

Wokingham Section 19 Flood Investigation

Final Report

November 2024

Prepared for:

**WOKINGHAM
BOROUGH COUNCIL**

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This report describes work commissioned by Wokingham Borough Council, by an instruction dated 13 October 2023. The Client's representative for the contract was Ray Drabble. Peter Rook and Grace Sheppard of JBA Consulting carried out this work.

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The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by JBA has not been independently verified by JBA, unless otherwise stated in the Report.

The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between (October 2023 and March 2024) and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

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Abbreviations

AEP Annual Exceedance Probability

AOD Above Ordnance Datum

BGS British Geological Society

WBC Wokingham Borough Council

DTM Digital Terrain Model

EA Environment Agency

JBA Jeremy Benn Associates

LiDAR Light Detection and Ranging

LLFA Lead Local Flood Authority

NGR National Grid Reference

PFR Property Flood Resilience

RMA Risk Management Authority

RoFSW Risk of Flooding from Surface Water (Environment Agency mapping)

Executive Summary

Background

Following flooding across Wokingham Borough on 31 March 2023, Wokingham Borough Council (WBC) as the Lead Local Flood Authority (LLFA) is undertaking a formal flood investigation under Section 19 of the Flood and Water Management Act 2010.

Wokingham Borough is located in Berkshire, in southern England. Internal flooding is known to have occurred to at least 6 properties within the Borough as a result of the flood event on 31 March 2023; this includes three properties in the parish of Hurst, one property in the centre of Wokingham; and one property in Earley. Hurst Parish was the main reported hotspot for fluvial flooding during the 31 March 2023 flooding event due to the extensive river and ditch network present around the settlement. As the number of properties affected by flooding in March 2023 constitutes ‘significant flooding’ in accordance with its [Flood Investigation Policy](#), WBC is under a duty to investigate this flooding. WBC has appointed JBA Consulting to undertake this investigation on its behalf.

Stakeholder engagement

As part of the Section 19 investigation, JBA Consulting engaged with multiple local stakeholders in Wokingham, including residents, Council members and Risk Management Authority partners. The objectives of engagement were to gather facts, opinions, and data to aid the understanding of the investigation; and to enable the involvement of community representatives in the investigation. The results of the stakeholder engagement are set out in Section 2.

Catchment characteristics and long-term flood risk

Section 3 describes the watercourses, drainage network, topography and geology of Wokingham Borough. Section 5 outlines the existing long term flood risk information on the risk of flooding from rivers, surface water and groundwater.

Information on historical flood events from Wokingham Borough Council’s SFRA (2023) and the Environment Agency’s Recorded Flood Outline dataset indicate that there have been numerous flood events across Wokingham Borough since March 1947. More recent events have included 2003, 2007, 2008, 2009, 2013/14, and 2015, all of which caused flooding to highways and numerous properties around the Borough.

Flood Risk Management

Responsibility for flood risk can be divided into “flood risk management” and “emergency response”. Section 3.1 describes the roles and responsibilities of the various bodies involved in flood risk management and emergency response. Section 3.3 describes the existing flood risk management activities undertaken in the Borough, which include channel maintenance and a flood warning system.

The storm event on 31 March 2023

There was a sustained period of rainfall during the month of March leading up to the event, although extreme rainfall depths were not recorded. However, rainfall was high compared to March in previous years, meaning it is likely that antecedent conditions exacerbated flooding within the borough. Using FEH22 (the rainfall depth-duration-frequency model) which considers the catchment characteristics in Hurst Parish, it has been calculated that the event on 31 March 2023 was approximately a 1 in 3 (33.3%) annual chance rainfall event.

Incident response

During the event, organisations worked separately in accordance with their operating instructions.

Correspondence between Wokingham Borough Council and its Highways contractor (Volker Highways) indicated the need for road closures within the area, due to flooding. WBC received 32 call outs on the evening of 31 March 2023 regarding highway flooding issues, some of which were passed on to Volker Highways.

Berkshire Fire and Rescue Service received one call out related to this flood event, which involved internal flooding of a primary school in Sonning as a result of heavy rainfall. They were able to pump the floodwater out of the building.

Source-pathway-receptor analysis

The sources, pathways and receptors of flooding during the event were as follows:

- Sources – extreme rainfall increasing water levels of local watercourses and ditches
- Pathways – exceedance of channel capacity in main rivers and ditches, causing water to flow along roads and footpaths
- Receptors – internal flooding to at least 6 properties, property garden flooding, flooding of roads causing restricted access.

Recommendations

Section 9.2 includes discussion of some recommendations for strengthening the management of flood risk in the affected areas of the Borough, based on observations from the 31 March 2023 event. Based on the identified causes and mechanisms of flooding, it is recommended that the following measures should be considered: watercourse maintenance and awareness of riparian responsibilities; Property Flood Resilience (PFR); and community flood resilience.

1 Introduction

1.1 Background to investigation

Following flooding in Wokingham Borough on 31 March 2023, Wokingham Borough Council (WBC) as the Lead Local Flood Authority (LLFA) has undertaken a formal flood investigation under Section 19 of the Flood and Water Management Act 2010.

It is a statutory requirement for LLFAs to investigate flooding to the extent that it considers it 'necessary or appropriate'. WBC has outlined its criteria for undertaking a Section 19 investigation in its [Flood Investigation Policy](#). WBC will investigate all flooding incidents reported by residents, or that otherwise come to its attention, that involve:

- *Internal flooding of habitable property (excluding garages and outbuildings)*
- *Flooding of any road that requires formal closure of that road and diversion of traffic*
- *Flooding of critical infrastructure that results in loss of service to consumers or potential loss of service*
- *Smaller "near miss" flooding incidents*
- *Smaller scale flooding and "ponding" on the highway*

Any investigations undertaken will seek to establish the likely causes of the flooding incident, the relevant Risk Management Authorities (RMAs), and any actions undertaken or proposed by the relevant RMA.

The flooding that occurred in Wokingham Borough on 31 March and 1 April 2023 caused internal flooding to at least 6 properties, with the most significant flooding impacts in Hurst Parish. Therefore, this meets the criteria for a Section 19 investigation. WBC appointed JBA Consulting to undertake this investigation on its behalf.

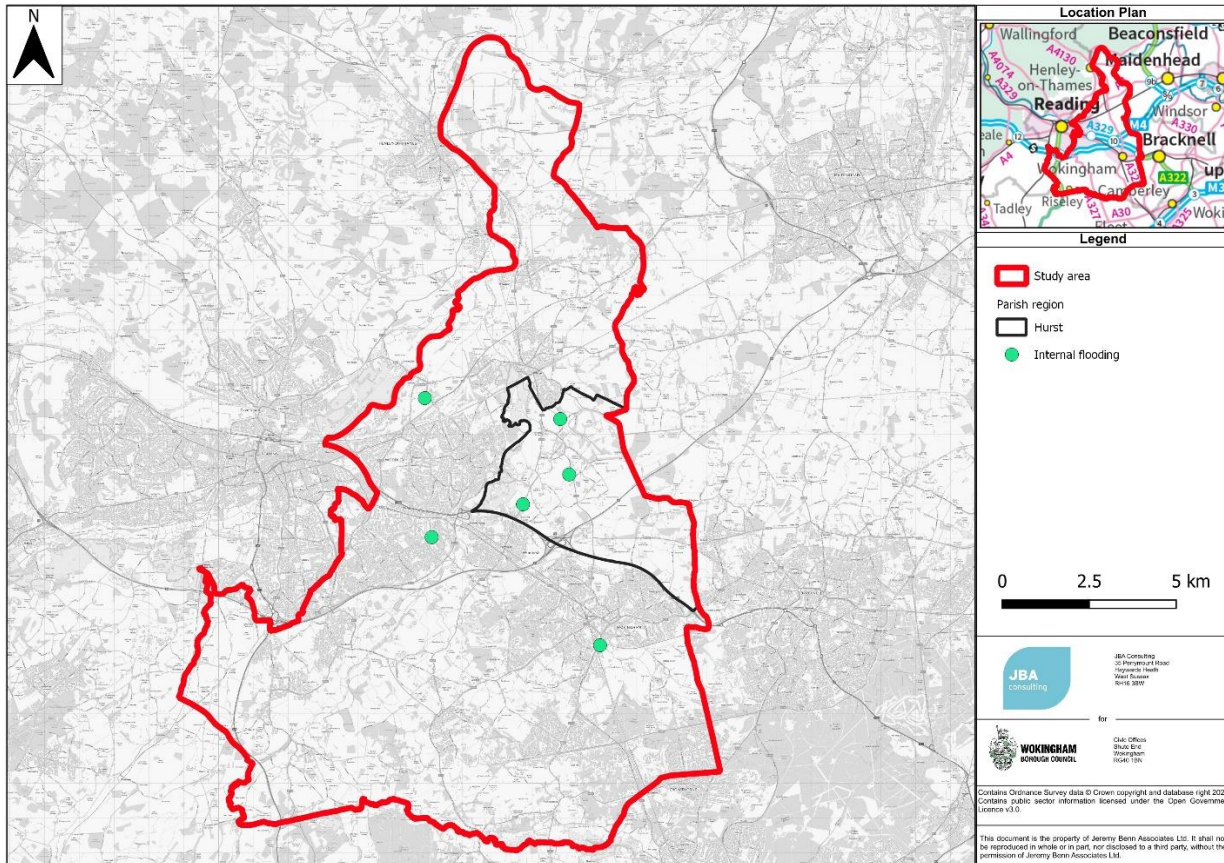


Figure 1-1: Internal flooding in Wokingham Borough on 31 March 2023

1.2 Site location

The borough of Wokingham is a Unitary Authority with borough status in Berkshire, England. The River Thames and the River Loddon flow through the borough and are identified as main rivers by the Environment Agency (EA). There are a number of other streams and ditches, notably within Hurst Parish that are also designated as Main Rivers.

1.3 Data collection

A wide range of data has been collected and assessed to inform the Section 19 investigation. This data has been used to understand the causes of flooding in Wokingham Borough, and includes the following:

- Open-source data from GOV.UK
- Photographs from a site visit, showing flood sources, pathways and receptors
- Correspondence with residents during site visits on 28 November 2023 and 18 January 2024. The site visits involved visiting four of the flooded properties in Hurst Parish and Wokingham Town, where we talked to residents and members of WBC to understand more about the mechanisms of flooding on 31 March 2023.
- Hydrometric data (rainfall and river level data)

- Information from authorities on drainage infrastructure, such as those managed by highways authorities and water companies
- Other data, such as photographs, newspaper articles and notes from the events

2 Stakeholder Engagement

JBA Consulting engaged with multiple local stakeholders in Wokingham Borough, including residents, community representatives, landowners, other Council departments, Council Members and RMA partners.

The objectives of the engagement were to:

- Gather facts, opinions, and data to aid the understanding of the investigation
- Enable the involvement and buy-in of the community in the investigation
- Provide a more technical debrief of the event with RMA and operational partners
- Disseminate the findings of the investigation to the community

A list of key stakeholders and how we engaged with them is shown in Table 2-1. The engagement terminology is taken from the Environment Agency's 'Working with Others' (2013) methodology:

- Inform- provide information
- Consult- receive, listen, understand and feedback
- Involve- decide together
- Collaborate- act together
- Empower- support independent action

Table 2-1: Key Stakeholders

Role	Organisation	How to engage	Type of engagement
Residents	N/A	Consult	Site visit, online questionnaire, public engagement meeting
Landowners	N/A	Consult	Site visit, correspondence,
Parish/Town Council	Hurst Parish Council	Consult	Site visit, correspondence
Water and Sewerage Company (WaSC)	Thames Water	Involve	Invitation to contribute, correspondence, data provision
Highway Authority	Volker Highways	Involve	Invitation to contribute, correspondence, data provision
Environment Agency	Environment Agency	Involve	Correspondence, data provision, site visit
LLFA	Wokingham Borough Council	Involve	Invitation to contribute, correspondence, online survey distribution, site visit, data provision
Council Members	Wokingham Borough Council	Consult	Invitation to contribute, site visit
Emergency Planning	Emergency Management Wokingham Borough Council	Consult	Invitation to contribute, correspondence

3 Flood risk management

Responsibility for flood risk can be divided into flood risk management and emergency response. The following section describes the roles of the various bodies involved in flood management, with roles and responsibilities for emergency response described in Section 7.

It should be noted that the responsibility for reducing the impacts of flooding to any property remains with the owner of that property, not with any risk management authority. Wokingham Borough Council, the Environment Agency and other risk management authorities have the statutory powers to carry out works for flood risk management purposes or other works to reduce flooding but are under no statutory duty to do so.

3.1 Flood risk management roles and responsibilities

Flood risk in England is managed by a range of different RMAs. The Flood and Water Management Act 2010 places a duty on all Risk Management Authorities to co-operate with each other. The Act also provides Lead Local Flood Authorities and the Environment Agency with powers to request information required in connection with their flood risk management functions.

The risk of flooding from main rivers is managed by the Environment Agency, and they have permissive powers to maintain and carry out improvements to main rivers. However, it is the responsibility of individual riparian owners, who own land on or next to a watercourse, to maintain main rivers and ordinary watercourses. The EA and LLFA have a responsibility to ensure that these landowners are undertaking their riparian responsibilities under the Land Drainage Act (1991), which include maintenance. The LLFA also has discretionary powers to undertake flood risk management works on ordinary watercourses.

3.1.1 Environment Agency

The Environment Agency is sponsored by the Government's Department of Environment, Food and Rural Affairs (Defra), and is tasked with the protection and conservation of the water and environment in England, the natural beauty of rivers and wetlands and the wildlife that lives there.

The Environment Agency's responsibilities include: water quality and resources; fisheries; conservation and ecology; and operational responsibility for managing the risk of flooding from main rivers. The Environment Agency has permissive powers (but not a duty) to carry out flood and coastal risk management work and to regulate the actions of other flood risk management authorities on main rivers along the coast.

Flood risk management work can include: constructing and maintaining 'assets' (such as flood banks or pumping stations); works to main rivers to manage water levels and make sure flood water can flow freely; operating flood risk management assets during a flood; channel maintenance on the river; issuing flood warnings; and responding to incidents.

The Environment Agency can also do work to prevent environmental damage to watercourses, or to restore conditions where damage has already been done. The strategies for flood and coastal erosion risk management show how communities, the public sector and other organisations can work together to manage this risk.

More information can be found on the Environment Agency's ['About us'](#) webpage.

3.1.2 Lead Local Flood Authority (LLFA)

LLFAs are responsible for coordinating the mitigation of risk of flooding from surface water, groundwater (water which is below the water table under the ground) and ordinary watercourses (non-main rivers). The LLFA is also responsible for developing, maintaining and applying a strategy for local flood risk management in their area and for maintaining a register of flood risk assets. LLFAs also have a statutory duty to investigate significant flood events to the extent they consider necessary.

Wokingham Borough Council is the LLFA for the area of Wokingham.

3.1.3 Water and Sewerage Company

Water and sewage companies are responsible for managing the risks of flooding from surface water and foul or combined public sewer systems providing drainage from buildings and developed areas.

Thames Water is the Water and Sewage company for Wokingham.

3.1.4 Highway Authority

Wokingham Borough Council is the Highway Authority, this function is currently undertaken by Volker Highways on behalf of WBC. It is responsible for maintaining the highway drainage system to an acceptable standard and ensuring that road projects do not increase flood risk. Correspondence with Volkers Highways (agency/authority for trunk roads) also occurred on 31 March 2023.

3.1.5 Riparian landowners

Riparian landowners who own land or property next to a river, stream or ditch (including where this runs through a pipe or culvert), have rights and responsibilities over the land. This includes: a responsibility to let water flow through the land without any obstruction, pollution or diversion which affects the rights of others; keeping banks clear of anything that could cause an obstruction and increase flood risk; maintaining the bed and banks of the watercourse; and keeping structures clear of debris. There is more information on these rights and responsibilities in the Environment Agency online guidance ['Owning a watercourse'](#).

The Environment Agency have published guidance on flood risk activities that may require an environmental permit. These environmental permitting rules must be followed if work is carried out:

- on or near a main river
- on or near a flood defence structure
- in a flood plain
- on or near a sea defence

More information can be found on EA's [Flood risk activities: environmental permits](#) webpage.

3.1.6 Local residents

Local residents should find out about any flood risk in the area, sign up for the Environment Agency's free flood warnings and make a written plan of how they will respond to a flood situation. Business owners should also make a flood plan for their business. There are measures that can be taken to reduce the amount of damage caused by flooding and properties at risk should be insured. Local residents can find out if their property is at risk, prepare for flooding, get help during a flood, and get help after a flood.

Further information is available from the following websites:

- [Check the long-term flood risk for an area in England](#)
- Environment Agency's ["How to plan ahead for flooding"](#)
- [Sign up for Flood Warnings with the Environment Agency](#)

3.2 Emergency responsibilities

The emergency responsibilities of different organisations are outlined in Table 3-1 below. Please note that Parish and Town Councils do not have a legal obligation to respond to emergencies. Whatever service they provide is voluntary and unique to each Parish or Town Council.

The [Civils Contingencies Act](#) delivers a single framework for civil protection in the UK. The Act is separated into 2 substantive parts: local arrangements for civil protection (Part 1); and emergency powers (Part 2).

Part 1 of the Act establish a clear set of roles and responsibilities or those involved in emergency preparation and response at the local level. The Act divides local responders into 2 categories, imposing a difference set of duties on each. More information can be found in Section 3.2.1.

Table 3-1: Roles and responsibilities in an emergency, during and after a flood event.

