

Section 19 Flood Investigation Report: Elmbridge

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	Elmbridge: Cobham, Esher & East Molesey, Weybridge & Walton-on Thames
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 EA, the LLFA, 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	This is a count of the reported incidents of internal property flooding that occurred across

flooding	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.
SCG	Strategic Command Group
EBC	Elmbridge 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 (Surrey County Council)
 - Property Flooding Database (Surrey County Council)
 - Historic Flooding Incidents Database (Surrey County Council)

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 Elmbridge Borough Council (EBC) 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 Elmbridge 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 100 incidents of internal property flooding in Elmbridge 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 EBC 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.
- Carried out maintenance along the River Thames, which included areas in the Spelthorne Districts

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.
- Assisted residents on the ground, working in partnership with EBC 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.
- 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. Elmbridge Borough Council

- Met with the Flooding Task Group set up by SCC to evaluate resilience planning and actions taken during the flood events in order to improve response to future events.

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.

A 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 risk management authorities 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 risk management authorities 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 Elmbridge Borough Council area. There are 47 sites in total, spread across three sub areas. There were approximately 100 incidents of internal property flooding in Elmbridge.

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.

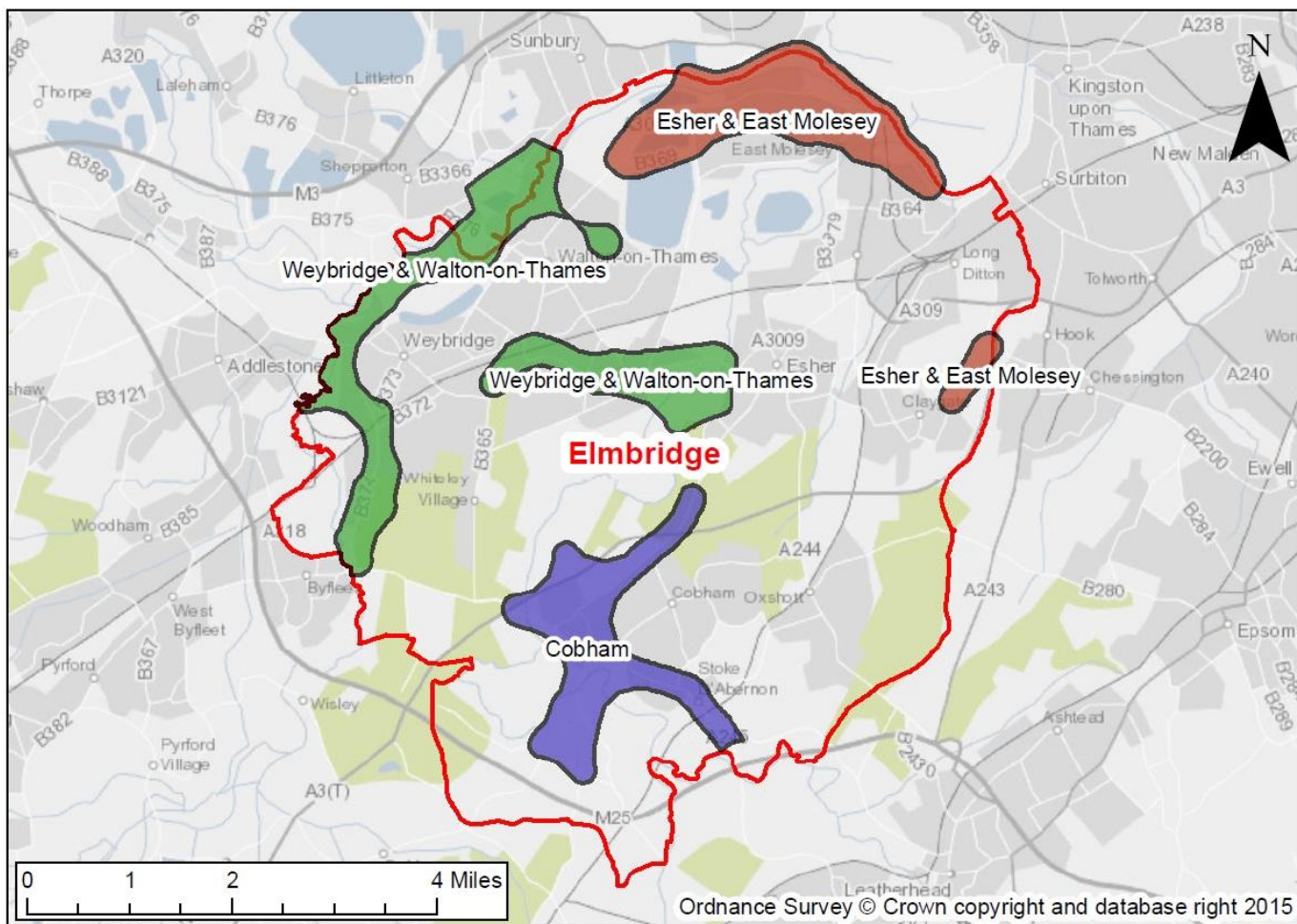


Figure 2-1 Location of Sub areas within Elmbridge Borough for this report

3. Background Weather and Catchment Conditions

3.1. Weather Conditions

