

# Section 19 Flood Investigation Report Hengest Avenue

**Incident: 23<sup>rd</sup> June 2016**

**Published: 20<sup>th</sup> March 2017**



**SURREY**

# Section 19 Report

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## **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 on June 22<sup>nd</sup> / 23<sup>rd</sup> 2016. The report also considers whether the relevant RMAs have exercised, or propose to exercise, their flood risk management functions. It does not address wider issues beyond that remit.

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

# 1.Executive Summary

A storm event caused localised flooding through-out Elmbridge on the 22<sup>nd</sup> / 23<sup>rd</sup> June. From midday on 22<sup>nd</sup> June to 23.00 on 23<sup>rd</sup> June an average of 60mm of rain fell in a 4km<sup>2</sup> catchment centred on Hinchley Wood. The majority of this rainfall accumulation occurred during the main rainfall event from 21.00 on the 22<sup>nd</sup> June to 02.30 on the 23<sup>rd</sup> June.

This section 19 is focussed on the Hengest Avenue and Clay Lane area of Hinchley Wood where localised flooding resulted in 10 internally flooded houses. The rainfall resulted in flooding of the watercourses in the Hengest Avenue area where capacity of the watercourses was reached resulting in flooding of roads and property. This section 19 focusses on the cause of this localised flood event and details the work carried out during the recovery / investigation phase.

The Environment Agency (EA) is the lead RMA for incidents of fluvial flooding from Main Rivers, and Surrey County Council (SCC) is the lead RMA for incidents of surface water and groundwater flooding. Elmbridge Borough Council (EBC) also performed other functions during the event, some of which were under different legislation including the Civil Contingencies Act 2004 and the Water industry Act 1991. The actions of all authorities involved in the flooding event are summarised in Chapter 4.

## 2. Introduction

### 2.1. Section 19 Flood Investigation Requirement

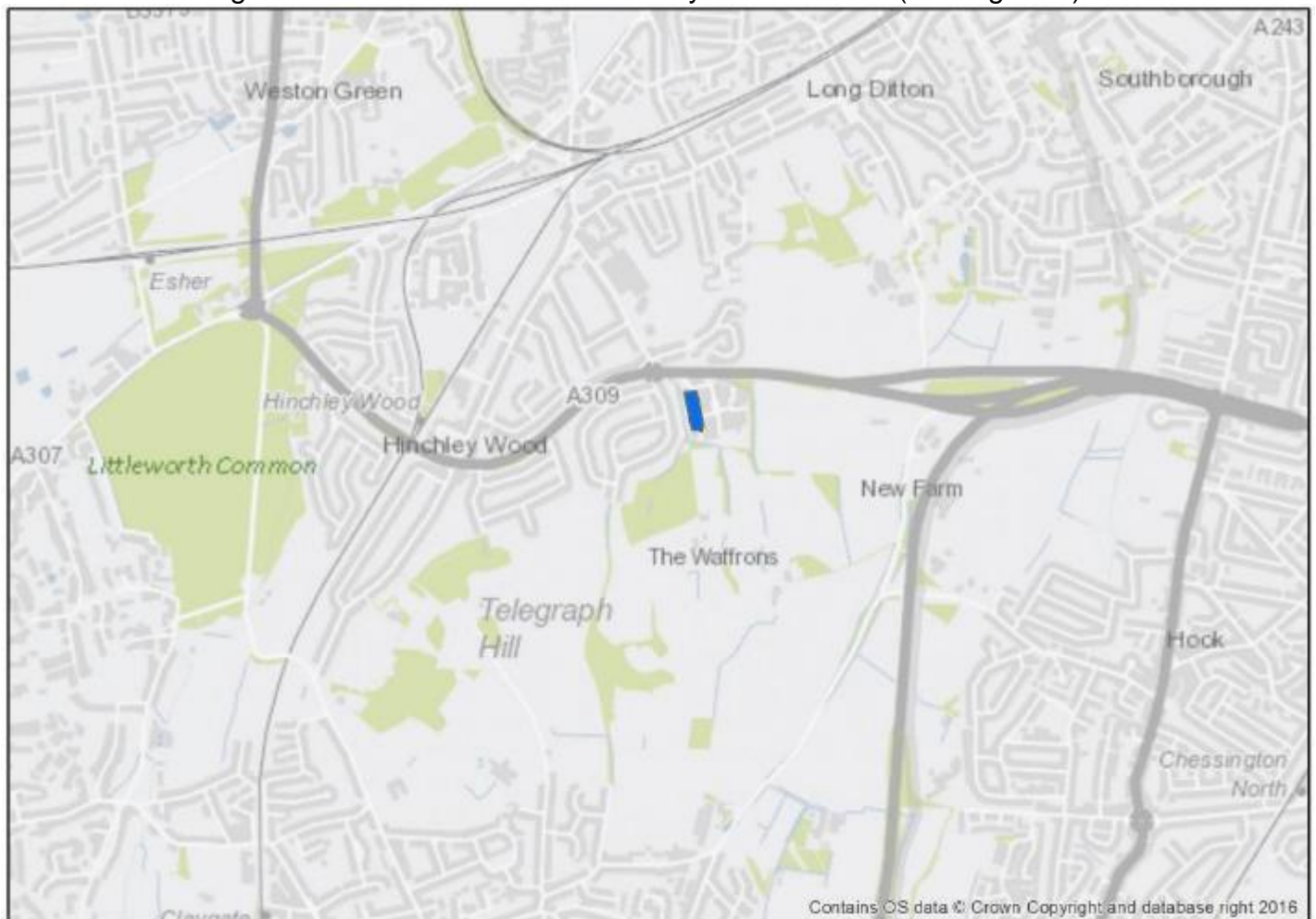
A Lead Local Flood Authority (LLFA) is defined under Section 6(7) of the Flood and Water Management Act as being the county council for that area. Section 19(1) requires that the investigation determines the RMAs that have relevant flood risk management functions and whether each of those authorities have exercised or is proposing to exercise those functions in response to the flood. Under the Flood and Water Management Act 2010 the 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. Section 19(2) requires that the LLFA publishes the results of its investigation and notifies the relevant risk management authorities accordingly.

