

# S19 Flood Investigation Report: The Caterham Bourne

**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. While 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	<b>Caterham Bourne – Woldingham and Whyteleafe</b>
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
AMAX	Annual Maximum Flow Series- a series of the maximum river flows each year for use in hydrological estimations.
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
FAS	Flood Alleviation Scheme
Flooding Asset Register	The register is a record of all structures or features designated by the Environment Agency, the Lead Local Flood Authority, the district and borough councils or the Internal Drainage Board which have an effect on flood risk. More information on the Flooding Asset Register can be found on Surrey County Council's <a href="#">website</a> and in Schedule 2 of the Flood and Water Management Act (2010).
Flood Risk Management Function	A flood risk management function is a function listed in the Act (or related Acts) which may be exercised by a risk management authority for a purpose connected with flood risk management.
Very Low Flood Risk	Area with a very low probability of flooding from rivers (< 1 in 1,000 annual chance of flooding or <0.1%).
Low Flood Risk	Area with a low probability of flooding from rivers (between a 1 in 1000 and 1 in 100 annual chance of flooding or between 0.1% and 1%)
Medium Flood Risk	Area with a medium probability of flooding from rivers (between a 1 in 100 and 1 in 30 annual chance of flooding or between 1% and 3.33%).

High Flood Risk	Area with a high probability of flooding from rivers (> 1 in 30 annual chance of flooding or greater than 3.3%).
IDB	Internal Drainage Board
LLFA	Lead Local Flood Authority
Main River	Main Rivers are usually larger streams and rivers, but some of them are smaller watercourses of local significance. Main Rivers indicate those watercourses for which the Environment Agency is the relevant risk management authority.
Ordinary Watercourse	Ordinary Watercourses are displayed in the mapping as the detailed river network. An Ordinary Watercourse is any watercourse (excluding public sewers) that is not a Main River, and the Lead Local Flood Authority, District/Borough Council or Internal Drainage Board are the relevant risk management authority.
RMA	Risk Management Authority
SCC	Surrey County Council
CBC	Croydon Borough Council
SCG	Strategic (and Tactical) Command Group
SESW	Sutton East and Surrey Water
TDC	Tandridge District 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 exceedance 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:

- Fluvial Flood Risk
  - 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](mailto:flooding.enquiries@surreycc.gov.uk).

## **Other Data Sources**

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

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

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# 1. Executive Summary

The purpose of this report is to investigate which RMAs had relevant flood risk management functions during the flooding that took place around the upstream section of the Caterham Bourne in February 2014, 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 does not address wider issues beyond that remit.

Croydon Borough Council (CBC) has produced a separate S19 report to the same effect, covering the Caterham Bourne catchment in their administrative area.

The upstream section of the Caterham Bourne begins in Woldingham and flows north through Whyteleafe to the Croydon border. The flooding in the area was a combination of fluvial and groundwater, caused by unprecedented rainfall during the Winter 2013/14 period (275% compared with an average winter).

The Environment Agency (EA) is the lead RMA for incidents of fluvial flooding from Main Rivers, and Surrey County Council (SCC) is the lead RMA for incidents of groundwater flooding. Thames Water (TW) and Tandridge District Council (TDC) 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 all three 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 resident engagement events, such as Flood Forum groups.
- Cleared blockages and maintained Main River sections.
- Undertaking initial investigations into potential flood alleviation schemes to reduce the risk of flooding in the future.

## 1.2. Surrey County Council:

- Staff assisted residents on the ground, working in partnership with other RMAs to help inform residents, answer their queries (also via the call centre), deploy signs and sandbags to inform the community of risks, such as road closures and reduce flooding to the highway respectively.
- 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.
- Undertaken the necessary works to improve, repair or refurbish/restore drainage assets.
- Undertaking initial investigations into potential schemes to reduce the risk of flooding in the future.
- Cleared blockages and jetted drainage assets to ensure water can flow freely. Carried out other maintenance works (with riparian owners) where necessary.
- Supported resident engagement events, such as Flood Forum groups.
- Investigated the causes behind the flooding.
- Plan to increase the capacity of the highway culvert on Tandridge Lane (Crowhurst).
- Are undertaking an assessment of potential options to reduce flood risk in the Burstow. SCC are undertaking a detailed assessment of the catchment to better understand the

mechanisms of flooding and develop option to reduce and manage the existing flood risk in Woldingham, Whyteleafe and Kenley.

