# Section 19 Flood Investigation Report: Waverley Borough

**29 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 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 | Waverley: Alfold, Bramley, Chiddingfold, Cranleigh, Elstead, Farnham, Godalming, Milford, Tilford & Churt. |
| Date(s) of Incidents | Winter 2013/14 |
| Section 19 Trigger(s) | Internal property flooding at multiple addresses<br>Road closures |

## Glossary

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

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

| | |
|---|---|
| WBC | Waverley Borough Council |
| RMA | Risk Management Authority |
| SCC | Surrey County Council |
| SCG | Strategic Command Group |
| SWS | Southern Water Services |
| TW | Thames Water |
| uFMfSW | Updated Flood Maps for Surface Water |

## Sources of Flooding

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

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

## Flood Risk Data Sources

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

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

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

## Other Data Sources

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

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

**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 Waverley Borough Council (WBC) in the winter of 2013/14. The report also considers whether the relevant RMAs have exercised, or propose to exercise, their risk management functions (as per section 19(1) of the Flood and Water Management Act 2010). It does not address wider issues beyond that remit.

The flooding in Waverley was predominately due to fluvial, ordinary watercourse and surface water flooding. This was caused by unprecedented rainfall during the winter 2013/14 period (275% compared with an average winter). There were approximately 120 incidents of internal property flooding in Waverly during winter 2013/14.

The Environment Agency (EA) is the lead RMA for incidents of fluvial flooding from Main Rivers, though Thames Water (TW), Southern Water Services Ltd (SWS) Surrey County Council (SCC) and WBC 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 data recorders to Cranleigh, Elstead, Farnham and Tilford & Churt during the flooding in January 2014.
- The EA, together with SCC, WBC and the Regional Flood Defence committee, has secured Local Levy funding for an investigation into the cause flooding in Alfold and potential solutions.

## 1.2. Surrey County Council

- SCC Secured Local Levy funding and is leading the initial assessment project for the Alfold investigation.
- Actively involved in Alfold Flood Forum.
- Temporarily closed roads for public safety during the flooding.
- Clearing ditches and unblocking pipes in Chiddingfold and Milford.
- SCC have removed obstructions and carried out repairs on an ordinary watercourse in Elstead
- SCC have cleansed and restored the area from the highways system to the outfall on Milford Road Elstead.
- Merryacres (Witley) is currently under investigation to develop a scheme to improve water conveyance throughout the catchment.
- SCC is undertaking an assessment of the potential options to reduce flood risk in Alfold.
- SCC is carrying out investigations for an ongoing scheme design on Parkside Road and Upper Hale Road (Farnham).

## 1.3. Thames Water

- Actively involved in Alfold Flood Forum and discussed the issue of surface water and ground water infiltration of their sewers.
- Undertook enhancement work to Godalming North pumping station on 30 December 2013 after pumps failed. TW have since carried out major repair work at the pumping station.

- Taking action to prevent ingress of water into Alfold sewers.

## 1.4. Waverley Borough Council

- Clearing ditches together with riparian owners.
- Investigating the condition and clearing culverts.
- Actively engaged in Local Levy funded project.
- Undertaken repairs to various culverts.
- Undertaken stream and river bank improvements across the borough.

# 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 Lead Local Flood Authority 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 Waverley Borough area. There are 66 sites in total, spread across 8 sub areas. There were approximately 120 incidents of internal property flooding in Waverley.

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.

