

# Section 19 Flood Investigation Report: Mole Valley

**28 October 2015**



**SURREY**

# Section 19 Report

## Purpose

This document has been prepared specifically for the purpose of meeting the requirements of Section 19 of the Flood and Water Management Act 2010.

The report investigates which risk management authorities (RMAs) had relevant flood risk management functions during the flooding that took place in the winter of 2013/14. The report also considers whether the relevant RMAs have exercised, or propose to exercise, their flood risk management functions. It does not address wider issues beyond that remit.

The supporting data has been put together based on records of internal property flooding and road closure information from a variety of sources. Whilst every effort has been made to verify the locations of the Section 19s identified, the nature of the data and the methods used to collate this information mean that it does not include every occurrence of flooding. This data only identifies where flooding has been reported and is indicative only.

Location Name	Mole Valley; Abinger & Shere, Betchworth, Brockham, Charlwood, Dorking, Fetcham, Forest Green, Leatherhead, Mickleham & Westhumble, North Holmwood, Ockley, Westcott
Date(s) of Incidents	Winter 2013/14
Section 19 Trigger(s)	Internal property flooding at multiple addresses Road closures

## Glossary

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

Acronym/Term	Definition
Annual Probability	Throughout this document, flood events are defined according to their likelihood of occurrence. The term 'annual probability of flooding' is used, meaning the chance of a particular flood occurring in any one year. This can be expressed as a percentage. For example, a flood with an annual probability of 1 in 100 can also be referred to as a flood with a 1% annual probability. This means that every year there is a 1% chance that this magnitude flood could occur.
EA	Environment Agency
FEH	Flood Estimation Handbook – by Centre for Ecology & Hydrology offering guidance on rainfall and river flood frequency estimation in the UK.
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 <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

Instances of property flooding	This is a count of the reported incidents of internal property flooding that occurred across Winter 2013/2014. This means that properties which were flooded twice are accounted for twice. It is therefore not a count of the number of properties.
LLFA	Lead Local Flood Authority
Main River	Main rivers are usually larger streams and rivers, but some of them are smaller watercourses of local significance. Main Rivers indicate those watercourses for which the Environment Agency is the relevant risk management authority.
Ordinary Watercourse	Ordinary Watercourses are displayed in the mapping as the detailed river network. An ordinary watercourse is any watercourse (excluding public sewers) that is not a Main River, and the Lead Local Flood Authority, District/Borough Council or Internal Drainage Board are the relevant risk management authority.
RMA	Risk Management Authority
SCC	Surrey County Council
SCG	Strategic Command Group
TW	Thames Water
MVDC	Mole Valley District Council
uFMfSW	Updated Flood Maps for Surface Water

## Sources of Flooding

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

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

## Flood Risk Data Sources

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

- Fluvial Flood Risk
  - Flood Risk Mapping (Risk of Flooding from Rivers and Sea; EA)
  - Flood Warning and Alert areas (EA)
- Surface Water Flood Risk
  - Updated Flood Maps for Surface Water (uFMfSW) (EA)
- Groundwater
  - Susceptibility to Groundwater Flooding (British Geological Survey)
- Historic Flood Evidence
  - Historic Flood Map (EA)
  - Wetspots (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](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 Risk Management Authorities (RMAs) had relevant flood risk management functions during the flooding that took place within the boundary of Mole Valley District Council (MVDC) 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 Mole Valley was predominately due to fluvial 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 270 incidents of internal property flooding in Mole Valley during winter 2013/14.

The Environment Agency (EA) is the lead RMA for incidents of fluvial flooding from main rivers, though Thames Water (TW), Surrey County Council (SCC) and MVDC 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

- Supported National Flood Forum engagement events in Brookham, Effingham (see Guildford S19 flood report, 2015), and Leatherhead, amongst other locations after the flooding.
- Operated Flood Alert and Flood Warning service.

## 1.2. Thames Water

- Participated in the Surrey SCG.
- Shared information to assist RMAs with their flood risk management duties.
- Attended local flood groups to assist in resolving localised flooding issues.
- Put arrangements in place for responding to winter weather conditions.

## 1.3. Surrey County Council

- Were responsible for a number of road closures, across the district during the flooding.
- Were actively engaged in Flood Forums in the district and attended Flood Forum meetings after the flooding.
- Undertook ditch clearing and gully and pipe cleaning, in order to alleviate the flooding.
- Organised evacuations in order to keep the public safe in areas of extreme flooding.
- Are carrying out localised repairs to the current drainage systems on Station Road, Gomshall.
- Plan to reinstate the culvert on Wonham Lane, Betchworth, in order to increase its capacity.
- Plan to construct new soakaways on Dorking Road, Bookham.
- Are undertaking a detailed assessment of improved conveyance and flood attenuation options across Bookham.
- Are undertaking an assessment into the potential options to reduce flood risk in the Brockham and Strood Green.



#### **1.4. Mole Valley District Council**

- Reported that 181 properties received council tax relief and 13 properties received business rate relief.
- Officers take an active role in Surrey Flood Risk Partnership Working Group and Board meetings
- Are active participants of the Surrey Flood Recovery Co-Ordination Group.
- Worked with the EA to remove debris in certain areas in order to alleviate flooding.
- Officers regularly attend Flood Forums throughout the District and are also working with Parish Councils to promote community resilience.
- Set up rest centres in Dorking and Leatherhead on Christmas Eve 2013.
- Provided alternative accommodation at Park House for the Surrey Fire and Rescue Service located in Leatherhead when their offices flooded.

## 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 Mole Valley District Council (MVDC) area. There are 81 sites in total, spread across 12 sub areas. There were approximately 270 incidents of internal property flooding in Mole Valley.

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.