### **1.3. 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.
- Pumped foul water out of the sewer system to reduce the risk of flooding to properties.
- Jetted their sewer systems to clear blockages and improve capacity.
- Cleaned roads that were affected by sewer flooding.

### **1.4. Tandridge District Council:**

- Provided residents with sandbags during the flood incident.
- Informed residents of the repair and renew grant.
- Assisted SCC in investigating the flooding issues.

## 2. Introduction

### 2.1. Section 19 Flood 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 RMAs that have relevant flood risk management functions and whether each of those authorities have exercised or is proposing to exercise those functions in response to the flood.

Section 19(2) requires that the LLFA publishes the results of its investigation and notifies the relevant risk management authorities accordingly.

### 2.2. Location of this Investigation

The area affected by the flooding extended from Woldingham Golf Course, along the valley floor through Whyteleafe to the SCC boundary and beyond into Croydon Borough's area. In addition, the area along Stafford Road in Caterham was affected with reports of properties being flooded; this is covered in more detail in the Tandridge Section 19 Report produced by SCC. Details of the flooding to the north of the County boundary is reported in the London Borough of Croydon Section 19 report, which is referenced (where applicable) in this report. It is understood that localised flooding occurred along a 4 mile corridor down to Purley. The main area of concern, in addition to the property flooding was the water works at Kenley, which is an important piece of local infrastructure. The location of the Caterham Bourne sub area is shown in Figure 2-1.

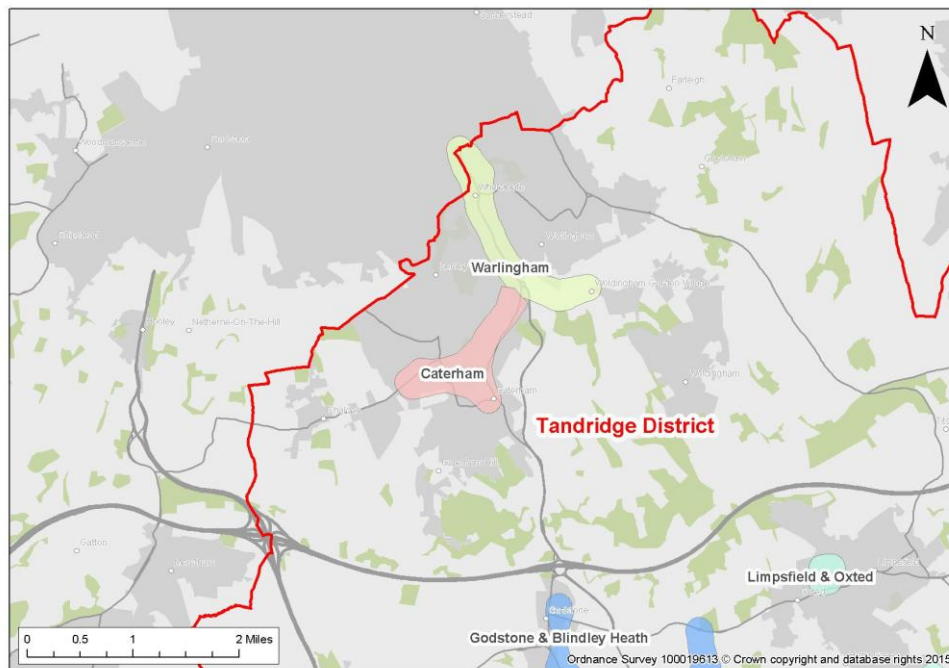


Figure 2-1: Location of study area



## 3. Flooding Incident

### 3.1. Trigger for S19 Report

The flooding resulted in around 65 properties suffering internal flooding and the A22 and Woldingham Road were closed for several weeks.

The flooding was split into several localised areas along the valley floor. Around 39 properties suffered internal flooding to the north of the Whyteleafe Tavern roundabout and around 26 properties to the south.

Flood water from the Bourne entered the sewerage system resulting in surcharging of manholes which then mixed with the Bourne floodwater. The sewerage system was unable to cope and ceased to function.

### 3.2. Background Weather Conditions

Storm events hit the UK on December 18 to 19, 23 to 27 and 30 to 31 2013, followed by January 3 and 5 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.