The Met Office has reported that the winter of 2013 to 2014 was the wettest winter in England and Wales since records began in 1766, with 435 mm of rain being recorded up to 24 February 2014. 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 ground water 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.

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 rainfall is reflected by the spikes in daily rainfall totals, representing major rainfall events, shown in Figure 3-1 below. This figure represents approximately two-thirds of the monthly average rainfall for December.

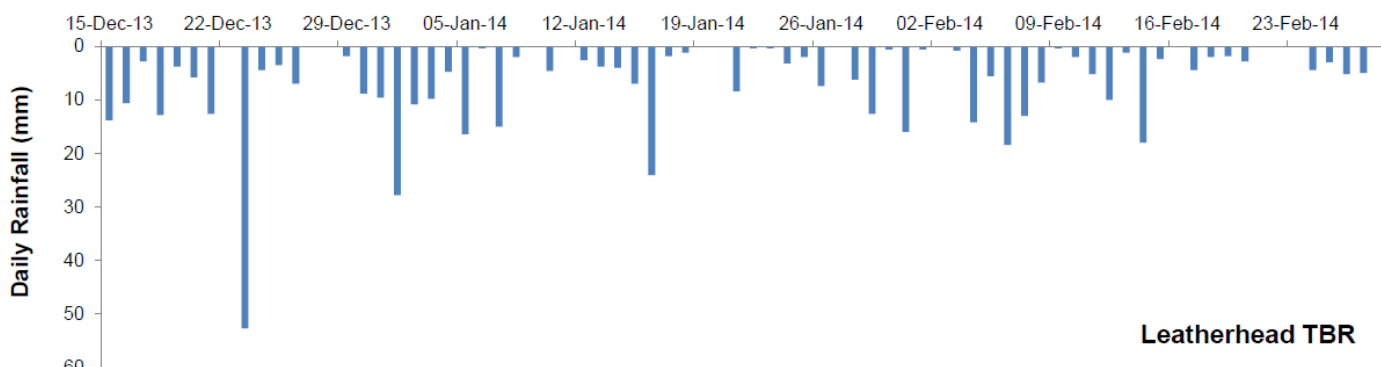


Figure 3-1 Daily Rainfall totals at Leatherhead, Surrey for winter 2013-14

The major storm event occurring on the 23 to 25 December resulted in 50-70mm of rainfall within 24 hours over an area from Dorset to Kent. With over 50mm of rainfall being recorded in some locations just on 23 December. This individual event, the largest single event of the winter, was estimated to be a 1 in 9 year annual chance event at Leatherhead.

The soil was saturated from the preceding high levels of rainfall. This gave rise to local pluvial flooding and also fluvial flooding from the River Mole causing inundation across flood plains. The persistent high levels of rainfall for this period led to a sharp rise in river flows and fluvial flood warnings were in effect across much of the UK. The long duration rainfall return period for 60 days was calculated for Leatherhead – this was estimated to be a 1 in 96 year annual chance. Rainfall measured at Wisley (adjacent to the River Wey) indicated that this was the wettest 60 day period since records started at this site 111 years ago.

3.2. Catchment Conditions

Elmbridge lies within the lower River Mole catchment. The upper Mole catchment overlies geology belonging to the Wealden Group which is typically very impermeable in nature, giving rise to a rapid river response to the rainfall events. The Mole cuts through the Chalk downs at Dorking where ground water levels influence the river.

Even though Esher is downstream of Dorking and in the lower reaches of the catchment, the “flash” response can be seen in the figure below with the sharp peaks on the 24 December, 17 January and the 1 February.

