

WATERMEAD LANE
FLOOD RISK INVESTIGATION



PREPARED FOR THE LONDON BOROUGH OF SUTTON

Created by Elijah Salami
Reviewed by Damon Reid-Williams
Approved by Michael Mair
Date December 2020
Version 1.2

Metis Consultants Ltd.
Spencer House
23 Sheen Road, Richmond
London, TW9 1BN
United Kingdom
t. 020 8948 0249
e. info@metisconsultants.co.uk
w. metisconsultants.co.uk

REVISION HISTORY

Version	Date	Description	Prepared	Approved
1.0	August 2020	Draft for client review	DR-W / ES	MM
1.1	October 2020	Draft for Risk Management Authority review	DR-W / ES	MM
1.2	December 2020	Final version following Risk Management Authority review	DR-W / ES	MM

LIMITATIONS

Metis Consultants Limited (Metis) have prepared this Report for the sole use of the Client. No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by Metis. This Report is confidential and may not be disclosed by the Client nor relied upon by any other party without the prior and express written agreement of Metis.

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

The work described in this Report is based on the conditions encountered and the information available during the period of production. The scope of this Report and the services are accordingly factually limited by these circumstances.

Metis disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to Metis' attention after the date of the Report.

Certain statements made in the Report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the Report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. Metis specifically does not guarantee or warrant any estimate or projections contained in this Report.

The Client should take appropriate professional legal advice prior to implementing any recommendations made within this Report that may impact on the legal exposure of the Client.

COPYRIGHT

© This Report is the copyright of Metis Consultants Limited. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

CONTACT DETAILS

Metis Consultants Ltd.
Spencer House
23 Sheen Road, Richmond
London, TW9 1BN
United Kingdom t. 020 8948 0249
e. info@metisconsultants.co.uk
w. metisconsultants.co.uk

EXECUTIVE SUMMARY

This flood risk investigation for Watermead Lane was triggered due to 8 properties reportedly experiencing internal flooding during a flood event. A Section 19 investigation was carried out in response to the flood event which occurred in June 2019.

The data collection and investigation exercises established that the site is potentially at risk of fluvial influenced flooding, surface water flooding and sewer flooding. The flood event on the 10th June is believed to be a result of a combination of factors (fluvial, surface water and sewer influenced).

A catchment analysis provided hydrological catchment outputs for the site. Watermead Lane lies adjacent to the River Wandle, the topographical low point of the defined catchment. This means that surface water within the catchment flows towards the River Wandle. Heavy rainfall events may cause the River Wandle's water level to rise, placing the adjacent Watermead Lane at risk of fluvial influenced flooding. The primary surface water flow path within the catchment flows in a south westerly direction towards Goat Road and outflows into the River Wandle.

The flood risk at the site is exacerbated due to several factors, including changes in topography, poor maintenance of existing sewer assets along Watermead Lane and the proximity of Watermead Lane to the River Wandle. The Risk Management Authorities who are responsible for managing the identified potential risks posed by flooding to Watermead Lane are the Lead Local Flood Authority (LLFA), Environment Agency (EA), and the private landowner. The London Borough of Sutton (Sutton), as the LLFA, has a responsibility to manage the risks posed by surface water. The EA has a responsibility to manage risks posed by rivers such as the River Wandle. Sutton and East Surrey (SES) Water have a responsibility as the landowners to ensure that the private sewer network is maintained.

Following the flood risk investigation carried out for the site, the following recommendations have been put forward for Watermead Lane:

- Sutton to collaborate with SES Water and the EA to further investigate the June 2019 flood event. Further analysis should be carried out on the outfall locations, the private surface water sewer network (mapping and ownership), and the River Wandle gauged water level data.
- Sutton to collaborate with the EA to provide property level protection to at risk properties on Watermead Lane.
- Sutton to collaborate with SES Water to review the capacity of the local sewer network, as well as investigation as to its ownership.

- Sutton to collaborate with the EA to explore potential flood defence schemes along Watermead Lane to increase resilience to flood risk.
- Sutton to collaborate with SES Water and Watermead Lane residents to explore retrofit SuDS to increase the area's resilience to flood risk.

CONTENTS

1	INTRODUCTION	1
1.1	BACKGROUND POLICY AND INFORMATION	1
1.2	LOCATION	3
1.3	METHODOLOGY	4
2	FLOOD INCIDENT DETAILS	5
3	FLOOD MECHANISMS	9
3.1	POTENTIAL SOURCES OF FLOODING	9
3.1.1	HYDROLOGICAL CATCHMENT	9
3.1.2	SURFACE WATER FLOOD RISK	11
3.1.3	ORDINARY WATERCOURSE FLOOD RISK	13
3.1.4	FLUVIAL FLOOD RISK	13
3.1.5	GROUNDWATER FLOOD RISK	17
3.1.6	SEWER FLOOD RISK	17
3.1.7	FLOOD RISK FROM OTHER SOURCES	20
3.2	RAIN GAUGE DATA	22
4	RISK MANAGEMENT AUTHORITIES	25
4.1	ENVIRONMENT AGENCY	25
4.1.1	RESPONSIBILITIES	25
4.1.2	AUTHORITY CONTRIBUTING ACTION TO FLOOD INCIDENT	25
4.2	LONDON BOROUGH OF SUTTON	26
4.2.1	RESPONSIBILITIES	26
4.2.2	AUTHORITY CONTRIBUTING ACTION TO FLOOD INCIDENT	27
4.3	THAMES WATER UTILITIES LIMITED	27
4.3.1	RESPONSIBILITIES	27
4.3.2	AUTHORITY CONTRIBUTING ACTION TO FLOOD INCIDENT	28
4.4	SES WATER	28
4.4.1	RESPONSIBILITIES	28
4.4.2	AUTHORITY CONTRIBUTING ACTION TO FLOOD INCIDENT	28
4.5	LANDOWNERS	28
4.5.1	RESPONSIBILITIES	28
4.5.2	AUTHORITY CONTRIBUTING ACTION TO FLOOD INCIDENT	29
4.6	OTHER AUTHORITIES	29
4.6.1	TRANSPORT FOR LONDON	29
4.6.2	CATEGORY ONE RESPONDERS	29
5	CONCLUSIONS AND RECOMMENDATIONS	30
5.1	CONCLUSIONS	30
5.2	RECOMMENDATIONS	31
	APPENDICES	32

FIGURES AND TABLES

Figure 1.1. Location of Watermead Lane	3
Figure 2.1. Location of Watermead Lane in relation to Bishopsford Bridge and the sluice gate	7
Figure 2.2. Broken Flap Valve	8
Figure 3.1. Watermead Lane Hydrological Catchment	10
Figure 3.2. EA RoFSW Map	12
Figure 3.3. EA raised flood wall – adjacent to Watermead Lane (Google Maps, 2020).....	14
Figure 3.4. EA River Wandle Flood Model Extents	15
Figure 3.5. EA Fluvial Flood Zone Map.....	16
Figure 3.6. Thames Water surface water sewer network.....	18
Figure 3.7. Thames Water foul water sewer network	19
Figure 3.8. Location of the Reservoir in relation to Watermead Lane.....	20
Figure 3.9. EA Risk of flooding from reservoirs extent map.....	21
Figure 3.10. Beddington rainfall gauge approximate location.....	22
Figure 3.11. Depth of rainfall for the June 2019 event	24
Table 1.1. Data sources assessed for this flood risk investigation.....	4
Table 3.1. Summary of Rainfall Events	23
Table 4.1. Borough level Risk Management Authorities	25

ACRONYMS AND ABBREVIATIONS

Abbreviation	Definition
EA	Environment Agency
FCERM	Flood and Coastal Erosion Risk Management
FWMA	Flood and Water Management Act
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
Merton	London Borough of Merton
PPG	Planning Practice Guidance
RMA	Risk Management Authority
RoFSW	Risk of Flooding from Surface Water
SES	Surrey and East Sutton
Sutton	London Borough of Sutton
TBR	Tipping Bucket Raingauge
TfL	Transport for London
TWUL	Thames Water Utilities Limited

1 INTRODUCTION

1.1 Background Policy and Information

As a unitary authority, the London Borough of Sutton (Sutton) is a Lead Local Flood Authority (LLFA). LLFAs are defined as a Risk Management Authority (RMA) under Section 6, Part 1 of the Flood and Water Management Act (FWMA) 2010. They are one of several parties who are responsible for managing the risks posed by flooding. Other RMAs as defined by the FWMA 2010 are:

- the Environment Agency (EA)
- a district council for an area for which there is no unitary authority
- an internal drainage board
- a water company, and
- a highway authority.

The RMA's relevant within Sutton are found in *Chapter 4*. District councils and internal drainage boards are not relevant RMAs in this flood investigation.