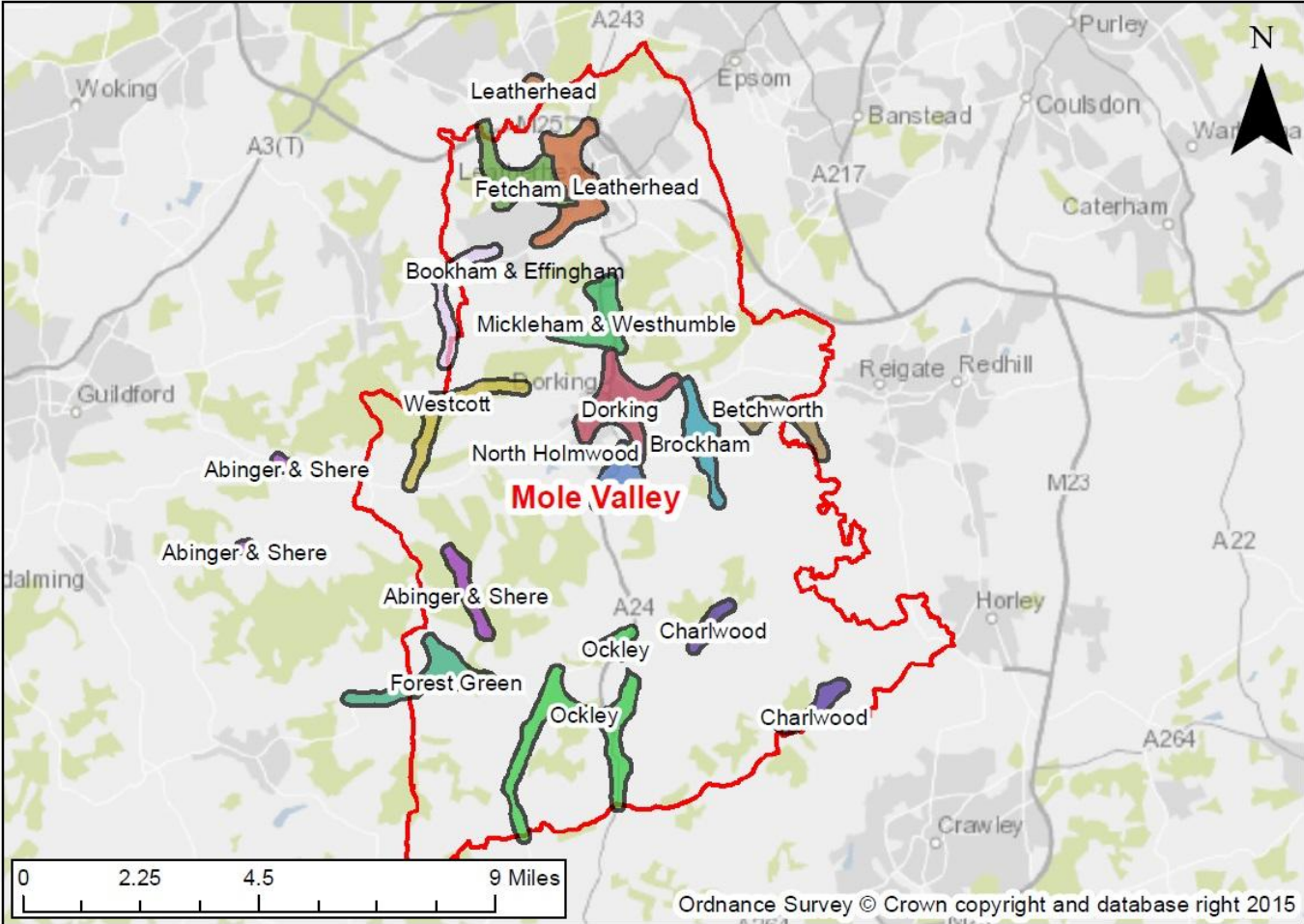


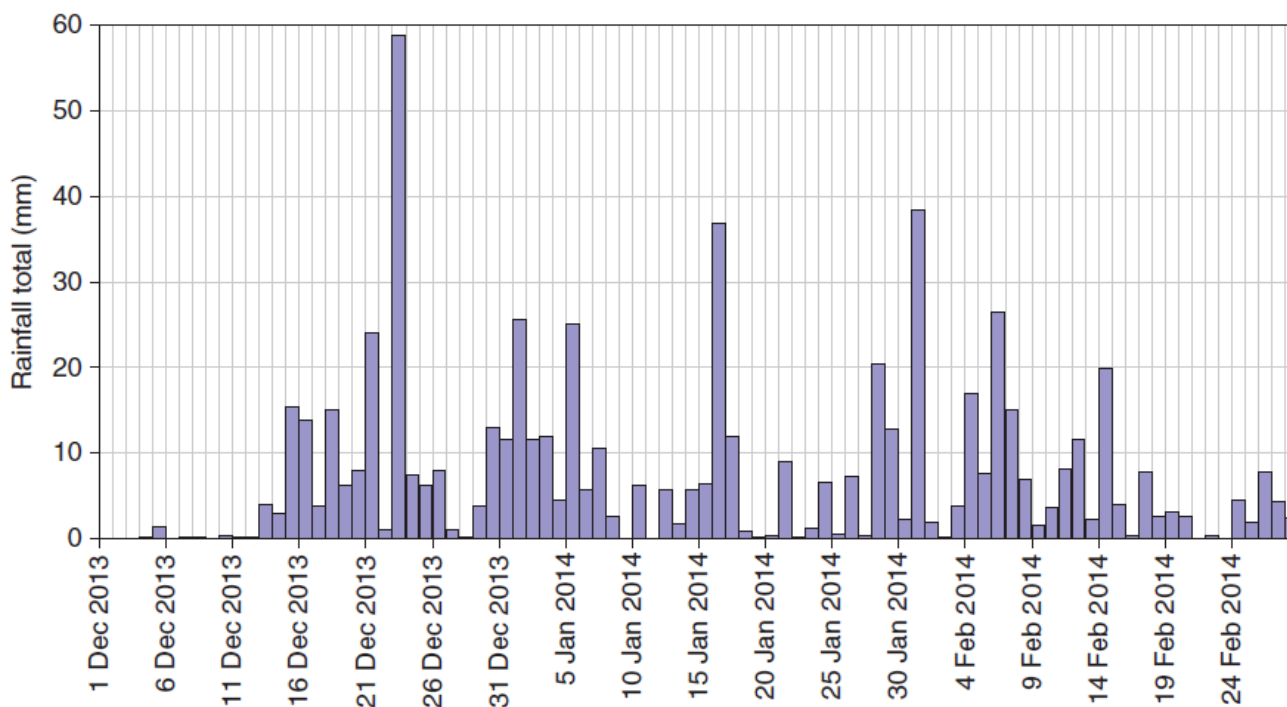
Figure 2-1 Location of Sub areas within Mole Valley District for this Report

## 3. Background Weather and Catchment Conditions

### 3.1. Weather Conditions

The Met Office has reported that the winter of 2013 to 2014 was the wettest winter in England and Wales since records began in 1766, with 435 mm of rain being recorded up to 24 February 2014. Parts of South East England received around two and a half times the amount of rainfall than they would normally expect at this time of year. This caused wide-spread flooding across Surrey from a range of sources including ground water as the levels across the region had risen so high. In some areas of South East England they exceeded records set in 2000/01, the last time significant disruption from groundwater flooding was recorded.

Storm events hit the UK on the 18 to 19, 23 to 27 and 30 to 31 December 2013, followed by 3 and 5 of January 2014. These storms came from the Atlantic and were characterised by unusually large and deep areas of low pressure, which brought rainfall and very strong winds. The rainfall is reflected by the spikes in daily rainfall totals, representing major rainfall events, shown in Figure 3-1 below.