Local Authorities (Wokingham Borough Council)
Coordinate emergency support within their own functions Deal with emergencies on 'non main rivers' Coordinate emergency support from the voluntary sector Liaise with central and regional government departments Liaise with essential service providers Open rest centres Manage the local transport and traffic networks Mobilise trained emergency social workers Provide emergency assistance Deal with environmental health issues, such as contamination and pollution Coordinate the recovery process Manage public health issues Provide advice and management of public health Provide support and advice to individuals Assist with business continuity

Police Force	Utility Providers
Save life Coordination and communication between emergency services and organisations providing support Coordinate the preparation and dissemination	Attend emergencies relating to their services putting life at risk Assess and manage risk of service failure Assist with recovery process, that is, water utilities manage public health considerations

Fire and Rescue Service
Save life rescuing people and animals Carry out other specialist work, including flood rescue services Where appropriate, assist people where the use of fire service personnel and equipment is relevant

Ambulance Service	Town and Parish Councils
Save life Provide treatment, stabilisation, and care at the scene	Support emergency responders Increase community resilience through support of community emergency plan development

Voluntary Services

- Support rest centres
- Provide practical and emotional support to those affected
- Support transport and communication
- Provide administration
- Provide telephone helpline support

Environment Agency

- Manage the risk of flooding from main rivers and the sea
- Operate Environment Agency flood defence assets
- Issue Flood Warnings and ensure systems display current flooding information
- Provide information to the public on what they can do before, during and after a flood event
- Monitor river levels and flows
- Work with professional partners and stakeholders and respond to requests for flooding information and updates
- Receive and record details of flooding and related information
- Operate water level control structures within its jurisdiction and in line with permissive powers
- Flood event data collection
- Arrange and take part in flood event exercises
- Respond to flooding incidents
- Respond to pollution incidents and advise on disposal
- Assist with the recovery process, for examples by attending flood surgeries
- Advise upon and regulate flood risk activities on and within the flood plains of main rivers

3.2.1 Local Resilience Forum (LRF)

Local resilience forums (LRFs) are multi-agency partnerships made up of representatives from local public services, including the emergency services, local authorities, the National Health Service (NHS), the Environment Agency and others. These agencies are known as Category 1 Responders.

LRFs are supported by organisations, known as Category 2 responders, such as the Highways Agency and public utility companies. They have a responsibility to co-operate with Category 1 organisations and to share relevant information with the LRF. The geographical area the forums cover is based on police areas.

The Local Resilience Forum is not a legal entity, nor does a Forum have powers to direct its members. Nevertheless, the Civil Contingencies Act (2004) and the Regulations provide that emergency responders, through the Forum, have a collective responsibility to plan, prepare and communicate for emergencies in a multi-agency environment.

The Local Resilience Forum for Wokingham is the Thames Valley Local Resilience Forum (TVLRF). The forum has identified fluvial flooding and surface water flooding as very high risk. The aim of the Thames Valley Local Resilience Forum is to facilitate multi-agency partners in fulfilling their duties under the Civil Contingencies Act (2004). These include: co-operate with local responders; share information with other local responders; assess the risk of emergencies in the area; put in place arrangements to warn, inform, and advise the public in the event of an emergency.

3.3 Existing flood risk management activities

The Wokingham Borough Council [Local Flood Risk Management Strategy \(2015\)](#) details the various responsibilities of key stakeholders and organisations, and the existing flood risk management activities at the time of publication.

The strategy has set out a range of objectives, supported by an Action Plan, which list various management objectives to be achieved within three time frames: short (within 3 years), medium (within 6 years) and long (within 10 years) term. These objectives include: ensuring that planning decisions take full account of flood risk; continuing to improve knowledge and understanding of current and future local sources of flood risk within Wokingham Borough; and maintaining and, where necessary, improving local flood risk management infrastructure.

3.3.1 Flood Warning Service (FWS)

The central area of Wokingham Borough (following the main river network) is covered by the Environment Agency's Flood Warning Service.

This service sends flood alert and warning messages to registered contact details by either phone, text or email. Flood alert and warning messages are also published on the check for flooding pages on the government website. If a flood event is forecast, alerts and warnings are issued using a set of four easily recognisable codes as shown in Table 3-2.

Table 3-2: EA Flood Alert and Warning Codes

Flood Code	What it means	What to do
 Flood Alert	Flooding is possible, be prepared	Be prepared to act Prepare a flood kit of essential items Monitor local water levels and the flood forecast on the website
 Flood Warning	Flooding is expected, immediate action is required	Move family, pets and valuables to a safe place Turn off gas, electricity and water supplies if safe to do so Put flood protection equipment in place
 Severe flood warning	Severe flooding and danger to life	Stay in a safe place with a means of escape Be ready should you need to evacuate Co-operate with the emergency services Call 999 if you are in immediate danger
Warning no longer in force	Warning has been removed in the last 24 hours	Be careful. Flood water may still be around for several days and could be contaminated If you've been flooded, ring your insurance company as soon as possible

The Flood Warning Service (FWS) provides alerts and warnings for river, sea and in some areas groundwater flooding, excluding surface water flooding.

Figure 3-1 shows the location of the warning and alert areas within Wokingham Borough.

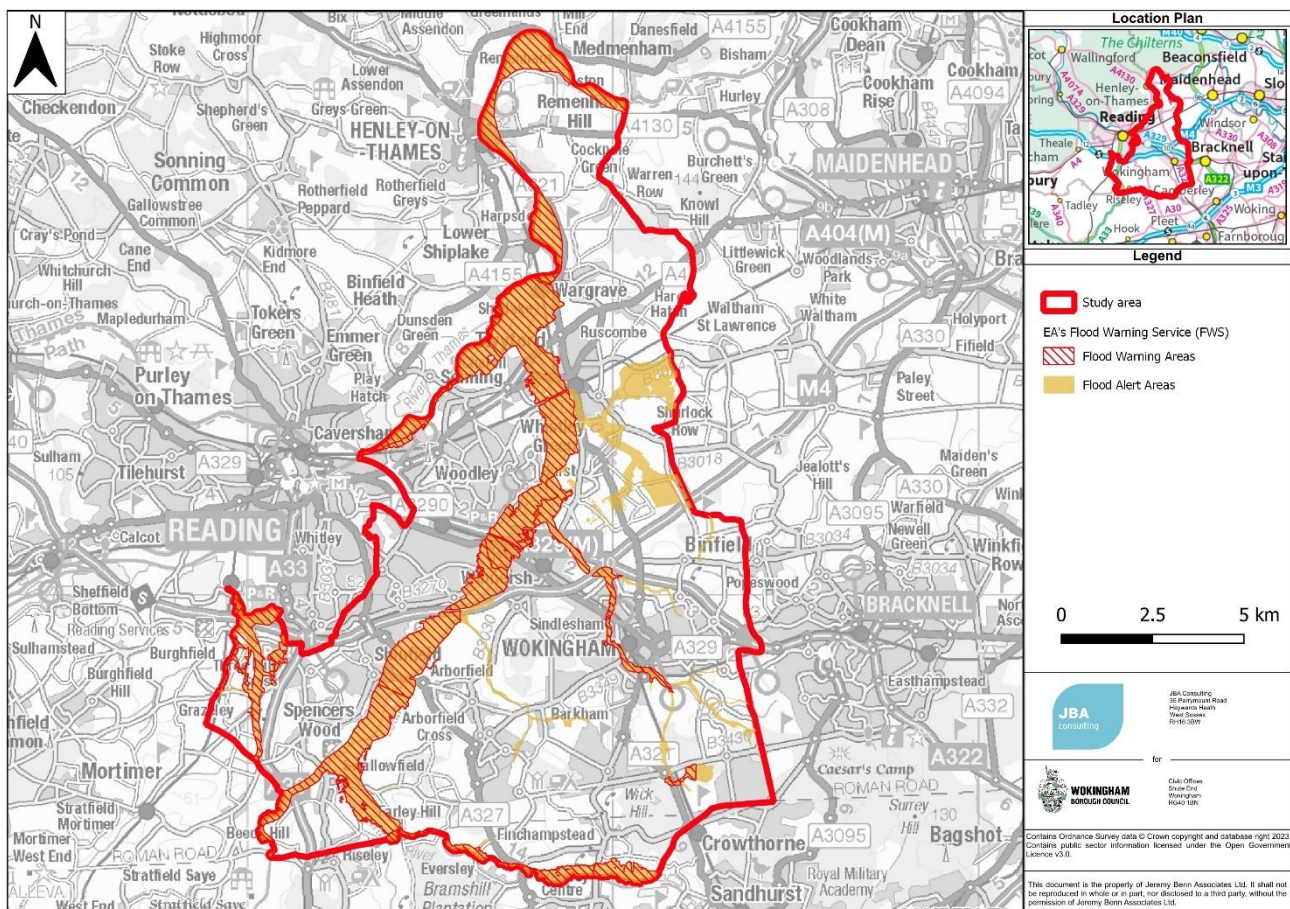


Figure 3-1: Environment Agency Flood Warning and Flood Alert Areas in Wokingham Borough

3.3.2 Community flood plans

It is understood that some Parish councils within Wokingham Borough do have community flood plans. The Parish Council in Charvil (which is located in the north west of the borough) has recently finalised their [Community Flood Plan](#), which can be found on the council's website. Additionally, Swallowfield Parish, has an active Swallowfield Flood Resilience Group that has been engaged in a number of catchment attenuation schemes within the Parish.

It is unknown if there are any additional active community flood groups within Wokingham Borough.

3.3.3 Maintenance

Maintenance is an essential part of managing flood risk. Together with landowners, WBC and the EA are involved in the maintenance of watercourses, drains and similar infrastructure.

The legal responsibility for maintenance of a watercourse lies with the riparian landowners (as set out in Section 5.1.5) rather than the Environment Agency or any other authority. The Environment Agency has permissive powers to carry out maintenance and improvement works on main rivers (such as the River Loddon); however, this is not a duty. The EA's powers allow them to carry out a variety of works to maintain main river channels, assets and structures in order to manage or reduce flood risk to people and property, and to safeguard the health and safety of staff or other river users.

Nationally, the Environment Agency's maintenance works can include weed and grass cutting by hand/machine, channel maintenance, obstruction removal, vermin control, tree/bush work, defence repair, flood reservoir work, structure maintenance and some works to improve habitat and biodiversity. Their maintenance work may occasionally include de-silting or dredging where this is proven to be the most cost-effective way of managing flood risk to people and property, without causing a deterioration of the water body as defined through the Water Framework Directive (WFD). However, the EA are extremely cautious about carrying out de-silting works and only approve limited, localised de-silting where they believe this will have a benefit.

More information on the EA's maintenance programme can be found on the [EA's Asset Management](#) webpage.

4 Catchment characteristics

4.1 Topography

A large proportion of Wokingham Borough is relatively low lying, particularly in Hurst Parish where the majority of the flooding occurred. Hurst Parish is located within the centre of the borough, north of Wokingham Town and south of Whistley Green. The area is characterised by low lying elevations, surrounded by steeper topographies to the north and south of the district. Areas of steeper topography include the town of Wokingham, southeast of Hurst Parish, as well as Wargrave and Remenham, located in the northern part of the district. Figure 3-1 indicates that elevations within and surrounding the study area range between 1.22m AOD and 270.02m AOD.

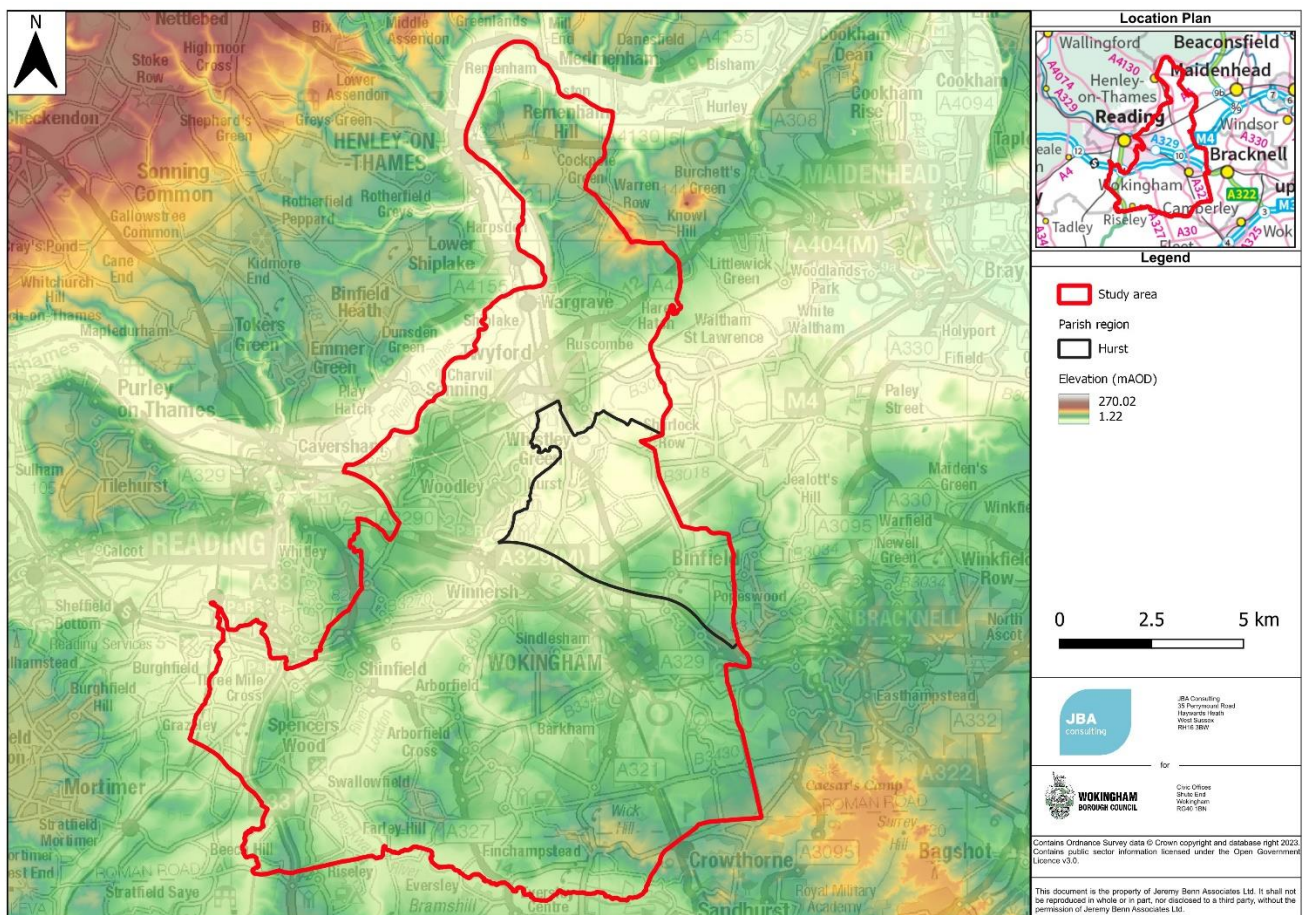


Figure 4-1: The topography of Wokingham Borough

4.2 Geology and soils

British Geological Survey (BGS) 50-kilometre mapping shows that the Wokingham Borough is underlain by different types of bedrock. The north of the borough is underlain by chalk bedrock, classified as a principal aquifer, which indicates that the rock is very permeable. The south-east of the borough is characterised by bands of Bagshot, Windlesham and

Camberley (sand) and Claygate (sand, silt, and clay) bedrock. These rocks are not as permeable as chalk and may be influenced by fluvial food risk as they have reasonable water bearing potential, classed as secondary aquifers. This means that groundwater levels may rise with river level. Areas overlying either principal or secondary aquifers are at risk of groundwater flooding, if the water table reaches the ground surface. The low-lying area in the centre of the district is underlain by River Terrace deposits, characterised by silt, sand and gravel.

[Landis Soilscales Viewer](#) highlights that soil type varies within Wokingham Borough. A significant part of the central study area (area north of Wokingham Town including a southern part of Hurst Parish) is characterised by slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils. These soils are considered to have impeded drainage. Additionally, the majority of Hurst Parish and Wokingham Town is characterised by loamy soils with naturally high groundwater. These are considered to be naturally wet soils, with high water tables.

4.3 Drainage system and river network

Watercourses in England are designated as either 'main rivers' or 'ordinary watercourses' by the EA. The [EA's Statutory Main River Map](#) shows which rivers in England are designated as 'main rivers'

Figure 4-2 indicates the presence of extensive watercourse links within the Wokingham Borough. The River Thames flows eastwards along the northwestern borough boundary. A tributary of the River Thames, known as the River Loddon, flows south, along the eastern fringes of Wokingham Borough. An extensive watercourse network is present within the centre of the Borough (Whistley Green and Hurst Parish), characterised by tributaries of the River Loddon, including the Twyford Brook and the Emm Brook. Hurst Parish is distinguished by a vast drainage network, the majority classified as main rivers.

