Section 19 Flood Investigation Report: Guildford Borough

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	Guildford; Ash Vale, Effingham, Guildford, Hog's Back, Jacobs Well & Burpham, Ockham & East Horsley, Ripley, Send and Shalford.
Date(s) of Incidents	Winter 2013/14
Section 19 Trigger(s)	Internal property flooding at multiple addresses Road closures

Glossary

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

Acronym/Term	Definition
Annual Probability	Throughout this document, flood events are defined according to their likelihood of occurrence. The term 'annual probability of flooding' is used, meaning the chance of a particular flood occurring in any one year. This can be expressed as a percentage. For example, a flood with an annual probability of 1 in 100 can also be referred to as a flood with a 1% annual probability. This means that every year there is a 1% chance that this magnitude flood could occur.
EA	Environment Agency
Flooding Asset Register	The register is a record of all structures or features designated by the Environment Agency, the Lead Local Flood Authority, the district and borough councils or the Internal Drainage Board which have an effect on flood risk. More information on the Flooding Asset Register can be found on SCC's website and in Schedule 2 of the Flood and Water Management Act (2010).
FRG	Flood Review Group
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.
RMA	Risk Management Authority
SCC	Surrey County Council
SCG	Strategic Command Group
TW	Thames Water
GBC	Guildford Borough Council
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)

Contents

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 Guildford Borough Council (GBC) 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 Guildford Borough was predominately due to fluvial sources, as well as surface water and groundwater flooding mechanisms. This was caused by unprecedented rainfall during the winter 2013/14 period (275% compared with an average winter). There were approximately 160 incidents of internal property flooding in Guildford Borough 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 GBC 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.
- Supported National Flood Forum engagement events across the Borough.
- The National Flood Forum provided a flood recovery trailer which visited the Borough of Guildford on three occasions.
- The EA erected temporary barriers on the River Wey in Guildford to prevent an additional occurrence of widespread flooding.
- From July 2014 Guildford was included as part of the Upper Wey Flood Alert area rather than the Lower Wey Flood Alert area.

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 we were able to resume it as soon as possible.
- Since the flooding in Avondale estate, TW has been surveying the sewer system.

1.3. Surrey County Council

- Implemented road closures across Guildford Borough during the flooding.
- Established a Task Group to look at lessons learned from the flooding and make recommendations for future flood incidents. GBC supported this work.
- As part of the Wetspots Capital Programme, are carrying out reprofiling, localised repairs and creating a new ditch system Ockham Road North carriageway.
- Are constructing a new carrier system on Hogs Back road, in the town of Puttenham.

1.4. Guildford Borough Council

- Set up a Flood Review Group (FRG) to undertake a borough-wide review of the response to the flooding

- Are participating in the Surrey Local Resilience Forum review to see how they can improve communications across the county.
- Ensured that their stockpiles of sandbags were topped up in the weeks before the flooding.
- Sandbags were also offered to businesses that requested them.
- Kept the public informed, prior to and during the flooding, using various communication channels including updates on their website, social media and radio broadcasts.

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 GBC area (see Figure 2-1 below). There are 48 sites in total, spread across 9 sub areas. There were approximately 160 incidents of internal property flooding in Guildford Borough.

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.