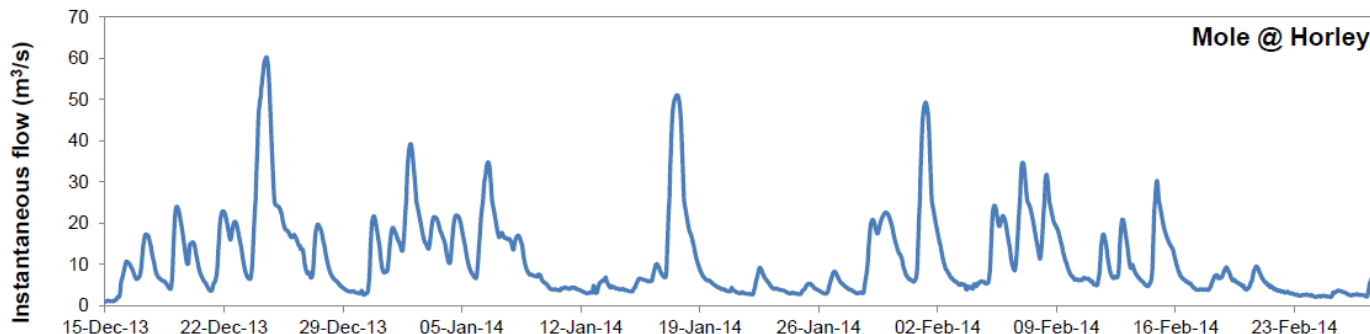


**Figure 3-1 Daily Rainfall totals at Charlwood, Surrey for Winter 2013-14**

The major storm event occurring on the 23 to 25 December resulted in 50-70mm of rainfall within 24 hours over an area from Dorset to Kent, as can be seen from the 60mm of rainfall recorded on the 23 December in Figure 3-1 above. This figure represents approximately two-thirds of the monthly average rainfall for December. Although the winter was the wettest on record, this individual event, the largest single event of the winter was estimated to be a 1 in 14 year annual chance event at Charlwood. However, the soil was already saturated from the high levels of rainfall leading up to the event. This gave rise to local pluvial (surface) flooding and also fluvial flooding from the River Mole. The persistent high levels of rainfall for this period lead to a sharp rise in river flows, and fluvial flood warnings were in effect across many parts of the UK. The long duration rainfall return period for 60 days was calculated for Newdigate. This was determined as being a 1 in 88 year annual chance.

### 3.2. Catchment Conditions

The Upper Mole catchment overlies geology belonging to the Wealden Group which are typically very impermeable in nature, giving rise to a rapid river response to the rainfall events. This rapid response or flashy response can be seen in the figure below with the sharp peaks on the 24 December, 17 January and the 1 February.



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

Due to its responsive catchment type, the Mole experienced its maximum peak flow as a consequence of the December 23 rainfall event. However, this winter was characterised by the rapid succession of high flow events. The mean flow at this gauge in Horley is  $1.4\text{m}^3/\text{sec}$ , however  $10\text{m}^3/\text{sec}$  was exceeded 26 times over this winter period.

**Table 3-1 Indicative Return Periods for the Mole Catchment Winter 2013-14**

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. Estimate based on correlation with nearby sub-catchments, and rainfall data

Table 3-1 shows the indicative return periods for the River Mole catchment based on river flow compared to a standard industry hydrology approach. Although the winter was the wettest since records began, the return period flows in the river are less rare.

This table indicates that flows are thought to peak around the 1 in 50 year annual chance. However, the extreme river levels exceeded the measuring capacity of the gauging stations at both Dorking and Leatherhead, preventing the actual peak flows from being recorded. Consequently the flows recorded by the Dorking and Leatherhead gauging stations will have been underestimated, with the actual return periods for these flows being higher.

Although a definitive calculation cannot be done with the available information, on the basis of the fluvial flood response seen further upstream it is reasonable to assume that the return period for the December storm was between 60-90 years at both Dorking and Leatherhead.

The “flash” nature of the individual events was witnessed in the Mole with levels reported to have been raised by approximately one foot per hour, and following its peak, returning to its regular level 10 hours later.

Outside the flood plain of the River Mole and its tributaries, the main source of flooding was from the intense rainfall. Water was reported to have flowed off the hills into several villages.

## 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 LLFA. Through the planning processes, they control development in their area, ensuring that flood risks are effectively managed. If they cover part of the coast, then District and Unitary councils also act as coastal erosion RMAs.

Internal Drainage Boards (IDB) are responsible for water level management in low lying areas. Not all areas require an IDB, and they currently cover approximately 10% of England. They work in partnership with other authorities and land owners to actively manage and reduce the risk of flooding.

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

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

Table 4-1 below summarises the RMAs responsible for the sites within this report. The ticks indicate which authorities have responsibility for which function. SCC is the LLFA. TW is the water company that has responsibility for all sources of sewer flooding. There are no Internal Drainage Boards in MVDC 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

RMA's have defined flood risk management functions under the Flood and Water Management Act (2010). A flood risk management function is a function listed in the Act (or related Acts) which may be exercised by an RMA for a purpose connected with flood risk management. The following section sets out the strategic actions and relevant flood risk management functions that were carried out before, during and after the flooding that occurred across Surrey and particularly in Mole Valley during the Winter of 2013/14.

### Environment Agency

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

- Operated Flood Alert and Flood Warning service.
- Carried out flood risk mitigation works.
- MVDC report that their Property Team has worked closely with the Environment Agency to remove debris from the riverbanks around the Middle Mole Area.

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

- Participated in the Strategic and Tactical Command Groups once a major incident had been declared to respond to the flooding across Surrey.
- Opened an Area Incident Room on the 23 December 2014, which was in operation for 46 days. For the majority of the flooding incident the Area Incident Room was manned for 24 hours a day, and over the 46 days involved over 600 staff. It was closed on the 28 February 2014.
- 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 Mole Valley the actions listed below were carried out:

- Operated Flood Alert and Flood Warning service.
- MDVC report that their Property Team has worked closely with the Environment Agency to remove debris from the riverbanks around the Middle Mole Area.

### 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 have a duty under the Flood and Water Management Act (2010) to cooperate with other relevant authorities in the exercising of their flood risk management functions. TW cooperated with other authorities by:

- Participating in the Surrey SCG.
- Sharing information to assist RMAs with their flood risk management duties.
- Attending local flood groups to assist in resolving localised flooding issues.

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

### **Surrey County Council**

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

- The LFRMS was published in December 2014.
- Some key drainage assets have been identified in Mole Valley and added to the Flooding asset register.
- Section 19 reports have been produced for the flooding experienced across the county in Winter 2013/14.