### 2.2. Trigger for Section 19 Report

The surface water flooding that occurred on 22<sup>nd</sup> / 23<sup>rd</sup> June caused 10 houses to flood internally in Hengest Avenue, Hinchley Wood. These internally flooded properties have triggered this Section 19 investigation for this location.

### 2.3. Location of this investigation

The localised storm event that traversed West to East across Elmbridge on the 22<sup>nd</sup> and 23<sup>rd</sup> June, caused surface water flooding across the Borough. Hengest Avenue is located in Hinchley Wood, in the NE of Elmbridge. It is located to the east of the Rythe catchment (see Figure 1).



**Figure 1. Location of the Hengest Avenue flooding incident.**

## 3. Flooding Incident

### 3.1. Weather Conditions

The South London area was dominated by a series of low pressure weather systems that resulted in intense rainfall events and thunderstorms during June 2016 (EA water situation report<sup>1</sup> – see references). The storm events that caused localised surface water flooding in Elmbridge occurred during 22<sup>nd</sup> / 23<sup>rd</sup> June.

Key points:

- The Kent and South London region received 198% of the long term average rainfall for June.
- The South London catchment rainfall total indicates that this area was the wettest June on record.
- The Lower Wey catchment (which includes the Lower Mole area) including the Hinchley Wood area received 242% of the long term average rainfall for June.
- The surface water flooding resulting from the rainfall events was localised. The response to the river telemetry network was small and no fluvial flood alerts were issued.