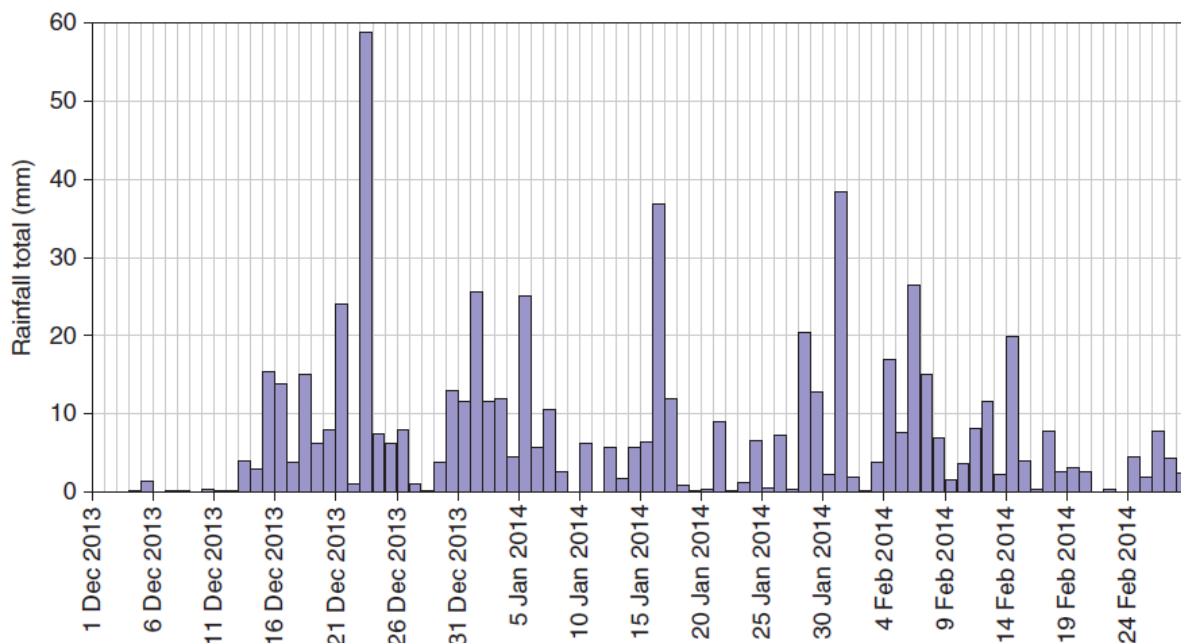


Figure 3-1 Daily Rainfall totals at Charlwood, Surrey for Winter 2013-14

Specifically in Godstone, near Caterham, the rain gauge recorded on average a 2.2 times increase in the long term average monthly rainfall expected. Table 3-1 below shows the total recorded rainfall at Godstone Gauge for the three months across Winter 2013/14.

Table 3-1 Monthly Rainfall Totals at Godstone, Surrey for Winter 2013-14  
(source: Met Office and Environment Agency)

Month and Year	Total Rainfall (mm) recorded at Godstone Gauge
December 2013	156.4
January 2014	212.6
February 2015	123.2

The major storm event for the south east occurred on the 23 to 25 December resulted in 50-70mm of rainfall within 24 hours over an area from Dorset to Kent. This is indicated by the peak in rainfall of nearly 60mm in Figure 3-1. This daily rainfall represents approximately two-thirds of the monthly average rainfall for December.

Combined with the saturated soil from the high levels of rainfall leading up to the event, the rainfall gave rise to local surface water and groundwater flooding and also subsequent fluvial flooding across many catchments in Surrey. The persistent high levels of rainfall for this period lead to a sharp rise in river flows leading to fluvial flood warnings across the south east of England.

### **3.3. Catchment Description**

The Caterham Bourne is an ephemeral watercourse, meaning it flows intermittently usually after periods of heavy or prolonged rainfall, and is predominantly dry at other times. Historically, it is recorded to flow heavily approximately every 7 years, although smaller flows can be observed more frequently. When the level of groundwater rises and reaches ground level, water starts emerging on the surface. Water from these springs finds its way into existing ditches and drainages. The source location is reported to vary with three valley flow paths leading towards the Wapses Lodge roundabout on the A22 at the southern tip of Whyteleafe. The EA flood risk online maps show the start of the designated main river at Wapses lodge where the three flow paths combine. The valley floor, through Whyteleafe, was the main area affected, which is part of the upper catchment of the Caterham Bourne. The route of the Bourne then flows in a northwest direction through Whyteleafe and into Croydon, roughly following the course of the A22.