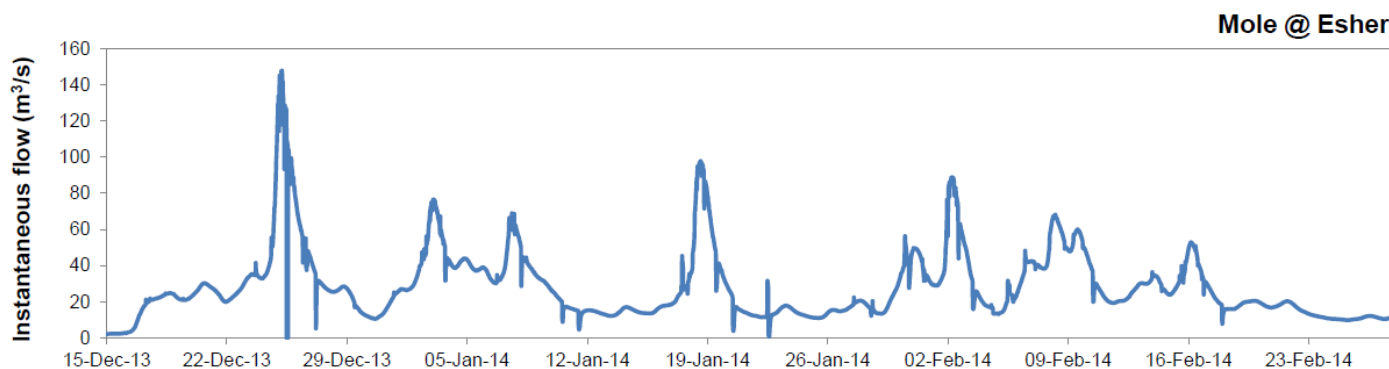


Figure 3-2 Instantaneous Flow in the River Mole at Esher Winter 2013-14

Due to its responsive catchment type, the River Mole experienced its maximum peak flow of $148\text{m}^3/\text{sec}$ on December 23 to 24. This was the largest peak flow in the gauge’s 16 year record and was estimated that this peak flow rate had a probability of 1 in 150 year annual chance of occurrence (based on a pooled analysis).

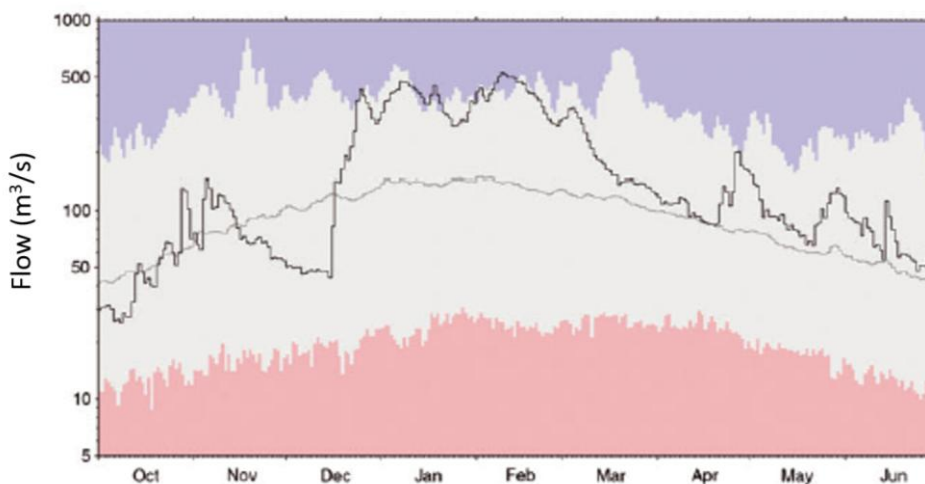


Figure 3-3 Daily Peak River flows for the Thames at Kingston (The grey line indicates the long-term average and the blue and red envelopes represent the highest and lowest recorded flows respectively)

The duration and repetition of high flow events contributed to the scale of the problem encountered with the Winter 2013/14 flood events. This is illustrated in Figure 3-3 which shows daily river flows for the River Thames at Kingston. Although flow levels rarely exceed the highest on record, they remain close to record levels for approximately two months.

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 Agency 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 risk management authority. 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 their 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 minor watercourses, working with the Lead Local Flood Authority. 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 risk management authorities.

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.

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 is the water company that has responsibility for all sources of sewer flooding. There are no Internal Drainage Boards in Elmbridge.

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 Elmbridge 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 IN Elmbridge 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.

