

Section 19 Flood Investigation Report: Spelthorne

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	Spelthorne; Laleham, Littleton, Shepperton, Staines-upon-Thames, Stanwell and Sunbury
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 IDB which have an effect on flood risk. More information on the Flooding Asset Register can be found on SCC'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
Instances of property flooding	This is a count of the reported incidents of internal property flooding that occurred across Winter 2013/2014. This means that properties which were flooded twice are accounted for twice. It is therefore not a count of the number of properties.

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.
SBC	Spelthorne 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 risk management authorities (RMAs) had relevant flood risk management functions during the flooding that took place within the boundary of Spelthorne Borough Council (SBC) 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 (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 Spelthorne was predominately due to fluvial sources. The exceptional rainfall that fell across the Winter of 2013/14 (275% compared with an average winter) also led to high groundwater levels which caused groundwater flooding and sewer flooding. Additionally, surface water flooding also occurred as a result of the exceptional rainfall. Approximately 130 properties were internally flooded in Spelthorne during winter 2013/14..

The Environment Agency (EA) is the lead RMA for incidents of fluvial flooding from Main Rivers. Thames Water (TW), Surrey County Council (SCC) and SBC have responsibilities in relation to other sources of flooding that occurred and 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.
- Temporary barriers and pumps were used in two locations in Staines to prevent approximately 150 properties from flooding.
- Operated the River Ash off-take sluice gate to control flood waters entering the River Ash from the River Colne.
- National Flood Forum engagement events were organised.
- Cleared debris, including trees, at Sunbury Lock amongst other areas.
- Set up Command stations at Surrey Police Headquarters to respond to the flooding across Surrey
- Carried out maintenance along the River Thames, which included areas in the Spelthorne Districts

1.2. Thames Water

- Tankers were supplied to pump away flood and foul water.
- Traced the trunk mains to understand where incapacities in the system were located.
- 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 disruption, normal service was able to resume as soon as possible.

1.3. Surrey County Council

- Closed roads in the interests of public safety.
- Provided portaloos for residents (where affected).
- Administered the Repair and Renew Grant to help protect properties from flooding in the future.

- 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.
- Published the LFRMS in December 2014

1.4. Spelthorne Borough Council

- A Flood Assistance Centre was set up by SBC in Staines-upon-Thames during February 2014.
- Provided sandbags to residents who requested them.
- Opened a Borough Emergency Centre which co-ordinated actions and resident request for sandbags and portaloos.
- Operated via customer services a call centre throughout the period of flooding and follow up with recovery issues.
- Liaised with Thames Water to provide pumping services where possible.
- Provided via leisure centres shower facilities for those affected by flooding.
- Delivered sandbags to residents in affected areas.
- Identified and checked locations of vulnerable residents, providing assistance where appropriate Liaised with residents in the recovery phase to try and ensure needs were addressed plus organised an event so residents could ask questions about the flooding to relevant authorities.
- During the flooding visited sites affected to reassure residents.
- Maintained a regular information flow for residents via the web and hand delivered leaflets.
- Ensured ditches maintained by the Council were kept clear.

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 the 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 the LLFA to publish 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

In total there are 53 sites included within this report, which have been assigned across seven sub areas. These are all located in the borough of Spelthorne.

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.