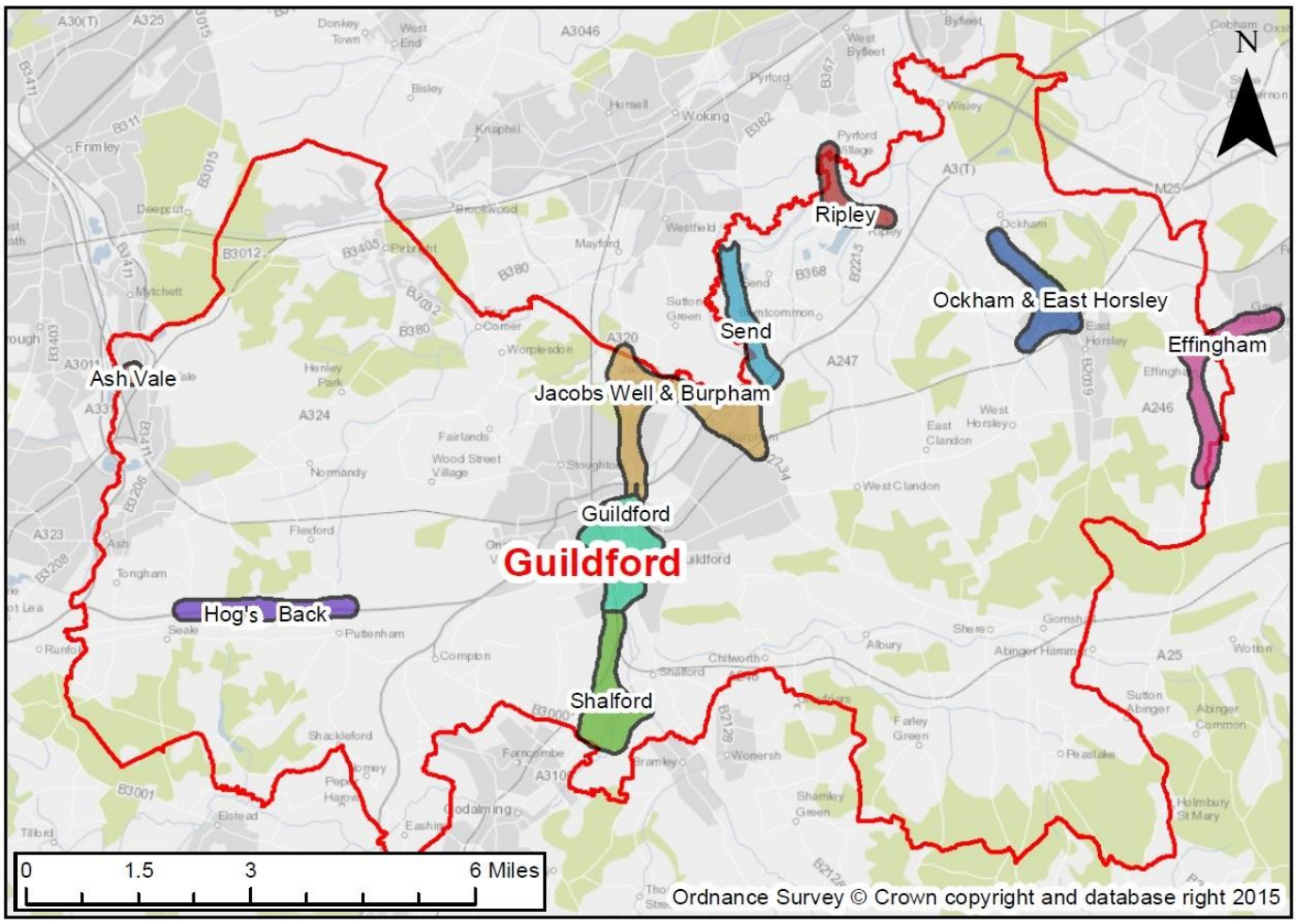

Figure 2-1 Location of Sub areas within Guildford Borough for this report

3. Background Weather and Catchment Conditions

3.1. Weather Conditions

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

Parts of South East England received around two and a half times the amount of rainfall that they would normally expect at this time of year. This caused wide-spread flooding across Surrey from a range of sources including groundwater. In some areas of South East England they exceeded records set in 2000/01.

Table 3-1 Winter 2013-14 Rainfall compared to long term average

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 18-19, 23-27 and 30-31 December 2013, followed by 3 and 5 January 2014.These storms came from the Atlantic and were characterised by unusually large and deep areas of low pressure, which brought rainfall and very strong winds. The period was also notable for the absence of exceptional rainfall from any single storm during January and February 2014. The highest daily totals recorded at the 41 Environment Agency rain gauges across West Thames was 57mm in December, 37mm in January and 28mm in February.

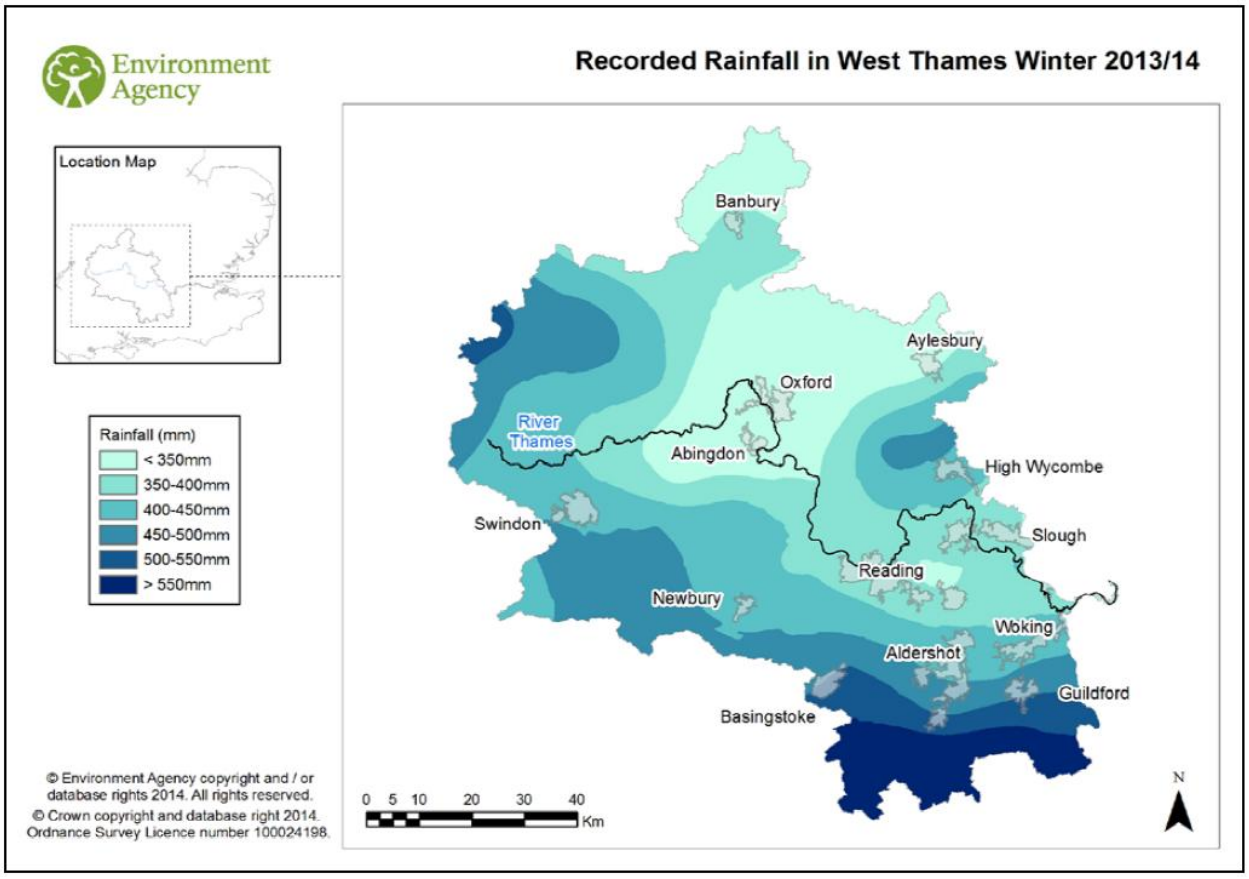

Figure 3-1 Recorded Rainfall in the Environment Agency West Thames Region 2013-14