As part of their role as an LLFA and an RMA under Section 19, Part 1 of the Act, Sutton is required to act when they become aware of flooding in the area. The FWMA 2010 states that:

A lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate –

- which risk management authorities have relevant flood risk management functions, and*
- whether each of those risk management authorities has exercised, or is proposing to*

For all flood investigations carried out under Section 19 of the FWMA 2010, Sutton must:

- publish the results of its investigation, and*
- notify any relevant risk management authorities*

Significant flooding incidents may trigger Sutton to conduct a Section 19 investigation. When Sutton are made aware of a flooding incident, A Section 19 is then triggered if one of the following threshold criteria referenced in the Sutton Local Flood Risk Management Strategy is met:

- If internal flooding of one property has been experienced on more than one occasion

- Where internal flooding of five or more properties has been experienced during a single flood incident
- Where critical infrastructure (e.g. roads impassable to traffic) has been affected by flooding more than once within a 12 month period.

Sutton can investigate other flood incidents if it deems necessary, even if a Section 19 threshold criteria is not met. As a significant flood incident which resulted in 8 properties reportedly experiencing internal flooding during the June 2019 flood event, the flooding of properties on Watermead Lane triggered Sutton to conduct a Section 19 investigation.

1.2 Location

Watermead Lane is in Carshalton, a town located in the north-eastern region of Sutton. It is located by the Sutton borough boundary with the London Borough of Merton (Merton) and runs parallel to the River Wandle (see *Figure 1.1*). For further information on flooding reported at the site, see *Chapter 2*.

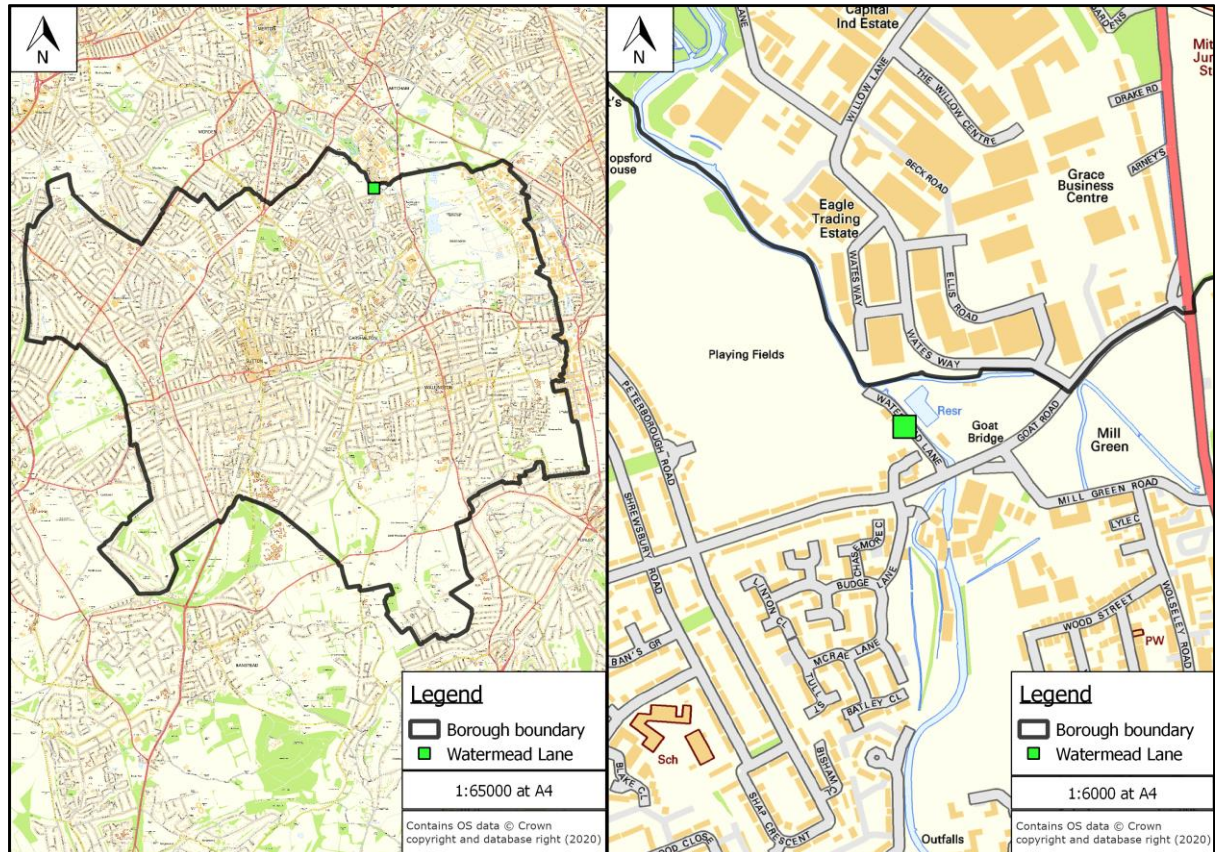


Figure 1.1. Location of Watermead Lane

1.3 Methodology

A method was developed and followed to facilitate the flood investigation. The first step was a data collection exercise to identify the type of data that was required to inform the flood investigation. A search on social media platforms was undertaken to verify the analysis conducted as part of the flood investigation. The data obtained as part of the exercise is listed in *Table 1.1*.

Table 1.1. Data sources assessed for this flood risk investigation

Data	Source
Assets significant to flood risk	EA / Sutton / Thames Water Utilities Limited (TWUL)
Geology information	British Geological Survey
Ground water information	EA
Historic flood records	Sutton
KSL Hydrological Review of June 2019 Event	EA
LiDAR (Light Detection and Ranging) topographical data	EA
Rainfall data for historic events	EA
River Wandle Flood Model	EA
Sewer network	TWUL / Sutton
Surface water, fluvial and artificial flood maps	EA
Watercourse locations	EA / Sutton

The data collected was analysed as part of a desktop study to identify the flood mechanisms for the local area. The available historical, topographical, drainage, geological and land use data was used to assess all potential flood risk sources. The data was also used to establish the hydrological catchment and the area's primary overland flow route(s), showing where water flows in the area in relation to Watermead Lane. The different RMAs were then identified alongside their responsibilities for the different flood risks posed to the site. Further information can be found in *Chapter 3* and *Chapter 4*.

Finally, the results of the investigation were compiled and are delivered in this report. Recommendations on flood risk mitigation and potential next steps are provided in *Chapter 5.2*.

2 FLOOD INCIDENT DETAILS

Watermead Lane is located in the north-easterly region of the London Borough of Sutton. The site lies adjacent to the River Wandle, an EA-designated main river, for which most of the catchment's surface water drains into. Watermead Lane is a topographical low point when compared to the southern parts of the wider hydrological catchment of Sutton.

There was heavy and prolonged rainfall leading up to the flood incident. A hydrological review published by the EA estimated that the rainfall event had an Annual Exceedance Probability of between 3.3 and 10%. The EA issued a flood alert on 10th June 2019 for 3:45pm-3:00am (11th June 2019). This warning was for the London Boroughs of Wandsworth, Merton, Lambeth, Croydon, and Sutton. The weather warning stated river levels had risen because of localised thunderstorms. Consequently, flooding of roads and farmland were possible in the afternoon, evening and early next morning. Rain gauge data taken from the Beddington rain gauge show that the rainfall peaked at 5:15am and 10:30pm on 10th June 2019. A hydrological review published by the EA estimated that the rainfall event had an Annual Exceedance Probability of between 3.3 and 10%.

The EA confirmed that their incident response staff were liaising with emergency services and their partners, checking and clearing any blockages and debris on the River Wandle. The EA advised for residents to avoid using low lying footpaths near local watercourses and for commuters to plan driving routes to avoid low lying roads near rivers which may be flooded.

Anecdotal evidence confirmed that the flood event caused internal flooding to multiple properties on Watermead Lane on 10th June 2019. Residents affected by the flooding suspected repair works on Bishopsford Road Bridge (downstream of the River Wandle from Watermead Lane) contributed to the flooding. It was believed that in-river weeds were washed downstream and got caught on the temporary works, blocking two of the three culverts by Bishopsford Road Bridge. This caused the river level to significantly rise as the flow was restricted at this point. However, the information received and hydraulic analysis has ruled this possibility out as details of the Watermead sluice gate confirmed that the structure controls flows just upstream of the bridge in question (see *Figure 2.1*). An analysis of the level differences between the bridge and Watermead Lane suggest that it is unlikely that a backup of flow at Watermead Lane would have occurred due to the bridge works.

There are between six and eight flap valves which lie along Watermead Lane and outfall into the River Wandle. It has been reported that a potential contributing factor to the flooding were two defective

flap valves (see *Figure 2.2*). The flap valves, when functioning correctly, prevent back flow flooding through the sewer pipes.



Figure 2.1. Location of Watermead Lane in relation to Bishopsford Bridge and the sluice gate



Figure 2.2. Broken Flap Valve

Anecdotal evidence from a local resident who experienced flooding on Watermead Lane reported that the removal of trees and bushes from the riverbank may have caused increased water runoff into the River Wandle. In addition, reports suggest that surface water from Middleton Road flowed towards Watermead Lane. However, the impact of this runoff was likely to be minimal.

3 FLOOD MECHANISMS

3.1 Potential Sources of Flooding

3.1.1 Hydrological catchment

To better understand the potential causes of flooding at Watermead Lane, the hydrological catchment area was defined. The catchment is an area of land where rain falls and drains towards the same waterbody, flow path or topographical low point. The hydrological catchment was established through an analysis of the wider area's topography. Light Detection and Ranging (LiDAR) data was used to help define the catchment, a surveying method that measures distance to a target by using light and sensors to make 3-D representations of target areas.