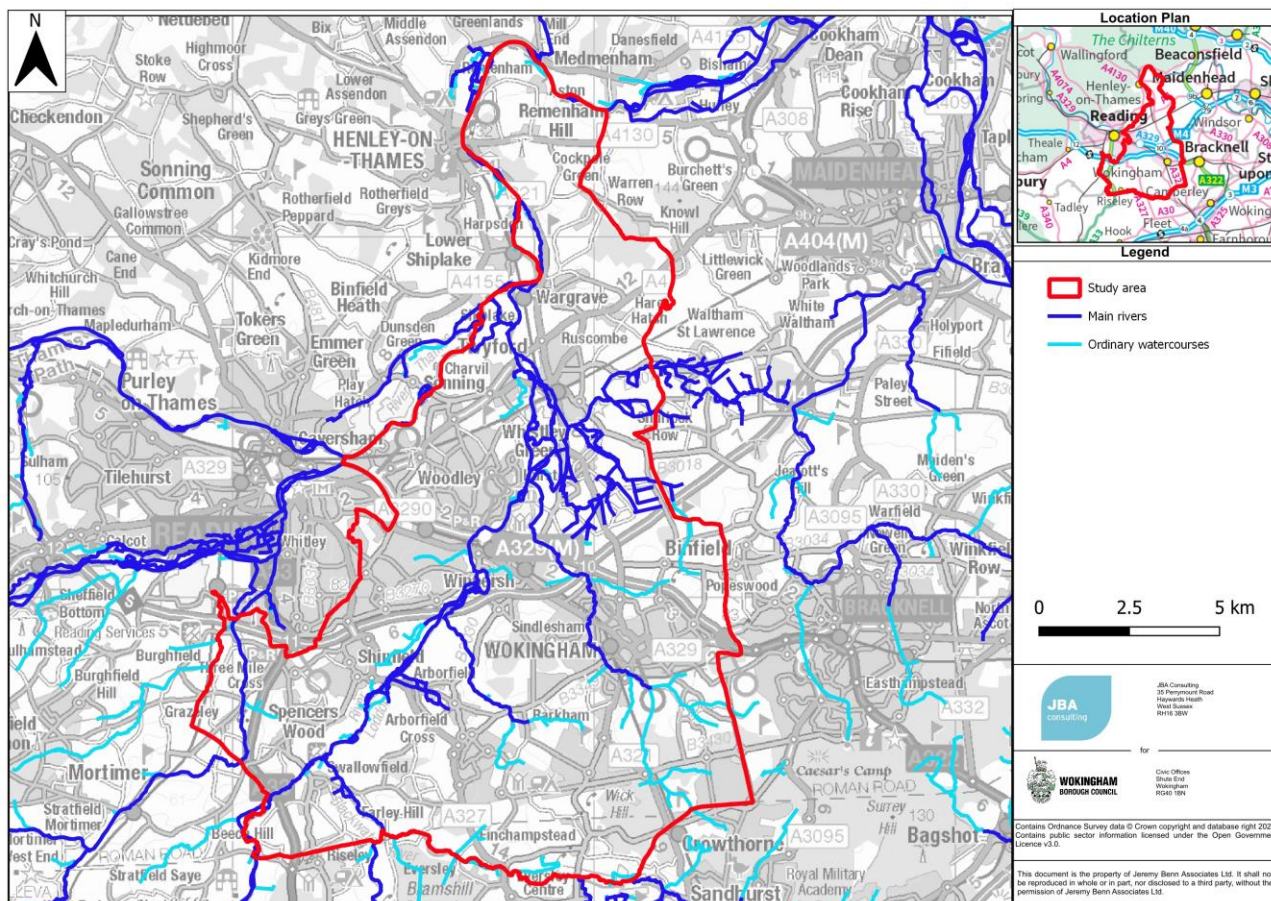


Figure 4-2: Watercourses within Wokingham Borough

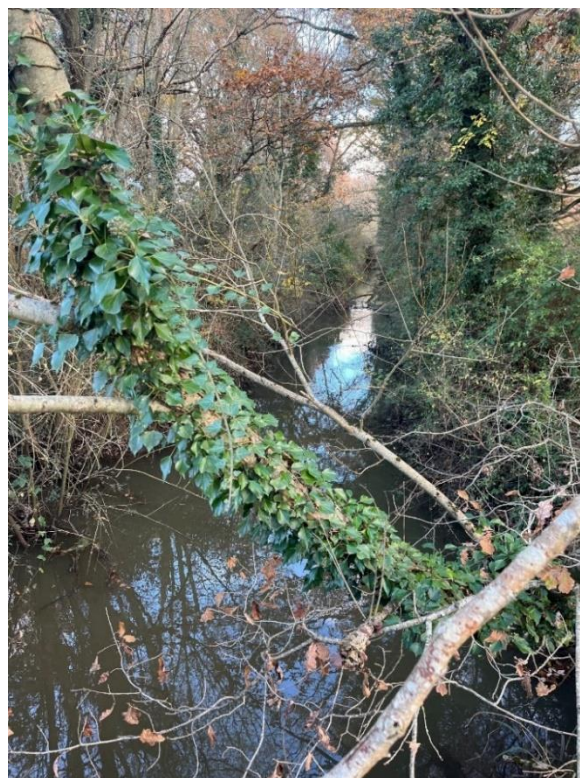


Figure 4-3: Photographs of the Twyford Brook, a Main River in Hurst Parish and Twyford

4.3.1 Assets

The EA'S AIMS database indicates that the average condition of assets within Hurst Parish is classified under the Environment Agency asset condition grades as 'poor' or 'very poor'. These assets are located along many of the ditches in Hurst Parish, specifically located in proximity to properties 1 and 2. Figure 4- 4 indicates that the majority of assets in the area are maintained by either the Environment Agency or private individuals/companies. The condition of the assets maintained by the Environment Agency are shown in Figure 4-5. This shows that the assets located near the affected properties are primarily bridges or culverts with a condition classification of 'fair' or below), indicating the lack of maintenance and/or clearance of vegetation.

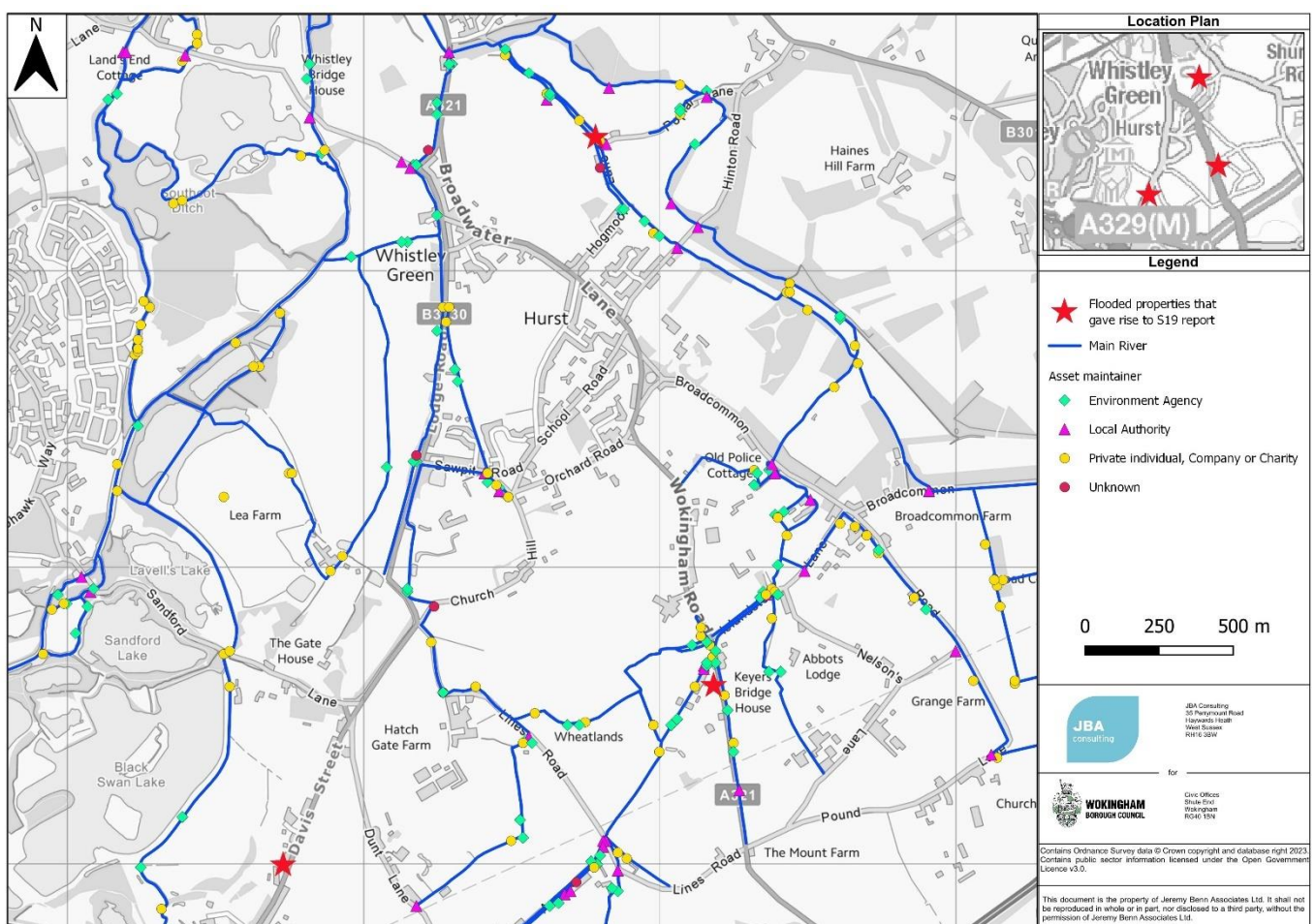


Figure 4-4: Maintenance of assets in Hurst Parish

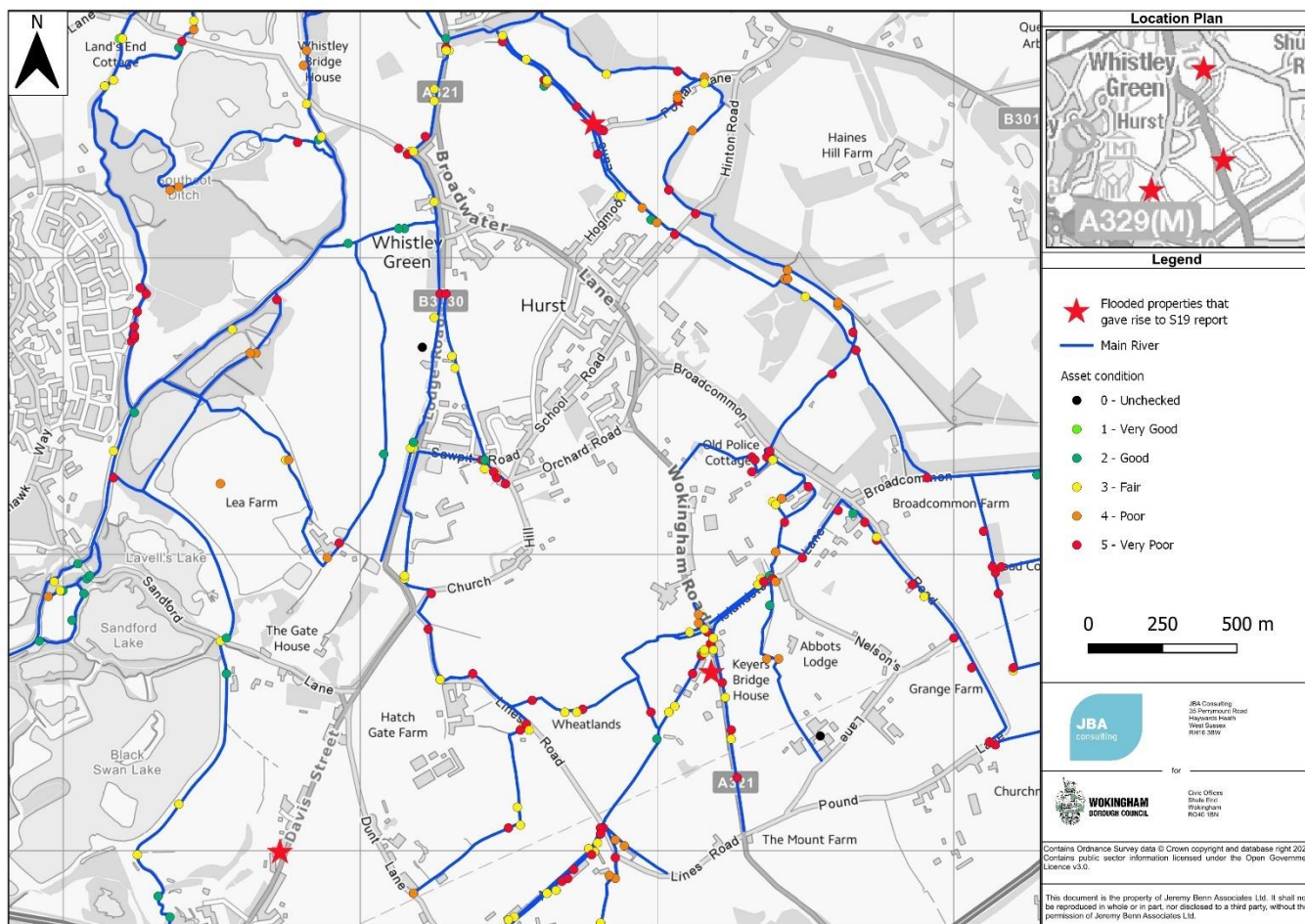


Figure 4-5: Condition of EA assets in Hurst Parish

5 Long-term flood risk information

5.1 Risk of flooding from rivers

The Environment Agency's Flood Map for Planning (Rivers and Sea), shown in Figure 5-1, defines areas at risk of flooding from fluvial and tidal sources. Land within Flood Zone 3 is defined as having a 1.0% or greater probability of river flooding in any given year. Areas within Flood Zone 2 have between a 1.0 % and 0.1% chance of river flooding in any given year. Flood Zone 1 refers to all remaining areas (land having less than 0.1% annual probability of river or sea flooding). It should be noted that the Flood Zones within the Flood Map for Planning (Rivers and Sea) represent undefended flood risk and therefore do not consider existing flood defences or the performance of assets.

It is likely that hydraulic river models have not been developed for drainage networks and ordinary watercourses, and therefore the fluvial flood risk posed by these systems is not represented in the Flood Map for Planning (Rivers and Sea). Areas at greatest risk of fluvial flooding include the low-lying central regions of Wokingham Borough, including the areas of Whistley Green and Hurst Parish.