In addition SCC carried out the following activities across Surrey:

- Officers inspected flood affected roads, after which defect repairs were undertaken by SCC's contractors; Kier. Where extensive areas of carriageway were damaged by the flooding, they were assessed for inclusion into the Project 400 programme; a targeted programme to resurface and repair roads which were damaged by the Winter 2013/14 floods.
- All flood affected roads in Surrey were assessed for potential schemes that may be included in the Project 400 programme.
- Surrey cleansed and re-opened roads as quickly as possible after the flooding.
- Surrey Fire and Rescue Service (SFRS) pumped flood waters away to protect residents, property and infrastructure during the flooding.
- During the flooding SCC and TW were in discussions about the opportunity for joint working across the County.
- The Surrey Strategic and Tactical Coordination Groups met for a response meeting in advance of the February 2014 event to set up coordination between authorities.
- Provided sandbags to slow down the ingress of water into properties and recycled sandbags after the event.
- Staff attended resident engagement events after the flooding to hear their concerns.
- After the storms and flooding, cleared trees, debris and carried out ditching works to enable the drainage systems to function normally again.
- Operated a call centre throughout the flooding which dealt with residents queries and have since hired a Community Resilience Officer to support communities in becoming more resilient to flooding amongst other issues.
- Administered the Repair and Renew Grant which provided up to £5000 for residents and businesses that were flooded in order to protect their property from flooding in the future.

Specifically in Mole Valley, SCC carried out the works below:

- Temporary road closures across the District.
- Were actively engaged in Flood Forums in the District and attended Flood Forum meetings after the flooding.
- Undertook ditch clearing and gully and pipe cleaning, in order to alleviate the flooding.
- Organised evacuations in order to keep the public safe in areas of extreme flooding.

### **Mole Valley District Council**

Mole Valley, as a District Council, have the following flood risk management functions: to designate structures and features that affect flood risk and they may also undertake works on ordinary watercourses to reduce flood risk, however these are permissive powers.

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

- Remains actively involved in Flood Forums across the district.
- Provided 11,400 sandbags during the flooding incident
- Set up rest centres in Dorking and Leatherhead on Christmas Eve 2013.
- Provided alternative accommodation at Park House for the Surrey Fire and Rescue Service located in Leatherhead when their offices flooded.
- Ensured a constant flow of information throughout the flood incident via the MVDC website, Twitter, Facebook and Customer Service Unit.

- Worked with SCC and the EA in sending out joint letters to residents, reminding them of their riparian responsibilities to help reduce flood risks from the Pipp Brook and River Rye in December 2014.
- In order to promote the repair and renew grant, MVDC wrote directly to residents affected by flooding with a view to encouraging applications.
- Reported that in Mole Valley, 181 properties received council tax relief and 13 properties received business rate relief.
- Their Property Team has worked closely with the Environment Agency to remove debris from the riverbanks around the Middle Mole Area.
- Officers regularly attend the Surrey Flood Risk Partnership Working Group and Board meetings and were active participants of the Surrey Flood Recovery Co-Ordination Group.
- Worked closely with multi agency partners, and continues to do so, particularly with the EA in relation to its current options appraisal on the Middle Mole.
- Officers are currently working with Parish Councils to promote community resilience.
- Continues to maintain its website to ensure residents are aware of how MVDC can help or the relevant organisation they should contact in particular circumstances:  
<http://www.molevalley.gov.uk/index.cfm?articleid=17514>

## 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 12 sub areas in this report, all within MVDC.

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

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

## 7. Sub Area: Abinger & Shere

### 7.1. Sub Area Definition

This sub area covers the area of Abinger Common to Leith Hill following Leith Hill Road, Farley Green and Shere. The Abinger & Shere sub area is composed of three discreet locations, as shown in Figure 2-1. Although Gomshall, Shere and Farley Green are outside of the MVDC area, they are included here for convenient reporting purposes.

### 7.2. Location and Catchment Description

Shere is adjacent to the Tilling Bourne. Neither Farley Green nor Leith Hill Road has any main river water courses in its vicinity.

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

During the winter flooding of 2013/2014 the flows in the Tilling Bourne were reported to have risen sharply due to the intensity and volume of rainfall over the catchment.

According to the EA online fluvial flood risk maps Shere is at risk of flooding only immediately next to the river banks, however the roads indicated to have flooded in the Section 19 site list are not within this narrow flood plain. There is some risk of surface water flooding as indicated in the EA surface water flood maps. The internal flooding to property in Shere is most likely to have been from surface water flooding, or potentially the river flood risk area exceeded what the current flood maps indicate. 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.

Both Leith Hill Road and Farley Green are also indicated to be at risk from surface water flooding in isolated locations. 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 EA provide free flood warnings and alerts to many areas of the UK; however the Abinger & Shere sub area is not within a Flood Warning and Flood Alert area.

The sub area is underlain by clay (mudstone) and sandstone formations. About half of the sub area is underlain by superficial; deposits of clay, silt, sand and gravels. The remaining parts of the sub area are not underlain by superficial deposits.

The majority of the sub area has limited potential for groundwater flooding to occur. There are small parts of the sub area where there is a potential for groundwater flooding to occur at the surface, particularly in the areas surrounding watercourses.

### 7.3. Identification of Relevant RMAs

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

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

### **Environment Agency**

A flood warning was issued by the EA at 01:08 on the 24 December 2013 for the Tillingbourne at Chilworth and Shalford. This is downstream of Shere.

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**

Leith Hill Lane (Ockley) and Upper Street (Gomshall) were subject to a temporary road closures during the flooding.

As part of the Wetspots Capital programme, SCC are carrying out localised repairs to the current drainage systems on Station Road, Gomshall.

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

## 8. Sub Area: Betchworth

### 8.1. Sub Area Definition

This sub area covers the area of Betchworth. It includes Snowerhill Road, Flanchford Road, Wonham Lane and Trumpets Hill Road.

### 8.2. Location and Catchment Description

The major watercourses in this sub area are the River Mole, which runs from the south to the northwest of the sub area and its tributaries Shag Brook, in the north of the sub area and Wallace Brook, in the south of the sub area. Gad Brook is another tributary of the River Mole that is located just outside the sub area, where the River Mole reaches the western boundary.

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

According to the EA online fluvial flood risk maps, regions in close proximity to the River Mole, Shag Brook and Wallace Brook are at risk of fluvial flooding. These areas are predominantly classed as low to high risk, with the higher risk areas being closer to the watercourses. The EA's online Updated Flood Maps for Surface Water indicate that the regions in close proximity to the River Mole and its tributaries are also at risk from surface water flooding. Small areas of Snowerhill Road and Bonehurst Road, that cross the River Mole, are also 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 into account climate change. They are designed only to give an indication of flood risk to an area of land and are not sufficiently detailed to show whether an individual property is at risk of flooding.

Parts of the Betchworth, which are in close proximity to the River Mole and its tributaries, are in either in a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings

The north of the sub area is underlain by sandstone, mudstone and clay formations. The majority of the sub area is not underlain by superficial deposits; other parts of the sub area are underlain by superficial deposits of clay, silt, sand and gravel.

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

### 8.3. Identification of Relevant RMAs

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

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

#### Environment Agency



A flood warning was issued for the River Mole at Sidlow, Leigh and Betchworth, on 23 December 2013 at 16.38 hours. 11 properties were warned, but according to the EA records none were flooded.

Flood warnings issued by the EA to the Betchworth sub area are detailed in Table 8-1.