Analysis of the area using a Graphic Information System provided several outputs, including defined hydrological catchments and primary flow paths (shown as 'Catchment Streams' in *Figure 3.1*). Watermead Lane lies adjacent to the topographical low point of the defined catchment. The defined catchment has the most influence on the identified flood risk issues along Watermead Lane. The risk of fluvial influenced flooding from the River Wandle stems from the defined catchment, and is a risk that may have been exacerbated by the two faulty flap valves. Surface water within the defined catchment will naturally drain towards the River Wandle which will cause the water level to rise and place Watermead Lane at risk of flooding. This may also lead to ponding across Watermead Lane as the sewer network may not have enough capacity to deal with the excess surface water.

The primary flow path is the main overland flow path for surface water in the defined catchment. The main overland flow route for the catchment area flows in a south westerly direction towards Goat Road, which is located at the topographical low point within the catchment. This suggests that rain falling on this catchment drains towards this flow path. The overland flow path then outfalls into the River Wandle which lies adjacent to Watermead Lane.

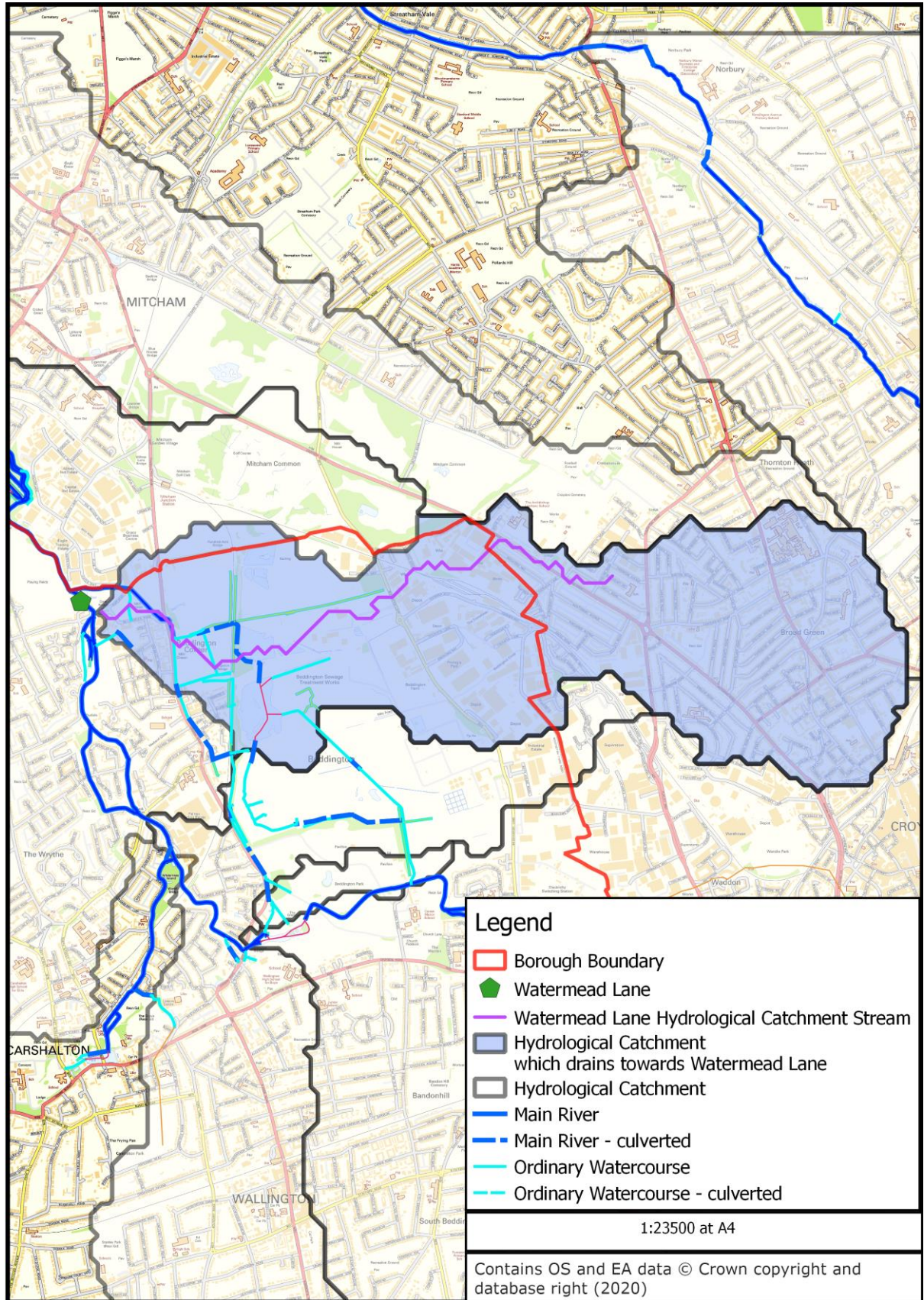


Figure 3.1. Watermead Lane Hydrological Catchment

3.1.2 Surface water flood risk

Surface water flooding arises due to the accumulation of water at ground level following prolonged or intense rainfall. When rainwater does not drain away through the normal drainage systems, or soak into the ground, it flows over the ground surface, leading to the risk of flooding in the surrounding areas.

A review of the EA's Risk of Flooding from Surface Water (RoFSW) data shows that surface water drains towards the River Wandle. During a 1 in 1000 year event, water is predicted to spill out of the left bank, causing flooding along Watermead Lane. Since Watermead Lane lies within the topographical low point, surface water is predicted to pond and potentially flood the houses along the road.

Watermead Lane is not at predicted risk of surface water flooding during the 1 in 30 year and 1 in 100 year events. However, Watermead Lane is predicted to flood during the 1 in 1000 year event (see *Figure 3.2*) with flood depths ranging from 0 – 0.15m to 0.6 – 0.9m maximum flood depth. Therefore, Watermead Lane is at risk from surface water flooding during extreme flood events.

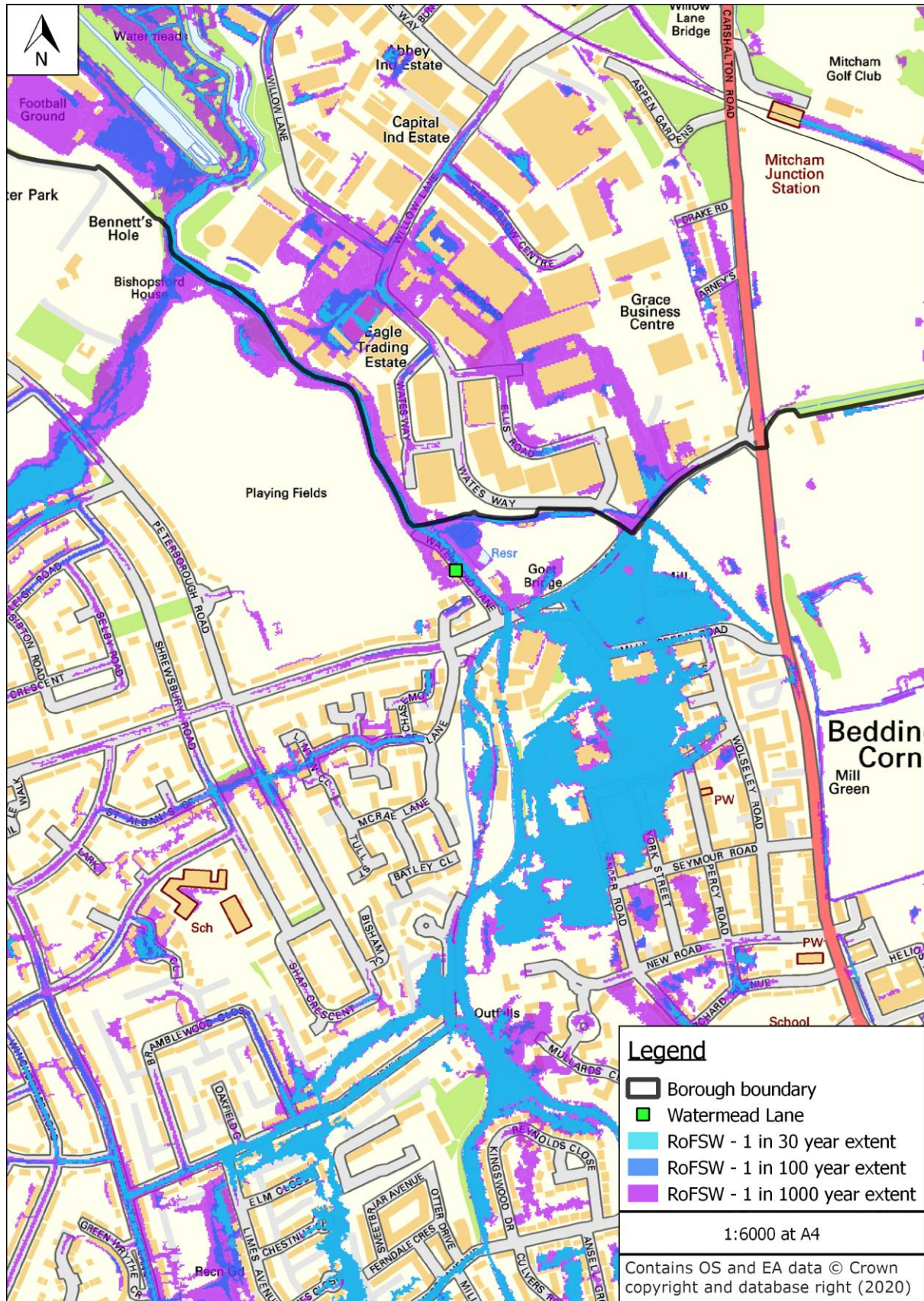


Figure 3.2. EA RoFSW Map

3.1.3 Ordinary watercourse flood risk

Ordinary watercourses are rivers and streams that are not designated as ‘main rivers’ by the EA. Lead local flood authorities have consenting and enforcement powers for ordinary watercourses. Significant rainfall events cause increased peak flows into the watercourses which may exceed the capacity of the channels and lead to surface water flooding over ground.

