

Section 19 Flood Investigation Report Woking

Incident: 11th May 2016

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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 purpose of this report is to investigate which RMAs had relevant flood risk management functions during the flooding that took place in the Woking Maybury area on 11th May 2016, and whether the relevant RMAs have exercised, or propose to exercise, their risk management functions (as per section 19(1) of the Flood and Water Management Act 2010). It does not address wider issues beyond that remit.

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

On 11th May 2016, a flash flood occurred in the Rive Ditch drainage catchment affecting properties and infrastructure in the Maybury and West Byfleet areas of Woking. Around 32mm of rain fell in a few hours which caused the main channel of the Rive Ditch to reach capacity quickly and flood the surrounding areas. The neighbouring water sewer networks and gullies were overwhelmed and were not able to drain to the main network. As a result, the surrounding area was flooded including surcharging of the network and gullies. This also prevented rainfall within these areas to drain away, causing overland flows and flash flooding of low lying areas.

There was internal flooding of 45 properties and three schools were closed. In the Maybury area there was one road closure. The flooding in this area led to traffic issues as some roads were not safe to drive along. This led to major traffic delays and grid-lock in the Woking area.

Category 1 responders including blue light services attended the flooded area, which at the time was a rapidly developing situation. Staff from Woking Borough Council (WBC) and Surrey County Council (SCC) attended the scene to prioritise emergency works and to help residents. Thames Water and the Environment Agency (EA) responded to emergency calls and attended the scene.

In the recovery phase following the incident, SCC arranged for the National Flood Forum to setup their trailer on 19th and 20th May to provide help to residents. The National Flood Forum was supported by the Risk Management Authorities (RMAs) WBC, SCC, Thames Water and the EA. WBC, SCC and Thames Water (TW) helped residents regarding property cleaning. SCC Highways and WBC cleaned roads and attended to blocked gullies. The National Flood Forum is actively engaging with residents with an aim to create two Flood Action Groups in the flooded areas.

The EA is the lead RMA for incidents of fluvial flooding from Main Rivers, and SCC is the lead RMA for incidents of surface water and groundwater flooding. TW and WBC also performed other functions during that event, some of which were under different legislation including the Civil Contingencies Act (2004), the Water industry Act (1991) and Water Resources Act (1991).

2. Introduction

2.1. Section 19 Flood Investigation Requirement

Under the Flood and Water Management Act (2010) the Lead Local Flood Authority (LLFA) must (to the extent that it considers it necessary or appropriate) undertake an investigation upon becoming aware of a flood incident within its area.

A LLFA is defined under Section 6(7) of the Flood and Water Management Act as being the County Council for that area. Section 19(1) requires that the investigation determines the RMAs that have relevant flood risk management functions and whether each of those authorities have exercised or is proposing to exercise those functions in response to the flood.

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

2.2. Trigger for Section 19 Report

The Rive Ditch catchment and the neighbouring areas of Maybury, Woking and West Byfleet are the focus for this Section 19 report. There were 45 internal property floods and 2 road closures. These internal property floods and the road closure were the trigger for this Section 19 investigation.

2.3. Location of this investigation

The flash flooding affected the Maybury and Byfleet areas of Woking. The flooding occurred along the Rive Ditch and the surface water flow route in the largely urban area.