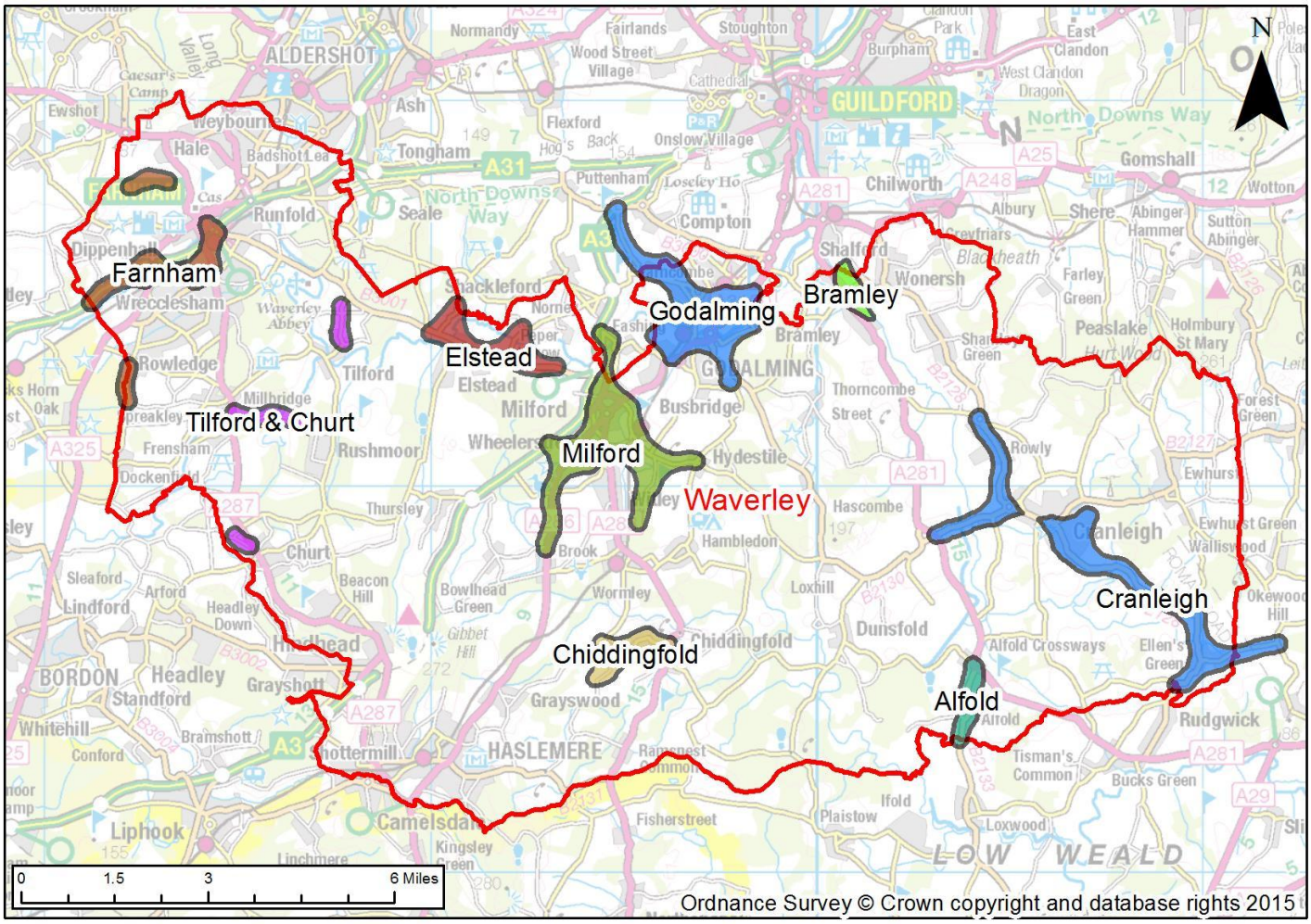


**Figure 2-1 Location of Sub areas within Waverley Borough for this Report**

# 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. Table 3-1 indicates total winter rainfall was more than double what would normally be expected during an average winter.

Parts of South East England received around two and a half times the amount of rainfall that they would normally expect at this time of year. This caused wide-spread flooding across Surrey from a range of sources including ground water. 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**

| Communities | Watercourse | Annual Chance (%) | Return Period (years) | Source of estimate |
|---|---|---|---|---|
| Crawley | River Mole | 1.25 | 80 | Analysis of peak flow rates using FEH methods |
| Dorking, Leatherhead | River Mole | 2 | 50 | Analysis of peak flow rates using FEH methods |
| Cobham, Esher | River Mole | 2 | 50 | Analysis of peak flow rates using FEH methods |
| Gatwick Airport | Gatwick Stream | 3.3 | 30 | Analysis of peak flow rates using FEH methods |
| Redhill | Redhill Brook | 2 | 50 | No flow data available, so estimate based on correlation with nearby sub-catchments, and rainfall data |

Storm events hit the UK on the 18th to 19th, 23rd to 27th and 30th to 31st December 2013, followed by 3rd and 5th of January 2014. These storms came from the Atlantic and were characterised by unusually large and deep areas of low pressure, which brought heavy rainfall and 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 EA rain gauges across the West Thames area were 57mm in December, 37mm in January and 28mm in February.

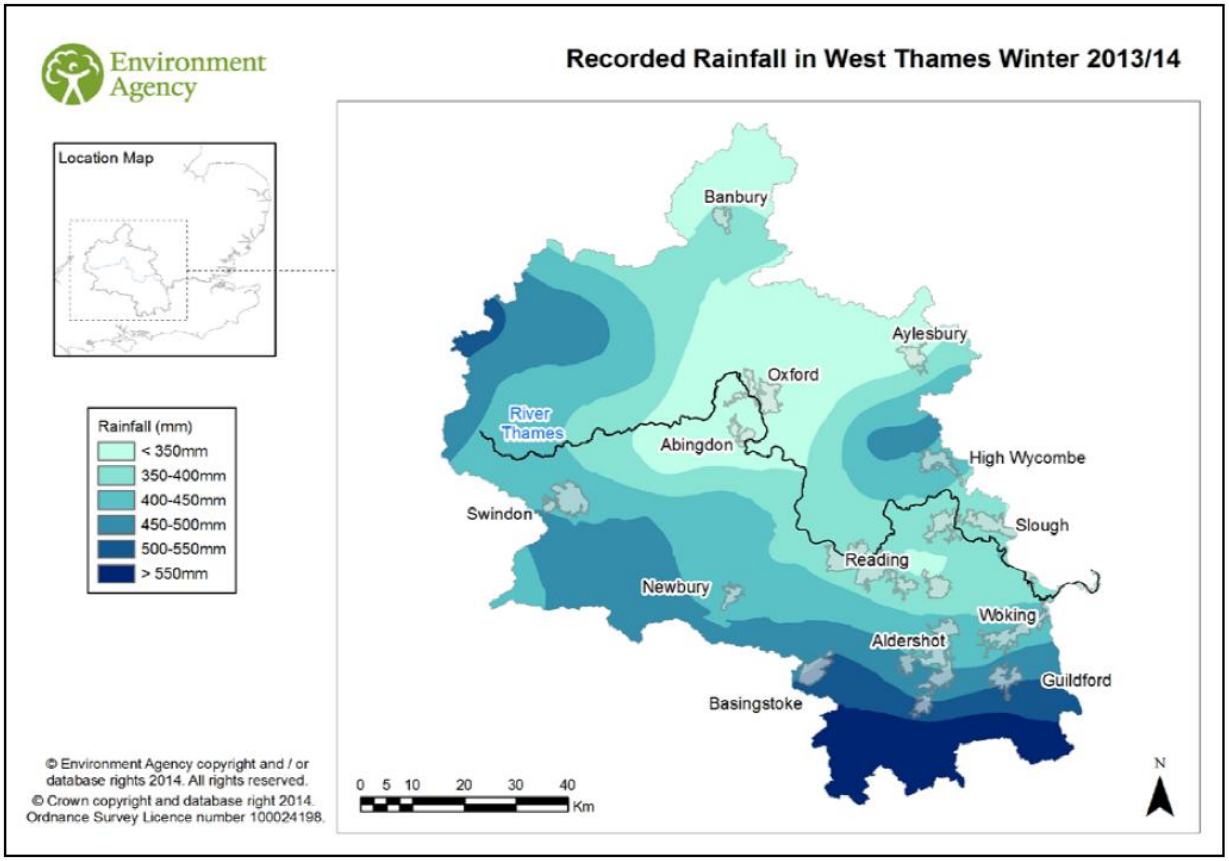


**Figure 3-1 Recorded Rainfall in the EA West Thames Region 2013-14**

## 3.2. Catchment Conditions

Most of Waverley Borough is within the River Wey catchment, with the southern and eastern edges in the uppermost reaches of the catchment. The sub-area of Alfold lies within the uppermost tributary reaches of the Loxwood Stream catchment which flows to the south. These small tributary streams react quickly to rainfall events.

