Section 19 Flood Investigation

23 September 2024 Flood Event

HILLINGDON
LONDON

METIS

Acknowledgements

We would like to extend our heartfelt thanks to all those who participated in the recent flood investigation, especially the residents who experienced flooding firsthand. Flooding is a deeply distressing event, bringing disruption, damage, and emotional strain. We recognise the significant impact it has on individuals, families, and communities.

We are especially grateful to those who, despite the stress and difficulty of their circumstances, provided valuable input to the investigation. Your contributions are essential in helping us understand the effects of flooding and to inform improved flood risk management for our communities.

Executive Summary

This flood investigation report was written as part of the London Borough of Hillingdon Council's (Hillingdon Council) duty as a Lead Local Flood Authority (LLFA) under Section 19 of the Flood and Water Management Act 2010 (FWMA). Heavy rainfall on the 22 and 23 September 2024 caused flooding and disruption across the south-east of England and London, including the London Borough of Hillingdon (Hillingdon). There were 172 flood incidents reported in total as a result of the rainfall event. This included 123 reports of internal flooding and 49 reports of external flooding. The majority of the flood incidents were located in Ickenham and Ruislip.

The investigation aims to identify the sources and causes of the flooding, as well as the flood management responsibilities of the Risk Management Authorities (RMAs) and other relevant stakeholders involved. Based on these details, this report includes recommendations with the aim of reducing the risk of future flood events.

As part of this investigation, the reported flood incidents were mapped within the hydrological catchments set out in Hillingdon Council's Catchment Plan 2022. The flood mechanisms of catchments that contained more than one internal flooding event were analysed to identify the sources and causes of flooding on the 23 September 2024. This included the use of available data from Thames Water Utilities Limited (TWUL), the Environment Agency (EA), and British Geological Survey (BGS), and a site visit to each location. The analysis also considered actions taken by each RMA before, during, and after the event up to March 2025.

During the event, the River Pinn, Ickenham Stream, and Yeading Brook experienced high water levels that rose above surface water drainage outlets. This reduced the surface water sewer network's ability to discharge into the rivers, limiting its capacity to accommodate more flows. The result was that the drainage network became overwhelmed and caused surcharging. Locations at the low topographical points were particularly susceptible to surface water accumulation. Some of the flood incidents were caused or worsened by fluvial flooding from the River Pinn or the Yeading Brook.

List of Recommendations

Catchment 2 – Bessingby Park Area	
1	Hillingdon Council Flood Officers should conduct a review of the flood alleviation works in Bessingby Park, ensuring that the basins are working as designed.
2	Hillingdon Council Flood Officers should facilitate the formation of a Flood Action Group (FLAG) at Whitby Road which may increase community flood resilience.
3	Hillingdon Council Flood Officers should further investigate the mechanisms of the fluvial flooding along Whitby Road and undertake remedial action if necessary.
4	Hillingdon Highways Team should consider reprofiling works and the installation of additional gullies along Beech Avenue to reduce the risk of flooding to properties from the highway.
5	Flood-affected residents should consider installing Property Flood Resilience (PFR) measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
6	Hillingdon Council Flood Officers should investigate options for further flood alleviation works in Bessingby Park and bid for future funding opportunities (where available) should a feasible option be identified.

Catchment 4 – Breakspear Road South, Ruislip	
7	Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
8	Hillingdon Council should continue to review HS2 plans, ensuring that the development does not increase the risk of flooding to surrounding properties.

Catchment 5 – East of Ickenham	
9	Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
10	Breakspear School should investigate the installed drainage of the artificial playing pitch to confirm the system is working in line approved drainage plans.
11	Hillingdon Council Flood Officers should investigate options for SuDS at Breakspear School and bid for future funding opportunities (where available), such as SuDS in Schools grants, should a feasible option be identified.

Catchment 6 – West Ruislip Depot Area	
12	Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.

13	Hillingdon Council Flood Officers should investigate options for SuDS at Glebe Primary School and bid for future funding opportunities (where available), such as SuDS in Schools grants, should a feasible option be identified.
14	The EA should consider installing river level or flow gauges on the Ickenham Stream as there is no gauge currently within this river.

Catchment 12 – Ruislip Gardens	
15	Hillingdon Highway Team should review the way the highways drain along Stafford Road, Trevor Crescent, Bedford Road, Clyfford Road, and Lea Crescent and consider installing additional gullies, rain gardens, or drainage channels along the route to reduce the risk of flooding to properties from the highway.
16	TfL should explore the installation of additional gullies along West End Road to reduce the risk of flooding to properties from the highway.
17	Hillingdon Council should continue to develop the surface water sewer daylighting scheme at Bridgewater Road Playing Fields with support from TWUL.
18	Hillingdon Council Flood Officers should facilitate the formation of a FLAG at Clyfford Road and surrounding area, with the aim of increasing community flood resilience.
19	Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures
20	Hillingdon Council Flood Officers should continue to work in partnership with the EA to develop the Ruislip Gardens flood alleviation scheme towards implementation.

Catchment 17 – Victoria Road Area	
21	TWUL should investigate a possible misconnection in their network upstream of Bourne Primary School.
22	Hillingdon Council Flood Officers should engage with Bourne Primary School's maintenance team to conduct a drainage survey in order to better understand the drainage issues at the site.
23	Hillingdon Council Flood Officers should engage with Bourne Primary School to develop a flood action plan based on findings from the drainage survey and an understanding of how the site floods.
24	Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
25	Hillingdon Council Flood Officers should investigate options for drainage improvements at Bourne Primary School and bid for future funding opportunities (where available), such as SuDS in Schools grants, should a feasible option be identified.
26	Hillingdon Council and Harrow Council should collaborate to investigate opportunities for a flood alleviation scheme within this catchment.

27	Lead Local Flood Authority officers should support investigate and support authorities with the implementation of flood resilience measures at Queensmead School.
28	Lead Local Flood Authority officers should continue to work in partnership with the EA and TWUL to develop the Victoria Road flood alleviation scheme towards implementation.

Catchment 26 – Brook Drive, Ruislip	
29	Lead Local Flood Authority officers should continue to work in partnership with the EA to develop the Pinn Meadows and Park Wood SSSI Natural Flood Management schemes towards implementation.
30	Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.

Catchment 44 – West End Road	
31	Hillingdon Highways Team should consider installing additional gullies along Cherry Close and Eversley Crescent to reduce the risk of flooding to properties from the highway.
32	TWUL should investigate their surface water sewer system at Cherry Close and rectify any blockages and consider improvements in capacity.
33	Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
34	Hillingdon Council and TWUL should collaborate to investigate opportunities for highway drainage improvements within the catchment.

Contents

1 Introduction 8
2 Risk Management Authorities 12
3 Flood Incident Details 16
4 Flood Event Analysis 26
5 Catchment 2 – Bessingby Park Area, Ruislip 28
6 Catchment 4 – Breakspear Road South, Ickenham 36
7 Catchment 5 – Central Ickenham 42
8 Catchment 6 – West Ruislip Depot Area 49
9 Catchment 12 – Ruislip Gardens 57
10 Catchment 17 – Victoria Road Area 66
11 Catchment 26 – Brook Drive, Ruislip 74
12 Catchment 44 – West End Road, Ruislip 82
13 Post Flooding Observations 91
14 General Recommendations 93
15 Flooding Incidents Outside the Section 19 Criteria 95
16 Before, during and after the Event 96
17 Appendix A 100

Acronyms and Abbreviations

Abbreviation	Definition
BGS	British Geological Survey
CDA	Critical Drainage Area
DfE	Department for Education
DWMP	Drainage and Wastewater Management Plan
EA	Environment Agency
FLAG	Flood Action Group
FWMA	Flood and Water Management Act
LFB	London Fire Brigade
LFRMS	Local Flood Risk Management Strategy
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
MAFP	Multi-Agency Flood Plan
Harrow	London Borough of Harrow
Hillingdon	London Borough of Hillingdon
Hillingdon Council	London Borough of Hillingdon Council
HS2	High Speed 2
PFR	Property Flood Resilience
RMA	Risk Management Authority
RoFSW	Risk of Flooding from Surface Water
SuDS	Sustainable Drainage Systems
TfL	Transport for London
TWUL	Thames Water Utilities Limited

1 Introduction

1.1 Background Policy and Information

1.1.1 This flood investigation report has been prepared by Metis Consultants Ltd on behalf of the London Borough of Hillingdon Council (Hillingdon Council) as part of their duty as a Lead Local Flood Authority (LLFA). Under Section 19 of the Flood and Water Management Act 2010 (FWMA), LLFAs are required to investigate significant flooding incidents and publish the results.

1.1.2 As stipulated by Section 19, Hillingdon Council must, to the extent that they consider it necessary or appropriate, investigate:

- which Risk Management Authorities (RMAs) have relevant flood risk management functions, and
- whether each of those RMAs has exercised, or is proposing to exercise, those functions in response to the flood.

1.1.3 After completing the flood investigation, Hillingdon Council must publish the results of its investigation and notify the relevant RMAs.

1.1.4 The criteria of flooding that triggers a Section 19 investigation is set by each LLFA for their area. At the time of writing, the criteria for Hillingdon Council are where more than 10 properties suffer internal flooding.

1.1.5 The flooding event on the 23 September 2024 triggered a Section 19 investigation, as there was internal flooding to more than 10 properties. A total of 172 flood incidents were reported regarding this flooding event, including 123 internal flooding incidents and 49 external flooding incidents. 157 of these flood incidents were reported directly to Hillingdon Council, with the Environment Agency (EA) sharing two additional reports of flooding, and the London Fire Brigade (LFB) sharing 13 additional reports of flooding. The majority of the flooding reports came from either Ickenham or Ruislip. It is possible more properties flooded given there is an acknowledged under reporting of flood incidents.

1.2 Methodology

1.2.1 To conduct the investigation, data was collected from the relevant RMAs through a series of emails and interviews. The source and data received is outlined in *Table 1-1*.

Table 1-1: Data sources.

Source	Data
Hillingdon Lead Local Flood Authority officers	• Flooding reports • Photographs and videos of the event • Historical flood records • Hydrological catchment mapping
Hillingdon Highways Team	• Actions taken before, during or after the event • Formal view on the causes of the flooding
Hillingdon Emergency Planning and Response Team	• Actions taken before, during or after the event • Formal view on the causes of the flooding
Thames Water Utilities Limited (TWUL)	• Actions taken before, during or after the event • Flooding reports • Sewer network data • Formal view on the causes of the flooding
Internally flooded schools	• Actions taken before, during or after each event • Photographs and videos of the event • Formal view on the causes of the flooding
EA	• Actions taken before, during or after each event • Flooding reports • Rainfall data • Flood Alert data • Detailed River Network data • Mapping of flood risk from different sources • River level data • Light Detection and Ranging (LiDAR) data • Formal view on the causes of the flooding
LFB	• Actions taken before, during or after each event • Flooding reports
London Borough of Harrow (Harrow) LLFA	• Actions taken after the event • Formal view on the causes of the flooding

Community Engagement and Evidence Collection

1.2.2 To support a comprehensive understanding of the September 2024 flooding event, the Council launched a public-facing questionnaire, which was made available on the Council's website from 3 December 2024 to 12 January 2025. The purpose of this survey was to gather first-hand accounts from residents affected by flooding, enabling the Council to collect qualitative and quantitative data to inform its investigation.

1.2.3 The questionnaire included structured questions regarding the timing, location, and severity of flooding, as well as open-ended sections for residents to describe their experiences in more detail. Crucially, respondents were also given the opportunity to upload photographs and videos, which provided valuable visual evidence of flood impacts

and water flow patterns. In total, 152 responses were received, representing a significant portion of affected communities and contributing to a more nuanced understanding of the event.

1.2.4 The online surveys were supplemented by interviews and direct engagement with other risk management authorities and representatives from educational facilities that experienced flooding.

Data Integration and Catchment Analysis

1.2.5 To provide further context to the community feedback, the Council undertook a detailed mapping exercise using Geographical Information Systems (GIS). This involved the integration of historical flood records, topographical data, and drainage infrastructure information to identify potential sources of flood risk within each impacted hydrological catchment.

1.2.6 Following this desktop analysis, a targeted site visit was conducted on 7 April 2025 to validate the mapped data and observe physical features that may have influenced flood behaviour. This included inspecting watercourses, culverts, surface water flow paths, and areas of known drainage constraint. The visit provided critical insight into the mechanisms that contributed to flooding, such as blocked assets, overland flow routes, and topographical depressions.

Supplementary Site Investigations and Stakeholder Engagement

1.2.7 Further site inspections were carried out during Summer 2025, focusing on sensitive and high-risk locations, particularly Bessingby Park and Ruislip Gardens, where flood impacts were notably severe. These visits allowed officers to assess seasonal conditions, vegetation growth, and any interim changes to land use or drainage systems that may affect future flood risk.

1.2.8 In parallel, the Council maintained ongoing liaison with key stakeholders, including officers from the Environment Agency and Thames Water, to share findings, validate assumptions, and ensure alignment with statutory responsibilities. These discussions helped clarify asset ownership, operational responses, and future maintenance commitments.

Review of Risk Management Authority Responsibilities and Actions

1.2.9 As part of the investigation, the Council undertook a detailed review of the roles and responsibilities of each Risk Management Authority (RMA) under the Flood and Water Management Act 2010. This included evaluating the actions taken by each RMA before, during, and after the September 2024 flood event.

Conclusions and Recommendations

1.2.10 The findings of this multi-faceted investigation have been compiled and presented in this report. Based on the evidence gathered, including resident feedback, site observations, GIS

analysis, and stakeholder input, a series of recommendations for flood risk mitigation have been developed. These recommendations aim to:

- Address identified vulnerabilities in drainage and surface water management.
- Improve inter-agency coordination and emergency response protocols.
- Enhance community awareness and preparedness for future flood events.
- Support investment in infrastructure upgrades and natural flood management solutions.

1.2.11 The Council will continue to work collaboratively with RMAs and local stakeholders to implement these recommendations and reduce flood risk across the borough.

2 Risk Management Authorities

2.1 Introduction

2.1.1 There are multiple RMAs who hold responsibilities for managing the risks of flooding within Hillingdon. These are shown in *Table 2-1*. The responsibilities of other key stakeholders related to the flooding event are outlined in *Table 2-2*.

Table 2-1: Relevant RMAs.

RMA	Borough-specific authority	Flood risk management responsibilities
EA	EA	Main rivers and reservoirs
LLFA	Hillingdon Council	Surface water, ordinary watercourses, and groundwater
Water & Sewerage Company	TWUL	Surface water, foul & combined sewer systems
Highway Authority	Hillingdon Council	Public highway drainage
Highway Authority	Transport for London (TfL)	Highway drainage on A roads
Highway Authority	National Highways	Responsible for the Strategic Road Network

Table 2-2: Relevant stakeholders.

Stakeholder	Flood risk management responsibilities
LFB	Responding to emergency calls related to flooding
Hillingdon Emergency Planning and Response Team	Responding to emergency calls related to flooding, produce a MAFP
Harrow LLFA	Surface water, ordinary watercourses, and groundwater within Harrow
Bourne Primary School	Maintaining the onsite surface water sewer network
Queensmead School	Maintaining the onsite surface water sewer network

2.2 Environment Agency (EA)

2.2.1 The EA is the national flood risk authority for England and Wales. They are responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea. In the borough, the EA has an important role in working with other RMAs to manage the risk of flooding from rivers and reservoirs and advising Local Planning Authorities on how development proposals may influence and be influenced by fluvial flood risk. They take part in emergency planning through issuing Flood Alerts and being a Category One Responder to flooding events under the Civil Contingencies Act 2004.

2.2.2 The Main Rivers within Hillingdon that the EA have oversight of are shown within the EA's Statutory Main River online mapping and listed below:

- Duke of Northumberland's River
- River Colne
- Wraysbury River
- Yeading Brook (the West and East arms)
- Ickenham Stream
- Frays River
- Cannon Brook
- River Crane
- River Pinn
- River Crane
- Bigley Ditch

2.2.3 The River Pinn, Ickenham Stream, and Yeading Brook run through the catchments that were affected by the September 2024 flood event.

2.3 Hillingdon Council

2.3.1 Hillingdon Council has multiple duties to perform as an RMA due to its role as a LLFA, Highway Authority, and Category One Responder. The LLFA leads on managing the risk of flooding from surface water, groundwater, and ordinary watercourses. Other duties of the LLFA are outlined below under the different acts:

Flood and Water Management Act 2010

- Develop, maintain, apply, and monitor a Local Flood Risk Management Strategy (LFRMS) (Section 9)
- Carry out flood risk investigations upon coming aware of a flood in its area (Section 19)
- Establish and maintain a register of structures or features which are likely to have a significant effect on a flood risk in its area (Section 21)

Land Drainage Act 1991

- Carry out flood risk management work if the work is considered desirable with regards to the LFRMS for the area, and the purpose of the work is to manage flood risk in the authority's area from surface runoff or groundwater (Section 14A)
- Regulate the flow of ordinary watercourses by prohibiting obstructions on ordinary watercourses and requiring works for maintaining the flow of an ordinary watercourse (Sections 23 and 25)

Town and Country Planning Order 2015

- Undertake a statutory consultee role on surface water drainage proposals for major developments

Flood Risk Regulations 2009

- Prepare a preliminary assessment report in relation to flooding in its area (Section 10)
- Identify flood risk areas (Section 14)

- Prepare flood hazard maps and flood risk maps in relation to each relevant flood risk area (Section 19)

2.3.2 Other RMAs have a duty to cooperate with LLFAs to undertake the above responsibilities. The LLFA can also carry out work in collaboration with other RMAs to help alleviate flooding within the borough.

2.3.3 As a Highway Authority, Hillingdon Council are responsible for providing and managing highways assets that are not privately owned, nor managed by TfL or National Highways. TfL managed routes in Hillingdon are the A4, A30, A40, A312, A437, and A4180. National Highways managed routes in Hillingdon are the M4 and M40. As part of Hillingdon Council's responsibilities for their highway assets, they must minimise the risk of highway flooding and maintain gullies and drains that run beneath the roads and footpaths.

2.3.4 As a landowner, Hillingdon Council have a responsibility to safeguard their own land and property against flooding. Common Law also requires Hillingdon Council to carry out tasks, such as drain clearing and maintaining existing flood defences, so that they do not increase the risk of flooding to any neighbouring properties.

2.3.5 As a Category One Responder under the Civil Contingencies Act 2004, Hillingdon Council plays a lead role in emergency planning and recovery after a flood event. The Council is required to produce a Multi-Agency Flood Plan (MAFP), outlining delivery of the emergency response to a flood and co-ordinates all relevant stakeholders, including other Category One Responders.

2.4 Thames Water Utilities Limited

2.4.1 TWUL are the sewerage provider for the borough, as well as a supplier of clean water in the borough along with Affinity Water. TWUL have responsibility for the management of flood risk in relation to the drainage network. Under Section 94 of the Water Industry Act 1991, TWUL must construct and maintain their sewers ensuring sufficient performance under all normal local climatic conditions. This includes managing any potential failures of their infrastructure that may cause flooding and ensuring sufficient maintenance of public sewers is carried out to reduce the risk of sewer flooding. They are a Category Two Responder under the Civil Contingencies Act 2004.

2.4.2 As part of their responsibility for ensuring flood resilience, TWUL have developed a 25 year Drainage and Wastewater Management Plan (DWMP) to reduce pressures on the service, including reducing the number of residential properties that are at risk of flooding.

2.5 Key Stakeholders

2.5.1 There are several other key stakeholders related to the flooding event, including landowners, Category One Responders, and Harrow LLFA, that do not act as RMAs for Hillingdon.

Landowners

2.5.2 Landowners have the primary responsibility of protecting their own land and property, including private roads, against flooding. Under Common Law, they are required to ensure any developments to their land or property do not increase the risk of flooding to a neighbouring property.

2.5.3 Riparian landowners, meaning those who own land that includes a watercourse, are responsible for ensuring any structures within the watercourse are clear of debris and the watercourse is able to flow naturally. Riparian landowners are also responsible for maintaining the bed and banks of the watercourse.

2.5.4 Hillingdon Council and TfL are major landowners that were impacted by the September 2024 flooding event. They also act as riparian owners for stretches of the River Pinn, Ickenham Stream, and Yeading Brook.

Category One Responders

2.5.5 All local authorities and blue light emergency services are categorised as Category One Responders under Schedule 1 of the Civil Contingencies Act 2004, with responsibilities including assessing the risk of the emergency, putting emergency plans in place and advising the public in the event of an emergency. For flood incidents within Hillingdon, the most relevant Category One Responders are the LFB, Hillingdon Council, and the EA.

3 Flood Incident Details

3.1 Rainfall Event

3.1.1 The rainfall event that occurred on the 22 and 23 September 2024 triggered flooding across the south-east of England and London, including in Hillingdon. The investigation requires an understanding of the event in more detail with particular attention given to the climatic events, weather fronts and rainfall data. This requires a granular level of detail to exact times and dates. All times included within this report are in British Summer Time.

3.1.2 During the event, a low-pressure front moved in a north-westerly direction over south and west London between the 22 and 23 September. The Met Office issued an amber weather warning between 08:16 and 21:00 on the 23 September, although flooding had already been reported in Hillingdon before this time. The EA calculated the return period of the rainfall event to be 18.49 years. This was calculated by comparing the rainfall event with the entire history of rainfall events recorded at the nearest rain gauge and ranking it to see how often that amount of rainfall has occurred. Meanwhile, TWUL approximated the return period to be 100 years as an equivalent to one month's rainfall within a five-hour period. The intense rainfall caused internal and external flooding in Hillingdon, with Ickenham and Ruislip being the most affected parts of the borough.

3.2 Rain Gauge Data

3.2.1 Rainfall data recorded by EA rain gauges have been collated for this flood event. The closest rain gauges to the affected areas were found to be RAF Northolt and Pinner Cemetery, their locations are shown below the data in figure 3-5.

3.2.2 The data, presented in *Figure 3-1*, shows that the rain began just before 21:45 on the 22 September, peaked around 00:30 on the 23 September, then stopped by 09:00. At the peak, 10.8mm of rain was measured within a 15-minute interval at the RAF Northolt gauge. Over a period of 11 hours and 15 minutes, a total of approximately 47.8mm of rain was received in RAF Northolt and 27.0mm was received in Pinner Cemetery.

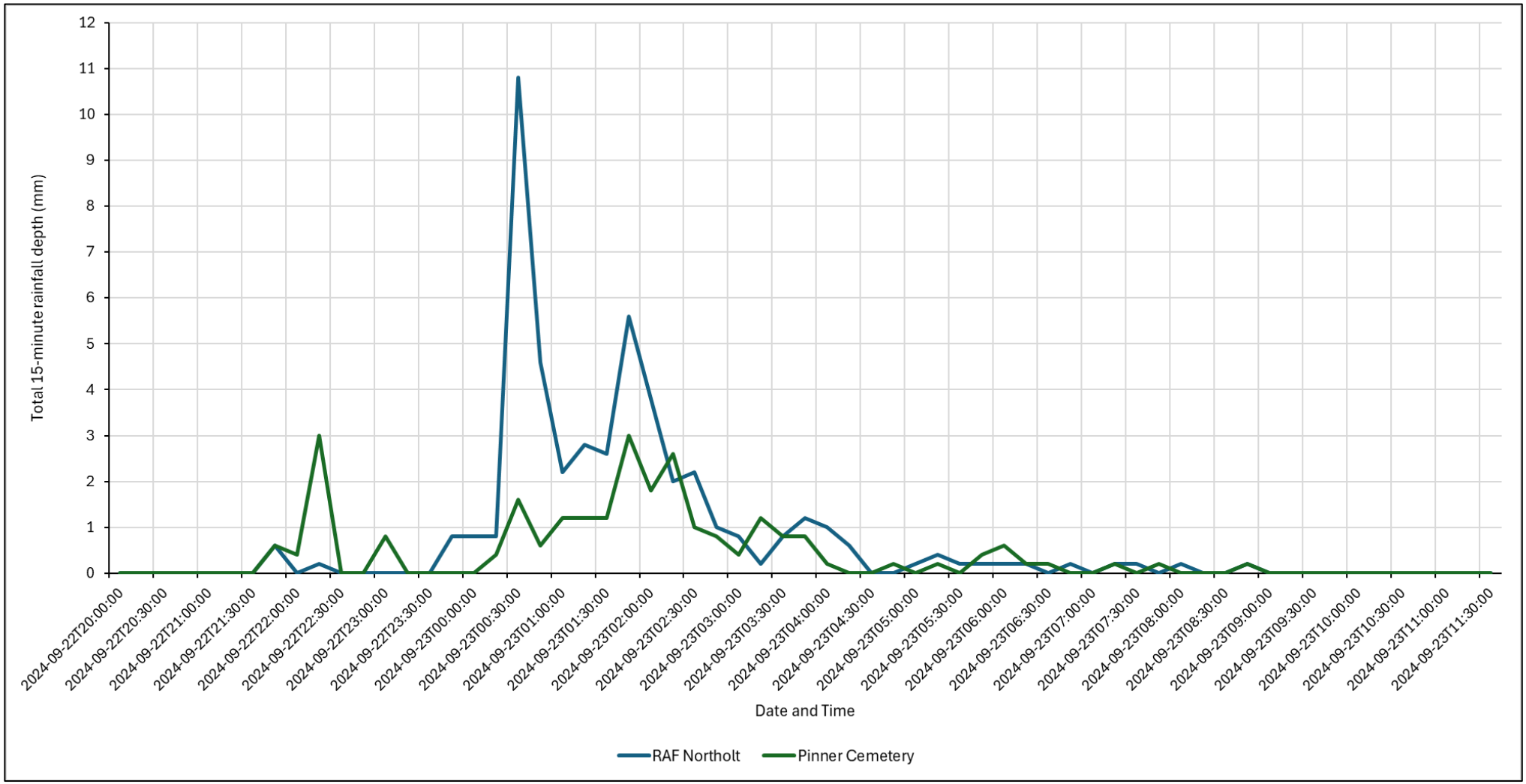


Figure 3-1: Rainfall at RAF Northolt and Pinner Cemetery on 22 and 23 September 2024.

3.3 River Gauge Data

3.3.1 River level data recorded by EA gauges has been collated for the River Pinn, Yeading Brook East and Yeading Brook West. The locations of these gauges are shown in

3.3.2 *Figure 3-5*. River level data could not be collected for the Ickenham Stream as there is no gauge within this river.

3.3.3 *Figure 3-2* shows the water levels measured in the River Pinn by two EA gauges. The Ruislip gauge is located approximately 3km upstream of the Swakeleys Road gauge. Levels in the River Pinn started to rise after 22:15 on the 22 September. At the Ruislip gauge, the water level rose from 0.27m at 22:15 to a peak of 1.57m at 05:15 on the 23 September, an increase of 1.30m.

3.3.4 The EA records the normal range for this gauge as 0.14 - 1.20m. It was reported that the River Pinn breached its banks in Pinn Meadows, which is where the Ruislip gauge is located. At the Swakeleys Road gauge, water levels were around 0.67m at 22:15 and rose to a maximum of 1.47m at 04:13 on the 23 September, an increase of 0.80m. These levels are within the normal range for this gauge, which is 0.56 - 1.50m.

3.3.5 It was reported that the River Pinn breached its banks in St George's Field, which is where the Swakeleys Road gauge is located. The Swakeleys Road gauge took notably longer than the Ruislip gauge to record water levels similar to those before the rainfall event. This is likely because the Swakeleys Road gauge is located downstream of the Ruislip gauge, meaning that surface water from a larger proportion of the river basin discharges into the river by this point.