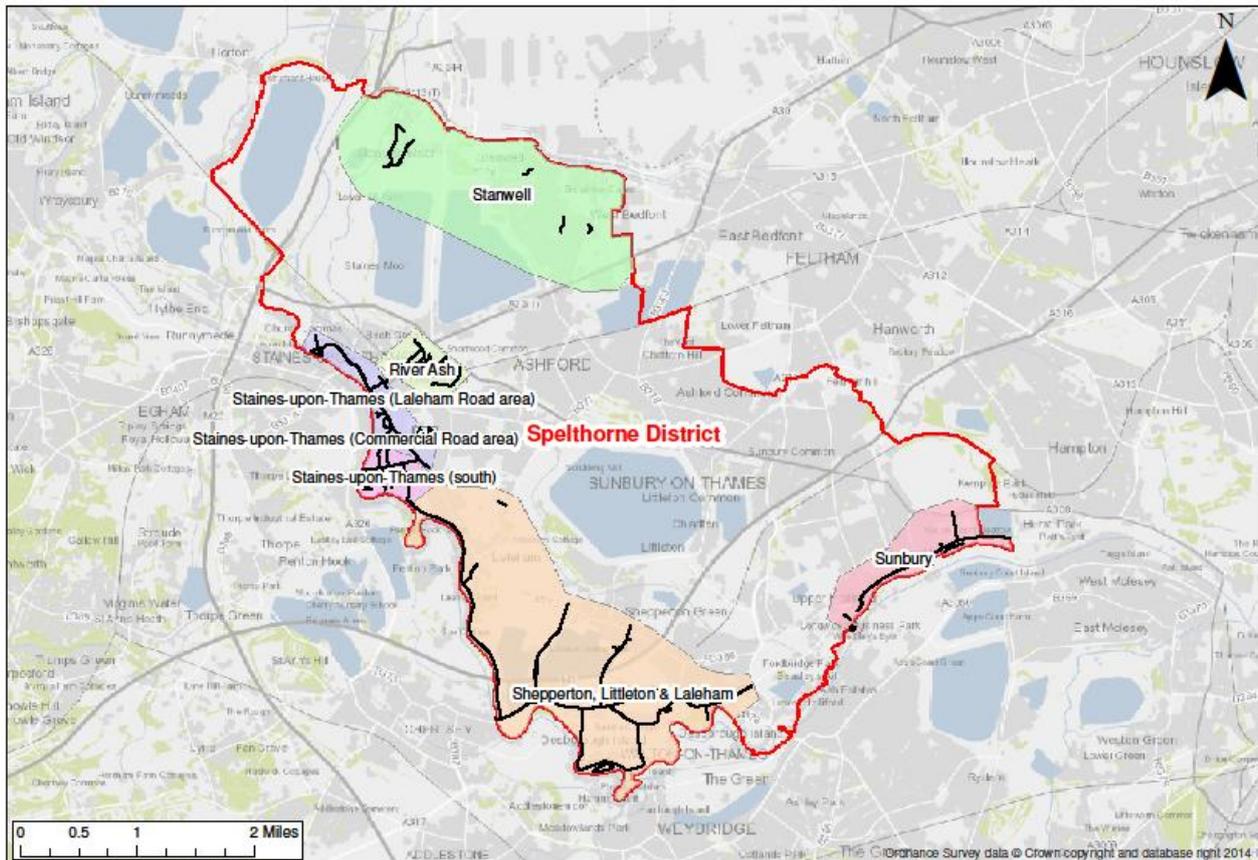


Figure 2-1 Location of sub areas within Spelthorne District for this Report

3. Background Weather 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. Table 3-1 shows that total rainfall was more than double what would be expected during an average winter. Parts of South East England received around two and a half times the amount of rainfall that they would normally expect.

This seasonal rainfall caused wide-spread flooding across Surrey from a range of sources including groundwater as the levels across the region had risen. 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 January 2014. These storms were characterised by unusually large and deep areas of low pressure from the Atlantic, 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.

3.2. Catchment Conditions

There are three main catchments in the Spelthorne area; the River Colne, the River Ash and the River Thames. The Rivers Colne and Ash are tributaries of the River Thames.

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, with notable problems along the River Colne at Watford and Staines.

Figure 3-1 and Figure 3-2 show the observed river flow hydrographs for various Lower Colne watercourses against local rainfall data, recorded at two gauging stations at 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 it caused the largest resulting river flows.

The flooding experienced in the Colne and Ash catchment was principally driven by the storm event which occurred on 6 to 8 February 2014. On the basis of the rainfall alone, this appears to have been a reasonably low return period event (<5 years). However, antecedent conditions were a major factor in relation to the catchment response, and it is more appropriate to base any assessment of event rarity on the peak river flow data, where available. This suggests an event return period of around 80-90 years.

Some of the Lower Colne tributaries were tightly managed during the winter in order to limit the extent and duration of flooding. This seems to have had the effect of reducing levels such that they did not exceed a 1 in 50 year event.