Flooding from ordinary watercourses is included within the EA’s *RoFSW* map. There are ordinary watercourses which serve as tributaries of the River Wandle and fall within the hydrological catchment (see *Figure 3.1*). A review of the Environment Agency Detailed River Network data confirms that there are no ordinary watercourses within the local vicinity of Watermead Lane. Therefore, the risk of Watermead Lane flooding from ordinary watercourses is low.

3.1.4 Fluvial flood risk

Fluvial flooding arises from main rivers. The EA designate whether a watercourse is a ‘main river’ or an ‘ordinary watercourse’. The mechanisms which cause ordinary watercourse flooding can also cause fluvial flooding. They both arise due to significant rainfall events that lead to the exceedance of the hydraulic capacity of the channels.

Watermead Lane runs adjacent to the River Wandle. A review of Google Map images, EA spatial flood defence data, and LiDAR data shows that Watermead Lane is protected by a raised flood wall along the northern area of Watermead Lane. It is presumed that the flood wall is approximately 0.5m – 0.75m above the adjacent ground level along Watermead Lane (see *Figure 3.3*).



Figure 3.3. EA raised flood wall – adjacent to Watermead Lane (Google Maps, 2020)

As highlighted in *Chapter 1.3*, the EA River Wandle model was reviewed as part of the investigation. The data shows that properties on Watermead Lane are at predicted risk of fluvial influenced flooding from a 1 in 100 year plus climate change event (see *Figure 3.4*). The EA's Flood Zone data shows that the Watermead Lane highway boundary which runs parallel to the River Wandle lies within Flood Zone 3 (land defined as having a 1 in 100 year or greater annual probability of river flooding). The data also shows that the properties on Watermead Lane fall within Flood Zone 2 (land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding) (see *Figure 3.5*). Once flood levels exceed the River Wandle channel capacity, flood water spills out of the west bank and flows along Watermead Lane. Since Watermead Lane lies within a topographical low point, water is predicted to pond and potentially flood the houses along the road. Therefore, Watermead Lane is at predicted risk of fluvial influenced flooding.