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.
- Participated in the Strategic and Tactical Command Groups once a major incident had been declared to respond to the flooding across Surrey.
- Cleared 860 blockages and storm damage incident.
- Reported 1087 pollution incidents.
- 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.
- 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.
- Carrying out tree works to the River Thames towpaths that they own.

- 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.

Specifically in Elmbridge the actions listed below were carried out:

- Sent out flood ambassadors and flood data recorders to the areas affected by flooding.
- The high flows caused some bank erosion to the Lower Mole FAS which has now been repaired by the EA.

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

- 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.

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 [insert area]. However, this investigation has identified other relevant actions carried out by [insert RMA] 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 (often daily) 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.

- TW employees worked outside of their normal hours to ensure that an increased level of support was available during the emergency response.
- Undertook wide scale clean ups of properties regardless of whether the cause was foul or river flooding.
- Provided a sewer flooding information leaflet for general distribution to properties affected and attended a number of local flood meetings.

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, 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. SCC's relevant flood risk management functions undertaken are listed below:

- The LFRMS was published in December 2014.
- A culvert on Leatherhead Road A224 has been identified and added to the Flooding asset register.
- 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.
- 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.

Specifically in Elmbridge, SCC carried out the works below:

- Closed a number of roads in Elmbridge.

Elmbridge Borough Council

Elmbridge, 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.

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

- EBC met with the Flooding Task Group set up by SCC to evaluate resilience planning and actions taken during the flood events in order to improve response to future events.

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 3 sub areas in this report, all within Elmbridge Borough Council.

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

Individual site information has predominantly come from SCC existing information (collated from a variety of sources) and EA datasets. No site visits were undertaken as there are over 500 sites 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 Surrey CC via flooding.enquiries@surreycc.gov.uk.

7. Sub Area: Cobham

7.1. Sub Area Definition

This sub area covers the area of Cobham. (See Figure 2-1, Section 2.2).

7.2. Location and Catchment Description

The major water course in the sub area is the River Mole, which flows from the south to the north of the sub area.

During the winter of 2013/2014, flooding in the sub area resulted in road closure and internal property flooding.

Flooding in December 2013 to February 2014 was caused by the River Mole overtopping its banks. There are no flood defences in Cobham.

The River Mole 2013/14 flood event at Esher is estimated at a 1 in 50 year annual chance event (2013-2014 Post Flood Event Analysis Kent and South London Area May 2015). Although the recorded flood water levels in the river were higher than for the 1968 flood event (EA Technical Report Winter Floods 2013/14 West Thames Area Flood) the flood extent is less than occurred in 2000 and 1968 (2013-2014 Post flood Event Analysis Kent and South London Area May 2015).

Cobham is located in the Middle Mole catchment and is at risk of flooding from fluvial flooding. The majority of the sub area is not at risk of fluvial flooding. However, the areas in close proximity to the River Mole are at a low to high risk of fluvial flooding, the high risk areas being the closest to the river.

The EA surface water flood maps indicate that the majority of the sub area is at low risk from surface water flooding. However there are some areas, particularly surrounding the River Mole, where there is a medium to high risk of surface water flooding. The EA surface water maps are based on topography and their accuracy is not as detailed 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 Cobham sub area, in close proximity to the River Mole, are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings.

The sub area is underlain by sand formations in the south and clay formations in the north. The majority of the sub area is also underlain by superficial deposits of sand and gravels.

The Cobham sub area is underlain by superficial deposits comprising Boyn Hill Gravel Member to the east, Taplow Gravel Formation in the centre and Lynchill Gravel Member in the most westerly section. Beneath the superficial deposits the bedrock comprises of Bagshot Formation (silty sands) to the north, the London Clay Formation to the south, with the Claygate Member (sand, silt and clay) between them.

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, the Land Drainage Authority (SCC/EBC), the LLFA (SCC) and the Highway Authority (SCC).

7.4. Exercised Flood Risk Management Functions & Actions

Environment Agency

The operation of the sluices at Cobham Mill commenced prior to any flooding in Cobham in response to the forecasts for significant rainfall. The operation of the gates was monitored throughout the duration of the flood events.

EA Flood Ambassadors were on site for the December 2013 and Jan 2014 events. As there are no permanent flood defences at Cobham, the Environment Agency did investigate mobilising temporary flood defences but the investigations demonstrated that the ground conditions were not suitable for them to be effectively used.