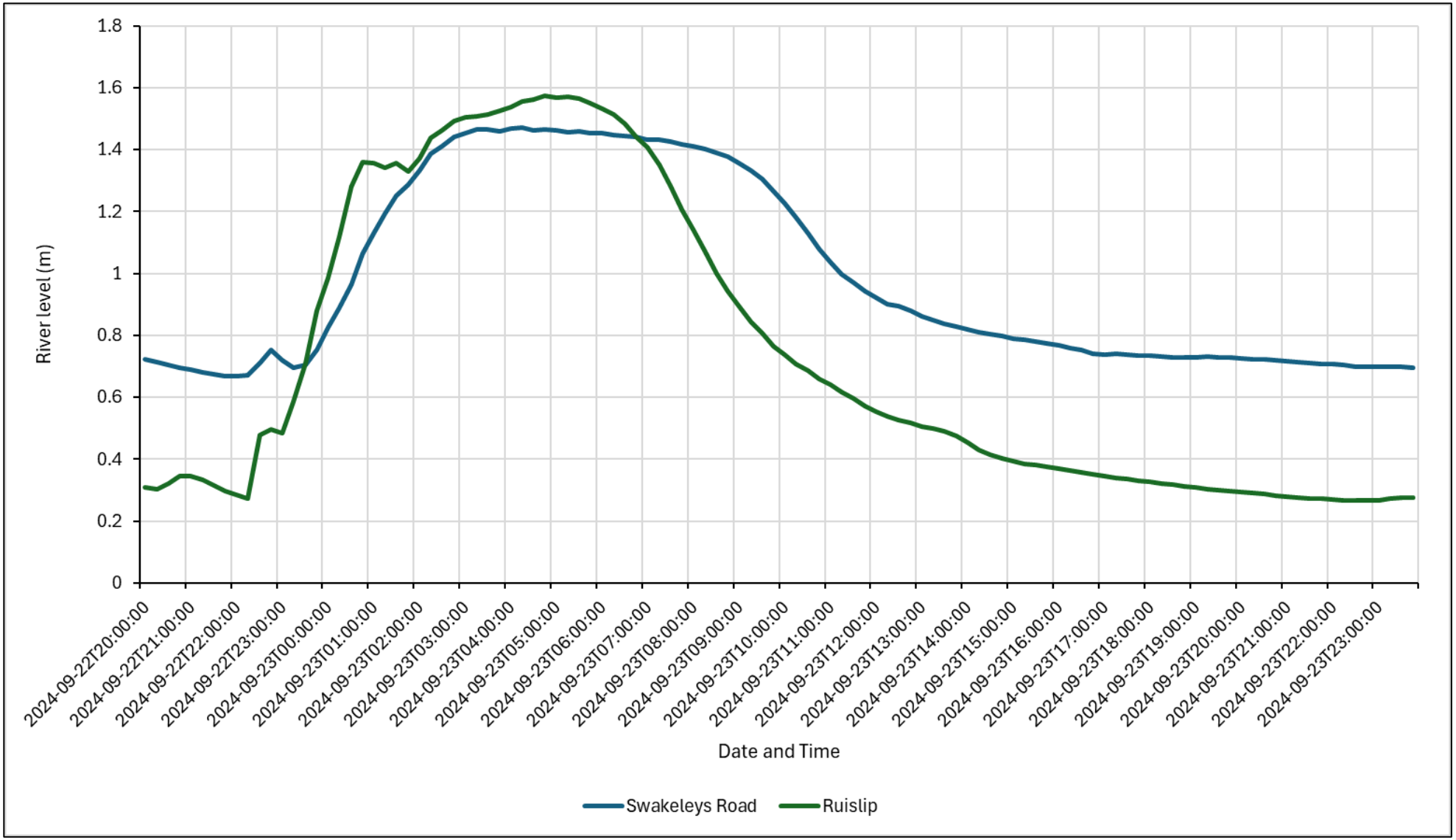


Figure 3-2: River level data from the Ruislip and Swakeleys Road EA gauges on 22 and 23 September 2024.

3.3.6 *Figure 3-3* shows the water levels measured in the Yeading Brook West by two EA gauges. The Village Way gauge is located approximately 7km upstream of the Gutteridge Wood gauge. Levels in the Yeading Brook West started to rise after 22:15 on the 22 September. At the Village Way gauge, the water level rose from 0.21m at 22:15 to a peak of 0.97m at 03:00 on the 23 September, an increase of 0.76m. These levels are within the normal range for this gauge, which is 0.06 - 1.19m.

3.3.7 At the Gutteridge Wood gauge, the water level rose from 0.43m at 22:15 to a peak of 1.22m at 23:00 on the 23 September, an increase of 0.79m. These levels are within the normal range for this gauge, which is 0.08m - 2.30m.

3.3.8 The peak water levels at the Gutteridge Wood gauge occurred much later than those at the Village Way gauge. This is likely because the Village Way gauge is located much further upstream than the Gutteridge Wood gauge, so there is a time delay as peak flows travel downstream.

3.3.9 There was one report of the Yeading Brook West breaching its banks during the rainfall event adjacent to Whitby Road, in between the two-level gauges. It is understood that this was due to a slight trench in the riverbank which operated as a flow channel. This has been identified for further investigation and remedial action.

3.3.10 *Figure 3-4* shows the water levels measured in the Yeading Brook East by two EA gauges. The Thistledene Avenue gauge is located approximately 2km upstream of the Yeading East gauge. Levels in the Yeading Brook East started to rise 45 minutes later than in the River Pinn and Yeading Brook West, at 23:00 on the 22 September.

3.3.11 At the Thistledene Avenue gauge, the water level rose from 0.05m at 23:00 to a peak of 1.09m at 02:45 on the 23 September, an increase of 1.04m. These levels are within the normal range for this gauge, which is 0.01 - 1.10m. At the Yeading East gauge, the water level rose from 0.23m at 23:45 to a peak of 1.05m at 03:45 on the 23 September, an increase of 0.82m. The EA records the normal range for this gauge as 0.03 – 0.65m.

3.3.12 The Yeading Brook East reportedly breached its banks less than 500m upstream of the Yeading East next to Bourne Primary School. Like with the gauges within the River Pinn and Yeading Brook West, the hydrograph from the gauge further downstream shows a delayed profile compared that from the upstream gauge, as it takes time for peak flows to travel downstream.

3.3.13 The investigation has found that the coverage of gauges and monitoring locations is not sufficient to allow for a robust understanding of the catchment. **A review of the efficacy and spacing of the gauges is recommended to ensure sufficient coverage in the priority flood risk areas.**

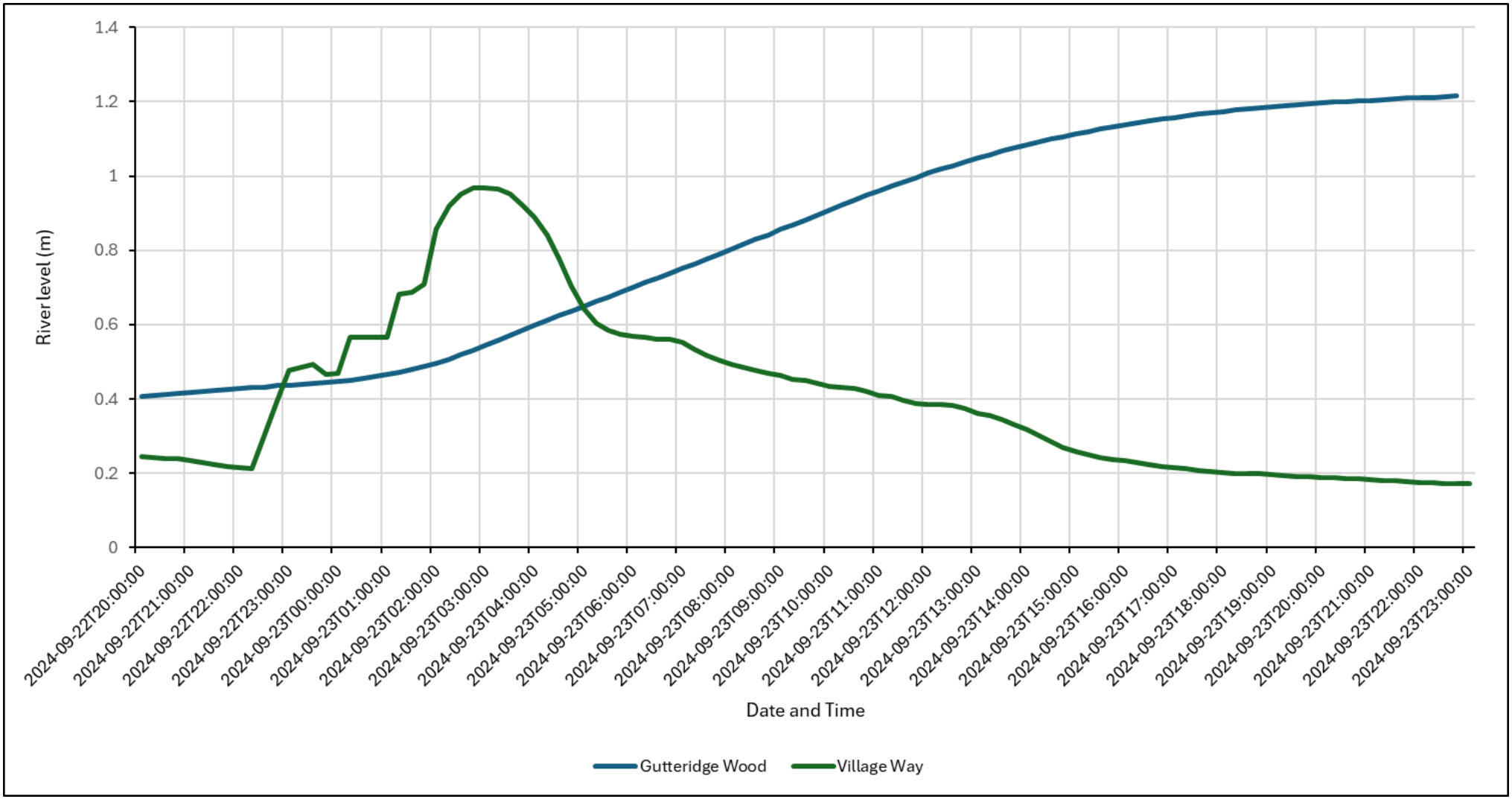


Figure 3-3: River level data from the Village Way and Gutteridge Wood EA gauge on 22 and 23 September 2024.

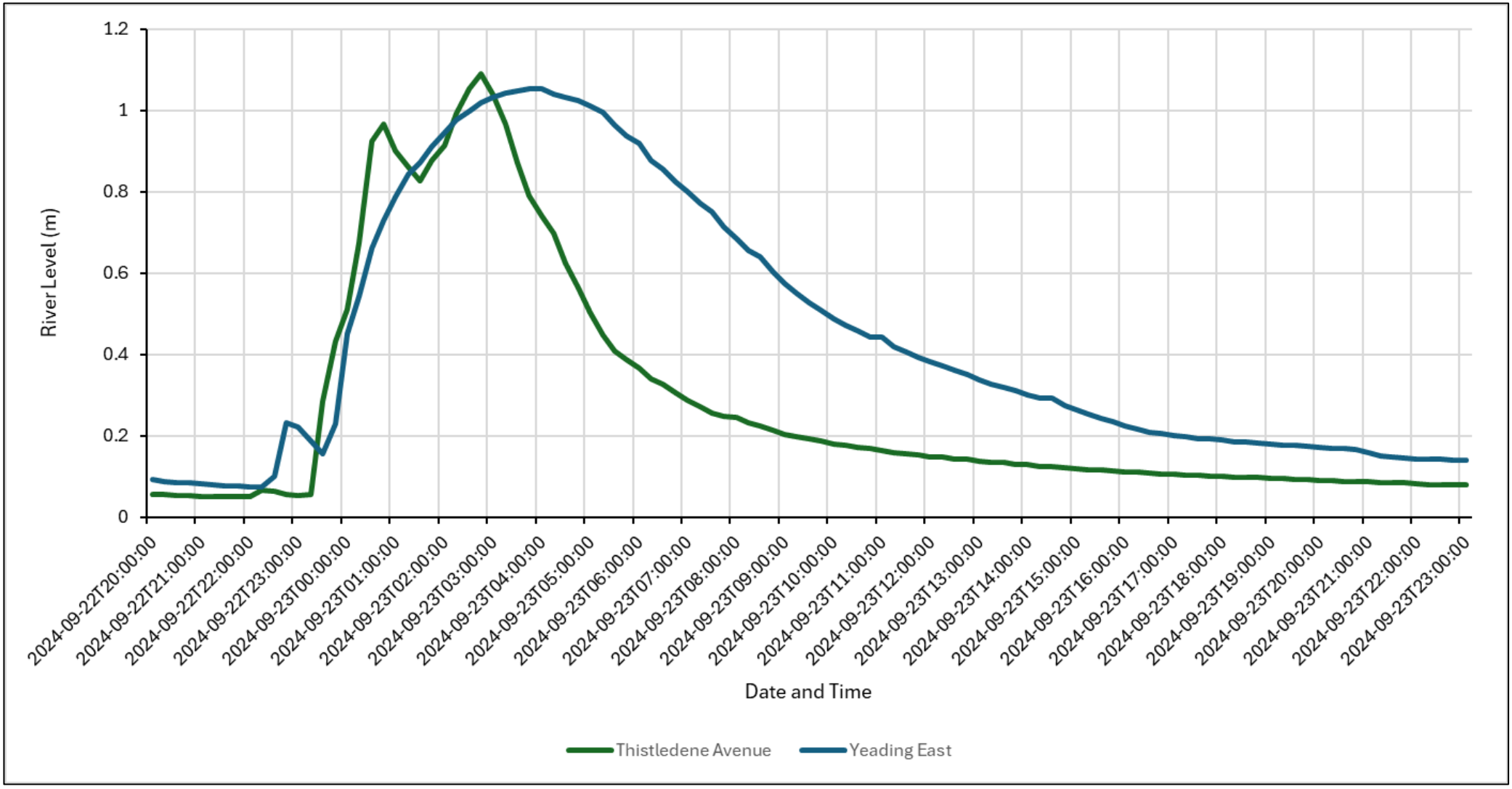


Figure 3-4: River level data from the Thistledene Avenue EA gauge on 22 and 23 September 2024.

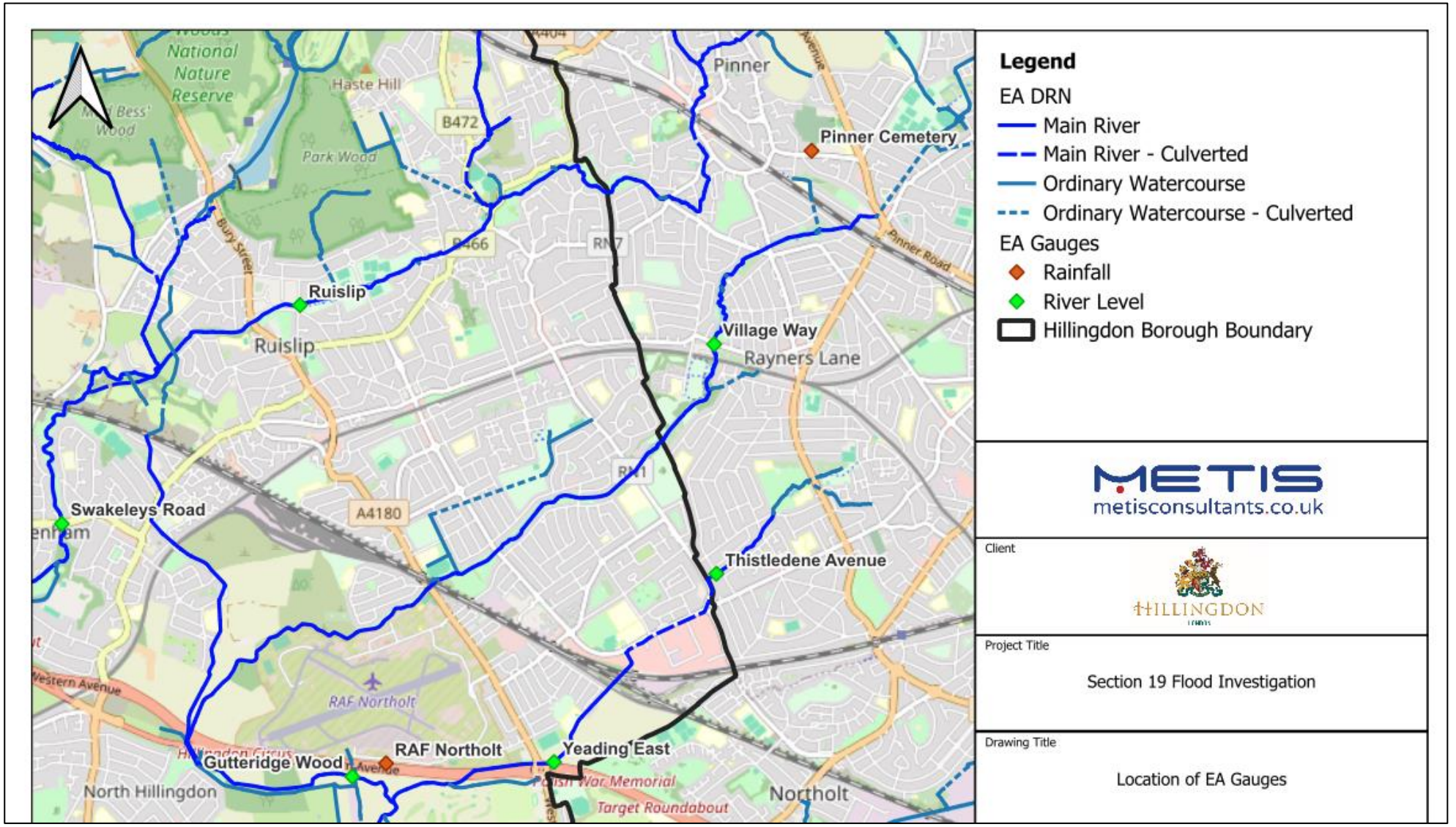


Figure 3-5: Locations of EA gauges discussed in this investigation.

3.4 Affected Locations and Hydrological Catchments

3.4.1 As mentioned in *Section 1.1*, there were 172 flood incidents reported in total as a result of the rainfall on the 22 and 23 September. The reports were classified into internal and external flooding as defined in *Table 3-1*.

Internal flooding	Flooding inside a building, including basements but excluding sheds and garages.
External flooding	Flooding within the boundaries of the property but not inside the property. It includes gardens, driveways, sheds, and garages.

Table 3-1: Definitions of internal and external flooding.

3.4.2 Of the 172 reported incidents, 123 were internal and 49 were external. The locations of these incidents are shown in Figure 3-6; the majority of the reports were from the Ickenham and Ruislip areas.

3.4.3 Hillingdon Council have identified 43 hydrological catchments across the borough as part of their Catchment Plan 2022. They were mapped based on overland flow paths via either natural topography or manufactured drainage structures to an outlet. The locations of the catchments that contain internal flood reports from the 23 September 2024 are provided in *Appendix A*. Due to the large number of reported incidents, detailed flood analysis has only been undertaken in *Sections 4* to *11* for the catchments that contain more than one internal incident in line with Hillingdon Council's Section 19 criteria. External flooding incidents and catchments that do not meet the Section 19 criteria are discussed in less detail in *Section 15*.

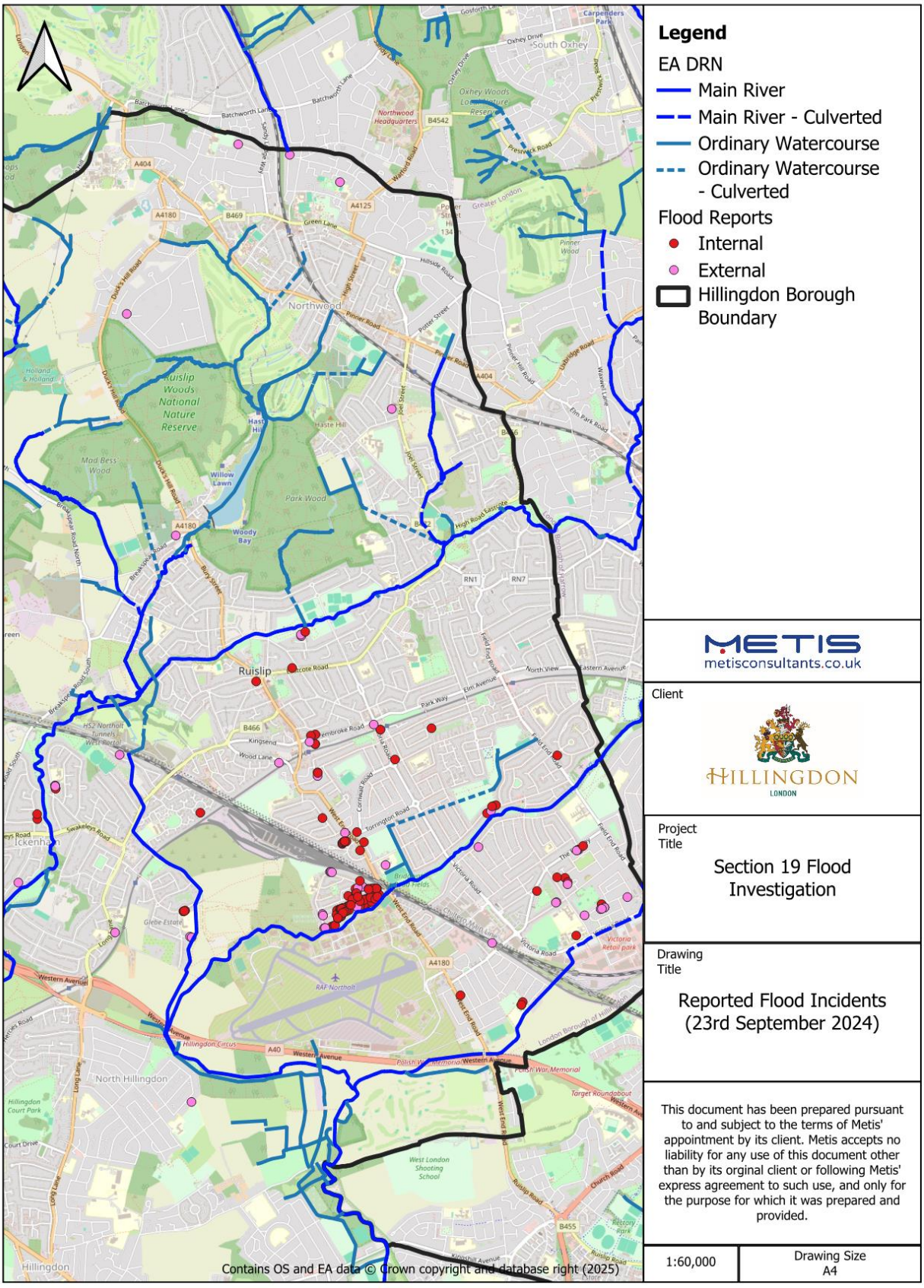


Figure 3-6: Location of reported flood incidents from the 23 September 2024.

4 Flood Event Analysis

4.1 Introduction

4.1.1 This Section describes the reported flood incidents, the local flood risk, the local drainage network, and the flood mechanisms for each catchment. The discussion of local flood risk will cover surface water, fluvial, ordinary watercourse, groundwater, and sewer flood risk. It is acknowledged that the flood mechanisms for each catchment have been deduced based on the available data and may change as a result of new evidence becoming available.

4.1.2 Flooding from surface water occurs when water from intense or prolonged rainfall is unable to sufficiently drain away through constructed sewer systems or ground infiltration, resulting in surface accumulation. The EA defines the risk of flooding from surface water (RoFSW) within three categories, as described in *Table 4-1*.

Table 4-1: Risk of flooding from surface water categories.

Low Risk	The area has a chance of flooding of between 0.1% and 1.0% each year.
Medium Risk	The area has a chance of flooding of between 1.0% and 3.3% each year.
High Risk	The area has a chance of flooding of greater than 3.3% each year.

4.1.3 Fluvial flooding occurs when intense or prolonged rainfall results in Main Rivers exceeding their hydraulic capacity and overtopping their banks. The EA defines fluvial flood risk within three categories, as described in *Table 4-2*.

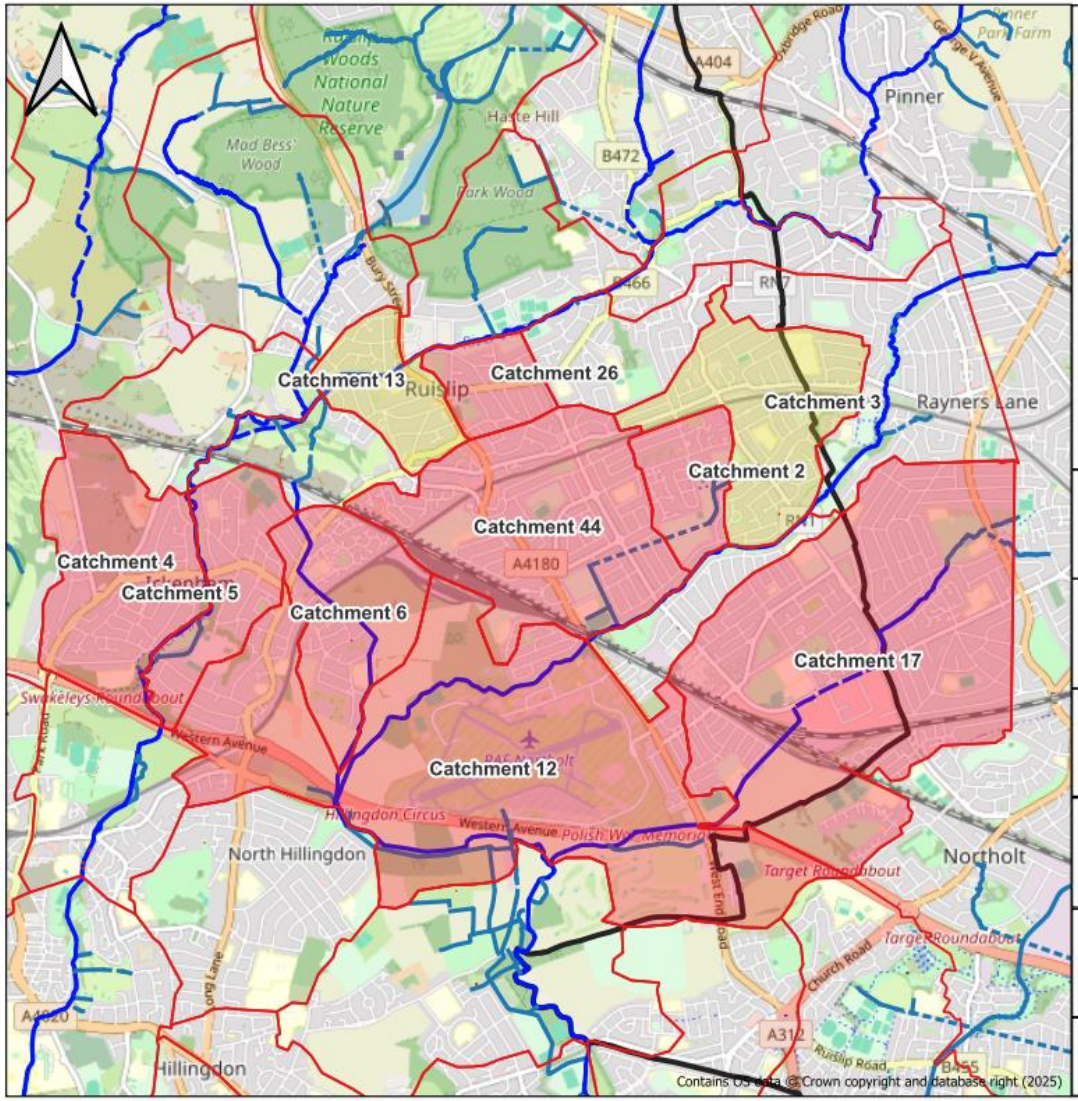
Table 4-2: Risk of fluvial flooding categories.