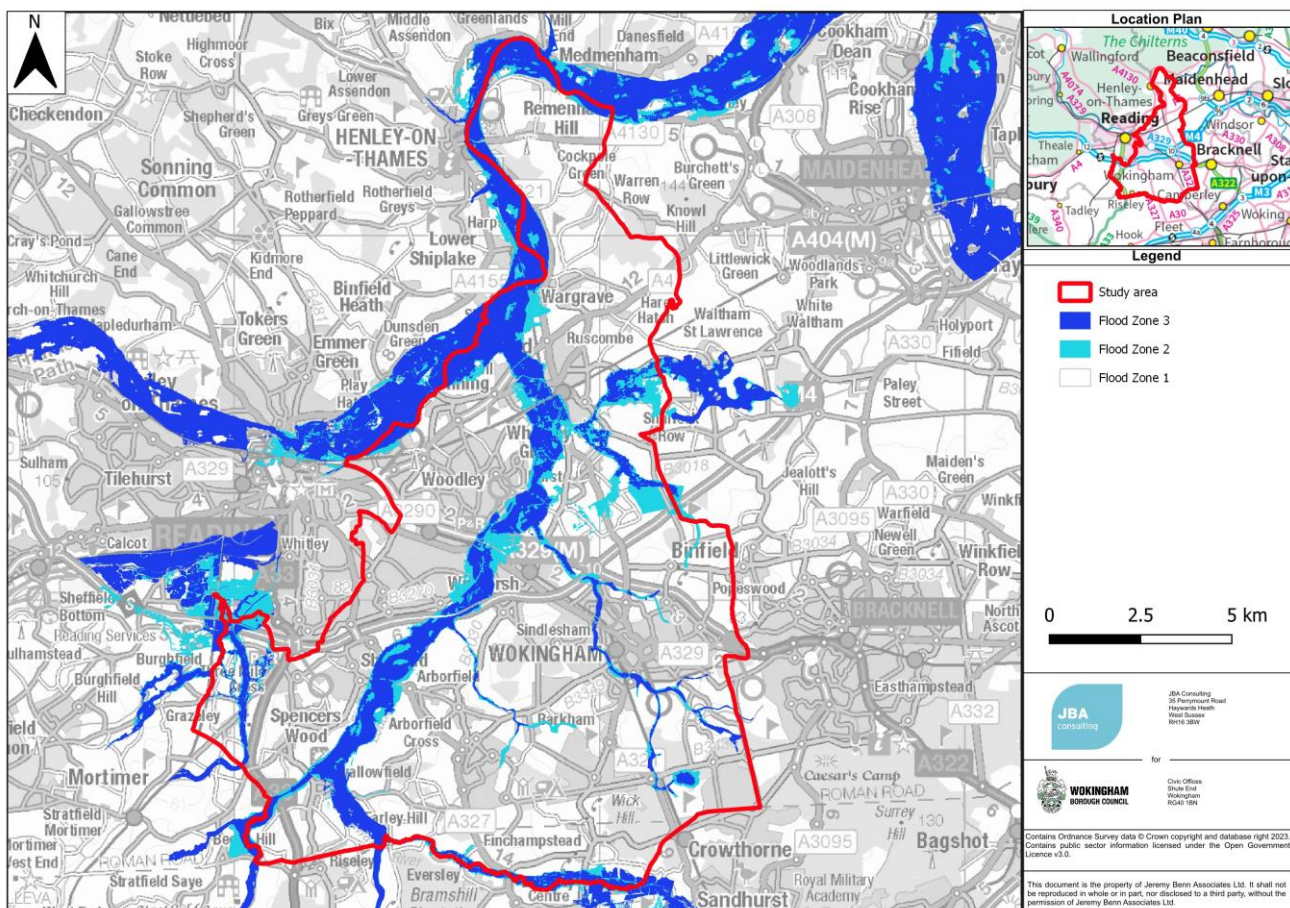


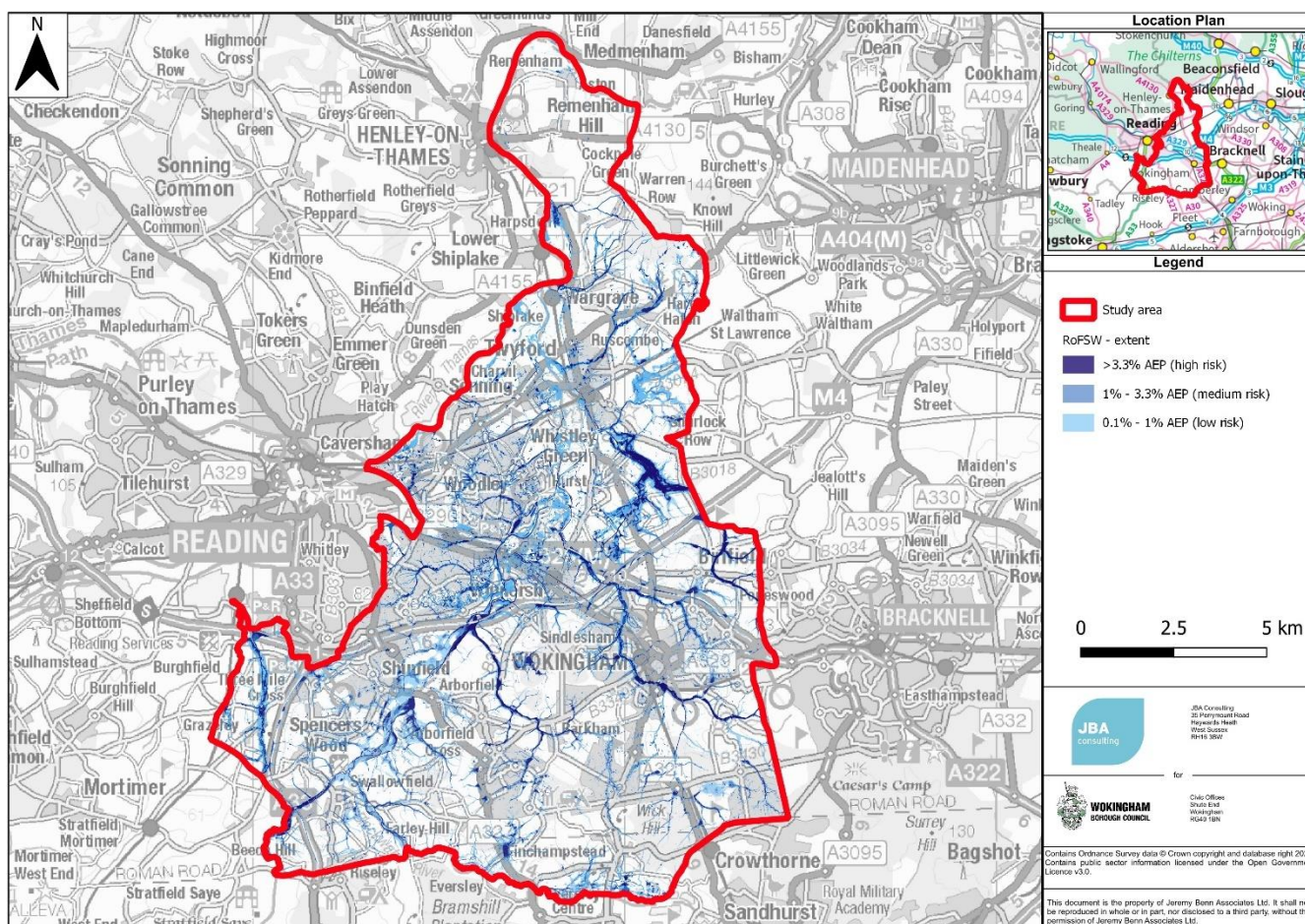
Figure 5-1: Flood Map for Planning (Rivers and Sea)

5.2 Risk of flooding from surface water

Flooding from surface water is caused by intense short periods of rainfall. It often occurs when the natural (or artificial) drainage system is unable to cope with the volume of incoming water. Surface water flooding problems are inextricably linked to issues of restricted drainage (for example due to blockage of drainage systems by debris) and flooding on surface water sewer networks.

The Environment Agency has published the Risk of Flooding from Surface Water (RoFSW) national mapping dataset, which shows the risk of surface water flooding. Figure 5-2 shows the areas at risk of flooding in Wokingham Borough in response to rainfall events with the following percentage chance of an event occurring in any given year (Annual Exceedance Probability):

- High risk – greater than a 3.3% chance (1 in 30-year)
- Medium risk – between a 3.3% and 1.0% chance (1 in 30-year to 1 in 100-year)
- Low risk – between a 1.0% and 0.1% chance (1 in 100-year to 1 in 1,000-year)



5-2: Risk of Flooding from Surface Water (RoFSW) within Wokingham Borough

5.3 Groundwater flooding

Flooding from groundwater occurs when the water table within the underlying rock or soil rises above ground level or interacts with properties or infrastructure below ground level. Figure 5-3 shows the risk of groundwater flooding in Wokingham Borough, indicating the varying levels of risk posed. Generally, a large proportion of the borough has a negligible risk of groundwater flooding, due to the nature of the geology. It is evident that the southeastern part of the district has a high risk of groundwater flooding, including a large area of Wokingham town. Additionally, localised areas of medium and high groundwater risk are identified within the centre of the district, in proximity to the extensive watercourse networks.

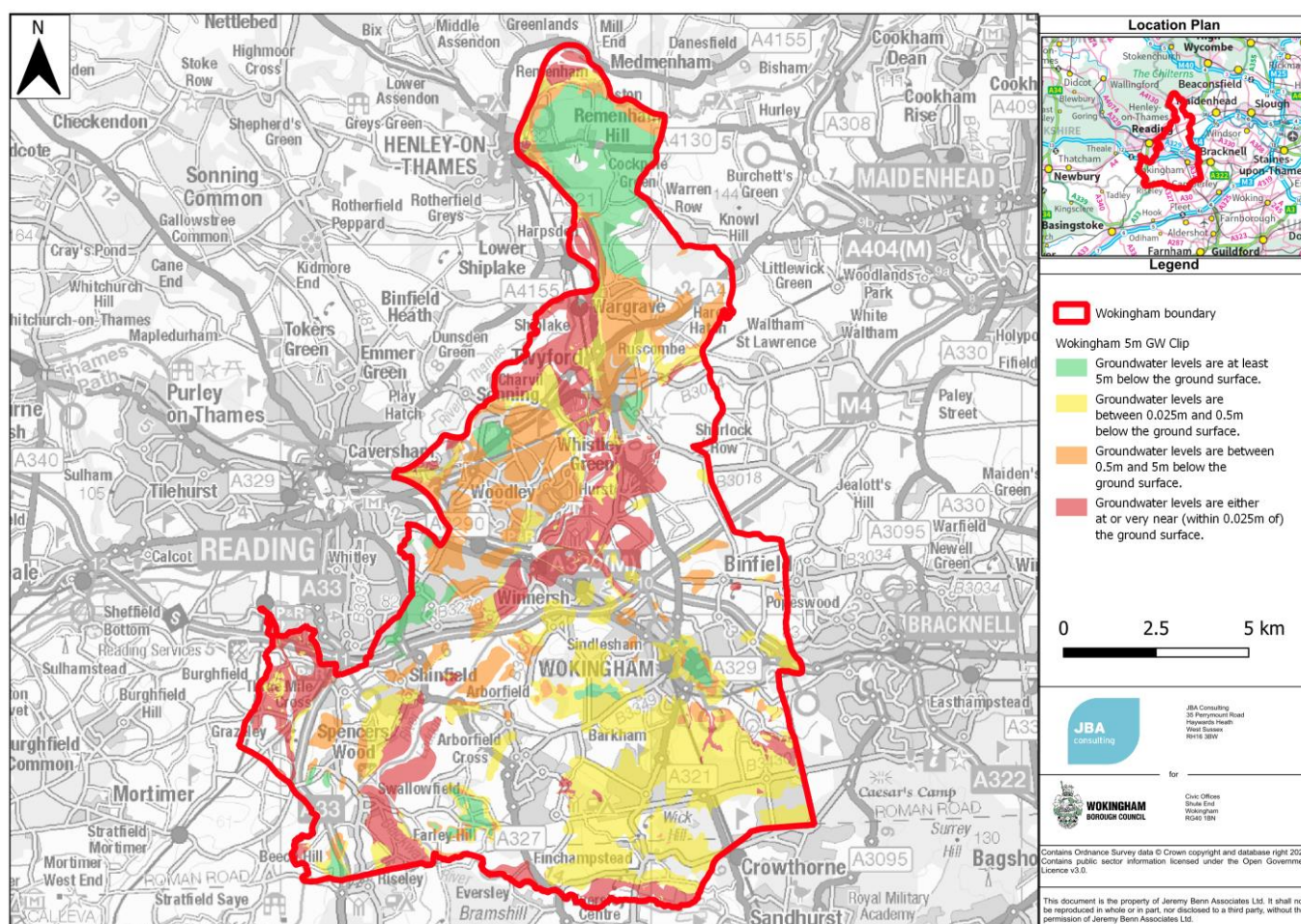


Figure 5-3: Groundwater flood risk within Wokingham Borough

5.4 Flood history

Wokingham Borough Council's Level 1 [Strategic Flood Risk Assessment \(SFRA\)](#), updated in 2023, indicates an extensive historical flooding record within Wokingham Borough. The historical events detailed in the tables below include information provided by Wokingham Borough Council and the Environment Agency. Table 5-1 details the major flood events identified in the Level 1 SFRA, which were recorded by Wokingham Borough Council. Table 5-2 details the flood events included within the [EA Recorded Flood Outlines dataset](#).

Table 5-1: Historic flooding events outlined in Wokingham Borough Council's Level 1 SFRA (2023)

Date	Source of flooding	Description of impacts
March 1947	Local drainage/ surface water	Flooding impacted the west of the Borough. No additional information was provided.
February 1990	Local drainage/ surface water	Flooding impacted the north of the Borough. No additional information was provided.
December 2000	Channel capacity exceedance/ surface water	Approximately 13 highways were flooded across the Borough. At least 10 properties were flooded externally, and 4 internally. Many of the properties affected were located around the urban centre of Wokingham.
December 2003/January 2004	Local drainage/ surface water/ sewer	The flood mostly impacted areas immediately adjacent to the Foudry Brook and River Loddon. No additional information was provided.
July 2007	Local drainage/ surface water	At least 58 highways and 120 properties were flooded externally including many gardens, driveways and garages. At least 80 properties were flooded internally.
2008	Surface water	At least 15 highways and 30 properties were flooded externally including many gardens. Over 25 properties were also flooded internally. Most reported incidences were clustered around Wokingham, Winnersh and Three Mile Cross.
2009	Surface water	One highway flooded in Earley.
January 2013	Local drainage/ surface water	Over 30 highway flooding incidents and 50 properties were flooded externally, mostly across the west of the Borough. At least 35 of the 50 properties were flooded internally.
2015	Surface water	4 highways were flooded in Wokingham and Arborfield. At least 6 properties were flooded in the area, although it is unclear whether the flooding was internal or external.

Table 5-2: Historic flooding incidents shown in the EA Recorded Flood Outlines dataset

Date	Source of flooding	Flood cause	Description of impacts
March 1947	Main river, Other	Channel capacity exceedance, and the	Widespread flooding across the Borough, particularly along the River Loddon and its tributaries, the River Thames, and the Blackwater east of Eversley.

Date	Source of flooding	Flood cause	Description of impacts
September 1968	Main river	Channel capacity exceedance	Areas of flooding along the River Loddon at Twyford and around the railway line crossing, and along the length of the River Blackwater through the Borough.
June 1971	Main river	Channel capacity exceedance	Affects a small area on the western boundary of the Borough along Foudry Brook.
November 1974	Main river	Channel capacity exceedance	Widespread flooding along the River Thames and the River Loddon and its tributaries. Also, some flooding along the River Blackwater at Swallowfield.
August 1977	Main river	Channel capacity exceedance	Flooding along the River Thames along the northwest boundary of the Borough.
December 1981	Main river	Channel capacity exceedance	Flooding along the River Loddon and its tributaries between Twyford in the north and the M4 in the south.
February 1990	Main river Other	Channel capacity exceedance	Widespread flooding along the River Loddon and the River Blackwater and also the River Thames along the northern boundary of the Borough.
February 1991	Main river	Channel capacity exceedance	Flooding along the River Loddon and its tributaries south of the railway line through Twyford.
September 1992	Main river	Channel capacity exceedance the	Flooding along Twyford Brook in the west of the Borough and south of the confluence of the River Loddon and the River Thames.
October 1993	Main river	Channel capacity exceedance	A small are of flooding along Twyford Brook in the west of the Borough and around the confluence of the River Loddon and the River Thames.
December 2000	Main river	Channel capacity exceedance	Widespread flooding along the River Thames and along the River Loddon by Twyford.
January 2003	Main river Other	Other Channel capacity exceedance	Widespread flooding along the River Thames and along the River Loddon north of Dinton Pastures Country Park. Also, a small area of flooding in the west of the area along Foudry Brook.
July 2007	Main river Other	Channel capacity exceedance	Widespread flooding throughout the Borough along the River Thames, the River Loddon and its tributaries.
Winter 2013-2014	Main river Other	Channel capacity exceedance	Channel capacity exceedance Widespread flooding along the River Thames and along the River Loddon by Twyford.

6 Hydrological analysis

6.1 Conditions at time of the event

Rain gauge data was obtained from the Environment Agency's [Hydrology data Explorer](#) service to determine the return period of the storm event on 31 March 2023, and the preceding conditions. The closest tipping bucket rain gauge is the Reading University gauge, located approximately 6km from the centre of Hurst Parish. Additionally, data from the Bracknell rain gauge (located approximately 9km from the centre of Hurst Parish).

The [EA's water situation report](#) for the entirety of the Thames area during March 2023 indicates the month was extremely wet with only three dry days (>2mm). High rainfall throughout the month saturated soils and caused soil moisture deficits (SMD's) to significantly reduce. Additionally, mean river flows increased at the majority of the indicator sites, with all sites except one, reporting a normal or higher flow.

The rain gauges at Bracknell and Reading University indicate that there was rainfall throughout the day of 31 March 2023 in both locations. Rainfall was relatively low and inconsistent until approximately 12:45. Although rainfall depths were low, the event was prolonged, lasting until 19:15 (6.5 hours), with the peak of the event occurring at 15:00 – 15:30. This pattern was consistent across both rain gauges.

The Environment Agency's [Hydrology data explorer service](#) indicates that amount of rain that fell during the month of March 2023 was relatively minimal, although fairly consistent. It is evident that rainfall was recorded at both the Reading University and Bracknell rain gauges, from 06 March 2023 until the storm event on 31 March 2023. Figure 6-1 shows that the rain gauges recorded significantly greater rainfall levels in March 2023, compared to the same month for the preceding three years. Although the amount of rainfall varied throughout the month, it is likely that antecedent conditions exacerbated flooding within the borough. This is also confirmed by the information provided in the EA water report for the Thames area, which highlights high rainfall throughout the month of March, which led to saturated soils, increasing the likelihood of flooding.

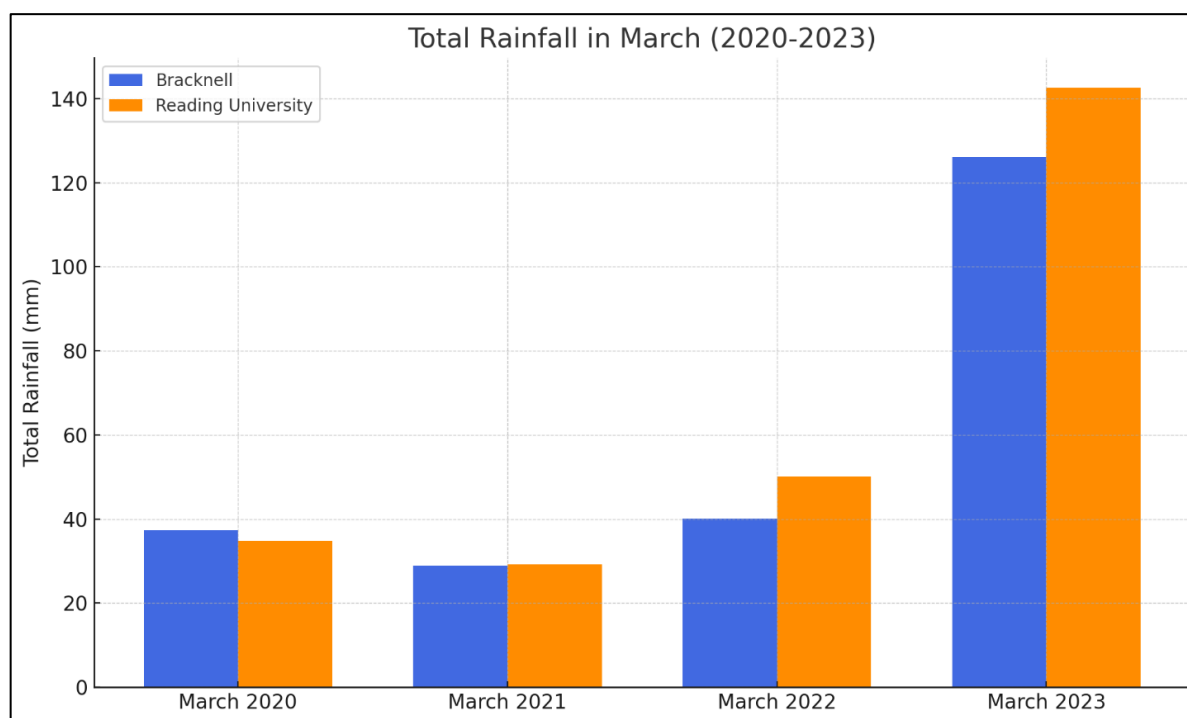


Figure 6- 1: Total rainfall recorded at both rain gauges in March 2023 and March for the preceding three years

6.2 Rainfall return period estimation for 31 March 2023

The rain gauges at Bracknell and Reading University recorded two rainfall peaks in the afternoon, where a significant amount more rainfall was recorded than earlier in the day. The largest peak in rainfall occurred at approximately 15:15 in both rain gauge locations, although analysis shows slight differences in amount of rainfall between these two gauges. The greatest rainfall depth recorded at the Bracknell rain gauge during the storm event was 6.25mm, compared to 4.38mm recorded at Reading University. However, both rain gauges recorded rainfall over the same time period, with an estimated storm duration of 6.5 hours, between 12:45 and 19:15. This indicates that the rainfall pattern recorded during this time period was similar across Wokingham Borough.