On the 23rd December, nearly 60mm of rainfall was recorded in an 18-hour period at the Cranleigh Waters gauge, south of Guildford. This caused extensive flooding on the River Wey. Christmas Eve was mostly dry, but levels rose steadily throughout the day and reached their peak in the early hours of Christmas Day in the Godalming and Guildford area. Levels rose 2.5m above normal winter levels in Guildford, although they did not quite reach the maximum level recorded in November 2000. Table 3-2 shows that both the December 2013 and November 2000 events were significantly lower than the 1968 floods which 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 River Levels for Recent Events**

| Site Name | Maximum River Level above local baseline (m) | | | | |
|---|---|---|---|---|---|
| | Dec 2013 | Dec 2012 | Jan 2003 | Nov 2000 | Sept 1968 (estimated) |
| Tilford | 2.09m | 1.67m | 1.77m | 1.98m | No data |
| Westbrook Mill (Godalming) | 1.58m | 1.37m | No data | No data | No data |
| Bramley | 4.00m | 3.38m | 3.41m | 3.56m | No data |
| Guildford | 3.72m | 2.51m | 3.09m | 3.78m | 4.6m |

There were several dry days between Christmas and New Year that allowed river levels across the area to subside. However, the period around New Year and the first week of 2014 was again exceptionally wet. Rainfall totals between 30th December and 8th January averaged 90mm, but with localised areas incurring up to 150mm of rain. 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 property flooding was not repeated. During this period, the highest rainfall on a single day was 35mm at Bordon (just west of the Waverley boundary) on the Upper Wey; this was considerably less than that recorded on 23 December. However, the cumulative effects of rainfall over many days had a profound impact. 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.

The EA has estimated annual chance return periods for the peak levels reached on their largest rivers. The December 2013 return period for the River Wey was estimated at a 1 in 15 to 20 annual chance at Godalming and a 1 in 20 to 30 annual chance at Guildford.

# 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

Lead Local Flood Authorities 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 Lead Local Flood Authority. Through the planning processes, they control development in their area, ensuring that flood risks are effectively managed. If they cover part of the coast, then District and Unitary councils also act as coastal erosion risk management authorities.

Internal Drainage Boards (IDB) are responsible for water level management in most low lying areas, covering approximately 10% of England. They work in partnership with other authorities and land owners to actively manage and reduce the risk of flooding.

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

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

Table 4-1below summarises the RMAs responsible for the sites within this report. The ticks indicate which authorities have responsibility for which function. Surrey CC is the Lead Local Flood Authority (LLFA). Thames Water (TW) and Southern Water Services (SWS) are the water companies that have responsibility for all sources of sewer flooding. There are no Internal Drainage Boards in the WBC area.

**Table 4-1 Risk Management Authorities**

| Flood Source | Environment Agency | Lead Local Flood Authority | Land Drainage Authority | | Water Company | | Highway Authority |
|---|---|---|---|---|---|---|---|
| | | Surrey County Council | | Borough/ District Council | Thames Water | Southern 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 Waverley 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.
- Cleared 860 blockages and storm damage incidents.
- Reported 1087 pollution incidents.
- 125 flood Ambassadors visited 95 locations.
- 70 flood data recorders sent to more than 100 locations.
- Supported (and are supporting) community groups to help develop their community flood/emergency plans.
- Sent out newsletters to inform residents of their site investigation works and are finalising plans for a regular community newsletter.
- Met with local people to discuss their ideas and are now studying these proposals in more detail.

Specifically in Waverley the actions listed below were carried out:

- Sent out flood data recorders to Cranleigh, Elstead, Farnham and Tilford & Churt during the flooding in January 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. The relevant functions undertaken are listed below:

- Repairs to Godalming North pumping station on 30 December 2013 after pumps failed. TW have since carried out further major repair work at the pumping station.

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

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

Specifically in Waverley the actions listed below were carried out:

- Actively involved in Alfold Flood Forum and has discussed the issue of surface water and ground water infiltration of their sewers.
- Undertook extensive works on TW assets in the Godalming area to reduce the risk of future sewer flooding to properties.

**Southern Water Services**
No specific flood risk management functions have been identified as being directly relevant to the 2013/2014 flooding incident in Waverley and no information on actions taken by SWS has been made available.

**Surrey County Council**
Surrey County Council, 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, consent and enforce works on ordinary watercourses, undertake works to mitigate surface water and groundwater flooding and undertake section 19 investigations. SCC also has responsibilities as a Highways Authority and as an Emergency Responder (under the Land Drainage Act 1991 and the Civil Contingencies Act 2004 respectively) which may relate to flooding. SCC's relevant flood risk management functions undertaken are listed below:

- The LFRMS was published in December 2014.
- Some key drainage assets have been identified in Waverley 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:

- SCC 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 that may be included in the Project 400 programme.
- SCC 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.
- SCC staff attended resident engagement events after the flooding to hear their concerns and gather additional information.
- After the storms and flooding, SCC cleared trees, debris and carried out ditching works to enable the drainage systems to function normally again.
- SCC 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.
- SCC administered the Repair and Renew Grant which provided up to £5000 for residents and businesses that were flooded in order to protect their property from flooding in the future.

Specifically in Waverley, SCC carried out the works below:

- Much of the flooding occurred in areas of riparian ownership. Owners are not always aware of their responsibilities of maintenance and necessary works required to alleviate flooding. SCC highways are currently working with partners including the National Trust and Parish/Town Councils to raise awareness of these responsibilities across Waverley.
- Leading on the Local Levy funded project in Alfold to look at options to reduce flood risk.

**Waverley Borough Council**
WBC, as a Borough Council, have the flood risk management function 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). Waverley's relevant functions undertaken are listed below:

- Clearing ditches together with riparian owners.
- Investigating the condition of and clearing culverts across the borough.
- Undertaking repairs to various culverts.

In addition, WBC carried out the following actions;

- Actively engaged in Local Levy funded project across Alfold and Waverley.
- Undertaking stream and river bank improvements across the borough.

## 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 8 sub areas in this report, all within the area covered by WBC.

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

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

# 7. Sub Area: Alfold

## 7.1. Sub Area Definition

This sub area covers the area of Alfold. It includes Loxwood Road and Clappers Meadow.

## 7.2. Location and Catchment Description

There are no major watercourses in the Alfold sub area. However, there are a series of ditches that drain the area. There is a minor watercourse taking water from the south east to the north. This flows behind the properties in Clappers Meadow, and crosses Loxwood Road at the road junction through two culverts.