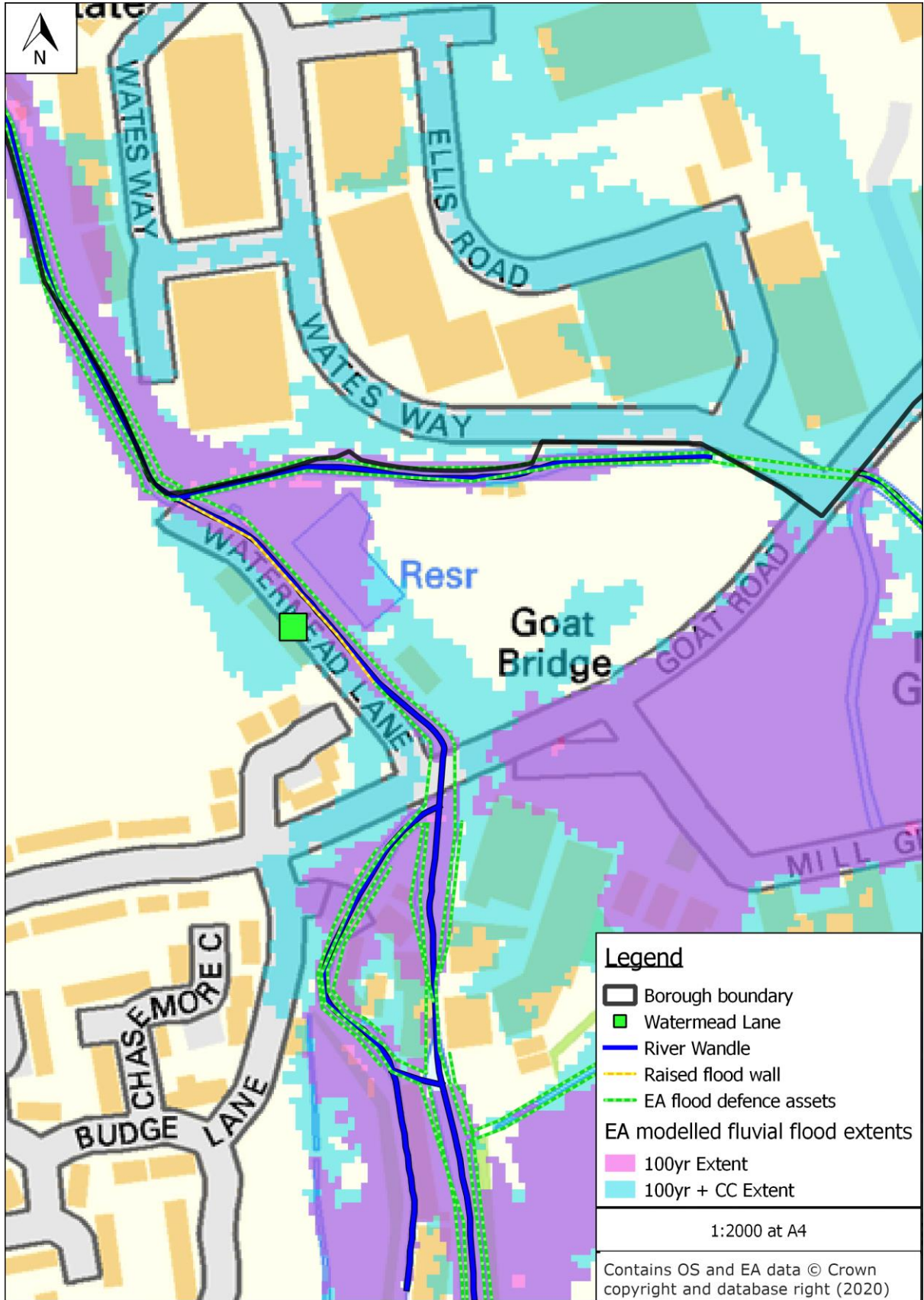


Figure 3.4. EA River Wandle Flood Model Extents

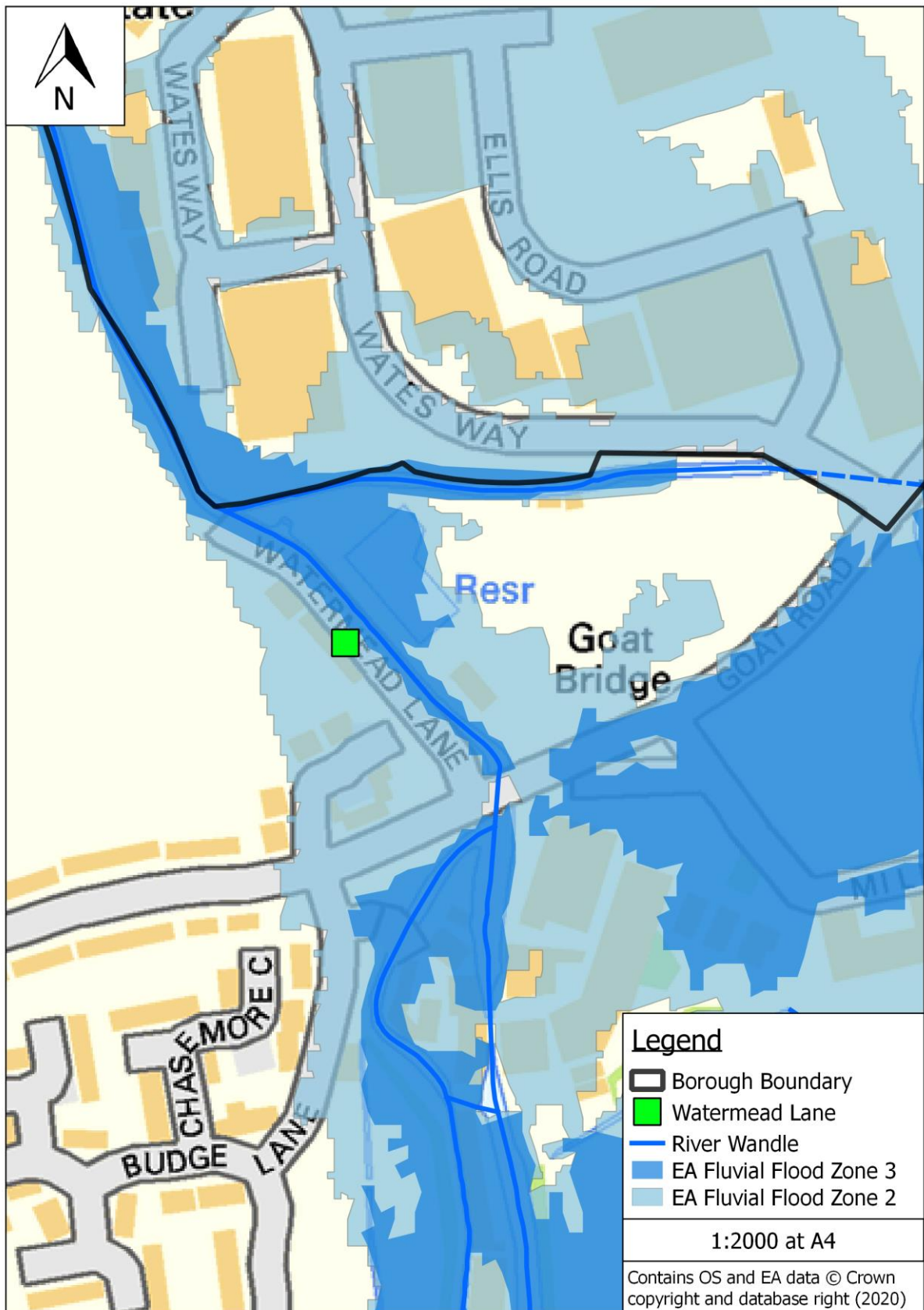


Figure 3.5. EA Fluvial Flood Zone Map

3.1.5 Groundwater flood risk

Groundwater flooding can occur due to the below-ground water table rising in response to significant periods of rainfall. Flooding will then occur at the surface where rainfall is no longer able to infiltrate into the ground. In extreme circumstances, water can emerge through the ground and cause flooding. The effects can be further exacerbated based on an area's ground composition and the presence of aquifers.

When considering the EA's Areas Susceptible to Groundwater Flooding data, Watermead Lane runs through two areas, the '>= 25% <50%' and '>=50% <75%' flood risk classes. However, there were no reports of basement or subsurface flooding during the June 2019 event, flooding which could have been caused by a high groundwater table. Therefore, it is less likely that this flooding incident can be attributed to groundwater flooding sources.

3.1.6 Sewer flood risk

Sewer flooding occurs when the hydraulic capacity of a given sewer system is exceeded by the inflow of water from a significant rainfall event. Drains and sewers can also become full when a blockage occurs downstream in the sewer system. This can lead to an accumulation of flow upstream, thus causing flooding over ground.

A review of the Thames Water sewer network shows that a foul pipe runs along Watermead Lane. The surface water sewer network for Watermead Lane is private and appears to be unadopted. It is maintained by Sutton and East Surrey (SES) Water. The private surface water sewer network data was unavailable for the investigation. As far as this investigation can clarify, the surface water sewer network is not mapped. Therefore, the approximate location of the surface water sewer network pipe in Watermead Lane and the approximate location of the two defective flap valves have been plotted based on data analysed as part of this investigation (see *Figure 3.6* and *Figure 3.7*). As highlighted in *Chapter 2*, it is believed that the defective valves (see *Figure 2.2*) would have allowed water from the river to flow through the sewer pipes and onto the highway, thus contributing to the flooding that occurred on June 2019. Therefore, Watermead Lane may be at risk from surface water sewer flooding.