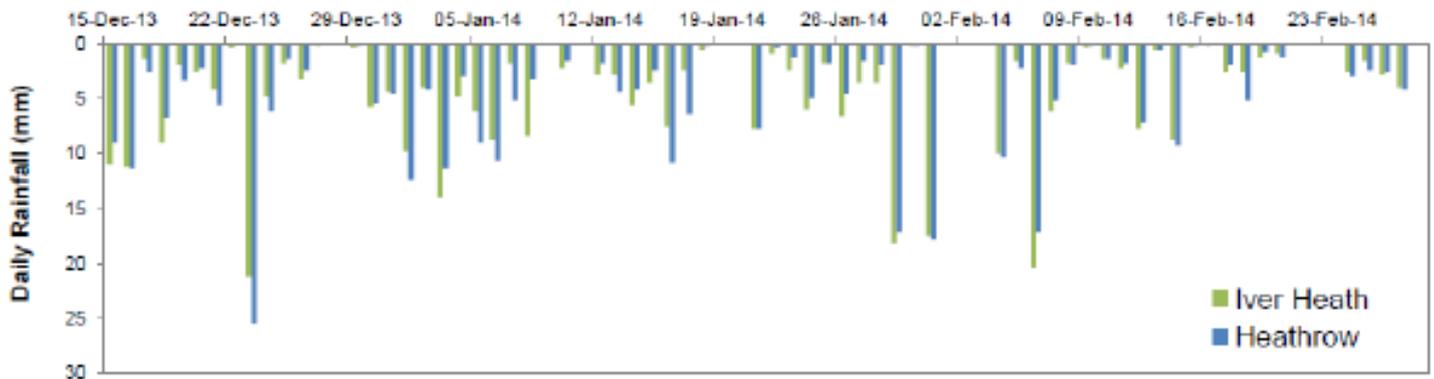


Figure 3-1 Daily Rainfall at Iver Heath and Heathrow Winter 2013-14

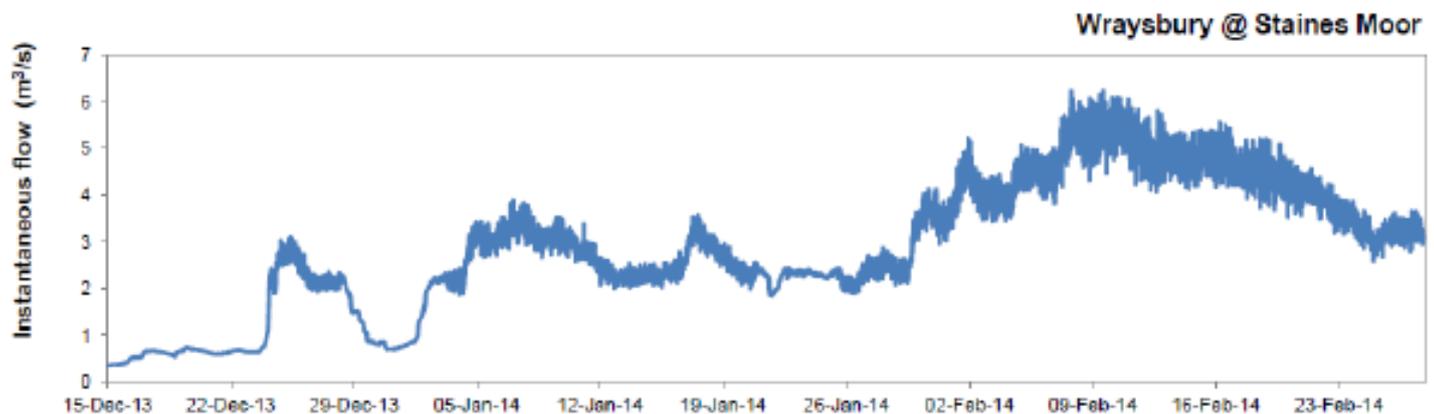


Figure 3-2 River Flow on the Wraysbury at Staines Moor (the lower River Wraysbury flows adjacent to the lower River Colne)

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 the levels in the Thames rose over the following two weeks as each catchment slowly discharged into the already swollen river. 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 total flood volume had a return period of more than 100 years.

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 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 Ordinary 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 (IDB) 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.

Error! Reference source not found. 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. TW is the water company that has responsibility for all sources of sewer flooding. There are no IDBs in the borough of Spelthorne.

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 Spelthorne 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.
- Carried out flood risk mitigation works.
- Operated flood risk management assets during the flooding.

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.
- The Environment Agency 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.
- 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.
- 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 are working with community groups to help them produce community emergency plans.

The EA carried out the following actions in relation to the River Thames:

- The removal of more than 200 tonnes of debris from the Thames weirs that were washed on to the weirs as a result of the floods.
- Tree works to the River Thames towpaths that the EA own.
- Worked with government and partners to secure the first stage of funding to develop the River Thames Scheme so it is ready for construction. 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.
- Created a River Thames Scheme webpage, a Facebook page, a Twitter account and an online blog to keep the public updated on progress.

Specifically in Spelthorne the actions listed below were carried out:

- Erected a temporary defence in Staines to manage flood risk.

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 Spelthorne borough. 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. During the event their main focus was on maintaining customer services, on protecting assets vital for the ongoing delivery of service and on 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.
- 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.

Specifically in Spelthorne the action listed below was carried out;

- After the Laleham Park pumping station failed due to high flood waters, a flood resilient door was installed and all motors replaced.

Surrey County Council

SCC, as LLFA, have 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, undertake works to mitigate surface water and groundwater flooding and undertake 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. SCC's relevant flood risk management functions undertaken are listed below:

- The LFRMS was published in December 2014.
- Section 19 reports have been produced for the flooding experienced across the county in Winter 2013/14.
- An aqueduct from Hythe End to Kempton Park has been identified in Spelthorne as a key drainage asset and added to the flooding asset register.

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.
- During the flooding SCC and TW were in discussions about the opportunity for joint working across the county.
- 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.
- After the storms and flooding; SCC 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 Spelthorne, SCC carried out the works below:

- Provided a sweeper, gully tanker and grab lorry along with associated labour to clean up flood affected roads in Shepperton. This was done in agreement with SBC.
- Arranged parking suspensions with SBC to allow a joint cleanup operation of five commuter parking roads.
- Undertook kerb and verge repair works to Chertsey Bridge Road

- Completed a programme of additional gully and drainage system clearing in all the flood affected roads in Spelthorne on Friday 28th March 2014.

Spelthorne Borough Council

SBC as a Borough Council, have 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.

SBC's relevant flood risk management functions undertaken are listed below:

- Participated in the Strategic and Tactical Command Groups once a major incident had been declared to respond to the flooding across Surrey.
- Ensured ditches maintained by the Council were kept clear

In addition SBC carried out the following activities across Surrey;

- A Flood Assistance Centre was set up by SBC in Staines-upon-Thames during February 2014.
- Provided sandbags to residents who requested them.
- Opened a Borough Emergency Centre which co-ordinated actions and resident request for sandbags and portaloos
- Operated via customer services a call centre throughout the period of flooding and follow up with recovery issues
- Liaised with Thames Water to provide pumping services where possible
- Provided via leisure centres shower facilities for those affected by flooding
- Delivered sandbags to residents in affected areas
- Identified and checked locations of vulnerable residents, providing assistance where appropriate Liaised with residents in the recovery phase to try and ensure needs were addressed plus organised an event so residents could ask questions about the flooding to relevant authorities
- During the flooding, visited sites affected to reassure residents
- Maintained a regular information flow for residents via the web and hand delivered leaflets

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 seven sub areas in this report, all within Spelthorne Borough.

Each sub area will be introduced and information relevant to the whole sub area presented. Responsible RMAs will be identified at sub area 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 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. (flooding.enquiries@surreycc.gov.uk).

7. Sub Area: Shepperton, Littleton & Laleham

7.1. Sub Area Definition

This sub area covers the area of Shepperton, Littleton and Laleham.

7.2. 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 Littleton & Laleham sub area.

The major watercourses in this sub area are the River Thames, which forms the western boundary of the sub area, and the River Ash, which flows northwest to southeast adjacent to the northern boundary of the sub area.