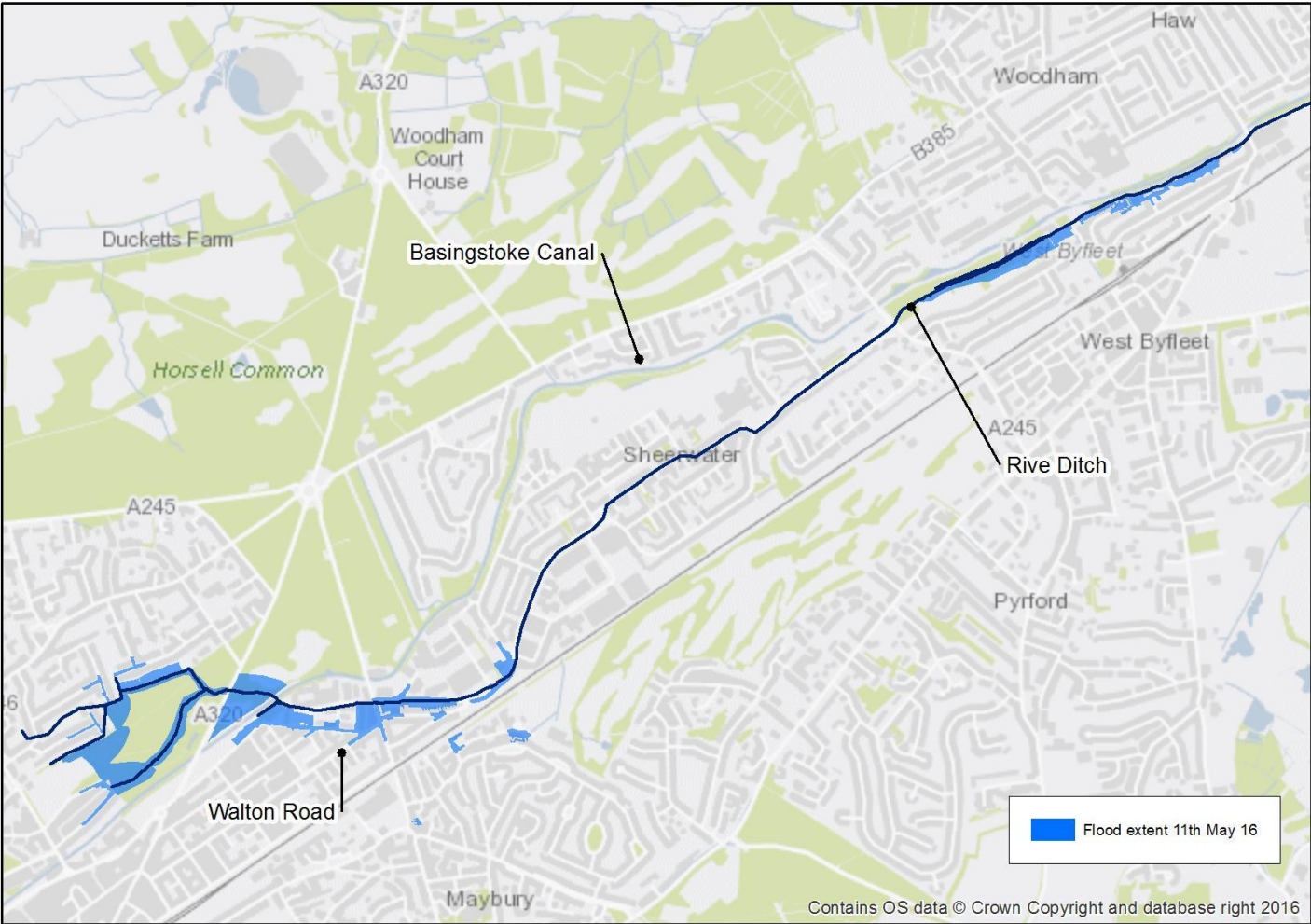


Figure 1. Location of the flash flood affected areas of Maybury and West Byfleet

3. Flooding Incident

3.1. Weather Conditions

The Rive Ditch (Fig. 1) is part of the wider area West Thames catchment. The West Thames catchment experienced a very wet period on 10th May which resulted in the EA issuing 14 flood alerts through-out the area. On the 11th May a localised storm event stalled over Woking from 11.00 to 13.30.

Key points:

- The Lower Wey catchment received 121% of the long term average rainfall for May¹.
- On 11th May the EA did not issue flood alerts in the Woking area as the river levels in the Lower Wey did not respond significantly to the short/intense rainfall event in Woking as the river monitoring equipment is on the larger watercourses.

The radar map for the flash flood event shows the rainfall intensity at 12.25 on the 11th May. The map shows the localised high intensity for the Maybury area of Woking.

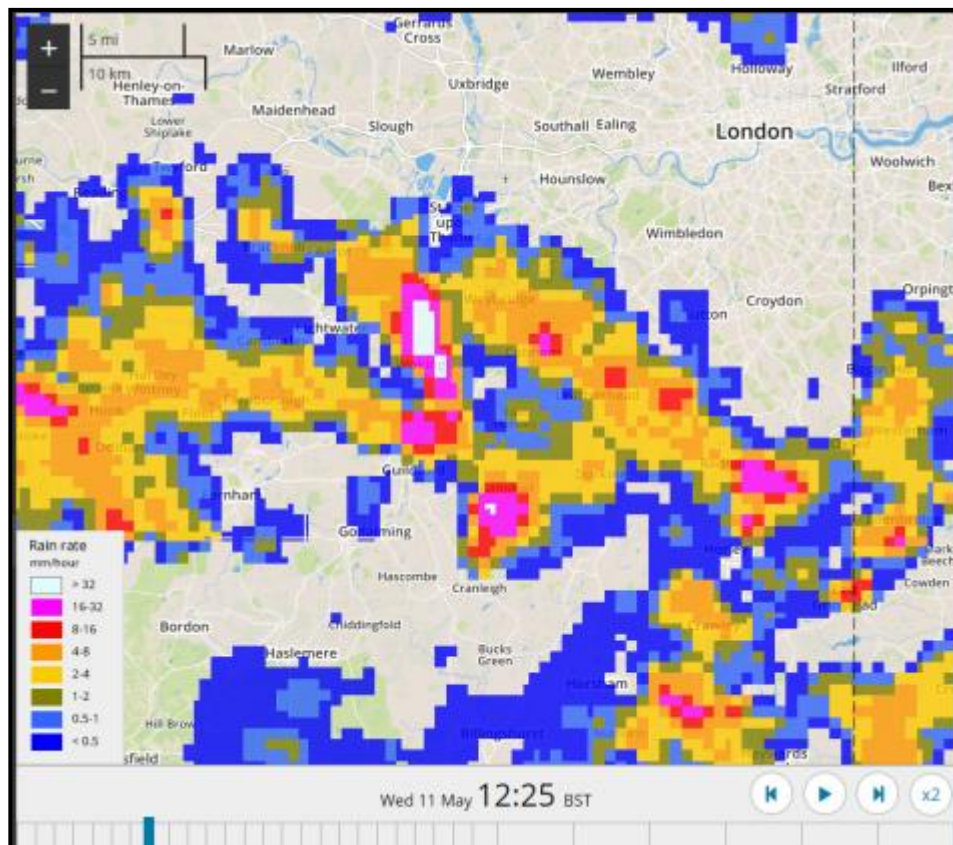


Figure 2. Rainfall Intensity map on the 11th May at 12.25 showing the storm location. Source: MetOffice Radar hazard manager.

The Radar images of Woking from the Met Office's Hazard Manager show that around 32mm/hour of rain fell during this time. Rainfall greater than 32mm/hour is exceptional. Comparison of the radar imagery from 11.30 – 13.30 indicate that the storm event stalled and remained in position over the Woking area.

3.2. Rainfall data

The rainfall in the Woking area on the 11th May was localised with intense local rainfall events. Rain gauges across the area showed the local variation in rainfall on 11th May:

- Pirbright Rain gauge: 38mms in 12 hours (20mm fell within 3 hours)
- Chobham Rain gauge: 33mms in 12 hours (11mm fell within 2 hours)
- Camberley Rain gauge: 30mms in 9 hours (22mm fell within 3 hours)
- Chertsey Rain gauge: 32mms in 12 hours (15mm fell within 2 hours)

The EA has supplied estimated radar intensity data that shows the observed rainfall at 15 minute intervals. A rainfall cumulative graph shows the average cumulative total rainfall for the Maybury area. From 11.00 to 13.00 there was 31.7mm of rainfall in the Maybury area (Figure 3). The total rainfall for the day was 40mm.