With ditches and culverts at capacity, water overflowed from ditches. Surface flow from land unable to enter into an overloaded system added to the problems. The resulting internal property flooding was exacerbated by the failure of an adjacent sewerage pumping station and sewers surcharging surface water.

Loxwood Road is also at risk at several locations where small watercourses and surface water flow routes cross the road. The intensity of rainfall and the saturation of the ground during the winter of 2013-14 would lead to flashy responses by these small water courses and peak flows are likely to temporarily exceed capacity.

The EA flood maps do not indicate any fluvial flood risk in this sub area. The EA surface water flood mapping indicates that Clappers Meadow and areas of Loxwood Road are at risk of surface water flooding. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps; however they can be used to identify general flow routes.

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

Alfold sub area is underlain by clay formations, which are relatively impermeable. The majority of the sub area is not underlain by superficial deposits; however some areas are underlain by alluvium (clay, sand, silt and gravel). 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 has no potential for groundwater flooding to occur. There is only a very small area in the north of the sub area where there is a potential for groundwater flooding to occur at the surface.

The sub area is not located within the EA Flood Warning or Flood Alert Areas.

## 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 Lead Local Flood Authority (Surrey County Council), the Highway Authority (Surrey County Council) and Water Companies (TW and SWS).

## 7.4. Exercised Flood Risk Management Functions and Other Actions

### Environment Agency

The EA is working with SCC, WBC and the Regional flood Defence Committee. Together, Local Levy funding has been secured to undertake an initial assessment of the causes of flooding at Clappers Meadow and Loxwood Road. This study will also consider whether a potential solution is likely to be found and whether there is an economic case to undertake additional works.

Section 5 provides additional details of EA's borough-wide exercised Flood Risk Management Functions since the flood incident.

### Waverley Borough Council

WBC carried out extensive ditch clearance works on surrounding 'Common Land' highway verges, while local residents have cleared out the ditches to the rear of properties in Clappers Meadow. WBC has undertaken CCTV surveys and repairs to surrounding culverted systems, and cleared culverts under Clappers Meadow. They are also actively engaged with the Local Levy funded project in this area.

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

### Surrey County Council

Surrey Highways carried out drainage improvement works along Loxwood Road.

SCC has secured Local Levy funding and is leading the initial assessment project, and has been engaging with the Alfold Flood Forum.

As part of the Alfold Flood Alleviation Scheme, SCC is undertaking an assessment of the potential options to reduce flood risk in the Alfold 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

TW has been actively involved with the Alfold Flood Forum, and has discussed the issue of surface water and ground water infiltration of their sewers.

A permanent stand-by generator has been installed at Clappers Meadow Sewerage Pumping Station. TW has also been taking action to prevent ingress of water into their sewers.

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

### Southern Water Services

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

# 8. Sub area: Bramley

## 8.1. Sub Area Definition

This sub area covers the area of Bramley. It includes the High Street, Fisher Rowe Close, Linersh Wood, Brambles Park and Tannery Lane. The areas around these locations together make up the Bramley sub area.

## 8.2. Location and Catchment Description

The village of Bramley has two watercourses flowing through it; Hascombe Stream (also referred to as the Bramley Stream) and the Cranleigh Waters. Both are classified as main rivers. The Hascombe Stream flows in a north-easterly direction through the centre of the village. It joins Cranleigh Waters to the north-east of Fisher Rowe Close. Cranleigh Waters flows in a north-westerly direction along the eastern edge of the village. During the winter of 2013/2014 there were a number of instances of internal property flooding.

There were several areas in Bramley that were affected by the flooding, including the High Street, Brambles Park, Linersh Wood, Linersh Drive, Barton Road, Fisher Rowe Close, Station Road and Tannery Lane.

Three shops along the High Street were flooded internally. The source of the flooding that occurred along the High Street is unconfirmed, but assumed to be a combination of surface water runoff and water from the Hascombe Stream. The stream flows around the back of the commercial properties. Along the affected area of the High Street there are two kerb inlet gulleys which discharge surface water directly to the stream. There is the possibility that flood water could backup via these structures; however it has not been possible to confirm if this occurred in this event. The risk of internal flooding of these shops is high because the properties have no threshold step above pavement, and the shops entrances are directly aligned with a dropped kerb. This means that water on the road can readily flow over the pavement and into the premises.

Several residential properties on Fisher Rowe Close were flooded internally. Other residential properties in the Close experienced external flooding. This is thought to have been from both the Hascombe Stream and Cranleigh Waters. The Thames Water pumping station was also severely affected by flood water, with pump failure resulting in backing up of foul flows through the network and the requirement for Thames Water to tanker sewerage away from the site.

There was flooding on Station Road where the road crosses Cranleigh Waters and at a property on Tannery Lane. In both cases, flood water originated from the Cranleigh Waters.

The EA flood maps indicate that there are areas of Bramley at risk of fluvial flooding including Tannery Lane, Station Road and Fishers Rowe and the A281 (High Street) crosses the Hascombe Stream.

The EA surface water flood mapping show a similar pattern to the fluvial flood maps, but highlight an additional number of overland flow routes. These maps are based on topography and their accuracy is not as robust as the fluvial flood maps, however they can be used to identify general flow routes.

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

The Bramley sub area is predominantly underlain by partially permeable sandstone formations with some impermeable clay formations to the north around Gosden Common. However the majority of the sub area is underlain by superficial deposits with limited permeability. 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 has potential for groundwater flooding to occur below ground level. However, in the areas surrounding the water courses there is a potential for groundwater flooding to occur at the surface.

The parts of the sub area closest to the main watercourses are within the Flood Warning and Flood Alert Areas. These are areas for which the EA provides free flood warnings.

## 8.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area have been identified as being the Lead Local Flood Authority (SCC), the Highway Authority (SCC), the EA, the Land Drainage Authority (SCC/WBC) and the water company (TW).

## 8.4. Exercised Flood Risk Management Functions and Other Actions

### Environment Agency

Details of the flood warnings (upstream of Bramley) issued by the EA between December 2013 and February 2014 are detailed in Table 10-1.

**Table 8-1 Flood warnings issued by the EA in Cranleigh between December 2013 and February 2014**

| Flood warning area | Date | Time | Number warned |
|---|---|---|---|
| Cranleigh Waters near Cranleigh and Shamley Green | 23/12/2013 | 22:03 | 63 |

The EA sent Flood Data Recording staff to Cranleigh in January 2014 to verify river levels at gauging stations, record property flooding and capture the physical extents of flooding on the ground.