The sub area is underlain by bedrock of the London Clay Formation to the north (clay, silt and sand) and Claygate Member (sand, silt and clay) and Bagshot Formation (sand) towards the south. This sub area is underlain by superficial deposits of predominately Shepperton Gravels to the south and Kempton Park Gravels and Langley Silt members. These are associated with fluvial environments and can convey flood waters. The far east and west of the sub area have the potential for groundwater flooding to occur at the surface, which includes areas to the south of Laleham (along Shepperton Road and the north of Littleton Lane) and along the River Thames to the east of Lock Island.

According to the EA online fluvial flood risk maps, a significant proportion of the sub area is at risk of fluvial flooding from the River Ash and River Thames. Areas closest to the rivers are predominantly located within a high risk zone, with a high chance of flooding from fluvial sources (greater than 1 in 30 annual chance event). Other parts of the sub area are predominantly in a medium (between 1 in 100 and 1 in 30 annual chance) and low risk zone (between 1 in 1000 and 1 in 100 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 Shepperton, Littleton & Laleham sub area are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings.

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

Flooding at Chertsey Bridge Road and the Surrounding Area

Fluvial and groundwater flooding was reported at Chertsey Bridge Road and the surrounding area from January to February 2014, resulting in extensive road and internal property flooding. Chertsey Bridge Road was temporarily closed. Thames Side, Littleton Lane, Sheep Walk, Dockett Eddy lane, Ferry lane and Russell Road were also closed.

In January 2014, just north of the M3, the River Thames overtopped its banks and flowed in to the north eastern end of a former quarry lake (see 'A' in Figure 7-1). Over time this led to the groundwater fed lake, supplemented with water from the River Thames, flowing through the eight culverts under the M3 into the southern lake. The water then flowed towards Abbeyfields, Thames Side and to the rear of the properties on Chertsey Bridge Road. Several residents of Chertsey Bridge Road built a bund behind their properties to divert these flood waters away, although this may not have been effective as flood depths of up to 900mm in the gardens of Chertsey Bridge Road were experienced. The fast moving flood water flowed onto and over Chertsey Bridge Road, meeting with flood waters from the River Thames on Dumsey Meadow. The flooding to Chertsey Bridge Road resulted in Chertsey Bridge being inaccessible to vehicles.

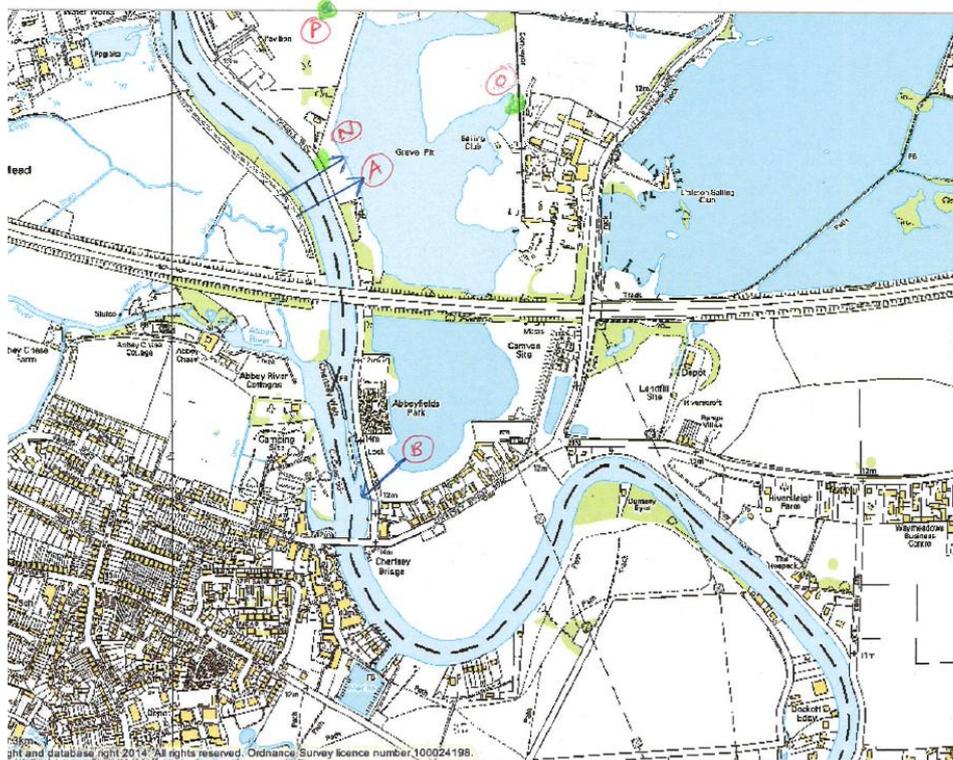


Figure 7-1 Section 19 study area for Chertsey Bridge Road and the surrounding area

A 400mm diameter culvert drains water from the southern tip of the lake system to the River Thames just downstream of Chertsey Lock.

Littleton Lane caravan site, near the eastern side of the lake, was affected by the flood waters from the lake, causing flooding to the site and leading to many residents evacuating their homes. Abbeyfields park homes site was affected by flood waters directly from the River Thames and indirectly from the lake. Flood water from the River Thames flowed into the North lake and then through to the South lake causing the level to rise and flood the back of the Abbeyfields site. There was internal property flooding and some residents evacuated, though others chose to stay. The flood waters remained throughout most of January and February 2014.

Groundwater Flooding and High Water Levels in the Lake

SBC advise that groundwater levels were still above normal levels the following summer at the north and western monitoring locations 'N' and 'P' (see Figure 7-1), with Littleton north and south lakes remaining high as a consequence. Borehole 'O' to the east though had levels back to its normal summer low point. This indicates that there may be barriers to groundwater flow between the east and west areas as well as a likely barrier to groundwater flow out to the River Thames.