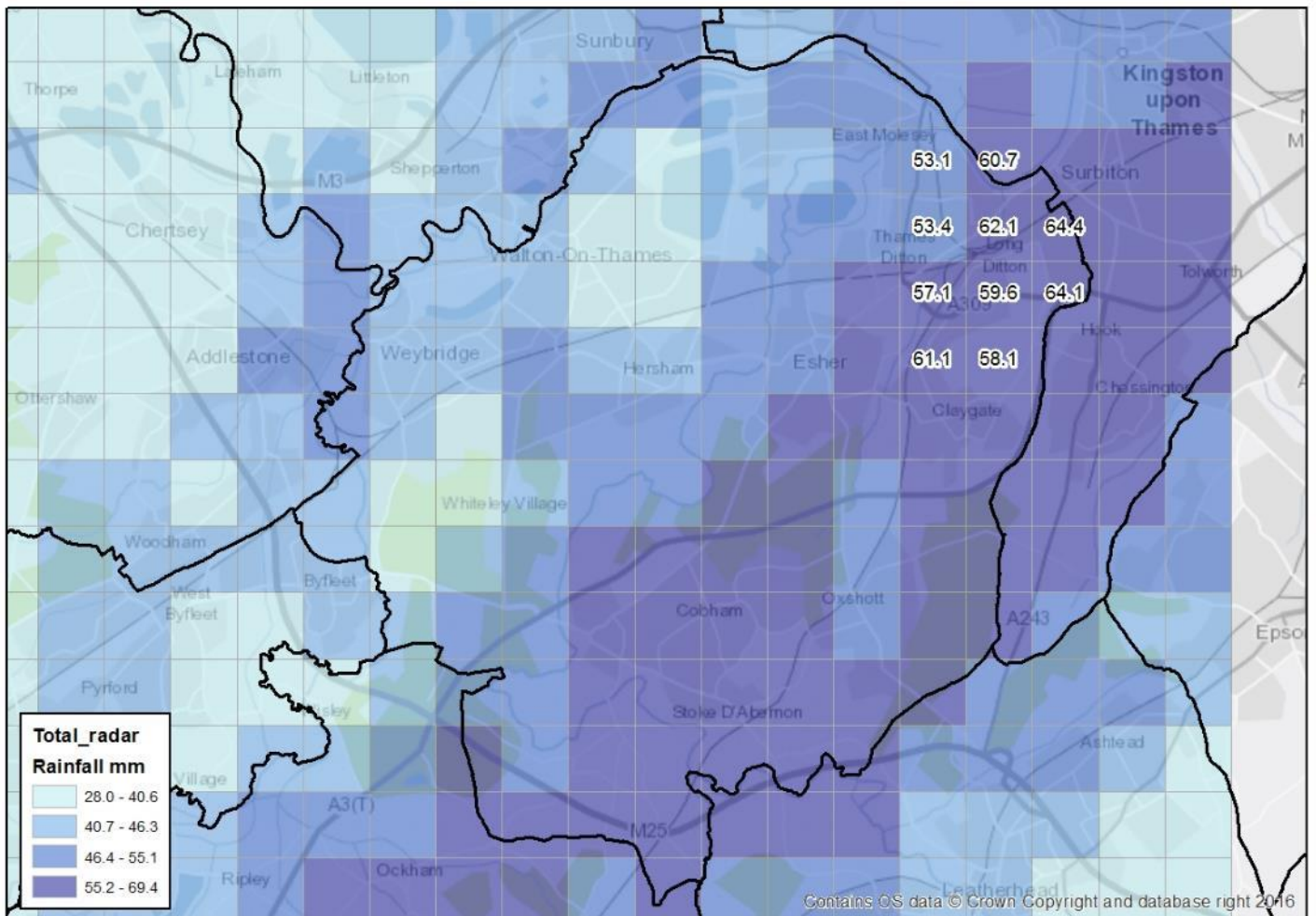
Rain Gauge	National Grid Reference	Total Rainfall from 11:00 GMT on 22/06/16 to 23:00 GMT on 23/06/16 (mm)
Chertsey	TQ0164767378	44.3
Hogsmill	TQ1946068280	62.0
Leatherhead	TQ1600955636	39.7

### 3.2. Rainfall data

Two rainfall events occurred during the storm period on the 22<sup>nd</sup> / 23<sup>rd</sup> June in the Hinchley Wood area of Elmbridge:

- 22<sup>nd</sup> June 21.30 – 23<sup>rd</sup> June 02.30 (main rainfall period)
- 23<sup>rd</sup> June 15.00 – 15.45

