnership contributions may be justified.
- SCC undertake detailed drainage surveys where asset information is limited or non-existent, prioritising areas at greatest risk of flooding.
- SCC formalise the process for investigating major flood events under the S19 duty and agree this process with the Surrey Flood Risk Partnership Board, to ensure efficient partnership working and data sharing for future investigations.

10.6. Actions and on-going work

The actions and on-going work of the RMAs are summarised below:

Environment Agency

- Operated Flood Alert and Flood Warning service.
- Sent out flood ambassadors and flood data recorders to the areas affected by flooding.
- Installation of *AquaDam* defence in Chertsey.
- Supported National Flood Forum engagement events.
- Cleared large blockages from the River Thames Navigation in Surrey.
- Cleared ditches and culverts.

- The Environment Agency has proposed to establish a Community Advisory Group which can identify questions relating to the River Thames scheme that could then be put to independent review.

Thames Water

- Carried out works to the Hamm Court and Penton Hook pumping stations, making them more resilient to future flooding.

Surrey County Council

- Surrey Fire and Rescue Service pumped water away from properties during the flooding to reduce the damage caused.
- Assisting residents with queries.
- Road closures.
- Deployment of sandbags.
- Inspection of assets and repairs carried on damaged assets.
- Administered the Repair and Renew Grant to help protect properties from flooding in the future.

Runnymede Borough Council

- Carried out a programme of works for the maintenance of the ordinary watercourse network across the Borough.

11. Acknowledgements

Surrey County Council would like to thank the following organisations and groups for providing information and input into the Section 19 Flood Investigation Report;

- The Environment Agency
- Runnymede Borough Council
- Thames Water
- The Meadlake Action Group
- Atkins