3.2. Catchment Conditions

The majority of GBC area lies within the catchment for the River Wey which flows northwards to the River Thames. Tongham and Ash lie within the Blackwater River catchment in the west of the area.

Up to 60mm of rainfall was recorded in an 18-hour period on the 23 December at the Environment Agency gauge at Cranleigh Waters, south of Guildford. This caused the peak flows in the River Wey and subsequent flooding. Christmas Eve was mostly dry, but levels rose steadily throughout the day and reached their highest in the early hours of Christmas Day in the Godalming and Guildford area. The rate of rise in river levels was more rapid than had been seen previously on the River Wey. There had been a rapid rise in flows on the Tillingbourne at Shalford and the Cranleigh Waters at Bramley: these both discharge into the Wey upstream of Guildford. The rapid rise in levels was a direct result of the intensity and volume of rainfall over the catchment.

On the lower reaches of the Wey (Byfleet, Old Woking and Weybridge), the highest levels were reached on Boxing Day. River levels rose 2.5m above normal winter levels in Guildford, although they did not quite match the levels of November 2000. Table 3-2 shows that both the December 2013 and November 2000 events were significantly lower than the 1968 floods – these are the largest on record in the catchment. In 1968, 110mm of rain fell across the Upper Wey catchment in a 48-hour period.

Table 3-2 2013 River Wey Maximum levels in December 2013 compared with previous events

Site Name	Dec 2013	Dec 2012	Jan 2003	Nov 2000	Sept 1968 (estimated)
Tilford	2.09m	1.67m	1.77m	1.98m	
Westbrook Mill (Godalming)	1.58m	1.37m			
Bramley	4.00m	3.38m	3.41m	3.59m	
Guildford	3.72m	2.51m	3.09m	3.78m	4.6m
Old Woking	3.93m	2.90m			4.2m
Brooklands (Byfleet)	4.04m	2.49m	3.09m		5.0m
Weybridge	1.87m	1.24m	1.62m	1.93m	2.5m

There were several dry days between Christmas and New Year which allowed river levels across the area to subside. However, the period around New Year and the first week of 2014 was exceptionally wet. Rainfall totals between 30 December and 8 January averaged 90mm, and in some areas up to 150mm of rain fell. The heaviest rainfall was recorded across Surrey and North Hampshire in places that had been badly affected over Christmas.

Levels on the River Wey rose again on New Year's Day but did not exceed those reached over Christmas. Widespread flooding of property was not repeated. During this period the highest rainfall on a single day was 35mm at Bordon on the Upper Wey: this was considerably less than that recorded on 23 December.

Following the prolonged rainfall, groundwater levels across South East England also rose dramatically. In some areas, they exceeded records set in 2000/01, the last time significant disruption from groundwater flooding was recorded.

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 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 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 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, Borough 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. There are no IDBs in the Guildford Borough area.

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. TW is the water company that has responsibility for all sources of sewer flooding.

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 or 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

RMAs 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 Guildford during the winter of 2013/14.

Environment Agency

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

- Operated Flood Alert and Flood Warning service.
- Operated flood risk management assets during the flooding.
- 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.
- Actively involved in the National Flood Forum, which provided a flood recovery trailer to various boroughs and districts throughout Surrey.
- Cleared 860 blockages and storm damage incidents.
- Reported1087 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.

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 the EA 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 the 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 Guildford the actions listed below were carried out:

Informing the public and monitoring the flooding incident

- In January and February 2014 the EA sent out flood data recorders to Guildford (amongst other locations), who were trained to verify river levels at gauging stations, record property flooding and capture the physical extent of flooding on the ground. The information they logged was tracked by the EA's AIR in order to help build a picture of the flooding extent. This detail will help support the EA in increasing the accuracy and timeliness of their flood warnings in the future.
- The EA also sent out ambassadors to Guildford between December 2013 and February 2014. Ambassadors are trained to:
    - Provide information on the latest flooding situation;
    - Raise awareness of the EA 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 the EA's presence and where possible reassure the public;
    - Inform the EA AIR of on-the-ground developments and provide feedback from communities affected.
- In March, once river levels were subsiding, ambassadors attended National Flood Forum engagement events at several locations, including Guildford.
- The EA is actively involved in the National Flood Forum, which provided a flood recovery trailer to various boroughs and districts throughout Surrey. It visited Guildford town centre twice on the 11th and 24th March. The EA also held a flood forum in the Guildhall in May.
- From July 2014 Guildford was included as part of the Upper Wey Flood Alert area rather than the Lower Wey Flood Alert area. This change should mean that Flood Alerts covering Guildford will be issued much earlier than previously, giving residents more time to prepare for flooding. Guildford town itself will continue to be covered by its own Flood Warning Area (Guildford Borough Council, 2014).