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

Flood warning area	Date	Time	Number warned
River Mole at Sidlow, Leigh and Betchworth	23/12/2013	16:38	11
River Mole at Sidlow, Leigh and Betchworth	06/01/2014	19:31	13
River Mole at Sidlow, Leigh and Betchworth	17/01/2014	09:58	14
River Mole at Sidlow, Leigh and Betchworth	01/02/2014	03:11	13
River Mole at Sidlow, Leigh and Betchworth	06/02/2014	21:20	14

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

### **Surrey County Council**

There were number of temporary road closures during the flooding including:

- Snowerhill Road (Dorking) which crosses the River Mole
- Flanchford Road (Reigate)
- Trumpets Hill Road (Betchworth)

As part of the LLFA Capital programme the SCC plan to reinstate the culvert on Wonham Lane, Betchworth, in order to increase its capacity.

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

### **Mole Valley District Council**

MVDC are actively engaged in a Leigh Drainage Forum, set up in after the flooding.

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

## 9. Sub Area: Bookham and Effingham

### 9.1. Sub Area Definition

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

### 9.2. Location and Catchment Description

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

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

Mole Valley District Council reported that Bookham had significant problems with springs and surface water flooding which blocked some roads and footpaths.

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

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

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

### 9.3. Identification of Relevant RMAS

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

### 9.4. Exercised Flood Risk Management Functions

#### Surrey County Council

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

Since the flooding SCC have been actively engaged the Bookham Flood Forum, with a representative of SCC attending a meeting after the flood.

As part of the Wetspots Capital programme, SCC plan to construct new soakaways on Dorking Road, Bookham.

As part of the Bookham Flood Alleviation Scheme, SCC are undertaking a detailed assessment of improved conveyance and flood attenuation options across Bookham.

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

### **Mole Valley District Council**

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

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

## 10. Sub Area: Brockham

### 10.1. Sub Area Definition

This sub area covers the area of Brockham and Strood Green, which includes Brockham Lane.

### 10.2. Location and Catchment Description

The major watercourses in this sub area are the River Mole, which runs from the east to the northwest of the sub area and its tributary Tanner's Brook. Tanners Brook flows adjacent to Old School Lane then joins the River Mole immediately downstream of the Brockham Bridge. Gad Brook, a tributary of the River Mole, runs through the south of the sub area at Leigh Road before joining the River Mole, upstream of Brockham village.

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

Brockham was affected by both fluvial flooding from the River Mole and surface water flooding caused by rapid rainfall, overwhelmed drainage ditches and surface water sewers in the winter of 2013/2014. Areas of Brockham and Strood Green clearly beyond the River Mole flood plain were also affected severely by surface water flooding. Leigh Road is likely to have been affected by fluvial flooding from the Gad Brook.

According to the EA online fluvial flood risk maps, regions of the sub area in close proximity to the River Mole and Tanner's Brook are at risk of fluvial flooding. These regions are predominantly classified as low to high risk areas, with the higher risk areas being in closer proximity to the watercourses. The EA's online Updated Flood Maps for Surface Water indicate that significant parts of Brockham and Strood Green are also at risk from surface water flooding. These areas, outside of the fluvial flood risk areas, are not within the EA's flood alert or warning areas. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps; however they can be used to identify general flow routes.

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

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

The sub area is predominantly underlain by the Weald Clay Formation (mudstone) with outcrops of mudstone, sandstone and siltstone formations in the north of the sub area. Around half of the sub area is underlain by superficial deposits of clay, sand, silt and gravels. The remaining areas are not underlain by superficial deposits.

The majority of the sub area has no or limited potential for groundwater flooding to occur. However, there are small areas in the sub area where there is a potential for groundwater flooding to occur at the surface, particularly in the areas surrounding watercourses.

### 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 EA, SCC and MVDC.

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

### Environment Agency

The flood warnings issued by the EA to the Brockham sub area are detailed in Table 10-1

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

Flood warning area	Date	Time	Number warned
River Mole at Brockham and Pixham	24/12/2013	04:56	165
River Mole at Brockham and Pixham	01/02/2014	07:59	167

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

### Mole Valley District Council

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

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

### Community Groups

The flood forum in Brockham has set up the Brockham Emergency Response Team (BERT) which had greatly assisted during the recent flood events by helping to pump water out of affected residents' homes. The positive work of BERT has been commended by the Lord Lieutenant of Surrey.

### Surrey County Council

Brockham Lane (Dorking) was subject to a temporary road closure during the flooding, as the River Mole water level rose so high as to flow over the top of the bridge crossing.

SCC has undertaken extensive ditch clearing, gully and pipe cleaning subsequent to this flooding. They have also secured Local Levy funding for an Initial Assessment for flood mitigation works in Brockham to better understand the causes of the flood risk, and to identify a range of potential options.

As part of the Brockham & Strood Green Flood Alleviation Scheme, SCC are undertaking an assessment into the potential options to reduce flood risk in the Brockham and Strood Green.

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

## 11. Sub Area: Charlwood

### 11.1. Sub Area Definition

This sub area covers two discrete areas: Newdigate to Parkgate and Charlwood. The first location covers just one road, Parkgate Road which links Newdigate and Parkgate (hereby referred to as Charlwood sub area A). This area lies in the upper reaches of two different tributaries which both ultimately flow to the River Mole. The second (hereby referred to as Charlwood sub area B) covers the village of Charlwood and includes three separate roads. This area includes the Wetland Gill.

### 11.2. Location and Catchment Description

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

According to the EA online fluvial flood risk maps, areas of both Charlwood sub area A and B are at risk of fluvial flooding. In Charlwood sub area A, a small area around the junction of Parkgate Road and Hogspudding Lane is at risk of fluvial flooding from the stream (a tributary of Beam Brook). This area is classified as being at low risk of fluvial flooding. In Charlwood sub area B, the areas surrounding the Wetland Gill are at risk of fluvial flooding. The areas in close proximity to watercourses are at low to high risk of fluvial flooding, with the greatest risk closest to the watercourse.

The EA's online Updated Flood Maps for Surface Water indicate that there is a risk of surface water flooding in Charlwood sub area A and B in areas surrounding watercourses. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps; however they can be used to identify general flow routes.

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

Parts of the Charlwood sub area are within Flood Alert Areas. These are areas for which the EA provides free flood warnings

Both Charlwood sub area A and B are underlain by the Weald Clay Formation (mudstone). Neither are underlain by superficial deposits.

The majority of the sub area has no or limited potential for groundwater flooding to occur. However, in the area surrounding Dolby Brook there is a potential for groundwater flooding to occur at the surface.

### 11.3. Identification of Relevant RMAs

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

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

#### Environment Agency

The flood warnings issued by the EA to the Charlwood sub area are detailed Table 11-1.

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

Flood warning area	Date	Time	Number warned
River Mole at Charlwood and Hookwood	23/12/2013	16:56	68
River Mole at Charlwood and Hookwood	06/01/2014	18:47	69
River Mole at Charlwood and Hookwood	17/01/2014	07:34	65
River Mole at Charlwood and Hookwood	01/02/2014	01:54	61
River Mole at Charlwood and Hookwood	06/02/2014	19:18	68

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**

Parkgate Road (Parkgate) was subject to temporary road closure during the flooding.