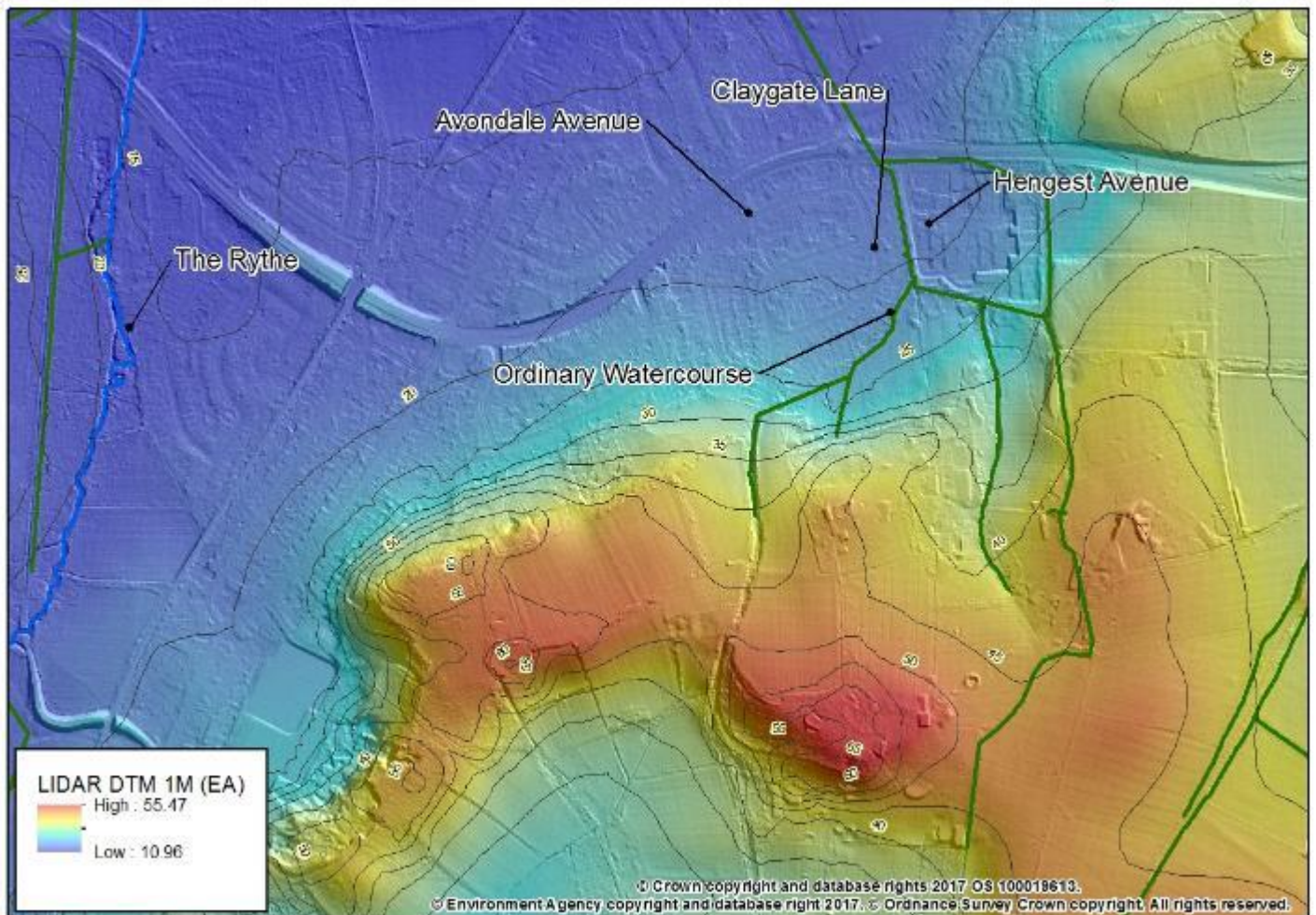
Radar observed accumulated rainfall data, from midday 22<sup>nd</sup> June to 23.00 23<sup>rd</sup> June, shows that the southwest – northeast area of Elmbridge received relatively more rainfall during this time period (Figure 2). The Hinchley Wood area received an average of 60mm of rainfall for a 4 km<sup>2</sup> catchment centred on Hinchley Wood on 22<sup>nd</sup>/23<sup>rd</sup> with the majority of the accumulation occurring in the two rainfall periods listed above.



**Figure 2. Map showing the radar observed rainfall totals (in mm) for Elmbridge from midday 22<sup>nd</sup> to 23.00 on 23<sup>rd</sup> June. This shows localised rainfall variation across the Borough (care must be taken in interpreting individual radar 1km<sup>2</sup> pixel values). The label on selected 1km<sup>2</sup> squares show the total cumulative rainfall during this period. Data supplied by the Environment Agency.**

### 3.3. Catchment Description

The surface water flow route in the Hinchley Wood area is located to the east of The Rythe main river catchment (see Figure 3). The general geomorphology is relatively high ground to the south decreasing in elevation to the north towards the A309 Kingston By-pass. The land cover is generally rural in the south with a golf course forming the main land-cover / land-use. The land-cover changes to urban with a series of housing developments south of the A309. There is a network of watercourses / ditches that are oriented south to north (Figure 3).



**Figure 3. Regional geomorphology of the area showing surface watercourse routes adjacent to Hengest Avenue. Height data source: Environment Agency LiDAR derived DTM 1m. The red colour tones indicate relatively high elevation and blue tones relatively low elevation.**

### 3.4. Flood Risk and History of Flooding

The area from Avondale Avenue to Hengest Avenue is shown to be at risk of surface water flooding in the following return period events; 1 in 30, 1 in 100 and 1 in 1000 (Figure 4 in Appendix 2 and Figure D12 in Elmbridge SFRA<sup>2</sup>- see references). The surface water flood extents are not appropriate to be used in assessing flood risk at an individual property level. In addition, the methods used to derive the flood extents are based on modelled design rainfall (i.e. not observed patterns of rainfall) and consequently these maps cannot definitively show that an area of land or property is, or is not, at risk of flooding.