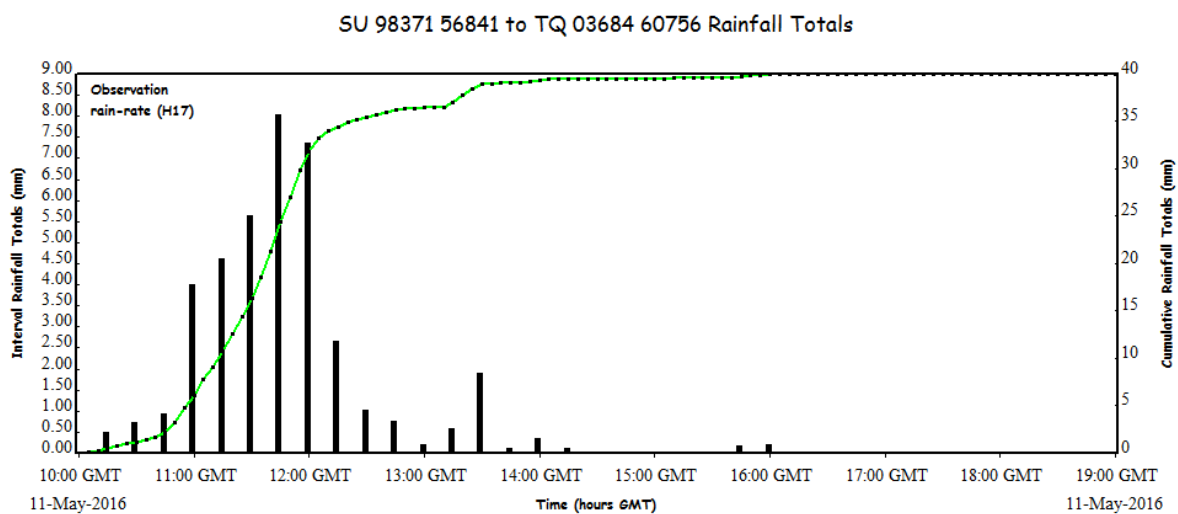


Figure 3. Rainfall cumulative totals for the Woking event focussed on the Maybury flood event area. Data supplied by the Environment agency and based on observed radar rainfall data.

There are two local amateur weather stations² that recorded similar cumulative total values of rainfall for the period between 12.00 and 14.00.

The MetOffice produce average monthly rainfall data for key weather stations across England. The average May rainfall for the Wisley weather station³ is 51.3 mm. Over the two hour period approximately two thirds of the average May rainfall fell in the Maybury area.

3.3. Catchment Description

The Rive Ditch flows from Horsell to the River Wey (see Fig 4). The Rive Ditch is a complex system that is fed by multiple surface water sewers which drain the surrounding impermeable areas. The Rive Ditch is classed as an ordinary watercourse in the open section at Horsell Common until it flows into a culvert just upstream of Monument Way West. From this point it becomes an adopted Thames Water Surface Water Sewer and flows through a 750mm pipe until it opens up again north of Woodlands Avenue, east of Sheerwater. At this point it becomes classified as Main River and is a deep, narrow, manmade channel. The Rive Ditch is then piped under the Basingstoke Canal and the Wey Navigation where they meet to the north of West Byfleet, within the Borough of Runnymede. At this location a large trash screen is installed to help reduce the risk of the pipe becoming blocked.