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 Guildford. 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 they 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.
- 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.

Specifically in Guildford the actions listed below were carried out:

- Tankered water in parts of the borough.
- Although the timing of the floods over the holiday period resulted in staff shortages, a number of employees worked outside of their normal hours to ensure that a sufficient level of support was available during the emergency response.
- Are taking steps to strengthen communication for future events, including the recruitment of additional customer service officers who would be named contacts for Parish Councils, Residents Associations and local communities.
- Is implementing a number of schemes to improve resilience as well as additional measures to protect properties, e.g. non-return valves for eligible homes, flood resistant doors, air brick plugs and flood gates.

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.
- Some key drainage assets have been identified in Guildford 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.
- Implemented a number of road closures during the flooding.
- Established a Task Group to look at lessons learned from the flooding and make recommendations for future flood incidents. GBC has supported this work.

Guildford Borough Council

Guildford, 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 Guildford. However, this investigation has identified other relevant actions carried out by GBC which are described below:

- GBC set up a FRG to undertake a borough-wide review of the response to the flooding that took place over the Christmas and New Year period of 2013-14. This review was led by the Lead Councillor for Community Safety and Health, supported by the Executive Head of Environment and the Executive Head of Housing and Health. GBC worked closely with the EA and the National Trust in writing the report documenting the review, which informed the findings and recommendations of the FRG. The FRG met for the first time on 7 January 2014.

<u>Sandbags</u>

- GBC had ensured that their stockpiles of sandbags were topped up in the weeks before the flooding. These were distributed across the borough on 24 December 2013 (Guildford Borough Council 2014).
- Sandbags were also offered to businesses that requested them.

<u>Informing the public and monitoring the flood incident</u>

- During the first phase of rapid flooding over Christmas GBC worked according to the agreed emergency planning protocols to make sure they promoted the most urgent information. GBC publicised the emergency numbers on their website as well as through social media. The

numbers were picked up and broadcast by local radio. The Council's out of hours contacts centre operated by Forestcare was open throughout the flood incident and no reports were received of people being unable to get through.

- As well as issuing relevant updates to staff, Councillors, the media and partners, the Council also used social media to reach as many people as quickly as possible. For example, the Council sent tweets asking people to come back and remove their parked cars on Christmas Eve before car parks flooded. The Council's messages were also retweeted and promoted by the local media and led to far fewer cars being affected.
- The Council arranged radio and other media interviews for appropriate lead Councillors to help support the promotion of key public information. Relevant communications and contact with the Health and Safety Team Leader, partners and colleagues continued throughout the Christmas and the New Year holiday.
- The Council maintains a flood emergencies page on their website throughout the year, which includes locations of sandbags, how to prepare for flooding, the EA emergency number and links to other relevant and partner information. The Council also promotes their website, social media and other contacts for help and information during severe weather in each winter edition of the *About Guildford* residents' newspaper.
- During the later periods of flooding in January and February, the Council continued to focus on reaching as many people as possible through online and other communication channels. The Council also promoted relevant information and contacts in the spring 2014 edition *of About Guildford*, including how to get help after the flooding.

Grill clearance

- Between October 2013 and January 2014, the Council cleared important grills at least five times, as well as reactive clearance work. Although most of the grills are the responsibility of riparian owners, the Council have cleared them for a number of years. However, clearance of grills is not related to the flooding in Guildford town centre, as there are no grills along the river.
- GBC are participating in the Surrey Local Resilience Forum review to see how they can improve communications across the county.

Since the flooding

- Since the flooding between December 2013 and February 2014, GBC have secured Defra funding through the EA to carry out building surveys to see what property level protection measures could be installed in William Road and the surrounding area.
- GBC are also planning to work with the Business Improvement District to encourage businesses subject to flooding to carry out property protection measures to their premises where practical. In addition, the Council has applied for and been awarded funding to support local businesses in developing and implementing business recovery plans. This can provide financial assistance to eligible businesses to help with immediate clean up, materials, exceptional business costs, temporary accommodation, non-recoverable insurance excesses, extra staff or security costs and business continuity planning.
- GBC have led the production of a Surface Water Management Plan for Guildford. The Council have received funding from the EA for several schemes across the borough, including Ashenden Road Surface Water Scheme.
- GBC engineers are also examining several options for temporary defences that could be used in the future. GBC will also consider construction of permanent defences, depending on the findings of the EA's study on potential options to minimise the risk of flooding in Guildford Town Centre.

- The FRG, led by GBC, has proposed the development of a scheme called ‘Flood Lookouts’, whereby volunteers are recruited from all areas of the community to assist in this role.

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 9 sub areas in this report, all within GBC.

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

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

7. Sub Area: Ash Vale

7.1. Sub Area Definition

This sub area covers the area of Ash Vale, specifically Cypress Grove and neighbouring roads.

7.2. Location and Catchment Description

The sub area of Ash Vale is situated between the Blackwater River to the west and the Basingstoke Canal to the east. The Blackwater River is a tributary of the River Loddon and has a total catchment area of 356 km^2.

During the winter of 2013/2014, flooding in Ash Vale resulted in internal property flooding.

Large areas of the Avondale estate flooded together with internal property flooding. GBC believe that failure of TW pumps may have been a significant contributing factor to the flooding.