Flood Zone 1	The area has a chance of flooding of less than 0.1% each year.
Flood Zone 2	The area has a chance of flooding of between 0.1% and 1.0% each year.
Flood Zone 3	The area has a chance of flooding of greater than 1.0% each year.

4.1.4 Ordinary watercourses are any watercourses that the EA have not designated as Main Rivers. Flooding from ordinary watercourses can occur if prolonged or intense rainfall causes peak flows to exceed the hydraulic capacity, resulting in flooding to adjacent areas.

4.1.5 Sewer flooding occurs when the volume of rainfall entering the sewer network exceeds the hydraulic capacity of that network, causing the system to back up and surcharge. Sewer flooding can be exacerbated in instances where the sewer is obstructed by debris, the receiving watercourse has high water levels blocking the outlet, or where there is ingress of groundwater.

4.1.6 The catchments relevant to the analysis are set out below. Additional references have been provided within the relevant chapters for ease of identification.



Legend

- Hillingdon Borough Boundary

Catchment Boundaries

- Contains more than 1 internal report
- Contains 1 internal report
- Contains no internal reports

METIS
metisconsultants.co.uk

Client

HILLINGDON

Project Title

Section 19 Flood Investigation

Drawing Title

Catchments Affected by Internal Flooding

Drawing Size	
A4	1:65,000

5 Catchment 2 – Bessingby Park Area, Ruislip

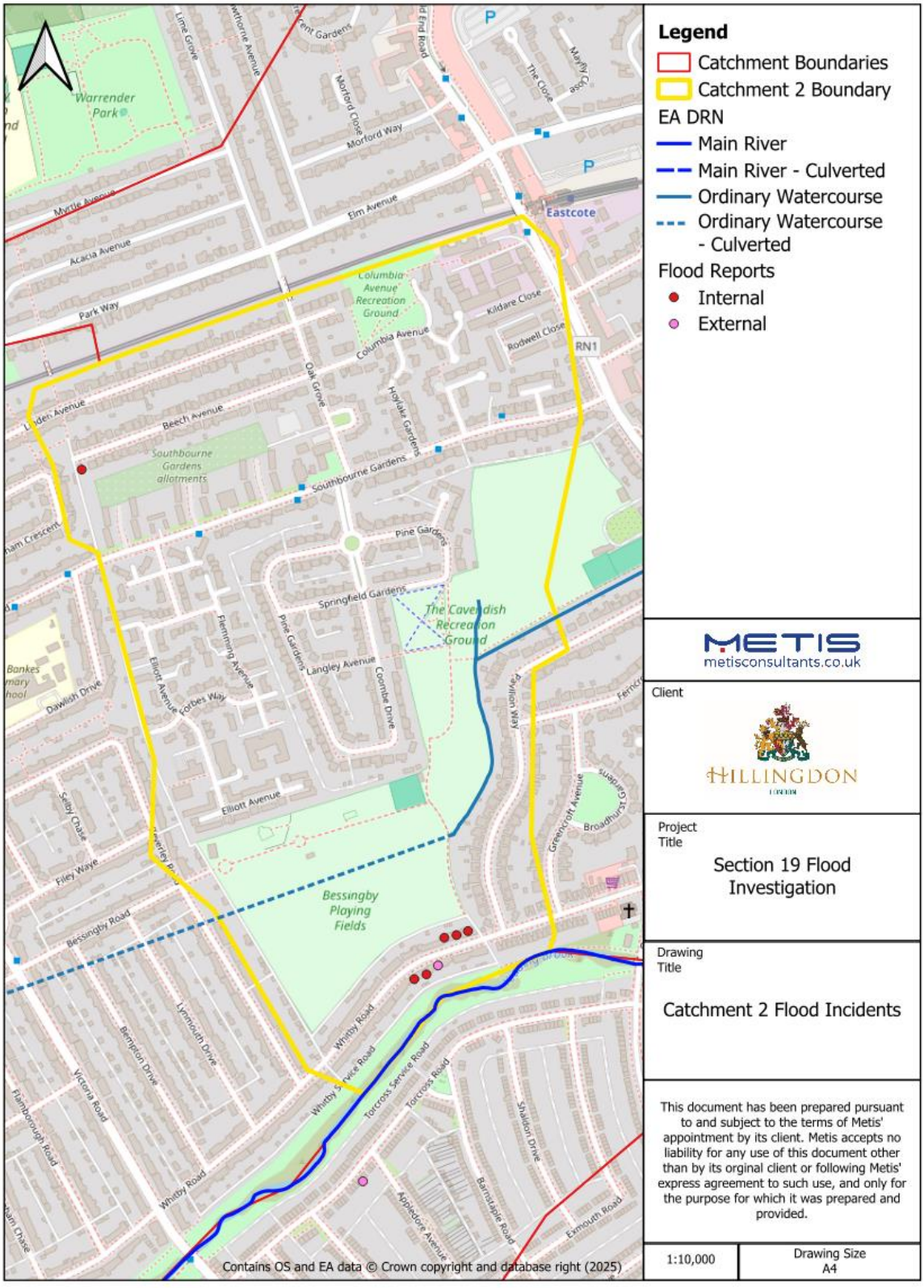


Figure 5-1: Catchment 2 flood incidents from the 23 September 2024 flood event.

5.1 Background

5.1.1 Catchment 2 is located in the north-east of the borough. BGS Geology Viewer shows that this catchment is underlain by Lambeth Group bedrock geology, which is characterised by a variable permeability with layers that can bear water. It includes a section of Brook Common which the Yeading Brook West runs through. It also includes the majority of Bessingby Park, which is the location of a flood alleviation scheme that involved the implementation of two detention basins in 2021 and 2022 in response to repeated flooding to nearby properties prior to 2021. As shown in figure 5-1 there were five internal flood incidents and one external flood incident reported in this catchment. The internal flood incidents occurred along Whitby Road and Beech Avenue.

Surface Water

5.1.2 As shown in Figure 5-2, there are two major surface water flow paths that run from the north of the catchment through Bessingby Park towards the Yeading Brook West in the south of the catchment. At Whitby Road, they converge with a third major flow path which originates from Catchment 3 to the east. The result is an elevated risk of surface water flooding along Whitby Road.

Fluvial

5.1.3 As seen in Figure 5-3, some Whitby Road properties in the south-eastern extent of the catchment are located within Flood Zone 2. However, all the reported flood incidents are located within Flood Zone 1.

5.1.4 Although located within Flood Zone 1 and 2, some properties reported internal flooding from the river. On investigation there is a slight trench that leads to the properties north of the Yeading Brook West which operates as a flow channel. This has been identified for further investigation and remedial action.

Ordinary Watercourses

5.1.5 Figure 5-3 shows that there is an ordinary watercourse which runs through Catchment 2. It is an open channel along the eastern boundary of Bessingby Park but becomes culverted as it crosses the green space. One of the major surface water flow paths follows the route of the open section of the ordinary watercourse. However, the flow path diverts from this route when the ordinary watercourse becomes culverted, potentially indicating that the capacity of the culvert can only deal with low-intensity rainfall events.

Groundwater

5.1.6 Groundwater flood risk mapping is not available for this catchment.

Sewer

5.1.7 The TWUL sewer network data shows that the sewer network in Catchment 2 is comprised entirely of surface water sewers that travel towards the Yeading Brook West. There are only two discharge points into the Yeading Brook West in this catchment which are both located adjacent to 168 Whitby Road. Considering this, there is a likelihood of sewer flooding in this catchment during heavy rainfall events as high river levels could reduce the network's ability to discharge, limiting its capacity for surface water.

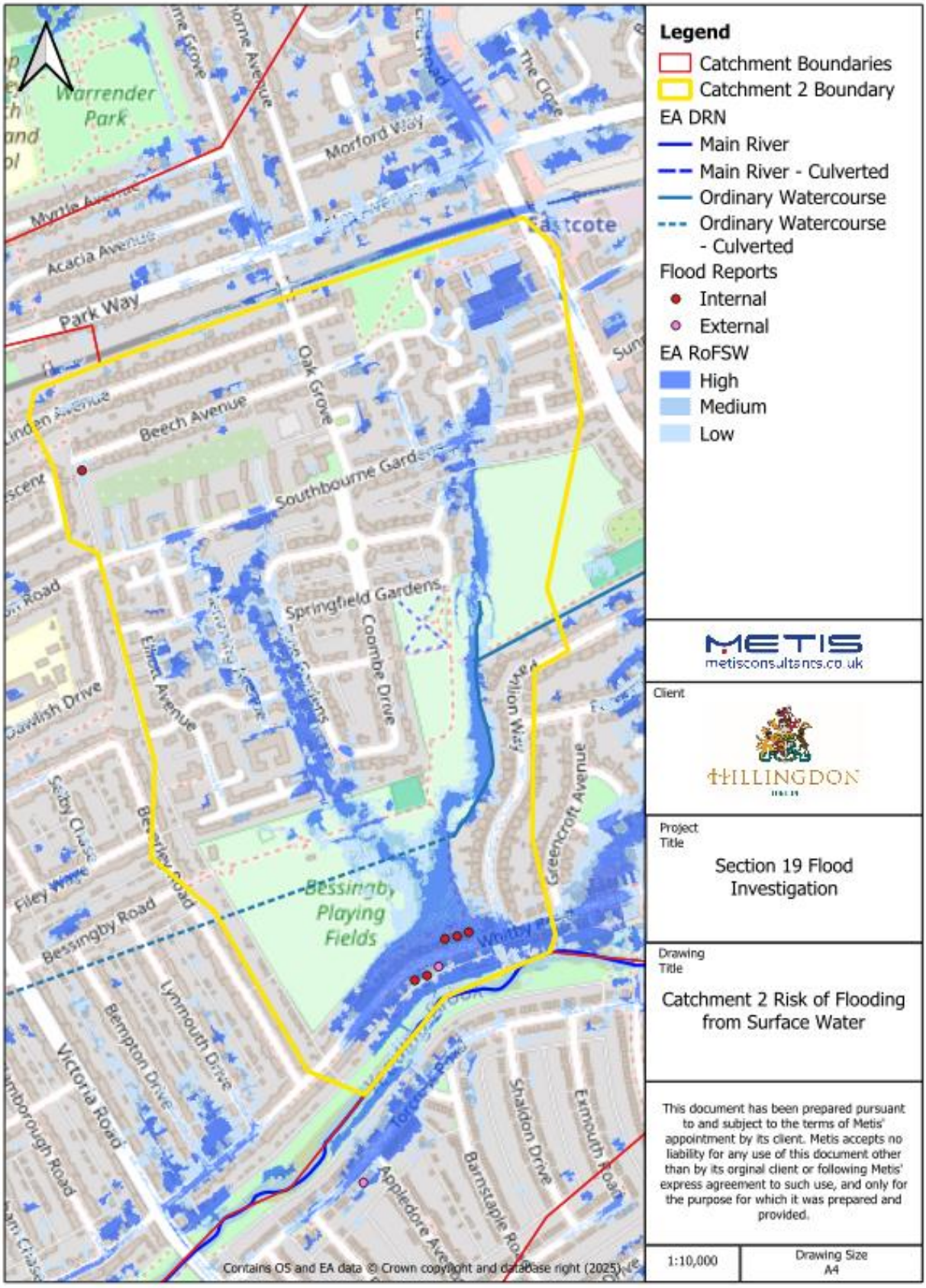


Figure 5-2: Catchment 2 flood incidents and Risk of surface water flooding.

Figure 5-3: Catchment 2 flood incidents and Flood Zones.

5.2 Sources and Causes of Flooding

5.2.1 LiDAR data shows the Yeading Brook West is a low point in Catchment 2, so rain that falls in the catchment is likely travels towards this watercourse as predicted in the EA's RoFSW mapping.

5.2.2 Bessingby Park is located north of the Yeading Brook West, so surface water from the catchment must first run through this green space before reaching the river. The volumes of water flowing through Bessingby Park likely exceeded the capacity of the ordinary watercourse culvert, meaning that this watercourse would have been ineffective at draining the surface water away.

5.2.3 The detention basins implemented within Bessingby Park was designed to alleviate against the 1 in 5 year rainfall event, so these were less effective at managing surface water runoff during this more intensive rainfall event and the exceedance flows ran onto Whitby Road via the footpath between 123 Whitby Road and 180 Pavilion Way. As detailed in *3.3*, the water levels in the Yeading Brook West rose during the rainfall event which reduced the ability of the surface water sewers to discharge, limiting how much surface water could drain away from Whitby Road. This was exacerbated as all the surface water sewer pipes in the catchment converge at Whitby Road. The volumes of water reaching this confluence was greater than the capacity of the network here, causing the sewer to surcharge as shown in Figure 5-4.

Figure 5-4: Photograph of the surface water sewer in Bessingby Park surcharging on the 23 September 2024. Image credit: Whitby Road resident.

5.2.4 In the north-west corner of the catchment, it was noted that surface water follows the topography of the land off the railway footbridge onto Linden Avenue and then straight down the footpath towards Beech Avenue, which is pictured in Figure 5-5. There is no gully at the junction between Linden Avenue and the footpath heading down towards Beech Avenue. The TWUL sewer network mapping shows that the gullies on either side of this point are the head of separate sewer runs that flow in opposite directions.

5.2.5 There are gullies on both sides of the road at Beech Avenue, however, the gullies closest to the end of the road are not in a position to capture any of the surface water running down the footpath before it reaches Beech Avenue properties. The only green space between Linden Avenue and Beech Avenue is a relatively narrow strip along the western edge of 58 Beech Avenue, pictured in Figure 5-6. Therefore, the likely cause of internal flooding along Beech Avenue was due to limited interception from gullies or green spaces resulting in large volumes of surface water flowing from Linden Avenue to Beech Avenue and entering the property through low-lying doors.

Figure 5-5: Photograph of the junction between Linden Avenue and the footpath to Beech Avenue. Image credit: Metis Consultants Ltd.

Figure 5-6: Photograph of the green space between Linden Avenue and Beech Avenue. Image credit: Metis Consultants Ltd.

5.3 Recommendations

- Hillingdon Lead Local Flood Authority officers should conduct a review of the flood alleviation works in Bessingby Park, ensuring that the basins are working as designed.
- Lead Local Flood Authority officers should facilitate the formation of a Flood Action Group (FLAG) at Whitby Road which may increase community flood resilience.
- Lead Local Flood Authority officers should further investigate the mechanisms of the fluvial flooding along Whitby Road and undertake remedial action if necessary.
- Hillingdon Highways Team should consider reprofiling works and the installation of additional gullies along Beech Avenue to reduce the risk of flooding to properties from the highway.
- Flood-affected residents should consider installing Property Flood Resilience (PFR) measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
- Lead Local Flood Authority officers should investigate options for further flood alleviation works in Bessingby Park and bid for future funding opportunities should a feasible option be identified.

6 Catchment 4 – Breakspear Road South, Ickenham

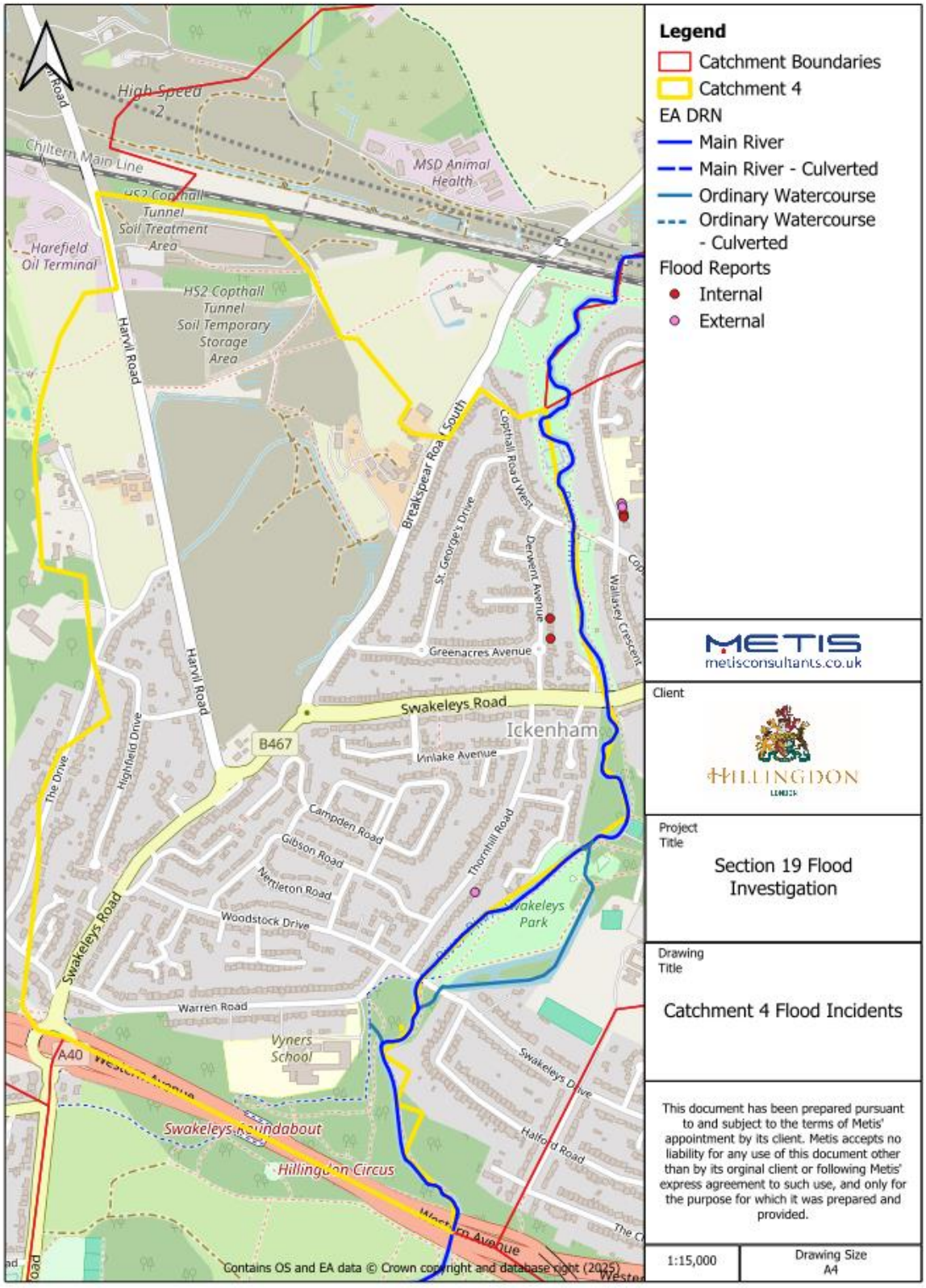


Figure 6-1: Catchment 4 flood incidents from the 23 September 2024 flood event.

6.1 Background

6.1.1 Catchment 4 is located in the west of the borough. BGS Geology Viewer shows that the west of this catchment is underlain by London Clay bedrock geology, which is characterised by a low permeability, whilst the east of this catchment is underlain by Lambeth Group bedrock geology, which is characterised by a variable permeability. The catchment consists of a mix of residential housing and large areas of open green space which are currently being developed by High Speed 2 (HS2). The River Pinn runs along the eastern boundary of the catchment. As shown in figure 6-1, there were two internal flood incidents and one external flood incident reported in Catchment 4. The internal flood incidents occurred along Derwent Avenue.

Surface Water

6.1.2 As shown in figure 6-2, there is one major surface water flow path that runs from the HS2 development in the north-west of the catchment towards the River Pinn in the east of the catchment. Residential properties located between the HS2 project, and the River Pinn are at a high risk of surface water flooding.

Fluvial

6.1.3 As seen in figure 6-3, the EA's Flood Zone mapping shows that Flood Zone 3 extends over Derwent Avenue, Kenbury Close, Greenacres Avenue, and Copthall Road West.

Ordinary Watercourses

6.1.4 Figure 6-3 also shows that there is a small stretch of an ordinary watercourse in Catchment 4 which is located in the A40 Fields Woods which connects to the River Pinn. The ordinary watercourse is not located near to or upstream of any reported flood incidents.

Groundwater

6.1.5 As seen in figure 6-4 the available data shows that Catchment 4 has less than 25% susceptibility to groundwater flooding, therefore it could be considered that the risk of groundwater flooding is low.

Sewer

6.1.6 The TWUL sewer network data shows that the sewer network in Catchment 4 is comprised entirely of surface water sewers that mostly travel towards the River Pinn. When river levels in the River Pinn are high, there is an increased likelihood of sewer flooding in this catchment, as this would limit the sewer network's ability to discharge and reduce its capacity.

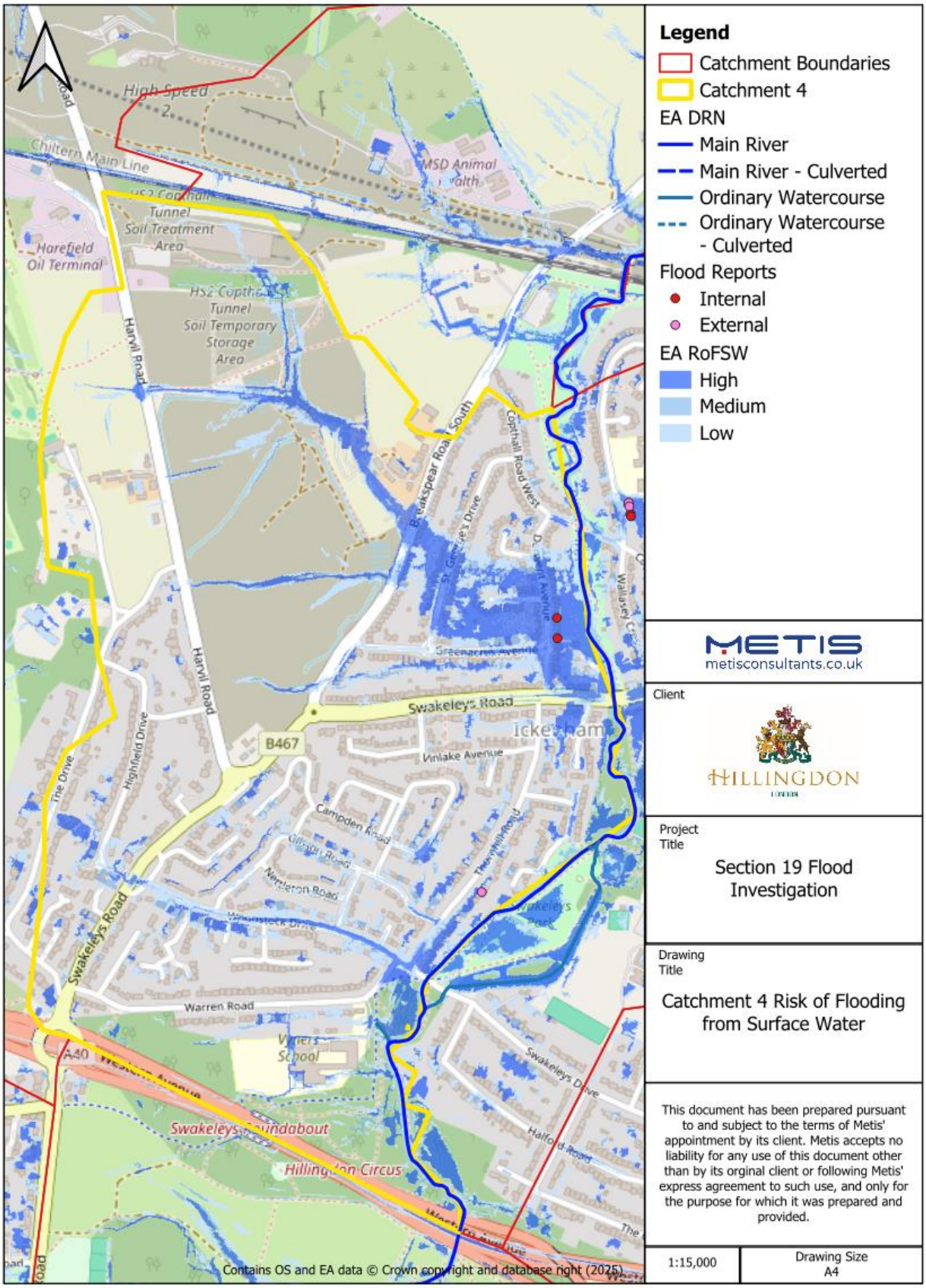


Figure 6-2: Catchment 4 flood incidents and Risk of surface water flooding.

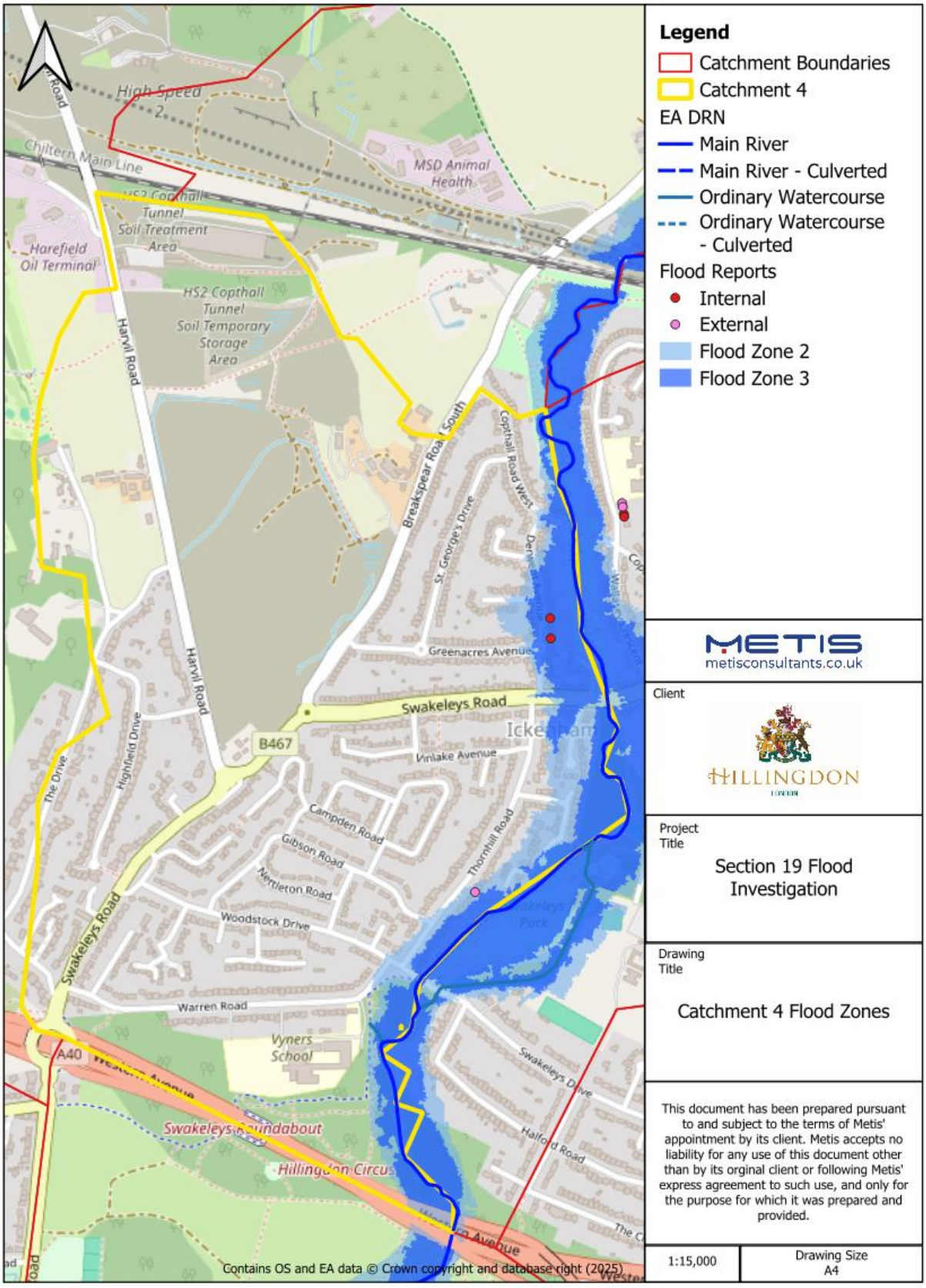


Figure 6-3: Catchment 4 flood incidents and Flood Zones.