These barriers are likely to have been put in place to enable dry working of the gravels. Being near the river they would always be flooded and have been more difficult to work. The western boreholes and lake margins are also where a more claylike geology is present so there may be natural barriers marking the edges of the economically recoverable gravels. Furthermore the Chertsey Lock is just beyond the lake and consists of sheet piling which may have locally blocked groundwater flow to the river.

Overall the very wet winter caused substantially higher lake and groundwater levels than in previous floods. The clays were saturated from the exceptional rainfall as well as fluvial flood waters washing over the lake area. The clay is of low permeability causing slow recharge back to the gravel aquifer, such that the gravels were recharged through the following summer when groundwater levels would usually have fallen further.

The groundwater gradient from the lake to the river is shallow, meaning that there is little driving force for groundwater flow toward the river and hence to lower lake levels. It was noted that eight months after the floods the water had still not had time to drain away.

Normal groundwater flows continued from the north toward the discharge point of the River Thames. The lake outlet pipe was not of sufficient capacity to remove the excess flood water, with it being two thirds submerged when at this time of year it would normally be above the shoreline and dry.

Consequently the available outlets for the excess water in the system following the winter floods are insufficient to lower the lake to its normal level in time for the coming winter.

Property Flooding

On 5 February 2014, properties in the region of the River Thames from Littleton Lane and Shepperton Green to Shepperton Lock were flooded from the River Thames or through groundwater from the fluvial gravels.

On 8 February 2014, properties closest to the River Thames from Shepperton Lock to Beasley's Ait were flooded from the Thames or through fluvial gravels.

On 9 February 2014 further property was flooded in the area of the River Thames at Shepperton Green.

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, LLFA (SCC), TW and the Highways Agency.

7.4. Exercised Flood Risk Management Functions and Other Actions

Environment Agency

The EA issued multiple flood warnings over this winter. Flood alerts were upgraded to flood warnings and severe flood warnings as the floods were closely monitored. These are listed in Tables 6-1 to Table 6-3.

Table 7-1 Severe flood warnings issued by the EA 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
River Thames at Laleham	09/02/2014	15:31:14	547
River Thames at Shepperton Green	09/02/2014	15:32:46	871
Properties closest to the River Thames from Littleton Lane, Shepperton Green to Shepperton Lock	09/02/2014	15:32:56	167

Table 7-2 Flood warnings issued by the EA 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 Walton	06/01/2014	20:49	139
River Thames at Laleham	07/01/2014	08:54	669
Properties closest to the River Thames from Littleton Lane, Shepperton Green to Shepperton Lock	07/01/2014	11:13	198
River Thames at Staines and Egham	08/01/2014	13:27	7152
River Thames at Laleham	05/02/2014	18:04	678
Properties closest to the River Thames from Littleton Lane, Shepperton Green to Shepperton Lock	05/02/2014	18:14	204
River Thames at Staines and Egham	07/02/2014	08:13	7257
River Colne and Frays River at West Drayton and Stanwell Moor	07/02/2014	19:48	771
Properties closest to the River Thames from Shepperton Lock to Beasley's Ait	08/02/2014	13:11	353
River Thames at Shepperton Green	09/02/2014	09:31	860
River Ash at Ashford and Staines	10/02/2014	07:19	232

Table 7-3 Groundwater flood alerts issued by the EA in Winter 2013/14

Flood warning area	Date	Number warned
Groundwater flooding in Egham	09/01/2014	237

There were both EA ambassadors and flood data recorders on the ground during the flooding in January and February 2014 to provide information and advice, and to record information on the extent and the impact of the flooding. The role of the ambassadors is to deliver key information and it involves:

- Providing information on the latest flooding situation.
- Raising awareness of the EA's Floodline service and information available on the EA website.
- Answer queries and provide advice on what to do before, during and after a flood.
- Maintain a presence and where possible reassure the public.
- Getting feedback from the communities affected.

Temporary barriers were erected in two locations in Staines. The EA was supported by professional partners, contractors and the Armed Forces. A 400m long temporary defence was erected at the rear of Penton Avenue on 14 February 2014. A 260m long temporary defence was erected between Staines Road and St. Pinnock Avenue on 15 and 16 February 2014. Both temporary defences held back floodwater. They were designed to protect more than 150 properties from a flood event with a 1 in 100 (1%) chance of occurring in any given year.

Three pumps were used to pump water from behind defences. The security of the pumps and barriers was continuously monitored by the police. They were removed from site on 21 February 2014.

Between the 9 and 13 February, the EA operated the River Ash off-take sluice gate a number of times. This was to control the flood waters entering the River Ash from the River Colne.

Once the flooding had subsided in March, National Flood Forum engagement events were organised in Shepperton.

A Flood Assistance Centre was also set up by SBC in February 2014.

Since the 2013/2014 flooding the EA have carried out maintenance work along the River Thames which includes:

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

Surrey County Council

The following roads were closed temporarily for public safety reasons:

- Thames Side
- Chertsey Bridge Road
- Littleton Lane

- Sheep Walk
- Renfree Way
- Dockett Eddy Lane
- Manor House Court
- Russell Road
- Ferry Lane

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

8. Sub Area: Staines-upon-Thames (Commercial Road area)

8.1. Sub Area Definition

This sub area covers the Commercial Road area of Staines-upon-Thames, including Knightsbridge Crescent and Parkside Place.

8.2. Location and Catchment Description

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

This sub area is situated approximately 500m east of the River Thames. Sweep's Ditch, a small tributary of the River Thames, also flows north-south through the sub area.