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

### **Mole Valley District Council**

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

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

## 12. Sub Area: Dorking

### 12.1. Sub Area Definition

This sub area covers the area of Dorking, which includes Vincent Lane and a section of the A24.

### 12.2. Location and Catchment Description

The major watercourses in this sub area are the River Mole, which runs from the east to the north of the sub area, its tributaries Pipp Brook, which joins the River Mole from the west of the sub area and Bent's Brook (tributary of Tanner's Brook and then the River Mole, upstream of Dorking), which flows north east through the south of the sub area.

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

Dorking was affected by fluvial flooding from the River Mole, particularly along the A24 between Mickleham and Dorking.

In some places in the Middle River Mole Catchment (Dorking, Leatherhead, Fetcham and Cobham), it was not possible to distinguish between river and surface water flooding.

The area was initially forecast 45mm of rain on 24 December 2013. The Mole corridor filled overnight and actually received 75mm, with the River Mole rising at least 1ft per hour. Some of the flooding was caused by the River Mole being at capacity and could not cope with the additional flow coming from Pipp Brook. This resulted in properties in the centre of Dorking being flooded. The River Mole returned to normal levels approximately 12 hours after its peak.

According to the EA online fluvial flood risk maps the regions of the sub area in close proximity to the River Mole, Pipp Brook and Brent's Brook are at risk of fluvial flooding. These regions in the EA's online Updated Flood Maps for Surface Water indicate that parts of the sub area in close proximity to watercourses are also at risk from surface water flooding. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps; however they can be used to identify general flow routes.

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

Parts of the Dorking sub area, which are located in close to the River Mole, Pipp Brook and Bent's Brook, are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings

The sub area is underlain by chalk formations to the north and clay formations to the south, with sandstone and mudstone formations in the centre of the sub area. The majority of the sub area is not underlain by superficial deposits; other parts are underlain by superficial deposits comprised of clay, silt sand and gravels.

The majority of the sub area has no or limited potential for groundwater flooding to occur. However, in the north of sub area, where Pipp Brook joins the River Mole, there is a potential for groundwater flooding to occur at the surface.



### 12.3. Identification of Relevant RMAs

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

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

#### Environment Agency

The flood warnings issued by the EA to the Dorking sub area are detailed in Table 12-1.

**Table 12-1 Flood warnings issued by the EA in Dorking between December 2013 and February 2014.**

Flood warning area	Date	Time	Number warned	EA count of those flooded
River Mole at Dorking and Mickleham	24/12/2013	04:47	59	9
River Mole at Dorking and Mickleham	17/01/2014	15:25	59	0
River Mole at Dorking and Mickleham	01/02/2014	08:23	61	0

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

#### Thames Water

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

#### Surrey County Council

Vincent Lane (Dorking) was subject to temporary road closure during the flooding.

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

#### Mole Valley District Council

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

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

## 13. Sub Area: Fetcham

### 13.1. Sub Area Definition

This sub area covers the area of Fetcham.

### 13.2. Location and Catchment Description

The major watercourse in this sub area is the River Mole which flows from the south east to the northwest.

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

Fetcham was affected by fluvial flooding from the River Mole during the winter flooding 2013/2014. There was significant flooding of riverside communities in the Middle River Mole catchment, with Fetcham being one of the most affected areas.

Some of the flooding in Fetcham was a result of a complex mechanism involving surface, fluvial and foul sewer flooding. The Environment Agency have indicated that flooding on 24<sup>th</sup> December affected approximately 75 homes.

According to the EA online fluvial flood risk maps the regions of the sub area in close proximity to the River Mole are at risk of fluvial flooding. This includes the eastern extreme of the sub area, closest to Leatherhead, and the northern extent where Cobham Road crosses the M25 and the River Mole (though Cobham Road is unlikely to be at risk from the Mole at this location as it is elevated over the M25). The majority of the sub area is located not at risk from fluvial flooding. However, parts of the sub area located close to the River Mole are classified as being at low to high risk of fluvial flooding. The EA's online Updated Flood Maps for Surface Water indicate that parts of the sub area in close proximity to watercourses are also at risk from surface water flooding. In addition there are some significant surface water flow routes indicated which pass through the urban areas of Fetcham. 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 EA provide free flood warnings and alerts to many areas of the UK. The regions of the sub area located close to the River Mole are within either a Flood Warning or Flood Alert area.

Parts of the Fetcham sub area, located close to the River Mole, are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings

The sub area is predominantly underlain by the clay formations. The majority of the sub area is not underlain superficial deposits. Other parts are underlain by superficial deposits comprising of clay, silt, sand and gravels.

The majority of the sub area has no or limited potential for groundwater flooding to occur. However, in the east of the sub area, through which the River Mole flows, there is a potential for groundwater flooding to occur at the surface.

### 13.3. Identification of Relevant RMAs

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

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

#### Environment Agency

The flood warnings issued by the EA to the Fetcham sub area are detailed in Table 13-1 and Table 13-2.

**Table 13-1 Severe flood warnings issued by the EA in Fetcham in December 2013 to February 2014.**

Flood warning area	Date	Time	Number warned
River Mole at Leatherhead and Fetcham	24/12/2013	14:10	269

**Table 13-2 Flood warnings issued by the EA in Fetcham between December 2013 and February 2014.**

Flood warning area	Date	Time	Number warned
River Mole at Leatherhead and Fetcham	24/12/2013	08:09	281
River Mole at Leatherhead and Fetcham	02/01/2014	07:33	287
River Mole at Leatherhead and Fetcham	06/01/2014	18:16	305
River Mole at Leatherhead and Fetcham	17/01/2014	16:50	305
River Mole at Leatherhead and Fetcham	01/02/2014	09:45	303

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.

#### Thames Water

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

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

#### 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.

#### Mole Valley District Council

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

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

## 14. Sub Area: Forest Green

### 14.1. Sub Area Definition

This sub area covers the area of Forest Green, which includes Ockley Road as far as Ewhurst, and Holmbury lane.

### 14.2. Location and Catchment Description

The major watercourses in this sub area are Thornhurst Brook and Cobblers Brook, in the west of the sub area, and Holden Brook towards the east of the sub area.

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

According to the EA online fluvial flood risk maps the regions of the sub area in close proximity to Thornhurst Brook, Cobblers Brook and Holden Brook are at risk of fluvial flooding. The majority of the sub area is not at risk from fluvial flooding. However, the areas in close proximity to watercourses are at medium to high risk of fluvial flooding. The EA's online Updated Flood Maps for Surface Water indicate that parts of the sub area in close proximity to watercourses are also at risk from surface water flooding, as well as at least one more significant flow route following an ordinary water course. 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 EA provide free flood warnings and alerts to many areas of the UK. The sub area is not located within a Flood Warning area nor Flood Alert area.