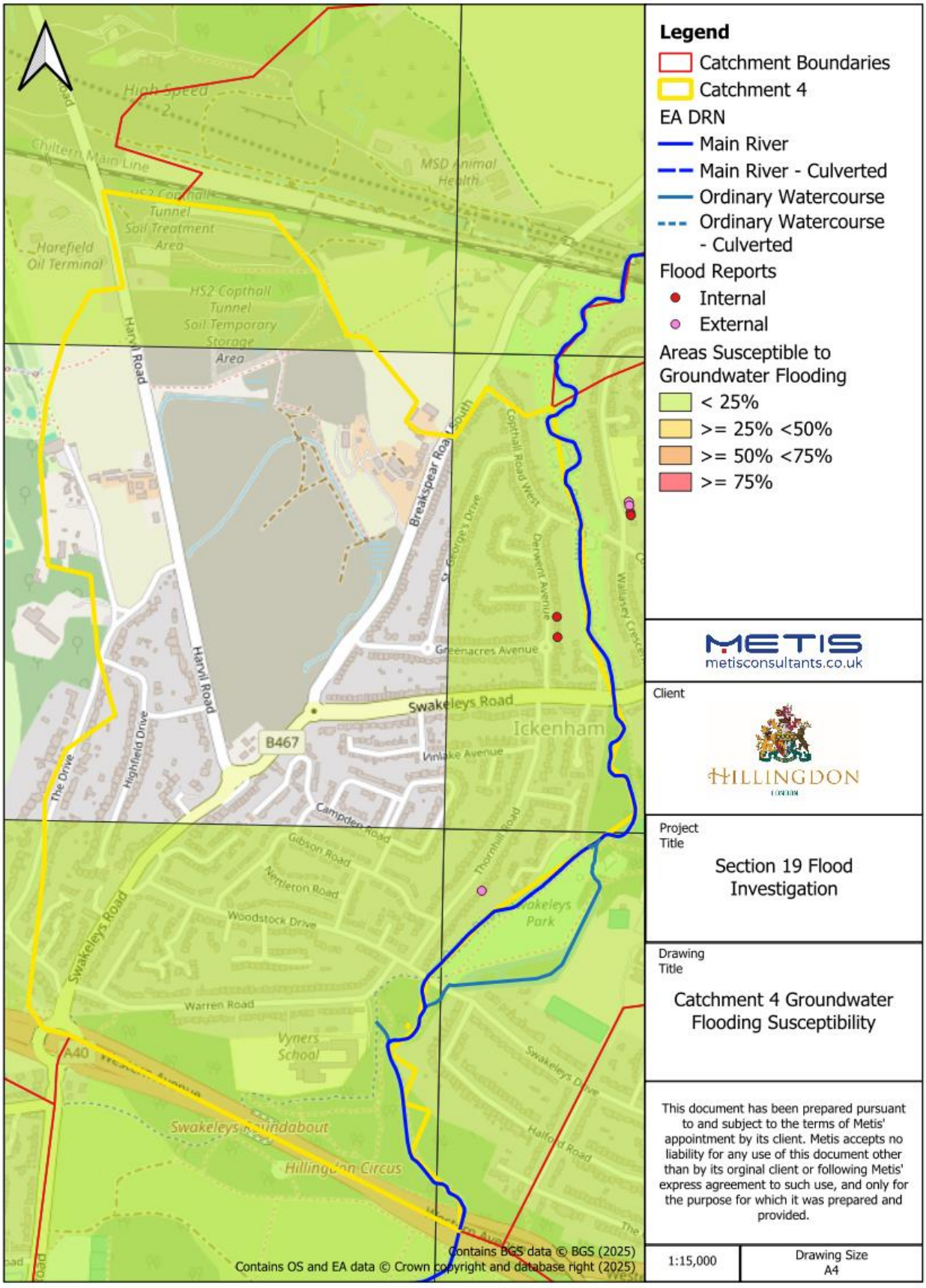


Figure 6-4: Catchment 4 flood incidents and groundwater flooding susceptibility.

6.2 Sources and Causes of Flooding

6.2.1 LiDAR data shows the River Pinn is a low point in Catchment 4, which means rain that falls within the catchment is likely to travel towards this watercourse, as predicted by the EA's RoFSW mapping.

6.2.2 As detailed in section 3.3, the levels in the River Pinn rose, reducing the sewer network's ability to discharge and limiting its capacity. Surface water flowing from the north-west of the catchment across Derwent Avenue was likely unable to drain away into the sewer system and instead flowed towards the front of Derwent Avenue properties via dropped kerbs. This surface water was then able to enter properties through low-lying doors and airbricks.

6.2.3 The levels in the River Pinn reportedly continued to rise until it burst its banks into St George's Field. Derwent Avenue properties back onto St George's Field. As predicted by the EA's Flood Zone mapping, it was reported that the fluvial flooding extended far enough to cause additional water to enter some of these properties through low-lying back doors and airbricks.

6.3 Recommendations

- Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
- Hillingdon Council should continue to review HS2 plans, ensuring that the development does not increase the risk of flooding to surrounding properties.

7 Catchment 5 – Central Ickenham

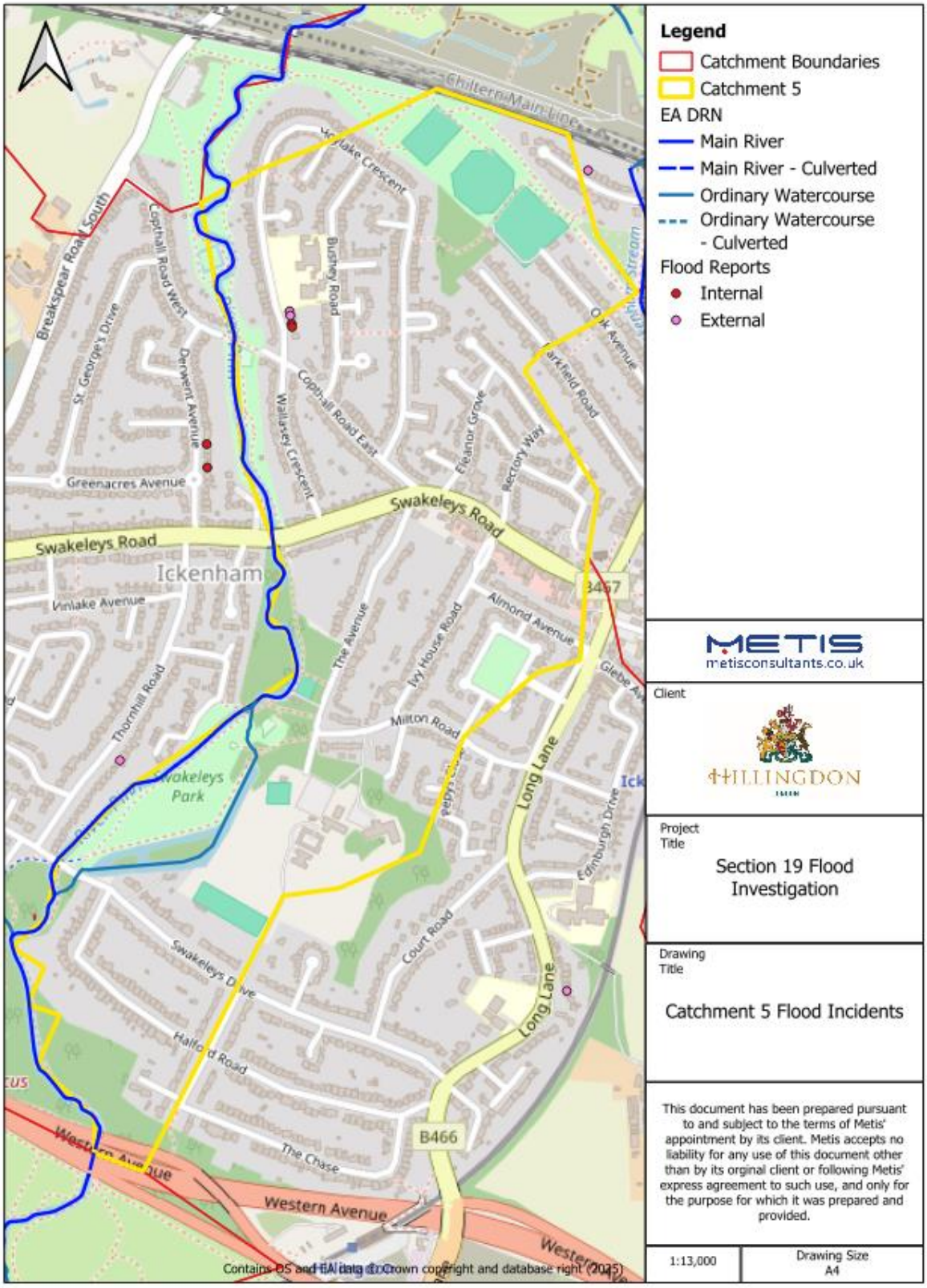


Figure 7-1: Catchment 5 flood incidents from the 23 September flood event.

7.1 Background

7.1.1 Catchment 5 is located in the centre of Hillingdon and east of Catchment 4. BGS Geology Viewer shows that the east of this catchment is underlain by London Clay bedrock geology, which is characterised by a low permeability, whilst the west of this catchment is underlain by Lambeth Group bedrock geology, which is characterised by a variable permeability.

7.1.2 The catchment is of a mix of residential housing and open green areas, including Swakeleys House Estate, Swakeleys Park, Milton Court and King George's Field. The Breakspear School is also located in this catchment, which installed an astro turf pitch in 2022. The River Pinn runs along the western boundary of the catchment. As shown in figure 7-1, there were two internal flood incidents, and two external flood incidents reported in Catchment 5. The internal flood incidents occurred along Hoylake Crescent.

Surface Water

7.1.3 As shown in figure 7-2, there is a band of high predicted surface water flood risk that extends from east to west across the southern boundary of Breakspear School. There is also a high risk of surface water flooding predicted along Swakeleys Road, The Avenue, Ivy House Road, and Copthall Road East.

Fluvial

7.1.4 As seen in figure 7-3, a significant area of land along the western boundary of the catchment is in Flood Zone 2 or 3. However, Hoylake Crescent is located in Flood Zone 1.

Ordinary Watercourses

7.1.5 Figure 7-3 also shows that there is an ordinary watercourse in Catchment 5 which branches from the River Pinn and runs through Swakeleys Park before connecting back to the River Pinn. The ordinary watercourse is not located near or upstream of any reported flood incidents.

Groundwater

7.1.6 As seen in figure 7-4, Catchment 5 is entirely located in areas that have less than 25% susceptibility to groundwater flooding, therefore it could be considered that the risk of groundwater flooding is low.

Sewer

7.1.7 The TWUL sewer network data shows that the sewer network in Catchment 5 is comprised entirely of surface water sewers that mostly travel towards the River Pinn. As with Catchment 4, when river levels in the River Pinn are high, there is an increased likelihood of sewer flooding in this catchment, as this would limit the sewer network's ability to discharge and reduce its capacity.

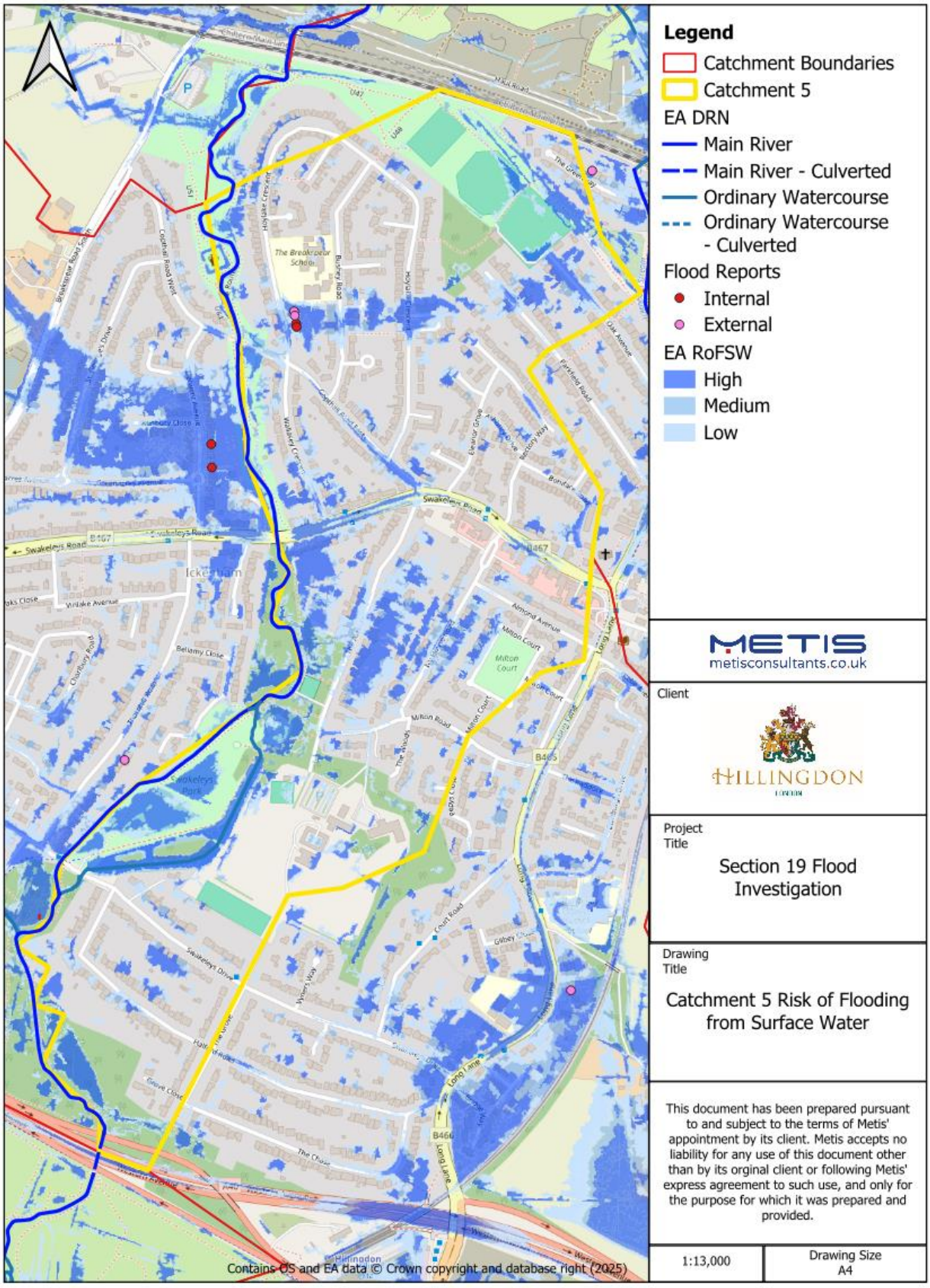


Figure 7-2: Catchment 5 flood incidents and Risk of surface water flooding.

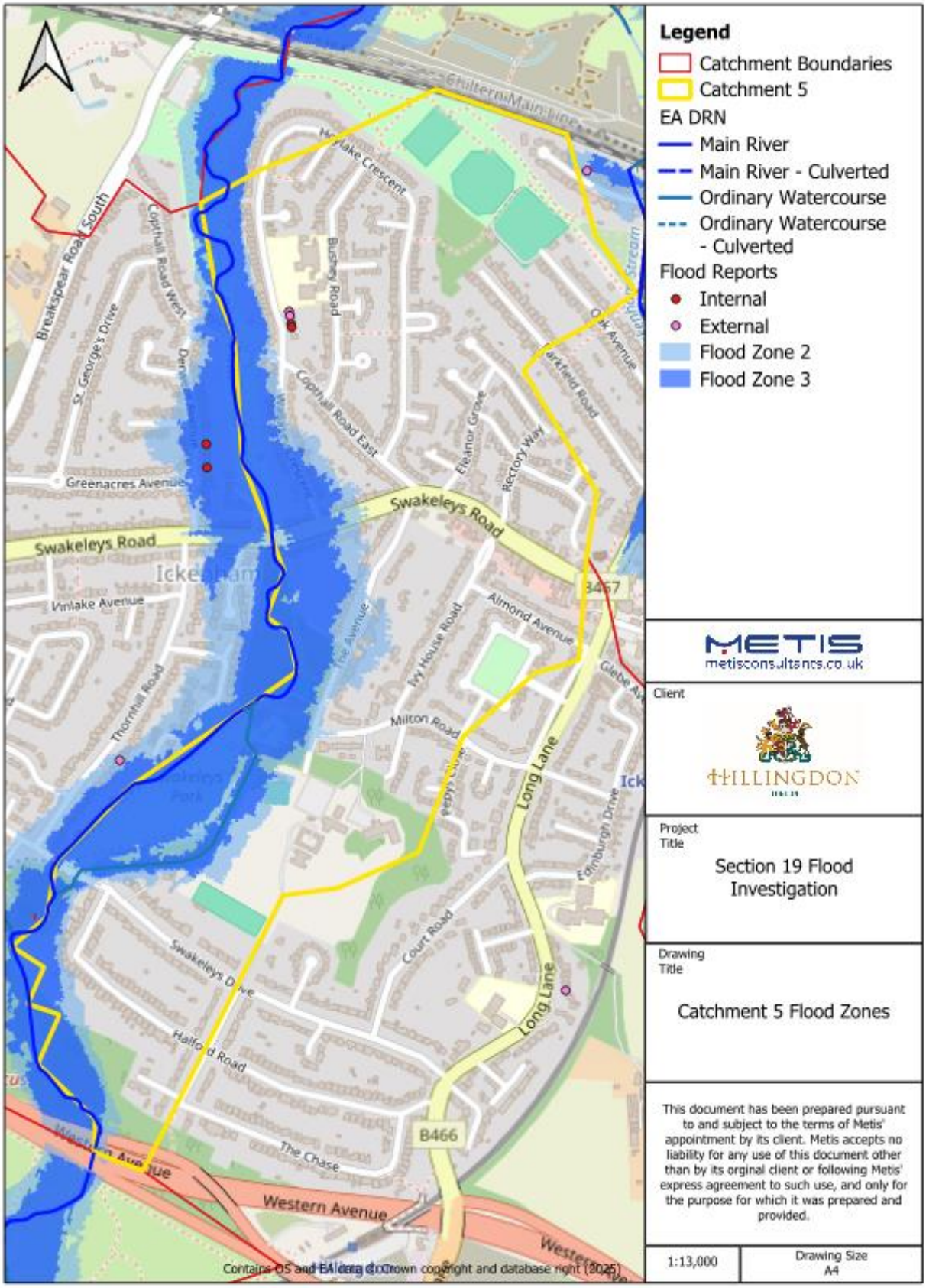


Figure 7-3: Catchment 5 flood incidents and Flood Zones.

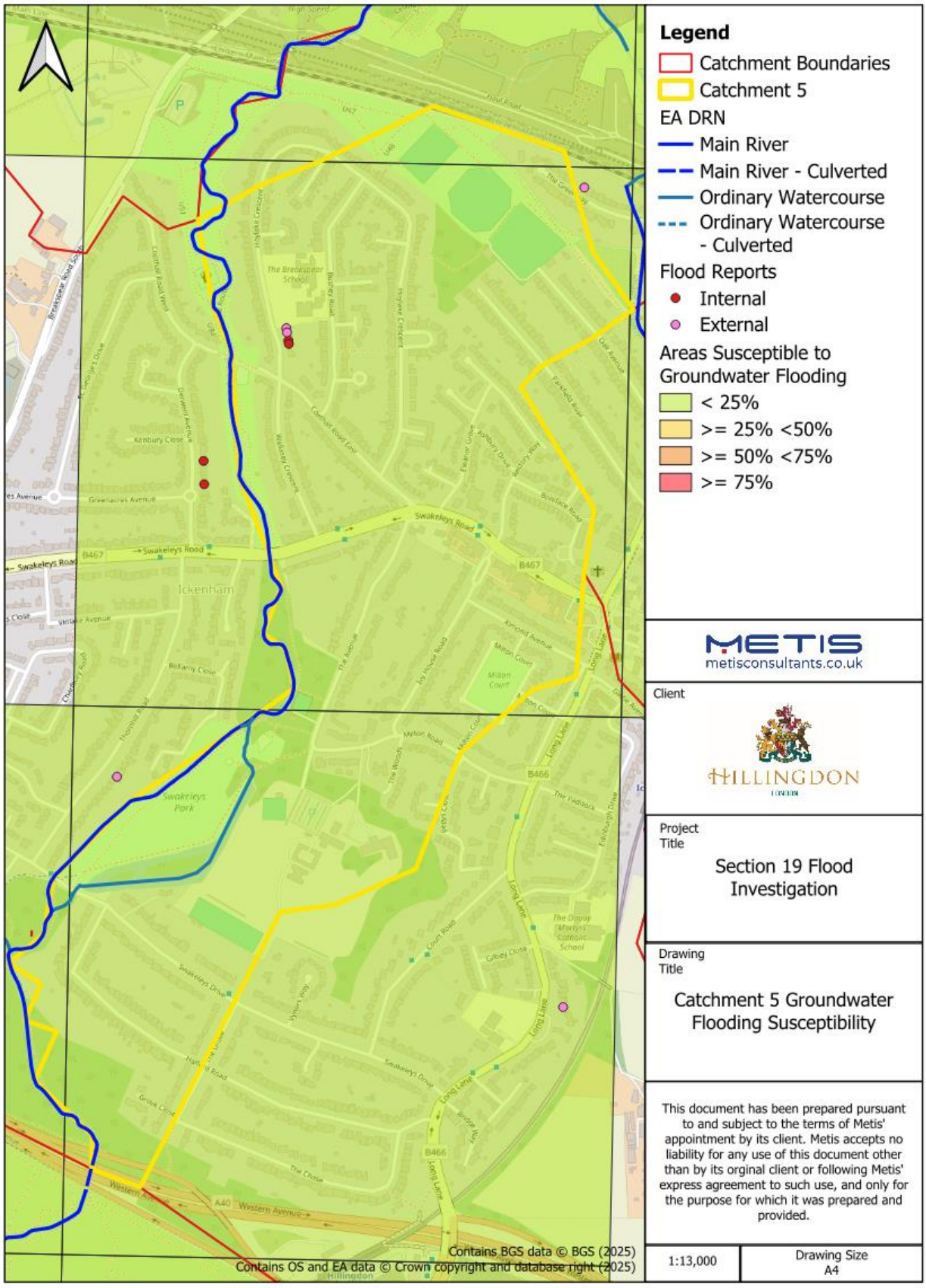


Figure 7-4: Catchment 5 flood incidents and groundwater flooding susceptibility.

7.2 Sources and Causes of Flooding

7.2.1 In the north of Catchment 5, LiDAR data shows that the land slopes in the south-westerly direction towards the River Pinn. This means surface water flows from the north of the catchment through Breakspear School to Hoylake Crescent before reaching the River Pinn, which aligns with observations from local residents and the modelled surface water flooding.

7.2.2 The River Pinn was reported to have burst its banks along the western boundary of the catchment, although there were no reports of the fluvial flooding extending to properties in this catchment. However, this reinforces the conclusions that the receiving river had limited capacity and in turn surface water sewers had limited ability to discharge surface water runoff. This aligns with the flow path shown on the surface water flood risk map, as well as the river level data outlined in section 3.3.

7.2.3 The questionnaire responses identified that the artificial playing pitch at Breakspear School either caused or exacerbated the flooding. The artificial playing pitch was proposed with an underlying permeable sub-base which was designed to provide surface water attenuation. However, it is necessary to note that the flow path modelled in this area occurs to the east of the artificial playing pitch and runs westwards across the school and a part of Hoylake Crescent towards the River Pinn.

7.2.4 The artificial playing pitch was identified through the questionnaire as being a contributory factor because water was seen cascading off it and onto the road. The playing pitch is towards the western end of a lengthy flow path that collects water from distance to the east. The planning requirements in place at the time of approval of the new playing pitch (2231/APP/2021/3980) related to the runoff occurring from the site itself, i.e. no increased risk of flooding from the proposed development. There is no requirement to reduce runoff occurring elsewhere in the catchment.

7.2.5 Consequently, on 23 September 2024 the observations recorded for Breakspear School reflect the modelling and flow route from further to the east. It is therefore likely that the artificial surface at the playing pitch was not the main contributory factor to the quantity of water running off given it is at towards the end of a flow path from a much wider catchment. This assumption is based on the installation of the drainage proposals as proposed within the planning application.

7.2.6 Further investigative work is outlined in the recommendations. Ultimately, the rainfall event led to large volumes of surface water flowing through the back gardens of Hoylake Crescent properties towards the River Pinn, as shown in *Figure 7-5*. This water was reportedly able to enter two Hoylake Crescent properties through low-lying airbricks and back doors. Property level resilience measures should be considered for these properties.

Figure 7-5: Photograph of surface water flooding to the back garden of a Hoylake Crescent property on the 23 September 2024. Image credit: Hoylake Crescent resident.

7.3 Recommendations

- Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
- Breakspear School should investigate the installed drainage of the artificial playing pitch to confirm the system is working in line with approved drainage plans.

8 Catchment 6 – West Ruislip Depot Area

Figure 8-1: Catchment 6 flood incidents from the 23 September 2024 flood event.

8.1 Background

8.1.1 Catchment 6 is located in the centre of borough and east of Catchment 5. BGS Geology Viewer shows that this catchment is underlain by London Clay bedrock geology, which is characterised by a low permeability. The catchment consists of a mix of residential housing and a large open green space called Ickenham Marsh. Glebe Primary School is also located in this catchment. The Ickenham Stream runs from the north-east to the south-west of this catchment. As shown figure 8-1, there were four internal flood incidents, and two external flood incidents reported in Catchment 6. The internal flood incidents occurred along Glebe Avenue and Aylsham Drive.

Surface Water

8.1.2 Figure 8-2 shows a major surface water flow path that flows from Aylsham Drive through Ickenham Marsh before following the route of Ickenham Stream. There is another major flow path that flows along the Metropolitan and Piccadilly Line railway before, again, following the route of Ickenham Stream. The result is a large area of land predicted to be at high risk of surface water flooding further downstream of the Ickenham Stream, including properties along Glebe Avenue.

