



West Berkshire Council

S19 FLOOD INVESTIGATIONS

Storms Henk, Isha, and Jocelyn - January 2024





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EXECUTIVE SUMMARY

The West Berkshire 2024 flood event covers the period from early January to late March, during which time a significant number of villages across West Berkshire were affected by flooding as a result of Storms Henk, Isha, and Jocelyn.

WSP were commissioned by West Berkshire Council, as the LLFA, to conduct a Section 19 Flood Investigation as a result of flooding across the region. The areas that experienced the most severe flooding, and therefore investigated within this report, include Burghfield Bridge, Pingewood, Sheffield Bottom, Eastbury, Great Shefford, Lambourn, Newbury, Pangbourne, Purley on Thames, Streatley, and Winterbourne. Other areas that were noted to have experienced flooding, at a less significant scale, include Bucklebury, Coley, East Garston, East Ilsley, Hampstead Norreys, Shefford Woodlands, Sulhamstead, Thatcham, Theale, Upper Lambourn, and West Ilsley.

The majority of the flooding occurred on the 5th of January, following Storm Henk which occurred on the 2nd of January. However, areas of West Berkshire remained inundated for varying lengths of time, due to Storms Isha and Jocelyn causing further flooding. In total, WSP are aware of approximately 210 properties in total that experienced a form of flooding as a result of the 2024 flood event. Of these, approximately 77 properties experienced internal flooding and approximately 133 properties experienced external flooding. Flooding resulted from multiple sources, such as fluvial, groundwater, sewer, and surface water, creating a complex network of issues.

WSP have completed an investigation into the causes, mechanisms, consequences, and responses associated with the 2024 flood event. This has involved discussions with local flood wardens and affected residents, site visits to the flooded locations, analysis of hydrology data, consultation with risk management authorities, and the review of data gathered by West Berkshire Council, such as questionnaires and photographic evidence.

The analysis of rainfall data across the West Berkshire catchment, did not suggest that Storms Henk, Isha, and Jocelyn had significantly large return periods. However, when combining the heavy rainfall with an already wet winter, high groundwater levels, and high river levels, it created prime conditions for flooding.

The key findings of this investigation are:

- Fluvial and groundwater flooding generally occurred in areas identified as Flood Zone 2 and Flood Zone 3, as indicated on the Environment Agency's flood map for planning. However, some localised flooding occurred within Flood Zone 1.
- Surface water flooding generally occurred in areas identified as being at a high risk of surface water flooding, as indicated on the Environment Agency's long term flood maps. However, again some localised flooding occurred outside of these zones.
- High groundwater levels after an unusually wet winter and extreme precipitation brought by Storms Henk, Isha, and Jocelyn, have been identified as the primary contributing factors to the flooding experienced across West Berkshire in early 2024.



The information obtained from this investigation has highlighted the need for the implementation of a number of measures. The recommendations resulting from this report, range from property flood resilience measures to further investigation for the implementation of flood alleviation schemes. A series of location-specific recommendations has been produced intended to help mitigate against the impact of future flooding.

1 INTRODUCTION

1.1 BACKGROUND

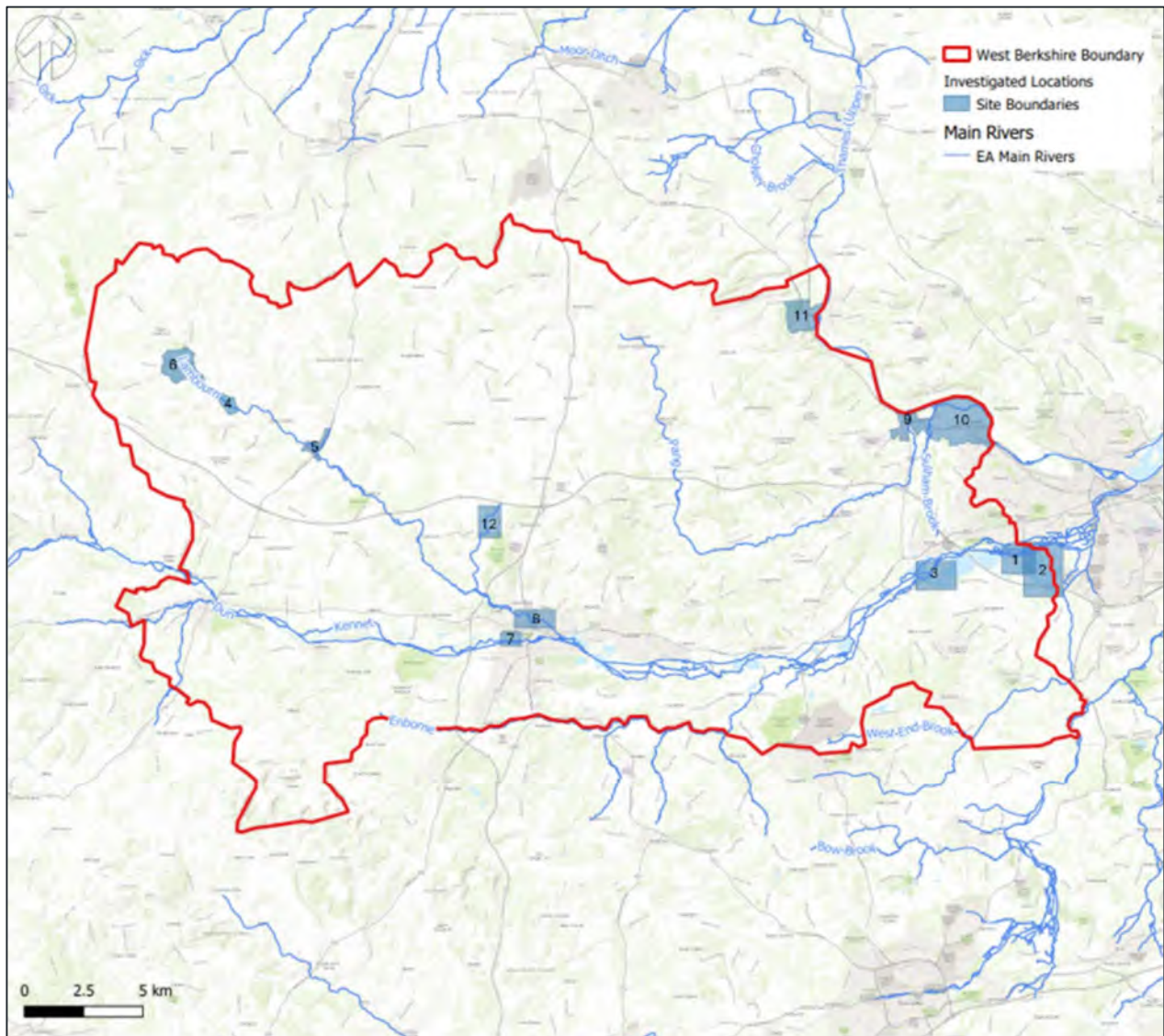
1.1.1. WSP has been commissioned by West Berkshire Council to conduct Section 19 Flood Investigations following flooding which was reported across West Berkshire because of storms in January 2024. The storms included Storm Henk on the 2nd of January, Storm Isha from the 21st to the 22nd of January, and Storm Jocelyn from the 23rd to the 24th of January. The flooding led to internal and external property flooding to residents & businesses and road closures.

1.1.2. The locations under investigation include:

- Burghfield – Burghfield Bridge, Pingewood & Sheffield Bottom
- Eastbury
- Great Shefford
- Lambourn
- Newbury – North & South
- Pangbourne
- Purley on Thames
- Streatley
- Winterbourne

(Refer to Figure 1-1 for Investigation Locations)

Figure 1-1 – Investigation Locations Across West Berkshire



**Refer to Table 1-1 for location details.*

- 1.1.3. West Berkshire Council has a responsibility under the Flood and Water Management Act 2010 (FWMA 2010) to undertake flooding investigations. Specifically, Section 19 states:
- “1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate –*
- a) which risk management authorities have relevant flood risk management functions, and*
 - b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.*
- 2) Where an authority carries out an investigation under subsection (1) it must –*
- a) publish the results of its investigation, and*
 - b) notify any relevant risk management authorities.”*

1.1.4. Table 1-1 and the figures in Appendix A summarise the areas which have been reported to West Berkshire Council as experiencing flooding following Storms Henk, Isha, and Jocelyn.

Table 1-1 – Effect of Flooding in Each Location (Source: West Berkshire Council, Flood Wardens, the Environment Agency and the Flood Questionnaire)

	Location	Total No. of Properties Flooded	Properties Internally Flooded	Properties Externally Flooded	Road Closures
1	Burghfield Bridge	15	10	5	1
2	Pingewood	4	1	3	2
3	Sheffield Bottom	10	7	3	2
4	Eastbury	9	6	3	2
5	Great Shefford	10	3	7	1
6	Lambourn	5	3	2	1
7	Newbury (South)	10	7	3	2
8	Newbury (North)	51	4	47	2
9	Pangbourne	4	4	Unknown	0
10	Purley on Thames	75	25	50	5
11	Streatley	21	6	15	0
12	Winterbourne	11	2	9	1

1.2 REPORT REQUIREMENTS

1.2.1. West Berkshire Council's Duty to Investigate, Flood Incident Policy, states the purpose and scale of investigations necessary to satisfy the requirements of FWMA 2010. The policy states:

- Any investigations undertaken will seek to establish the likely causes of the flooding incident, the relevant risk management authorities, and identify any recommended actions to be undertaken by the relevant risk management authorities to reduce the risk of a recurrence;
- The investigations will be undertaken during, or as soon as possible after, the flooding incident, and will be appropriate to the scale and nature of the flooding incident;
- Small scale flooding incidents, and incidents where the relevant risk management authorities are immediately apparent or are undertaking actions to alleviate the cause of the flooding incident, are likely to require limited investigations; and

- Large scale flooding incidents, incidents where the relevant flood risk management authorities are unclear, and incidents where several risk management authorities are involved, are likely to require more detailed investigations. In such circumstances the Council will work closely with the risk management authorities involved and may, where appropriate, prepare a detailed report.

1.2.2. To achieve the above requirements:

- Causes of flooding have been investigated by undertaking the following actions:
 - Reviewing the rainfall pattern (hydrological assessment), to determine the magnitude of the flood event;
 - Issuing a questionnaire consultation with affected residents to understand the perceived causes of flooding; and
 - Comparing the flood event with published flood risk maps to understand if the flooding occurred as predicted.
- The responsibilities and necessary actions for the relevant Risk Management Authorities have been established; and
- This report has been produced to capture the data, findings, and recommendations.

1.3 SITE VISITS

1.3.1. WSP staff carried out site visits to each affected area on the following dates:

- Burghfield – Burfield Bridge – 26th February 2024
- Burghfield – Pingewood – 3rd May 2024
- Burghfield – Sheffield Bottom – 3rd May 2024
- Eastbury – 1st March 2024
- Lambourn – 19th April 2024
- Newbury (South) – 15th March 2024
- Newbury (North) – 22nd March 2024
- Pangbourne – 5th April 2024
- Purley on Thames – 14th March 2024
- Streatley – 7th March 2024
- Winterbourne – 18th April 2024

1.3.2. Site visits were completed to assist in the identification and mapping of flooding sources, causes, flow routes, and consequences.

1.3.3. Photographs from these site visits are provided throughout this report and in Appendix G.

1.4 LIMITATIONS

- 1.4.1. The information contained in this document has been compiled for the benefit of West Berkshire Council officers and contractors, Parish Councils, Thames Water, the Environment Agency, and the affected community.
- 1.4.2. It should be noted that much of the following record is dependent upon accounts of the flood events from residents, business owners, flood wardens, and West Berkshire Council officers. Prior to taking any recommendations forward, a feasibility study should be undertaken to confirm the viability of any interventions.
- 1.4.3. During WSP's site visits, it was noted that many properties owners have chosen not to report if they were affected by flooding, for privacy and / or insurance purposes. There has also been some variation between information collected during these site visits, and through the West Berkshire Council flood questionnaire.

2 FLOOD RISK MANAGEMENT ROLES AND RESPONSIBILITIES IN WEST BERKSHIRE

2.1 WEST BERKSHIRE COUNCIL

- 2.1.1. Under the FWMA 2010, West Berkshire Council, as the Lead Local Flood Authority (LLFA):
- is responsible for coordinating the management of flood risk from local sources. This includes surface water, groundwater and ordinary watercourses;
 - has a duty to investigate and publish reports on flood events (to the extent it considers necessary);
 - is responsible for compiling and maintaining a register of structures and features that have a significant effect on flood risk;
 - has responsibility for consenting third-party works to ordinary watercourses; and
 - is required to co-operate with other Risk Management Authorities.
- 2.1.2. West Berkshire Council is also the Highway Authority and has the following powers and duties:
- maintain highways, including ensuring that highway drainage systems are clear and that blockages on the highway are cleared;
 - deliver works that they consider necessary to protect the highway from flooding, either on the highway itself or on land which has been acquired by the Highway Authority in the exercising of highway acquisition powers; and
 - divert parts of watercourses or carry out any other works on any form of watercourse if it is necessary for the construction, improvement or alteration of the highway or provides a new means of access to any premises from the highway.
- 2.1.3. The Council also has other related roles in planning and development control, public health and emergency planning.

2.2 ENVIRONMENT AGENCY

- 2.2.1. The Environment Agency is responsible for providing a national strategic overview of flooding. The Environment Agency is also responsible for managing flood risk from Main Rivers. The Environment Agency does not have a responsibility for surface water flooding.
- 2.2.2. The Environment Agency has a key role in providing flood warnings to the public and in protecting and improving the natural environment.
- 2.2.3. The Environment Agency has permissive powers to reduce flood risk by undertaking work on Main Rivers and flood defence structures.