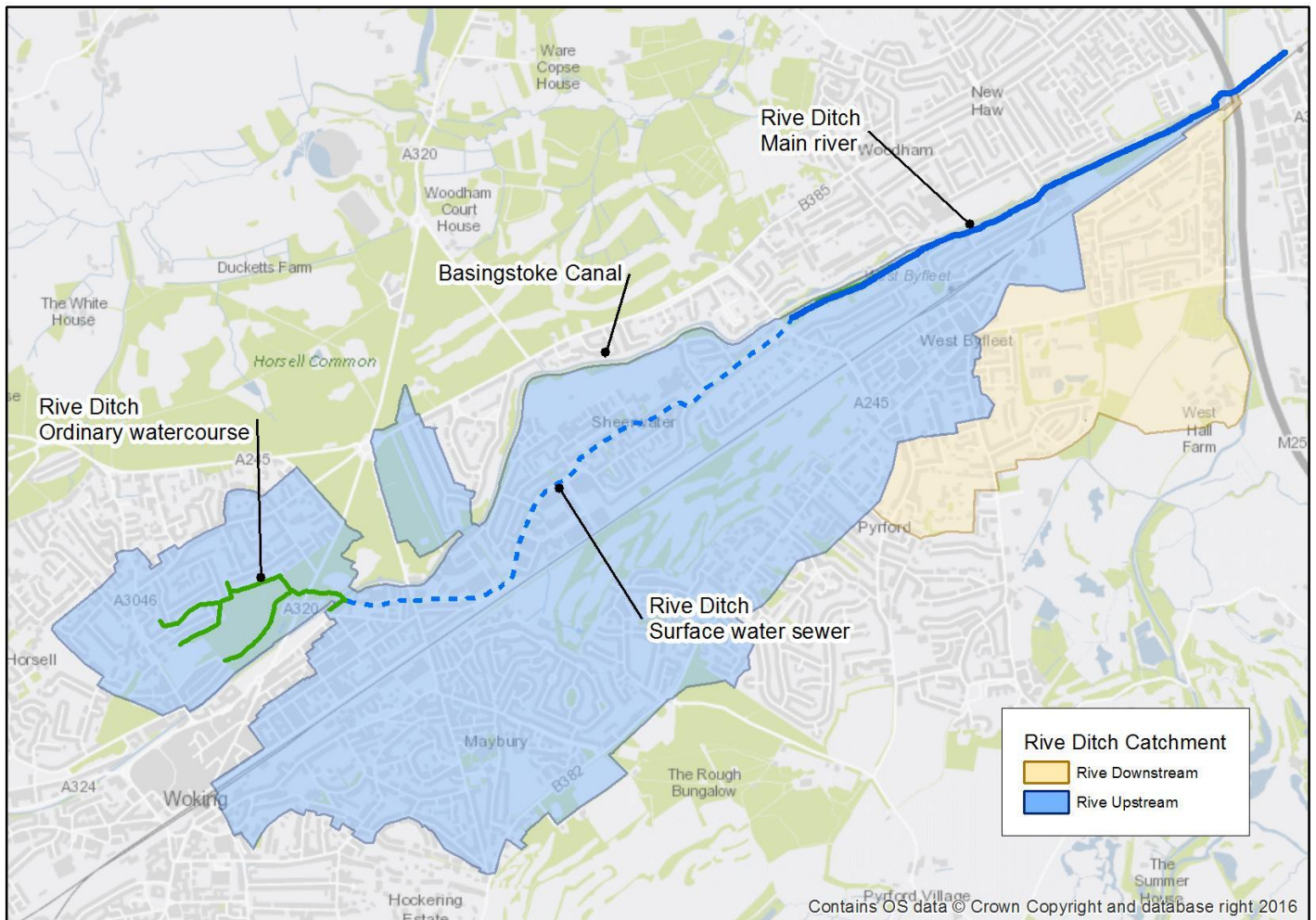


Figure 4. Rive Ditch catchments in Woking and West Byfleet. (Information supplied by WBC).

3.4. Flood Risk and History of Flooding

The area has a history of being flooded through surface water, with the previous event being recorded in 2007. There are several locations of SCC recorded highway flooding, known as 'wetspots' in the Maybury and West Byfleet areas. There has also been previous localised flooding in the Maybury area following feedback from residents at the National Flood Forum meeting.

As a result of the 2007 flooding event SCC, WBC and the EA have been working in partnership to assess the risk from the Rive Ditch and assess suitable mitigation options to help reduce flood risk. This project commenced in 2013 and is being led by SCC. Draft flood outlines have now been produced and the hydrological modelling will now be reviewed against the most recent flood event.

Fluvial Flood Risk

Sections of the Rive Ditch and neighbouring areas are at risk of fluvial flooding in Flood Zone 2 and Flood Zone 3; see map in **Appendix 2** for location of flood zone 2 and 3 areas.

Surface Water Flood Risk

The Maybury, and West Byfleet area are at risk of surface water flooding. Residential/commercial areas and infrastructure, including roads, are shown to be at risk from surface water flow routes; see Risk of Surface Water flooding maps in **Appendix 2**.

4. Risk Management Functions carried out during the flood event

4.1. RMA Responsibilities

RMAs have defined flood risk management functions under the Flood and Water Management Act (2010). A flood risk management function is a function listed in the Act (or related Acts) which may be exercised by an RMA for a purpose connected with flood risk management. The following section sets out the strategic actions and relevant flood risk management functions that were carried out before, during and after the flooding that occurred in Woking during the 11th May flood event.

Environment Agency

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

The EA are category 1 responders regarding flood risk (Civil Contingencies Act 2004). They are required to warn and inform of flood risk.

Thames Water

Thames Water 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.

Civil Contingencies Act 2004 (CCA)

- Designates water and wastewater undertakers as statutory category 2 responders to national disasters and emergencies placing on them duties to share assured information with other responders in an appropriate manner.

Flood and Water Management Act 2010

- Requires the management of risks associated with assets or processes that may cause or be affected by flooding.
- Requires water companies to share data with other flood risk authorities.

Surrey County Council

SCC, as LLFA, have flood risk management functions which include (but are not limited to); the provision of a Local Flood Risk Management Strategy (LFRMS), designation and maintenance of a register of structures or features that have a significant effect on flood risk, consenting and enforcement works on Ordinary Watercourses, undertaking works to mitigate surface water and groundwater flooding and undertaking Section 19 investigations. SCC also has responsibilities as a Highways Authority and as an Emergency Responder (under the Land Drainage Act 1991 and the

Civil Contingencies Act 2004 respectively) which may relate to flooding. Highway Authorities are responsible for providing and managing highway drainage which may include provision of roadside drains and ditches, and must ensure that road projects do not increase flood risk.

The Highways Authority has a duty under the Highways Act 1980 to maintain highways that are maintainable at public expense. This includes a duty to maintain existing highways drainage. The Highways Authority also has powers to improve drainage systems but no duty to do so.

It is the Council's policy that roadside gullies are subject to routine maintenance. The frequency of cleaning is dependent on their categorisation of risk. The level of risk is determined by a number of factors such as location and the amount of silt present at each clean.

Highway drainage systems are designed to take highway surface water. Highway drainage systems are not designed as "storm drains", and do not have the capacity for the level of rainfall from an extreme flash flood. The Highways Authority has powers to improve drainage systems but no duty to do so.

Woking Borough Council

District and Borough Councils can carry out flood risk management works on minor watercourses. Through the planning processes, they control development in their area, ensuring that flood risks are effectively managed.

- The Council will help where it can as a category 1 responder. They, on a priority basis, will provide sandbags to residents and businesses where property is at risk of flooding.
- Supporting Emergency Services on request by providing an Incident Liaison Officer
- Provision of emergency accommodation – i.e. set up rest centre as required and other welfare provision
- Assist with arranging transport or evacuated area.
- Participate in a vulnerable people search
- Assist with co-ordination of recovery

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.

Rive Ditch Maintenance

Routine maintenance of the Rive Ditch is carried out by Runnymede Borough Council on behalf of SCC. This arrangement has been in place for several years. In 2016 Runnymede have carried out ditch maintenance on the following dates:

- January 8, 15 and 29
- February 12 and 26
- March 11 and 24
- April 15

The Environment Agency carries out routine maintenance and clearance of the Main River section of the Rive Ditch. In addition, operational staff attended the Rive Ditch trash screen upon receipt of a Heavy Rainfall Alert to ensure that it was clear. The Environment Agency have fitted a camera to the trash screen to enable RMA remote monitoring of the site.

Land Owners

Information regarding responsibilities on flood risk and water flow responsibilities is described in “Living on the Edge”⁵ Environment Agency publication. Responsibilities include:

- “You must let water flow through your land without any obstruction, pollution or diversion which affects the rights of others.”
- “You must accept flood flows through your land, even if these are caused by inadequate capacity downstream.”