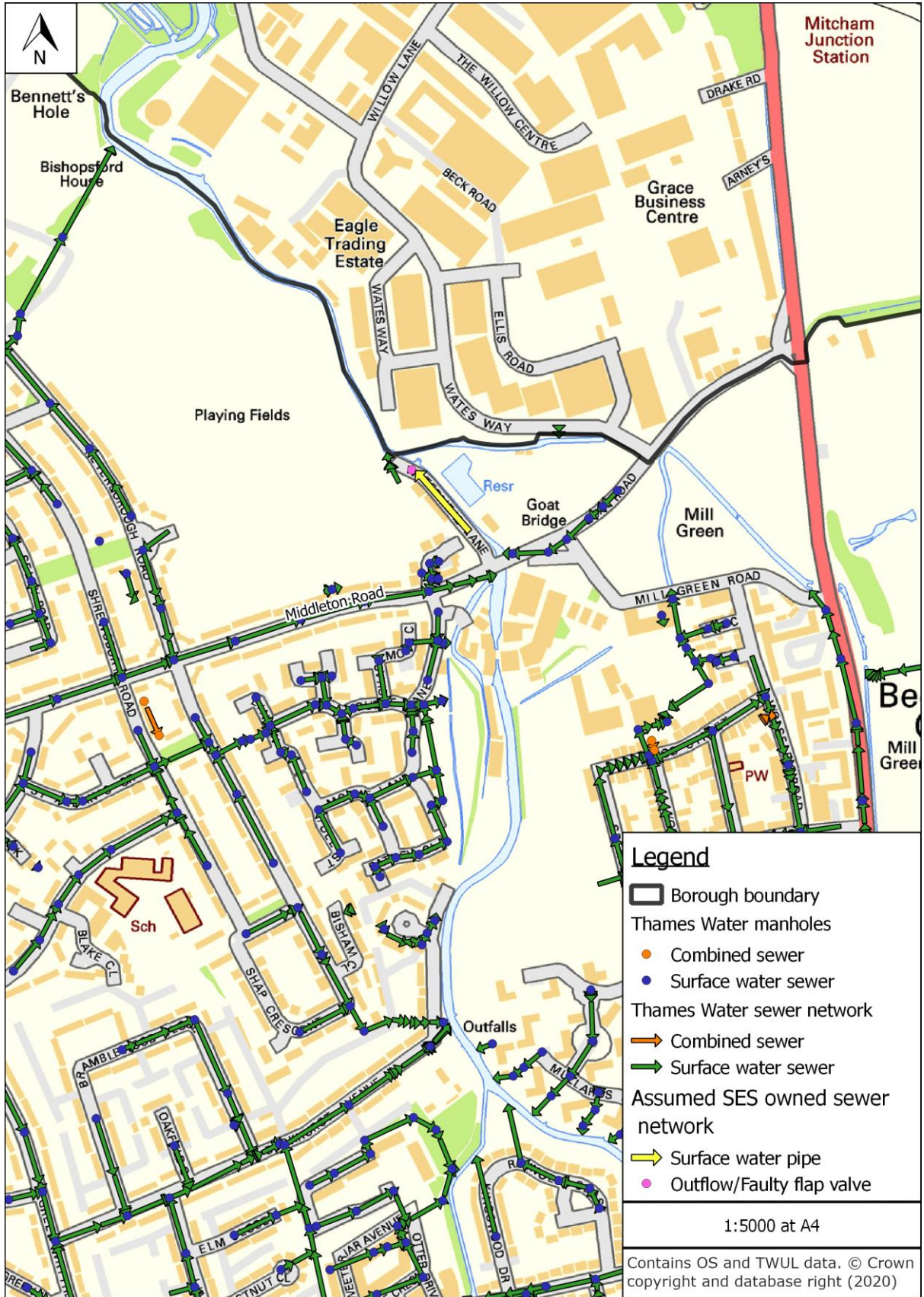


Figure 3.6. Thames Water surface water sewer network

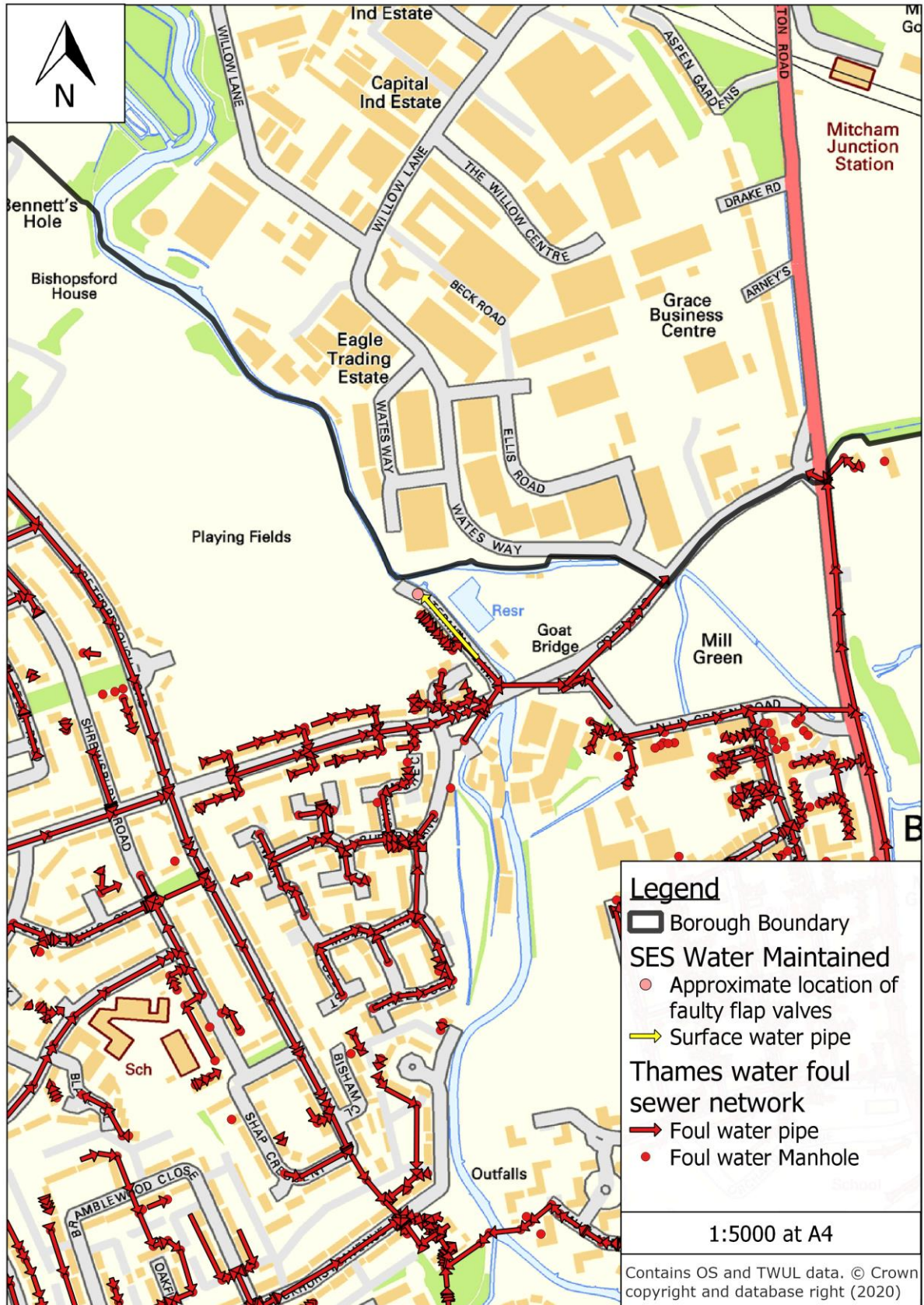


Figure 3.7. Thames Water foul water sewer network

3.1.7 Flood risk from other sources

There are no canals or artificial watercourses in Sutton. A reservoir lies to the north-east of Watermead Lane, on the other side of the River Wandle (see *Figure 3.8*). A review of LiDAR data shows that the levels along Watermead Lane are above the levels of the reservoir to the north-east. Hence Watermead Lane sits outside of the predicted reservoir flooding extent (see *Figure 3.9*). Therefore, Watermead Lane is not at predicted risk of flooding from other sources.



Figure 3.8. Location of the Reservoir in relation to Watermead Lane

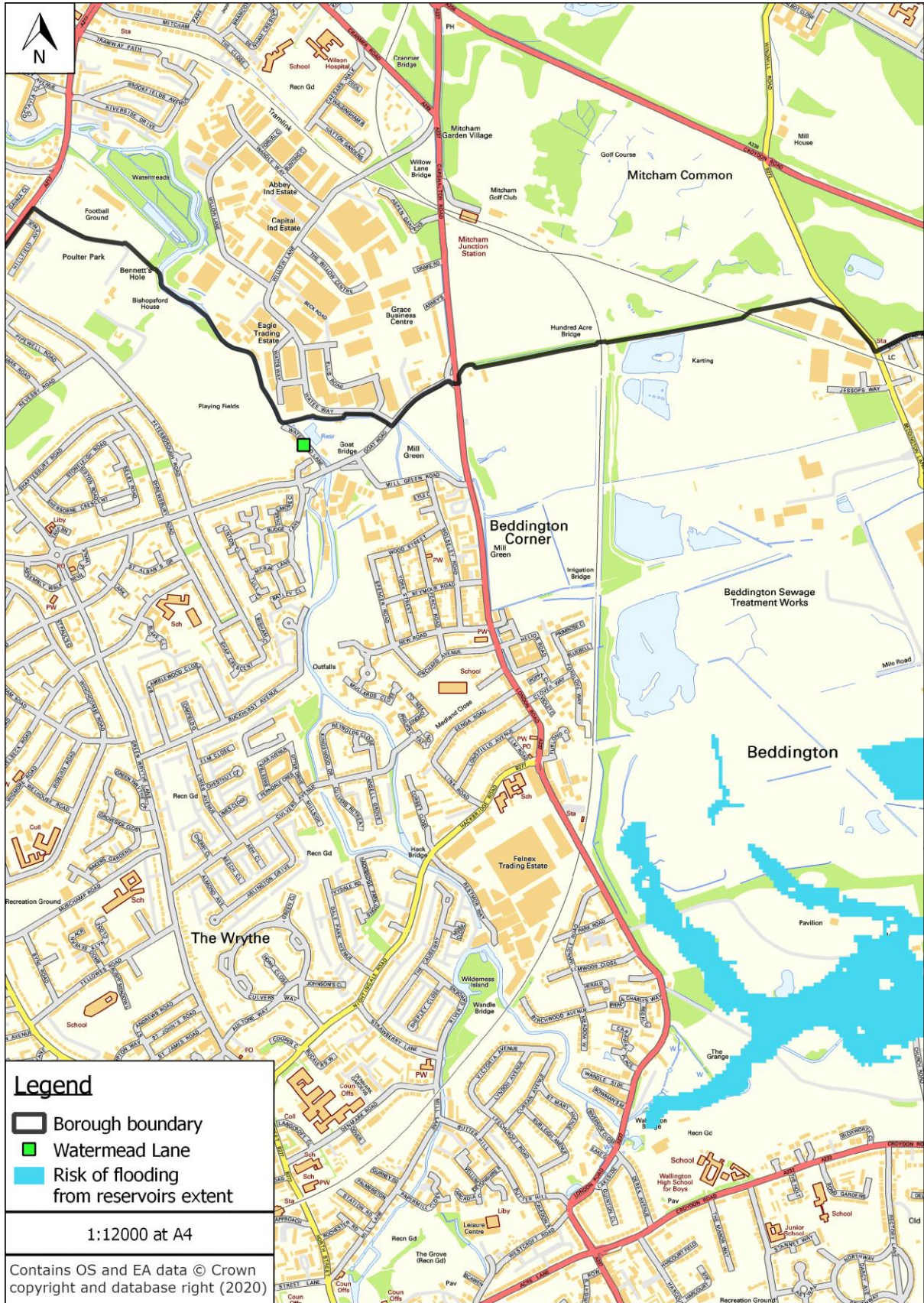


Figure 3.9. EA Risk of flooding from reservoirs extent map

3.2 Rain gauge data

Rainfall data from a rain gauge at Beddington was used to assess the reported rainfall event which resulted in flooding at the site. This rainfall gauge is located within the borough boundary and is located approximately 2km east of Watermead Lane (see *Figure 3.10* for approximate location).