2.3 THAMES WATER

- 2.3.1. Thames Water has responsibility for the public foul and surface water sewer systems in its ownership. Thames Water is also responsible for treating sewage from its foul network and to empty and dispose of the contents of their sewers. The Water Company has a general duty (under Section 94 of the Water Industry Act 1991) to provide, extend and improve public sewer systems, ensuring the areas they serve are 'effectually drained'.

- 2.3.2. Thames Water must also maintain a register of flooding from sewers. The register records information which is used to apply for investment funds from Ofwat to undertake improvements or repairs to the foul and surface water networks. Investment is agreed with Ofwat on a five-year cycle referred to as Asset Management Periods (AMP). The current AMP runs from 2020-2025.

2.4 RIPARIAN LANDOWNERS

- 2.4.1. Landowners whose property is adjacent to a river, a stream or a ditch are likely to be 'riparian owners'. Riparian owners have a responsibility to maintain the bed and banks of any watercourse within or adjacent to their property, even if that watercourse is adjacent to a highway (in most cases), and to ensure there are no obstructions to the natural flow of water.

2.5 PROPERTY OWNERS

- 2.5.1. Responsibility for protecting property from flooding lies in the first instance with property owners. Property owners whose home or business premises are in areas known to be at risk of flooding should consider making their own flood defence preparations. Property owners also have a common law duty to mitigate their losses during a flood event, but without increasing the damage to neighbouring properties.

3 HYDROLOGY

- 3.1.1. This section assesses the rainfall, water levels, river flows & groundwater levels associated with the Storm Henk event that occurred in January 2024. Whilst there were several storm events; Storm Henk from the 2nd January, Storm Isha from the 21st – 22nd January and Storm Jocelyn from the 23rd – 24th January, Storm Henk has been the focus of the analysis as it had the most significant effect and the most significant rainfall, levels and flows. Storm Henk affected several areas across West Berkshire, including Burghfield, Eastbury, Newbury, Streatley, Purley on Thames, Great Shefford, Pangbourne and Lambourn, which have all been assessed in this report.
- 3.1.2. Rainfall has been assessed using seven different rainfall gauges from the National River Flow Archives dataset (NRFA) across or close to the West Berkshire unitary authority area. No other rain gauges were considered to be appropriate to use within the assessment of the flood event due to their significant distance from West Berkshire. Additionally, rainfall has also been assessed through purchasing eight 1 x 1 km radar grid squares at each of the affected locations across West Berkshire, from the Met Office. The rainfall radar grid values have then been used to assess the Annual Exceedance Probability (AEP) of Storm Henk.
- 3.1.3. It is important to note that this rainfall analysis and the AEP estimates are approximates based off observed rainfall data which comes with a degree of uncertainty. Other factors such as catchment characteristics and antecedent rainfall conditions have not been considered for this analysis. Assessment of AEP based solely on rainfall data can only ever provide an approximation of the resultant flood event. Other local factors, such as asset condition and blockage may also have influenced the flooding seen, rather than simply the magnitude of the event.

3.2 RAINFALL GAUGE ANALYSIS

- 3.2.1. Table 3-1 shows the location of these gauges, the rainfall event recorded and the amount of rainfall between the 4th – 5th January, two days after Storm Henk event and at the start of the flooding occurring. Appendix C.1 at the end of the report shows a map of the location of the Environment Agency rain gauges, along with the location of the eight 1 x 1 radar grid squares and groundwater gauges. The rain gauges recorded a total rainfall ranging from approximately 25 mm – 37 mm for the rainfall event between 14:00 on the 4th January – to 04:00 on the 5th January, varying between 10 hours 45 minutes to 12 hours 30 mins in this time period.

Table 3-1 – The Seven Rainfall Gauges Assessed Between the 4th – 5th January Across West Berkshire Associated with Storm Henk

Rain Gauge	Grid Ref	Rainfall Event (& Duration)	Rainfall (mm)
<i>Chieveley</i>	SU 46952 73862	4 th January 14:30 – 5 th January 02:15 (11 hours 45 mins)	36.85
<i>Cleeve</i>	SU 60088 81828	4 th January 15:00 – 5 th January 03:00 (12 hours)	26.30

Rain Gauge	Grid Ref	Rainfall Event (& Duration)	Rainfall (mm)
<i>Kingsclere</i>	SU 53007 60934	4 th January 14:00 – 02:30 (12 hours 30 mins)	28.08
<i>Maddle Farm</i>	SU 30520 81777	4 th January 14:45 – 5 th January 01:30 (10 hours 45 mins)	35.55
<i>Shalbourne</i>	SU 32788 65559	4 th January 14:30 – 5 th January 03:00 (12 hours 30 mins)	30.70
<i>West Ilsley</i>	SU 45642 82926	4 th January 14:15 – 5 th January 01:45 (11 hours 30 mins)	29.56
<i>Yattendon</i>	SU 55894 74330	4 th January 14:30 – 5 th January 02:45 (12 hours 15 mins)	35.29

3.3 RAINFALL RADAR ANALYSIS

- 3.3.1. Due to the significant distance between the rain gauges and the affected flooded areas (e.g. the closest rain gauge to Newbury is 6.6km) and the localised nature of rainfall events, the rain gauges likely do not represent the rainfall experienced at each of the affected locations across West Berkshire. Rainfall radar data was therefore purchased from the Met Office to support the rainfall analysis. Assessing the radar data alongside the rainfall gauge data provides a better indication of the spatial distribution of rainfall across West Berkshire.
- 3.3.2. Along with assessing the rainfall amounts between the 4th – 5th January, the AEP of the rainfall event recorded by the radar rainfall data has been assessed.

Methodology

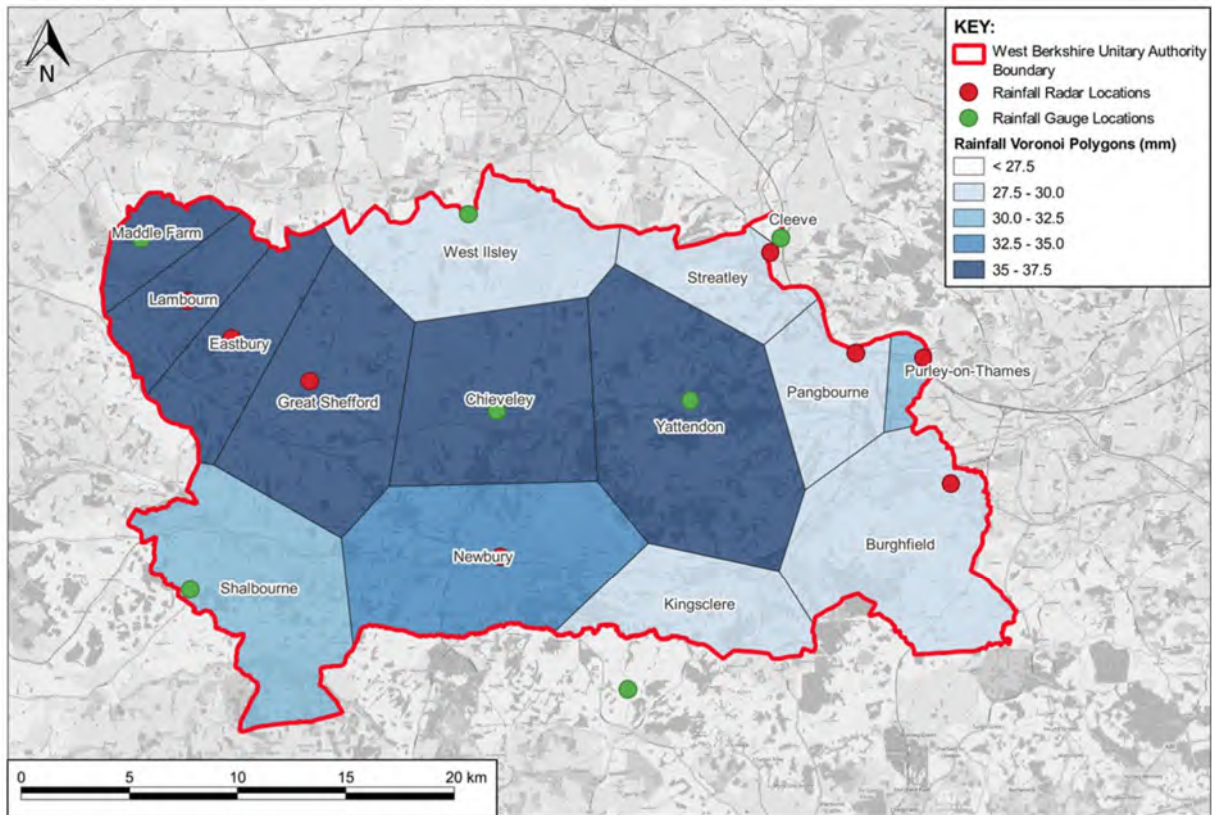
- 3.3.3. The Flood Estimation Handbook (FEH) web service Event Rarity Calculator can be used to assess the AEP of a recorded rainfall event. This is the likelihood of rainfall of this depth being exceeded in a typical year in that location when compared with FEH22 rainfall probability model. For instance, a rainfall event with an AEP of 1% means that rainfall of this depth or greater would have a 1% chance of occurring in any year in that location. This is also known as a '1 in 100 year' return period event.
- 3.3.4. Table 3-2 shows the AEP of the rainfall event between the 4th – 5th January at each of the radar locations, along with the time the rainfall event occurred and the amount of rainfall the radar 1 x 1 grid square recorded. The radar data was purchased for eight 1 x 1 km grid squares at each of the affected locations across West Berkshire, covering all the main effected areas from the flood event across January.

Table 3-2 – The Eight 1 x 1 Radar Grid Squares Assessed between the 4th – 5th January Across West Berkshire. Each of these Grid Squares are Located Across the Main Affected Locations in the Region. Includes the Return Period of the Rainfall Event which Encompasses the Whole Storm Event.

Location	Grid Ref	Rainfall Date (& Duration)	Rainfall (mm)	Annual Exceedance Probability (AEP)
<i>Burghfield</i>	SU 67932 70481	4 th January 14:00 – 5 th January 04:00 (14 hours)	28.8	<i>1 in 4-year return period</i>
<i>Eastbury</i>	SU 34707 77183	4 th January 15:00 – 5 th January 02:00 (11 hours)	36.0	<i>1 in 8-year return period</i>
<i>Newbury</i>	SU 47112 67111	4 th January 14:00 – 5 th January 03:00 (13 hours)	34.2	<i>1 in 6-year return period</i>
<i>Purley on Thames</i>	SU 66657 76287	4 th January 15:00 – 5 th January 04:00 (13 hours)	30.5	<i>1 in 5-year return period</i>
<i>Streatley</i>	SU 59587 81148	4 th January 15:00 – 5 th January 04:00 (13 hours)	29.1	<i>1 in 4-year return period</i>
<i>Great Shefford</i>	SU 38314 75218	4 th January 15:00 – 5 th January 03:00 (12 hours)	37.5	<i>1 in 9-year return period</i>
<i>Pangbourne</i>	SU 63541 76514	4 th January 15:00 – 5 th January 04:00 (13 hours)	29.9	<i>1 in 5-year return period</i>
<i>Lambourn</i>	SU 32646 78910	4 th January 15:00 – 5 th January 02:00 (11 hours)	37.3	<i>1 in 10-year return period</i>

- 3.3.5. The radar data was purchased for eight 1 x 1 km grid squares at each of the affected locations across West Berkshire, covering all the main affected areas from the flood event across January.
- 3.3.6. Figure 3-1 below shows the recorded distribution across West Berkshire, incorporating each of the eight radar grids which are located at each of the affected locations as well as the seven rainfall gauges to present the spatial distribution of the rainfall across West Berkshire.

Figure 3-1 – Spatial Distribution of Rainfall for the Rainfall Event Between 4th January 14:00 – 5th January 04:00. This Encompasses Rain Gauges (green dots) and Rainfall Radar Gridded Data (red dots) to Develop an Overall Picture of Rainfall Across West Berkshire.



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- 3.3.7. The results show that the rainfall events over the West Berkshire region were significant and there was heavy rainfall through the whole region, with gauges/radar data in the west and central areas of the West Berkshire unitary authority showing the highest amount of rainfall during this rainfall period.
- 3.3.8. The AEP of the rainfall events varied from 1 in 4-year to 1 in 10-year using the rainfall radar data.

3.4 FLOW/LEVEL ANALYSIS

- 3.4.1. Table 3-3 shows the eight water level gauges which were assessed as they are close to the eight affected sites (see Appendix C.2 for the mapped location of the flow and level gauges). The table displays the highest daily water level recorded in January 2024 (along with the date it was recorded). This level is ranked compared to the rest of the AMAX data record.

Table 3-3 – The Eight Gauges Recording the Water Level (m) through January 2024 and Ranking the Highest Water Level Value of that Month to the Full AMAX Record.

Gauge (Station ID)	Full Data Record	Max January 2024 Water Level (m AOD ¹) (& Date)	January 2024 Peak AMAX Rank Compared to Full Data Record
Eastbury (2254TH)	January 2016 – September 2023	2.852 (4 th January)	1 of 8
Lambourn (2251TH)	October 2000 – September 2023	1.36 (4 th January)	2 of 24
Pangbourne (2190TH)	July 1987 – May 2024	1.128 (7 th January)	1 of 37
Reading (2200TH)	October 1992 – September 2023	7.54 (7 th January)	1 of 32
Mapledurham Lock (2199TH)	November 1995 – September 2023	0.847 (7 th January)	1 of 29
Shaw (2270_w1TH)	October 2013 – May 2024	2.058 (9 th January)	2 of 11
Sulham (2195TH)	October 1991 – September 2023	0.833 (5 th January)	2 of 33
Theale (2290TH)	November 1985 – September 2023	1.838 (5 th January)	1 of 38

3.4.2. Table 3-3 shows that in January 2024, the above water level gauges recorded the highest or second highest water levels when compared to the annual AMAX record. This demonstrates that there was unprecedented fluvial flooding in many parts of the region since individual station records began.