The Ash Vale is predominantly underlain by sand formations, with sand, silt and clay formations in the southwest of the sub area. The underlying geology suggests that under normal conditions water will permeate the ground and reduce overland runoff during rainfall events. The Ash Vale sub area is underlain also by superficial deposits of alluvium and river terrace deposits (clay, silt, sand and gravel) which are associated with fluvial environments and have the ability to convey flood waters. The whole sub area has the potential for groundwater flooding to occur at the surface.

The EA online fluvial flood risk maps indicate a significant proportion of Ash Vale is at risk of fluvial flooding from the River Blackwater. Ash Vale is predominantly located within a low risk zone, with a low chance of flooding from fluvial sources (between 1 in 1000 and 1 in 100 annual chance). A small proportion of the sub area is within a high risk zone, with a high chance of flooding from fluvial sources (greater than 1 in 30).

The EA's online Updated Flood Maps for Surface Water (uFMfSW) indicate that parts of the sub area are also at risk from surface water flooding, though not part of an obvious flood route.

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.

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

7.3. Identification of Relevant RMAs

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

7.4. Exercised Flood Risk Management Functions

Environment Agency

The EA is actively involved in the National Flood Forum, which provided a flood recovery trailer to various boroughs and districts throughout Surrey. On 18 March 2014 it visited close to the Avondale estate in Ash Vale.

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

Guildford Borough Council

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

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

Surrey County Council

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

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

Thames Water

Large areas of the Avondale estate flooded with instances of internal property flooding being recorded. Since the flooding incident TW has been surveying the sewer system. On 23 July 2015, GBC reported that the surveillance is still ongoing. GBC believe that failure of the TW pumps may have been a significant contributing factor to the flooding.

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

8. Sub Area: Effingham

8.1. Sub Area Definition

This sub area covers the area of Lower Road and High Barn Road in Effingham.

8.2. Location and Catchment Description

There are no major watercourses in the Effingham sub area and the EA flood maps do not indicate any risk of river flooding from Main Rivers.

During the winter of 2013/2014 Effingham was subject to flooding at a number of locations (from groundwater and surface water sources) which resulted in road closures.

The EA's online uFMfSW indicate that parts of the sub area are at risk from surface water flooding.

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 Effingham sub area is not located within an EA Flood Warning and Flood Alert Area.

The Effingham sub area is predominantly underlain by chalk formations, with a band of sand and clay formations in the north of the sub area. The majority of the Effingham sub area is not underlain by superficial deposits; other parts are underlain by superficial deposits of Head (Gravel, Sand, Silt and Clay). Under normal conditions, rainwater is absorbed into the ground so there is no major fluvial flow. However there is the potential for groundwater flooding to occur in a small part of the sub area, to the north of the A246.

8.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMA in this sub area has been identified as being SCC.

8.4. Exercised Flood Risk Management Functions

Surrey County Council

Lower Road (Bookham) and High Barn Road (Effingham) were subject to a temporary road closure during the flooding.

SCC were actively engaged the Bookham Flood Forum, with a representative of SCC attending a meeting after the flood.

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

Mole Valley District Council

Actions prior to and during the flood incident

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

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

9. Sub Area: Guildford

9.1. Sub Area Definition

This sub area covers the area of the town of Guildford.

9.2. Location and Catchment Description

The River Wey flows through the centre of Guildford. The River Wey is a tributary of the River Thames and has a total catchment area of 904 km^2.

In the winter of 2013/2014 Guildford was subject to flooding which resulted in road closures and internal property flooding.

There were reports of internal property flooding caused by sewerage flooding in the sub area.

The flooding in Guildford on 24 and 25 December 2013 is reported by the EA to have been the worst since 2000. 139 properties were flooded by the River Wey, following heavy rainfall on saturated ground over the preceding days. Areas in and around the town centre were worst affected, particularly Friary Street, High Street, Mary Road, William Road, and Walnut Tree Close.

The return period of the level of flooding experienced in winter 2013/14 on River Wey at Guildford is estimated to be between a 1 in 20-30 years. Details of the catchment response are covered in Section 3.

Guildford is underlain by chalk to the south (Seaford Chalk Formation, Lewes Nodular Chalk Formation, Newhaven Chalk Formation, Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated), with a band of Lambeth Group (clay, silt and sand) and London Clay to the north. The Guildford sub area is underlain also by superficial deposits of alluvium (clay, silt, sand and gravel) and river terrace deposits (sand and gravel). The underlying geology suggests that under normal conditions water will permeate the ground and reduce overland runoff during rainfall events. The superficial deposits are associated with fluvial environments and can convey flood waters. The central area of the Guildford sub area has the potential to experience groundwater flooding at the surface; an area which runs approximately along the A281 and A322.

The EA online fluvial flood risk maps indicate a significant proportion of Guildford town centre is at risk of fluvial flooding from the River Wey. The town centre is predominantly located within a high risk zone, with a high chance of flooding from fluvial sources (greater than 1 in 30). A smaller area is located within a low risk zone, with a low chance of flooding from fluvial sources (between 1 in 1000 and 1 in 100).

The EA's online uFMfSW indicate that parts of this sub area are also at risk from surface water flooding.

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 parts of the Guildford sub area, in close proximity to the River Wey, are within the EA Flood Warning Area. These are areas for which the EA provides free flood warnings.

9.3. Identification of Relevant RMAs

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

9.4. Exercised Flood Risk Management Functions

Environment Agency

Actions prior to and during the flood incident

Section 5 provides details of EA's borough-wide exercised flood risk management functions since the flood incident.