The EA issued flood warnings to 190 registered property owners in December 2013, 196 in January 2014 and 199 in February 2014.

The EA had flood data recorders on site for the December 2013 and January 2014 events.

The EA have completed flood investigation reports analysing the technical gauge and rainfall data and their own actions and response to the flood events

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

Surrey County Council

SCC were responsible for a number of temporary road closures during the flooding including:

- Stoke Road (Cobham)
- Plough Lane (Cobham)
- Mill Road (Cobham)
- Old Common Road (Cobham)
- Portsmouth Road (Cobham)

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

Elmbridge Borough Council

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

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

8. Sub Area: Esher & East Molesey

8.1. Sub Area Definition

This sub area covers the area of Claygate, East Molesey, Thames Ditton and West Molesey. (See map in 2.2). The Esher & East Molesey sub area is comprised of two discrete areas. For the purpose of this S19 report these will be referred to as Esher & East Molesey A (EEM-A) and Esher & East Molesey B (EEM-B).

8.2. Location and Catchment Description

East Molesey and Thames Ditton are located in the Lower River Mole and the River Thames catchment .

During the winter of 2013/2014, flooding in the sub area resulted in road closure and internal property flooding.

The Lower Mole Flood Alleviation Scheme (FAS) provides protection to an estimated 10,000 properties. The River Mole confluence with the River Thames is in East Molesey opposite Hampton Court.

The Claygate area is on the Woodstock Road, which does not appear to be at risk of fluvial flooding according to the EA flood maps, so this is most likely to be highway drainage or surface water flood risk.

In December 2013, there were no properties reported as being flooded from the River Mole or River Thames

In January 2014 one property in Molesey was reported as flooded from the Thames.

In February 2014 twelve properties in Molesey were reported as flooded from the Thames.

The 2013/14 flood event is estimated at a 1 in 50 year annual chance event at Esher.

On 13 December 2013 the gauge on the River Mole near its confluence with the Thames recorded its highest peak level in 16 years out of 26 years of data held.

According to the EA online fluvial flood risk maps, large regions of the EEM-A are at low risk of fluvial flooding. The areas in close proximity to the River Thames, and other water courses, are at high risk of fluvial flooding. In EEM-B, where the A3 meets the A309, there is a low risk of fluvial flooding.

The EA surface water flood maps indicate that EEM-A is not at significant risk of surface water flooding, whereas in EEM-B there is a risk of surface water flooding from drains. The EA surface water maps are based on topography and their accuracy is not as detailed as the fluvial flood maps; however they can be used to identify general flow routes.

The flood risk maps do not take climate change into account. 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 EEM-A sub area are within a Flood Warning and Flood Alert Areas. These are areas for which the EA provides free flood warnings. The EEM-B sub area is not located within a Flood Warning or Flood Alert area.

The sub area is predominantly underlain by London Clay, with Claygate Member making up half of EEM-B. The majority of the sub area is also underlain by Kempton Park Gravel Formation with deposits of alluvium to the south and the east of the area.

In large parts of the sub area there is a potential for groundwater flooding to occur at the surface in the areas surrounding the water courses. The remaining areas have little or no potential for groundwater flooding to occur.

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, the Land Drainage Authority (SCC / Elmbridge Borough Council), the LLFA (SCC), the Highway Authority (SCC) and Water Company (TW).

8.4. Exercised Flood Risk Management Functions & Actions

Environment Agency

The EA operated the Lower Mole FAS on the 24 and 25 December 2013. The Environment continued to operate the Lower Mole FAS as necessary throughout January and February 2014.

EA Flood Ambassadors were on site (Esher) for the January 2014 event.

EA Flood Ambassadors were on site (Molesey) for the February 2014 event.

The EA had flood data recorders on site (Esher) for the January 2014 event.

The EA had flood data recorders on site (Molesey) for the January 2014 and February 2014 events.

The EA issued River Thames flood warnings for Molesey to 1736 registered property owners in January 2014 and 1770 in February 2014.

The high flows caused some bank erosion to the Lower Mole FAS which has now been repaired by the EA.

The EA have completed flood investigation reports analysing the technical gauge and rainfall data and their own actions and response to flood events

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

Surrey County Council

SCC were responsible for a number of temporary road closures during the flooding including:

- Riverbank (Thames Ditton)
- Woodstock Lane South (Esher)

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.