The sub area is underlain by bedrock of the London Clay Formation (clay, silt and sand). The superficial deposits underlying the sub area are; Shepperton Gravels and alluvium. These are associated with fluvial environments and can convey flood waters. There is the potential for groundwater flooding to occur at the surface in this 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 River Ash and River Thames. Areas adjacent to Sweep's Ditch are predominantly located within a high risk zone, with a high chance of flooding from fluvial sources (greater than 1 in 30 annual chance). Other parts of the sub area are predominantly in a medium risk zone (between 1 in 100 and 1 in 30 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 and 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.

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

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

The EA's online Updated Flood Maps for Surface Water indicate that parts of the land adjacent to Sweep's Ditch 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.

In January, six properties were flooded by the River Thames in the Staines area. Some of the worst affected areas included Mayfield Gardens, Chertsey Way and Bundy's Way.

Knightsbridge Crescent and Parkside Place Flooding

A flood event was reported at Knightsbridge Crescent and Parkside Place due to rising groundwater and surface water build up in January 2014 and continued through to February 2014. Knightsbridge Crescent has suffered multiple historic incidents of flooding.

Knightsbridge Crescent was affected by similar flooding in 2003.

In early January 2014, following a period of extended rainfall, rising groundwater and surface water build-up began to flood parts of Knightsbridge Crescent, including up to the edge of some properties. The flood water included some foul water contamination from mixing with sewage from the drains and property drains which were also backed up. In Parkside Place rising groundwater flooded the road and parking areas, also causing some sewer overflow. The flood waters continued in to February 2014.

Knightsbridge Crescent borders the Main River watercourse, Sweep's Ditch. The watercourse did not overtop its banks but several roadside drains that directly run in to the watercourse backed up.

8.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area are the EA, LLFA (SCC), TW and SBC.

8.4. Exercised Flood Risk Management Functions and Other Actions

Environment Agency

This area is within the flood warning areas of River Thames at Staines and Egham including Bell Weir and Penton Hook Locks, Runnymede, Hythe End, Pooley Green, Thorpe Lea and East Egham. Flood warnings were issued on 8 January and 7 February. This was raised to a severe flood warning on the 9 February. The flood warnings are shown in Table 6-1 to Table 6-3.

In January and February, EA flood ambassadors and flood data recorders were sent to the Staines-upon-Thames area to provide information and advice, and to record information on the extent and the impact of the flooding. Once the flooding had subsided in March, National Flood Forum engagement events were organised in Staines by the EA.

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.

Spelthorne Borough Council

A Flood Assistance Centre was set up by SBC in Staines-upon-Thames during February 2014.

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

Thames Water

TW supplied a tanker to pump away some of the water and the worst of the foul water contamination at Knightsbridge Crescent and Parkside Place.

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

Surrey County Council

SCC provided portable loos for residents that required the facilities at Knightsbridge Crescent and Parkside Place.

Parkside Place was formally closed in this sub area during this flood event. Other roads were impassable (such as Knightsbridge Crescent) but not formally closed.

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

9. Sub Area: Staines-upon-Thames (Laleham Road area)

9.1. Sub Area Definition

This sub area covers the Laleham Road area of Staines-upon-Thames.

9.2. Location and Catchment Description

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

The major watercourses in this sub area are the River Wraysbury and River Colne, which join in the north of the sub area and flow into the River Thames. This forms the western boundary of the sub area. Sweep's Ditch, a small tributary of the River Thames, also flows through the sub area.

The sub area is underlain by the London Clay Formation (clay, silt and sand). Superficial deposits of Shepperton Gravels, Alluvium and Langley Silt, which are associated with fluvial environments and can convey flood waters. There is the potential for groundwater flooding to occur at the surface across the majority of this 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 these watercourses. Areas adjacent to the River Thames and the confluence of the Wraysbury and Colne are predominantly located within an area with a high chance of flooding (greater than 1 in 30 annual chance). Other parts of the sub area are predominantly in a medium (between 1 in 100 and 1 in 30 annual chance) and low risk zone (between 1 in 1000 and 1 in 100 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 Staines-upon-Thames (Laleham Road area) sub area are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings.

Guildford Street Flooding (off Laleham Road)

A flood event was reported at Guildford Street due to rising groundwater in January 2014 and continued through to February 2014. This location has suffered multiple historic incidents of flooding.

There have been reported instances of similar flooding of this road in 2003 and 2012.

In early January 2014, following a period of extended rainfall, rising groundwater began to cause flooding to Guildford Street. The flood water included some foul water contamination from mixing with sewage from the drains and as the flood levels increased reached up to the edge of a number of properties. This caused drains to backup and prevented residents from using their sanitation facilities (toilets etc). The flood waters remained throughout most of January and February 2014.

9.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area are the EA, LLFA (SCC), TW and SBC.

9.4. Exercised Flood Risk Management Functions and Other Actions

Environment Agency

This area is within the flood warning areas of River Thames at Staines and Egham as well as the River Colne, Colnbrook and Stanwell Moor. Most flood warnings are shown in Table 6-1 to Table 6-3, but others relevant to the River Colne include 10 January, 31 January, and 7 February.

In January and February, EA flood ambassadors and flood data recorders were sent to the Staines area to provide information and advice, and to record information on the extent and the impact of the flooding. Once the flooding had subsided in March, National Flood Forum engagement events were organised in Staines-upon-Thames by the EA and SBC.

Spelthorne Borough Council

SBC pre-emptively visited and cleansed Guildford Street prior to the flooding. Sandbags were provided to every property that requested them and the street was visited each day.