Fluvial

8.1.3 Flood Zone 2 and 3 runs parallel with the Ickenham Stream, and extends over properties along High Road Ickenham, Tweeddale Avenue, Nithsdale Grove, and Austins Lane (see figure 8-3). Further south in the catchment, Flood Zone 2 and 3 are mostly located on the eastern side of the Ickenham Stream, covering Ickenham Marsh. Glebe Avenue and Aylsham Drive are within Flood Zone 1.

Ordinary Watercourses

8.1.4 Figure 8-3 shows that there are no mapped ordinary watercourses within Catchment 6, therefore it could be considered that the risk of flooding from ordinary watercourses is low.

Groundwater

8.1.5 As seen in figure 8-4, the available data shows that Catchment 6 has less than 25% susceptibility to groundwater flooding, therefore it could be considered that the risk of groundwater flooding is low.

Sewer

8.1.6 The TWUL sewer network data shows that the sewer network in Catchment 6 is comprised entirely of surface water sewers that mostly drain to the Ickenham Stream. When river levels in the Ickenham Stream are high, there is an increased likelihood of sewer flooding in this catchment, as this would limit the sewer network's ability to discharge and reduce its capacity.

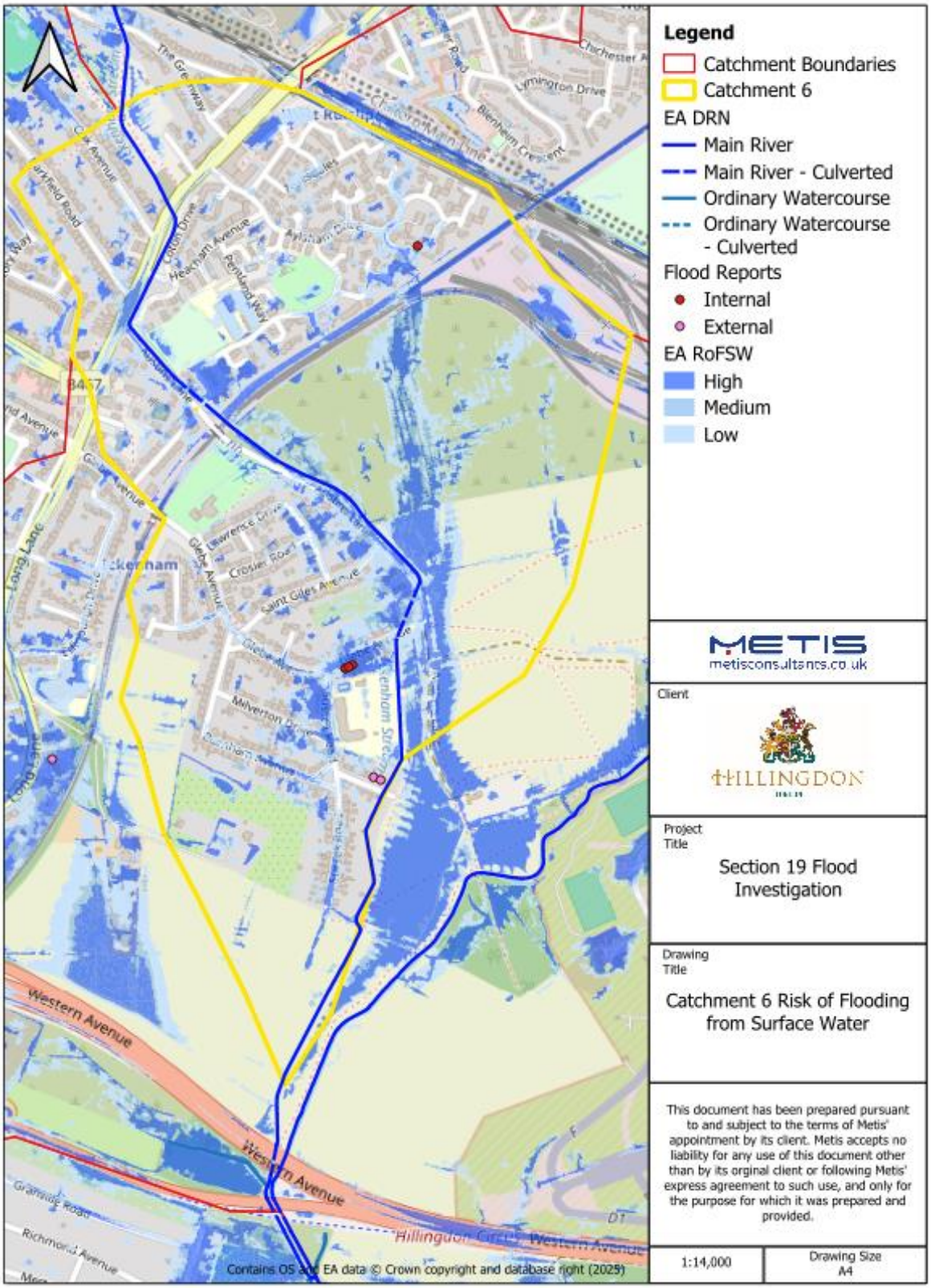


Figure 8-2: Catchment 6 flood incidents and Risk of surface water flooding.

Figure 8-3: Catchment 6 flood incidents and Flood Zones.

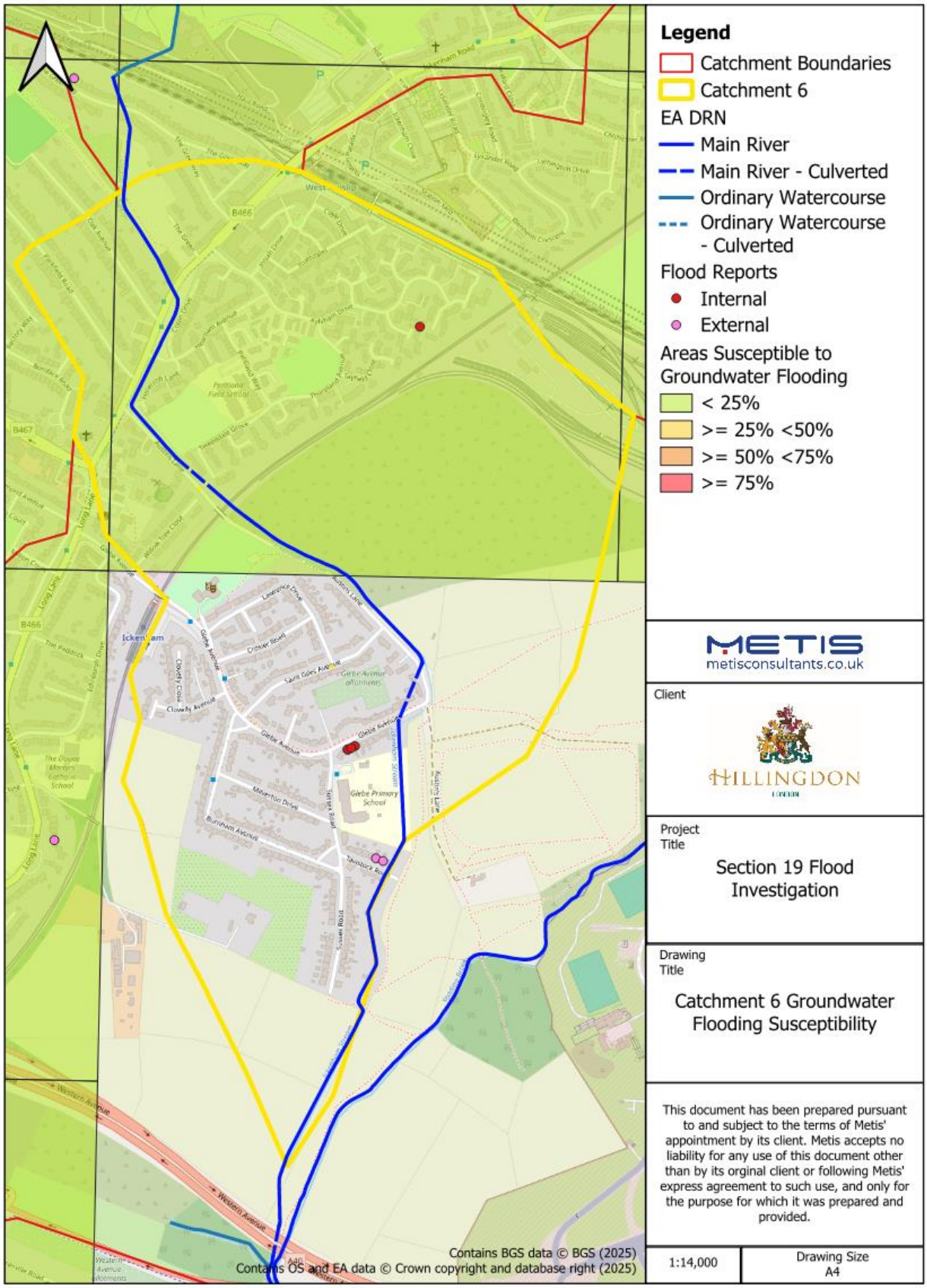


Figure 8-4: Catchment 6 flood incidents and groundwater flooding susceptibility.

8.2 Sources and Causes of Flooding

8.2.1 LiDAR data shows that Catchment 6 slopes from north-west to south-east, which means that surface water runoff likely flows towards the south-east of the catchment, as predicted by the EA's RoFSW mapping.

8.2.2 There is no data that shows how the levels in the Ickenham Stream responded to the rainfall event. However, the Ickenham Stream is a tributary of the Yeading Brook West which does have water level data available, described in *3.3*. It is likely that the water levels in the Ickenham Stream reacted similarly to those in the Yeading Brook West, rising overnight between the 22 and 23 September, but not breaching its banks. The rising levels in the Ickenham Stream likely reduced the sewer network's ability to discharge, limiting its capacity to drain runoff from the surface. Therefore, surface water flowing from the north-west of the catchment was able to accumulate along Glebe Avenue as shown in *Figure 8-5*. Surface water flowed into the driveways of Glebe Avenue properties across dropped kerbs and caused internal flooding from the front.

Figure 8-5: Photograph of the surface water flooding along Glebe Avenue on the 23 September 2024. Image source: Glebe Avenue resident.

8.2.3 Surface water then reportedly flowed southwards from Glebe Primary School and entered Glebe Avenue properties through rear gardens. It is possible that the school's drainage system also reached capacity during the rainfall event, resulting in surface water also draining towards Glebe Avenue properties. It is important to note that flooding was only reported at properties that back onto the impermeable school car park and playground. Glebe Avenue properties that back onto the school field did not report flooding, likely because the runoff was attenuated by the permeable surface and directed along alternative flow paths.

8.2.4 The cause of the internal flooding incident along Aylsham Drive was likely due to a more localised issue in the drainage system. Surface water runoff is expected to flow from Aylsham Drive down Melville Close and onwards towards Ickenham Marsh and the Ickenham Stream. A private drain at the back of the flood-affected property, shown in Figure 8-6, is situated at a low point along this flow path. It is probable that this drain reached capacity, leading to surface water accumulating at the back of the Aylsham Drive property and ultimately entering the property through the back door.

Figure 8-6: Photograph of the private drain located at the back of the flood-affected property on Aylsham Drive. Image credit: Metis Consultants Ltd.

8.3 Recommendations

- Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
- Lead Local Flood Authority officers should work with Glebe Primary School to consider drainage improvements and bid for future funding opportunities, such as SuDS in Schools grants, should a feasible option be identified.
- The EA should consider installing river level or flow gauges on the Ickenham Stream as there is no gauge currently within this river.

9 Catchment 12 – Ruislip Gardens

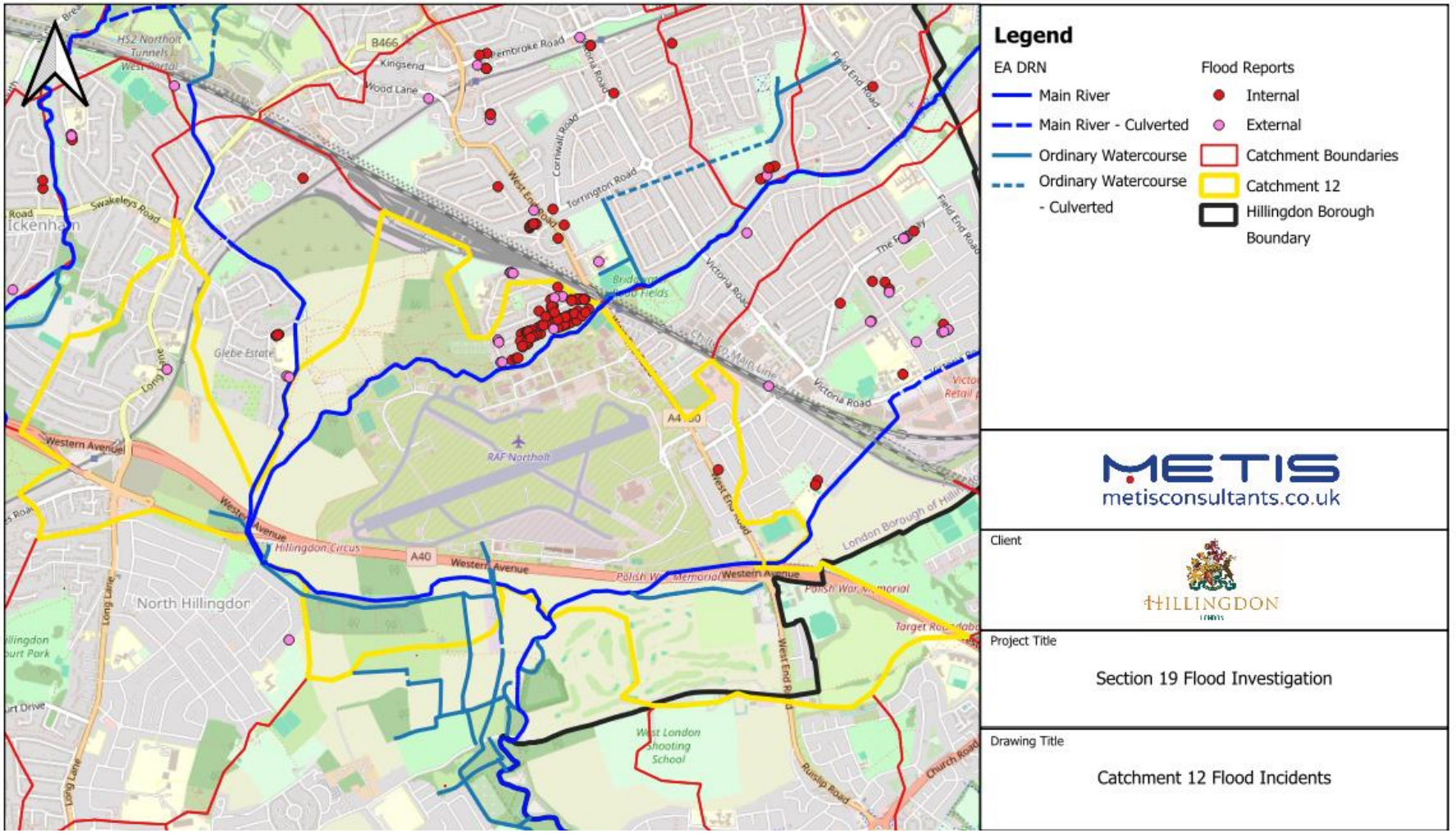


Figure 9-1: Catchment 12 flood incidents from the 23 September 2024 flood event

9.1 Background

9.1.1 Catchment 12 extends from the centre of Hillingdon to the east into the London Borough of Ealing. RAF Northolt, owned by the Ministry of Defence, makes up a significant proportion of the catchment. Additionally, a large area in the north of Catchment 12 consists of Ickenham Marsh. BGS Geology Viewer shows that the majority of this catchment is underlain by London Clay bedrock geology, which is characterised by a low permeability.

9.1.2 The Yeading Brook West runs from north of the catchment in a south westerly direction where it converges with the Ickenham Stream. From here, the Yeading Brook West runs along the south of the catchment in an easterly direction. The Yeading Brook East runs along the south-east of the catchment in a parallel south westerly direction, until it converges with the Yeading Brook West and flows southeast out of the catchment. As shown in 9-1. The Council received reports of 72 internal flood incidents and eight external flood incidents in Catchment 12. The internal flood incidents occurred along Stafford Road, Trevor Crescent, Bedford Road, Clyfford Road, Lea Crescent, and West End Road.

Surface Water

9.1.3 As shown in figure 9-2 there is a major surface water flow path that follows the route of the Yeading Brook West from Ruislip Gardens Station towards the confluence with Ickenham Stream. There is also a high predicted risk of surface water flooding across much of RAF Northolt and along the A40.

Fluvial

9.1.4 As seen in figure 9-3, a large area of Ickenham Marsh surrounding the Yeading Brook West and Ickenham Stream lies within Flood Zone 2 and 3. A section of Gutteridge Wood and Meadows between the A40 and Yeading Brook West also lies in Flood Zone 2 and 3. C & L Golf and Country Club lies in Flood Zone 2 of the Yeading Brook East, as does a section of the A40. However, none of the flood incidents are located within Flood Zone 2 or 3.

Ordinary Watercourses

9.1.5 Figure 9-3 also shows that there are a number of ordinary watercourses located in Gutteridge Wood and Meadows and in C & L Country and Golf Club. There are no ordinary watercourses located near or upstream of any reported flood incidents.

Groundwater

9.1.6 As seen in figure 9-4, the available data shows that Catchment 6 has less than 25% susceptibility to groundwater flooding, therefore it could be considered that the risk of groundwater flooding is low.

Sewer

9.1.7 The sewer network in Catchment 12 is comprised entirely of surface water sewers. The TWUL sewer network data shows that surface water sewers in the Ruislip Gardens area all discharge to the Yeading Brook West. Meanwhile, the surface water sewers along West End Road south of Trenchard Avenue all discharge to the Yeading Brook East. When water levels in these rivers are high, there is an increased likelihood of sewer flooding in this catchment, as this would limit the sewer network's ability to discharge and reduce its capacity.

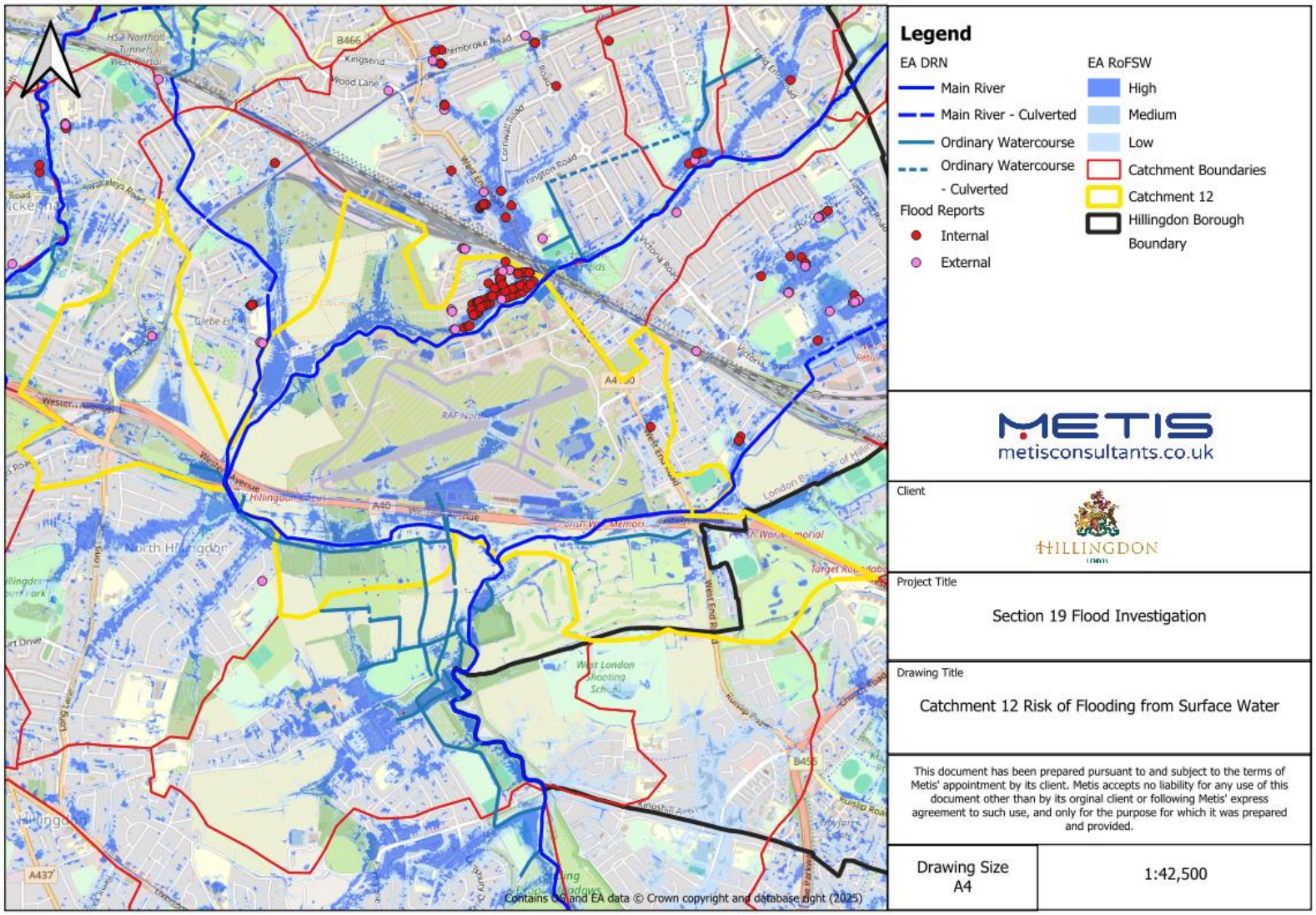


Figure 9-2: Catchment 12 flood incidents and Risk of surface water flooding.

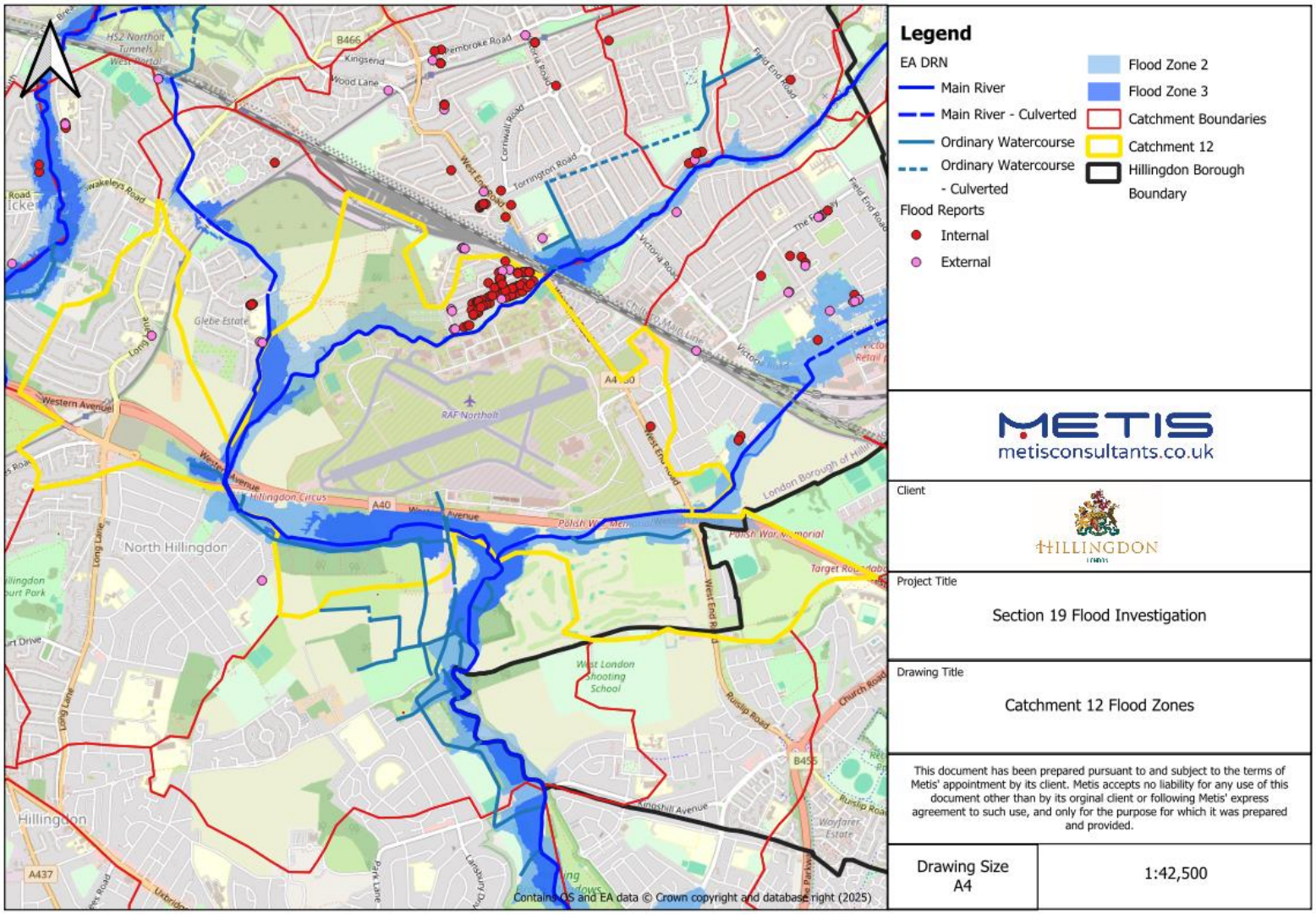


Figure 9-3: Catchment 12 flood incidents and Flood Zones.