The area is not in a main river catchment and is located predominately within Flood Zone 1, with a very low chance of flooding from fluvial sources. The flood zones do not take into account climate change and are designed only to give an indication of flood risk to an area of land and is not sufficiently detailed to show whether an individual property is at risk of flooding.

The area to the north of Claygate Lane including the A309 is located within an area which is classed as having a potential for groundwater flooding to occur at the surface (BGS Susceptibility to Groundwater Flooding). This is based on a conceptual understanding of the regional geology and hydrogeology and is therefore only an indication of where geological conditions could enable groundwater flooding to occur. It does not indicate hazard or risk and it does not provide any



information on the depth to which groundwater flooding may occur or the likelihood of the occurrence of an event of a particular magnitude. This information should not be used on its own to make planning decisions at any scale, particularly site scale, or to indicate the risk of groundwater flooding.

Historic flooding records in this area is limited. The previous recorded flood event in the area (Figure 5) was in Autumn 1968 where the ordinary watercourse channel capacity was exceeded (EA – recorded flood outlines).

The Elmbridge Borough Strategic Flood Risk Assessment<sup>2</sup> (see references) contains additional information on flood risk and historic flooding within Elmbridge. The “Thames Ditton, Long Ditton, Hinchley Wood and Weston Green” section (pages 111 – 113) contains further information on flood risk and historic flooding in the Hinchley Wood area.

## 4. Flood Investigation

This Section 19 focuses on the cause of the localised surface water and ordinary watercourse flooding that occurred on 22<sup>nd</sup> / 23<sup>rd</sup> June 2016 and watercourse maintenance carried out following the incident. The following sections outline the response to the incident and details the flood enquiry carried out by SCC.

### 4.1. Incident response

Risk Management Authorities were contacted by residents during the event. In summary, the following Risk Management Authorities attended the area:

- Surrey Fire and Rescue Service (SFRS) attended the area following resident reports of internal property flooding and flooding on roads.
- SCC contractors Kier attended the scene during the incident following reports of flooding on the carriageway.

### 4.2. Recovery and Investigation

During the recovery phase following the flooding the EA, Elmbridge BC and SCC Highways were contacted by residents. The combination of the high risk of surface water flooding, high localised rainfall and restricted capacity of the ditch network resulted in flooding of the surrounding area.

A flood enquiry (ME-252184) was investigated by SCC Strategic Network Resilience team and this Section 19 is a summary of this flood enquiry. The flood enquiry focused on the ditch capacity and maintenance in the area.

The residents of Hengest Avenue and Claygate Lane were affected by the flooding event and have been contacted regarding the extents of the flooding. The landowners identified in relation to the ditch survey are:

- UK Power Networks (UKPN),
- Taylor Wimpey and Trinity Estates
- Surbiton Golf Course.

Initial survey of the watercourse and drainage network neighbouring Hengest Avenue indicated a number of issues (see Figure 6, Appendix 2). These are summarised below:

- Combination of high localised rainfall event in conjunction with 2 areas of restricted ditch capacity resulted in flooding at the Hinchley Wood estate.
- Southern boundary: the ditch along the southern boundary of the estate was silted to the point that the width had been reduced to approximately one third of the upstream area. This meant that water would spill out of the banks and flow down Hengest avenue, resulting in flooding to the front of the properties.
- Watercourse / Culvert junction: A blocked trash grille located next to a footpath behind the fence of the west side of the estate caused water to back-up from this blockage and run onto the footpath and under the fence into gardens. This caused flooding to the rear of the Hengest Road properties (see before and after photos in Appendix 2).
- Twin pipe culvert at the northern most section of the watercourse had blockage within one of the two pipes. This severely reduced the capacity that could be taken by the culvert, causing water to back up and flood gardens along Claygate Lane.

- Surbtion Golf Course, located to the south of the estate, has a series of ditches that connect to the watercourse at Hengest Avenue. The watercourse here was not able to accept the run-off from the golf course ditches during the high rainfall event.

## 5. Findings

The Section 19 (FWMA 2010) for the 22<sup>nd</sup> / 23<sup>rd</sup> June 2016 flood event focusses on the cause of the flooding in Hengest Avenue and the surrounding area and roads. It sets out recommendations that will help reduce flooding in the area.