3.4.3. As with the level analysis above, flow gauges were also assessed using the same methodology.

Table 3-4 – The Five Gauges Assessing River Flow (m³/s) through January 2024 and Ranking the Highest Flow Value of that Month Compared to the full AMAX Record.

Gauge (Station ID)	Full Data Record (Up to September 2023)	Max January 2024 Flow (m ³ /s (& Date)	January 2023-24 AMAX Rank Compared to Full Data Record	Annual Exceedance Probability (AEP)
Newbury (2250TH)	February 1989 – March 2024	40.10 (7 th January)	1 of 35	N/A
Pangbourne (2190TH)	December 1968 - November 1998 (monthly readings), December 1998 – May 2024 (daily readings)	5.09 (7 th January)	4 of 56	22

¹ metres Above Ordnance Datum

Gauge (Station ID)	Full Data Record (Up to September 2023)	Max January 2024 Flow (m ³ /s (& Date))	January 2023-24 AMAX Rank Compared to Full Data Record	Annual Exceedance Probability (AEP)
Reading (2200TH)	October 1992 – November 2023	276.00 (7 th January)	2 of 32	N/A
Shaw (2270_w1TH)	October 2013 – June 2024	7.04 (9 th January)	2 of 11	21
Welford (2255TH)	October 1962 – September 1983 (monthly readings), March 2003 – January 2024 (daily readings)	6.65 (9 th January)	2 of 44	N/A

- 3.4.4. Like the water level results, the peak flows across West Berkshire in January 2024 were often the highest, if not the highest recorded flows when compared to the annual AMAX record. This again demonstrates that there was unprecedented fluvial flooding across the region since records for individual stations.

3.5 GROUNDWATER ANALYSIS

- 3.5.1. Groundwater flooding is known to have occurred during the January 2024 events. To assess this, groundwater levels across West Berkshire were analysed using the Hydrology Data Explorer.
- 3.5.2. Thirteen groundwater level gauges were analysed to develop an understanding of groundwater levels across West Berkshire in January 2024. After an initial analysis, records from seven gauges were discounted, either due to the data record being too short (< 5 years), or because data was missing for January 2024. Data from the following six level gauges were taken forward: Bangor Manor, Beenham, Bockhampton, Compton Sheperds Hill, Great Shefford and Wash Common.
- 3.5.3. Table 3-5 shows that recorded groundwater levels at three of the gauge sites were the highest on record when compared to the gauges' full dataset. Recorded levels at the three other gauge sites were also shown to be high. Overall, this demonstrates that in some areas of West Berkshire, groundwater was at unprecedented high levels, which likely meant unprecedented groundwater flooding.

Table 3-5 – The Six Gauges Assessing Groundwater Levels (mAOD) for January 2024 and Ranking the Highest Groundwater Level Value of that Month Compared to the Full AMAX Record.

Gauge (Station ID)	Full Data Record (Upto September 2023)	Max January 2024 Water Level (mAOD) (& Date)	January 2024 Peak AMAX Rank Compared to Full Data Record
Bangor Manor (SU46_7)	January 2001 – September 2023	85.159 (9 th January)	1 of 23
Beenham (SU56_220)	October 1999 – September – 2023	53.877 (22 nd January)	1 of 25

Gauge (Station ID)	Full Data Record (Upto September 2023)	Max January 2024 Water Level (mAOD) (& Date)	January 2024 Peak AMAX Rank Compared to Full Data Record
<i>Bockhampton (SU37_60)</i>	March 2001 – September 2023	121.455 (7 th January)	1 of 23
<i>Compton Shepherds Hill (SU57_154)</i>	October 1999 – September 2023	95.987 (17 th January)	3 of 25
<i>Great Shefford (SU37_1)</i>	July 2002 – September 2023	106.647 (9 th January)	2 of 23
<i>Wash Common (SU46_138)</i>	May 2005 – September 2023	79.097 (7 th January)	5 of 20

- 3.5.4. See Appendix C.1 for the mapped location of the groundwater gauges and Appendix C.3 for the annual max groundwater level records of the respective groundwater gauges relative to the highest level recorded in January 2024.

3.6 SUMMARY

- 3.6.1. The analysis shows that the rainfall at the time of Storm Henk led to high river flows which itself led to flooding across many areas of West Berkshire. This was compounded and significantly influenced by unprecedented groundwater levels in the surrounding area which reduced the catchments' ability to absorb rainfall and exacerbated the amount of rainfall runoff into watercourses.
- 3.6.2. A feature of the flooding that occurred is the amount of time it took for river flows and levels to return to normal levels; an occurrence that can also be attributed to the high groundwater levels and the amount of water in the catchment.

4 FLOOD INVESTIGATION

4.1 OVERVIEW

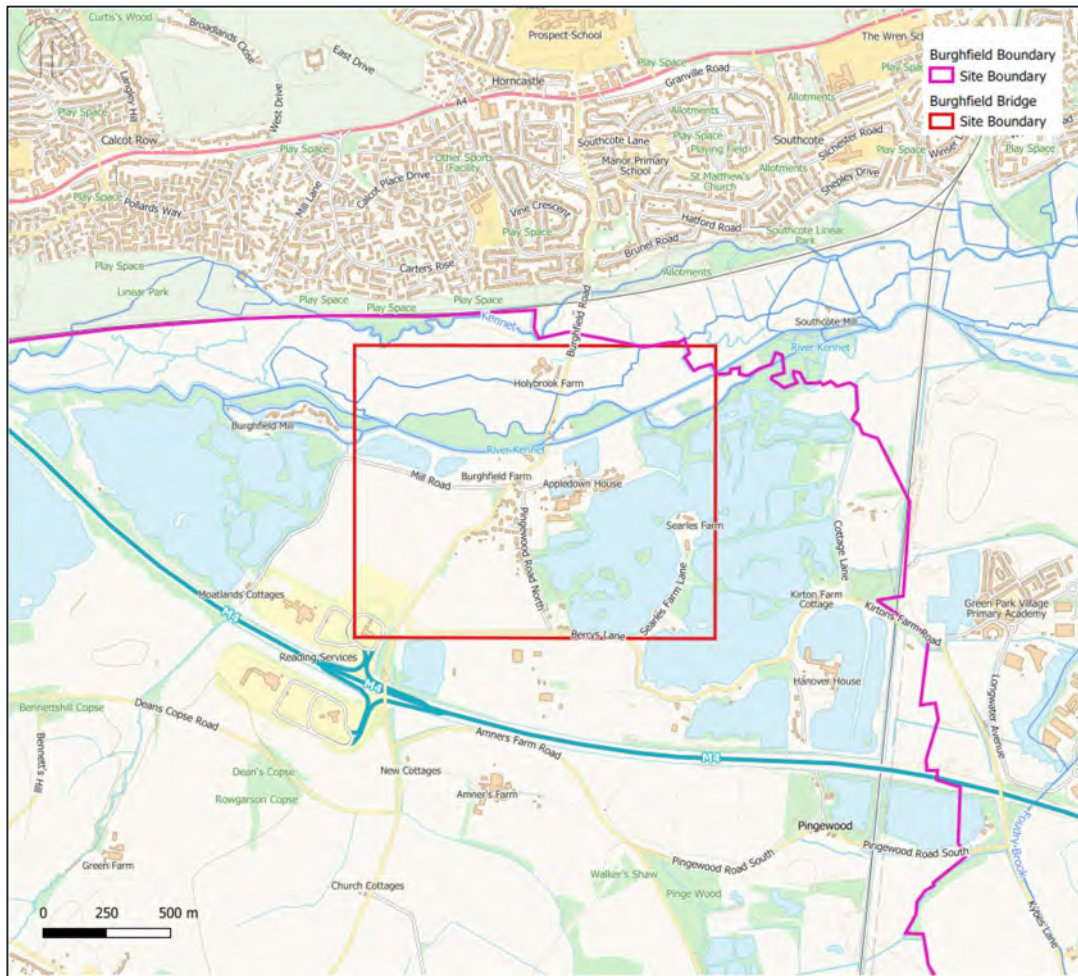
- 4.1.1. The next sections of the Flood Investigation Report (FIR) provide an assessment of the information received for the areas that experienced flooding; a review of the sources of flooding; the effect on the local area; and the response and / or actions preceding, during and following the flood events by the relevant flood risk management authorities.
- 4.1.2. Following the flood events, consultation with local residents, in the form of a questionnaire, was undertaken. A summary of the residents' responses is provided in Appendix B.
- 4.1.3. Consultation was also undertaken with flood risk management authorities including the Environment Agency, Thames Water and Wokingham Borough Council. Refer to Appendix D for copies of this correspondence.

5 BURGHFIELD – BURGHFIELD BRIDGE

5.1 LOCATION & PREVIOUS FLOODING

- 5.1.1. The village of Burghfield is located in the east of West Berkshire and south of the town of Reading. Specifically, the area of Burghfield Bridge was affected by flooding in early 2024 and has a National Grid Reference of 468032, 170660. Refer to Figure 5-1 below.
- 5.1.2. The village is situated in a topographically low point and surrounded by high ground in the form of the M4 to the south and west, and the railway to the north and east.
- 5.1.3. The village contains lakes from former gravel works, both to the east and west of the residential area. In addition, the Kennet and Avon Canal flows in the north of the village where it hydrologically connects with the River Kennet.
- 5.1.4. Road drainage is present across the village in the form of ditches, pipes, and gullies, which are in a varying state of maintenance.
- 5.1.5. Previous flooding occurred in Burghfield Bridge during the winter 2013/14 flood event, during which similar areas were affected. During this event, approximately 18 properties were flooded internally and approximately four properties were flooded externally across the entirety of Burghfield. Similar to the 2024 flood event, sources of flooding included groundwater and fluvial from the River Kennet and Kennet and Avon Canal. Historic flood outlines are mapped within Appendix E.1.

Figure 5-1 – Burghfield Bridge Location Map



5.2 FLOODING

- 5.2.1. From questionnaire responses and interviews with the Burghfield Bridge residents, it is understood that the flooding in early 2024 was from groundwater and fluvial sources. During WSP's site visit to Burghfield Bridge, local residents described how the Kennet and Avon Canal had overtopped its banks on occasions across January and February, after Storms Henk, Isha, and Jocelyn. This resulted in water flowing south from the canal, through the car park and grounds of the Cuning Man Pub, and through the culvert under the Burghfield Road onto the first 50 yards of Pingewood Road North and down Green Lane affecting some residential properties in the area. Of the two roads, Pingewood Road North experienced the deepest floodwaters, which resulted in cars breaking down and struggling to pass through. This created an access issue for emergency vehicles.
- 5.2.2. Flooding occurred for approximately a week and a half, during which groundwater emerged and had to be pumped south from the residential area towards lower derelict land where winter groundwater normally accumulates. During this time, internal flooding affected approximately ten properties including both residential and commercial. In addition to this, some properties in Pingewood Road North were unable to use their showers, toilets, and washing machines due to high groundwater filling their septic tanks; a situation which has continued for several months. The high groundwater levels experienced throughout the early months of 2024, meant that floodwaters generally took a long time to completely subside.

Figure 5-2 – Flooding at Burghfield



5.3 CAUSES

- 5.3.1. The winter of 2023/24 was one of the wettest on record, which served to elevate groundwater levels for prolonged periods of time in areas of West Berkshire. High groundwater in and around the area was noted as a significant contributing factor to the flooding, specifically along Pingewood Close. This was exacerbated by exceptional rainfall during storms Henk, Isha and Jocelyn leading to the Kennet and Avon Canal exceeding its capacity at this location on multiple occasions. Furthermore, it was reported by flood wardens that the septic tank drainage fields in Burghfield Bridge are situated under the water table, contributing to raw sewage emerging above ground level.
- 5.3.2. Whilst the volumes of water in the catchment are believed to be the main cause of flooding in Burghfield bridge, several other factors were noted during WSP's visit to Burghfield Bridge, which may have had an influence on the severity or consequence of flooding. Some of these factors are potentially long term and complex. Further investigation is recommended to determine the level of influence if any they may have had on the events of early 2024.
- Changes to land use or land cover have taken place over time. Some residents expressed concerns that the infilling of gravel lakes and creation of manmade bunds around the industrial developments in the area may have worsened the flooding experienced. This may have prevented overland flow between the lakes and canal and created disconnected floodplains with an overall decrease in water storage capacity.

- It is noted that the north bank of the Kennet and Avon Canal is significantly higher than the south bank, despite the developed area of Burghfield Bridge being located south of the canal. This means when water levels are high in the canal, they can overtop and flow south into the developed area of Burghfield Bridge, rather than the undeveloped floodplain to the north, as occurred during the 2024 flood event.
- It was observed that the south banks of the canal are significantly weakened in places from mooring canal boats and a potential lack of management. Residents also expressed concerns of the potential for canal boats to break loose from their moorings and block flow downstream under Burghfield Road bridge.
- Further downstream, approximately 400m east of the Burghfield Road bridge, it was noted that only six out of the seven sluice gates were fully operational during the 2024 flood event, causing a reduced flow of water discharging to lakes to the south and a separate branch of the River Kennet.
- Road gullies along Pingewood Road North were noted as being full of mud, debris, and groundwater during WSP's visit, and residents also reported this being the case during the flood event. Following the flooding, this increased the amount of time it took floodwater to recede and made it easy for road flooding to re-occur after heavy rainfall.
- Concerns were raised over long-term land use changes in the land west of Burghfield Road and South of Mill Road.