Informing the public and monitoring the flooding incident

The report also states that on the morning of 23 December 2013, the EA held a Flood Advisory Service teleconference with their partner organisations to give them advanced warning of the flooding. They indicated that a flood warning might be issued for Guildford on the following day.

The flood alert for the River Wey at Guildford was then issued at 10:10 on 24 December 2013. The flood warning for the area was issued just over an hour later at 11:23. The rate of rise in river levels was far more rapid than had been seen previously on the River Wey. The rapid rise in levels has been attributed by the EA to the intensity and volume of rainfall over the catchment.

Table 9-1 below shows the Flood Warnings issued by the EA during winter 2013/14 in the Guildford sub area.

Table 9-1 Flood Warnings issued by the Environment Agency in the Guildford sub area in winter 2013/14

Flood Warning Area	Date	Time	Number warned
River Wey at Guildford	24/12/2013	11:22	843
River Wey at Guildford	02/01/2014	12:18	857
River Wey at Guildford	06/01/2014	19:00	875
River Wey at Guildford	08/02/2014	11:06	859

In December and January, ambassadors were sent to residential areas where property flooding had either occurred or had the potential to happen, including riverside communities on the River Wey. Four flood ambassadors were sent to Guildford.

Flood barriers and sandbags

On 6 January 2014, the EA erected temporary barriers on the River Wey in Guildford to prevent an additional occurrence of widespread flooding. The EA combined these barriers with sandbags on the right bank of the River Wey between Town Bridge and Debenhams. These were taken down on 8 January 2014 and then redeployed on 5 February 2014, where they stayed in position until 20 February 2014. The barriers were monitored continuously by GBC's CCTV network.

Actions since the flood incident

The EA are planning to carry out a review of potential options to minimise the risk of flooding in Guildford Town Centre. The EA have requested funding to repair the damage done to the River Wey by the 2013/14 flooding, including removal of fallen trees and silt that was washed down and has subsequently reduced the channel capacity.

From July 2014 Guildford was included as part of the Upper Wey Flood Alert area rather than the Lower Wey Flood Alert area. This change should mean that Flood Alerts covering Guildford will be issued much earlier than previously; giving residents more time to prepare for the flooding. Guildford town itself will continue to be covered by its own Flood Warning Area (Guildford Borough Council, 2014).

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

Surrey County Council

Millmead (Guildford) was subject to a temporary road closure 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.

Guildford Borough Council

Actions prior to and during the flood incident

Sandbags

The Council attempted to distribute sandbags to Guildford town centre on 24 December 2013. However, the speed by which the river rose, in combination with the heavy traffic in the town centre (caused by a loss of power to the Stoke Junction traffic lights), prevented the sandbags from being put in place in accordance with the Engineer's Flood Plan until later on that day.

Sandbags were also offered to businesses that requested them.

Informing the public and monitoring the flood incident

On the afternoon of 24 December 2013 senior housing managers and environmental health officers from GBC started delivering letters to properties in specific flooded roads in Guildford, including Walnut Tree Close, Mary Road, William Road and Leas Road. The letters advised people that flooding was likely and they should think about making appropriate arrangements.

Evacuating the public

Surrey Fire and Rescue evacuated Walnut Tree Close by boat at 5am on the 25 December 2014. 12 people, 2 dogs and a cat were taken to Park Barn Day Centre. The Council's community transport team helped to transport those affected. This rest centre remained open until 6pm to enable alternative arrangements to be put in place for those affected. This was in accordance with the Emergency Plan. There was sufficient capacity in this rest centre for those requiring relocation during this period. GBC found that in practice many households make alternative arrangements themselves with the assistance of relatives and their household insurers. A second rest centre could have been opened but was not required (Guildford Borough Council, 2014).

Actions since the flood incident

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

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

Thames Water

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

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

10. Sub Area: Hog's Back

10.1. Sub Area Definition

This sub area covers the Hog's Back Road through Puttenham, Tongham, Seale and part of Wanborough.

10.2. Location and Catchment Description

There are no major watercourses within the sub area of Hog's Back. The closest watercourse is the River Blackwater to the west.

In the winter of 2013/2014 Hog's Back was subject to flooding which resulted in road closures.

The EA's online uFMfSW indicate that parts of the sub area are at risk from surface water flooding.

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 Hog's Back sub area is not located within an EA Flood Warning and Flood Alert Area.

The sub area is underlain by chalk, mudstone, sandstone and clay formations. The sub area is not underlain by superficial deposits and has limited potential for groundwater flooding to occur. Under normal conditions, rainwater is absorbed into the ground so there is no major fluvial flow.

10.3. 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 SCC and GBC.

10.4. Exercised Flood Risk Management Functions

Guildford Borough Council

GBC reports that they have received funding from the Environment Agency for several schemes including Flexford Flood Relief Scheme (located in Hogs Back).

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

Surrey County Council

Hog's Back (Guildford) was subject to a temporary road closure during the flooding.

As part of the Wetspots Capital Programme, SCC plan to construct a new carrier system on Hogs Back road, in the town of Puttenham.

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

11. Sub Area: Jacobs Well & Burpham

11.1. Sub Area Definition

This sub area covers the area of Burpham, Jacobs Well and Stoughton.