4.2. Pre-incident

The Environment Agency offers a flood alert service to some properties in West Byfleet and Sheerwater. In the Woking area the EA river gauges or monitoring equipment are located on the Lower River Wey. These are used to issue the Lower Wey Flood Alert. This alert area includes part of West Byfleet and Sheerwater. The Rive Ditch does not have its own Flood Alert or Flood Warning system.

The River Wey did not respond significantly to the short, intense localised rainfall event on relatively dry ground. As a result the EA did not issue a Flood Alert covering the Woking Area on the 11th of May.

Woking's drainage engineer visited the Rive Ditch trash screens on May 10th and confirmed that the screens were clear.

Surrey Emergency Management received a yellow rain warning from the Met Office for the SE England indicating local heavy showers and thunderstorms that had the potential for localised surface water flooding. The warning was not location specific.

4.3. Incident Response

The emergency services and WBC started to receive phone calls from the public at around 12.15pm regarding the flood event. Blue light category 1 responders (Civil Contingencies Act 2004) and WBC reacted to the evolving incident and contacted SCC Emergency Management. The flood waters started to recede at approximately 15.00. At 16.30 residents were informed that a rest centre had been setup at the HG Wells centre.

The following section outlines the response carried out by each of the RMAs. There is also a section on the agency response to the trash screen on the Rive Ditch.

Surrey County Council

Three schools were closed during the flooding incident.

Emergency Management

- Emergency Management co-ordinated response to the rapid flash flood incident
- Surrey Fire and Rescue were onsite at around 13.30 and worked to close roads and help residents

Adult Social Care

- SCC Adult Social Care officers were at the HG Wells rest centre from 16.30 to help residents and to offer support and refreshments

Surrey Highways

- Surrey Highways Maintenance Engineer spoke to the Highways Duty Officer around 14.00. The Local Highways Officer was onsite with Woking's drainage engineer inspecting drainage network and gullies
- Surrey Highways contractors Kier carried out one emergency road closure due to flooding
- 12 emergency flood enquiries in the Maybury area were made to the Highways Emergency contact centre. Reactive emergency crews (SCC Highways contractor Kier) were dispatched to the area to assist in a road closure
- Surrey Highways liaised with the Police to carry out one road closure
- Strategic Network Resilience team supported WBC drainage team at the scene around Walton Terrace to assess the flood incident

Woking Borough Council

- Started to receive calls from the public at 12.15pm regarding numerous reports of flooding across the Borough. The Walton Terrace area was the focus of these reports. WBC officer initiated emergency procedures based on this information
- Contractors Serco were asked to deliver sandbags to the flooding area. Overall 1500 sandbags were delivered to the affected areas
- Officers were deployed to assist delivery of sandbags
- Car obstructions at Albert Drive adjacent to the Woking depot caused delays in sandbag delivery. The West Byfleet depot was also used to deploy sandbags as quickly as possible
- Six WBC staff were onsite during the incident helping residents in Walton Terrace, Monument Way and Albert Drive and other affected roads within the area
- Additional officers were deployed to deliver sandbags to West Byfleet where the main river section of the Rive Ditch overtopped and flooded neighbouring residential area
- At 15.00 flood water started to subside at Boundary Road, Walton Terrace, Monument Way and neighbouring areas
- At approximately 16.30 WBC officers visited affected properties to inform residents that a rest centre had been set up in the HG Wells centre. They were informed that local authority officers would be available to help residents
- Six families were placed in temporary accommodation overnight
- Albert Drive was still flooded at 17.30 with the water level beginning to subside. Albert Drive was not closed to traffic. As a result, vehicles were driving through flood water, which at the time was at the height of the kerb level. Some vehicle speeds caused bow wave in the flood water which pushed the water into surrounding low lying areas. Some vehicles, at speed, mounted the dual cycle/pedestrian pavement to avoid the flood water causing considerable risk to pavement users. This was observed by the local authorities

- At approximately 17.30 WBC officers were recalled back to the HG Wells centre for a debrief of the situation and responses

Runnymede Borough Council

- Drainage engineer received calls from residents regarding property flooding adjacent to the Rive Ditch
- Contacted by residents who indicated that Scotland Bridge Road had been flooded

Thames Water

On the 11th May 2016 the first call from the area was from Chertsey Road Woking at 12.15pm following the start of very heavy rainfall.

- 50 customer calls followed from across the area over a three hour period and throughout the day. Main postcodes effected were GU21 and GU22
- Reports were of highway/property flooding/ manholes surcharging
- Tankers were supplied to pump away flood and foul water and generally support our customers and local residents
- Main sewer routes were inspected to understand where incapacities in the system were located
- The main focus during event was on maintaining customer services, on protecting assets vital for the ongoing delivery of service, and on ensuring that where there was disruption, normal service was able to resume as soon as possible.

Thames Water initial investigations in the area concluded that the sewer network became overloaded due to the very significant surface water that was present. This surface water then caused the sewer system to hydraulically overload. In some locations the surface water flooding was in excess of 300mm deep.

Rive Ditch – Runnymede Borough Council and Environment Agency

Due to the adverse weather warnings for the week commencing 9th May, Runnymede Borough Council and the EA scheduled in Rive Ditch maintenance:

- They attended the ditch on the morning of May 11th.
- Runnymede Borough Council contractors and EA field team cleared the trash screen at the junction with the Wey Navigation on the morning of May 11th.
- The Runnymede contractors reported that following the flooding event the trash screen was completely clogged with debris and they had to continuously remove the debris. This was reported to Runnymede's drainage engineer at 16.00.
- Two EA operation staff joined the two Runnymede contractors at 16.20 and they all continued to clear the trash screen until 19.30 when the Rive Ditch water levels dropped to near normal levels.

In addition, WBC have confirmed that Rangers from the Basingstoke Canal Authority (BCA), the EA, fire services and Officers from Runnymede Borough Council were at the trash screen. They constantly cleared the build up of debris against the screen to help the water flow more efficiently. However, due to the volume of water the capacity of the pipe was exceeded which caused the water to back up along the Rive Ditch. The Rangers from the BCA also pumped water from the Rive Ditch into the Basingstoke Canal in order to help reduce the rate in which flood waters were rising.

Woking's drainage engineer visited the Rive Ditch trash screens on May 10th and confirmed that the screens were clear.