Figure 5-3 – Flooding at Burghfield Bridge Close



5.4 FLOOD DEFENCES/ASSETS

- 5.4.1. WSP are not aware of any flood defences in the area that benefit Burghfield Bridge.

5.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 5.5.1. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 5.5.2. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation.
- 5.5.3. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 5.5.4. Consultation with the Environment Agency has confirmed that there are no flood defences within the area of Burghfield. Furthermore, the Environment Agency do not own any gauges within Burghfield to measure river flows and levels. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.
- 5.5.5. The following flood alerts were in place during the 2024 flood event:
- River Kennet from Thatcham down to Reading (061WAF22LowerKen) – In force: 31/12/2023 – 04/02/2024
 - River Enborne and Foudry Brook (061WAF22EnbnFdry) – In force: 02/01/2024 – 07/01/2024
- 5.5.6. The following flood warning was in place during the 2024 flood event:
- Properties closest to the River Kennet at the Burghfield, Southcote, Coley and Holybrook areas (061FWF22XThIRdg) – In force: 02/01/2024 – 11/01/2024
- 5.5.7. The Environment Agency received 10 reports of flooding across the whole of Burghfield, during the 2024 flood event. Of these reports, two properties reported internal flooding, and seven properties reported external flooding. Six of these properties were located within Burghfield Bridge. Of the affected properties in Burghfield Bridge, two properties were flooded internally, and four properties were flooded externally. It is noted that the Environment Agency received reports of external fluvial flooding to two properties in Dewe Lane and one property in Mill Road, which were not reported to WSP during site visits, or West Berkshire Council through the flooding questionnaire. Subsequently, this information has been added to Table 1-1 and Table 5-1.
- 5.5.8. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Kennet within Burghfield and that there are no plans to carry out improvement works. However, details of the Thames Valley Flood Scheme have been provided. The scheme, led by the Environment Agency, is investigating the possibility to store water across

the Thames catchment. This is likely to include a combination of flood storage and natural flood management currently across approximately 17 locations.

West Berkshire Council

- 5.5.9. Consultation with West Berkshire Council has confirmed that site visits to the Burghfield area were conducted on the following dates:
- 7th January 2024
 - 9th January 2024
 - 11th January 2024
 - 12th January 2024
 - 16th January 2024
 - 23rd January 2024
- 5.5.10. Furthermore, road closures were put in place on Pingewood Road North on the 8th of January 2024 until the 10th of January 2024, and Berrys Lane on the 10th of January 2024 until the 14th of January 2024.

Canal and River Trust

- 5.5.11. A request for information has been sent to the Canal and River Trust, however no response has been received at this time.

Royal Berkshire Fire and Rescue Service

- 5.5.12. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) have been consulted for information. RBFRS reportedly did not attend any incidents in relation to the 2024 flood event in this area.

5.6 RECOMMENDATIONS

Local Residents

- 5.6.1. Residents should report any highway drainage issues to West Berkshire Council as soon as they become apparent.
- 5.6.2. Residents and business owners affected by flooding may benefit from property flood resilience measures, such as flood doors, waterproof airbricks, non-return valves that can be fitted to drains and placing electrical sockets above floor levels, to improve resilience to their premises during subsequent storm events.

Riparian Owners

- 5.6.3. Riparian owners within Burghfield Bridge, should ensure that ditches are well maintained and allow the free passage of water during flood events.

West Berkshire Council

- 5.6.4. It is considered there may be potential ongoing issues with the condition, and therefore the capacity, of existing highway drainage assets along Pingewood Road North. It is acknowledged that the design standard of existing highway drainage is likely to be lower than the rainfall event recorded and that it will also not be designed to cope with groundwater. However, it is recommended that a

CCTV survey could be undertaken to confirm its condition. Remedial works could then be identified and prioritised in consideration of their impact on local flood risks.

- 5.6.5. It is recommended that West Berkshire Council could review the current highway drainage maintenance schedule and, where appropriate, increase the frequency of inspections. Alternatively, these assets could be marked as a priority, and arrangements should be made for pre-emptive inspections on receipt of forecasts of heavy rain.
- 5.6.6. The area may also benefit from a local level flood mitigation scheme including the retrofit of drainage facilities to improve conveyance capacity and reduce the risk of blockage. There may be the potential to divert flow from the Kennet and Avon Canal into fields to the north as a form of temporary storage and controlled release. Further data needs to be collected to ascertain the potential benefits and options for the provision of practicable solutions.
- 5.6.7. During WSP's site visit to Burghfield Bridge, residents expressed concerns that general land use changes and raising of land may have increased flood risk.
- 5.6.8. Where there is sufficient evidence that land use change or land raising has taken place without the appropriate permissions, West Berkshire Council as planning authority and LLFA may choose to use enforcement powers to ensure any works deemed to have increased flood risk is rectified.

Environment Agency

- 5.6.9. This investigation has indicated that there may be potential issues with the capacity or condition of the River Kennet with frequent overtopping occurring during the flood event. It is recommended that the Environment Agency review how flow is being managed upstream of Burghfield Bridge to determine whether peak volumes can be reduced at Burghfield Bridge during times of flood.
- 5.6.10. Additionally, opportunities to improve capacity should be identified such as clearing channels of debris or vegetation. It is recommended that the Environment Agency review the necessity and frequency of any maintenance programme if one is in place for the area.
- 5.6.11. There may also be potential for a flood alleviation scheme along the River Kennet which should be further investigated and communicated with West Berkshire Council. The floodplain to the north of the River Kennet could be more efficiently utilised for floodplain storage during times of high flows, to reduce the potential for the canal and river to overtop their banks. This will require further investigation and communication between West Berkshire Council, the Environment Agency, and local landowners.

Parish Council

- 5.6.12. The Parish Council should continue to support local flood wardens in Burghfield Bridge and provide education and communication to local residents on the following:
 - How to monitor river levels and flows.
 - How to sign up to the Environment Agency flood alerts and warnings.
 - How to report concerns to the relevant flood risk management authorities.
 - Guidance on effective property flood resilience.
 - What to do and when, in preparation for a flood.
 - Where to find support following a flood event.

Canal and River Trust

- 5.6.13. The flood investigation has highlighted the unstable banks along the Kennet and Avon Canal, potentially the result of erosion from mooring boats. It is recommended that the Canal and River Trust investigate the condition of the canal banks and carry out the necessary remedial works, specifically to the south bank. Restoration works could be completed using Nature Based Solutions (NBS) to help raise and strengthen the canal banks to increase the capacity of the canal and prevent further overtopping.

5.7 SUMMARY

- 5.7.1. The flooding generally occurred in areas categorised as Flood Zone 2 and Flood Zone 3 as indicated on the Environment Agency's flood map for planning (refer to Appendix E.1), however some flooding occurred outside of these zones.
- 5.7.2. Table 5-1 summarises the flooding experienced in Burghfield Bridge as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.1 which details the locations of the flooded areas.

Table 5-1 – Summary of Flooding in Burghfield Bridge

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
15	Fluvial and Groundwater	10	5	2 – Berrys Lane & Pingewood Road North

**Excluding properties recorded as having flooded internally.*

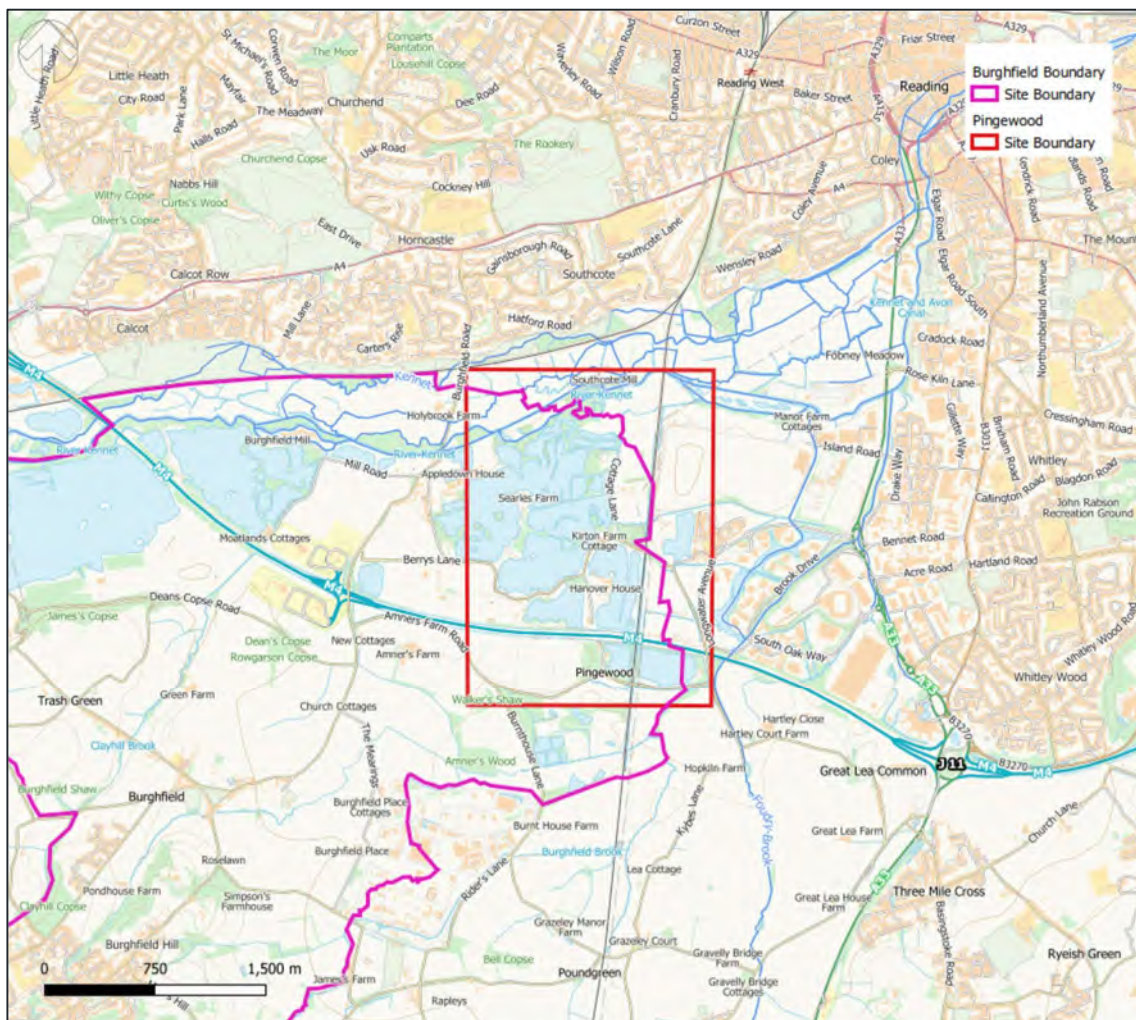
- 5.7.3. West Berkshire Council, and the Environment Agency had flood management responsibilities related to this event due to the multiple flood sources and assets involved. West Berkshire Council attended multiple times during the flooding to monitor the situation and enforce road closures where required. It is unknown whether the Environment Agency carried out any actions during or following the event. Recommendations have been identified to help manage the impact of any future flooding events.

6 BURGHFIELD – PINGEWOOD

6.1 LOCATION

- 6.1.1. Pingewood is located in the east of West Berkshire and falls within the Burghfield Parish Council. Pingewood is situated downstream of Burghfield Bridge along the Kennet and Avon Canal. Refer to Figure 6-1 below.
- 6.1.2. Previous flooding occurred in Pingewood during the winter 2013/14 flood event, during which similar areas were affected. During this event, approximately 18 properties were flooded internally and approximately four properties were flooded externally across the entirety of Burghfield. Similar to the 2024 flood event, flooding was the result of fluvial sources from the River Kennet and Kennet and Avon Canal, and the overtopping of the lakes to the north of Pingewood. Historic flood outlines are mapped within Appendix E.2.

Figure 6-1 – Pingewood Location Map



- 6.1.3. The area is home to several interconnected fishing lakes and ditches, as well as the Kennet and Avon Canal and River Kennet to the north.

- 6.1.4. Pingewood is situated in a topographical low point and surrounded by features set on higher ground – such as the Reading-Basingstoke railway line to the east, the M4 to the south and west, and the Kennet and Avon Canal to the north – that these act as barriers which prevent floodwater from escaping, as experienced in early 2024.

6.2 FLOODING

- 6.2.1. From questionnaire responses and interviews with the Pingewood flood warden, it is understood that the flooding in early 2024 was from fluvial sources. The area that was affected by flooding in January 2024 has a National Grid Reference of (469120, 169892) and is shown in Figure 6-1. The flooding in Pingewood generally occurred in areas categorised as Flood Zone 2 and Flood Zone 3 as indicated on the Environment Agency's Flood Map for Planning (refer to Appendix E.2).
- 6.2.2. WSP is aware of approximately three properties that were affected by fluvial flooding in early January. It is possible that more properties were affected but their owners have chosen not to report the issues.
- 6.2.3. Internal fluvial flooding affected one residential property along Kirtons Farm Road. External fluvial flooding also affected another residential property in Kirtons Farm Road and an angling club in Pingewood. It is understood that flood depths varied across Pingewood, with maximum depths reported to have reached approximately 0.5m in the angling club carpark. It is also understood that a SSE substation in Cottage Lane may have flooded, however not significantly enough to cause a loss of power. Flooding began in early January following Storm Henk and continued for approximately one month.
- 6.2.4. The ditch that drains Farnham Flint Lake and runs west to east below Cottage Lane (hereby referred to as Cottage Lane Ditch) played an important role in the 2024 flood event. The local flood warden and the angling club manager reported that the ditch backed up and overtopped its banks causing water to flow across and southwards along Cottage Lane. From here, floodwater affected Kirtons Farm Road and flowed down to Berrys Lane where further internal flooding of residential properties may have occurred. The water then flowed into Pingewood Lagoon and Englefield Lagoon via grips along Berrys Lane. Refer to Flood Event figure in Appendix A.2.