11.2. Location and Catchment Description

The River Wey flows through the centre of the sub area. The River Wey is a tributary of the River Thames and has a total catchment area of 904 km^2. Other watercourses include the Merrow Common Stream which runs through Burpham into the River Wey.

During the winter of 2013/2014 Jacobs Well and Burpham was subject to flooding which resulted in road closure and internal property flooding.

There was significant flooding in Burpham during Christmas 2013, notably in Gosden Hill Road, Merrow Lane and on New Inn Lane near the new development at Raynham Close. Clay Lane was closed temporarily. In Jacobs Well, Stringers Avenue and Woking Road were affected.

The EA's online fluvial flood risk maps indicate a significant proportion of the sub area is at risk of fluvial flooding from the River Wey. The sub area is predominantly located within a high risk zone, with a high chance of flooding from fluvial sources (greater than 1 in 30). A smaller area is located within a low risk zone, with a low chance of flooding from fluvial sources (between 1 in 1000 and 1 in 100).

The EA's online uFMfSW indicate that parts of the sub area are also at risk from surface water flooding.

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 Jacobs Well & Burpham sub area is 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 clay, sand and chalk. The underlying geology suggests that, in some parts of the sub area, water could be prevented from permeating into the ground and could lead to overland runoff during rainfall events. The north eastern parts of the sub area are not underlain by superficial deposits; other parts are underlain by alluvium, Kempton Park Gravels and head deposits (clay, silt, sand and gravel). Much of the sub area has the potential for groundwater to occur at the surface, or affect below ground infrastructure.

11.3. Identification of Relevant RMAs

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

11.4. Exercised Flood Risk Management Functions

No flood risk management functions relevant to the EA have been identified as specific to the flood incident in this 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

Clay Lane (Jacobs Well) was subject to a temporary road closure during the flooding.

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

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

Guildford Borough Council

Burpham is highlighted in the Guildford Surface Water Management Plan as an area potentially vulnerable to flooding. GBC are putting a bid together to the EA for funding for a detailed investigation of the area.

GBC also states that temporary repairs have been carried out to the grill in Merrow Lane, just upstream of Gosden Hill Road. On 23 July 2015, GBC confirmed they are regularly checking the grill and still plan to rebuild the structure.

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

12. Sub Area: Ockham & East Horsley

12.1. Sub Area Definition

This sub area covers the area of Ockham and East Horsley.

12.2. Location and Catchment Description

This area is at high and medium risk of fluvial flooding from a tributary of the River Wey which flows through East Horsley to the north-west. This watercourse runs parallel to Ockham Road North. EA flood maps indicate East Lane is at risk of fluvial flooding at the junction with Ockham Road North, and is also at risk of surface water flooding.

During the winter of 2013/2014 Ockham and East Horsley was subject to flooding which resulted in road closures including Ockham Road North and Ripley.

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.

Parts of the Ockham & East Horsley sub area is within an EA Flood Alert Area. These are areas for which the EA provides free flood warnings.

The sub area is underlain by clay formation and is also underlain by superficial deposits of sand and gravel deposits. The underlying geology suggests that under normal conditions, water does not permeate into the ground and overland runoff is greater and more responsive to rainfall events. The majority of the sub area is underlain by superficial deposits of Head and has the potential for groundwater flooding to occur at the surface.

12.3. Identification of Relevant RMAs

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

12.4. Exercised Flood Risk Management Functions

Environment Agency

No flood risk management functions relevant to the EA have been identified as specific to the flood incident in this 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

Ockham Road North (Oakham) and Ripley Lane (Oakham) were subject to a temporary road closure during the flooding.

As part of the Wetspots Capital Programme, SCC are carrying out the following actions on Ockham Road North carriageway:

- Reprofiling,
- Localised repairs, and

- Creation of a new ditch system.

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

Guildford Borough Council

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

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

13. Sub Area: Ripley

13.1. Sub Area Definition

This sub area covers the area of Newark Lane in Ripley.

13.2. Location and Catchment Description

The main watercourses within the sub area are the River Wey and Hoe Stream, one of its tributaries. Within the sub area, the River Wey splits into several channels, including Abbey Stream and Mill Tail (a tributary of the River Wey Navigation).

During the winter of 2013/2014 Ripley was subject to flooding which resulted in road closures.

The EA online fluvial flood risk maps indicate Newark Lane, north of the junction with Papercourt Lane, is at risk of fluvial flooding from the watercourses, as well as a short stretch just east of the boating lake by Homewood Farm. The proportion affected is predominantly located within a high risk flood zone, with a high chance of flooding each year (greater than 1 in 30). A smaller area is located within a medium risk flood zone, with a chance of flooding between 1 in 100 and 1 in 30 in any year, and a low risk flood zone, with a chance of flooding between 1 in 1000 and 1 in 30 each year.

The EA's online uFMfSW indicate that parts of the sub area are also at risk from surface water flooding.

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 Alert and Flood Warning Area. These are areas for which the EA provides free flood warnings.

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

The sub area is predominantly underlain by sand and clay formations. The underlying geology suggests that under normal conditions, water does not permeate into the ground and overland runoff is greater and more responsive to rainfall events. The sub area is also underlain by superficial deposits of alluvium and Kempton Park Gravels (clay, silt, sand and gravel). These deposits are associated with fluvial environments and can convey flood waters. There is the potential for groundwater flooding to occur at the surface across the whole sub area.

13.3. Identification of Relevant RMAs

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

13.4. Exercised Flood Risk Management Functions

Environment Agency

No flood risk management functions relevant to the EA have been identified as specific to the flood incident in this 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

Newark Lane (Ripley) was subject to a temporary road closure 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.