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

### Surrey County Council

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

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

### Waverley Borough Council

WBC commissioned a study to better understand flood risk in Bramley and identify potential options to manage the flood risk in this area.

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

**Thames Water**

TW deployed units to tanker sewerage away from sites affected by sewerage flooding.

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

# 9. Sub Area: Chiddingfold

## 9.1. Sub Area Definition

This sub area covers the area of Chiddingfold. It includes Pook Hill and a cluster of roads around Woodside Road.

## 9.2. Location and Catchment Description

There are two tributaries of the River Lox in the Chiddingfold sub area. The Loxwood Stream runs through the south of the village with another tributary crossing the A283 at Northbridge.

During the winter of 2013/2014 Pook Hill and a cluster of roads around Woodside Road were subject to flooding. The mechanism of flooding was not recorded.

While it is known that the Loxwood Stream did burst its banks, the reported flooding of properties in 2013/2014 was not generally attributed to fluvial flooding.

There were three main areas of flooding in Chiddingfold; Ridgley Road, Mill Lane to South Bridge and Coxcombe Lane areas.

The Ridgley Road flooding was linked to a highway culvert that due to its poor condition and steep unsupported banks at its entrance became obstructed by debris. The resulting overland flows contributed to flooding to two properties and threatened several others.

The flooding along Mill Lane and around the South Bridge area can be attributed to water flowing off high ground to the north of Mill Lane. This water, unable to find a path to the river, flowed in the direction of South Bridge causing internal flooding to several properties. This was exacerbated by localised overland and highway runoff in the South Bridge area along with the failure of a nearby sewerage pumping station.

The flooding in Coxcombe Lane did not include internal property flooding.

The EA flood maps for surface water indicate several flow routes through the roads known to be affected in this sub area, especially around Woodside Road and Ridgley Road. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps; however they can be used to identify general flow routes.

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

The Chiddingfold sub area is underlain by sandstone and mudstone layers. The sub area is not underlain by any superficial deposits. The underlying geology suggests that under normal conditions water will permeate the ground and reduce overland runoff during rainfall events.

The majority of the sub area has no potential for groundwater flooding to occur. However, in some areas surrounding the water courses there is a potential for groundwater flooding to occur at the surface.

SCC received reports that the local pumping stations may have experienced failures and that there were issues with some of the surface water sewers in the area.

The parts of the sub area closest to the main watercourses are within the Flood Alert Areas. 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 Lead Local Flood Authority (SCC), the Highway Authority (SCC), the EA and the Water Company (SWS).

## 9.4. Exercised Flood Risk Management Functions and Other Actions

**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**

Pook Hill road was subject to a temporary road closure during the flooding.

SCC Highways carried out improvements to the culvert under Ridgley Road near the surgery.

Chiddingfold Parish Council is supporting residents with the “Lengthsman Scheme” which will improve the resilience of key drainage in the 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.

**Southern Water Services**

No flood risk management functions relevant to SWS have been identified as specific to the flood incident in this sub area and no information on actions taken by SWS have been made available.

# 10. Sub Area: Cranleigh

## 10.1. Sub Area Definition

This sub area covers the area of Cranleigh, Ellen's Green and Rowly. It includes Elmbridge Road, Guildford Road in one location with Horsham Road and several surrounding roads in a separate location. These two locations together make up the Cranleigh sub area.

## 10.2. Location and Catchment Description

The major watercourses that run through Cranleigh are Cranleigh Waters, Cobblers Brook, Thornhurst Brook and the Wey & Arun Junction Canal.

During the winter of 2013/2014 there were a number of instances of internal property flooding. The most significant flooding occurred with the overflowing of the Holdhurst Brook, which flooded eight properties. The blockage of a trash screen on a culvert entrance also exacerbated this incident. Further flooding from nearby highway runoff is also reported.

There were further internal property floods in the Elmbridge Road area due to fluvial flooding from the Cranleigh Waters and overflow from the disused Wey and Arun Canal.

The EA flood maps indicate that there are areas of Cranleigh at risk of fluvial flooding including Horsham Road. The B2130 crosses Cranleigh Waters and the Wey and Arun Canal. Tributaries cross Guildford Road. Horsham Road crosses Cobblers Brook, Thornhurst Brook, and another watercourse crosses the B2128 by Pollingford Bridge.

The EA surface water flood mapping shows a similar pattern to the fluvial flood maps, but with a greater density of flood routes. These maps are based on topography and their accuracy is not as robust as the fluvial flood maps, however they can be used to identify general flow routes.

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

The Cranleigh sub area is underlain by impermeable clay formations. The majority of the sub area is not underlain by superficial deposits; however there are alluvium and river terrace deposits in the north west of the catchment. 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 has no potential for groundwater flooding to occur. However, in the areas surrounding the watercourses there is a potential for groundwater flooding to occur at the surface.

The parts of the sub area closest to the main watercourses are within the Flood Warning and Flood Alert Areas. These are areas for which the EA provides free flood warnings.

## 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 the Lead Local Flood Authority (SCC), the Highway Authority (SCC), the EA and the Land Drainage Authority (SCC / WBC).

## 10.4. Exercised Flood Risk Management Functions and Other Actions

### Environment Agency

Details of the flood warnings issued by the EA between December 2013 and February 2014 are detailed in Table 10-1.

**Table 10-1 Flood warnings issued by the EA in Cranleigh between December 2013 and February 2014**

| Flood warning area | Date | Time | Number warned |
|---|---|---|---|
| Cranleigh Waters near Cranleigh and Shamley Green | 23/12/2013 | 22:03 | 63 |

The EA sent Flood Data Recording staff to Cranleigh in January 2014 to verify river levels at gauging stations, record property flooding and capture the physical extents of flooding on the ground.

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

### Surrey County Council

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

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

### Waverley Borough Council

WBC has carried out bank clearance works along the Cranleigh Waters around the Elmbridge Road area. This work was undertaken jointly with the Environment Agency and other riparian landowners.

WBC identified a key drainage asset in the sub area, referred to as "Nightingales Grill" and is working with SCC to establish ownership and ensure future maintenance is carried out.

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

# 11. Sub Area: Elstead

## 11.1. Sub Area Definition

This sub area covers the area of Elstead centred around the B3001.