### 5.1. Causes

High rainfall on the 22<sup>nd</sup> and 23<sup>rd</sup> June caused the drainage network in the area to reach capacity during this time period and result in flooding of properties both externally and internally, and roads. The key causes are:

- High rainfall
- Blocked ditch / trash screen
- Blocked twin pipe system

### 5.2. Actions

The following outlines the key actions carried out by RMAs during the incident and the investigation carried out by SCC following the incident.

- SFRS attended the area following reports of internal and external flooding.
- SCC contractors Kier attended area following reports of flooding on carriageway.
- Elmbridge Borough Council contacted residents regarding reports of flooding.
- Flood investigation carried out by SCC Strategic Network Resilience identified sections of the drainage network that required maintenance.
- Investigation identified maintenance responsibility of ordinary watercourse and culverts.
- Maintenance has already been carried out to improve the capacity of the ordinary watercourse and culverts.
- Trash screen (watercourse / culvert to the west of Hengest Avenue) cleared and ditch section dug out.

### 5.3. Recommendations

Following the flood investigation carried out by SCC the following recommendations have been outlined:

#### Maintenance

- Riparian owners to monitor watercourse and maintain.

## 6. Acknowledgements

- The residents of Hengest Avenue and Claygate Lane.
- EA for supplying Radar data and weather situation reports.
- All RMAs for input into this report.

## 7. References

1. EA Monthly water situation report: Kent and South London  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/536789/Water\\_Situation\\_Report\\_KSL\\_06\\_16v.1.0.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/536789/Water_Situation_Report_KSL_06_16v.1.0.pdf)
2. Elmbridge Strategic Flood Risk Assessment, May 2015 -  
<http://www.elmbridge.gov.uk/planning/sdps/flood-risk/sfra/>

# Appendix 1

## Glossary

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

Acronym/Term	Definition
AMAX	Annual Maximum Flow Series- a series of the maximum river flows each year for use in hydrological estimations.
Annual Probability	Throughout this document, flood events are defined according to their likelihood of occurrence. The term 'annual probability of flooding' is used, meaning the chance of a particular flood occurring in any one year. This can be expressed as a percentage. For example, a flood with an annual probability of 1 in 100 can also be referred to as a flood with a 1% annual probability. This means that every year there is a 1% chance that this magnitude flood could occur.
EA	Environment Agency
FAS	Flood Alleviation Scheme
Flooding Asset Register	The register is a record of all structures or features designated by the Environment Agency, the Lead Local Flood Authority, the district and borough councils or the Internal Drainage Board which have an effect on flood risk. More information on the Flooding Asset Register can be found on Surrey County Council's <a href="#">website</a> and in Schedule 2 of the Flood and Water Management Act (2010).
Flood Risk Management Function	A flood risk management function is a function listed in the Act (or related Acts) which may be exercised by a risk management authority for a purpose connected with flood risk management.
Very Low Flood Risk	Area with a very low probability of flooding from rivers (< 1 in 1,000 annual chance of flooding or <0.1%).
Low Flood Risk	Area with a low probability of flooding from rivers (between a 1 in 1000 and 1 in 100 annual chance of flooding or between 0.1% and 1%)
Medium Flood Risk	Area with a medium probability of flooding from rivers (between a 1 in 100 and 1 in 30 annual chance of flooding or between 1% and 3.33%).
High Flood Risk	Area with a high probability of flooding from rivers (> 1 in 30 annual chance of flooding or greater than 3.3%).
IDB	Internal Drainage Board
LLFA	Lead Local Flood Authority
Main River	Main Rivers are usually larger streams and rivers, but some of them are smaller watercourses of local significance. Main Rivers indicate those watercourses for which the Environment Agency is the relevant risk management authority.
Ordinary Watercourse	Ordinary Watercourses are displayed in the mapping as the detailed river network. An Ordinary Watercourse is any watercourse (excluding public sewers) that is not a Main River, and the Lead Local Flood Authority, District/Borough Council or Internal Drainage Board are the relevant risk management authority.
RMA	Risk Management Authority
SCC	Surrey County Council
TW	Thames Water
UFMfSW	Updated Flood Maps for Surface Water

## Sources of Flooding

The source of the flooding is predominantly pluvial resulting from high rainfall from the storm event. The duration of the flooding indicates that it was mainly a surface water flood through the catchment, however groundwater cannot be totally ruled out. There is no evidence of groundwater contribution to the flooding event.