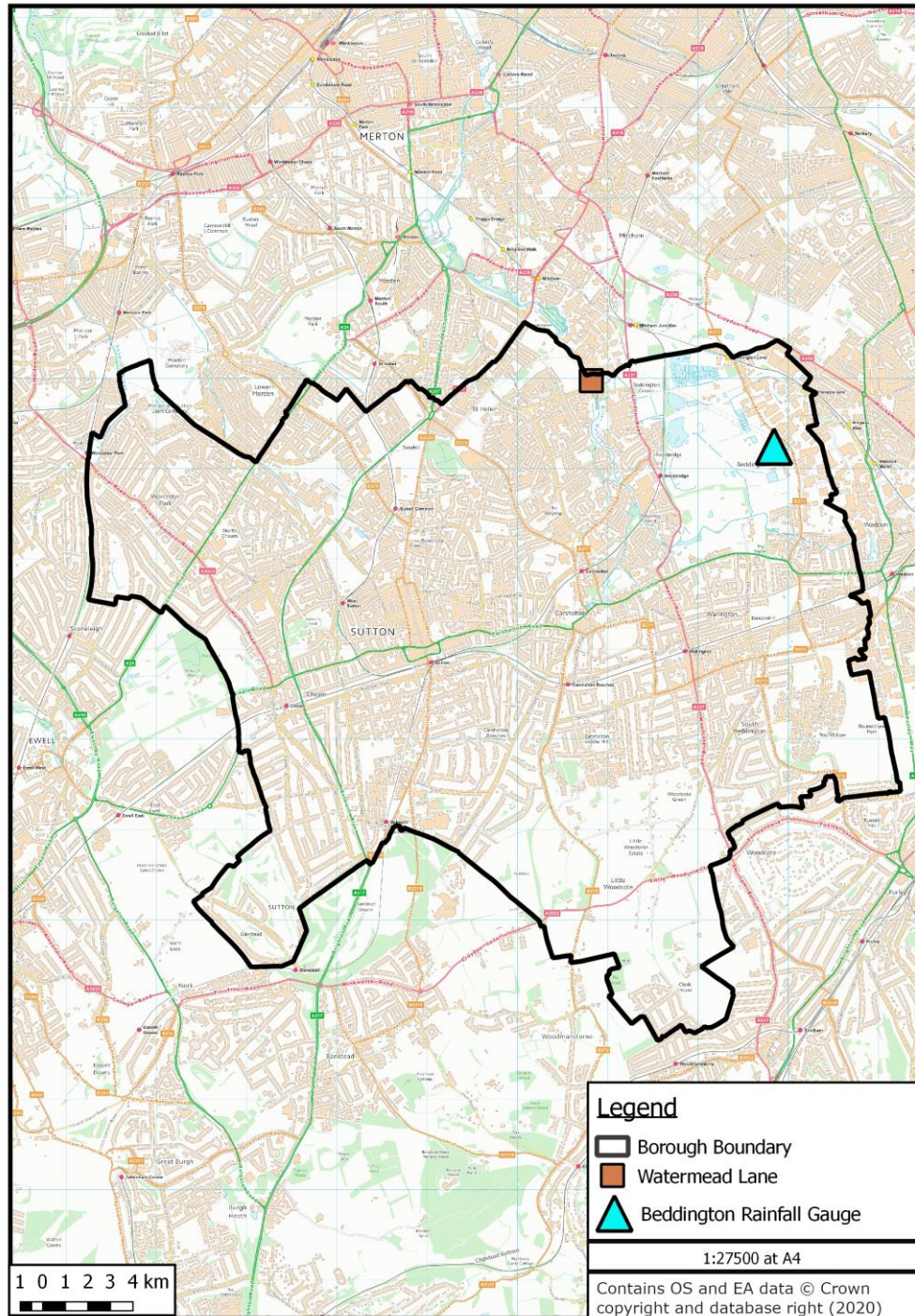


Figure 3.10. Beddington rainfall gauge approximate location

The data analysed from the Beddington rain gauge shows the variation in rainfall over a 48 hour period for each of the rainfall events. The measurements recorded at the Beddington rain gauge site are captured in a Tipping Bucket Raingauge (TBR). The data recorded provides accumulated totals for each 15-minute period. The gauge recorded a total of 70.2mm of rain on 10th June 2019. *Table 3.1* provides a summary of the rainfall event investigated as part of this study. Rainfall event specific details on rainfall variation are shown in *Figure 3.10* below.

Table 3.1. Summary of Rainfall Events

Rainfall Event	First Significant Rainfall Period	First Recorded Peak (mm)	Peak Time	Second Significant Rainfall Period	Second Recorded Peak (mm)	Peak Time
June 2019	00:00 to 06:45 BST on 10 th June	0.8	05:15	10:30 to 23:30 BST on 10 th June	4.4	22:00

The data for the June 2019 event indicates that the peak rainfall return period for this event approximates to a 1 in 5 year event (20% probability of a rainfall of that intensity occurring each year). As highlighted in *Chapter 3.1*, the EA River Wandle model shows that the Wandle floods Watermead Lane during the 1 in 100 year climate change and above flood events. Watermead Lane is not predicted to flood during the higher probability fluvial flood events and therefore a 1 in 5 year event would not result in the significant flooding experienced during the June 2019 flood event. Based on this information, the amount of water captured by the rainfall gauge is not as expected considering the nature of the recorded flood event. It is therefore possible that the flood event is greater than a 1 in 5 year event. The proximity of the Beddington TBR to Watermead Lane makes it the best rain gauge data source to approximate the rainfall return period for the Watermead Lane catchment.

The TBR results for the June 2019 event have been labelled as “good and complete” by the EA. This means that the TBR gauge was operational during the event to accurately record rainfall depth. As mentioned in *Chapter 2* it has also been reported that a likely contributing factor to the flooding were the two defective flap valves on the outfalls into the River Wandle. This could have contributed significantly to the to the extreme level of flooding along Watermead Lane. Further information on the rainfall return period estimations can be found in Appendix A.

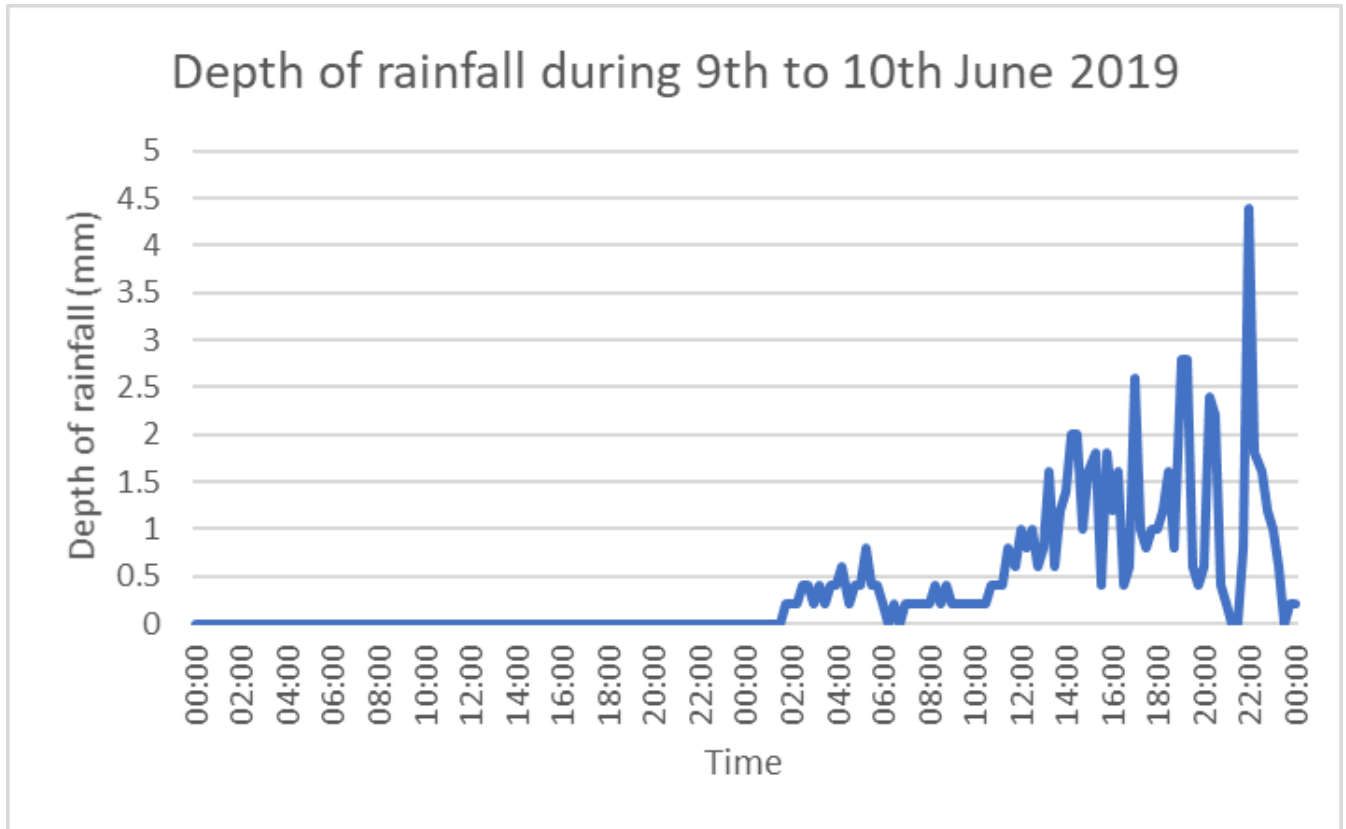


Figure 3.11. Depth of rainfall for the June 2019 event

4 RISK MANAGEMENT AUTHORITIES

As per *Chapter 1.1*, there are several RMAs who are responsible for managing the potential risks posed by flooding. *Table 4.1* lists them at a borough level, with further information provided in *Chapter 4.1* to 4.6.

Table 4.1. Borough level Risk Management Authorities

Risk Management Authorities	Authority	Risk management responsibilities
EA	EA	Main rivers and reservoirs
LLFA	Sutton	Surface water, ordinary watercourse, and groundwater sources
Water and sewerage company	TWUL	Surface water and foul / combined sewer systems
Water and sewerage company	SES	Surface water and foul / combined sewer systems
Highway Authority	Sutton	Highway drainage
Highway Authority	TfL	Highway drainage

4.1 Environment Agency

4.1.1 Responsibilities

The EA are the lead RMA in managing flood risk from designated main rivers and reservoirs. They have a range of different powers and responsibilities including surveying, maintenance and improvement works to main rivers and the sea relating to flood and coastal erosion risk management. The EA plays a key role in advising planning authorities on the implications that proposed developments may have on flood risk, providing and operating flood warning systems, and improving the environment.

Fluvial influenced flooding is an identified flood risk source for Watermead Lane. Flooding that occurred at the site during the June 2019 event was a result of flooding from fluvial sources. The EA therefore have direct responsibilities as an RMA for the site.

4.1.2 Authority Contributing Action to Flood Incident

Before

On 10th June 2019, the EA issued a Flood Alert for the River Wandle Area for several London boroughs, including the London Borough of Sutton. The Flood Alert stated that flooding of properties was not forecast at the time of issue (approximately 16:00). It also stated that incident response staff were checking and clearing any blockages on the River Wandle.

During

No known actions were taken by the EA during the flood event.