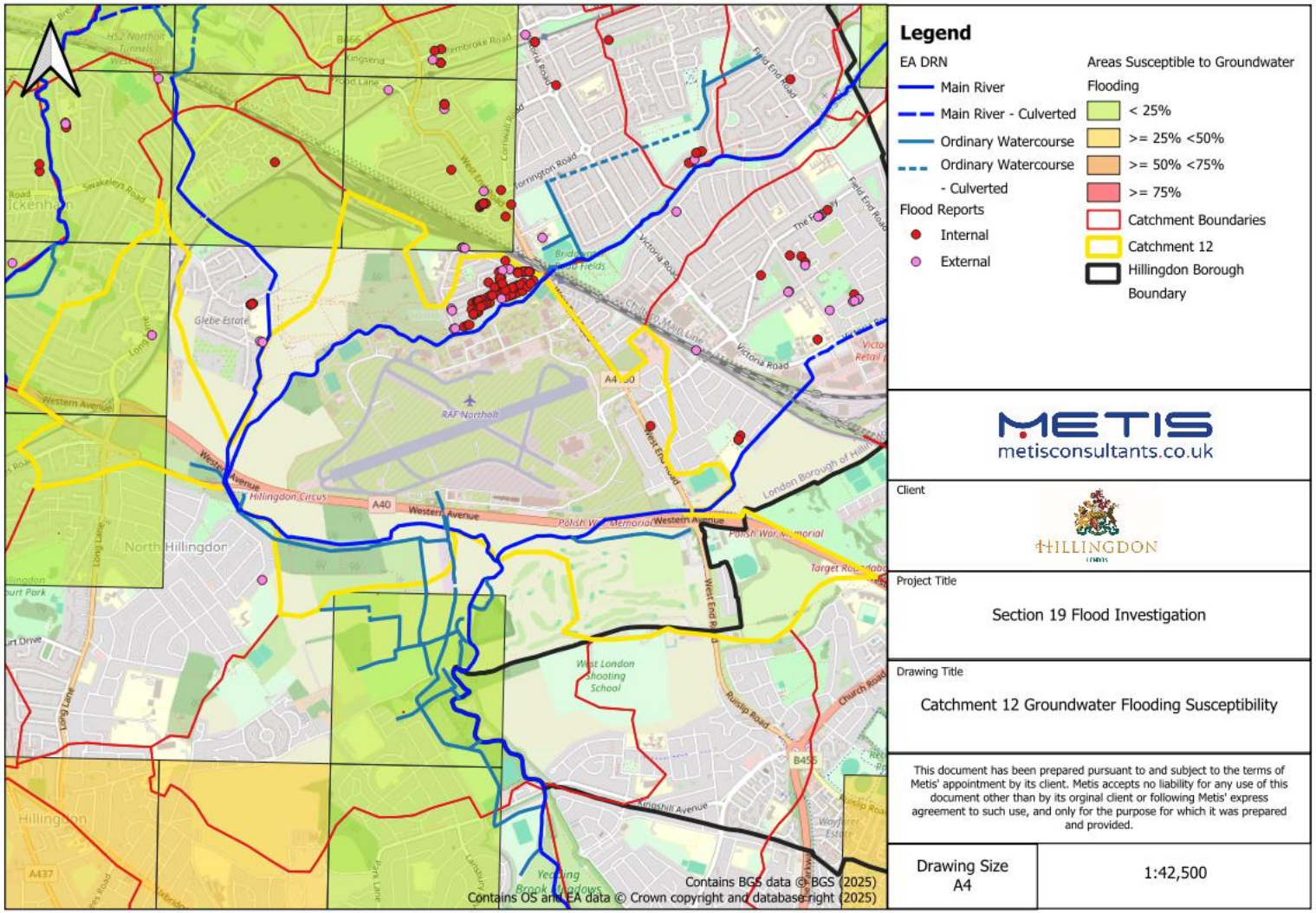


Figure 9-4: Catchment 12 flood incidents and groundwater flooding susceptibility.

9.2 Sources and Causes of Flooding

9.2.1 LiDAR data shows that the land around Clyfford Road slopes in a south-easterly direction from the railway towards the Yeading Brook West, meaning that surface water runoff also flows south-east. There are few permeable surfaces along Stafford Road, Trevor Crescent, Bedford Road, Clyfford Road, and Lea Crescent, with most properties having impermeable driveways at the front as shown in the photo to the right. A number of these driveways also slope down to the properties which are at lower levels than the carriageways. If surface water cannot flow into the river, then the next lowest areas are properties along the properties identified above.

9.2.2 Additionally, it is noted that the gullies along these roads are not closely spaced typically serve upward of 20 properties each. For example, there are no gullies between 12 and 66 Clyfford Road, a length of 24 properties. As detailed in section 3, river levels in the Yeading Brook West rose which likely submerged the outfalls from the Thames Water drainage network.

9.2.3 It is necessary to note that the outfalls are particularly low within the Yeading Brook West (see image right). Whilst the river, as reported by residents, was far from 'full', it is the height of the outfalls that are material to the cause of flooding. The outfalls become less able to function as the water level rises; eventually the force of flow from the outfall into the river is not sufficient and the network becomes locked and backs up. This is evidenced by the flood risk mapping that shows Clyfford Road not at risk from river flooding even in the extreme 1:1000-year event, whilst being at risk from surface water flooding in much lower events (e.g. 1:30 year).

9.2.4 The flooding was potentially exacerbated as multiple residents reported that many of the

gullies were in need of clearing before the flood event. The result was large volumes of runoff accumulating along the eastern extents of Stafford Road, Trevor Crescent, Bedford Road, Clyfford Road, and Lea Crescent, causing internal and external flooding.

9.2.5 Further investigations carried out over the Summer of 2025 identified significant problems with the drainage outfalls that carry the majority of water from Ruislip Gardens to the Yeading Brook.

9.2.6 Firstly, it confirmed the observations regarding the relatively low level of some drainage outfalls. The image to the right shows the outfall that takes water north of the catchment and is consistent with other outfalls on the western bank of the Yeading Brook. These outfalls are sunk low in the embankment which means moderate water rise in the river would submerge the outfall rendering them ineffective.

9.2.7 Secondly, the image below shows one of the three outfalls that drain Ruislip Gardens in the Summer of 2025. The outfall is heavily blocked which impedes the discharge of water from the drainage network.

9.2.8 During a site investigation, standing water could be seen within the road gullies on Clyfford Road even though there had been minimal rainfall in the preceding weeks. The outfalls have subsequently been tendered to and the worst of the blockages removed.

9.2.9 LiDAR data shows that the land around the flood-affected property on West End Road in Catchment 12 is generally flat. However, on the site visit, it was noted that West End Road is elevated slightly higher than the properties either side of it, resulting in surface water runoff being directed towards the front of these properties.

9.2.10 The gullies located closest to the flood-affected properties are not in a position to capture much of this runoff, resulting in surface water flowing over dropped kerbs and into the driveway before accumulating at the front of the property. This external surface water flooding was likely exacerbated by the rising water levels above drainage outfalls within

both arms of the Yeading Brook, limiting the efficacy of the sewer network in the area to move water away from properties. This allowed for enough surface water accumulation to breach the damp proof course and cause internal flooding through the walls.

9.3 Recommendations

- Hillingdon Highway Team should review the way the highways drain along Stafford Road, Trevor Crescent, Bedford Road, Clyfford Road, and Lea Crescent and consider installing additional gullies, rain gardens, or drainage channels along the route to reduce the risk of flooding to properties from the highway.
- TfL should explore the installation of additional gullies along West End Road to reduce the risk of flooding to properties from the highway.
- Hillingdon Council should develop a surface water sewer daylighting scheme at Bridgewater Road Playing Fields with support from TWUL.
- Lead Local Flood Authority officers should facilitate the formation of a FLAG at Clyfford Road and surrounding area, with the aim of increasing community flood resilience.
- Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
- Lead Local Flood Authority officers should continue to work in partnership with the EA and TWUL to develop the Ruislip Gardens flood alleviation scheme towards implementation.

10 Catchment 17 – Victoria Road Area

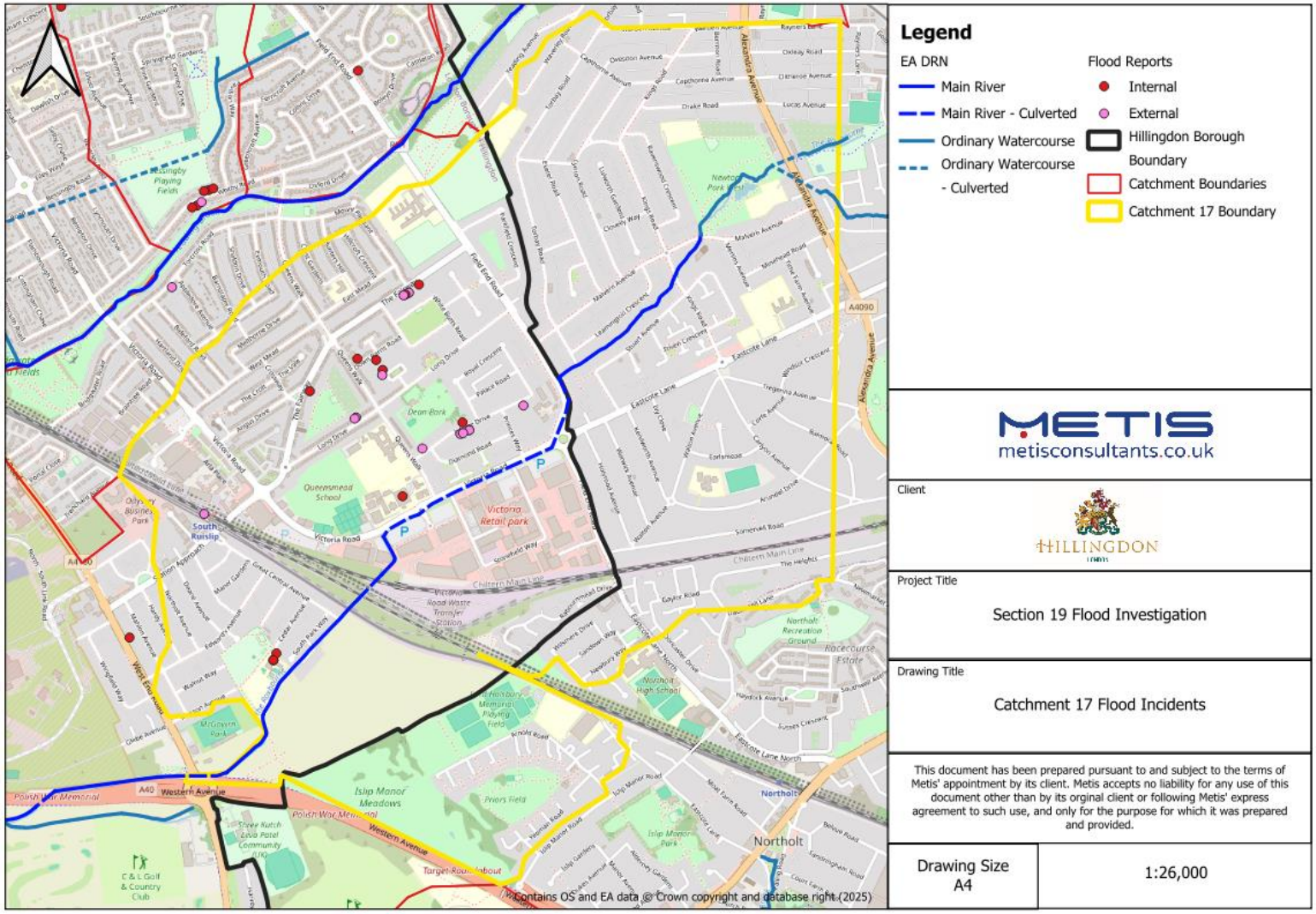


Figure 10-1: Catchment 17 flood incidents from 23 September 2024 flood event.

10.1 Background

10.1.1 Catchment 17 is located in the east of the borough but also extends into the London Boroughs of Ealing and Harrow. BGS Geology Viewer shows that this catchment is underlain by London Clay bedrock geology, which is characterised by a low permeability. The catchment includes several schools, including Queensmead School and Bourne Primary School, as well as South Ruislip Station.

10.1.2 The Yeading Brook East is mainly an open channel from north-east to south-west across the catchment, although a section of the river is culverted below Victoria Road. As shown in Figure 10-1, there were 11 internal flood incidents and 11 external flood incidents reported in Catchment 17. The internal flood incidents occurred at The Fairway, Down Barns Road, Monks Close, Jubilee Drive, Queensmead School and Bourne Primary School.

Surface Water

10.1.3 As shown in Figure 10-2, large areas of the catchment to the north and east of the culverted section of the Yeading Brook East are at high predicted risk of surface water flooding. These areas include The Fairway, Down Barns Road, Monks Close, Jubilee Drive, and Queensmead School. There is also a surface water flow path in the west of the catchment that runs from South Ruislip Station through Bourne Primary School and towards an open section Yeading Brook East.

Fluvial

10.1.4 As seen in Figure 10-3, the land surrounding the culverted section of the Yeading Brook East is within Flood Zone 2. This includes Queensmead School and Jubilee Drive. Further downstream, Bourne Primary School is also located within Flood Zone 2.

Ordinary Watercourses

10.1.5 Figure 10-3 also shows that there are two ordinary watercourses within Catchment 17. They are both located within Harrow and represent the upstream extents of the Yeading Brook East. They are culverted below Alexandra Avenue before converging in Newton Park West.

Groundwater

10.1.6 There is no information available on groundwater flood risk within Catchment 17.

Sewer

10.1.7 The TWUL sewer network data shows that the sewer network in Catchment 17 is comprised entirely of surface water sewers that travel towards and discharge into the Yeading Brook East. When water levels in this river are high, there is an increased likelihood of sewer flooding in this catchment, as this would limit the sewer network's ability to discharge and reduce its capacity.

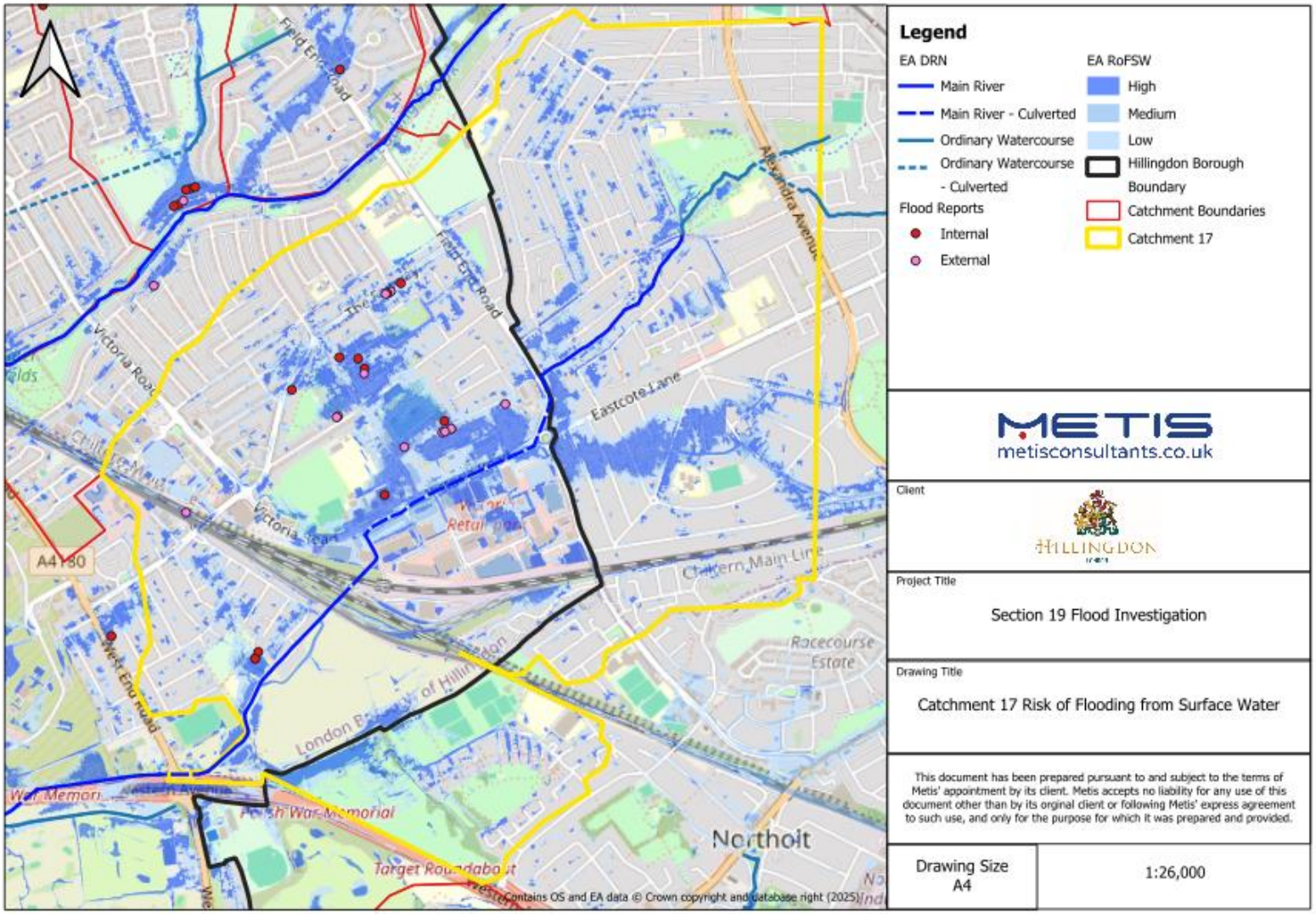


Figure 10-2: Catchment 17 flood incidents and risk of flood from surface water.

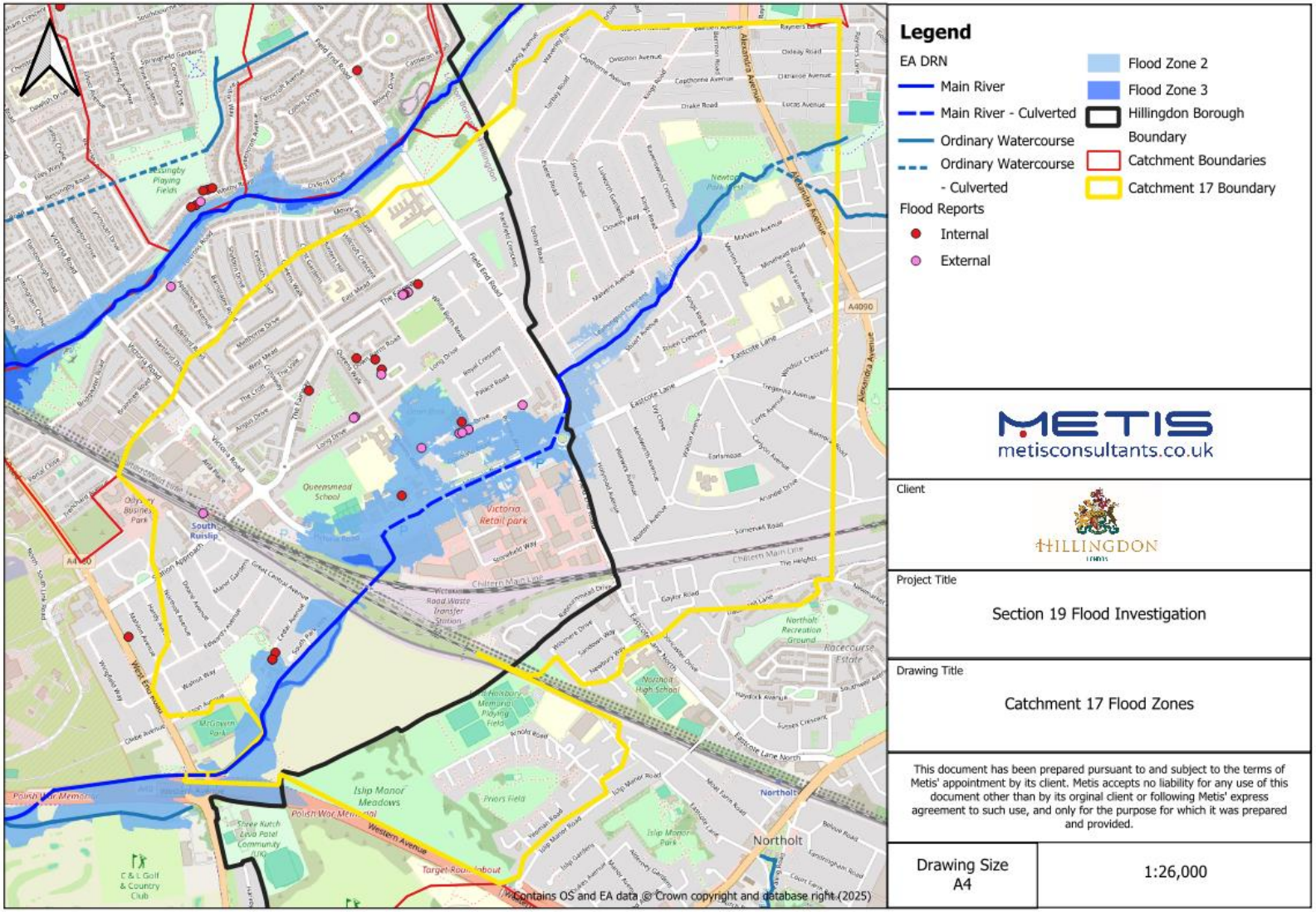


Figure 10-3: Catchment 17 flood incidents and Flood Zones.

10.2 Sources and Causes of Flooding

10.2.1 LiDAR data shows that the Yeading Brook East is a low point in Catchment 17, which means rain that falls within the catchment is likely to travel towards this watercourse. Considering this, surface water runoff from Mount Pleasant and Queens Walk likely flowed southwards towards The Fairway and accumulated at the front of the north-facing properties, as shown in *Figure 10-4*.

10.2.2 High water levels in the Yeading Brook East, as evidenced by *3.3,* would have reduced the ability of the surface water sewer network to discharge and limited its capacity, increasing the volumes of water accumulating on the surface. The accumulation of surface water was great enough to cause water to enter some of these properties through low-lying airbricks.

Figure 10-4: Photograph of surface water accumulating outside The Fairway properties opposite the junction with Mount Pleasant on the 23 September 2024. Image credit: The Fairway resident.

10.2.3 Some of the surface water runoff from The Fairway and Queens Walk likely continued to follow the topography of the land southwards to Down Barns Road and Monks Close. Combined with runoff from Brackenbridge Field and direct rainfall, surface water accumulated along Down Barns Road and Monks Close as shown in *Figure 10-5* and was able to enter some properties through low-lying doors and airbricks. There were reports of

gullies requiring clearing before the flood event, which likely further reduced the amount of surface water able to drain and worsened the flooding.

Figure 10-5: Photograph of surface water flooding along Down Barns Road on the 23 September 2024. Image credit: Down Barns Road resident.

10.2.4 The mechanisms of the internal and external flooding at Jubilee Drive, Queensmead School, and Bourne Primary School were likely consistent with that along The Fairway, Down Barns Road, and Monks Close. Surface water had a reduced ability to drain into the sewer network, resulting in it following the local topography and flooding along highways and into properties. However, it is important to note that Queensmead School and Bourne Primary School are located adjacent to the Yeading Brook East which is the low point of Catchment 17.

10.2.5 Rainfall from the rest of the catchment likely flowed towards these areas of lower elevation, resulting in extensive accumulation of surface water at the sites, as seen in

Figure 10-6. It is noted that the private drainage systems within the school grounds have had limited maintenance prior to the flooding event and thus may have contained blockages, worsening the surface water flooding. At Bourne Primary School, some of the flooding may have also been fluvial, as the Yeading Brook East reportedly overflowed its banks at this location. On a final note, the flooding at Bourne Primary School was contaminated with foul water, potentially indicating that a surface water sewer with a misconnection either surcharged near the school or discharged into the Yeading Brook East further upstream of the school.

Figure 10-6: Photograph of the flooding at Bourne Primary School on the 23 September 2024. Image credit: Bourne Primary School.

10.3 Recommendations

- TWUL should investigate a possible misconnection in their network upstream of Bourne Primary School.
- Lead Local Flood Authority officers should engage with Bourne Primary School's maintenance team to conduct a drainage survey in order to better understand the drainage issues at the site.
- Lead Local Flood Authority officers should engage with Bourne Primary School to assist in the development of a flood action plan based on findings from the drainage survey and an understanding of the flood risk.
- Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
- Lead Local Flood Authority officers should investigate options for further drainage improvements at Bourne Primary School and bid for future funding opportunities (where available), such as SuDS in Schools grants, should a feasible option be identified.
- Hillingdon Council and Harrow Council should collaborate to investigate into opportunities for a flood alleviation scheme within this catchment.
- Hillingdon Council Flood Officers should support the DfE with implementing flood resilience measures at Queensmead School.
- Hillingdon Council Flood Officers should continue to work in partnership with the EA to develop the Victoria Road flood alleviation scheme towards implementation.

11 Catchment 26 – Brook Drive, Ruislip

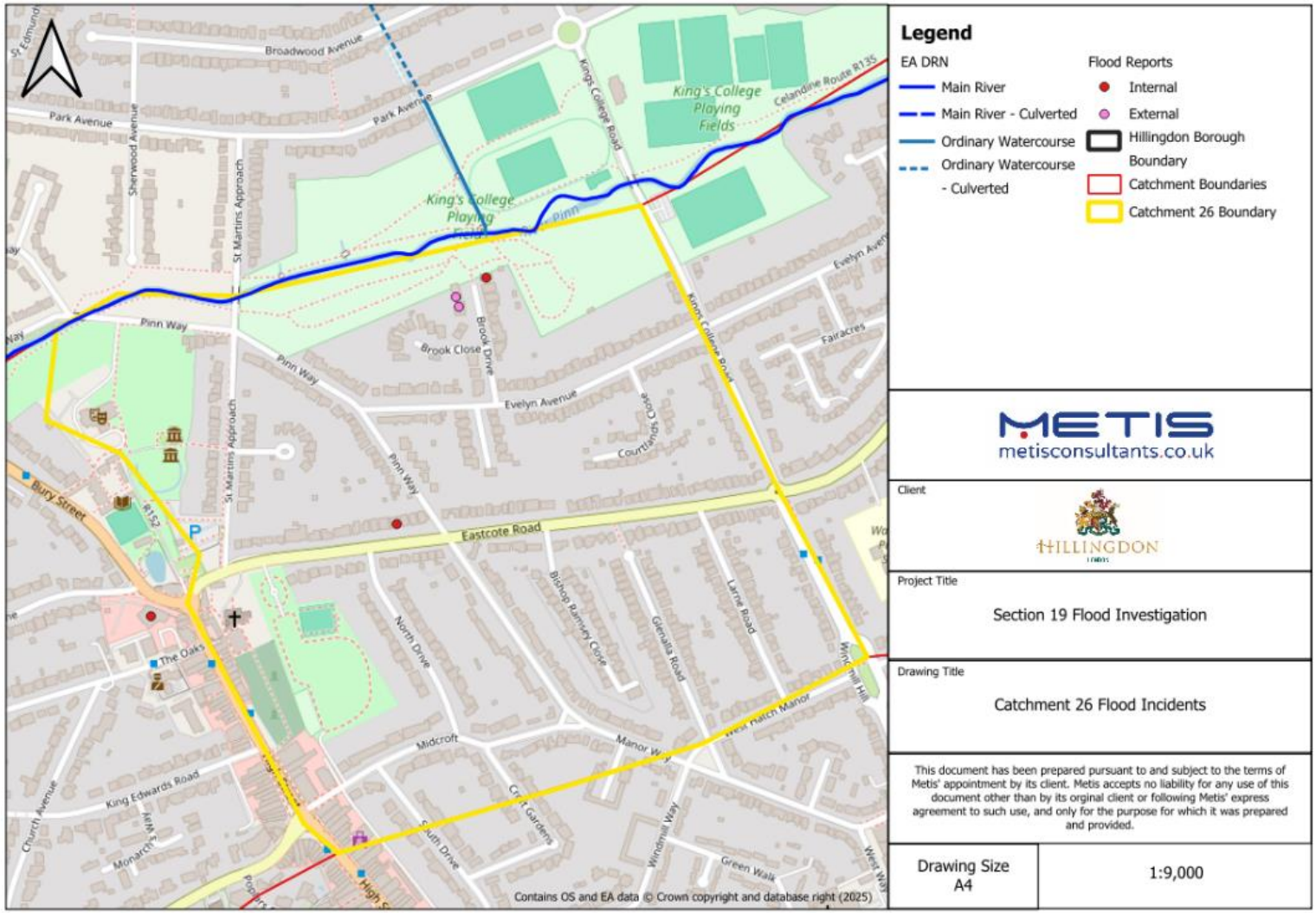


Figure 11-1: Catchment 26 flood incidents from the 23 September 2024 flood event.

11.1 Background

11.1.1 Catchment 26 is located in the north of Hillingdon. BGS Geology Viewer shows that the majority of this catchment is underlain by Lambeth Group bedrock geology, which is characterised by a variable permeability, with some of the land in the west of the catchment underlain by London Clay bedrock geology, which is characterised by a low permeability. Eastcote Road dissects the catchment, and the River Pinn runs along its northern boundary. It also includes a section of Pinn Meadows, where in response to the July 2016 flood event Hillingdon Council installed a swale and a pond to reduce the risk of future flooding to Brook Drive properties.