Groundwater can rise above underground structures such as existing culverts and sewers, and break surface at permeable points. Due to urban development, many parts of the Bourne have been culverted over the years with varying sized pipes while some sections of the Bourne remain as open ditches. Not all culverts and ditches have the capacity to cope with large flow events such as the one experienced in the winter of 2013/2014.

The series of storm events between December 2013 and February 2014 led to both natural and artificial storage capacities being reached and exceptional rates of groundwater recharge. This in turn resulted in groundwater levels which were widely above the typical winter maxima and subsequent flooding of roads and property along the Caterham Bourne in both Surrey and the neighbouring London Borough of Croydon.

The geology of the area comprises Chalk of the Hollywell Nodular, New Pitt, Lewes and Seaford Formations which are locally overlain by Head Deposits. The Chalk being a major aquifer, presents a high risk of groundwater flooding at the surface.

### **3.4. Flood Risk and History of Flooding**

The following information details the types of flood risk that are relevant to the area in question, along with an overview of the history of local flooding.

#### **Fluvial**

The valley floor has a medium to high chance of flooding from fluvial sources (greater than a 1 in 100 annual chance of flooding, with some areas at risk during events with an annual chance of 1 in 30 or greater). 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 sub area are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings.

### **Groundwater**

The areas of interest are also located within an area which is classed as having a potential for groundwater flooding to occur at the surface. This is based on a conceptual understanding of the regional geology and hydrogeology and is therefore only an indication of where geological conditions could enable groundwater flooding to occur. It does not indicate hazard or risk and it does not provide any information on the depth to which groundwater flooding may occur or the likelihood of the occurrence of an event of a particular magnitude. This information should not be used on its own to make planning decisions at any scale, particularly site scale, or to indicate the risk of groundwater flooding.

### **Surface Water**

The valley floor and also contributing drainage paths are shown to be at risk of surface water flooding in the following return period events; 1 in 30, 1 in 100 and 1 in 1000. The surface water flood extents are not appropriate to be used in assessing flood risk at an individual property level. In addition, the methods used to derive the flood extents are based on modelled design rainfall (i.e. not observed patterns of rainfall) and consequently these maps cannot definitively show that an area of land or property is, or is not, at risk of flooding.

The Updated Flood Maps for Surface Water (UFMfSW) have been created from the EA's nationally produced surface water flood mapping, and appropriate locally produced mapping from LLFAs such as SCC. This means that in different areas, the flood extents have varying levels of suitability scales for viewing or assessing. Most of the area's information is only suitable for assessing flood risk at a 'town to street' scale. This scale is suitable for identifying which parts of towns or streets are at risk. It is unlikely to be reliable for assessing risk in a more localised area.

### **Historical Evidence of Flooding**

The Historic Flood Map shows that there is no record of this area being previously flooded by rivers, groundwater or a combination of these sources. However this does not necessarily mean that flooding has not occurred, just that it has not been reported and/or recorded within the Historical Flood Map dataset.

Wetspots indicate the approximate location of known previous flooding on the highway. There are wetspots within the areas of interest and this highlights that there has been historic flooding in the vicinity.

According to SCC's Property Flooding Database, there have been previous instances of property flooding nearby, either internally or externally. Property flooding is sensitive information and property owners/occupiers may not always report flooding accurately. Hence while this dataset is the most comprehensive record of property flooding in Surrey, there may be instances of property flooding which were not reported and are therefore not recorded.

SCC's Historic Flooding Incident Database highlights all reported, non point location specific, flooding incidents e.g. example road was flooded. The data indicates that a number of roads and/or properties along roads in the area were reported to have experienced flooding.

## 4. Risk Management Authorities

### 4.1. Identification of Relevant Risk Management Authorities (RMAs)

In the Flood & Water Management Act 2010, a risk management authority means –

- a) the EA,
- b) a LLFA,
- c) a district or borough council for an area for which there is no unitary authority,
- d) an Internal Drainage Board (IDB),
- e) a water company, and
- f) a Highway Authority.