Source	Description
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.

## Flood Risk Data Sources

The following sources of data have been used in preparing this report:

- Fluvial Flood Risk
  - Risk Mapping (Risk of Flooding from Rivers and Sea; EA)
- Surface Water Flood Risk
  - Updated Flood Maps for Surface Water (UFMfSW) (EA)
- Groundwater
  - Susceptibility to Groundwater Flooding (British Geological Survey)
- Historic Flood Evidence
  - Historic Flood Map (EA)
  - Wetspots (SCC)
  - Property Flooding Database (SCC)
  - Historic Flooding Incidents Database (SCC)

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

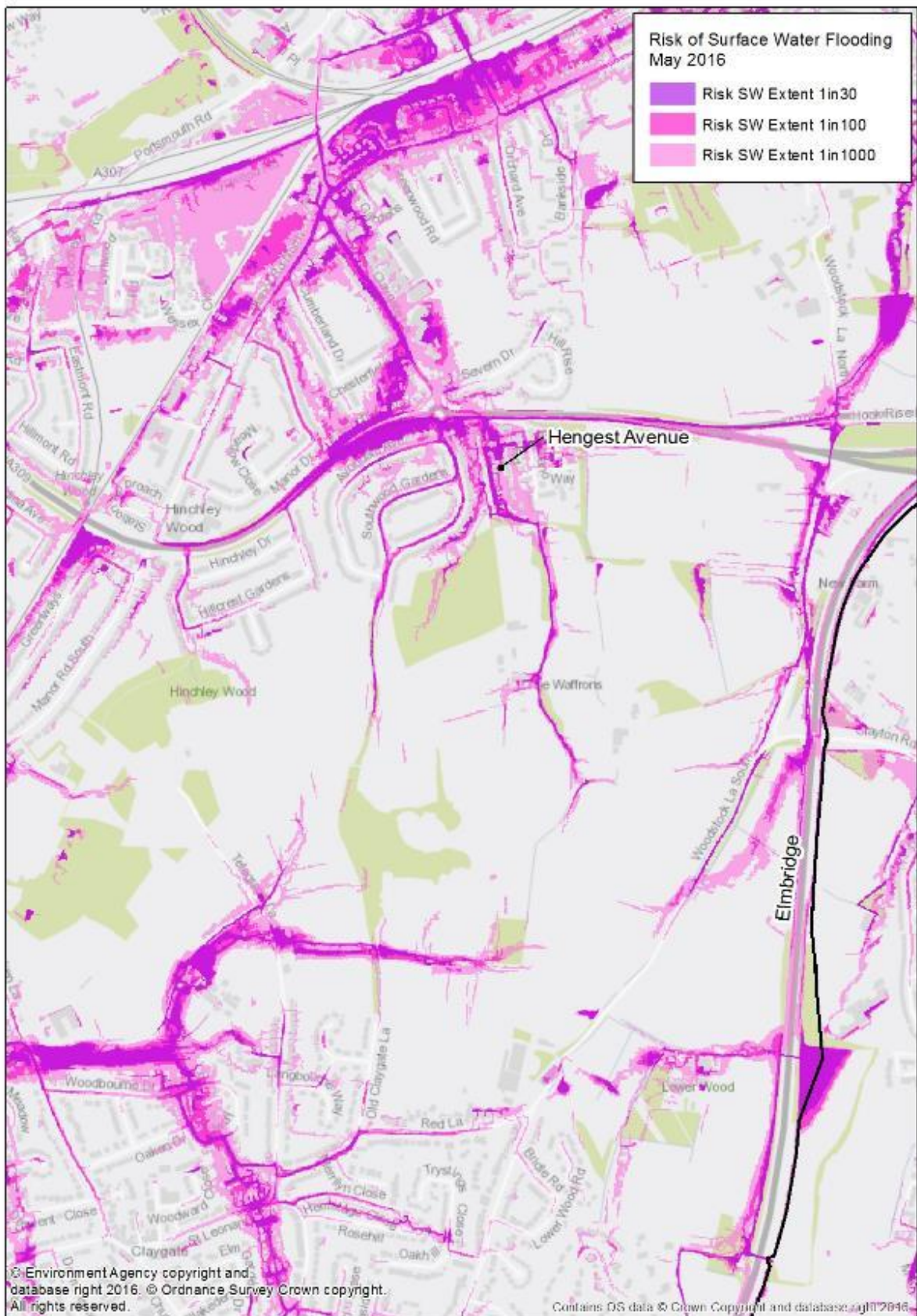
## Other data sources

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

- RMA collated information on property flood information
- MetOffice / EA reports / data on the rainfall event.