4.4. RMA response to flooding - recovery

The recovery phase following the incident started 12th May. Multi-agency response changed to RMA agency staff responsible for supporting residents and prioritising help. Resources from both SCC and WBC jointly prioritised clean-up operations, identification of vulnerable people and community support. The following section lists the actions taken by the RMAs during the recovery phase.

Environment Agency

The EA have supported community engagement in the recovery phase by attending meetings and supplying weather information. They attended and supported the National Flood Forum meetings on the 19th and 20th May.

Thames Water

During the recovery phase Thames Water provided customer assistance in providing a basic clean up service internally or externally as required to customer properties:

- Thames Water deployed jetting crews and tankers across the area from our regional pool of 300 staff and 200 vehicles
- Thames Water teams were reporting back that there had been significant surface water across the area
- Thames Water teams reported that the foul sewers were over loaded with surface water infiltration
- Thames Water attended the National Flood Forum meeting at Walton Terrace on 19th / 20th May

Once the flood waters had receded and dispersed, Thames Water CCTV inspected drainage assets at 60 locations across Woking to check their condition. This work was focused on the areas where flooding occurred. No major collapses or blockages were found.

Woking Borough Council

- WBC contractors Serco started road cleaning at 20.00 on the 11th May after the flood water had receded
- Supported the National Flood Forum meeting at Walton Terrace on the 19th / 20th May
- On the 12th May the WBC Drainage and Flood Risk Team revisited the flooded area to carry out further investigation into the flood event including mapping of flood extents and indicative surface water flood flow directions
- WBC and SCC Emergency Management arranged for skips to be placed in Walton Road for resident use
- WBC drainage engineer has been in contact with SCC Highways to schedule in road cleaning
- Officers had discussions with residents regarding insurance
- Provided an 11th May flooding update⁴ to the Woking Joint Committee

Surrey County Council

Emergency Management

SCC Emergency Management Team arranged for two skips to be delivered and placed on land at Walton Road for the use of flooded residents. Residents were advised that if they did have contents insurance then it was not advisable to throw any items away until the insurance company had sent a loss adjuster to assess the situation.

Surrey Highways

The Local Highways emergency response (Kier) and Strategic Network Resilience team identified areas for gully cleaning and road repairs. This was in addition to flood enquiry requests made by residents following phone calls and information gather from public meetings. The key actions carried out were:

- The area team inspected the flooded area on the 12th May. The flood water had receded. This indicated that there were no major issues with the highways drainage systems
- Local Area Team liaised with Emergency Management to determine the best location for skips and arrange for licences
- The reactive jetting crew attended several areas to resolve blockage issues in the drainage network

National Flood Forum

The National Flood Forum, at the request of SCC, organised a flood surgery on Thursday 19th and Friday 20th May. The National Flood Forum trailer was located at the southern end of Walton Terrace. The National Flood Forum were supported by representatives from SCC (Highways and Emergency Management), Surrey Fire and Rescue Service, WBC, Thames Water and the EA. The meeting started at 12.00 and finished at 21.00. The National Flood Forum provided advice on flood insurance and provided advise on the general house recovery following a flood including the drying out process and decontamination.

4.5. Ongoing Work

Rive Ditch Flood Alleviation Project

A multi-agency project commenced in 2013 to assess the flood risk along the Rive Ditch catchment. SCC (project lead), WBC, and the EA are working in partnership and have commissioned Atkins to carry out work on the project including hydrological modelling to assess flood risk. Project aims were to assess flood risk and to assess suitable mitigation options to reduce flood risk. Catchment analysis and hydrological modelling have produced draft flood outlines. The post-investigation flood mapping carried out by WBC and SCC Strategic Network Resilience team will be used to refine the hydrological modelling.

Thames Water

Thames Water are currently working with the lead flood authorities in Surrey and await the publication of the Section 19 to understand the recommendations and any Thames Water actions. Thames Water are reviewing the sewer network in the area to further understand how to reduce the impact of heavy rain and surface water on the drainage network.

Surrey Highways

Surrey County Council is leading on the Rive Ditch Flood Alleviation project. Once the hydrological modelling has been finalised flood mitigation options will be assessed. The Strategic Network Resilience team is working with the National Flood Forum to engage with the residents in both the Maybury area and West Byfleet.

National Flood Forum

SCC has commissioned the National Flood Forum to engage the community in the 11th May flooded areas with an aim to setup a flood action group. Community groups have been identified in the Walton Terrace/Albert Road area and in West Byfleet.

5. Findings

The section 19 (FRMA 2010) for this flood event outlines the incident response and subsequent recovery phase actions carried out by the RMAs.

The localised storm event that stalled over Woking from 11.30 – 13.30 produced two thirds the average total May rainfall in a two hour period. The cumulative rainfall during this period caused surface water and fluvial flooding as the surface water, foul water and watercourses capacity were exceeded. 45 properties are known to have flooded internally during this event. There was one road closure and many roads in the flooded areas were affected leading to major traffic congestion.

5.1. Incident Response

- Police and fire services responded to the incident
- WBC and SCC officers attended Walton Terrace and Albert Road
- Surrey Police and Surrey Highways closed one road
- Three schools were closed in response to the incident
- SCC Highway officers and contractors (Kier) also responded
- EA and Runnymede Borough Council contractors attended the Rive Ditch trash screen to keep it clear of debris

5.2. Recommendations

Incident Response

- 5.2.1. EA to clarify if there is benefit for residents to sign up to flood alerts and warnings in this area of Woking.
- 5.2.2. SCC Emergency Management Teams and Surrey Highways to review the existing Surrey local authority sandbag policy in relation to deployment from highway stock, with particular focus on schools and inform the Highway Duty officers of any agreed changes before December 2016.
- 5.2.3. Surrey Highways Duty Manager to be included on the Surrey Local Resilience Forum severe weather teleconference.
- 5.2.4. SCC Highways to clarify the process for requesting road closures during an incident to EMT and WBC before December 2016.
- 5.2.5. The Surrey Flood Risk Partnership Board to examine when and how flooded property data is collected.