Figure 6-2 – Flooding at Pingewood Substation



6.3 CAUSES

- 6.3.1. The winter of 2023/24 was one of the wettest on record, specifically because of heavy rainfall during storms Henk, Isha, and Jocelyn in January. As a result, groundwater was unusually high and waterbodies were full throughout the early months of 2024.
- 6.3.2. During WSP's site visit to Pingewood, the flood warden and angling club manager expressed concerns over the condition of Cottage Lane ditch and culverts downstream of Cottage Lane. At the time of WSP's visit it was noted that Cottage Lane ditch was dense with vegetation. It was not possible to survey any culverts during the visit, but WSP is aware that Network Rail has undertaken its own surveys of the culvert below the Reading-Basingstoke railway line in the past.
- 6.3.3. There are two culverts that run under the Reading-Basingstoke railway line, north of Reading Green Park Station, and both were believed by the angling club manager to have been contributory factors in the 2024 flood event, by preventing high flows from moving downstream of Pingewood.

- 6.3.4. The northern culvert is designed to convey flows from the northern lakes in Pingewood below the railway line to the Kennet and Avon Canal. If this culvert is blocked, as it was considered to be in early 2024, then flows back up into the northern lakes and flow south to the southern culvert. The southern culvert takes flows from Cottage Lane ditch, under the railway, and past the Green Park development. During early 2024, locals considered that that the southern culvert was approximately 30% blocked, which caused flows to back up and flood Cottage Lane.
- 6.3.5. In addition to the two railway line culverts, a third culvert is located to the east of the railway line and north of the Green Park development. Anecdotal evidence, provided by the angling club manager, indicates that this culvert was also blocked during early 2024, further restricting flows in Cottage Lane ditch.
- 6.3.6. During WSP's site visit to Pingewood, it was noted that Kirtons Farm Road has a lack of highway drainage, therefore acting as another potential, yet smaller, contributing factor. In addition to this, Kirtons Farm Road has raised ground on either side, meaning floodwater is restricted to the road.
- 6.3.7. Finally, during WSP's site visit, the angling club manager remarked on a culvert constructed below Green Lane in 2015 (approximately) to convey water from the small lake next to Burghfield Bridge Tyres, under Green Lane and into Burghfield Lake to alleviate flooding in Burghfield Bridge. The club manager believes that the culvert has affected the dynamics of flow and flooding in this area and may have worsened the flood risk in Pingewood.

Figure 6-3 – Flooding at Kirtons Farm Road



6.4 FLOOD DEFENCES/ASSETS

- 6.4.1. WSP is not aware of any flood defences in the area that benefit Pingewood.

6.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 6.5.1. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 6.5.2. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation.
- 6.5.3. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 6.5.4. Consultation with the Environment Agency has confirmed that there are no flood defences within the area of Burghfield. Furthermore, the Environment Agency do not own any gauges within Burghfield to measure river flows and levels. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.
- 6.5.5. The following flood alerts were in place during the 2024 flood event:
- River Kennet from Thatcham down to Reading (061WAF22LowerKen) – In force: 31/12/2023 – 04/02/2024
 - River Enborne and Foudry Brook (061WAF22EnbnFdry) – In force: 02/01/2024 – 07/01/2024
- 6.5.6. The following flood warning was in place during the 2024 flood event:
- Properties closest to the River Kennet at the Burghfield, Southcote, Coley and Holybrook areas (061FWF22XThIRdg) – In force: 02/01/2024 – 11/01/2024
- 6.5.7. The Environment Agency received 10 reports of flooding across the whole of Burghfield, during the 2024 flood event. Of these reports, two properties reported internal flooding, and seven properties reported external flooding. The Environment Agency did not receive any reports of flooding within Pingewood specifically.
- 6.5.8. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Kennet within Burghfield and that there are no plans to carry out improvement works. However, details of the Thames Valley Flood Scheme have been provided. The scheme, led by the Environment Agency, is investigating the possibility to store water across the Thames catchment. This is likely to include a combination of flood storage and natural flood management currently across approximately 17 locations.

West Berkshire Council

- 6.5.9. Consultation with West Berkshire Council has confirmed that site visits to the Pingewood area were conducted on the following dates:
- 7th January 2024
 - 9th January 2024
 - 11th January 2024
 - 12th January 2024
 - 16th January 2024
 - 23rd January 2024
- 6.5.10. Furthermore, the following road closures were put in place:
- Kirtons Farm Road – 8th of January 2024 until the 14th of January 2024
 - Berrys Lane – 10th of January 2024 until the 14th of January 2024
 - Amers Farm Road – 8th of January 2024 until 10th of January 2024
 - Pingewood Road South – 8th of January 2024 until 10th of January 2024

Canal and River Trust

- 6.5.11. A request for information has been sent to the Canal and River Trust. No response has been received at this time however due to the nature of flooding it is assumed that no actions were necessary during, or as a result of, the flood event.

Royal Berkshire Fire and Rescue Service

- 6.5.12. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) have been consulted for information. RBFRS reportedly did not attend any incidents in relation to the 2024 flood event in this area.

6.6 RECOMMENDATIONS

Local Residents

- 6.6.1. Residents and business owners should report any ditch maintenance and / or culvert issues to West Berkshire Council and Network Rail as soon as they become apparent.
- 6.6.2. Residents and business owners affected by flooding may benefit from property flood resilience (PFR) measures, such as flood doors, waterproof airbricks, and placing electrical sockets above floor levels, to provide resilience to their premises during storm events.

West Berkshire Council

- 6.6.3. One recommendation of this report is that WBC could carry out an investigation into the road drainage along Kirtons Farm Road to determine the potential requirement for additional road drainage, for example in the form of gullies and grips.
- 6.6.4. It is recommended that West Berkshire Council review and enforce the maintenance of ditches within Pingewood, specifically Cottage Lane Ditch. During WSP's site visit to Pingewood, it was noted that there may not be a clear understanding of who is responsible for maintaining Cottage Lane Ditch and its culverts. West Berkshire Council could seek to confirm these details and ensure that regular maintenance of the ditch is carried out.
- 6.6.5. Finally, it is recommended that an investigation could be undertaken into the feasibility of clearing the northern railway culvert. During WSP's site visit to Pingewood, it was reported by the angling club manager that this culvert has been blocked for a significant period (possibly 20 years) and that the ditch downstream of the culvert has likely silted up. An assessment could be carried out to determine the effect of opening the culvert up with regards to the ability of the downstream ditch to accommodate flows and to understand the effect on flood dynamics upstream and downstream of the culvert.

Parish Council

- 6.6.6. The Parish Council should continue to support local the flood warden in Pingewood and provide education and communication to local residents on the following:
- How to monitor river levels and flows.
 - How to sign up to the Environment Agency flood alerts and warnings.
 - How to report concerns to the relevant flood risk management authorities.
 - Guidance on effective property flood resilience.
 - What to do and when, in preparation for a flood.

- Where to find support following a flood event.

6.6.7. During WSP's site visit to Pingewood, it was noted that the area currently only has one flood warden. If possible, an additional flood warden should be sought to strengthen communication and co-operation between the local community and West Berkshire Council.

Network Rail

6.6.8. Network Rail as a riparian owner have a responsibility under the Land Drainage Act 1991 to ensure that all culverts that run under their railways are clear and free of blockages that could cause an obstruction to flow and influence flood risk. It is recommended that Network Rail work with West Berkshire Council to assess the condition of the two culverts below the Reading-Basingstoke railway line, north of Reading Green Park Station, and determine what measures are required to improve their capacity (e.g. by increasing the frequency of maintenance and / or clearing the blocked culvert) and reduce the risk of flooding upstream in Pingewood whilst not increasing risk to properties and land downstream.

6.7 SUMMARY

6.7.1. The flooding in Pingewood generally occurred in areas categorised as Flood Zone 2 and Flood Zone 3 as indicated on the Environment Agency's Flood Map for Planning (refer to Appendix E.2).

6.7.2. Table 6-1 summarises the flooding experienced in Pingewood as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.2 which details the locations of the flooded areas.

Table 6-1 – Summary of Flooding Occurring in Pingewood

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
4	Fluvial	1	3	2 – Kirtons Farm Road & Berrys Lane

**Excluding properties recorded as having flooded internally.*

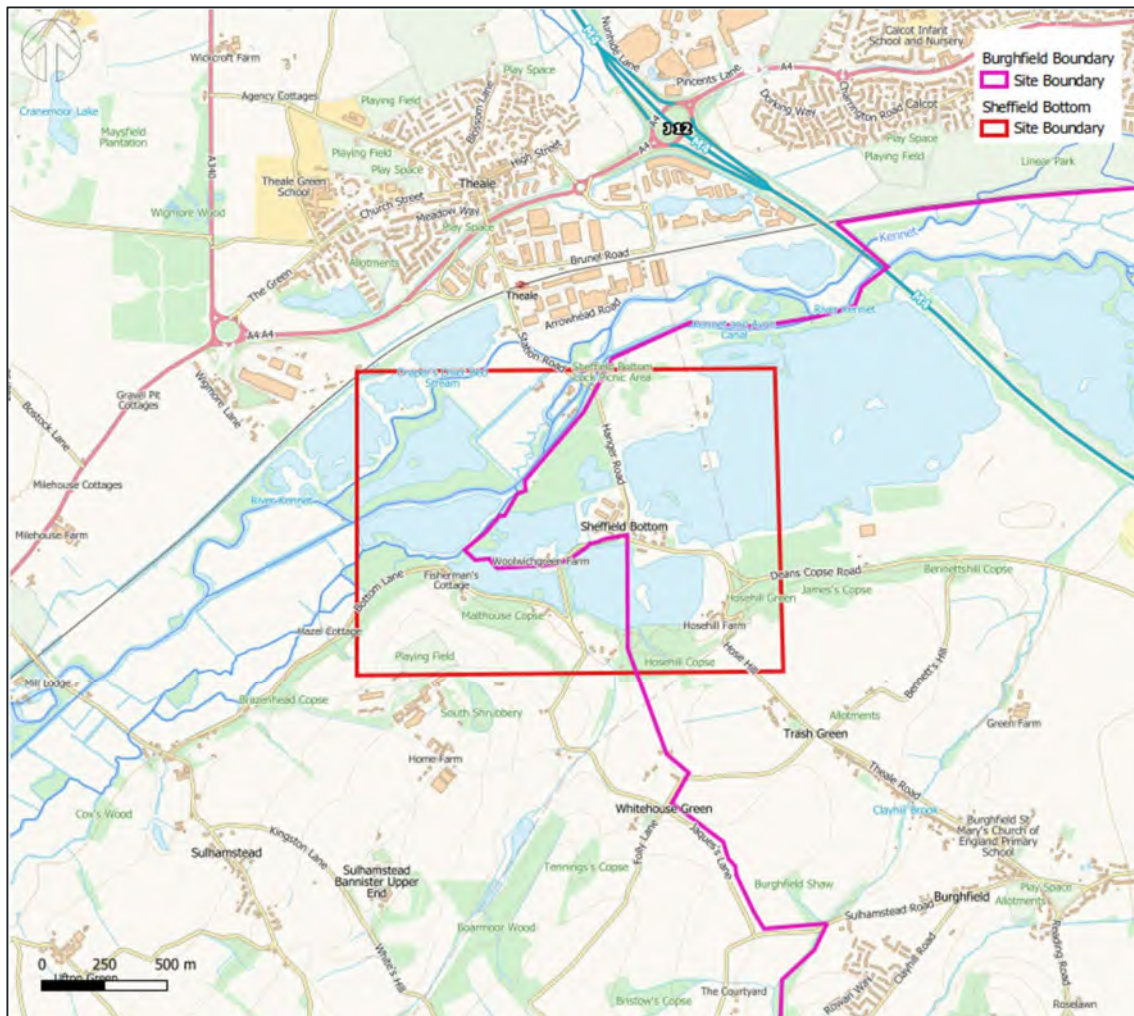
6.7.3. West Berkshire Council attended several times during the flooding to monitor the situation and enforce road closures where required. Recommendations have been made to help manage the effect of any future flooding events.

7 BURGHFIELD – SHEFFIELD BOTTOM

7.1 LOCATION

- 7.1.1. Sheffield Bottom is located in the east of West Berkshire and falls within Burghfield Parish Council. Sheffield Bottom is situated upstream along the Kennet and Avon Canal from Burghfield Bridge. The area affected by flooding has a National Grid Reference of 469120, 169892 and is shown in Figure 7-1.
- 7.1.2. Previous flooding occurred in Sheffield Bottom during the winter 2013/14 flood event, during which similar areas were affected. During this event, approximately 18 properties were flooded internally and approximately four properties were flooded externally across the entirety of Burghfield. Similar to the 2024 flood event, flooding was the result of fluvial sources from the River Kennet and the Kennet and Avon Canal, and the overtopping of the lakes to the west of Sheffield Bottom. Historic flood outlines are mapped within Appendix E.3.

Figure 7-1 – Sheffield Bottom Location Map



- 7.1.3. Sheffield Bottom is situated in a topographical low point and bordered by steep hills to the south of the village. This encourages surface water runoff to flow along Hose Hill and Bottom Lane towards the village.
- 7.1.4. The area is home to interconnected lakes, as well as the Kennet and Avon Canal, River Kennet, and The Draper's Osier Bed Stream (DOBS).