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

Surrey County Council

SCC provided portable toilets for residents who required the facilities at Guildford Street.

The following roads were closed temporarily for public safety reasons:

- Laleham Road
- Carlyle Road
- River Bank
- Thames Street

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

TW supplied a tanker to pump away some of the water and the worst of the foul water contamination at Guildford Street. In addition to this they traced the sewer to Laleham Road and found all manholes to the trunk sewer to be surcharged with much diluted sewage indicating that the system was inundated.

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. Sub Area: Staines-upon-Thames (River Ash)

10.1. Sub Area Definition

This sub area covers the area of Staines-upon-Thames close to the River Ash. A separate report was produced for the River Ash and Knowle Green area, which was published in April 2015. This report can be found on the [SCC website](#).

11. Sub Area: Staines-upon-Thames (south)

11.1. Sub Area Definition

This sub area covers the area of south Staines-upon-Thames surrounding Staines Town Football Club.

11.2. Location and Catchment Description

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

The major watercourse in the sub area is the River Thames, which forms the western boundary of the sub area.

The sub area is underlain by bedrock of the London Clay Formation (clay, silt and sand). Superficial deposits of Shepperton Gravels and alluvium underlay the sub area, which are associated with fluvial environments and can convey flood waters. There is the potential for groundwater flooding to occur at the surface across the majority of the sub area.

According to the EA online fluvial flood risk maps the sub area is at risk of fluvial flooding from the River Thames. Areas closest to the River Thames are predominantly located within a high risk zone, with a high chance of flooding from fluvial sources (greater than 1 in 30 annual chance). Other parts of the sub area are predominantly in a medium (between 1 in 100 and 1 in 30 annual chance) and low (between 1 in 1000 and 1 in 100 annual chance) risk.

The EA's online Updated Flood Maps for Surface Water indicate that there is no significant 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.

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

Parts of the Staines-upon-Thames (south) sub area are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings.

The winter flooding of 2013/2014 included the flooding of Penton Hook (Britain's largest inland marina), Staines-upon-Thames. This area has historically suffered from flooding, and the return periods at Penton Hook, which is just to the south of this sub area, are given in **Error! Reference source not found.**

Table 11-1 Return periods, in years, for Penton Hook, River Thames

Location	2014		2007 (summer)	2003 (winter)
	Return period	Associated month		
Staines-upon- Thames (Penton Hook)	15-20	February	Less than 2	10-20

This sub area is centred around Wheatsheaf Lane and experienced similar flooding in early 2003.

In early January 2014, following a period of extended rainfall, rising groundwater and the build-up of surface water began to cause flooding to Wheatsheaf Lane. This also resulted in the surcharging of the foul sewer network. Rising groundwater flooded a number of properties along Wheatsheaf Lane, compounded by the ground floor level of several properties being lower than that of the road. Flood waters filled the road and flooded parts of Avondale Road, Garrick Close and Penton Hook Road. The flood waters remained throughout most of January and February 2014.

11.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area are the EA, LLFA (SCC), TW and SBC.

11.4. Exercised Flood Risk Management Functions and Other Actions

Thames Water

TW supplied a tanker to pump away some of the water and the worst of the foul water contamination on Wheatsheaf Lane.

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

Environment Agency

The flood warnings issued by the EA to this sub area are detailed in Table 6-1 and Table 6-2.

On 14 February 2014 the EA, supported by professional partners, contractors and the Armed Forces, erected a 400m temporary flood barrier located at the rear of Penton Avenue, Staines-upon-Thames (south). On the 15 and 16 February 2014 a 260m temporary flood barrier was set up between Staines Road and St. Pinnock Avenue. Further attenuation was provided by three pumps that were used to pump water from behind the defences. For security reasons the pumps were continuously monitored by the police, while in place. The pumps were removed from the site on the 21 February 2014. The defences were designed to protect more than 150 properties from a flood event with a 1 in 100 (1%) chance of occurring in a year. Both sets of temporary defences were successful in holding back the floodwater.

In January and February EA flood ambassadors and flood data recorders were sent to the Staines area to provide information and advice; and to record information on the extent and the impact of the flooding. Once the flooding had subsided in March, National Flood Forum engagement events were organised in Staines by the EA.

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

Spelthorne Borough Council

A Flood Assistance Centre was set up by SBC in Staines-upon-Thames during February 2014.

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

Surrey County Council

Wheatsheaf Lane and Thames Side were closed during the flooding.

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

12. Sub Area: Stanwell

12.1. Sub Area Definition

This sub area covers the area of Stanwell.

12.2. Location and Catchment Description

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

The major watercourses in this sub area are the River Colne, Duke of Northumberland River and Longford River. The River Colne runs through the top of the sub area from northeast to southwest. Only small portions of the Duke of Northumberland River and the Longford River are located within the sub area. However, both rivers run along the eastern boundary of the catchment.

The sub area is underlain by bedrock of the London Clay Formation (clay, silt and sand). Superficial deposits of alluvium, Kempton Park Gravels, Taplow Gravels and Shepperton Gravels underlay the sub area. These deposits are associated with fluvial environments and can convey flood waters. The majority of the sub area has the potential for groundwater flooding to occur at the surface, except for northern areas of Stanwell and small pockets to the east and west of the sub area, which have the potential for groundwater to affect property and infrastructure below ground level.