The RMAs together cover all sources of flooding.

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

**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, and filling in any gaps in responsibility where the relevant RMA is unclear. 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 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** 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. This area is not covered by an IDB.

**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. In this area, TW is the water and sewerage company, with some areas being provided portable water supply by Sutton and East Surrey Water (SESW). Water and sewerage companies have no specific duties under the Flood and Water Management Act 2010 other than the duty to cooperate with other risk management authorities. However they still need to operate under the Water Industry Act 1991.

**Highway Authorities** are responsible for providing and managing highway drainage which may include provision of roadside drains and ditches, and must ensure that road projects do not increase flood risk. SCC is the highway authority for this location.

Table 4-1 below summarises the RMAs in this location. The ticks indicate which authorities have responsibility for which function and the highlighted cells show which functions are relevant to the flooding in this report.

**Table 4-1 Risk Management Authorities**

Flood Source	Environment Agency	Lead Local Flood Authority	Land Drainage Authority		Water Company	Highway Authority
		Surrey County Council	Tandridge 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	✓					

## 4.2. Exercised Flood Risk Management Functions during the Flood Event

The combined primary sources of flooding that contributed to this flooding incident were fluvial and groundwater in nature; the EA is the lead on managing fluvial flood risk and SCC is the lead on managing groundwater risk.

This section provides details on how RMAs carried out flood risk management functions, as well as other actions relevant to this flooding incident.

### 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 this event are listed below:

- Monitoring of rainfall, river flows, groundwater levels and soil moisture deficits.

- Flood data collectors were deployed to identify incidents of high groundwater and flooded properties to support partners in planning response.
- Briefings and advice were published on the website.
- Flood Ambassadors were sent out to document flooding and provide information on the ground.
- Operated Flood Alert and Flood Warning service, including Groundwater Flood Alerts. The first Groundwater Flood Alert was issued on the 8th January 2014.
- Operated flood risk management assets during the flooding. Where resources allowed the EA provided specialist advice, pumps and temporary defences. In total 17 pumps and over 8km of pipes and 200m of temporary defences were provided.
- Carried out flood risk mitigation works. Where resources allowed, operatives were sent to clear blockages to assist council teams.

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

- Participated in the Strategic and Tactical Command Groups (SCG) once a major incident had been declared to respond to the flooding across Surrey.
- Provided weekly reports on the groundwater situation from mid-January to late April 2014
- Following liaison with SESW in early February 2014, permission was granted to increase abstraction from the boreholes at Kenley above the rates permitted in their abstraction license to assist in alleviating rising groundwater,

### **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.
- Following this flooding incident, the ponds and associated flow control structures created in Woldingham (created through collaborative working with TDC, the Army and SCC) have been added to the SCC Flooding Asset Register to highlight the importance they have on flood risk to other organisations and the public.
- Section 19 reports have been produced for the flooding experienced across the county in Winter 2013/14.
- The A22 and Woldingham Road were closed due to flooding for several weeks.
- Carried out emergency works in Whyteleafe on the demolition site where the culverted Bourne had been damaged,
- Operated a 24 hour highways/flood crew in Whyteleafe during the event,

In addition SCC carried out the following activities across Surrey;

- Officers inspected flood affected roads, after which defect repairs were undertaken by SCC's contractors; Kier. Where extensive areas of carriageway were damaged by the flooding, they were assessed for inclusion into the Project 400 programme; a targeted programme to resurface and repair roads which were damaged by the Winter 2013/14 floods.

- All flood affected roads in Surrey were assessed for potential schemes which may be included in the Project 400 programme.
- Cleansed and re-opened roads as quickly as possible after the flooding.
- Surrey Fire and Rescue Service (SFRS) pumped flood waters away to protect residents, property and infrastructure during the flooding.
- During the flooding SCC and TW were in discussions about the opportunity for joint working across the county.
- The Surrey SCG 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 sandbags after the event.
- Staff attended resident engagement events after the flooding to hear their concerns.
- After the storms and flooding, SCC cleared trees, debris and carried out ditching works to enable the drainage systems to function normally again.
- Operated a call centre throughout the flooding which dealt with residents queries and have since hired a Community Resilience Officer to support communities in becoming more resilient to flooding amongst other issues.
- Administered the Repair and Renew Grant which provided up to £5000 for residents and businesses that were flooded in order to protect their property from flooding in the future.