11.1.2 The EA also installed Property Flood Resilience (PFR) measures in 37 residential properties along Brook Drive and adjacent streets. As shown in Figure 11-1, there were two internal flood incidents, and two external flood incidents reported in this catchment. The internal flood incidents occurred along Brook Drive and Eastcote Road.

Surface Water

11.1.3 As shown in figure 11-2, high surface water flood risk is predicted across the catchment but is concentrated at Pinn Meadows and the surrounding roads.

Fluvial

11.1.4 As seen in figure 11-3, the north section of the catchment is located in Flood Zone 2 or 3, including Pinn Meadows, Pinn Way, Brook Drive, Brook Close and Evelyn Avenue.

Ordinary Watercourses

11.1.5 There are no mapped ordinary watercourses within Catchment 26. Therefore, the risk of flooding from ordinary watercourses is low.

Groundwater

11.1.6 Figure 11-4 shows that the majority of the catchment is at less than 25% susceptibility to groundwater flooding. A small area in the north which includes Pinn Meadows, and some Brook Drive properties is classified as between 25% and 50% susceptible to groundwater flooding. Whilst, the groundwater may not result directly in flooding, it contributes to the excess amount of water in the catchment that struggles to be accommodated in either the river, drainage network, or open spaces.

Sewer

11.1.7 The TWUL sewer network data shows that the sewer network in Catchment 26 is comprised entirely of surface water sewers that travel towards the River Pinn. When water levels in this river are high, there is an increased likelihood of sewer flooding in this catchment, as this would limit the sewer network's ability to discharge and reduce its capacity.

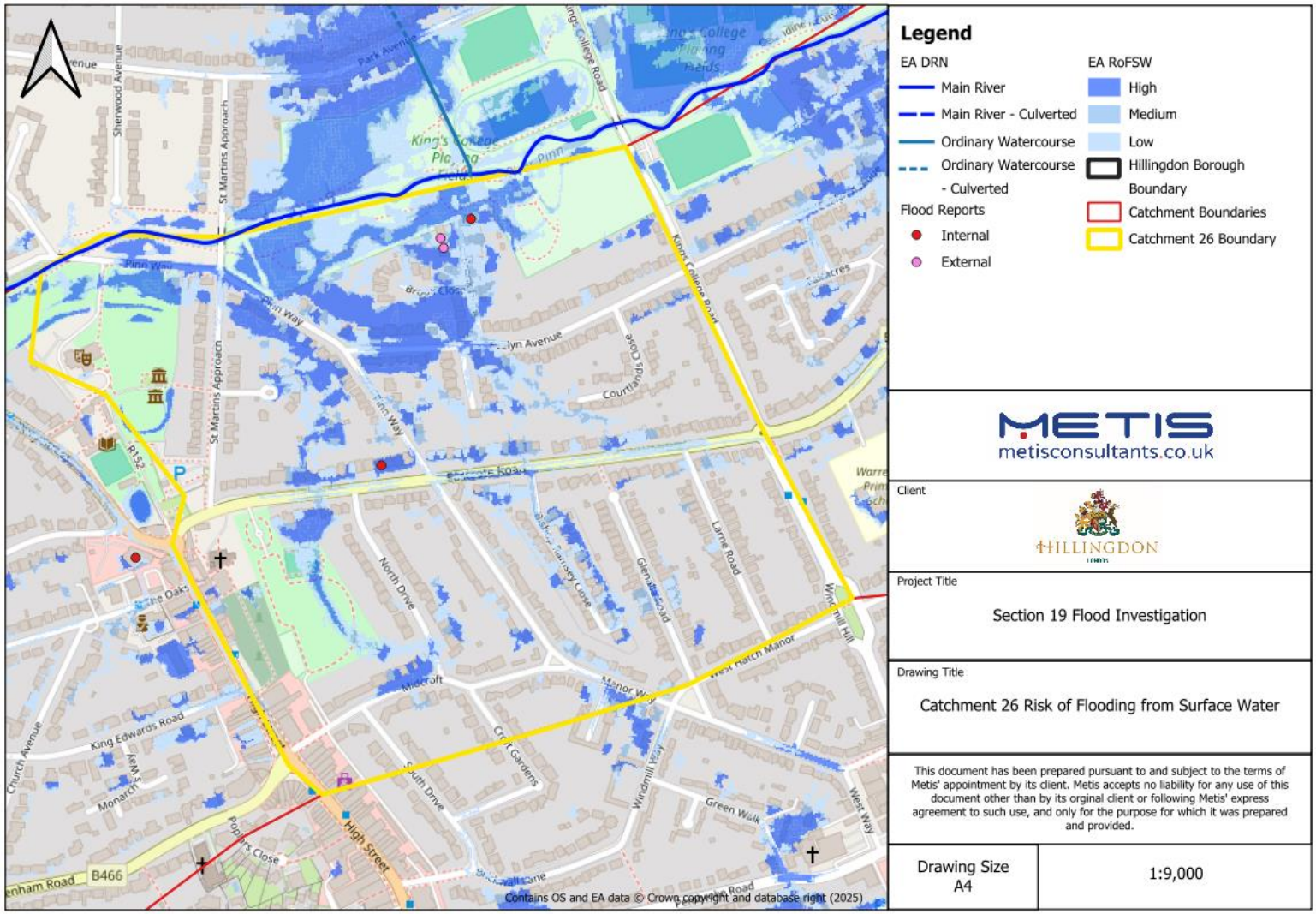


Figure 11-2: Catchment 26 flood incidents and Risk of surface water flooding.

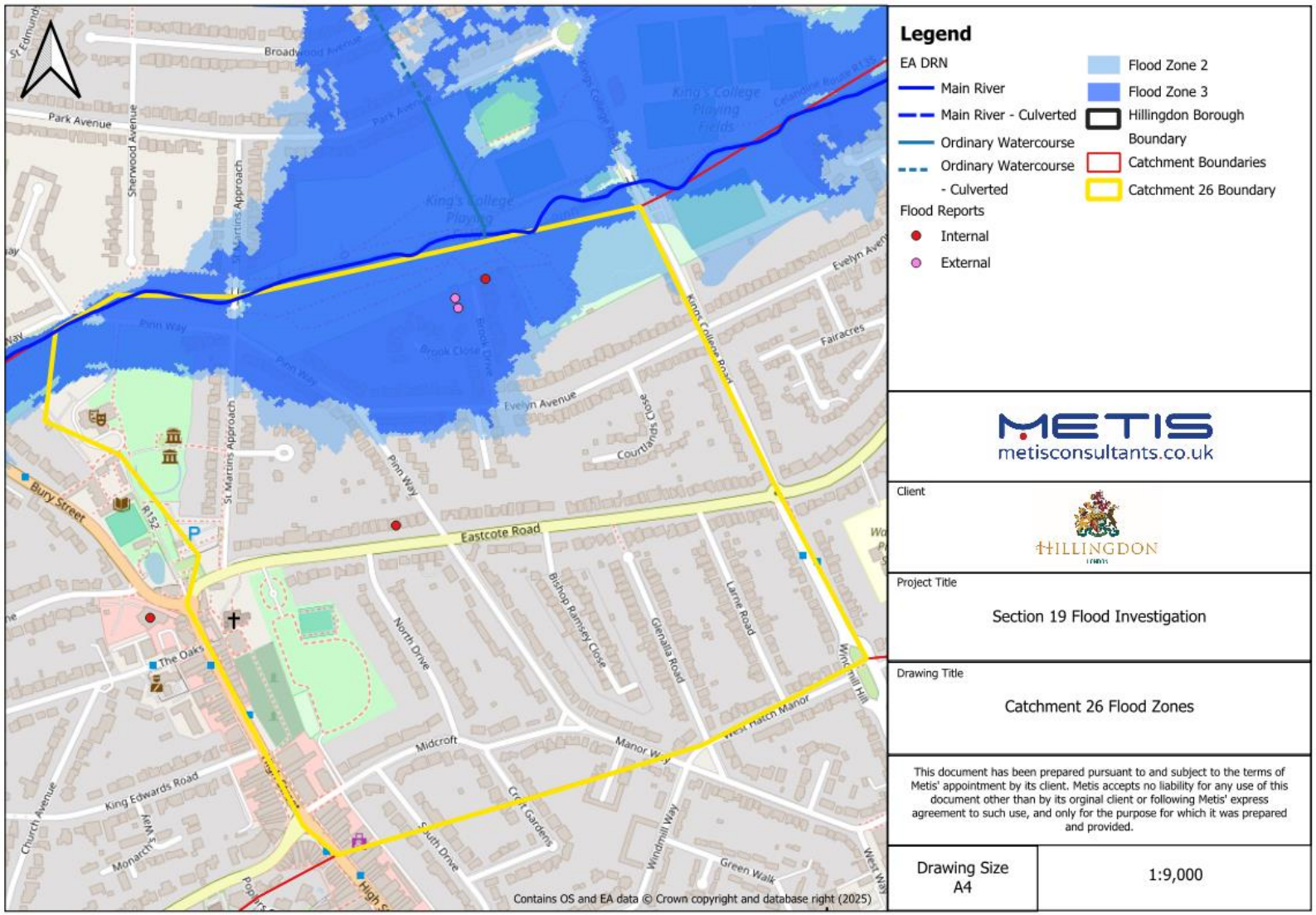


Figure 11-3: Catchment 26 flood incidents and Flood Zones.

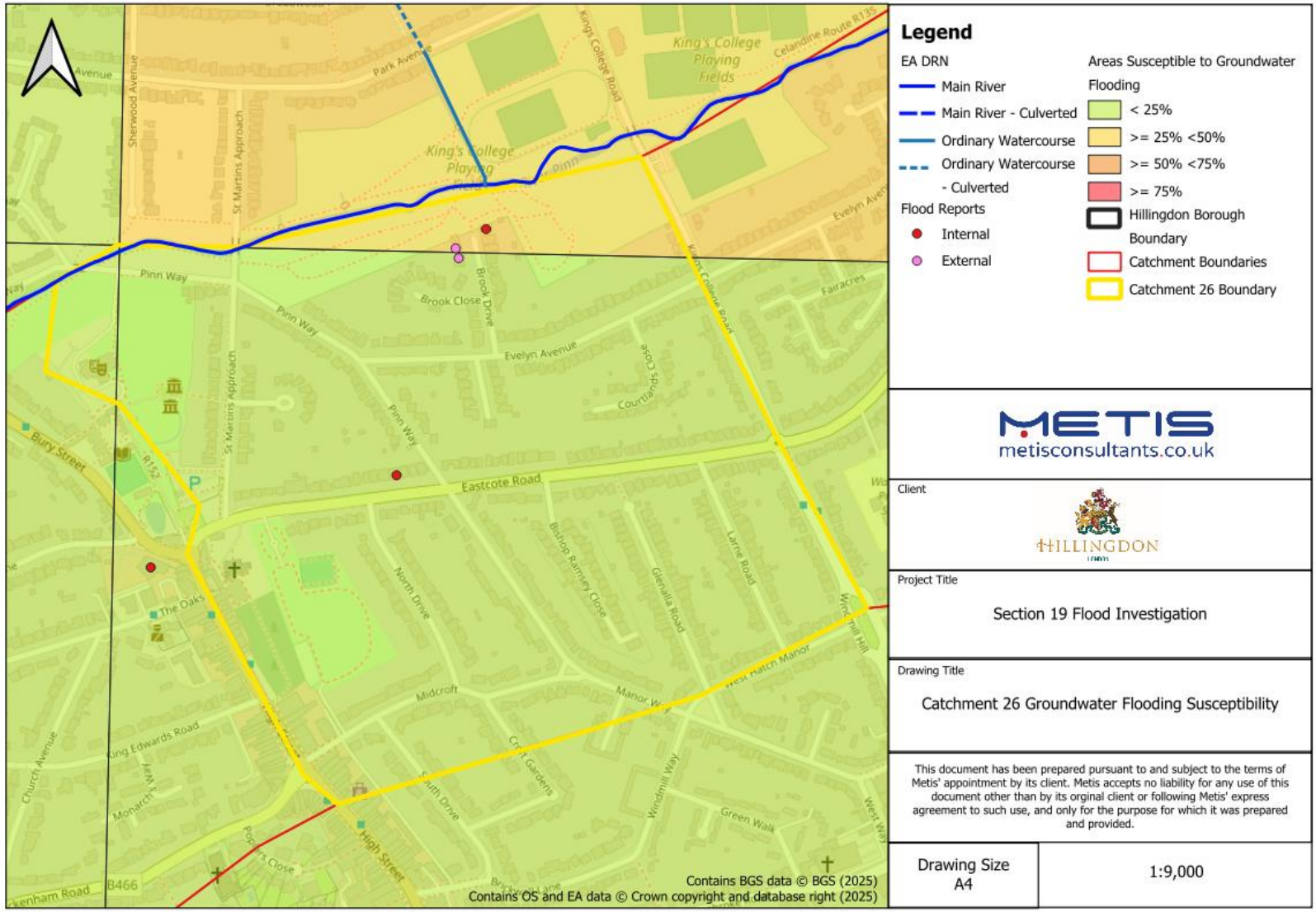


Figure 11-4: Catchment 26 flood incidents and groundwater flooding susceptibility.

11.2 Sources and Causes of Flooding

11.2.1 LiDAR data shows the River Pinn is a low point in Catchment 26, which means rain that falls within the catchment is likely to travel towards this watercourse. Therefore, rain that falls in the south of the catchment needs to travel across Eastcote Road to reach the River Pinn. As discussed with other catchments, less runoff was likely able to drain away from the surface due to high levels in the River Pinn which limited the local sewer network's capacity.

11.2.2 The result was significant volumes of surface water flowing across Eastcote Road and towards the front of the south-facing properties via the dropped kerbs and driveways, as shown in *Figure 11-5*. It was noted that the property that flooded internally had a low-lying letterbox which allowed water to enter the property.

Figure 11-5: Photograph of surface water flooding at the front of an Eastcote Road property on the 23 September 2024. Image credit: Eastcote Road resident.

11.2.3 The flooding at Brook Drive was reported as coming from the River Pinn. The River Pinn extends into Harrow and Hertfordshire, where it receives surface water via direct runoff and sewer outfalls. During heavy rainfall events, the volume of water entering the River Pinn upstream can exceed its downstream capacity, resulting in the river bursting its banks. In Pinn Meadows, a section of the River Pinn near Brook Drive has been straightened, resulting in a reduced capacity and an increased risk of fluvial flooding here.

11.2.4 In 2016, Hillingdon Council installed a swale and a pond next to Brook Drive to help desynchronise peak surface water flows into the River Pinn and peak riverine flows from further upstream. However, a high-water table means that these features fill up with groundwater, which reduces their capacity and likely meant that they were unable to attenuate the surface water runoff on the 23 September. Additionally, the upstream flows were likely enough alone to cause the River Pinn to breach its banks at this location and cause fluvial flooding to Brook Drive, as shown in *Figure 11-6*. Due to previous fluvial flooding along Brook Drive, many of the properties have PFR measures installed. These proved effective on the 23 September in minimising the number of internal flooding incidents.

Figure 11-6: Photograph of fluvial flooding along Brook Drive on the 23 September 2024. Image credit: Brook Drive resident.

11.3 Recommendations

- Hillingdon Council Flood Officers should continue to work in partnership with the EA to develop the Pinn Meadows and Park Wood SSSI Natural Flood Management schemes towards implementation.
- Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.

12 Catchment 44 – West End Road, Ruislip

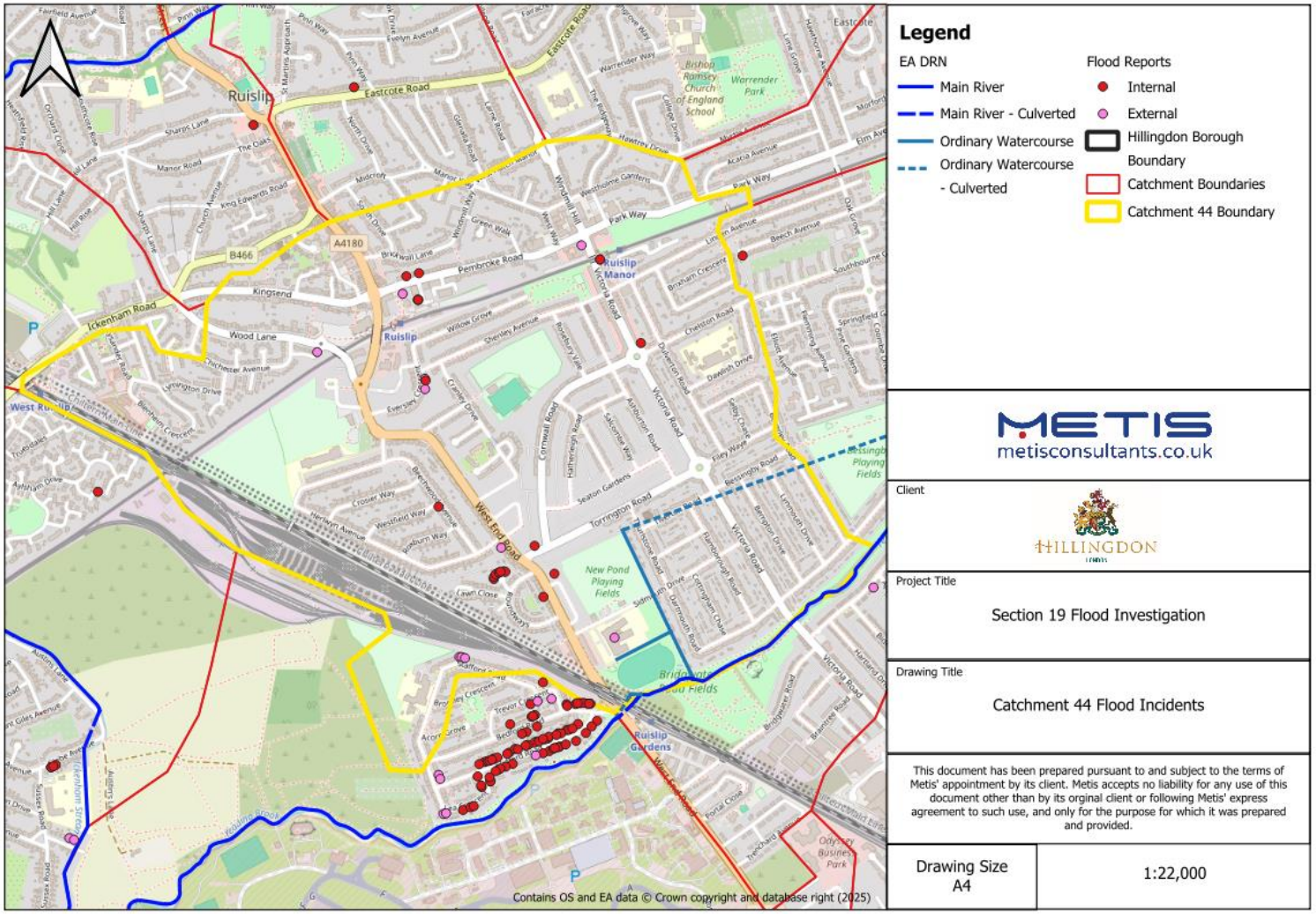


Figure 12: Catchment 44 flood incidents from the 23 September 2024 flood event.

12.1 Background

12.1.1 Catchment 44 is located in the north of the borough and to the south of Catchment 26. BGS Geology Viewer shows that the west of this catchment is underlain by London Clay bedrock geology, which is characterised by a low permeability, whilst the east of this catchment is underlain by Lambeth Group bedrock geology, which is characterised by a variable permeability.

12.1.2 This catchment includes Ruislip High School and Ruislip Manor Station. The Chiltern Main Line railway runs along the catchment's south-western extent, and the Yeading Brook West runs along its southern boundary. As shown in *figure 12 t*here were 18 internal flood incidents and ten external flood incidents reported in this catchment. The internal flood incidents occurred along Pembroke Road, Victoria Road, Eversley Crescent, Beechwood Avenue, Cornwall Road, West End Road, Berkeley Close, and Cherry Close.

Surface Water

12.1.3 As shown in figure 12-1, there is a major surface water flow path that runs in a south-easterly direction from Pembroke Road through Eversley Crescent. This converges south of Grosvenor Vale with another major surface water flow path that runs in a south-westerly direction from Park Way through Victoria Road. The combined flow path continues south, joining with flow paths from Beechwood Avenue and Seaton Gardens and leading to a large area of high predicted risk of surface water flooding in the south of the catchment. This area includes Cherry Close, West End Road, and Berkeley Close.

Fluvial

12.1.4 As seen in figure 12-2, some Dartmouth Road, West End Road, Bell Close, and Roundways properties are located in Flood Zone 2. Bridgewater Road Fields in the south of the catchment is located in Flood Zone 3.

Ordinary Watercourses

12.1.5 Figure 12-2 also shows that there is an ordinary watercourse that runs culverted in a south-westerly direction from the east of the catchment. This ordinary watercourse becomes an open channel in New Pond Playing Fields and runs south to join the Yeading Brook West. A tributary to this ordinary watercourse runs along the southern boundary of Ruislip High School. Therefore, there may be risk of flooding from ordinary watercourses near New Pond Playing Fields or Ruislip High School.

Groundwater

12.1.6 As seen in figure 12-3, the available data shows that Catchment 6 has less than 25% susceptibility to groundwater flooding, therefore it could be considered that the risk of groundwater flooding is low.

Sewer

12.1.7 The TWUL sewer network data shows that the sewer network in Catchment 44 is comprised entirely of surface water sewers that mostly travel towards the Yeading Brook West. When water levels in this river are high, there is an increased likelihood of sewer flooding in this catchment, as this would limit the sewer network's ability to discharge and reduce its capacity.

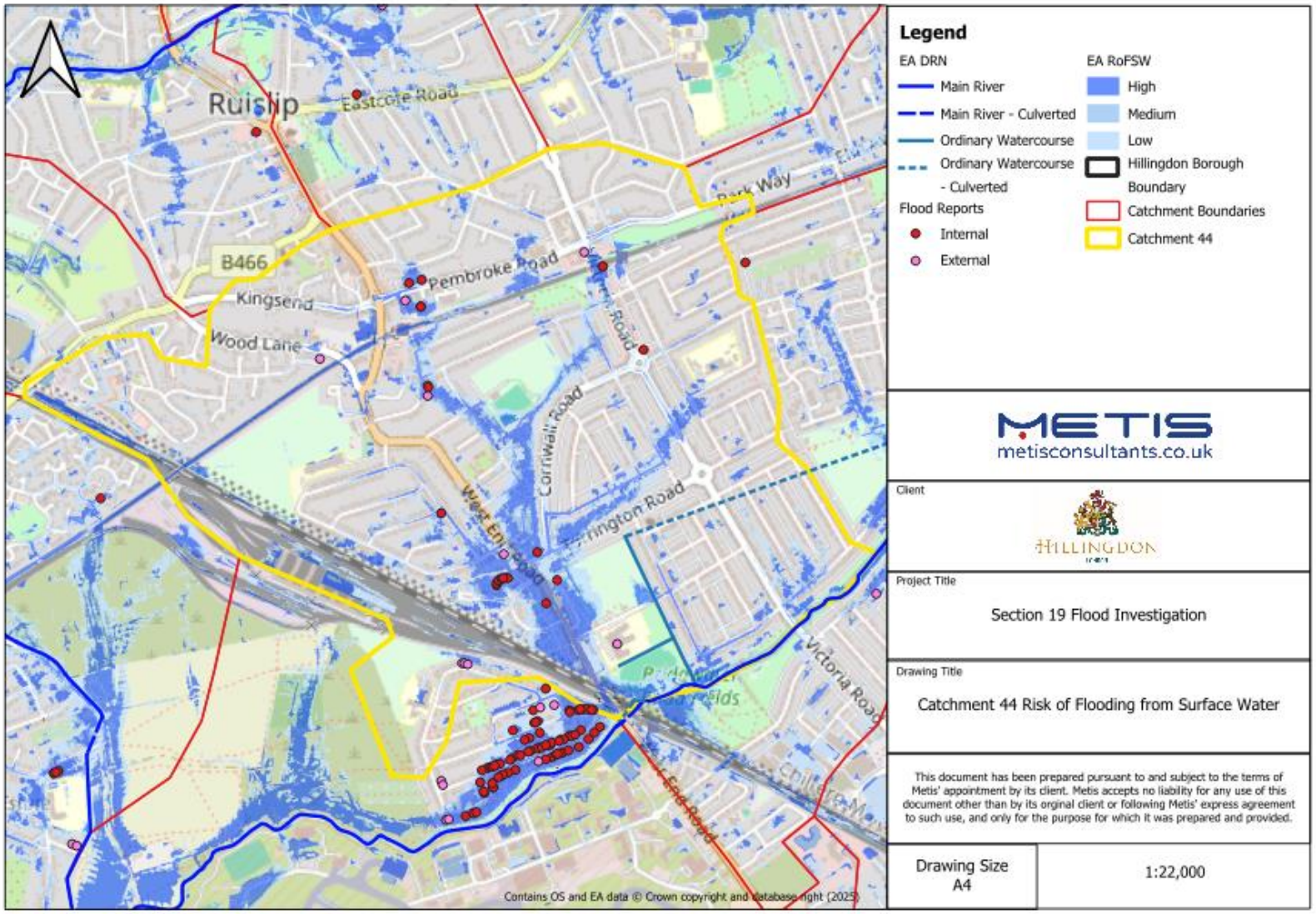


Figure 12-1: Catchment 44 flood incidents and Risk of surface water flooding.