The sub area is underlain by the Weald Clay Formation (mudstone, limestone and sandstone), with an outcrop of the Lambeth Group (clay, silt and sand) at the southern boundary of the sub area. The majority of the sub area is not underlain by superficial deposits. Other parts are underlain by superficial deposits comprised of clay, silt, sand and gravels.

The majority of the sub area has no potential for groundwater flooding to occur. However, in the east of the sub area, through which Holden Brook flows, there is a potential for groundwater flooding to occur at the surface.

### 14.3. Identification of Relevant RMAs

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

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

#### Environment Agency

The flood warnings issued by the EA to the Forest Green sub area are detailed in Table 14-1.

**Table 14-1 Flood warnings issued by the EA in Forest Green in December 2013.**

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

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**

Ockley Road (Forest Green) was subject to a temporary road closure during the flooding.

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

### **Mole Valley District Council**

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

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

## 15. Sub Area: Leatherhead

### 15.1. Sub Area Definition

This sub area covers the area of Leatherhead, and Charlwood Drive in Oxshott.

### 15.2. Location and Catchment Description

The major watercourse in this sub area is the River Mole, which flows from the south to the north east. The Rye watercourse flows towards the Mole across the north east of the sub area, and crosses the M25 and the A243, and the B2430.

Leatherhead was affected by fluvial flooding from the River Mole in the winter 2013/2014.

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

In some places in Leatherhead it was not possible to distinguish between river and surface water flooding.

According to the EA online fluvial flood risk maps the regions of the sub area in close proximity to the River Mole and The Rye are at risk of fluvial flooding. The majority of the sub area is not at risk from fluvial flooding. However, the areas in close proximity to The River Mole and The Rye are at low to high risk of fluvial flooding, with the areas closest to the rivers at the greatest risk of flooding. The EA's online Updated Flood Maps for Surface Water indicate that Charlwood Drive in Oxshott, and further residential areas in Leatherhead, are also at risk from surface water flooding. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps; however they can be used to identify general flow routes.

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

Parts of the Leatherhead sub area, located close to the River Mole, are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings

The sub area is underlain by chalk formations in the south and clay formations in the north. The chalk and clay formations are separated by a narrow strip of Thanet Formation (sand). The majority of the sub area is not underlain by superficial deposits. Other parts are underlain by superficial deposits comprising of clay, silt, sand and gravels.

The majority of the sub area has no or limited potential for groundwater flooding to occur. However, there is a potential for groundwater flooding to occur at the surface, in the areas surrounding the River Mole.

### 15.3. Identification of Relevant RMAs

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

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

### Environment Agency

The flood warnings issued by the EA to the Leatherhead sub area are detailed in Table 14-1 and Table 15-2

**Table 15-1 Severe flood warnings issued by the EA in Leatherhead between December 2013 and February 2014.**

Flood warning area	Date	Time	Number warned
River Mole at Leatherhead and Fetcham	24/12/2013	14:10	269

**Table 15-2 Flood warnings issued by the EA in Leatherhead between December 2013 and February 2014.**

Flood warning area	Date	Time	Number warned	EA count of those flooded
River Mole at Leatherhead and Fetcham	24/12/2013	08:09	281	41
River Mole at Leatherhead and Fetcham	02/01/2014	07:33	287	0
River Mole at Leatherhead and Fetcham	06/01/2014	18:16	305	0
River Mole at Leatherhead and Fetcham	17/01/2014	16:50	305	0
River Mole at Leatherhead and Fetcham	01/02/2014	09:45	303	0

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

Waterway Road (Leatherhead) and Charlwood Drive (Oxshott) were subject to a temporary road closure during the flooding.

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

### Mole Valley District Council

MVDC report that their Property Team have undertaken bank revetment work at Thorncroft Drive since the flooding.

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



## 16. Sub Area: Mickleham & Westhumble

### 16.1. Sub Area Definition

This sub area covers the area of Mickleham and Westhumble, including Chapel Lane and the A24 and the Burford Bridge Hotel.

### 16.2. Location and Catchment Description

The major watercourse in this sub area is the River Mole, which runs from the south to the north of the sub area.

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

According to the EA online fluvial flood risk maps the regions of the sub area close to the River Mole are at risk of fluvial flooding. The majority of the sub area is not at risk from fluvial flooding. However, the areas in close proximity to the River Mole are at low to high risk of fluvial flooding, with the areas closest to the river at greatest risk. The EA's online Updated Flood Maps for Surface Water show that the sub area generally is not at significant risk from surface water flooding, however there is a surface water flow route shown coming off the hills to the east, following Headley Lane, then crossing open ground to the A24. Chapel Lane is also indicated as a flow path for surface water. The EA surface water maps are based on topography and their accuracy is not as robust as the fluvial flood maps; however they can be used to identify general flow routes.

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

Parts of the Mickleham & Westhumble sub area, located close to the River Mole, are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings

The sub area is underlain by chalk formations. Around half of the sub area is underlain by superficial deposits comprising of clay, silt, sand and gravels. The remaining areas are not underlain by superficial deposits.

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

### 16.3. 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 / MVDC).

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

### EA

The flood warnings issued by the EA to the Mickleham & Westhumble sub area are detailed in Table 16-1.

**Table 16-1 Flood warnings issued by the EA in Mickleham & Westhumble between December 2013 and February 2014**

Flood warning area	Date	Time	Number warned	EA count of those flooded
River Mole at Dorking and Mickleham	24/12/2013	04:47	59	9
River Mole at Dorking and Mickleham	17/01/2014	15:25	59	0
River Mole at Dorking and Mickleham	01/02/2014	08:23	61	0

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

### Surrey County Council

The A24 northbound and southbound was closed temporarily during the flooding. Chapel Lane (West Humble) was also subject to a temporary road closure during the flooding.

Guests in the Burford Bridge Hotel were advised to wait in the building as evacuation was not possible due to the fast flowing water. Evacuation was then safely completed later in the day.

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

### Mole Valley District Council

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

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

## 17. Sub Area: North Holmwood

### 17.1. Sub Area Definition

This sub area covers the area of North Holmwood, including Glory Mead.

### 17.2. Location and Catchment Description

The main watercourse in this sub area is Brent Brook, which is a tributary of Tanner's Brook.

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

In some places in the Middle River Mole Catchment, it was not possible to distinguish between river and surface water flooding.

According to the EA online fluvial flood risk maps the regions of the sub area in very close proximity to Bents Brook are at risk of fluvial flooding, particularly where it runs beside the A24. The majority of the sub area is not at risk from fluvial flooding. However, the areas in very close proximity to Bents Brook have a medium risk of fluvial flooding. The EA's online Updated Flood Maps for Surface Water indicate much more extensive flood risk in North Holmwood than the fluvial flood maps. The surface water flood risk areas do indicate a flood risk to Glory Mead, as well as longer lengths of Spook Hill, and Holmsdale 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.