Recovery phase

- 5.2.6. For RMAs to review and update, where necessary, response and recovery emergency plans.
- 5.2.7. Surrey Local Resilience Forum to confirm the policy/protocol for deploying skips following an incident.
- 5.2.8. SCC Highways to internally clarify the reactive maintenance response after an incident; primarily what contingency is available to assist in clearing.
- 5.2.9. RMAs to examine opportunities to coordinate maintenance of drainage network following a flood event.

Ongoing work

- 5.2.10.** SCC Strategic Network Resilience and WBC Drainage and flooding team to use data collected on the flood event to refine the Rive Ditch flood alleviation scheme hydrological model.
- 5.2.11.** The schools affected are recommended to review and update their emergency plans to capture any opportunities for mitigating the impact of future floods and communicate any significant changes to the relevant authority.

Resident Engagement

- 5.2.12.** For residents to work with the National Flood Forum to create a Flood Action Group in the Maybury and West Byfleet areas to address areas of ongoing concern and develop resilience for those properties at risk of flooding. This Flood Action Group will be the conduit for the RMAs to communicate to the residents and for the residents to monitor progress on specific issues.

6. Acknowledgements

- The residents of the Maybury, Woking and West Byfleet for providing information.
- Environment Agency for supplying Radar data, weather situation reports and rainfall data.
- National Flood Forum for setup of recovery phase resident engagement.
- All RMAs for attending National Flood Forum meetings.
- All RMAs for input into this report.

7. References

1. EA Monthly water situation report: West Thames Area – May 2016.
2. Local weather station information:
<https://www.wunderground.com/personal-weather-station/dashboard?ID=ISURREYW4#history/s20160511/e20160511/mdaily>
<https://www.wunderground.com/personal-weather-station/dashboard?ID=IENGLAND1088#history/s20160511/e20160511/mdaily>
3. Met Office average rainfall for Woking area – Wisley weather station:
<http://www.metoffice.gov.uk/public/weather/climate/gcpevmgzn>
4. “Flash Flooding update from 11th May 2016.”, Woking Borough Council joint committee papers, 29/06/2016.
5. “Living on the Edge – a guide to your rights and responsibilities of riverside ownership”, Environment Agency publication:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/454562/LIT_7114.pdf

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 website and in Schedule 2 of the Flood and Water Management Act (2010).
Flood Risk Management Function	A flood risk management function is a function listed in the Act (or related Acts) which may be exercised by a risk management authority for a purpose connected with flood risk management.
Very Low Flood Risk	Area with a very low probability of flooding from rivers (< 1 in 1,000 annual chance of flooding or <0.1%).
Low Flood Risk	Area with a low probability of flooding from rivers (between a 1 in 1000 and 1 in 100 annual chance of flooding or between 0.1% and 1%)
Medium Flood Risk	Area with a medium probability of flooding from rivers (between a 1 in 100 and 1 in 30 annual chance of flooding or between 1% and 3.33%).
High Flood Risk	Area with a high probability of flooding from rivers (> 1 in 30 annual chance of flooding or greater than 3.3%).
IDB	Internal Drainage Board
LLFA	Lead Local Flood Authority
Main River	Main Rivers are usually larger streams and rivers, but some of them are smaller watercourses of local significance. Main Rivers indicate those watercourses for which the Environment Agency is the relevant risk management authority.
Ordinary Watercourse	Ordinary Watercourses are displayed in the mapping as the detailed river network. An Ordinary Watercourse is any watercourse (excluding public sewers) that is not a Main River, and the Lead Local Flood Authority, District/Borough Council or Internal Drainage Board are the relevant risk management authority.
RMA	Risk Management Authority
SCC	Surrey County Council
TW	Thames Water
UFMfSW	Updated Flood Maps for Surface Water –now risk of flooding from surface water.

Sources of Flooding

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:

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

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

flooding.enquiries@surreycc.gov.uk.