Elmbridge Borough Council

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

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

9. Sub Area: Weybridge & Walton-on-Thames

9.1. Sub Area Definition

This sub area covers the area of Weybridge and Walton-On-Thames. (See map in 2.2). The Weybridge & Walton-on-Thames sub area is comprised of two discrete areas. For the purpose of this S19 report these will be referred to as Weybridge & Walton-on-Thames A (WWT-A) and Weybridge & Walton-on-Thames B (WWT-B).

9.2. Location and Catchment Description

During the winter of 2013/2014, flooding in the sub area resulted in road closure and internal property flooding.

Walton on Thames is located in the River Thames catchment and is at risk of flooding from the River Thames and from surface water flooding. Weybridge is located in the catchment for the River Wey close to the confluence with the River Thames. The flood plains for the two rivers combine here.

Levels in the River Wey rose on the 25 December 2013 reaching its peak on the 26 December 2013 though these were lower than the 1968 flooding event. Property flooding started in the afternoon of the 25 December 2013 with three properties in the vicinity of Wey Road being worst affected.

Levels in the River Thames rose higher in the February event and caused backing up in the River Wey and were the highest recorded since 1947, with 33 properties affected by flooding from the either river or a combination of both.

The 2013-14 flood event is estimated to have a probability of 1 in 20 to 1 in 30 year annual chance on the River Wey at Weybridge. The River Thames flow was assessed as having an estimated 1 in 15 to 1 in 20 annual chance event at Shepperton.

According to the EA online fluvial flood risk maps, the majority of the WWT-A is at risk of fluvial flooding from the River Wey and its tributaries. Large parts of the sub area are at low or medium risk of fluvial flooding. However, the regions of the sub area in close proximity to the River Wey and its tributaries are at high risk of fluvial flooding. The EA maps also indicate that WWT-B is not a risk of fluvial flooding.

The Environment Agency flood maps indicate that WWT-A and WWT-B are not a significant risk of 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 WWT-A sub area are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings. WWT-B is not within a Flood Warning or Flood Alert area.

The Cobham sub area is underlain by superficial deposits comprising Kempton Park Gravel Formation, the Lynch Hill Gravel Member and the Taplow Gravel Formation. The Bedrock comprises Bagshot Formation (silty sand) and the Claygate Member (sand silt and clay) with a small area of London Clay to the north.

In the majority of sub area there is a potential for groundwater flooding to occur at the surface in the areas surrounding the water courses (Desborough Channel and the River Mole). The remaining areas have little or no potential for groundwater flooding to occur.

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 LLFA (SCC), the Highway Authority (SCC), the EA, the Land Drainage Authority (SCC / EBC) and Water Company (TW).

9.4. Exercised Flood Risk Management Functions & Actions

Environment Agency

EA Flood Ambassadors were on site (Weybridge) for the December 2013 and January 2014 events.

EA Flood Ambassadors were on site (Walton) for the January 2014 and February 2014 events.

The EA had flood data recorders on site (Weybridge) for the January 2014 event.

The EA had flood data recorders on site (Walton) for the January 2014 event.

The EA issued flood warnings for Weybridge to 363 registered property owners in December 2013 and 383 for February 2014.

The EA issued flood warnings for Walton to 139 registered property owners in December 2013 and 139 for February 2014.

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

The EA have completed flood investigation reports analysing the technical gauge and rainfall data and their own actions.

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

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

- Carrying out asbestos surveys to EA weir sites, including Shepperton (on the boundary of the Weybridge & Walton-on-Thames sub area).
- Carrying out six yearly Electrical Inspections to EA lock and weir sites including Shepperton (on the boundary of the Weybridge & Walton-on-Thames 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

SCC were responsible for a number of temporary road closures during the flooding including:

- Fordbridge Road (Sunbury On Thames)
- Walton Lane (Weybridge)
- Jessamy Road (Weybridge)

- Hilary Crescent (Walton)

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.

Elmbridge Borough Council

The following flood forum groups have been set up.

- Walton Lane
- Wheatley's Eyot
- Thames Ditton Island
- Hurst Park

Section 5 provides details of EBC'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 and TW carried out actions in relation to the flooding experienced in Elmbridge over winter 2013/14. It has also been established that SCC and EBC 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 100 incidents of internal property flooding in Elmbridge. 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 sources. The River Wey and River Thames are the main source of fluvial flooding in Weybridge & Walton-on-Thames.

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.

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:

- 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.

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:

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- Elmbridge Borough Council
- Thames Water
- Atkins.