## Appendix 2



**Figure 4. Map showing modelled Risk of Flooding from Surface Water extents (data currency: May 2016) for the Hinchley Wood area.**

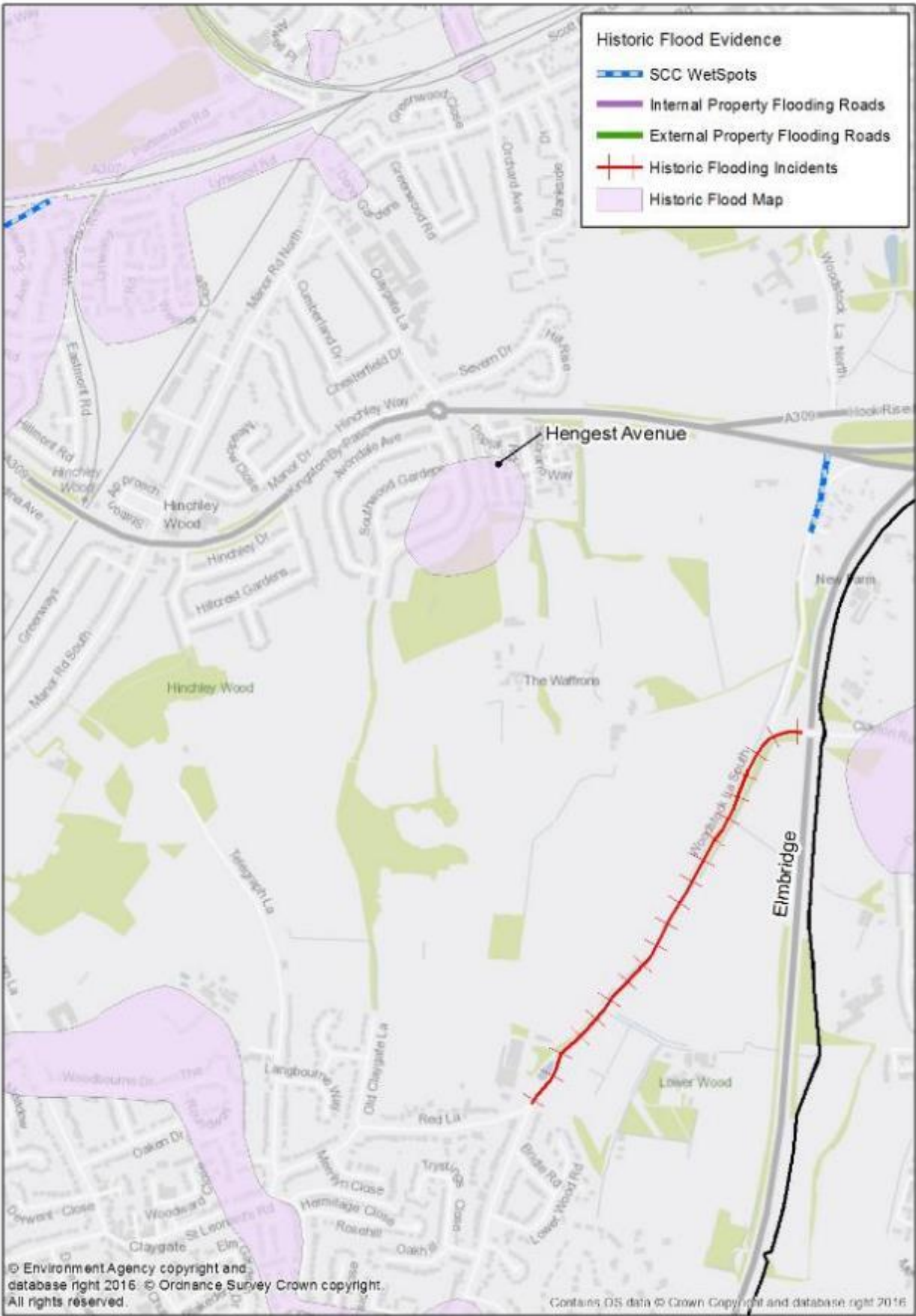


Figure 5. Historic flooding for the Hinchley Wood area



**Figure 6. Location map summarising watercourse issues and works carried out. Photos taken as part of the SCC ME-252184 flood enquiry including before and after photos of the ditch clearance west of Hengest Avenue.**