## 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.

TW attended the Strategic and Tactical Command Groups set up by the Surrey Local Resilience Forum to provide updates and assist where possible. TW also attended sites of foul sewer flooding in Bourne Park Close and Lower Road.

In addition 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 the focus was on maintaining customer services, on protecting assets vital for the ongoing delivery of service and on ensuring that where there was service disruption we were able to resume it as soon as possible. To these ends TW carried out the following actions within Surrey:

- Physical protection measures – deployment of flood barriers and sandbags to TW sites (both water and wastewater).
- Regular physical checks of unmanned sites to ensure that they were working and in workable condition.
- Optimisation of use of the sewerage network – where possible work such as investigations and sewer cleaning was carried out to ensure that sewers and pumping stations were working to optimum capacity.
- Increased the number of engineers and staff on the ground to investigate flooding reports: Network Engineers visited internally flooded properties where sewer flooding was the primary cause.
- Undertook wide scale clean ups of properties.
- Provided a sewer flooding information leaflet for general distribution to properties affected and attended a number of local flood meetings.

- Provided support to SESW with regard to the event at Kenley Water Treatment Works (Croydon).

### **Tandridge District Council**

TDC 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. TDC carried out the following actions in relation to this flood event:

- TDC is represented on one flood alleviation project that is currently being undertaken to reduce the risk of flooding along the Caterham Bourne in Whyteleafe.
- Participated in the SCG.
- Set up a District Emergency Centre to assist residents during the flood period, including Officers assisting residents in evacuating
- In an Emergency Planning role the Local Authority assisted in the identification of vulnerable residents, communicating information and relocating people.
- Assisted in the setting up of flood forums.
- Administered council tax rebates to flooded properties.

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.



## 5. Conclusions and Recommendations

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.

### 5.1. Causes

There were approximately 65 incidents of internal property flooding in the Caterham Bourne area within Surrey. 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 and groundwater sources. The exceptionally high rainfall raised groundwater levels causing the Bourne to flow. The high volume of water was unable to be contained in the ditches and culverts that form the Bourne which resulted in flooding of properties and roads and surcharging of the sewerage system.

### 5.2. Lessons Learnt

#### Flood Data

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

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

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

#### 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 and culverts was certainly a contributing factor on the impact of the flooding experienced from the winter 13/14 flood event.

### 5.3. 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.
- All RMAs to develop a formalised response to high groundwater levels in the area.

## 6. Actions and on-going work

The Council has recruited a Community Resilience Officer, who has been establishing contact with communities affected by flooding, raising flood risk awareness and helping residents become more flood resilient. To date over fifteen local flood fora have been set up and are operating across the county.

SCC has set up the Surrey Flood Risk Partnership Board bringing together all the flood RMAs with a view of sharing knowledge and resources to alleviate flood risks for the benefits of its residents. Following the Winter 2013/14 flooding officers have been working closely together to address issues about how each RMA communicates with each other and how data is collected and shared.

CBC have submitted a successful bid to the Thames Regional Flood and Coastal Committee resulting in a detailed study of the Caterham Bourne catchment to better understand the mechanisms of flooding from different sources and allow the testing of options to manage flood risk. The main objective of this study is to identify economically viable options to reduce flood risk in the area with a strong business case to justify addition funding contributions from Central Government and other benefitting organisations (within the boundaries of both Croydon and Surrey). All RMAs for the area sit on the project's steering group.

SCC has been successful in submitting a bid to the Coast to Capital Local Enterprise Partnership (LEP) for a flood resilience scheme on the A22, which includes the section of the A22 within the Caterham Bourne catchment in Surrey. The objectives of this scheme are to reduce the overall impact of flooding on this strategic route both in terms of improving its capability to function during flood events and to improve its long term long term resilience to flooding and reduce future maintenance requirements. This scheme will encompass various packages of works including more resilient road surfacing and improved drainage systems.

Following the flood event, all the organisations with risk management functions have come together to formalise their response to high groundwater levels in the area. The various operations that the organisations carry out will be documented along with lines of communication so that during future events there will be a coordinated response.

A vast amount of information on flooding was gathered as a result of the Winter 2013/14 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 FAS.

## 7. Acknowledgements

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- The Environment Agency
- Tandridge District Council
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- Croydon Borough Council
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