Table 6-1: Rainfall totals in the Wokingham area on 31 March 2023

Rain gauge	Daily total on 31/03/2023 (mm)	Total for 12:45 – 19:00 on 21/03/2023 (mm)	Grid reference
Bracknell	37.35	28.92	485782, 171932
Reading University	41.48	31.49	473917, 171906

Figure 6-2 shows the location of the rainfall and river level gauges used within this investigation. The Environment Agency's [Hydrology data Explorer](#) service was used to select gauges in closest proximity to the affected areas. Additional river level gauges are present in Wokingham, however, the 3 shown in Figure 6-2 are nearest to the locations

reported to have flooded on 31 March 2023.

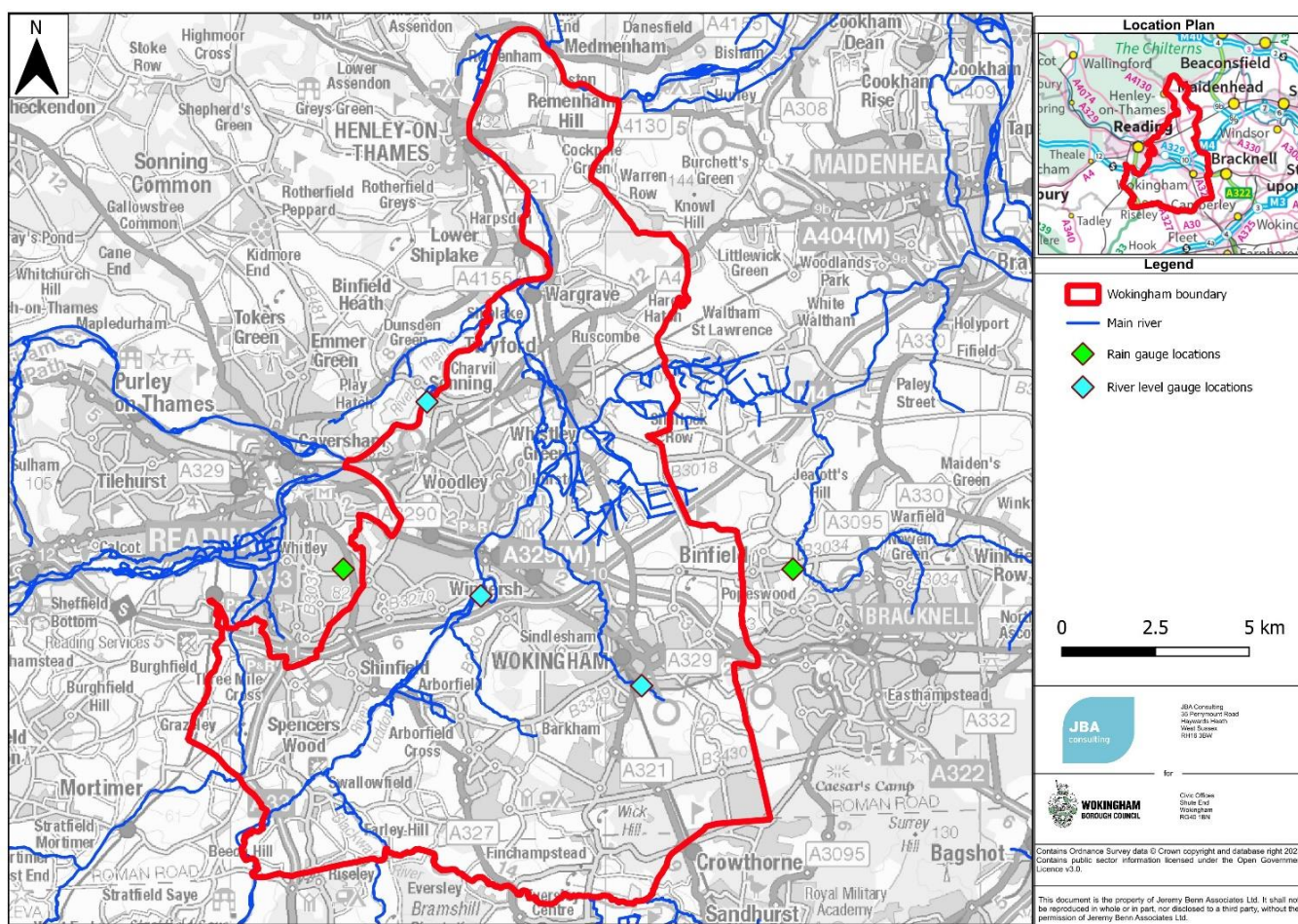


Figure 6-2: Rain and river level gauge locations within and in the vicinity of Wokingham Borough

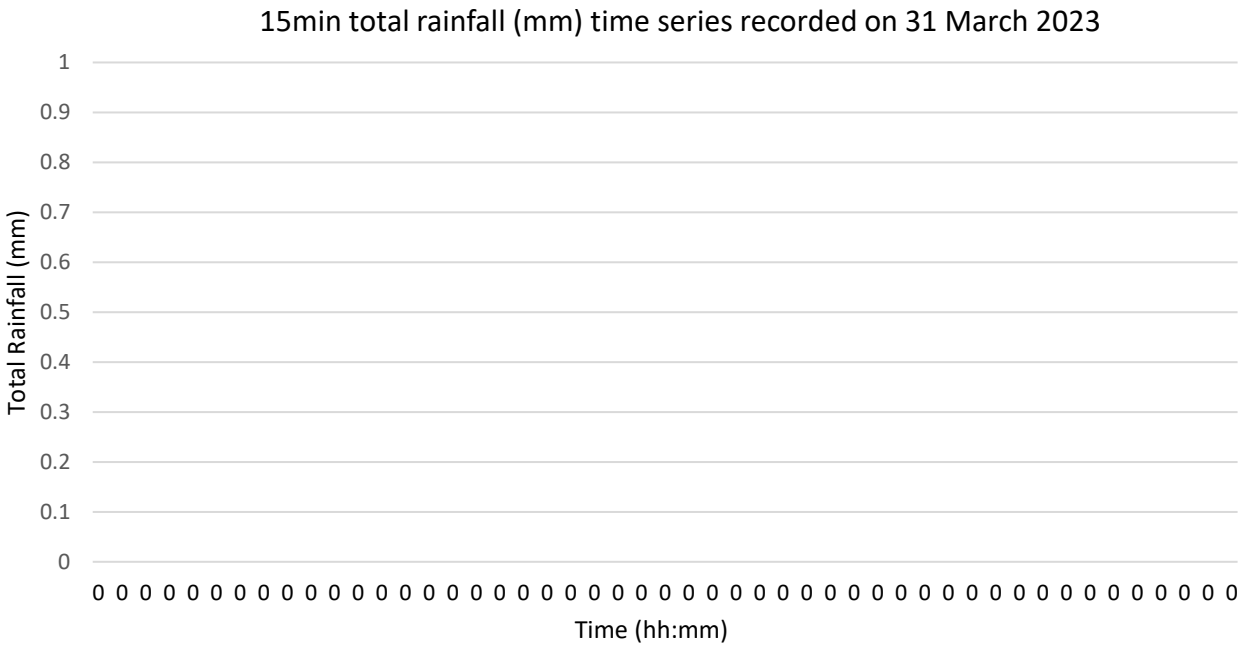


Figure 6-3: Total rainfall on 31 March 2023 from the Bracknell gauge

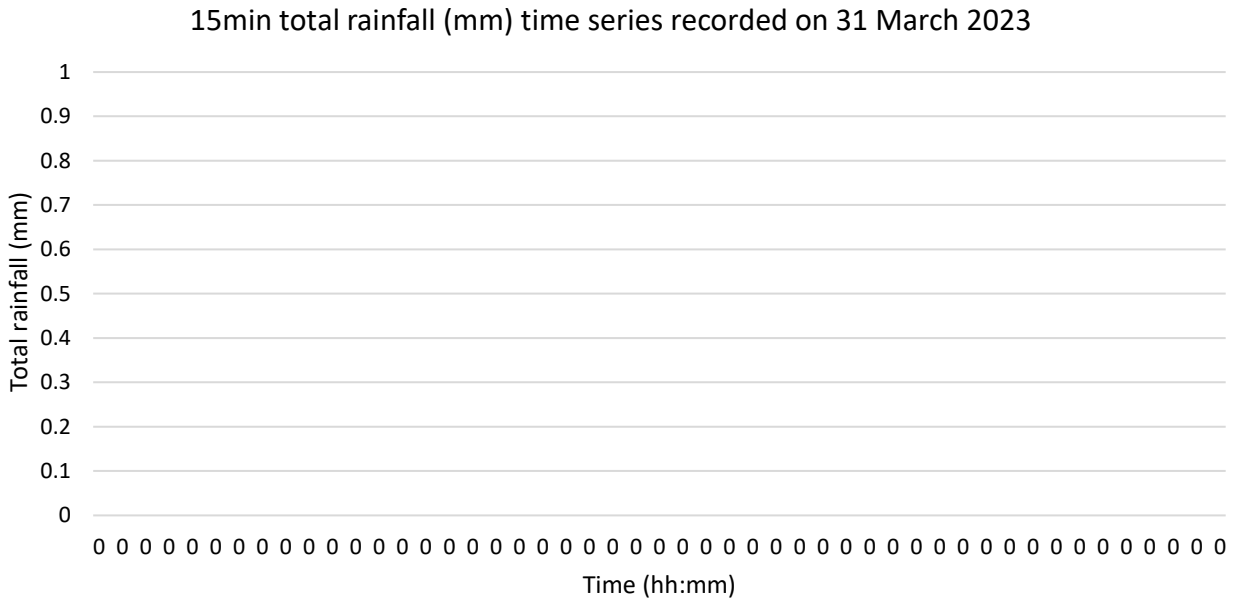


Figure 6-4: Total rainfall on 31 March 2023 from the Reading University Gauge

In order to determine the rarity of the storm event on 31 March 2023, an average of the total rainfall recorded within the 6.5 hour storm duration was calculated. This provided an average of 30.19mm across the two rain gauges.

Using FEH22 (the rainfall depth-duration-frequency model), which considers the catchment characteristics in Hurst Parish; a 6.5 hour storm with a 30.19mm rainfall depth is estimated to have a return period of approximately 1 in 3 years. This

indicates that the rainfall event was relatively frequent and would not be considered an extreme storm event.

6.3 River level conditions

River level gauge data was also obtained from the Environment Agency's Hydrology data explorer service. Table 6-2 provides information on three river level gauges in the vicinity of Wokingham Borough which have been used to analyse the occurrence of fluvial flooding on 31 March 2023.

Table 6- 2: Locations of river gauges assessed for the investigation

Gauge	River	Grid reference
Wokingham	Emm Brook	480970, 167890
Sindlesham Mill	River Loddon	476670, 170280
Sonning Lock	River Thames	475231, 175468

Data shown in Figure 6-5 indicates that river levels were relatively consistent between 15 March and 30 March 2023. Gauge data highlights that at all three locations, river levels peaked on 31 March or within a few days following the storm event. It is evident that the Emm Brook in Wokingham experienced the most significant rise in water levels, reaching a daily maximum water level of 1.74m on 31 March 2023. Further analysis shows that river levels decreased to pre-event levels on approximately 04 April 2023.

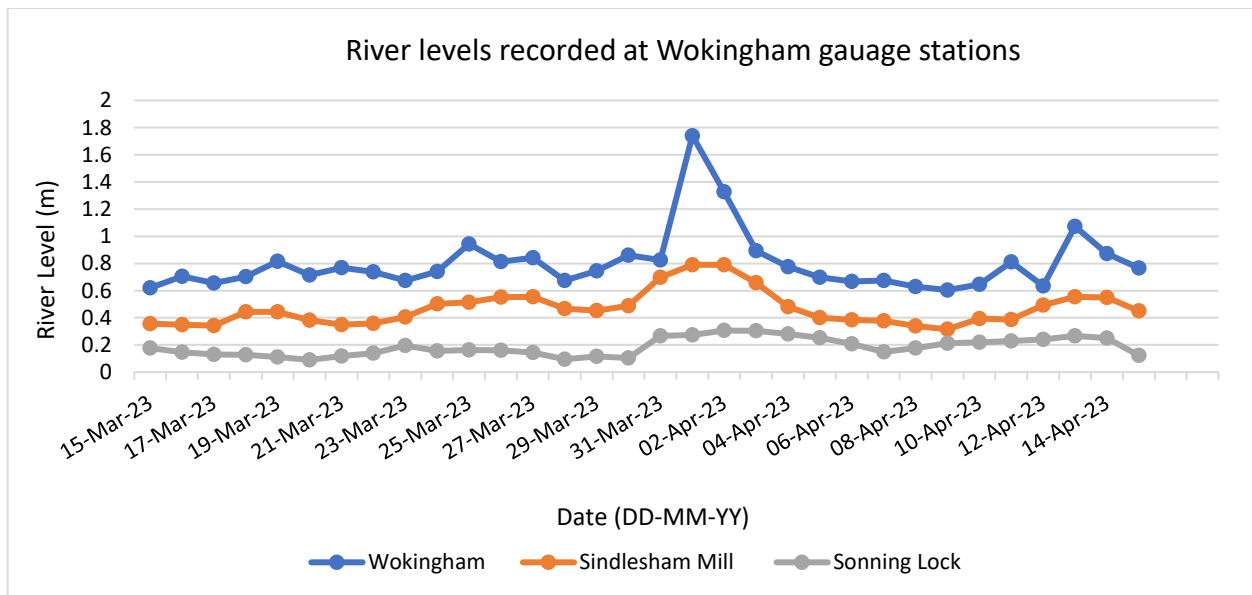


Figure 6-5: Comparison of river level data between 15 March and 15 April 2023

7 Incident response

Several agencies responded to the flooding event in Wokingham on 31 March 2023, including Wokingham Borough Council, WBC's Highways team, Volker Highways, the Environment Agency and the Royal Berkshire Fire and Rescue Service. A timeline of incident response is provided in Table 7-1.

The Met Office issued weather warnings corresponding with the periods of flooding. These warnings covered the Wokingham Borough and were as follows:

- 30th March 2023: Yellow warning of rain issued at 10:01am. Valid between 06:00am and 18:00pm on 31st March.
- 31st March 2023: Yellow warning of rain issued at 20:36pm on 31st March 2023. Valid between 20:36pm and 23:59pm.

The Environment Agency issued a Flood Warning in the evening of 31 March 2023, notifying residents that the Emm Brook was likely to flood as a result of heavy rainfall. Some areas within the Loddon catchment are covered by this Flood Warning Service. However, many of the properties which experienced flooding are located outside of this the Flood Warning Area, indicating that some areas were unaware of the high possibility of fluvial flooding. It is also understood that the EA issued a Flood Alert (for the Lower River Loddon Area) on 31 March 2023.

The first response to the flooding involved correspondence between Wokingham Borough Council and Volker Highways, with WBC requesting the closure of Sandford Lane and Hurst Road (A321) due to highway flooding. Additionally, WBC also responded to the flooding by delivering sandbags to affected properties. Wokingham Borough Council received at least 32 calls from residents between 17:15 and 23:45 during the evening of 31 March 2023, identifying highway flooding issues within the Borough. The majority of these calls were passed on to Volker Highway, who dealt with the issues accordingly. An additional 10 calls were made on 4 April 2023, between 08:26 and 18:06, with residents identifying further highway flooding issues.

Records of calls to the emergency services in response to flooding indicates that the Royal Berkshire Fire and Rescue Service were called out to Sonning Church of England Primary School due to internal flooding. The Fire and Rescue Service deployed pumps to divert floodwater out of the school. There are no other records of calls to the Fire and Rescue Service in response to flooding during March or April 2023.

Table 7-1: Timeline of incident response

Date	Time	Activity/event	Agency
31/03/23	Unknown	Intense rainfall causes internal flooding to at least 6 properties in Wokingham Borough	N/A
31/03/23	Unknown	Highway flooding – Sandford Lane and Hurst road closure	Volkers Highways
31/03/23	Unknown	Pumping out of floodwater from Sonning Primary School	Royal Berkshire Fire and Rescue Service
31/03/23	17:15 – 23:35	Reports of highway flooding from residents – at least 32 calls	Wokingham Borough Council- passed to Volker Highways
31/03/23	Unknown	Sandbags delivered to properties	Wokingham Borough Council

8 Source-Pathway-Receptor analysis

8.1 Hurst – Property 1

8.1.1 Source

Following correspondence with residents from Hurst Parish, it is evident that flooding occurred along Hogmoor Lane due to the exceedance of channel capacity of the ditches running parallel, as well as blockage of an existing culvert located where the road bends northwards. Property 1 is located where Hogmoor Lane meets Poplar Lane and is surrounded by a ditch network (designated as main rivers) which diverges around the east and west sides of the property, as shown in Figure 8-1. The resident has identified that flooding of the watercourse that flows through the garden of the property did not occur, although water levels did rise significantly.

Wokingham Borough Council Flood Investigation Report (Winter 2013/2014) indicates that two unnamed watercourses located in Hurst (referred to as the Green Man Stream and Stow Stream) contained a considerable amount of debris and vegetation, resulting in the flooding of Hogmoor Lane and surrounding area during the 2013-14 flood event. This is similar to March 2023 event, whereby channel capacity exceedance of the Green Man Stream and Stow Stream occurred due to heavy rainfall and significant debris within the channel.