7.2 FLOODING

- 7.2.1. From questionnaire responses and interviews with local residents and the Sheffield Bottom flood wardens, it is understood that the flooding in early 2024 was mainly from fluvial and groundwater sources although surface water flooding also occurred as mentioned above.
- 7.2.2. The fluvial flooding mainly occurred in areas categorised as Flood Zone 3 as well as some areas categorised as Flood Zone 2, as indicated on the Environment Agency's Flood Map for planning (refer to Appendix E.3). Furthermore, the surface water flooding generally occurred within areas of high surface water flood risk, as shown from the Environment Agency's long term flood maps (refer to Appendix E.3).
- 7.2.3. It is understood that approximately seven properties experienced internal flooding and approximately ten properties experienced external flooding.
- 7.2.4. Internal surface water flooding affected two properties on Hose Hill. Both properties and a third property on Hose Hill also experienced external surface water flooding.
- 7.2.5. Three properties along Station Road experienced internal fluvial flooding on the 12th of January. Internal flood depths subsided quickly; however, external floodwaters remained for approximately three days. Another property along Station Road, and one commercial property along Deans Copse Road, also experienced external fluvial flooding in January. Two industrial properties along Arrowhead Road also experienced internal fluvial flooding.
- 7.2.6. It is also believed that residential properties opposite Theale Lakes Business Park, may have experienced internal groundwater flooding; however, further details have not been received.
- 7.2.7. From interviews with local residents and flood wardens, it is understood that in early January 2024, water in The Draper's Osier Bed Stream (DOBS) overtopped into Elephant Lake. Once Elephant Lake was full, it overflowed into the field to the north-east where it then flowed under Station Road and back into the DOBS.
- 7.2.8. It was also reported that the River Kennet overtopped its banks in early 2024. As a result, excess water flowed into Fishing Lake 1 and then into Woolwich Green Lake, which is shallower than the fishing lake and therefore likely to have a smaller water storage capacity. Woolwich Green Lake is connected to Hosehill Lake via a culvert and Hosehill Lake is connected to Theale Lake via another culvert. During high flows, water from Hosehill Lake overtopped and flowed over the top of Deans Copse Road and into Theale Lake.
- 7.2.9. During WSP's site visit to Sheffield Bottom, it was reported that during flood conditions a large volume of flows passed below Station Road. During these conditions, the Canal and River Trust opened hatches by Station Road, allowing the canal to flow and move floodwaters away from Sheffield Bottom, however as no response has been received by the Canal and River Trust it is not possible to verify this.

- 7.2.10. Roads flooded by surface water and fluvial floodwaters in January 2024 included Station Road, Deans Copse Road, Hose Hill, and Hagnar Road, which experienced flood depths of approximately 150mm. Station Road and Hagnar Road were affected by fluvial flooding, whereas Hose Hill was affected by surface water flooding because of its steep gradient. Deans Copse Road was affected by fluvial flooding to the west and surface water flooding to the east because of surface water runoff from Hose Hill. This created flood depths that made the road impassable for cars and affected safe access and egress, specifically for AWE employees.
- 7.2.11. During WSP's site visit to Sheffield Bottom, it was reported that the 2024 flood event was not as significant as the 2013/14 flood event, however, floodwater took a longer time to dissipate.

7.3 CAUSES

- 7.3.1. The winter of 2023/24 was one of the wettest on record, which served to elevate groundwater levels for prolonged periods of time in areas of West Berkshire. High groundwater in and around the Sheffield Bottom was noted as a significant contributing factor to the flooding. This was exacerbated by exceptional rainfall during storms Henk, Isha and Jocelyn leading to the River Kennet and DOBS exceeding their capacity.
- 7.3.2. Whilst the volume of water in the catchment is believed to be the main cause of flooding in Sheffield Bottom, several factors were reported during WSP's visit to Burghfield Bridge as potentially having an influence on the severity and / or consequence of flooding.
- 7.3.3. Residents expressed concerns over the effect of a fish pass which was installed immediately upstream of the weir near Sulhamstead Lock prior to the 2013/14 flood event. This allows a continuous flow from the River Kennet into DOBS, potentially contributing to DOBS being overwhelmed during times of high flows. This issue and lack of ability to control flow into DOBS at the fish pass and weir, was highlighted in the 2013/14 s19 Flood Investigation. WSP are not aware of any steps having been taken to investigate this.
- 7.3.4. Some residents also expressed concerns that the infilling of gravel lakes and raising of land around industrial developments in the area may have exacerbated the flooding experienced in January 2024. These factors may have removed historic overland flow routes between the lakes and watercourses and created disconnected floodplains with an overall decrease in water storage capacity. Residents considered that potential changes to ploughing and hedge removal in the local area may also have increased the runoff of surface water along Hose Hill.
- 7.3.5. Another potential influence on the 2024 flood event, was the condition of watercourses within and around Sheffield Bottom. During WSP's site visit, local flood wardens reported that bank erosion, due to factors such as Signal crayfish, moles, and high flows, is an issue in the area. As a result of this and a potential lack of maintenance, channel capacity is less than optimal.
- 7.3.6. The efficiency of locks in the area was also questioned. The Canal and River Trust open and close the locks along the Kennet and Avon Canal in response to high flows; however, it is believed by residents that the locks may be closed by members of the public, therefore preventing the flow of water downstream and encouraging the flooding of Sheffield Bottom.

7.4 FLOOD DEFENCES/ASSETS

- 7.4.1. WSP is not aware of any flood defences in the area that benefit Sheffield Bottom.

7.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 7.5.1. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 7.5.2. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation.
- 7.5.3. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 7.5.4. During WSP's site visit to Sheffield Bottom, local residents and flood wardens reported that the Environment Agency had completed a site visit as a result of the flooding; however, no further details have been provided.
- 7.5.5. Consultation with the Environment Agency has confirmed that there are no flood defences within the area of Burghfield. Furthermore, the Environment Agency do not own any gauges within Burghfield to measure river flows and levels. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.
- 7.5.6. The following flood alerts were in place during the 2024 flood event:
- River Kennet from Thatcham down to Reading (061WAF22LowerKen) – In force: 31/12/2023 – 04/02/2024
 - River Enborne and Foudry Brook (061WAF22EnbnFdry) – In force: 02/01/2024 – 07/01/2024
- 7.5.7. The following flood warning was in place during the 2024 flood event:
- Properties closest to the River Kennet at the Burghfield, Southcote, Coley and Holybrook areas (061FWF22XThIRdg) – In force: 02/01/2024 – 11/01/2024
- 7.5.8. The Environment Agency received 10 reports of flooding across the whole of Burghfield, during the 2024 flood event. Of these reports, two properties reported internal flooding, and seven properties reported external flooding. The Environment Agency did not receive any reports of flooding within Sheffield Bottom specifically.
- 7.5.9. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Kennet within Burghfield and that there are no plans to carry out improvement works. However, details of the Thames Valley Flood Scheme have been provided. The scheme, led by the Environment Agency, is investigating the possibility to store water across the Thames catchment. This is likely to include a combination of flood storage and natural flood management currently across approximately 17 locations.

West Berkshire Council

7.5.10. Consultation with West Berkshire Council has confirmed that site visits to the Sheffield Bottom area were conducted on the following dates:

- 7th January 2024
- 9th January 2024
- 11th January 2024
- 12th January 2024
- 16th January 2024
- 23rd January 2024

7.5.11. Furthermore, road closures were put in place on Deans Copse Road on the 5th of January 2024 until the 12th of January 2024, and Hangar Road on the 8th of January 2024 until the 12th of January 2024.

Canal and River Trust

7.5.12. A request for information has been sent to the Canal and River Trust, however no response has been received at this time.

Royal Berkshire Fire and Rescue Service

7.5.13. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) have been consulted for information. RBFRS reportedly did not attend any incidents in relation to the 2024 flood event in this area.

7.6 RECOMMENDATIONS

Local Residents

- 7.6.1. Residents should report any highway drainage issues to West Berkshire Council and any foul or surface water sewer drainage issues to Thames Water as soon as they become apparent.
- 7.6.2. Residents and business owners affected by fluvial flooding may benefit from property flood resilience measures, such as flood doors, waterproof airbricks, and placing electrical sockets at raised levels. Residents and business owners affected by groundwater flooding may benefit from the installation of hard flooring, non-return valves, and sump pumps to protect and / or make their premises more resilient from flooding during times of high groundwater.

Riparian Owners

- 7.6.3. Riparian owners across Sheffield Bottom should ensure that watercourses within their ownership are clear of obstructions, such as vegetation, and enable the free passage of water. Furthermore, landowners should ensure that regular maintenance of the ditches are carried out.

West Berkshire Council

- 7.6.4. It is considered there may be potential issues with the condition, and therefore the capacity, of the existing highway drainage assets along Hose Hill and Jacques Lane. It is acknowledged that the design standard of existing highway drainage is likely to be lower than the rainfall event recorded and that it will also not be designed to cope with groundwater. However, it is recommended that a

CCTV survey could be undertaken to confirm its condition. Remedial works could then be undertaken, focussing on areas at highest risk of flooding, to ensure that flood risk is reduced.

- 7.6.5. West Berkshire Council could review the current highway drainage inspection and maintenance schedule and, where appropriate, increase their frequency. Alternatively, critical assets could be marked as a priority, and arrangements should be made for pre-emptive inspections on receipt of forecasts of heavy rain.
- 7.6.6. As the LLFA, West Berkshire Council could review the maintenance schedule for the culvert that takes DOBS under Station Road. During WSP's site visit, residents expressed concerns that the culvert often has fallen trees and vegetation blocking the channel and therefore a more routine clearing of debris is recommended.

Environment Agency

- 7.6.7. It was reported that after the 2013/14 flood event, the Environment Agency dug a ditch behind the Fox and Hounds Pub. During WSP's site visit it was noted that this ditch was blocked and full of vegetation. The Environment Agency could consider clearing the ditch and creating a schedule to ensure regular maintenance of the ditch occurs to help decrease flood risk along Deans Copse Road.
- 7.6.8. As recommended in response to the 2013/14 flood event, controls could be installed at the weir and fish pass at the head of Draper's Osier Bed Stream. If the channel were to overtop in the future, the controls could be used to reduce the volume in the channel and prevent it continuing to flood out of bank.

Parish Council

- 7.6.9. The Parish Council should continue to support local flood wardens in Sheffield Bottom and provide education and communication to local residents on the following:
- How to monitor river levels and flows.
 - How to sign up to the Environment Agency flood alerts and warnings.
 - How to report concerns to the relevant flood risk management authorities.
 - Guidance on effective property level protection.
 - What to do and when, in preparation for a flood.
 - Where to find support following a flood event.
- 7.6.10. During WSP's site visit to Sheffield Bottom, it was noted that the area could benefit from increasing the number of flood wardens, specifically for the southern area of Sheffield Bottom. This would aid communication and advancements, with regards to flood risk, between the local community and West Berkshire Council.

7.7 SUMMARY

- 7.7.1. The fluvial flooding mainly occurred in areas categorised as Flood Zone 3 as well as some areas categorised as Flood Zone 2, as indicated on the Environment Agency's Flood Map for planning (refer to Appendix E.3). Furthermore, the surface water flooding generally occurred within areas of high surface water flood risk, as shown from the Environment Agency's long term flood maps (refer to Appendix E.3).

7.7.2. Table 7-1 summarises the flooding experienced in Sheffield Bottom as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.3 which details the locations of the flooded areas.

Table 7-1 – Summary of Flooding in Sheffield Bottom

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
10	Fluvial & Groundwater.	7	3	2 – Deans Copse Road & Hagnar Road

**Excluding properties recorded as having flooded internally.*

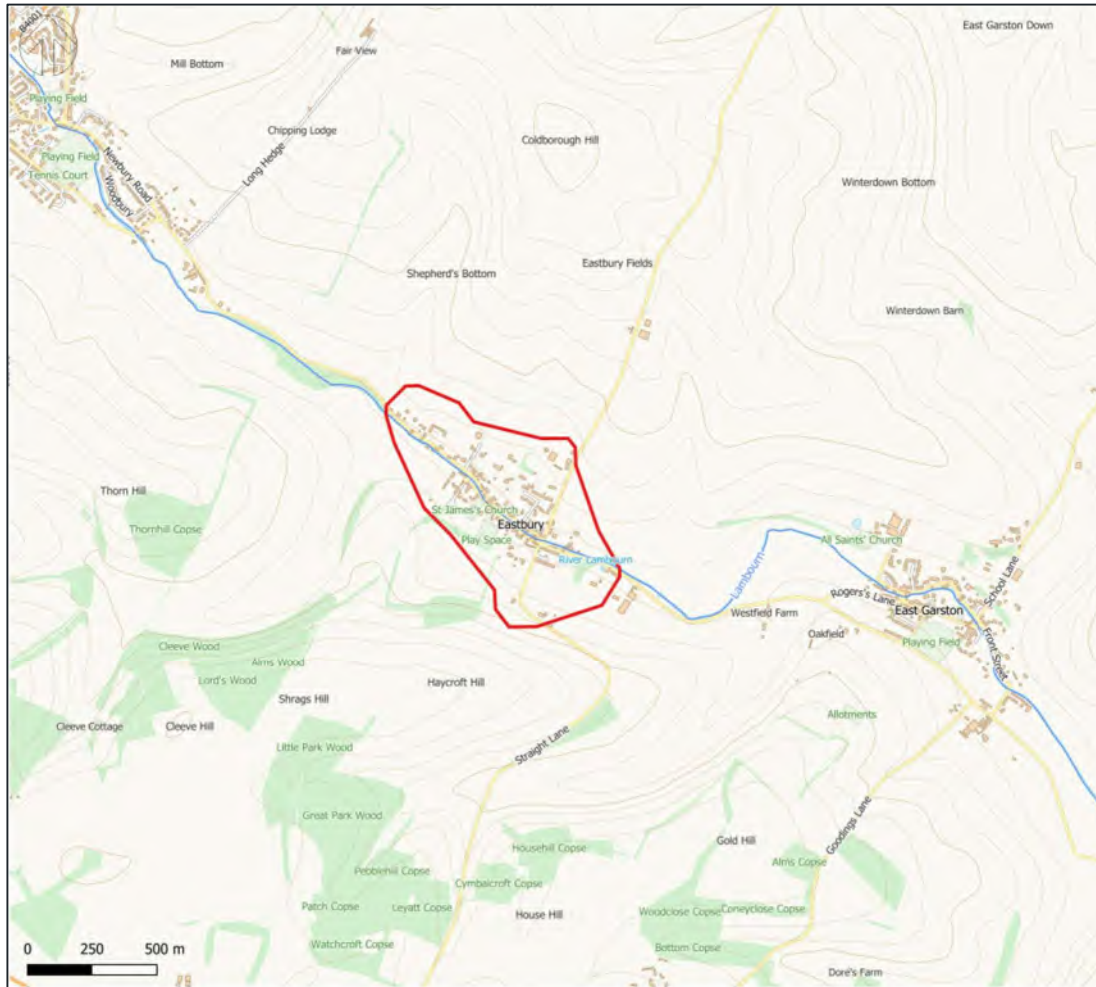
7.7.3. West Berkshire Council and the Environment Agency each had flood management responsibilities related to this event due to the flood sources and assets involved. West Berkshire Council attended the area several times during the flooding to monitor the situation and enforce road closures where required. Recommendations have been identified to help manage the impact of any future flooding events.