## 11.2. Location and Catchment Description

The River Wey runs through the sub area. The river crosses the B3001 Farnham Road, Shackleford Road, and passes close to Fulbrook Lane which lies within the edge of the flood plain. The river has a narrow flood plain indicated in the fluvial flood risk maps.

During the winter of 2013/2014 the sub area was subject to flooding which resulted in road closures and internal property flooding. The flooding mechanisms for these events have not been recorded.

Extensive flooding around Elstead Bridge caused internal flooding to a nearby restaurant and closed several roads for a period.

The EA surface water flood maps indicate that there is some risk of surface water flooding in the sub area adjacent to small watercourses, as well as in the urban area. Flooding attributed to egress of groundwater occurred around the Upper Springfield, Hill Crest and Orchard Close areas. This was particularly bad at Orchard Close where limited surface water drainage had difficulty coping with seasonal flows and took some considerable time to drain away.

The surface water flooding maps are based on topography and their accuracy is not as robust as the fluvial flood maps, however they can be used to identify general flow routes.

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

The Elstead sub area is underlain predominantly by sandstone and mudstone layers, with sandstone only to the west of the subarea. The sub area is also underlain by superficial deposits of Alluvium, Head and River Terrace Deposits. 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.

In the majority of the sub area there is a potential for groundwater flooding to occur at the surface.

The parts of the sub area closest to the main watercourses are within the Flood Warning or Flood Alert Areas. These are areas for which the EA provides free flood warnings.

## 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, the Land Drainage Authority (SCC / WBC), the Lead Local Flood Authority (SCC) and the Highway Authority (SCC).

## 11.4. Exercised Flood Risk Management Functions and Other Actions

### Environment Agency

Details of the flood warnings issued by the EA between December 2013 and February 2014 are detailed in Table 11-1.

**Table 11-1 Flood warnings issued by the EA in Elstead between December 2013 and February 2014**

| Flood Warning Area | Date | Time | Number warned |
|---|---|---|---|
| River Wey at Elstead and Eashing | 23/12/2013 | 22:24 | 17 |
| River Wey at Elstead and Eashing | 02/01/2014 | 05:51 | 17 |
| River Wey at Elstead and Eashing | 17/01/2014 | 16:07 | 19 |
| River Wey at Elstead and Eashing | 01/02/2014 | 17:16 | 19 |
| River Wey at Elstead and Eashing | 07/02/2014 | 21:07 | 19 |

The EA sent Flood Data Recorders to Elstead in January 2014. These are people trained to verify river levels at gauging stations, record property flooding and capture the physical extents of flooding on the ground.

Section 5 provides additional details of EA's borough-wide exercised Flood Risk Management Functions since the flood incident.

### Surrey County Council

A number of roads were closed temporarily due to flooding including:

- Fulbrook Lane
- Upper Springfield Road
- Farnham Road
- Shackleford Road
- Orchard Close
- Hill Crest Road

On Milford Road (Elstead), SCC have removed obstructions and carried out repairs on the ordinary watercourse.

SCC have cleansed and restored from the highways system to the outfall on Milford Road, Elstead.

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.

# 12. Sub Area: Farnham

## 12.1. Sub Area Definition

This sub area covers the area of Farnham, including Middle Oak Park, Boundary Road, and the centre of Farnham around Alton Road, River Lane and Ridgeway Road.

## 12.2. Location and Catchment Response

The River Wey runs through the centre of the Farnham sub area, with its flood plain affecting the centre of Farnham itself and the A31.

During the winter of 2013/2014 the sub area was subject to flooding which resulted in road closures and internal property flooding. There were reports of internal sewerage and drainage flooding in the sub area.

The EA fluvial flood maps indicate that areas classified as being at high and medium flood risk (at risk greater than a 1 in 30 annual chance and between a 1 in 30 and 1 in 100 annual chance) adjacent to the River Wey.

The surface water flood mapping indicates multiple flow routes across the A31, Middle Oak Park and Boundary Road. None of the other locations appear to be at significant risk from fluvial or surface water. The surface water flooding maps are based on topography and their accuracy is not as robust as the fluvial flood maps, however they can be used to identify general flow routes.

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

The Farnham sub area is predominantly underlain by the Folkestone Formation (sandstone) and London Clay Formation (clay, silt and sand), with small outcrops of chalk in the middle of the subarea. The sub area is also underlain by superficial deposits of Alluvium, Head and River Terrace deposits. 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.

In the majority of the sub area there is a limited potential for groundwater flooding to occur. However, in the areas surrounding the water courses there is potential for groundwater flooding to occur at the surface.

The parts of the sub area closest to the main watercourses are within the Flood Warning and Flood Alert Areas. These are areas for which the EA provides free flood warnings.

## 12.3. Identification of Relevant RMAs

Following a range of consultation events during and since the floods, the relevant RMAs in this sub area have been identified as being the EA, the Land Drainage Authority (SCC / WBC), the Lead Local Flood Authority (SCC), the Highway Authority (SCC) and Water Company (TW).

## 12.4. Exercised Flood Risk Management Functions and Other Actions

**Environment Agency**

There are no records of a flood warning being issued for the River Wey at Farnham as property flooding was not expected. According to EA records, property flooding from the River Wey did not occur in Farnham.

The EA sent Flood Data Recorders to Farnham in January 2014. These are people trained to verify river levels at gauging stations, record property flooding and capture the physical extents of flooding on the ground.

Section 5 provides additional details of EA's borough-wide exercised Flood Risk Management Functions prior to, during and since the flood incident.

**Surrey County Council**

A number of roads were closed temporarily due to flooding including:

- Boundary Road
- Ridgeway Road
- Alton Road
- River Lane

SCC is carrying out investigations for an ongoing scheme design on Parkside Road and Upper Hale Road (Farnham).

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.

# 13. Sub Area: Godalming

## 13.1. Sub Area Definition

This sub area covers the area of Godalming, including Priorsfield Road to the A3.

## 13.2. Location and Catchment Description

The River Wey runs through the centre of Godalming.

There was a heavy rainfall event on the 23 December that was responsible for the flooding on the River Wey. On 24 December 2013 it was mostly dry, but the river levels were reported to have risen steadily throughout the day and reached their highest in the early hours of Christmas Day at Godalming. Catteshall Road and the Meadrow areas were the first to be affected, with 22 roads in total identified as flooded.

Flooding from the River Wey resulted in a large number of properties being internally flooded.