8.1.2 Pathway

The volume of water flowing towards Property 1 was reported to exceed the capacity of the culvert located on Poplar Lane, and floodwater flowed towards the property. Correspondence with the resident indicates that floodwater originated from the ditches surrounding the property.

Hogmoor Lane acts as the main pathway conveying flood water towards the property, with a fall in gradient from the western end of the road (approximately 37mAOD) to the northern end of the road (approximately 36mAOD). This resulted in the accumulation of floodwater in the centre of Hogmoor Lane, as well as around Property 1. Photographic evidence from the event shows significant volumes of water located on Hogmoor Lane and surrounding fields east of the road (Figure 8-2).

8.1.3 Receptor

Property 1 experienced internal flooding on 31 March 2023. Photographic evidence indicates that floodwater flowed along Hogmoor Lane and towards the property, causing internal and external flooding. As a result of the flooding, the resident has since installed large capacity channel drains along the driveway on the western side of the property. Additionally, sheet piling has been installed on the banks of the watercourse that runs through the garden of the property, to manage bank erosion. The resident noted that this

section of the watercourse did not flood during the event, and that flooding originated from the watercourse on the opposite side of the highway.

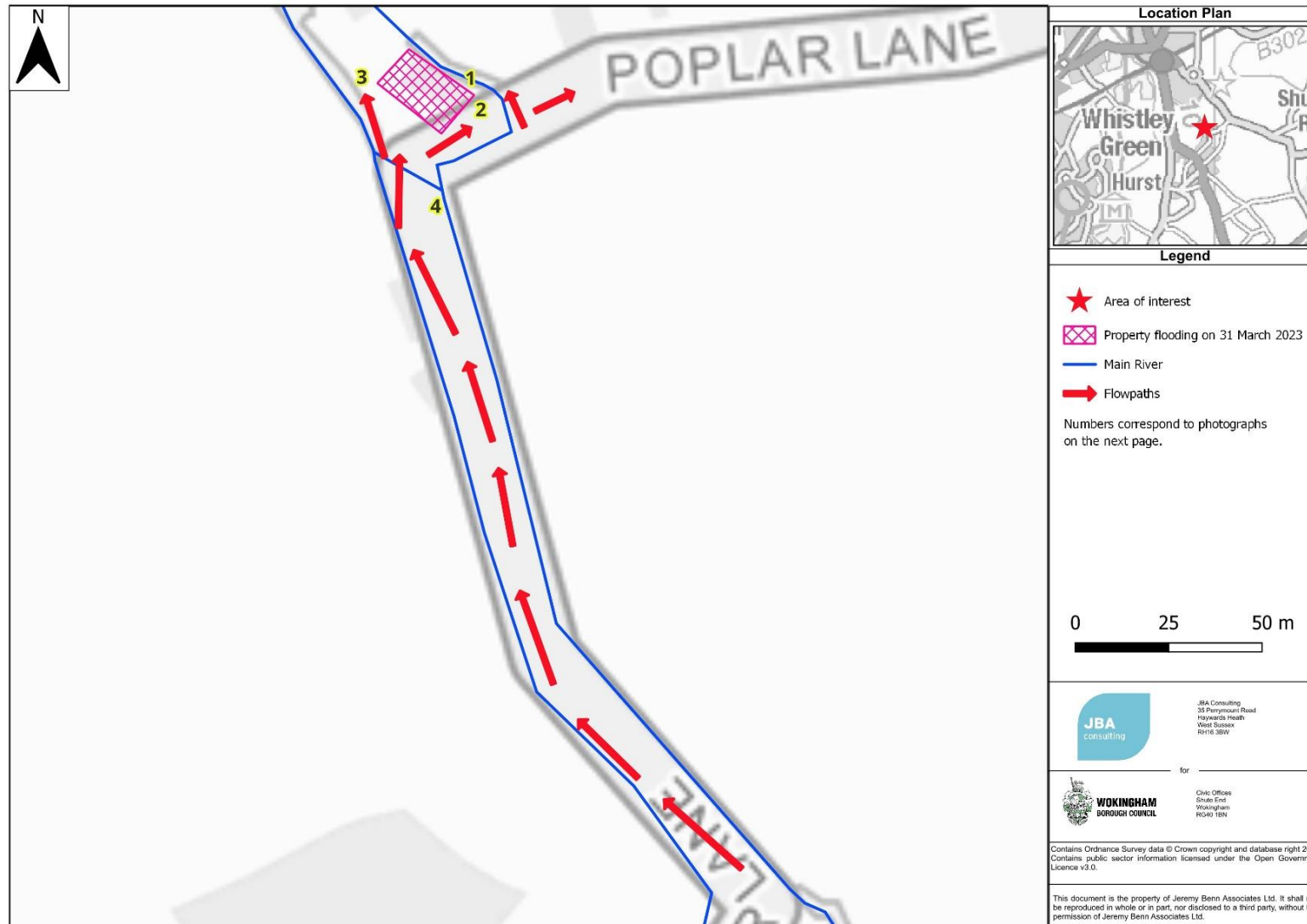


Figure 8-1: Source-Pathway-Receptor mapping for Hogmoor Lane and Property 1 in Hurst Parish



1. Flood water encroaching onto owner's land, up to front of property.



2. Flooding of ditch and field adjacent to Hogmoor Lane



3. Flooding of Hogmoor Lane and adjacent ditch



4. Surface water pooling outside property

Figure 8-2: Photographs of flooding in Hurst Parish on 31 March 2023

8.2 Hurst Parish – property 2

Source Following correspondence with residents, it has been established that intense rainfall experienced on 31 March 2023 caused ditches and watercourses to overflow and flood many areas within the borough. The watercourse located on the eastern side of Wokingham Road (designated as a main river) was unable to cope with the volume of water, resulting in flooding of the main road and Property 2, as shown in Figure 8-3.

Correspondence with residents highlights the issue of vegetation and debris along the ditch and watercourse network in Hurst Parish, which limits the volume of water that can be stored within the ditches. Extreme rainfall combined with restricted channel capacity results in exceedance of channel capacity and flooding to the surrounding areas.

8.2.1 Pathway

Floodwater from surrounding ditches, especially from the densely vegetated watercourse located on the eastern side of Wokingham Road (the A321) would have flowed westwards towards the property, causing external and internal flooding. Flooding was exacerbated by the low-lying topography of the area, and a slight northwards slope along the A321, which resulted in floodwater being conveyed towards the property.

8.2.2 Receptor

Property 2 (shown in Figure 8-3) is the second property in Hurst Parish to have recorded internal flooding on 31 March 2023 as a result of intense rainfall. A video recording taken by the resident shows how flooding affected Wokingham Road (the A321), with water encroaching onto a significant proportion of the driveway and garden, as well as up to the front of the property, where internal flooding occurred. This event, as well as 3 previous occasions of flooding to the property, have caused major concern for the resident.

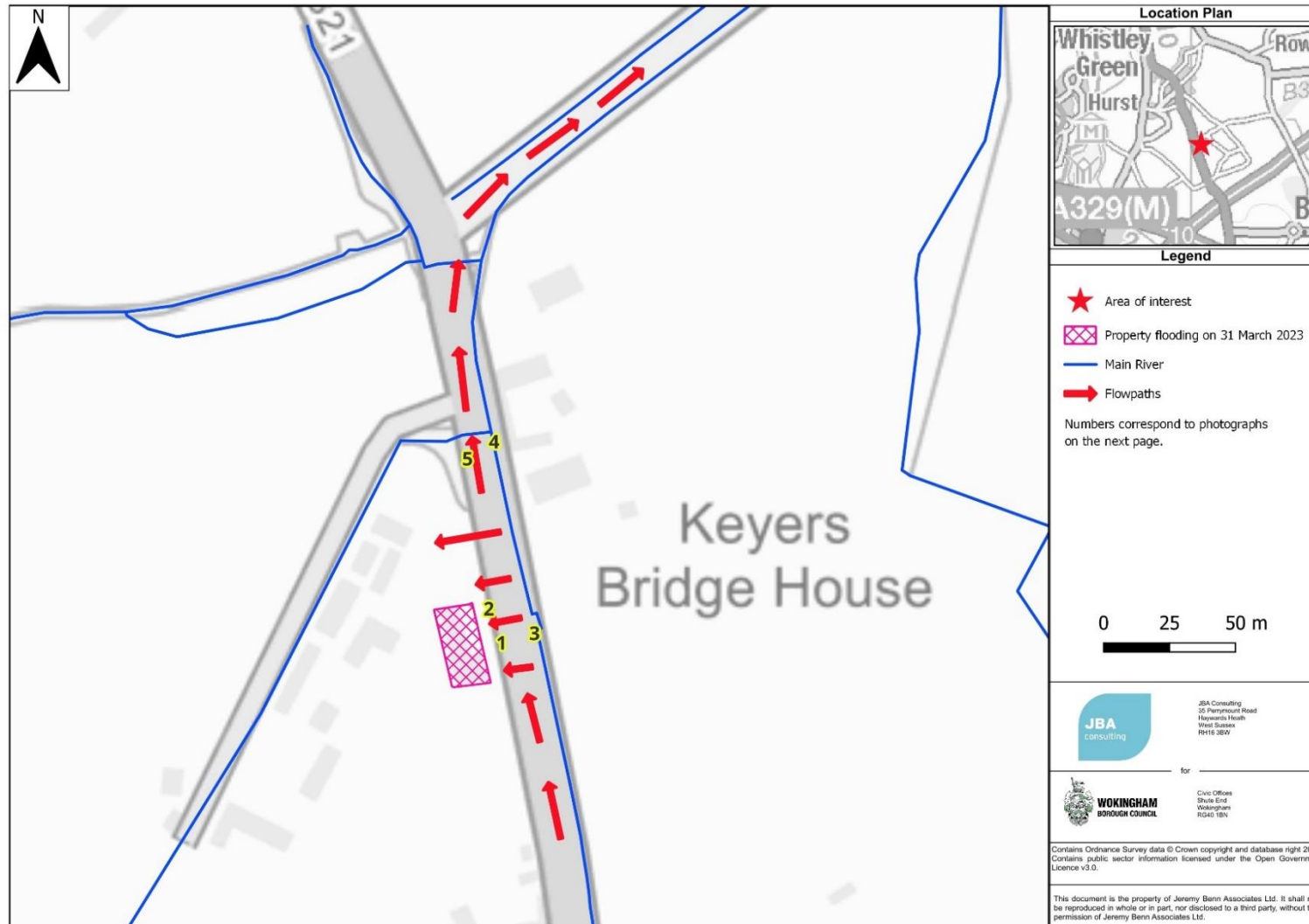


Figure 8-3: Source-Pathway-Receptor mapping for Wokingham Road Property 2 in Hurst Parish



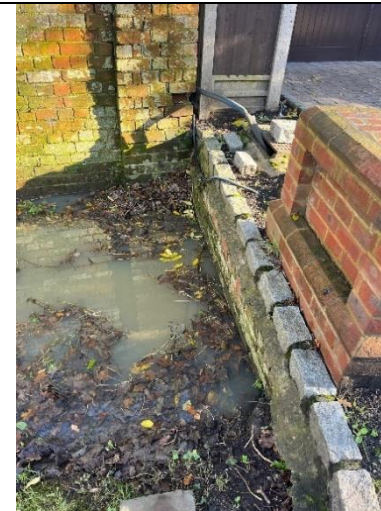
1. Flooding of Wokingham Road and Front drive of property on 31 March 2023



2. Flooding of driveway on 31 March 2023



3. Site visit - high water levels in ditch on east side of the property (taken on 28 November 2023)



4a. Site visit - blocked culvert north of the property (taken on 28 November 2023)



4b. Site visit - ditch downstream from culvert (taken on 28 November 2023)



5. Site visit – ditch on western side of Wokingham Road, north of the property (taken on 28 November 2023)

Figure 8-4: Photographs taken during the flooding event and on the site visit

8.3 Hurst Parish- property 3

8.3.1 Source

The source of flooding at the third property in Hurst Parish was identified to be the ditch (ordinary watercourse) located along the western side of the property. The alignment of the ditch has been estimated in Figure 8-5, as the watercourse is non-main river, and is therefore not included on national river mapping datasets.

Heavy rainfall on 31 March 2023 caused the ditch to overflow onto the adjacent footpath. From discussions with residents, it is likely the channel exceedance may have been caused or exacerbated by the condition of this watercourse. It has been noted that the watercourse is partially blocked with tree roots downstream of the property (Figure 8-5) which has resulted in leaves and debris building up within the channel.

8.3.2 Pathway

Figure 8- 4 demonstrates the pathways of floodwater during the storm event of 31 March 2023. It is evident from photographs taken during the site visit that the ditch is narrow, with limited capacity. As a result, during periods of heavy rainfall, water overtops the banks and flows onto the footpath and towards Property 3.

The topography of the land is flat, with an elevation of approximately 40mAOD along the footpath and on the western boundary of the property. Due to the proximity of the property to the ditch (approximately 7m) and the low elevation, flood water flows directly towards the property.

8.3.3 Receptor

Floodwater from the exceeded ditch flowed towards the property, causing internal flooding on 31 March 2023. Damage to the wooden flooring within the ground floor of the property was reported by the resident, and concrete floors have subsequently been installed. Due to the build-up of vegetation and debris experienced within the watercourse, the property owner now frequently removes vegetation from the ditch, in order to reduce the likelihood of future flooding to the property.

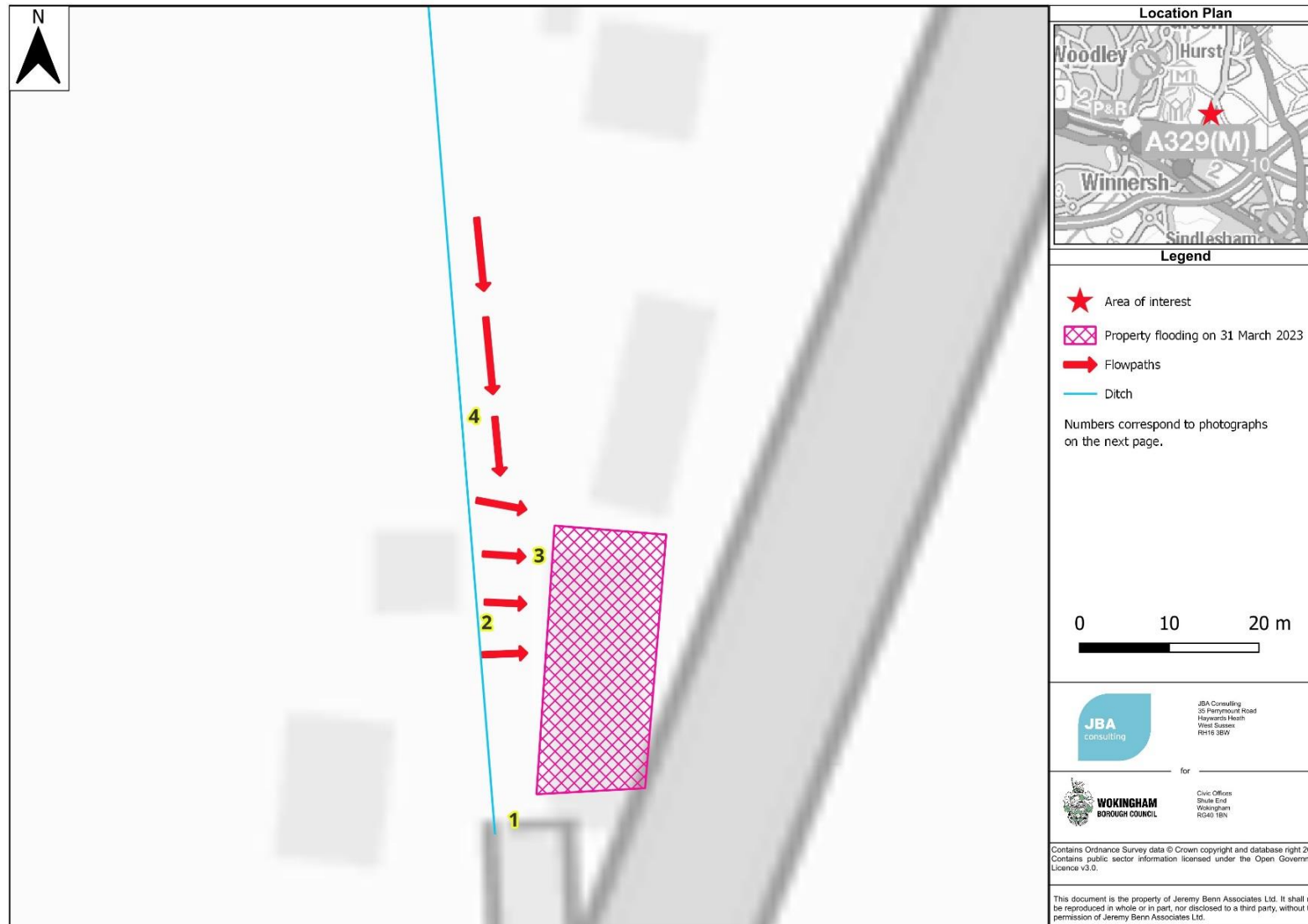


Figure 8-5: Source-Pathway-Receptor mapping for property 3 in Hurst Parish

	
1. Footpath and ditch from the south of the property	2. Ditch on the western side of the property
	
3. Western side of property, adjacent to the footpath and ditch	4. Ditch on the western side of the property

Figure 8-6: Photographs of the property and surrounding ditch taken on 28 November 2023

8.4 Wokingham town centre – Property 4

8.4.1 Source

The Emm Brook, a tributary of the River Loddon, was the source of flooding on 31 March 2023 to Property 4, in Wokingham town centre (shown in Figure 8- 7). As a result of intense rainfall, river levels rose, and water overtopped the banks. The Emm Brook flows in a southeasterly direction, approximately 5m away from the eastern side of the property.