Appendix 2

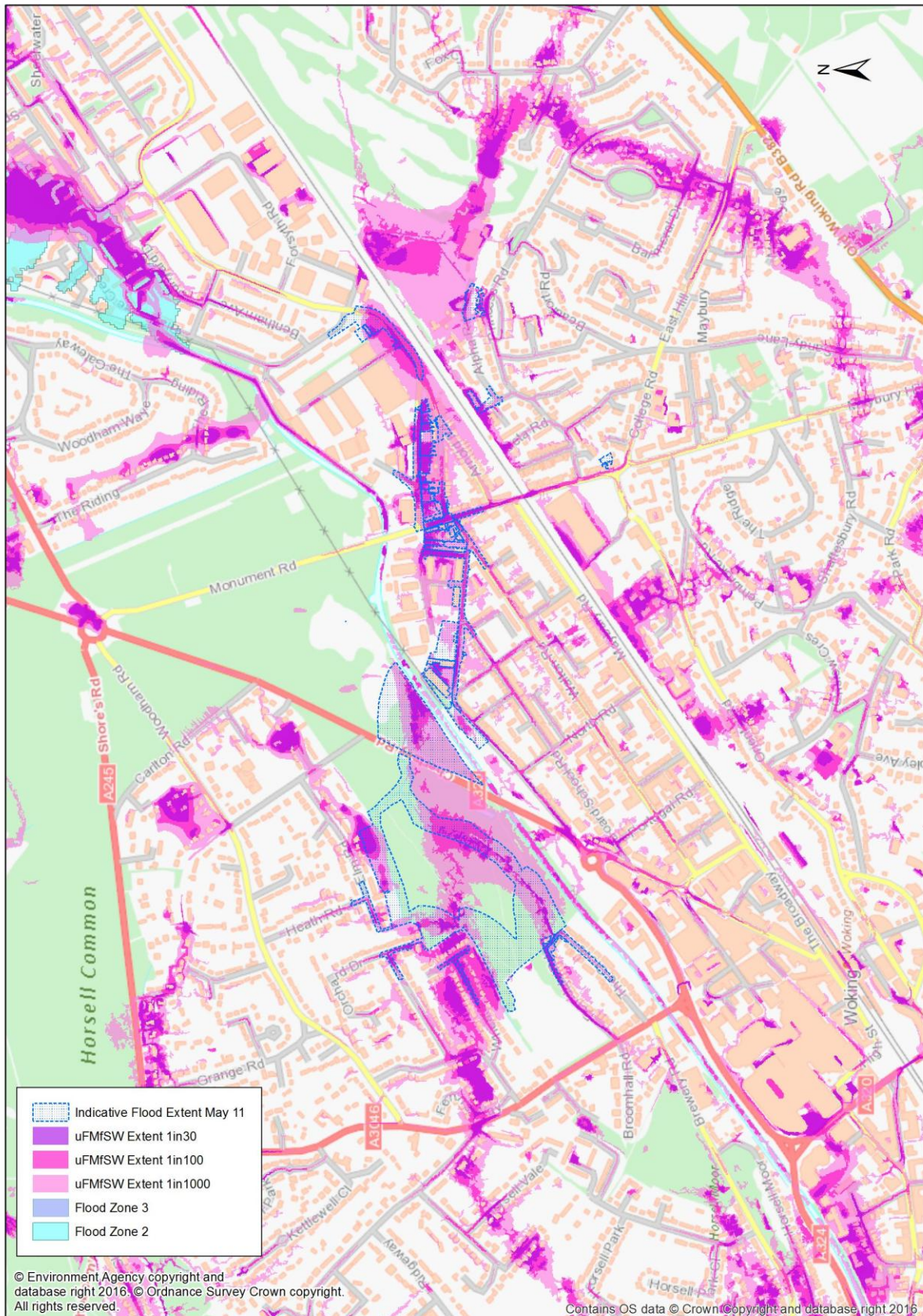


Figure 5. Map showing modelled Risk of Flooding from Surface Water extents (data currency: May 2016) and Flood Map for Planning Rivers and Sea (data currency: Oct 2016) for the Maybury area. The indicative flood extents for the 11th May flood incident are provided by WBC.

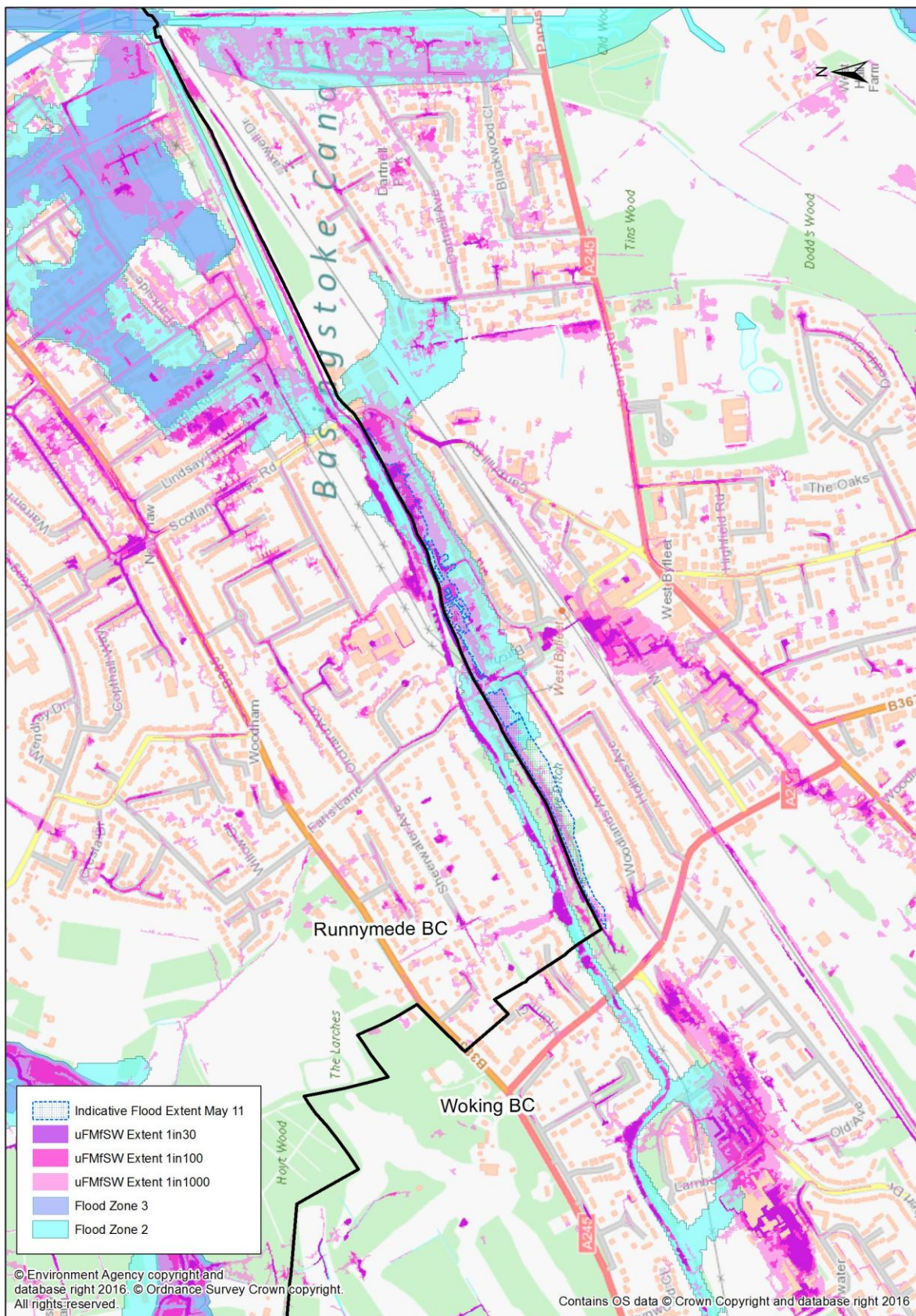


Figure 6. Map showing modelled Risk of Flooding from Surface Water extents (data currency: May 2016) and Flood Map for Planning Rivers and Sea (data currency: Oct 2016) for West Byfleet area. The indicative flood extents for the 11th May flood incident are provided by WBC.