The return period for the River Wey in Godalming in December 2013 was estimated to be a 1 in 15 to 20 annual chance.

It is reported that a number of homes in Godalming were affected by sewer flooding prior to 25 December and on 30 December. On 30 December event there was a failure in the Trunley Heath sewerage works caused by a pump station breakdown. TW fixed the failure within 18 hours.

To the north of the area around Tilthams Green on the border and within the Guildford BC area, internal flooding occurred from a surcharged stream and overtopping of the Wey Navigation. Further details of the flooding in this area can be found in the Guildford Borough S19 Report. Upstream from here the drainage systems within the WBC area are complex and likely exacerbated the situation. There was reported flooding to properties upstream around Birch Road.

The EA fluvial flood maps indicate that the areas of Godalming fringing the River Wey and Hell Ditch's flood plain are at risk from fluvial flooding. Properties at risk are mainly within the low risk zone (at risk less frequently than 1 in 100 annual chance), however some properties are at high risk (more frequently than 1 in 30 annual chance). In addition to the River Wey and Hell Ditch, another tributary, the River Ock, joins the Wey from the south west following the railway line. This indicates a flood risk to the A3100 and Station Approach. New Way is located just outside the flood risk area.

The residential area of Wey Court, off the A3100 in Farncombe, lies on the edge of the Hell Ditch and River Wey flood plain. The flooding extent included Kings Road which is just outside the EA predicted flood risk zones.

The surface water flood maps indicate a flow route from The Circle to Wey Court. This would have compounded the effects of any fluvial flooding. Catteshall Lane and Old Station Way are also clearly shown as lying on a surface water flow route. Priorsfield Road and Mark Way are indicated to have only small localised areas of surface water flood risk. The surface water flooding maps are based on topography and their accuracy is not as robust as the fluvial flood maps, however they can be used to identify general flow routes.

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

The Godalming sub area is underlain by sandstone and mudstone formations. The underlying geology suggests that, under normal conditions, water will permeate the ground and reduce overland runoff during rainfall events.

The majority of the sub area has limited potential for groundwater flooding to occur. However, in the town centre of Godalming, there is a potential for groundwater flooding to occur at the surface.

The parts of the sub area closest to the main watercourses are within the Flood Warning and Flood Alert Areas. These are areas for which the EA provides free flood warnings.

## 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 Lead Local Flood Authority (SCC), the Land Drainage Authority (WBC) the EA and water company (TW).

## 13.4. Exercised Flood Risk Management Functions and Other Actions

### Environment Agency

Details of the flood warnings issued by the EA between December 2013 and February 2014 are detailed in Table 13-1. Details of groundwater flood alerts issued by the EA in January 2014 are detailed in Table 13-2.

**Table 13-1 Flood warnings issued by the EA in Godalming between December 2013 and February 2014**

| Flood warning area | Date | Time | Number warned |
|---|---|---|---|
| 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 |

**Table 13-2 Groundwater flood alerts issued by the EA in Godalming in January 2014**

| Flood warning area | Date | Number warned |
|---|---|---|
| Groundwater flooding in Godalming, Shackleford and Hambledon areas | 09/01/2014 | 31 |

The initial flood warning was issued at 20:48 on December to almost 500 people. The EA gathered further information during the flooding and adjusted the flood warning trigger level in Godalming accordingly.

Some residents expressed concern that temporary defences were used in Guildford but not in Godalming. The EA had considered their use but elected not to use them, primarily because of the length of riverbank that would need to be protected. Residents were also concerned about the effect that the operation of weirs and sluices might have on flooding from the River Wey. Third party operators had gradually opened the weirs in the lead-up to 24 December in efforts to avoid flooding: the final gate movements at Westbrook Mill were still being made on the morning of Christmas Day. The EA has advised that the impacts of this on river levels would have been negligible.

On 29 May 2015 the EA attended a meeting to discuss flood issues in Godalming North with all relevant agencies.

The EA are leading on a project to identify and evaluate options for a scheme to reduce flood risk in Godalming.

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

**Surrey County Council**

The Emergency Services were required to evacuate vulnerable residents from Wey Court, Meadrow and Catteshall Road areas.

Catteshall Road was subject to a temporary road closure during the flooding.

Subsequent works to improve the highway drainage in the area have been carried out.

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.

**Waverley Borough Council**

WBC had contractors on site throughout the flooding - issuing sand bags/flood sacks and providing assistance to local residents.

WBC carried out subsequent works on adjacent Lammas Lands (flood plain between Hell Ditch and River Wey) including cutting back vegetation, tree management, and restoration of a drainage channel and pond.

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

**Thames Water**

On 30 December 2013, TW fixed the failure of pumps at a pumping station in Godalming North. Since the flooding in December 2013 TW has undertaken enhancement work at the pumping station.

TW also undertook extensive works on TW assets in the Godalming area to reduce the risk of future sewer flooding to properties.

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

# 14. Sub Area: Milford

## 14.1. Sub Area Definition

This sub area covers the area of Enton, Milford, Eashing and Witley.

## 14.2. Location and Catchment Description

The River Wey runs through the northern half of the Milford sub area. There are several lakes along a tributary which flows to the River Wey, crossing roads and urban areas in Milford.

During the winter of 2013/2014 there were a number of flooding incidents that resulted in road closures and internal property flooding. In the Webb Road area, 8 properties were flooded from overground flows off of National Trust land; with water held up by the culvert under the A286. Downstream from here a poorly maintained ditch with limited capacity culverts caused additional problems.

Further problems occurred where the system is much degenerated and passes through the Merry Acres estate. The outlet ditch here had almost disappeared.

Additional problems occurred along the Station Lane where flows from overland and highway run off overloaded a culverted system and caused internal property flooding to several properties.

The EA fluvial flood maps indicate the north of the sub area is at risk of fluvial flooding from the River Wey. This includes the site at Lower Eashing where the road crosses the river.

The flood maps for surface water indicate several flow routes, including Station Lane and Water Lane, and areas of significant concentrations of surface water flood risk such as Cramhurst. The surface water flood maps are based on topography and their accuracy is not as robust as the fluvial flood maps, however they can be used to identify general flow routes.

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

The sub area Milford is underlain by sandstone and mudstone formations. The majority of the sub area is not underlain by superficial geology, however some parts in the north of the sub area are underlain by Alluvium and Head deposits. The geology suggests that under normal conditions water will permeate the ground and reduce overland runoff during rainfall events.