Parts of the North Holmwood sub area are within a Flood Warning and Flood Alert Area. These are areas for which the EA provides free flood warnings. Neither the Flood Warning nor Flood Alert areas cover the roads actually flooded in this sub area, during the 2013/2014 floods.

The sub area is underlain by clay formations in the south and sandstone formations in the north and south west. The majority of sub area is not underlain by superficial deposits.

The majority of the sub area has no potential for groundwater flooding to occur. However, a small area surrounding the Brent Brook has a potential for groundwater flooding to occur at the surface.

### 17.3. 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 / MVDC), the Lead Local Flood Authority (SCC) and the Highway Authority (SCC).

### 17.4. 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**

Glory Mead (Dorking) was subject to temporary road closure during the flooding.

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

### **Mole Valley District Council**

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

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

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## 18. Sub Area: Ockley

### 18.1. Sub Area Definition

This sub area covers the area of Beare Green, Capel and Ockley, including the A24 and the A29. This sub area is made up of two separate locations.

### 18.2. Location and Catchment Description

Beare Green, Capel and Ockley lie close to the watersheds of the catchments for the Wey, Mole and the Arun. As such they have very rapid responses to major rainfall events. The major watercourses in this sub area are Kitts Brook, which turns into Holmswood Gill, then North River and flows southerly along a route to the east of the A29 (into the Arun catchment), Holden Brook, which flows southerly to North River, but to the west of the A29, and Fylls Brook which seems to rise in the vicinity of one of the flooded areas on Horsham Road. There are also a number of large ponds and lakes in the sub area, including Vann Lake.

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

According to the EA online fluvial flood risk maps the regions of the sub area in very close proximity to North River are at risk of fluvial flooding. The A29 twice crosses North River at the south western end of the sub area. Holms Gill and Holmswood Gill combine before crossing Cole's Lane and continuing south. The majority of the sub area is not at risk of fluvial flooding. However, the areas located in very close proximity to watercourses are at medium to high risk of fluvial flooding. The EA's online Updated Flood Maps for Surface Water indicate that this area has a network of local surface water flood routes. The maps also seem to identify low points where surface water is likely to pool. Several of these coincide with the Section 19 flood locations.

The EA provide free flood warnings and alerts to many areas of the UK. The sub area is not located within a Flood Warning area or Flood Alert area.

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 is underlain by Weald Clay Formation with some sandstone outcrops. The majority of the sub area is not underlain by superficial deposits.

The majority of the sub area has no potential for groundwater flooding to occur.

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

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

#### Environment Agency

The most southerly part of the A29 in this sub area is at risk of fluvial flooding and lies within the EA flood warning area called: The Rivers Arun and Kird, Boldings Brook, North River and Par Brook.

One part of the A24 at Beare Green lies within the River Mole and its tributaries from Kinnersley Manor to South Hersham flood alert area. No other parts of this sub area are covered by flood warnings.

There are no records of a flood alert being raised for this area, though multiple warnings were issued for the River Mole.

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**

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.

### **Mole Valley District Council**

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

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

## 19. Sub Area: Westcott

### 19.1. Sub Area Definition

This sub area covers the area to the north and west of Westcott, it includes Ranmore Common Road and White Down Lane, stopping just short of the A25.

### 19.2. Location and Catchment Description

There are no watercourses in the vicinity to these roads, so the Section 19 locations are not included within the fluvial flood risk areas on the EA maps. Consequently, they are not included within a flood warning area either.

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

Whitedown Lane and Ranmore Common Road were subject to road closures during the flooding.

The EA's online Updated Flood Maps for Surface Water indicate that the sub area is not at significant risk of surface water flooding either. 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 EA provide free flood warnings and alerts to many areas of the UK. The sub area is not located within a Flood Warning area or Flood Alert area.

The sub area is predominantly underlain by sandstone and mudstone formations, with some outcrops of chalk in the north of the sub area. Around half of the sub area is underlain superficial deposits comprised of clay, silt, sand and gravels.

The majority of the sub area has limited potential for groundwater flooding to occur. However, there are some very small parts in the sub area where there is a potential for groundwater flooding to occur at the surface.

### 19.3. Identification of Relevant RMAs

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

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

#### Surrey County Council

Both White Down Lane and Ranmore Common Road were subject to temporary road closure during the flooding.

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

#### Mole Valley District Council

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

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



## 20. Conclusion

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

The report has identified that the EA carried out actions in relation to the flooding experienced in Mole Valley over winter 2013/14. It has also been established that SCC and MVDC 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.

### 20.1. Causes

There were approximately 270 incidents of internal property flooding in Mole Valley. 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 and foul water sources. The River Mole was the main source of fluvial flooding in the district and is reported to have affected the Brockham, Fetcham, Leatherhead and North Holmwood sub areas

### 20.2. Flood Data

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

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

### 20.3. 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.

## 20.4. 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.

## 20.5. Recommendations

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

- All RMAs continue to improve their cooperation, coordination and communication with one another, particularly with regard to their flood risk management functions and during times of emergency.
- All RMAs continue to raise awareness of flood risk and increase the resilience of communities and businesses to flood risk, across Surrey.
- SCC and the EA further develop public awareness and understanding of riparian responsibilities, in order to improve the condition of watercourses across Surrey.
- All RMAs review their current processes for data collection during a flood event, giving consideration to the best practice guidance produced by SCC and the EA.
- All RMAs pass any records of future property flooding in Surrey to SCC for collation in a central database.
- SCC undertake studies where there is significant groundwater flooding to better understand the nature of the flooding and the levels of risk.
- All RMAs review the benefits of proposed flood schemes in the 6 Year Programme of Flood and Coastal Erosion Risk Management Schemes and consider whether partnership contributions may be justified.
- SCC undertake detailed drainage surveys where asset information is limited or non-existent, prioritising areas at greatest risk of flooding.
- SCC formalise the process for investigating major flood events under the S19 duty and agree this process with the Surrey Flood Risk Partnership Board, to ensure efficient partnership working and data sharing for future investigations.

## 20.6. Actions and on-going work

As well as Flood Risk Management Functions carried out in the sub areas mentioned in this report, additional works are planned within Mole Valley District:

- SCC have works planned to increase the capacity of a culvert on Horsham Road, Walliswood.
- SCC are carrying out an initial assessment to identify potential options for managing flood risk in the area of Brockham and Strood Green.
- Following the completion of an initial assessment in Bookham, SCC are developing a detailed business case for flood risk management schemes in East Bookham as well as reviewing alternative options for managing flood risk in the other areas of Bookham.
- The Environment Agency are undertaking a large scale assessment of the Middle Mole to identify opportunities for flood risk management schemes.

## 21. Acknowledgements

SCC would like to thank the following organisations and groups for providing information and input into the Section 19 Flood Investigation Report:

- The Environment Agency
- Mole Valley District Council
- Thames Water
- Atkins