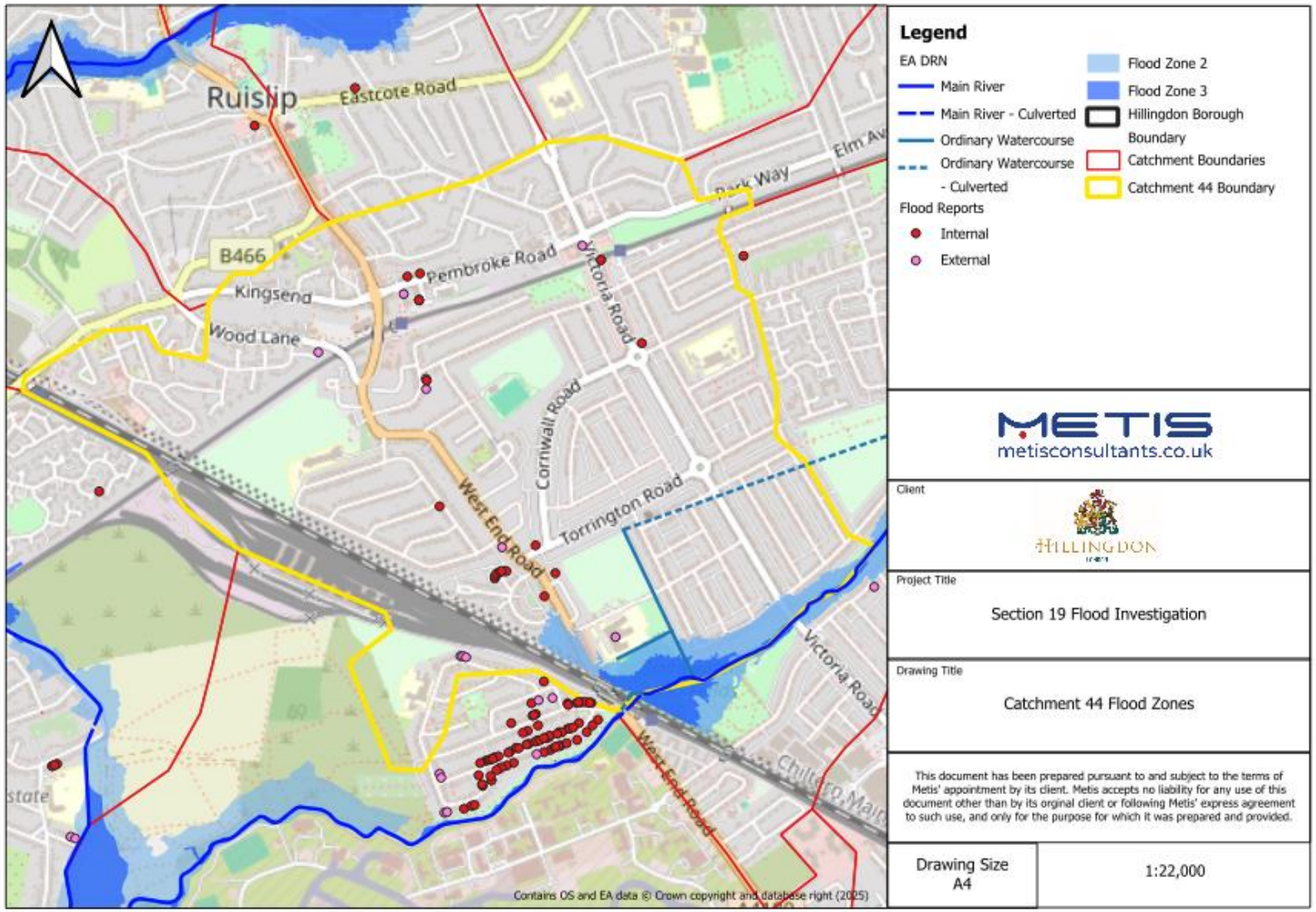


Figure 12-2: Catchment 44 flood incidents and Flood Zones.

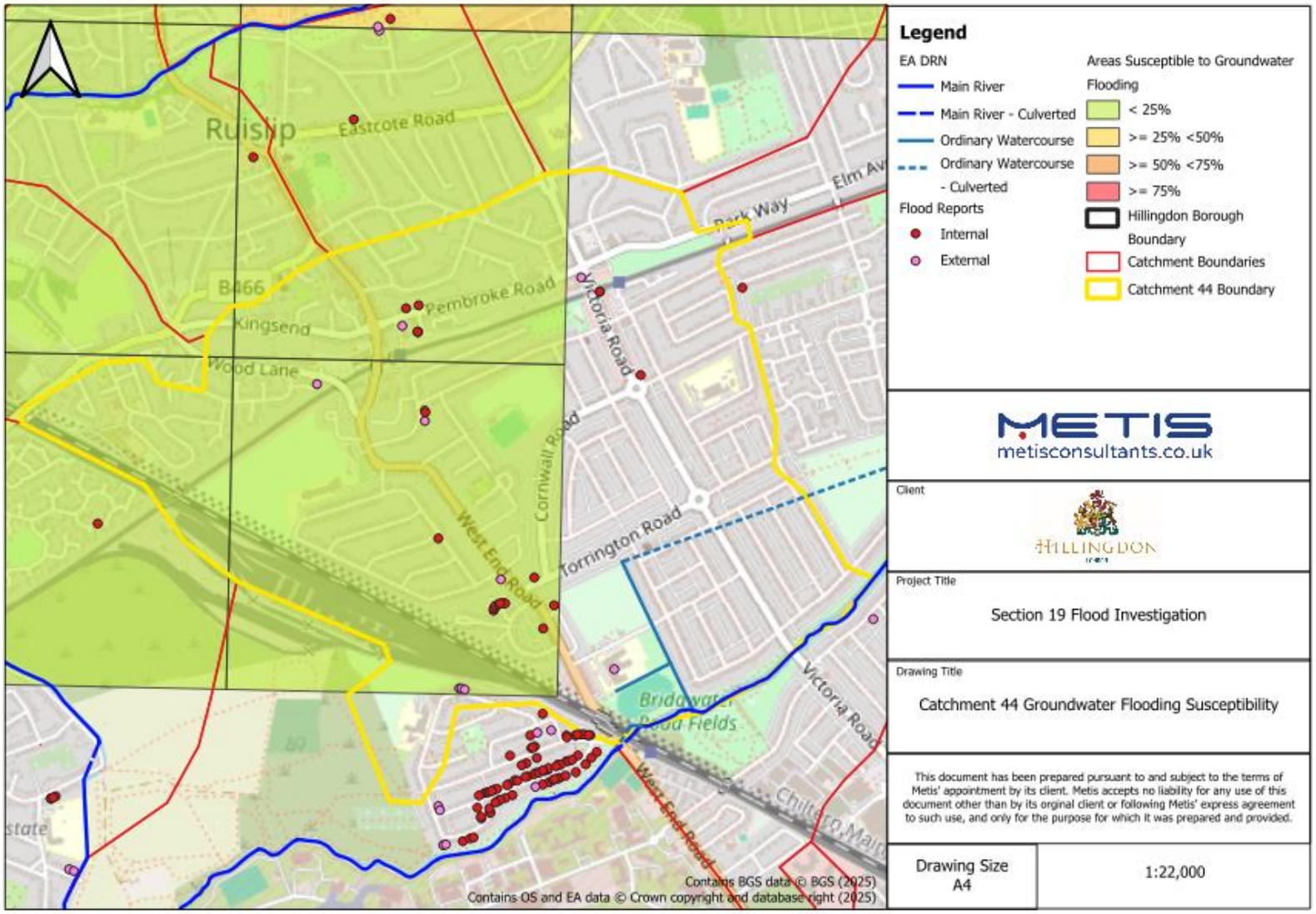


Figure 12-3: Catchment 44 flood incidents and groundwater flooding susceptibility.

12.2 Sources and Causes of Flooding

12.2.1 Rising river levels reduced the sewer network's ability to discharge and thus its capacity for draining surface water. Therefore, rainfall instead likely surcharged from drainage systems and followed the topography of the land, which LiDAR data indicates slopes from north to south. As it flowed, surface water runoff would have accumulated at locations with relatively low elevations. For example, as seen in *Figure 12-4*, the entrance to Ruislip Manor Station is located where Victoria Road concaves. Surface water from further north in the catchment pools at this low point in the highway.

12.2.2 On the 23 September 2024, the surface water pooling here was extensive enough to reach the entrance of the station. For Pembroke Road, Victoria Road, and Beechwood Avenue, the flood-affected properties are located at a lower elevation than the highway. Thus, surface water was able to accumulate and enter the front of these properties through low-lying air bricks and doors. Meanwhile, the flood-affected properties along West End Road and Berkeley Close are located at lower elevations compared to the adjacent areas of open green space that they back onto, therefore surface water accumulated and entered at the back of these properties through low-lying air bricks and doors.

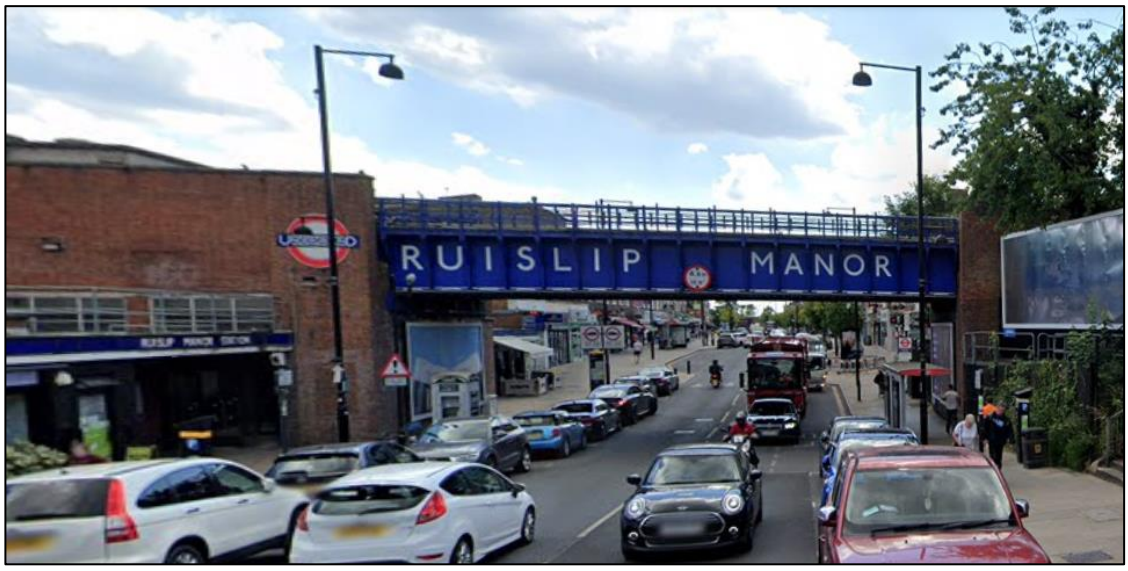


Figure 12-4: Entrance to Ruislip Manor Station along Victoria Road. Image credit: Google Earth.

12.2.3 The flood-affected property along Eversley Crescent is not located at local low point in the topography. However, it is located at bend in the highway, as shown in *Figure 12-5*. With no gully in a position to intercept the runoff, surface water from further north in the catchment likely travelled straight down Eversley Crescent, overtopped the dropped kerb at the bend, flowed into the driveway, and entered the property through the low-lying air bricks and door.

Figure 12-5: Photograph of Eversley Crescent. Image credit: Metis Consultants Ltd.

12.2.4 The flood-affected property along Cornwall Road is located at the end of a private access road which runs in a southerly direction. Therefore, it is likely that the flooding was, again, a result of surface water following the topography of the land. The property also reportedly flooded from a surcharging private sewer in the back garden, which indicates that the drainage system at the property had reached capacity and likely slowed the rate of surface water draining away from the property after the rainfall event.

12.2.5 Finally, there is a sloped entrance to Cherry Close, as shown in *Figure 12-6*, which allowed surface water from Roundways to flow towards the Cherry Close properties. There is only one gully that serves Cherry Close. During the site visit, standing water could be seen within this gully, despite there being no rainfall at that location on the 7 April 2025. This indicates a capacity issue or possible blockage within the drainage network here. It is likely that the gully was ineffective at draining surface water away, and thus the surface water had nowhere to go except towards the Cherry Close properties, causing internal flooding to the entire close.

Figure 12-6: Photograph of Cherry Close. Image credit: Metis Consultants Ltd.

12.3 Recommendations

- Hillingdon Highways Team should consider installing additional gullies along Cherry Close and Eversley Crescent to reduce the risk of flooding to properties from the highway.
- TWUL should investigate their surface water sewer system at Cherry Close and rectify any blockages or capacity issues.
- Flood-affected residents should consider installing PFR measures to reduce the amount of floodwater entering their property during a flood event. The National Flood Forum has a six-step guide to navigate the process of installing PFR measures.
- Hillingdon Council and TWUL should collaborate to investigate opportunities for highway SuDS within the catchment.

13 Post Flooding Observations

13.1 Assistance with Flooded Properties

13.1.1 Feedback received through the Council's public questionnaire and subsequent engagement with residents has highlighted the significant emotional and practical distress caused by the flooding. Many residents described the experience as deeply upsetting, with some reporting damage to homes, loss of personal belongings, and disruption to daily life. The psychological impact of the flooding has left communities feeling vulnerable and anxious about future occurrences.

13.1.2 A recurring theme in the responses was frustration and concern regarding the perceived lack of support and communication from Risk Management Authorities (RMAs). Residents expressed disappointment over the absence of timely assistance during and after the event, including limited access to emergency services, unclear guidance on recovery processes, and a lack of visible presence from responsible agencies.

13.1.3 Flooding is often the result of intense and prolonged rainfall, which can overwhelm natural and built drainage systems. While authorities work hard to manage flood risks, extreme weather events will continue to happen and cause risks. This is why residents are encouraged to take proactive steps to protect themselves and their properties. Having a personal flood plan, knowing how to respond, and implementing measures such as installing flood barriers or raising electrical sockets can make a significant difference.

13.1.4 One contributing factor to increased surface water flooding is the widespread paving over of gardens and driveways, which reduces natural drainage and increases runoff. Reversing this trend will assist communities.

13.1.5 The Council recognises these challenges and is committed to collaborating with communities to build resilience. This means supporting residents in understanding their flood risk, promoting sustainable drainage solutions, and encouraging the preservation or restoration of green spaces.

13.1.6 While risk management authorities play a vital role, they too can become overwhelmed during major flood events. By fostering a shared responsibility approach, where residents, communities, and authorities work together, it is possible to reduce reliance on emergency response and strengthen local preparedness.

13.2 Post Flooding

13.2.1 Residents also raised concerns about the assistance received during times of flooding, residents often face significant challenges in accessing timely and effective assistance. Many found themselves overwhelmed by the immediate dangers, rising water levels, property damage, and threats to personal safety, while struggling to navigate unclear or delayed communication from authorities.

13.2.2 Beyond the immediate response, residents would like to see long-term commitment from authorities to flood prevention and resilience. This includes investment in infrastructure like improved drainage systems, flood barriers, and sustainable land management. Importantly, more personal support with clean up and recovery has also been raised as a major area of concern.

13.2.3 Intervening in personal flooding situations is not straightforward for Risk Management Authorities. For some flood events, central Government has put in place special recovery support, including funding, to assist communities and residents. Residents and businesses asked for assistance through council tax and business rate reliefs which needs to be considered by the Council further.

13.2.4 The Council will continue to prioritise assistance for vulnerable residents during and immediately after flooding incidents.

14 General Recommendations

14.1 Background

14.1.1 In addition to the area specific recommendations, the investigation has considered more general practices of the risk management authorities. All flood incidents should be a catalyst for considering improvement of practices, particularly regarding day-to-day activities.

14.1.2 Of most importance is the need for the relevant risk management authorities to work more collaboratively to provide a more holistic approach to flood risk management. For example, it would be useful for all parties to understand maintenance and inspection regimes with updates provided as a matter of course.

14.1.3 This is best reflected in the outfalls serving Ruislip Gardens. No information on inspections or maintenance is available. It is understood that the Environment Agency has inspected the river whilst the efficacy of the drainage network is the responsibility of Thames Water, and land around the outfalls is understood to be managed by the Green Spaces team of the Council. Blockages of the outfalls were not identified until investigative work was completed as part of this statutory investigation. Processes should be improved to ensure that organisations can work together to better identify defects.

14.2 General Recommendations for Hillingdon Council

1. Hillingdon Council Flood Officers should utilise community engagement to increase awareness and the uptake of PFR measures, including air brick covers and flood gates.
2. 102 of the 152 respondents to the September 2024 flooding questionnaire indicated that they are not aware of EA flood warnings. Hillingdon Council Flood Officers should therefore utilise community engagement to increase awareness and the uptake of EA flood warning service. Hillingdon Council can also advertise EA flood warnings their flooding webpage by using widgets.
3. Hillingdon Council Flood Officers should utilise community engagement to ensure landowners are aware of their flood management responsibilities, including keeping private drains clear from blockages.
4. Hillingdon Highways Team should work together with Flood Officers to identify priority gully cleaning locations where the risk of flooding is considered to be very high. These areas should be subject to increased gully cleaning.
5. Hillingdon Highways Team should explore the potential of increasing permeable surfacing when resurfacing council-owned roads, pavements, and areas of hard-standing.

6. Hillingdon Highways Team should consider the feasibility of delivering highways SuDS as part of other highway works planned for the borough.
7. Hillingdon Highways Team should publicly share information on the maintenance of their drainage assets.
8. Hillingdon Council Flood Officers should ensure policies on sandbags are up to date and available on the website.
9. To consider council tax and business rate relief for impacted residents and business.

14.3 General Recommendations for the EA

10. The EA are advised to review their threshold for a flood warning to ensure it accurately represents real world conditions, as the River Pinn breached its banks on the 23 September 2024 but there was no flood warning.
11. The EA is advised to provide details of river inspections and consider how these are carried out particularly taking the opportunity to observe the state of outfalls (whether riparian or Thames Water or other).

14.4 General Recommendations for TWUL

12. TWUL should collaborate with Hillingdon Council and utilise community engagement to increase awareness and usage of the Sewer Flooding Questionnaire.
13. TWUL should evaluate their process of sharing information to ensure it enables other RMAs to obtain as many details of a flood event as possible.
14. The TWUL Drainage and Wastewater Management Plan (DWMP) is a long-term strategic plan that sets out how drainage networks are to be improved and maintained to ensure future resilience. As part of the DWMP, TWUL have produced a Strategic Plan for the Mogden Catchment, which Hillingdon falls within. TWUL should look to implement the actions within this plan to reduce the risk of flooding to residential properties.
15. TWUL should explore the potential of upgrading the surface water sewer network capacity within the flood-affected catchments to limit gully surcharging and ensure that surface water flows can be managed effectively.
16. Information on inspection regimes should be shared routinely along with the need for any remedial work that may be the responsibility of others, for example Hillingdon asset managers or the Environment Agency.
17. To provide clearer information on maintenance regimes and be more public facing with work and activities.
18. To provide clearer information and improved promotion on how to report flooding.

15 Flooding Incidents Outside the Section 19 Criteria

15.1 Background

15.1.1 There were 48 external flood incidents reported for the 23 September 2024 flood event, 18 of which occurred on roads with no internal reports. There were also two hydrological catchments in Hillingdon that only contained one reported internal flood incident The additional locations of these incidents are listed below:

Lyndhurst Crescent	Uxbridge	Torcross Road	Ruislip
Long Lane	Ickenham	Aragon Drive	Ruislip
Tavistock Road	Ickenham	Poole Close	Ruislip
Thornhill Road	Ickenham	Bury Street	Ruislip
The Greenway	Ickenham	Breakspear Road	Ruislip
Stafford Road	Ruislip	Lichfield Road	Northwood
Ruislip High School	Ruislip	Bayhurst Drive	Northwood
South Ruislip Station	Ruislip	Rofant Road	Northwood
Long Drive	Ruislip	Grove Road	Northwood

15.1.2 These isolated incidents have been recorded and investigated in accordance with service requirements but are not the subject of a formal Section 19 investigations.

16 Before, during and after the Event

Authority	Actions regarding flood incident
Hillingdon Council	**Before** • Hillingdon Council as the LLFA have completed a number of flood alleviation works near the flood-affected areas, including at Bessingby Park, Park Wood SSSI, Elephant Park, Court Park, and Eastcote Town Centre. Further works were being developed at Pinn Meadows, Bridgewater Road Fields, Park Wood SSSI, South Ruislip, and Ruislip Gardens. • Hillingdon Green Spaces Team were developing a river meandering scheme at Bridgewater Road Fields with the aim to provide flood alleviation benefits. • Hillingdon Highways Team were developing raingarden schemes along Kings College Road and Aragon Drive with the aim to provide flood alleviation benefits. • It is noted that Hillingdon Highways Team send out a contractor to clear gully blockages within 24 hours of a report. • It is noted that when highways resurfacing is required, Hillingdon Highways Team aim to carry out like-for-like replacements, with no changes to the permeability of the surface. • Hillingdon Emergency Planning and Response Team produced the MAFP. **During** • A Gold Co-ordination Group was established to align actions between different teams within Hillingdon Council, including the Highways Team and the Emergency Planning and Response Team. The first meeting of the Gold Group was at 09:45 on 23 September. Subsequent meetings were held on the 24, 25, and 26 of September. On the 27, the group stood down at the agreement of all members. • The Gold Group organised Council Officers or contractors to attend reports received via the GOSS reporting system or phone calls. Each site was assessed, with sandbags and pumping required at some properties. • Road sweepers and gully cleansing teams were deployed to help alleviate issues of surface water flooding on roads across the borough. For some roads, there was no drainage for the water to flow into, so it was case of having to wait for it to recede naturally. • Hillingdon Council assisted the LFB with pumping and evacuations. Meanwhile, there was limited communication or collaboration with the EA and TWUL during the event. • Hillingdon Council posted a news article updating residents on the response to the flooding and directing flood-affected residents to the Council's online flooding webpage for further information.

Authority	Actions regarding flood incident
	After • Hillingdon Emergency Management and Response Team held a post-incident debrief in order to identify organisational learning. As a result of this debrief, two MAFP webinars were hosted internally to ensure staff understand the role and responsibilities of the different RMAs during flooding incidents. • Hillingdon Emergency Management and Response Team hosted a multi-agency Resilience Forum meeting on the 30th of September which included the EA, LFB, and RAF Northolt. The response to the flood event was discussed and the minutes were written up and shared with the attendees. • Hillingdon Council as the LLFA posted a questionnaire on Hillingdon Council's website from the 3rd of December 2024 to the 12th of January 2025 to gain more information about the flooding incident. This questionnaire was shared with local schools, community groups, and residents who had previously made reports via email. • Hillingdon Council as the LLFA are now prioritising their A40 Critical Infrastructure and Victoria Road Critical Drainage Area (CDA) flood alleviation schemes, which are located near the most affected areas. • Hillingdon Green Spaces Team finished the construction of the meandering scheme at Bridgewater Road Fields. • Hillingdon Highways Team finished the construction of the Kings College Road and Aragon Drive raingardens.
TWUL	**Before** *No information shared.* **During** • Field Officers attended flood incidents that were reported via phone calls. The sites were assessed, and the flood-affected residents were advised to make a formal report via TWUL Sewer Flooding Questionnaire. **After** *No information shared.*
EA	**Before** • A flood alert for the Yeading Brook East was issued on 22 September at 15:54. **During** • Field Officers were deployed to clear trash screens. • Community Information Officers were deployed to the flood-affected areas. • An email was sent to local MP Danny Beales to provide update. **After** • Calculated the return period for the rainfall event for the 23 September 2024.

Authority	Actions regarding flood incident
	• Flood Resilience Officers visited the Brook Drive on the 24th of September 2024 to help build a document of evidence for how river levels are reflected in real life.
LFB	**Before** • Undertake visual inspections of highways during the autumn and report any blocked gullies to Hillingdon Council. • **During** • Attended 999 calls and evacuated residents whose properties had been internally flooded. • **After** • Held a post-incident debrief in order to identify organisational learning.
Harrow Council	**Before** • Implemented a flood alleviation scheme within Newton Park East in 2019 to address flood risks downstream of the Yeading Brook East. **During** *No information shared.* **After** • Commissioned a feasibility study into additional flood alleviation works in the Roxbourne CDA, an area located at the upstream extent of the Yeading Brook East.
Bourne Primary School	**Before** *No information shared.* **During** • The school had to be closed on the 23 of September due to the flooding. **After** • Due to foul water contamination in the flood waters, sections of the school were required to remain closed until November 2024 whilst Hillingdon Council sanitised and dried the affected areas. Alternative provision, including remote learning, was put in place for affected pupils. Welfare checks were carried out for any vulnerable families. • It was noted that there was initially a lack of communication with Hillingdon Council whilst the school was reaching out for support to reduce the risk of future flooding.
Queensmead School	**Before** • A Flood Risk Assessment was carried out in October 2023 by the Department for Education (DfE) to identify the flooding mechanisms onsite and options for flood resilience measures. **During** • The school had to be closed on the 23 of September due to the flooding.

Authority	Actions regarding flood incident
	After • In light of the September 2024 flood incident, the DfE have allocated an initial provision of £25,000 for further optioneering works, including survey works. Once complete, the DfE will approve a budget to implement the flood resilience measures.

17 Appendix A

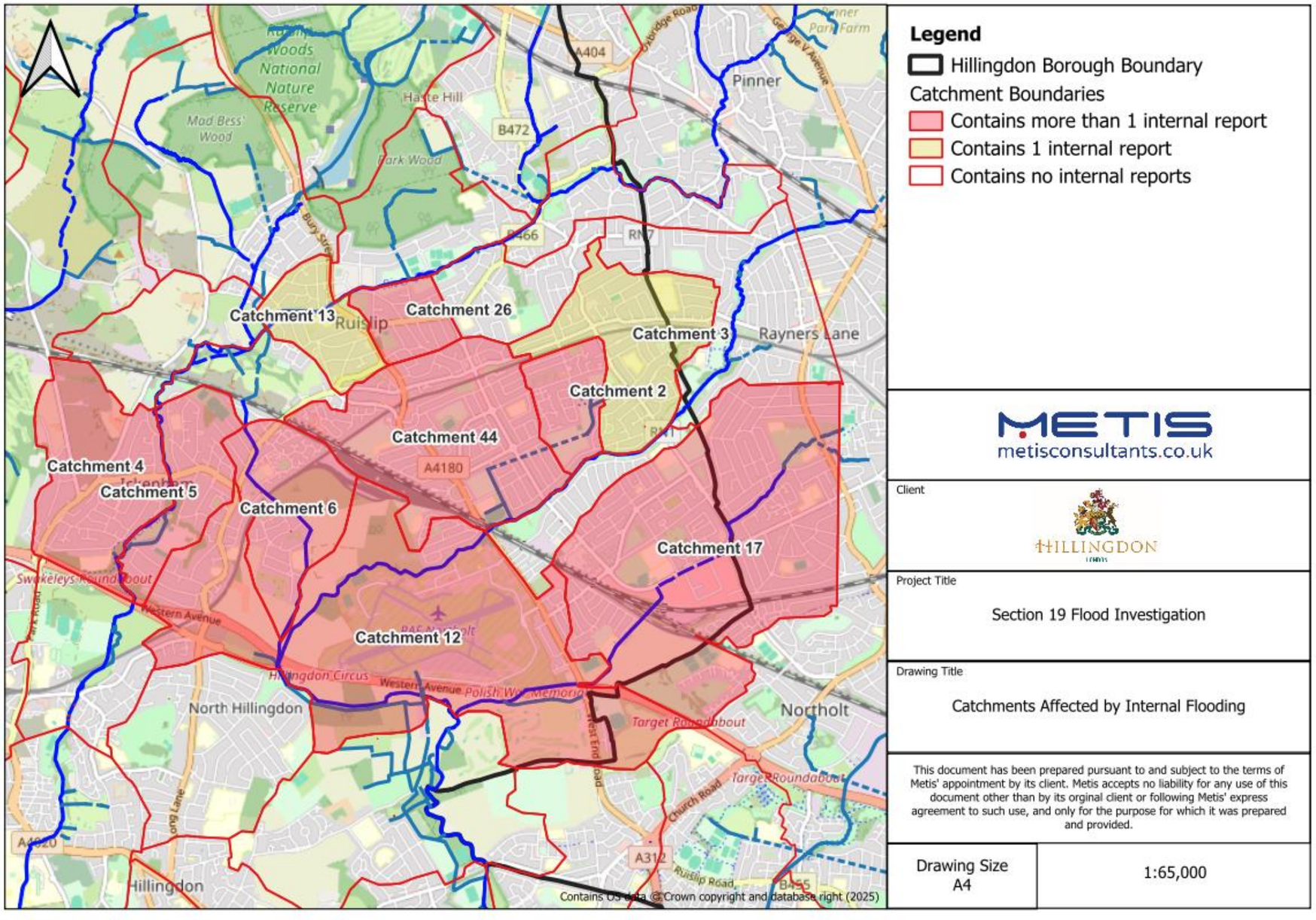


Figure 17-1: Hydrological catchments that contain one or more flood incident from the 23 of September 2024.