According to the EA online fluvial flood risk maps, parts of the sub area located close to the River Colne are at risk of fluvial flooding. The Stanwell Moor area, which includes Hithermoor Road, is located in the flood risk zones from the River Colne, varying between high (greater than 1 in 30 annual chance) risk to low (between 1 in 1000 and 1 in 100 annual chance) risk. The remaining Section 19 sites within this sub area are spread out within Stanwell. None of these are indicated to be at risk of fluvial flooding; however all are shown to be at risk of surface water flooding.

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 Stanwell sub area are within a Flood Warning Area (Stanwell Moor) and Flood Alert Area (River Colne, Frays River at West Drayton and Stanwell Moor). These are areas for which the EA provides free flood warnings.

12.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area are the EA, LLFA (SCC) and SBC.

12.4. Exercised Flood Risk Management Functions and Other Actions

Environment Agency

Details of the flood warnings issued by the EA in Stanwell during February 2014 are detailed in **Error! Reference source not found..**

Table 12-1 Flood warnings issued by the EA in Stanwell in February 2014.

Flood warning area	Date	Time	Number warned
River Colne and Frays River at West Drayton and Stanwell Moor	07/02/2014	19:48	771

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.

Spelthorne Borough Council

Once the flooding had subsided in March, National Flood Forum engagement events were organised in Stanwell.

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

Surrey County Council

The following roads were closed temporarily for public safety reasons:

- Chesterton Drive
- Caledonia Road
- Hithermoor Road (Stanwell Moor)

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

13. Sub Area: Sunbury

13.1. Sub Area Definition

This sub area covers the area of Sunbury, adjacent to the River Thames.

13.2. Location and Catchment Description

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

The major watercourses in this sub area are the River Thames, which forms the south eastern boundary of the sub area.

The sub area is underlain by bedrock of the London Clay Formation (clay, silt and sand). In addition there are superficial deposits of Kempton Park Gravels and alluvium, which are associated with fluvial environments and can convey flood waters. The southern parts of the Sunbury sub area, which run alongside the River Thames, have the potential for groundwater flooding to occur at the surface.

According to the EA online fluvial flood risk maps a significant proportion of the sub area is at risk of fluvial flooding from the River Thames. Areas closest to the rivers are predominantly located within a high risk zone, with a high chance of flooding from fluvial sources (greater than 1 in 30 annual chance). Other parts of the sub area are predominantly in a low (between 1 in 1000 and 1 in 100 annual chance) risk zone.

The EA's online Updated Flood Maps for Surface Water indicates that the sub area is not at significant 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.

The majority of the sub area is within a Flood Warning and Flood Alert Area, particularly the areas in close proximity to the River Thames. These are areas for which the EA provides free flood warnings. The Section 19 sites affected during the winter of 2013/14 are covered by the following flood warning and flood alert areas:

- Properties closest to the River Thames at Sunbury (flood warning area)
- River Thames at Sunbury (flood warning area)
- River Thames from Shepperton to Molesey (flood alert area)

During events in both January and February 2014, properties in the area of the River Thames at Sunbury were flooded from the River Thames or through the fluvial gravels.

13.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area are the EA and LLFA (SCC).

13.4. Exercised Flood Risk Management Functions and Other Actions

Environment Agency

On 6 January 2014, the EA issued flood warnings to just over 200 properties closest to the River Thames at Sunbury. On 8 January 2014, the EA issued flood warnings to 1,000 people in the wider area of the River Thames at Sunbury, as levels rose further.

On 2 February 2014, the EA issued a flood warning to the properties closest to the River Thames at Sunbury, several day before the flooding started. On 7 February 2014, the EA issued a further flood warning to the River Thames at Sunbury, as river levels rose.

Details of the flood warnings issued by the EA between January 2014 and February 2014 are detailed in **Error! Reference source not found.**

Table 13-1 Flood warnings issued by the EA in Sunbury between January and February 2014.

Flood warning area	Date	Time	Number warned	Environment Agency count of those flooded
Properties closest to the River Thames at Sunbury	06/01/2014	09:20	227	2
River Thames at Sunbury	08/01/2014	21:59	1012	1
Properties closest to the River Thames at Sunbury	02/02/2014	10:10	229	35
River Thames at Sunbury	07/02/2014	19:13	1016	6

The EA cleared 22 large trees that were bought down and other large blockages in the 2013/14 winter floods. Sunbury Lock was one of the most seriously affected areas.

In December 2013 to January 2014, the EA sent flood ambassadors to residential areas in Sunbury where property flooding had either occurred or had the potential to happen. The EA flood ambassadors aimed to deliver key information to affected communities. Once the flooding had subsided in March, National Flood Forum engagement events were organised in Sunbury.

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.

Surrey County Council

Fordbridge Road was closed temporarily for public safety reasons.

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

14. 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 and TW carried out actions in relation to the flooding experienced in Spelthorne over winter 2013/14. It has also been established that SCC and SBC 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.

14.1. Causes

Approximately 130 properties were internally flooded in Spelthorne. 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, surface water, ordinary watercourse, sewer and groundwater sources. The River Thames was the main source of fluvial flooding in the borough and is reported to have affected the Shepperton, Littleton & Laleham and Sunbury sub areas.

14.2. 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.

14.3. 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.

14.4. 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.

14.5. Recommendation

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

- 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.

14.6. Actions and on-going work

As well as the Flood Risk Management Functions carried out in the sub areas mentioned in this report, SCC plan to carry out additional work within the Spelthorne Borough:

- On Staines Road West (Ashford), SCC are constructing a new drainage system, gullies, a crossing and an outfall to the River Ash.
- All RMAs are supporting the development of community resilience groups and local flood plans.

15. 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
- Spelthorne Borough Council
- Thames Water
- Atkins