After

In the two days following the flood incident, the EA visited Watermead Lane to speak to affected residents and investigate the source of the flooding. Discussions with residents suggested that drainage assets were not maintained properly. In March 2020, the EA's Flood Resilience Team published a Hydrological Review of the June 2019 event across the River Wandle and Ravensbourne catchments. The report estimated that the June 2019 event had an Annual Exceedance Probability of between 3.3 and 10%. It concluded that the rainfall event was significant and that it would not be inconceivable to expect flooding from watercourses in some locations.

4.2 London Borough of Sutton

4.2.1 Responsibilities

Sutton has different RMA roles as an LLFA, a Highway Authority and a landowner. As a unitary authority LLFA, Sutton has the lead responsibility for managing flood risk from surface water, ordinary watercourse, and groundwater sources. They are responsible for:

- Developing, applying, maintaining, and monitoring local flood risk management strategies.
- Maintaining a register of structures and features that have a significant effect on flood risk.
- Preparing and maintaining preliminary flood risk assessments, flood hazard maps, flood risk maps and flood risk management plans.
- Reviewing and consulting on surface water management plans for major developments.
- Undertaking Section 19 flood risk investigations as per the FWMA 2010.

Other RMAs have a duty to cooperate with LLFAs where necessary to undertake the above responsibilities. Sutton can also carry out work to help alleviate surface water, groundwater, and ordinary watercourse flooding in collaboration with other RMAs. Under the powers granted to them, Sutton can make by-laws regarding flood risk management work.

As a Highway Authority, Sutton are responsible for providing and managing highway drainage that is not managed by Transport for London (TfL) or Highways England. Part of their responsibility is to manage highway flooding on and from highways, reducing the wider flood risk that may be presented from highways through routine works such as gully cleansing.

As a landowner, Sutton have a responsibility to safeguard their own land and property against flooding. Common law also requires that they do not increase the risk of flooding to a

neighbouring property through carrying out tasks such as drain clearing and maintaining any existing flood defences. Sutton is the landowner of part of Watermead Lane, however this part of the road does not contain any of the affected properties.

4.2.2 Authority Contributing Action to Flood Incident

Before

Sutton undertake a borough-wide gully cleansing exercise once a year. Sutton cleansed the gullies in the local area in January 2018.

During

No known actions were taken by Sutton during the flood event.

After

Sutton liaised with stakeholders in the days and weeks following the flooding (including the London Borough of Merton, EA, and SES Water) to determine the cause of the flooding. Letters were also sent to residents in July 2019 to facilitate communication with those who were impacted by the flooding. Sutton undertook a gully cleansing exercise after the heavy rainfall event on 10th June 2019.

4.3 Thames Water Utilities Limited

4.3.1 Responsibilities

TWUL is the water and sewerage company responsible for managing public surface water and foul or combined sewer systems. They are responsible for any maintenance and repair work on their drainage assets. Watermead Lane is served by a TWUL foul sewer network. The known sewer data for the study area has been used as part of this investigation.

When wet winters and high ground water occurs, TWUL investigate where the water may be forcing its way in into the sewer network. TWUL use CCTV, Impermeable Area Surveys, flow monitors, and manhole surveys to identify problem areas. TWUL may also investigate potential flood impacts if a report has been submitted to highlight internal property flooding.

The identified flood risk sources for Watermead Lane are not from TWUL sewer flood sources (foul sewers). TWUL therefore do not have direct responsibilities as an RMA to manage sewer related flood risks at the site.

4.3.2 Authority Contributing Action to Flood Incident

TWUL are not responsible for managing flood risk from the surface water sewers at Watermead Lane and therefore have not taken any actions in response to flood risk.

4.4 SES Water

4.4.1 Responsibilities

SES Water own a stretch of Watermead Lane as a water and sewerage company. As the landowners they are responsible for managing public sewer systems and maintenance and repair work on drainage assets which fall within their land.

Watermead Lane is served by a private surface water sewer network. The identified flood risk sources for Watermead Lane are potentially from sewer flood sources (due to defective flap valves). SES therefore have direct responsibilities as an RMA to manage the drainage assets along Watermead Lane to reduce the risk of flooding at the site.

4.4.2 Authority Contributing Action to Flood Incident

Before

No known actions were taken by SES Water before the flood event.

During

No known actions were taken by SES Water during the flood event.

After

SES Water have confirmed that they have replaced the two broken flap valves by the River Wandle and will carry out routine maintenance on the drainage assets as necessary. They have also confirmed that they are investigating options to survey the properties in Watermead Lane to establish the alignment of the outfall pipework.

4.5 Landowners

4.5.1 Responsibilities

Landowners have the primary responsibility of safeguarding their own land and property against flooding. Under common law they are also required to ensure that they do not use their property in a way that increases the risk of flooding to a neighbouring property. Common law also enables landowners to take reasonable measures to protect their property from flooding, provided the measures do not cause harm to others.

4.5.2 Authority Contributing Action to Flood Incident

Watermead Lane is partly owned by Sutton and partly owned by SES Water. The actions taken by Sutton and SES Water are listed in *Chapter 4.2.2* and *Chapter 4.4.2* respectively.

4.6 Other Authorities

4.6.1 Transport for London

The roads surrounding Watermead Lane are not on TfL's highway network and do not fall within the same hydrological catchment as a TfL managed highway. TfL do not have responsibilities as an RMA to provide or manage drainage for the site.

4.6.2 Category One Responders

Blue light emergency services are categorised as Category One Responders under the Civil Contingencies Act (2004). They are organisations at the core of responding to most emergencies. Services such as the Metropolitan Police Service and the London Fire Brigade are the most relevant responders with regards to flood incidents.

Firefighters and officers from Sutton Fire Station attended the site on 10th June 2019 during the rainfall event. Staff members attended the scene in an Operational Support Vehicle with sandbags to try and help residents mitigate against internal flooding. The fire fighters and officers provided support as it was reported that 8 properties on Watermead Lane had experienced between two to six inches of internal flooding. A resident account also stated that the firefighters and officers provided aid to two elderly residents and took them to a safe place.

Firefighters and officers from Wimbledon Fire Station also responded to a call out on the opposite side of the River Wandle during the rainfall event. Staff members attended properties at Wandle Side to assist the local residents.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This flood risk investigation for Watermead Lane was triggered because multiple properties experienced internal flooding during the June 2019 flood event.

The data collection and investigation exercises established that the site is primarily at risk of fluvial influenced flooding and surface water flooding. The flood event on the 10th June is believed to be a result of a combination of factors (fluvial, surface water and sewer influenced).

A catchment analysis provided hydrological catchment and primary flow path outputs for the site. The defined catchment shows that Watermead Lane lies adjacent to the topographical low point of the defined catchment. The primary flow path is the main overland flow path for surface water in the catchment. The main overland flow path flows through Beddington Lane and Beddington Corner in a south westerly direction towards Goat Road. The flood risk on Watermead Lane is exacerbated due to several factors, including:

- Being located directly adjacent to the River Wandle.
- Being located within the River Wandle Flood Zone 2 and Flood Zone 3 extent.
- Being positioned topographically lower compared to the areas immediately to the east, northeast, north, northwest, and west.
- Drainage pipes from Watermead Lane may have had no operational back-flow protection, allowing surface water to flow out of the river into the road.
- Damage of the drainage pipe flap return valves.
- Potential land alterations within the immediate vicinity, including building work across Middleton Way and removal of trees and bushes from the riverbank which may have caused increased water runoff into the river.
- Increased urbanisation within the hydrological catchment.

The RMAs who are responsible for managing the potential risks posed by flooding to the site are the EA (to manage the risks posed by designated main rivers), Sutton (to manage the risk posed by surface water), and SES Water (they are the landowner of the affected stretch of Watermead Lane and therefore have a responsibility to manage and maintain the sewer network and drainage assets present).

Prior to the flood event, the EA issued a Flood Alert for the River Wandle area. After the event they visited the site and have also published a Hydrological Review of the event. Sutton also liaised with

stakeholders in the days and weeks following the flooding (including the London Borough of Merton, EA, and SES Water) to determine the cause of the flooding. The actions carried out by the EA and Sutton align with their roles and responsibilities. Following the flood event, SES Water said they would carry out the necessary repairs and maintenance work to the drainage assets in Watermead Lane. They have confirmed that the two defective flap valves have been replaced. Further investigation is required to determine the cause of the defective flap valves, and whether the maintenance work has been carried out.

5.2 Recommendations

- Sutton to collaborate with SES Water to further investigate the June 2019 flood event. Surveys should be undertaken to map the surface water sewer network, and investigation as to its ownership should be carried out.
- Sutton to collaborate with the EA to further analyse the River Wandle gauged water level data, to more accurately determine the flood event that led to the June 2019 flood event on Watermead Lane.
- SES Water to conduct routine maintenance on the drainage assets, as necessary.
- Sutton to collaborate with the EA to provide property level protection to at risk properties on Watermead Lane.
- Sutton to collaborate with SES Water to review the capacity of the local sewer network.
- Sutton to collaborate with the EA to explore potential flood defences schemes along Watermead Lane to increase resilience to flood risk.
- Sutton Council to collaborate with SES Water and Watermead Lane residents to explore retrofit SuDS to increase the area's resilience to flood risk.

APPENDICES

Appendix A – Rainfall Return Period Estimations