The majority of the sub area has no potential for groundwater flooding to occur. However, in some areas, particularly surrounding the water courses, there is a potential for groundwater flooding to occur at the surface.

The parts of the sub area closest to the main watercourses are within the Flood Warning or Flood Alert Areas. These are areas for which the EA provides free flood warnings.

## 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 Lead Local Flood Authority (SCC), the Highway Authority (SCC), the EA, Water Company (TW) and the Land Drainage Authority (SCC / WBC).

## 14.4. Exercised Flood Risk Management Functions and Other Actions

### Environment Agency

A flood alert was issued to the Upper River Wey by the EA at 18:55 on the 23 December 2013.

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

### Surrey County Council

Lower Eashing and Mousehill Lane were subject to a temporary road closure during the flooding.

The ditch on Webb Road, which was causing internal flooding to property, was cleared by SCC using a digger. SCC also jetted and subsequently replaced a pipe under the road that was linked to the ditch in order to further alleviate the flooding.

The floods in Merry Acres were due to a poor outfall system. SCC are carrying out works downstream to improve flows under the main A283

Merryacres (Witley) is currently under investigation to develop a scheme to improve water conveyance throughout the catchment.

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.

### Waverley Borough Council

WBC has dug out the ditch immediately downstream of Merry Acres and is working with SCC to improve this end of the Webb Road to Petworth Road spine drainage system.

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

# 15. Sub Area: Tilford & Churt

## 15.1. Sub Area Definition

This sub area includes three sites - Tilford Street in Tilford, Priory Lane in Millbridge and Lampard Lane in Churt.

## 15.2. Location and Catchment Description

The River Wey runs through the Tilford and Churt sub area. Frensham Little and Great Ponds are two large open-water bodies that are also Large Raised Reservoirs in the sub area. During the winter of 2013/2014 the sub area was subject to flooding which resulted in road closures and internal property flooding. The flooding mechanisms for these events have not been recorded.

The Millbridge GU10 pumping station failed due to fluvial flooding.

Tilford Street is not indicated to be at risk of fluvial flooding, or from significant amounts of surface water flooding according to the EA flood risk maps. Several points on Priory Lane are within the low risk flood zone (less frequent than 1 in 100 annual chance) for the River Wey, with some patches of surface water flood risk. Lampard Lane is not shown to be at either fluvial or surface water flood risk. The surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps, however they can be used to identify general flow routes.

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

River levels recorded on the River Wey at the Tilford gauging station were significantly higher in the December 2013 flooding event than other previous events recorded by the EA, see Table 15-1.

**Table 15-1 2013 levels recorded at Environment Agency gauging station compared with previous events on the River Wey**

| Site Name | December 2013 | December 2012 | January 2003 | November 2000 |
|---|---|---|---|---|
| Tilford gauging station | 2.09 m | 1.67 m | 1.77 | 1.98 |

The Tilford & Churt sub area is underlain by folkestone formation (sandstone). The majority of the sub area is not underlain by superficial deposits, however some parts of the sub area are underlain by alluvium and head deposits. The underlying geology suggests that under normal conditions water will permeate the ground and reduce overland runoff during rainfall events.

The majority of the sub area has no potential for groundwater flooding to occur. There are limited areas where there is a potential for groundwater flooding to occur at the surface.

With there being little risk of fluvial or surface water flood risk in this area of permeable ground, this leads to the suggestion that the source of the flooding may have been the highway drainage. The exceptional weather is likely to have exceeded the drainage capacity and lead to localised flooding.

However, the high levels of saturation in the catchment would have exacerbated the situation in areas not normally prone to flooding.

The parts of the sub area closest to the River Wey are within the Flood Warning and Flood Alert Areas. These are areas for which the EA provides free flood warnings.

## 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 Lead Local Flood Authority (SCC), the EA and the Highway Authority (SCC).

## 15.4. Exercised Flood Risk Management Functions and Other Actions

**Environment Agency**

The EA issued a flood warning at 21.31 on the 23 December 2013 for the River Way at Tilford.

Flood Data recorders were sent here by the EA in January 2014.

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

**Surrey County Council**

Tilford Street, Priory Lane and Lampard Lane were subject to a temporary road closure during the flooding.

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.

# 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 and TW carried out actions in relation to the fluvial and surface water flooding experienced in Waverley over winter 2013/14. It has also been established that SCC and WBC 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 120 incidents of internal property flooding in Waverley. The main cause of the widespread flooding across Surrey was the exceptional and unprecedented amount of rainfall that fell over the months of December, January and February 2013/14, which in turn resulted in major flooding from fluvial, surface water, ordinary watercourses, sewers and groundwater. The sewer flooding was largely due to inability of systems to cope with ingress of both ground and surface water – often overloading pumping stations. The most notable incidences in Waverley were around Catteshall area of Godalming, Fisher Rowe Close in Bramley, Clappers Meadow in Alfold and South Bridge in Chiddingfold.

The River Wey was the main source of fluvial flooding, particularly in the Godalming area, where it resulted in a number of internal property floods 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.

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.

## 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 undertakes 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 undertakes 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

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

**Environment Agency**

- Operated Flood Alert and Flood Warning service.
- Sent out flood ambassadors and flood data recorders to the areas affected by flooding.
- Supported National Flood Forum engagement events.
- Cleared ditches and culverts.
- Evaluating options for a scheme to reduce flood risk in Godlaming.

**Thames Water**

- Undertaken enhancement work to Godalming North pumping station on 30 December 2013 after pumps failed. TW have since carried out further major repair work at the pumping station.

**Surrey County Council**

- Assisting residents with queries.
- Road closures.
- Deployment of sandbags.
- Inspection of assets and repairs carried on damaged assets.
- Administered the Repair and Renew Grant to help protect properties from flooding in the future.
- Undertaking a flood risk study to identify scheme options to reduce flood risk in Alfold.
- Investigation underway for scheme in Witley to improve water conveyance throughout the catchment.
- Investigation ongoing for a highways drainage scheme for Upper Hale Road in Farnham.

**Waverley Borough Council**

- Carried out works on ditches and culverts across the borough.
- Carried out a flood risk study to identify scheme options to reduce flood risk in Bramley.

# 17. Acknowledgements

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- Waverley Borough Council
- Thames Water
- Atkins