Guildford Borough Council

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

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

14. Sub Area: Send

14.1. Sub Area Definition

This sub area covers the area of Potters Lane in Send.

14.2. Location and Catchment Description

The River Wey and River Wey Navigation flow through parallel to Potters Lane in Send. According to the EA online fluvial flood risk maps, some parts of the sub area are at risk of fluvial flooding from the River Wey. These parts of the sub area are predominantly located within a high risk zone, with a chance of flooding each year (greater than 1 in 30).

During the winter of 2013/2014 Send was subject to flooding which resulted in internal property flooding.

The EA's online uFMfSW indicate that these parts of the sub area are also at risk from surface water flooding.

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.

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

Send is predominantly underlain by sand and clay formations. The underlying geology suggests that, in some parts of the sub area, water could be prevented from permeating into the ground and could lead to overland runoff during rainfall events. The sub area is also underlain by superficial deposits of alluvium, Lynch Hill and Kempton Park Gravels, and head (clay, silt sand and gravel). The north and the south-west of the sub area have the potential for groundwater flooding to occur at the surface.

14.3. Identification of Relevant RMAs

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

14.4. Exercised Flood Risk Management Functions

Environment Agency

No flood risk management functions relevant to the EA have been identified as specific to the flood incident in this 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

Potters Lane was subject to a temporary road closure during the flooding.

There are no further other details available on SCC's exercised flood risk management functions prior to, during and since the flood incident in this sub area.

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

Guildford Borough Council

Actions prior to and during the flood incident

A number of gardens around Send Lakes were flooded. GBC hired pumps in case it was necessary to start reducing water levels, but these were not required. However, GBC are not responsible for controlling water levels in Send Lakes; responsibility lies with the riparian landowners. GBC has taken the roles of liaison, consultation, facilitation and protector of these properties in the absence of action from the responsible parties.

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

15. Sub Area: Shalford

15.1. Sub Area Definition

This sub area covers the area of Shalford and south Guildford, including the roads of Old Portsmouth Road, Tilthams Corner Road and Trunley Heath Road.

15.2. Location and Catchment Description

The River Wey and River Wey navigation flow through this sub area. The EA online fluvial flood risk maps indicate Tilthams Corner Road and Trunley Heath Road are both at high risk of fluvial flooding (greater than 1 in 30 in each year). Tilthams Corner Road crosses the River Wey navigation and river flood plain. Other minor watercourses include the Tillingbourne, which flows through the north of Shalford.

During the winter of 2013/2014 Shalford was subject to flooding which resulted in road closures including Tilthams Corners Road and Trunley Heath Road. There was also internal property flooding on Old Portsmouth Road.

GBC recorded extensive flooding around Tilthams Corner and the Riverway Industrial Estate. Outbuildings were flooded in Tilthams Corner and there was internal flooding of an industrial unit on the Riverway Estate.

The EA's online uFMfSW indicate that parts of Old Portsmouth Road is at risk from surface water flooding.

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.

Parts of the Shalford 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 predominantly underlain by sandstone, clay and mudstone formations. The underlying geology suggests that, in some parts of the sub area, water could be prevented from permeating into the ground and could lead to overland runoff during rainfall events. The sub area is also underlain by superficial deposits of alluvium, head, Kempton Park Gravels and river terrace deposits (clay, silt, sand and gravel). Around two thirds of the sub area has the potential for groundwater flooding to occur, particularly in the north-east and south-east.

15.3. Identification of Relevant RMAs

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

15.4. Exercised Flood Risk Management Functions

Environment Agency

Table 15-1 below shows the Flood Warnings issued by the EA during winter 2013/14 in the Shalford sub area.

Table 15-1 Flood Warnings issued by the Environment Agency in the Shalford sub area in winter 2013/14

Flood Warning area	Date	Time	Number warned
Tillingbourne at Chilworth and Shalford	24/12/2013	01:08	34
River Wey at Godalming, Peasmarsh and Shalford	24/12/2013	20:48	491
River Wey at Godalming, Peasmarsh and Shalford	01/02/2014	20:59	523

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

There were number of temporary road closures, in the Shalford sub area, during the flooding including:

- Tilthams Corner Road (Peasmarsh)
- Old Portsmouth Road (Shalford)
- Trunley Heath Road (Goldaming)

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

Guildford Borough Council

In Shalford GBC have cleared ditches under their ownership, in order to alleviate future flooding incidents.

GBC and the EA are investigating the causes behind the flooding in this sub area and possible solutions. The Council is liaising with local residents and the Riverway Industrial Estate to keep them informed of progress.

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

16. Conclusion

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

The report has identified that the EA carried out actions in relation to the fluvial flooding experienced in Guildford Borough over winter 2013/14. It has also been established that SCC and GBC 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.

16.1. Causes

There were approximately 160 incidents of internal property flooding in the Guildford Borough. 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, sewer and spring sources. The River Wey was the main source of fluvial flooding in the borough, resulting in a large number of internal property flooding incidents and road closures.

16.2. 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.

16.3. 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.

16.4. 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.

16.5. 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 Six 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.

16.6. 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 Guildford Borough.

As part of the Wetspots Capital Programme, SCC are constructing a new drainage system on Woodbridge Road, Guildford.

17. 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
- Guildford Borough Council
- Thames Water
- Atkins