8 EASTBURY

8.1 LOCATION

- 8.1.1. The village of Eastbury is located in the north-west of West Berkshire and falls within the Lambourn Parish Council. The village has a National Grid Reference of 434765, 177195 and is shown in Figure 8-1.
- 8.1.2. The village is located in a topographical low point and is surrounded by tracks, such as Eastbury Shute and Straight Lane, that lead to Eastbury and create flows of surface water coming down from the surrounding hills.
- 8.1.3. The village is situated around the River Lambourn, which is a winterbourne river that flows through the middle of Eastbury, parallel to Lambourn Valley Road and Back Street. During a typical year the River Lambourn will cease to flow for several months in late autumn / early winter, however this was not the case over the 2023/24 winter season, where flow was continuous.
- 8.1.4. Road drainage is present across the village in the form of pipes and gullies that discharge into the River Lambourn. The River Lambourn banks are also lined with grips to allow floodwaters to channel back into the watercourse.
- 8.1.5. Previous flooding occurred in Eastbury during the winter 2013/14 flood event, during which similar areas were affected. Similarly to the 2024 flood event, flooding was the result of fluvial sources from the River Lambourn. Historic flood outlines are mapped within Appendix E.4.

Figure 8-1 – Eastbury Location Map



8.2 FLOODING

- 8.2.1. From questionnaire responses and interviews with the Eastbury flood wardens, it is understood that the flooding in early 2024 was from sewer, groundwater, and fluvial sources. During WSP's site visit to Eastbury, the local flood wardens described how the River Lambourn overtopped its banks after Storms Henk, Isha, and Jocelyn. This led to fluvial flooding affecting Back Street and Lambourn Valley Road and the drives and gardens of properties along Back Street.
- 8.2.2. Flooding along Back Street reached depths of approximately 140mm and a road closure was put in place to prevent waves of floodwater entering properties. Flood wardens have reported that the fluvial flooding experienced in 2024 has been less significant than previous years, such as 2013/14, thanks to the implementation of the alleviation scheme further upstream on the River Lambourn.
- 8.2.3. The majority of internal flooding within Eastbury was reported as a result of emergence of groundwater inside resident's properties. Groundwater flooding started on the 5th of January following a period of heavy rainfall brought by Storm Henk. During WSP's site visit to Eastbury, it was noted that several properties in Eastbury have property level flood protection, in the form of flood gates and doors, however this was not successful in preventing groundwater flooding. A spring also appeared along Lambourn Valley Road, in between The Hermitage and Station Lane, and began to erode the road. Subsequently, a road closure was put in place.

- 8.2.4. Lambourn Valley Road was also affected by sewer flooding, specifically in Eastbury Newtown, and led to a partial road closure. Sewer flooding was caused by two surcharging manholes along the road, despite the tankering of sewage in Eastbury by Thames Water. This flooding started on the 5th of January and was still inundated during WSP's site visit on the 1st of March. Flood wardens reported that the sewer floodwaters had remained continuously since January and only subsided for short periods of time during patches of warmer weather. Flood wardens reported that a flap valve had been installed in the sewer network after the 2014 flood event, which has been successful during the 2024 floods in stopping internal sewer flooding to properties in Eastbury Newtown.

Figure 8-2 – Eastbury Flood Alleviation Scheme in operation



8.3 CAUSES

- 8.3.1. During WSP's site visit to Eastbury, some residents expressed concerns about the sewer network being inundated and exceeding its capacity. As a result, the manholes in Eastbury Newtown are surcharging, however it is not clear whether the source of inundation is from groundwater, river flooding, possible surface water connections to the foul network, or the sewer to the west.
- 8.3.2. Flood wardens reported that the summer season in 2023 was unusually wet, meaning the chalk aquifers in the area recharged significantly quicker than usual. This caused the River Lambourn to continue to flow through the winter months, when usually it would dry up, and groundwater levels to

remain high. This is likely to have contributed to the internal groundwater flooding to some properties within the village.

- 8.3.3. The banks of the River Lambourn are lined with grips, originally dug by WBC, who continue to maintain them. Local flood wardens assist in monitoring and maintaining them where necessary. During WSP's site visit to Eastbury, it was noted that these grips were successful in diverting floodwater from Back Street, back into the River Lambourn. However, in some reaches of the river, they were also allowing an escape route for river water during high flows and encouraging road flooding.

Figure 8-3 – Flooding at Back Street



8.4 FLOOD DEFENCES/ASSETS

- 8.4.1. Eastbury benefits from a flood alleviation scheme, located along the River Lambourn, just upstream of the village. The scheme opened in June 2015 and was designed to control the amount of water flowing into Eastbury. The scheme consists of a bund running along each of the adjacent fields and a dam across the River Lambourn, with a gap on the riverbed to allow the river to flow through at

normal levels. This encourages the river to spill into its floodplain during high flows, where it is stored and slowly released as levels drop. This protects Eastbury from fluvial flooding and allows time for residents to install property level protection, such as flood barriers, in the event of high flows.

- 8.4.2. During the 2024 flood event, the scheme worked as planned and successfully held back significant amounts of water from inundating Eastbury. As detailed in this report, Eastbury still experienced flooding in early 2024 however, flood wardens have expressed the level of flooding experienced would probably have been much worse had the alleviation scheme not been in place.
- 8.4.3. During WSP's site visit to Eastbury, it was noted that debris was gathering at the base of the scheme and preventing flow from passing through. As a result, local flood wardens were regularly checking the scheme and clearing any debris to prevent damage and improve efficiency.

8.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 8.5.1. During WSP's site visit to Eastbury, flood wardens reported that Thames Water provided sandbags to residents which were successfully used to divert floodwaters away from properties and prevent waves of floodwaters entering properties when cars drove past. Residents also reported that Thames Water employees assisted and were able to unblock the highway gully, however shortly after they found the gully had become blocked again. It was also noted that Thames Water had been pumping sewage from manholes at the Lambourn Valley Road and Back Street junction.
- 8.5.2. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 8.5.3. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation.
- 8.5.4. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 8.5.5. Consultation with the Environment Agency has confirmed their ownership of the Eastbury flood alleviation scheme. The Environment Agency does not own any gauges within Eastbury to measure river flows however, the Eastbury gauge is used to measure river levels. Upon review of this data, the Environment Agency believe the upstream data for all three storms is reliable and of good quality. The downstream data recorded during Storm Henk is also reliable however, data recorded during Storm Isha and Jocelyn is believed to be less reliable, possibly due to an interference with measuring equipment. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.
- 8.5.6. The following flood alert was in place during the 2024 flood event:

- River Lambourn and its tributaries from Upper Lambourn down to Newbury (061WAF22Lambourn) – In force (04/01/2024 – 05/06/2024)

8.5.7. The following flood warning was in place during the 2024 flood event:

- River Lambourn from Upper Lambourn to Great Shefford (061FWF22UpLamGSh) – In force (04/01/2024 – 11/02/2024)

8.5.8. The Environment Agency received two reports of flooding in Eastbury during the 2024 flood event. Both of these reports were for external fluvial flooding from the River Lambourn.

8.5.9. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Lambourn within Eastbury and that there are no plans to carry out improvement works.

West Berkshire Council

8.5.10. During WSP's site visit to Eastbury, it was reported that West Berkshire Council attended to assess the safety and condition of Lambourn Valley Road after a spring of groundwater began eroding a section of the road. As a result of their visit, a temporary road closure was put in place.

8.5.11. Consultation with West Berkshire Council has confirmed that site visits to the Eastbury area were conducted on the following dates:

- 7th January 2024
- 10th January 2024
- 12th January 2024
- 16th January 2024
- 18th January 2024
- 23rd January 2024
- 25th January 2024

8.5.12. Furthermore, road closures were put in place on Back Street and Lambourn Valley Road on the 5th of January 2024.

Royal Berkshire Fire and Rescue Service

8.5.13. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) has been consulted for information. RBFRS reportedly did not attend any incidents in relation to the 2024 flood event in this area.

8.6 RECOMMENDATIONS

Local Residents

8.6.1. Residents should report any highway drainage issues to West Berkshire Council and any foul sewer drainage issues to Thames Water as soon as they become apparent.

8.6.2. Residents and business owners affected by fluvial flooding may benefit from property flood resilience measures, such as flood doors, waterproof airbricks, and placing electrical sockets at raised levels, to further protect their premises during subsequent storm events. In contrast, residents and business owners affected by groundwater flooding may benefit from the installation of hard

flooring, non-return valves, and sump pumps to protect their premises from further flooding during times of high groundwater.

West Berkshire Council

- 8.6.3. An immediate recommendation of this report is for West Berkshire Council to unblock the road gully in Eastbury Newtown to allow floodwaters to subside more efficiently. A CCTV survey could then be conducted to access the condition of the highway drainage network, specifically in Eastbury Newtown, and explore the cause of the blocked gully. Remedial works should then be investigated to determine if it is possible to prevent the gully from becoming blocked again and reduce flood risk.
- 8.6.4. West Berkshire Council could review the current highway drainage maintenance schedule and, where appropriate, increase the frequency of inspections, specifically in Eastbury Newtown. Alternatively, these assets could be marked as a priority, and arrangements should be made for pre-emptive inspections on receipt of forecasts of heavy rain.
- 8.6.5. A schedule should be put in place for the maintenance of the grips along the River Lambourn. If this is already in place, then the schedule should be updated, with Eastbury highlighted as a priority location for inspection on receipt of forecasts of heavy rain.
- 8.6.6. Furthermore, improved communication is required between the Eastbury flood wardens and West Berkshire Council, specifically regarding decisions on road closures and safety, to allow the flood wardens to communicate these decisions to the rest of the local community and reduce confusion.

Environment Agency

- 8.6.7. This flood investigation has highlighted the potential need for a trash screen to be added to the existing flood alleviation scheme located upstream of Eastbury. This would serve to prevent the build-up of large debris and improve the efficiency of the scheme. Subsequently, a maintenance schedule should be put in place to encourage regular inspection and clearance of the trash screen.
- 8.6.8. In addition to this, during WSP's site visit to Eastbury, it was noted that the downstream river levels gauge on the flood alleviation scheme is reading incorrectly. Currently, it is reading levels from splashes of water as they flow through. The gauge should be moved slightly further downstream to ensure it reads precise river levels that can then accurately inform residents of Eastbury during high rainfall events.
- 8.6.9. Additionally, the village may benefit from the installation of boreholes, used for groundwater monitoring, and preparation of a groundwater flood plan to help inform flood risk.

Thames Water

- 8.6.10. It is understood that Thames Water have previously lined the sewers and sealed manholes within the area to reduce flood risk. This flood investigation has highlighted that sewer flooding has still occurred despite these works. Therefore, it is recommended that Thames Water could carry out a full CCTV survey to investigate the capacity and condition of the sewer network. Once it is understood what is causing the excessive inundation of the sewer system, RMAs should work in partnership to identify any feasible remedial works.
- 8.6.11. Recognising the significant costs associated with upgrading sewerage assets, it is recommended that potential remedial works are identified and prioritised for maximum benefit. Potential works could include the relining of the sewer network using new technologies, or the installation of a new,

isolated sewer line to take foul water from Eastbury Newtown, directly to East Garston sewage works. Furthermore, Thames Water could consider upgrading Bockhampton pumping station.

Parish Council

8.6.12. The Parish Council should continue to support local flood wardens in Eastbury and provide education and communication to local residents on the following:

- How to monitor river levels and flows.
- How to sign up to the Environment Agency flood alerts and warnings.
- How to report concerns to the relevant flood risk management authorities.
- Guidance on effective property level protection.
- What to do and when, in preparation for a flood.
- Where to find support following a flood event.

8.7 SUMMARY

8.7.1. The flooding generally occurred in areas categorised as Flood Zone 2 and 3 where there is also a high surface water flood risk, according to the Environment Agency's long term flood maps (refer to Appendix E.4). However, some internal groundwater flooding has occurred outside of these high-risk areas.

8.7.2. Table 8-1 summarises the flooding experienced in Eastbury as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.4 which details the locations of the flooded areas.