8.4.2 Pathway

The flow path of floodwater is likely to have originated from the Emm Brook on the eastern side of the property. Water then flowed southwest towards the roundabout along Finchampstead Road, where significant surface water pooling occurred. Additionally, water followed the natural topography towards the property, causing internal flooding. It is likely that water from the Emm Brook flows along the footpath on the south side of the property creating an additional pool of floodwater southeast of the premises. A tributary of the Emm Brook is also present south east of the property, as shown in Figure 8-7.

8.4.3 Receptor

These flow paths caused internal flooding to the property on 31 March 2023 after significant rainfall. The entire ground floor was damaged as a result of the flooding, and the residents were forced to move out of the property. Flooding also impacted the roundabout, which became inundated. It is evident that the property located adjacent (northwest) to Property 4 was not affected by flooding on 31 March 2023 as this is located closer to the main road, where there is a slight increase in elevation.

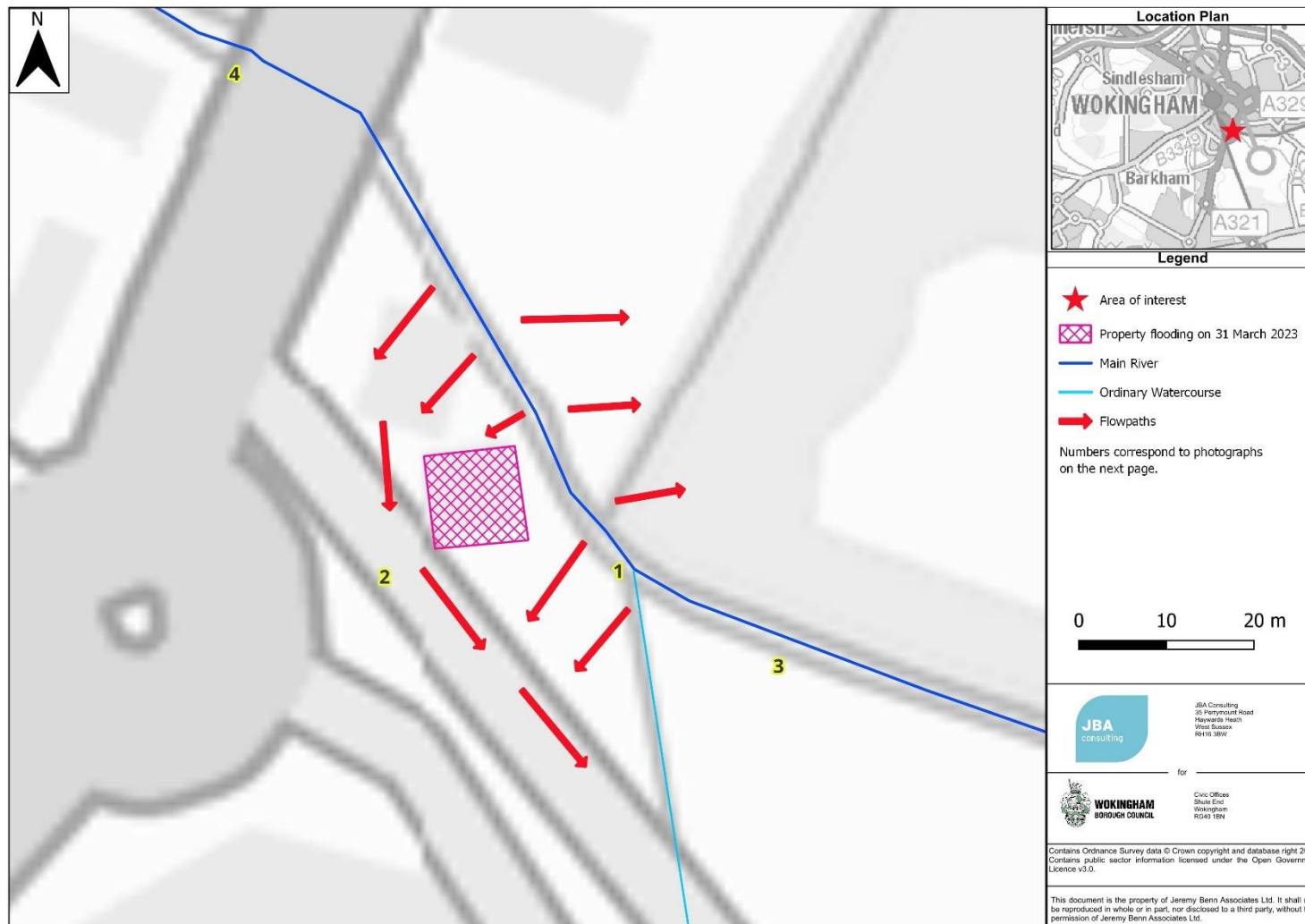


Figure 8-7: Source-Pathway-Receptor mapping for property in Wokingham town centre

	
1. The Emm Brook River flowing eastward alongside the property	2. Footpath with a shallow ditch southwest of the property
	
3. River level gauge station located southeast of the property	4. The Emm Brook river from the bridge on Finchampstead Road

Figure 8-8: Photographs of the property in Wokingham and surrounding area taken on 28 November 2023

8.5 Earley – Property 5

8.5.1 Source

The source of flooding at Property 5 in Earley on 31 March 2023 was heavy rainfall exceeding the channel capacity of a watercourse (tributary of the River Loddon) which flows westwards across the settlement. The watercourse is located approximately 30m north of the property.

8.5.2 Pathway

Figure 8- 9 identifies the pathways of surface water on 31 March 2023. This indicates that floodwater flowed along Mill Lane from the watercourse, pooling within the boundary of the property and in surrounding areas. Across the area of Earley, it is evident that significant flow paths of fluvial flood water form along many roads and lanes, which result in less extensive pooling of water, due to the steeper topography of the area.

8.5.3 Receptor

Internal flooding of Property 4 in Figure 8-9 occurred during the mentioned storm event. It is unknown whether the property was damaged as a result of this flooding incident. Roads, including Mill Lane, were also affected by flooding.

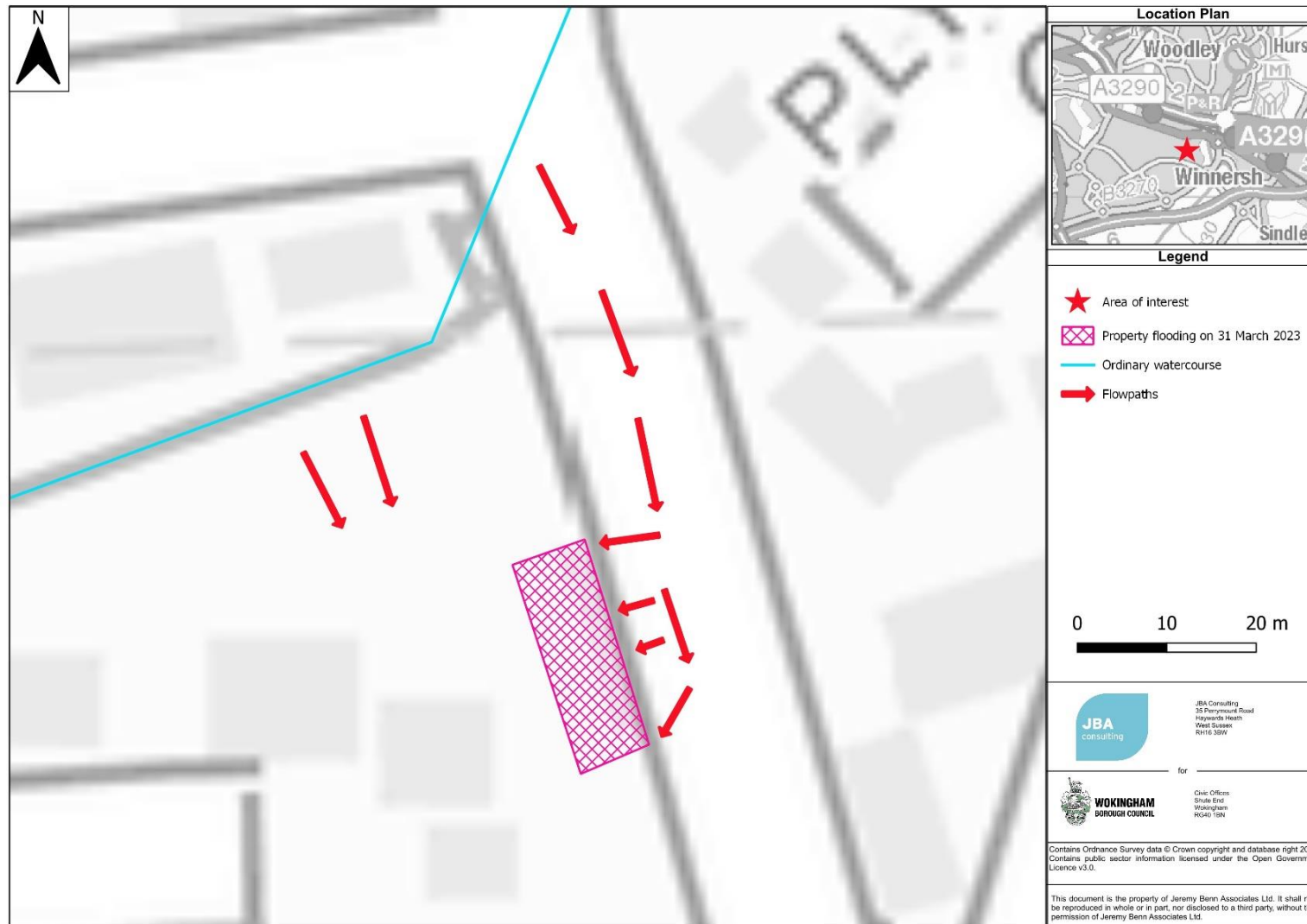


Figure 8-9: Source pathway receptor mapping for Property 4 in Earley

8.6 Additional property flooding

In addition to the property flooding detailed in this section, the storm event on 31 March 2023 is likely to have caused internal flooding to further properties. Berkshire Fire and Rescue service recorded internal flooding of the Sonning Church of England Primary School, which is located in Sonning near Reading. However, it is unknown whether flooding occurred to additional properties in the Wokingham Borough during this rainfall event, due to the absence of further flooding reports.

9 Conclusions and Recommendations

9.1 Conclusions

The flooding that occurred in Wokingham on 31 March 2023 caused internal flooding to at least 6 properties, the majority of which were located in the parish of Hurst. Wokingham Borough Council, as the Lead Local Flood Authority, has exercised their power to undertake a Section 19 investigation, as the event fulfilled its criteria of '*Internal flooding to habitable property*'. The Council appointed JBA Consulting to undertake this investigation on its behalf.

Analysis of rain gauge data from the 6.5 hour storm event that affected Wokingham on 31 March 2023, indicates that the storm is estimated to have a return period of approximately 1 in 3 years. This is therefore considered to be a frequent, relatively insignificant rainfall event. However, the catchment was highly saturated prior to the event due to high levels of rainfall throughout March 2023. The rainfall experienced in Wokingham caused an increase in river and ditch levels around the Borough, particularly the in the parish of Hurst. This resulted in the exceedance of channel capacity and the blockage of culverts by debris conveyed in the channel, leading to flooding of surrounding roads and properties. Correspondence with residents during the site visit on 28 November 2023 highlighted several problems with extensive vegetation growth and lack of maintenance on watercourses within the borough.

The main flood pathways in Hurst Parish originated from the extensive ditch network within the area. It is evident that roads, footpaths, and property gardens acted as conduits, channelling water to towards the affected properties. It is indicated that water flowed northwards along Hogmoor Lane, before pooling at the junction of Poplar Lane, where flooding occurred at Property 1, as detailed in Section 8. Additionally, a significant pathway formed along Wokingham Road, flowing in a north easterly direction towards Island Stone Lane. At this location, flooding of the ditch (classified as a main river) on the eastern side of Wokingham Road caused internal flooding to Property 2 in Hurst Parish. A further flooding incident in Hurst Parish was recorded with flooding of a smaller ditch, causing internal flooding of a third property. The majority of flooding in the Borough during the 31 March 2023 event appears to have been concentrated in Hurst Parish, although two further properties in Wokingham town centre and Earley were also affected by flooding.

Wokingham Borough Council received a significant number of calls concerning the flooding and consequent highway issues. Incident calls were received between 17:15 and 23:45 on the evening of 31 March 2023, the majority of which were passed onto Volkers Highway and dealt with accordingly. Additionally, Flood Warning and Met Office Weather Warnings were issued, but the residents affected by the flooding were outside of fluvial flood warning areas. Only one 'flooding' call out was recorded to the Royal Berkshire Fire and Rescue Service during the event, where flood water entered a Primary School in Sonning, Reading, and was subsequently pumped out.

9.2 Recommendations

Based on the identified causes and mechanisms of flooding, potential options to mitigate flood risk and/or damage to property have been considered. This includes consideration of measures such as watercourse maintenance and riparian awareness, flood attenuation, community flood preparedness and Property Flood Resilience (PFR).

It should be noted that landowners have prepared a plan to better manage flood risk in Hurst Parish 'Addressing Flooding in Hurst', this has been attached as Appendix A. An additional site visit was undertaken on 18 January 2024 by WBC, the EA, ward and parish councillors and key landowners to explore these options in more detail.

9.2.1 Watercourse maintenance plan and riparian awareness

It is recommended that Wokingham Borough Council as LLFA, identify riparian owners in Hurst Parish and advise of riparian responsibilities. The Environment Agency, in partnership with the riparian owners, should consider an enhanced maintenance schedule for the extensive watercourse systems within the parish.

This is the most important recommendation detailed in this section, as the flooding experienced in Hurst Parish on 31 March 2023 was strongly linked to a lack of capacity along main river and ordinary watercourse systems, due to the presence of debris or heavy vegetation growth, as shown in Figure 9- 1. Therefore, taking preventative measures towards managing vegetation and debris along the watercourses is a key priority, to prevent a similar event happening in the future. It is important to note that channel maintenance is carried out sympathetically in relation to the ecology and habitat, to protect the species that live in and use the watercourses. It is also important ensure that any channel maintenance carried out works with natural processes and not against them.

One of the suggestions of the report prepared by landowners is the importance of maintaining flow in the Twyford Brook. The report recommends that all obstructions within the Twyford Brook, especially from the A321 (Hurst Road) bridge to Twyford station, to prevent water backing up towards Hurst Parish should be cleared. This Section 19 reiterates the importance of this as the Twyford Brook will play a key role in allowing flows from watercourses upstream to be discharged.

It is recommended that WBC as LLFA work in partnership with the EA and local residents to develop a riparian maintenance plan and ensure that riparian awareness is acknowledged and understood.



Figure 9-2: Photographs showing presence of vegetation growth in watercourses in Hurst Parish

9.2.2 Flood attenuation

Options for providing flood attenuation in the affected locations is also recommended, in order to slow down the flow of water reaching properties. By diverting some of the river flow out into storage ponds, a proportion of the flood water is stored during the periods of highest flow, and slowly released back into the river once there is capacity again. This reduces the volume of river flow reaching downstream properties and other receptors. Attenuation of floodwater can also be achieved by using natural flood management techniques. Examples include planting hedgerows and trees in upper catchments, to allow water to be intercepted before it reaches rivers, as well as installing woody debris dams within channels, which slow the water by increasing resistance to flow.

Controlling the water flow by reducing the process of dredging in the Haines Hill area, which lies east of Hurst Parish could lead to improvements in managing flood risk. This approach aims to slow down the water, allowing Twyford Brook to handle excessive volumes more effectively during periods of heavy rainfall. Additionally, installing a weir at Stanlake is proposed to provide attenuation and reduce flood risk. Providing flood attenuation will require the cooperation of local landowners, who would need to agree to occasional flooding of their lands as part of the effort to slow the water's advance toward Hurst Parish. The EA have been consulted in regard to this proposal, who advise that the installation of a weir in a main river would require a Flood Risk Activity Permit (FRAP) and possibly planning permission. Additionally, it is a legal requirement that fish passage would need to be secured on any new obstruction, such as a weir or dam. Therefore, the EA advise that more information would be needed and suggest that a site visit is arranged to discuss options.

It is recommended that Wokingham Borough Council, works in partnership with local landowners and the Environment Agency, to investigate the feasibility of flood attenuation measures in Hurst Parish, to mitigate flood risk in the area.

9.2.3 Community flood preparedness

Residents are encouraged to find out about possible flood risk in the area and to find out if their property is at risk¹. It is recommended that the individuals at risk of flooding make a personal flood plan, which sets out a list of actions which can quickly be put in place during a flood event to minimise the disruption caused. Guidance and a personal flood plan template is provided by the Environment Agency and can be found on the Government website^{2, 3}.

Communities can also work together to improve their resilience and plan for future flood events. Wokingham Borough Council could assist communities in Hurst Parish, Wokingham and Earley in setting up a Flood Action Group, to plan and prepare for flooding.

1 [Check the long term flood risk for an area in England - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

2 [How to plan ahead for flooding - Check for flooding - GOV.UK \(check-for-flooding.service.gov.uk\)](https://check-for-flooding.service.gov.uk)

3 [Personal flood plan - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

It is evident from looking at the EA's Flood Warning and Flood Alert Area mapping that Properties 1, 2 and 5 are located within a Flood Alert Area, with only Property 5 located within an EA Flood Warning Area.

9.2.4 Property Flood Resilience

It is also recommended that WBC and the Environment Agency investigate funding opportunities for installing PFR measures at the flooded properties in Hurst Parish and the wider area. This recommendation is also an important mitigation measure, as it reduces the likelihood of localised property flooding.

PFR measures include implementing barriers for doorways, portable puddle sucker pumps and sump pumps with associated drainage outlets. As the properties are isolated and have flooded from different sources, PFR may be an appropriate solution (where the property construction is suitable for such measures).

Further information can be found on the following websites:

- [FloodRe](#)
- [National Flood Forum](#)
- [Blue Pages](#)
- [Be Flood Smart](#)
- [BeFloodReady](#)

9.2.5 Improved asset maintenance regime

It has been identified that a significant contributing factor to the flooding on 31 March 2023 was the blockage of culverts and other assets as a result of high rainfall and significant debris and vegetation growth within channels. Regular clearance and maintenance of assets is important to ensure the effective flow of water through these structures.

It is evident from the EA's AIMS dataset that the average condition of assets within Hurst Parish is classified under the Environment Agency asset condition grades as 'poor' or 'very poor'. The condition of bridges/ culverts located in proximity to the affected properties in Hurst Parish is classified as 'very poor', indicating the lack of maintenance/ clearance of vegetation.

Increased asset maintenance in priority areas could help to mitigate flood risk to the affected properties, by reducing the amount of water leaving watercourses and ditches and flooding roads and properties. Areas of interest for improved maintenance of watercourses and ditches include:

- Wokingham Road, towards Islandstone Lane
- Hogmoor Lane and Poplar Lane

A Addressing flooding in Hurst

Addressing flooding in Hurst

January 2024

If the threat of flooding in Hurst is to be addressed during periods of intense rainfall, the amount of water pooling in the village needs to be mitigated. Whilst the nature of the local *topography* (flat, with limited elevation above sea level) and the *geology* (heavy clay sub-soil) make it likely that flooding will never be eradicated, an initiative bringing together local landowners to help solve the problem has produced a practical plan. This essentially comprises the following:

- A. The flow of water **downstream** from Hurst must be vastly improved (ie. via the Twyford Brook and onwards to the River Loddon). This will ensure floodwater is taken away from the village as efficiently and as quickly as possible.
- B. The water **upstream** from Hurst – which otherwise exacerbates any flooding issues in the village – needs to be held back when there is excessive rainfall.

DOWNSTREAM: All the water to the east of Hurst flows into the Twyford Brook (a watercourse that flows to the south of Twyford's *Broad Hinton* area, then northwards past Twyford station, and eventually into the River Loddon. NB: Up until around 1925 the Brook was known as the "*River Broadwater*", hence the name of Broadwater Lane in Hurst). There is a single pinch-point (**Point A** on the map below, where the Brook runs under the Hurst Road, the A321) where all of this water amasses before travelling northwards to the station. If the Twyford Brook from Point A past the station, is not functioning efficiently, all of this water has nowhere to go and inevitably backs-up in the direction of Hurst.

UPSTREAM: The surface water that affects Hurst (either directly as it passes Hurst; or because blockages in the Twyford Brook cause it to back-up towards the village) comes in the first place from two directions:

1. From the **M4 motorway** (ie. from the south, *through Haines Hill*).
2. From the low-lying **Ruscombe Lake** area (ie. from the east, *through Stanlake*). [NB. Bracknell's rainfall historically fed into Ruscombe Lake].

THE PLAN

To mitigate Hurst's flooding, the following will be necessary:

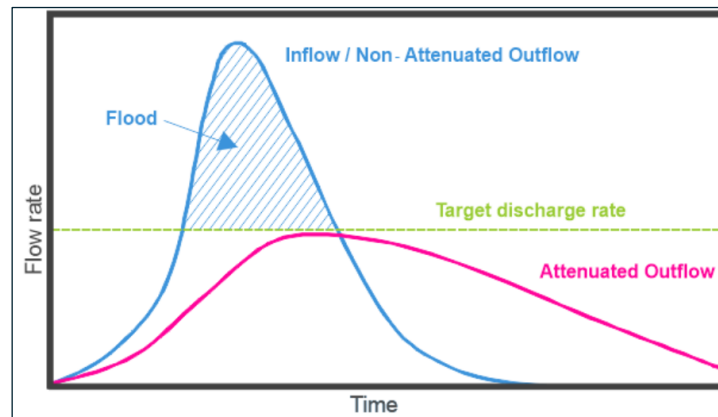
1. **Twyford Brook:** Remove all blockages in the Twyford Brook, in particular from the A321 (Hurst Road) bridge along the stretch northwards to Twyford station.
2. **Stanlake:** Install a weir at **Point B**. This will control the flow of water through Stanlake at times of excessive rainfall, effectively creating an attenuation reservoir to the east of Point B, allowing the Twyford Brook to better handle the excessive demands placed on it at these times.
3. **Haines Hill:** Attenuate the flow of water through Haines Hill by avoiding excessive dredging of Haines Hill's ditches (intended in Spring/Summer 2024). This is NOT in Haines Hill's interest as it means Haines Hill's fields will be flooded at times of intense rainfall (effectively creating an attenuation reservoir). This in turn means Haines Hill's farming enterprise cannot crop these fields. However, it will allow the Twyford Brook to better handle the excessive demands placed on it at these times.
4. **Thames Water:** It is widely recognised that Thames Water's pumping station is woefully inadequate for the job, resulting in drains overflowing and adding to the flooding issues in Hurst. Therefore, WBC should deal with Thames Water to find a resolution for this problem.



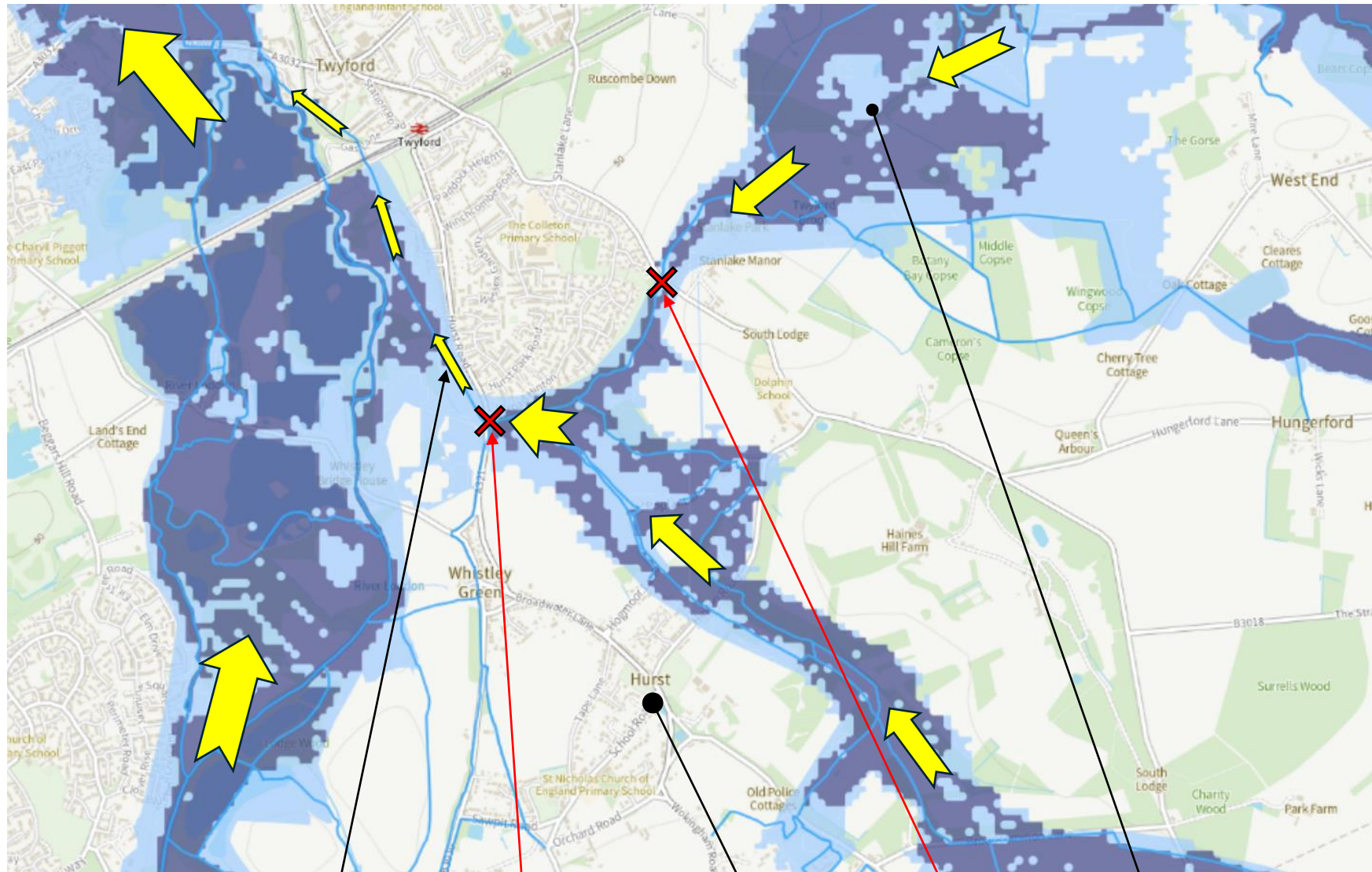
Twyford Brook severely restricted (January 2024)

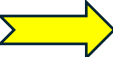


Thames Water pumping station ineffective

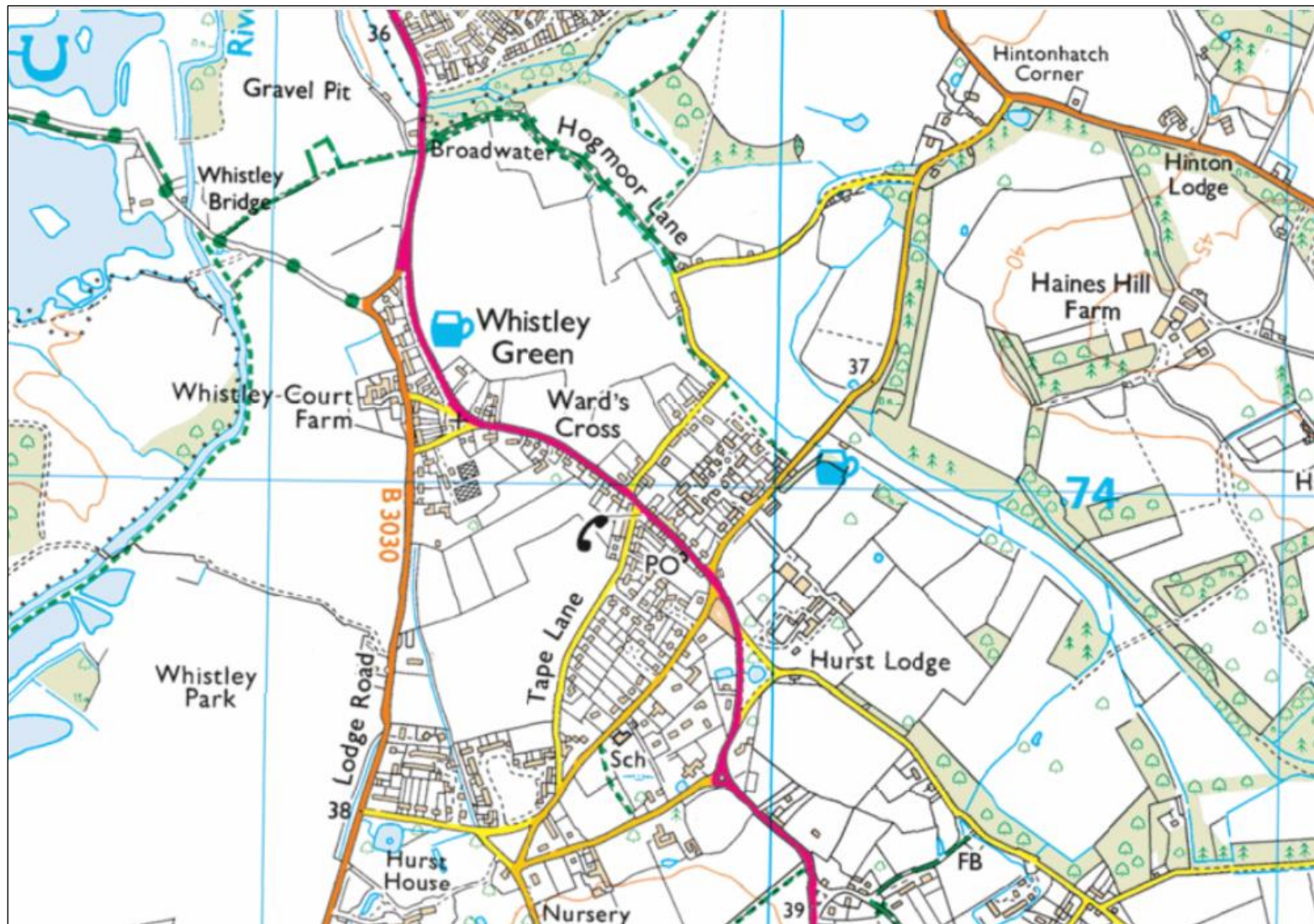


Attenuation at Stanlake and Haines Hill, requiring agreement to flood their land at times of intense rainfall, to slow the water reaching Hurst



Direction of flow: 
 Blockage
 Point A (Pinch-point)
 Hurst village
 Point B (Weir?)
 Ruscombe Lake (originally)

ORDNANCE SURVEY MAP AROUND HURST *(shows zero contours = very flat)*





British
Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 433072 : BGS Reference: SU87SW32

British National Grid (27700) : 481050,174150

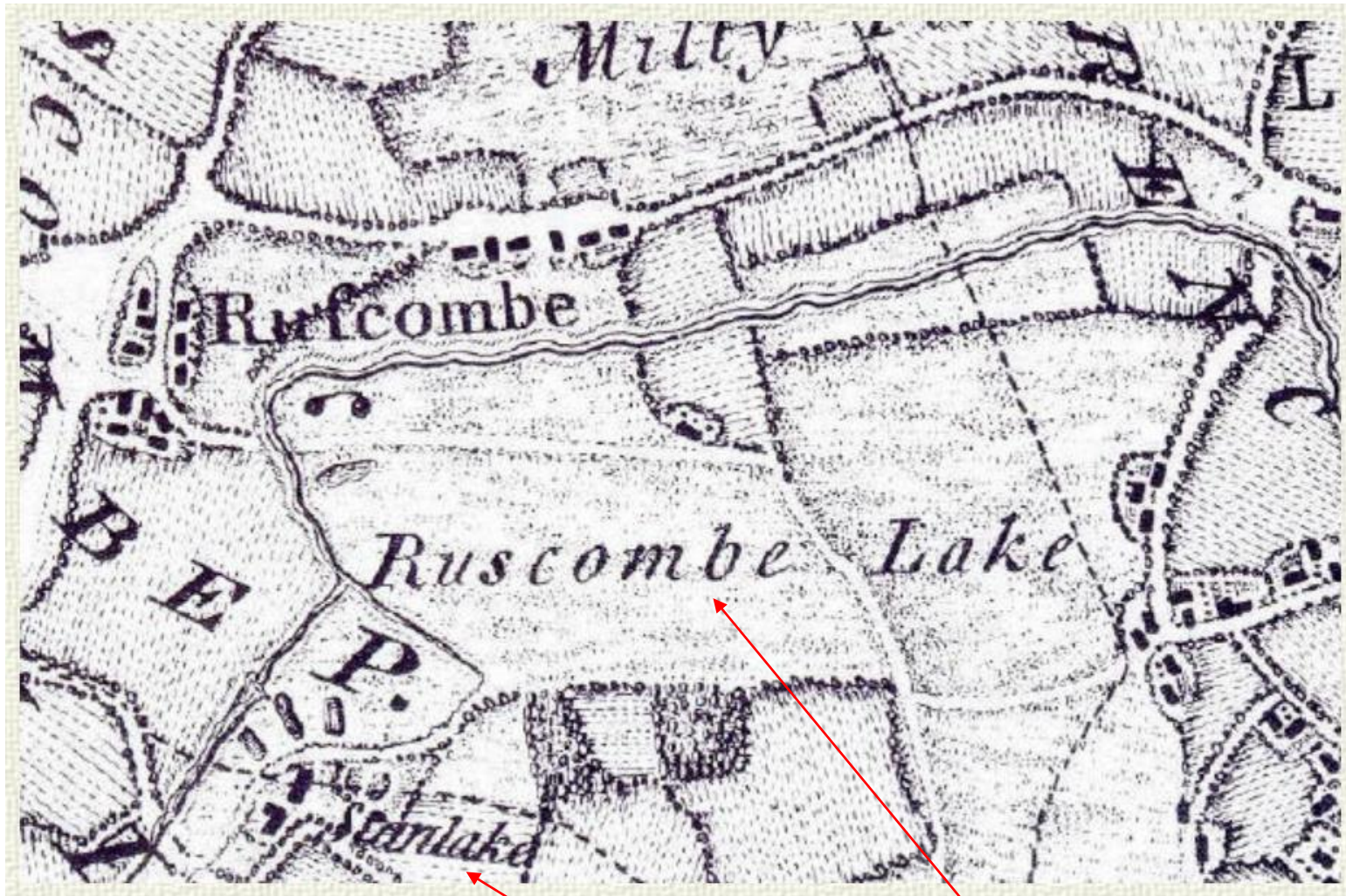
[Report an issue with this borehole](#)

<< < Prev Page 3 of 7 ▾ Next > >>

(2) (For Survey use only) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA If measurements start below ground surface, state how far	THICKNESS		DEPTH	
		Feet	Inches	Feet	Inches
Drift	TOP SOIL	1	0	1	0
	STONE & CLAY MIXED	7	0	8	0
London	GREY & BROWN CLAY	6	0	14	0
Clay	BLUISH CLAY	10	0	24	0
Reading Beds	READING BEDS	80	0	104	0
Upper Chalk	CHALK	146	0	250	0

16 feet of thick clay

Historic Map of Ruscombe



Stanlake Park

Ruscombe Lake

Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
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