Table 8-1 – Summary of Flooding in Eastbury

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
9	Fluvial, Groundwater, and Sewer.	6	3	2 – Back Street and Lambourn Valley Road

**Excluding properties recorded as having flooded internally.*

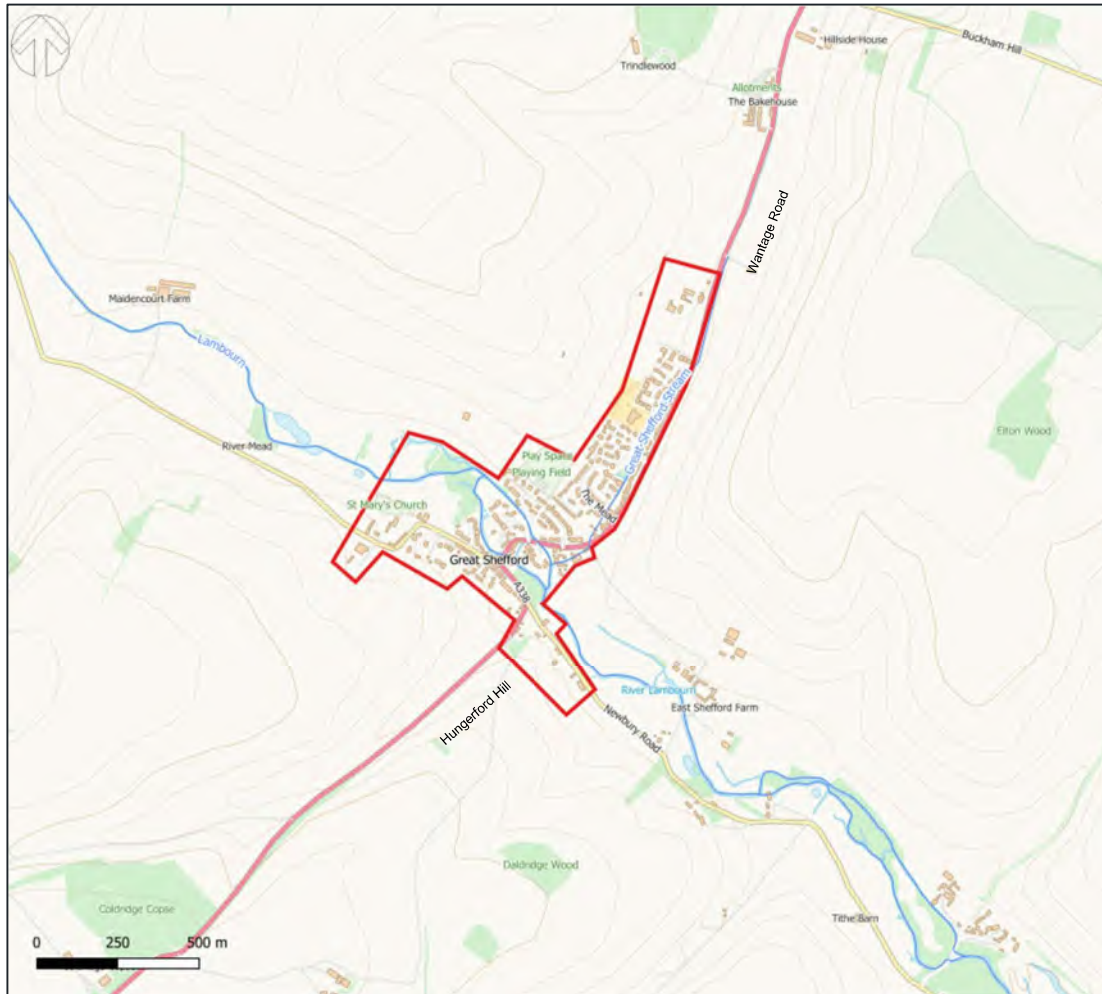
8.7.3. WBC, Thames Water and the Environment Agency all had flood management responsibilities related to this event due to the multiple flood sources and assets involved. WBC and Thames Water both attended during flooding to carry out remedial actions. Several recommendations have been identified to help manage the impact of any future flooding events.

9 GREAT SHEFFORD

9.1 LOCATION

- 9.1.1. The village of Great Shefford is located in the west of West Berkshire and is located downstream along the River Lambourn from Lambourn and Eastbury. The centre of the village has a National Grid Reference of 438314, 175218 and is shown in Figure 9-1.
- 9.1.2. The village is surrounded by agricultural fields and hills, specifically to the east and west of Wantage Road, and south of Great Shefford, along Hungerford Hill.
- 9.1.3. The River Lambourn splits into two channels just upstream of the village and flows parallel to Newbury Road. The village also has a winterbourne stream that flows parallel to Wantage Road before joining the River Lambourn. During a typical year the winterbourne stream will cease to flow for several months over the late autumn / early winter, however this was not the case during the 2023/24 winter season.
- 9.1.4. Previous flooding occurred in Great Shefford during the winter 2013/14 flood event, during which similar areas were affected. During this event, approximately 16 properties were flooded internally and approximately 21 properties were flooded externally across Great Shefford. Similar to the 2024 flood event, flooding the result of fluvial, groundwater, sewer, and surface water sources. Historic flood outlines are mapped within Appendix E.9.

Figure 9-1 – Great Shefford Location Map



9.2 FLOODING

- 9.2.1. From questionnaire responses and interviews with affected residents, it is understood that the flooding in January 2024 was from sewer, groundwater, fluvial, and surface water sources. Approximately three properties suffered internal flooding and approximately 10 properties suffered external flooding. Approximately 20 properties within the village were affected by disruption to their wastewater facilities. Whilst disruption to wastewater facilities did not affect everyone in the village, some properties still could not use their wastewater facilities during WSP's visit on the 28th of March 2024.
- 9.2.2. There were no incidents of internal sewer flooding, however several properties experienced external sewer flooding because of surcharged manholes. This resulted in raw sewage entering the winterbourne stream and subsequently the River Lambourn which is classed as an Environment Agency Main River.
- 9.2.3. One property within Great Shefford was affected internally by groundwater flooding. When visited by WSP on the 28th of March 2024 groundwater was seen coming up through the floor and from skirting boards. Having first started on the 4th of January, groundwater flooding initially took approximately 10 days to subside, however, during WSP's site visit, it was noted that the property had flooded several times after this first incident.

- 9.2.4. One property that experienced external surface water flooding on the 4th of January reported that floodwater reached a depth of approximately 150mm but that it had subsided by midnight on the same day. The occupants used a pump to remove floodwater from the back garden and prevent it from flowing into the properties opposite. This was successful in preventing internal flooding, however the floodwater levels only started to drop after using the pump for an hour.
- 9.2.5. During WSP's site visit, it was reported that approximately 10 properties were affected by external flooding, specifically in gardens, from fluvial sources. It is understood that flooding started on the 9th of January, and it was still evident during WSP's site visit. In addition, approximately two properties were affected by internal fluvial flooding from the River Lambourn following Storm Henk.

Figure 9-2 – Flooding at Great Shefford Stream



9.3 CAUSES

- 9.3.1. The winter of 2023/24 was one of the wettest on record, which served to elevate groundwater levels for prolonged periods of time in areas of West Berkshire. High groundwater in and around the area was noted as a significant contributing factor to the flooding and caused springs to appear at topographical low points within Great Shefford. This was exacerbated by exceptional rainfall during storms Henk, Isha, and Jocelyn leading to the River Lambourn and Great Shefford Stream exceeding their capacity in places.

- 9.3.2. These high groundwater levels may have infiltrated into the sewer system and contributed to the system reaching capacity and surcharging, however this cannot be confirmed until a CCTV survey can be completed. The sewer system being overrun resulted in manholes surcharging outside properties along Wantage Road. During WSP's site visit it was reported that there was potentially a collapsed drain in front of Downside House, along Wantage Road, which may also be affecting sewer capacity.
- 9.3.3. Surface water flooding was likely caused by the heavy rainfall, brought by Storms Henk, Isha, and Jocelyn, falling on already saturated ground. This meant it could not infiltrate into the soil and instead ran down off the hills that surround Great Shefford.

Figure 9-3 – Flooding at Wantage Road



9.4 FLOOD DEFENCES/ASSETS

- 9.4.1. Great Shefford currently benefits from a temporary flood alleviation scheme that takes water from the winterbourne stream running along Wantage Road and pumps it 900m before discharging it into the River Lambourn along Newbury Road. During the 2024 flood event, the temporary scheme worked as planned. The pump was switched off a week prior to WSP's visit.

- 9.4.2. In response to the 2013 / 14 flood event, a permanent flood alleviation scheme was designed by the Environment Agency. Proposals for the scheme are such that it will be an adaptation of the current temporary scheme, with the addition of a trash grid. Boreholes have been put in place, but further works cannot go ahead until groundwater levels have dropped (at time of writing).
- 9.4.3. Furthermore, storage basins are located along the winterbourne stream on either side of Blakeney Fields road. This allows the stream to safely overflow during high flows and provides protection to the Spring Meadows estate, which was built on water meadows and subsequently has a high surface water flood risk.

9.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 9.5.1. During WSP's site visit to Great Shefford it was noted that, according to local flood wardens, Thames Water had been tankering the sewer system since January. It was reported by local residents that for the first month of tanking, residents did not experience relief to the sewer system but changing the location of pumps appeared to improve this, particularly when two tankers were used.
- 9.5.2. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 9.5.3. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation.
- 9.5.4. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 9.5.5. Consultation with the Environment Agency has confirmed that there are currently no permanent flood defences within Great Shefford. The Environment Agency confirmed there are temporary pumping plans in place to reduce flood risk prior to the implementation of Great Shefford flood alleviation scheme.
- 9.5.6. The Environment Agency do not own any gauges within Great Shefford to measure river flows or levels. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.
- 9.5.7. Upon consultation with the Environment Agency, no information was received regarding flood alerts, suggesting there were no alerts in place during the 2024 flood event.
- 9.5.8. The following flood warning was in place during the 2024 flood event:
- River Lambourn from Upper Lambourn to Great Shefford (061FWF22UpLamGSh) – In force (04/01/2024 – 11/02/2024)

- 9.5.9. The Environment Agency received one report during the 2024 flood event, on the 4th of January, reporting that the village was affected by groundwater and fluvial flooding across roads and pavements.
- 9.5.10. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with Great Shefford Stream and that there are no plans to carry out improvement works. However, construction of Great Shefford flood alleviation scheme is currently underway, and works will continue to increase flood resilience across the village.

West Berkshire Council

- 9.5.11. A request for information was sent to West Berkshire Council to detail their response to the 2024 flooding events. The information received, details that Newbury Road was closed for one day on the 25th of April 2024. In addition to this, representatives of West Berkshire Council visited Great Shefford on the following dates:
- 7th of January 2024
 - 10th of January 2024
 - 12th of January 2024
 - 16th of January 2024
 - 18th of January 2024
 - 23rd of January 2024
 - 25th of January 2024

Royal Berkshire Fire and Rescue Service

- 9.5.12. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) have been consulted for information. RBFRS reportedly did not attend any incidents in relation to the 2024 flood event in this area.

9.6 RECOMMENDATIONS

Local Residents

- 9.6.1. Residents should report any foul and surface water sewer issues to Thames Water as soon as they become apparent. In addition to this, residents affected by sewer issues may benefit from the installation of non-return valves to prevent future internal sewer flooding.
- 9.6.2. The resident affected by groundwater flooding may benefit from the installation of Property Flood Resilient measures such as hard flooring and sump pumps to help reduce the risk of flooding to their premises during times of high groundwater.

West Berkshire Council

- 9.6.3. West Berkshire Council should continue to work with and support the Environment Agency to complete the installation of the new flood alleviation scheme as soon as weather and ground conditions allow.

Environment Agency

- 9.6.4. During WSP's site visit, it was reported that the Great Shefford groundwater monitoring gauge appeared to have intermittently stopped working during the early months of 2024. It would be

beneficial for the Environment Agency to investigate the gauge and carry out any necessary remedial works.

Thames Water

- 9.6.5. It is recommended that Thames Water could carry out a full CCTV survey to investigate the capacity and condition of the sewer network. Once it is understood what is causing the excessive inundation of the sewer system, RMAs should work in partnership to identify any feasible remedial works.
- 9.6.6. Recognising the significant costs associated with upgrading sewerage assets, it is recommended that potential remedial works are identified and prioritised for maximum benefit. Potential works could include the relining of the sewer network using new technologies, the sealing of manholes to prevent surcharging, and the addition of non-return valves.

Parish Council

- 9.6.7. The Parish Council should provide support to local flood wardens and aid the communication between residents in the area. This may include the distribution of information regarding the following:
- How to monitor groundwater levels.
 - How to sign up to the Environment Agency flood alerts and warnings.
 - How to report concerns to the relevant flood risk management authorities.
 - Guidance on effective property level protection.
 - What to do and when, in preparation for a flood.
 - Where to find support following a flood event.

9.7 SUMMARY

- 9.7.1. The flooding generally occurred in areas categorised as Flood Zone 3 where there is also a high surface water flood risk, according to the Environment Agency's flood maps (refer to Appendix E.9). However, the property affect by surface water flooding is located outside of these high-risk areas.
- 9.7.2. Table 9-1 summarises the flooding experienced in Great Shefford as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.9 which details the locations of the flooded areas.

Table 9-1 – Summary of Flooding in Great Shefford

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
10	Fluvial, Groundwater, Sewer, and Surface Water.	3	7	1 – Newbury Road

**Excluding properties recorded as having flooded internally.*

- 9.7.3. West Berkshire Council, Thames Water, and the Environment Agency all had flood management responsibilities related to this event due to the multiple flood sources and assets involved. West Berkshire Council attended the area during the flooding to monitor the situation and enforce road



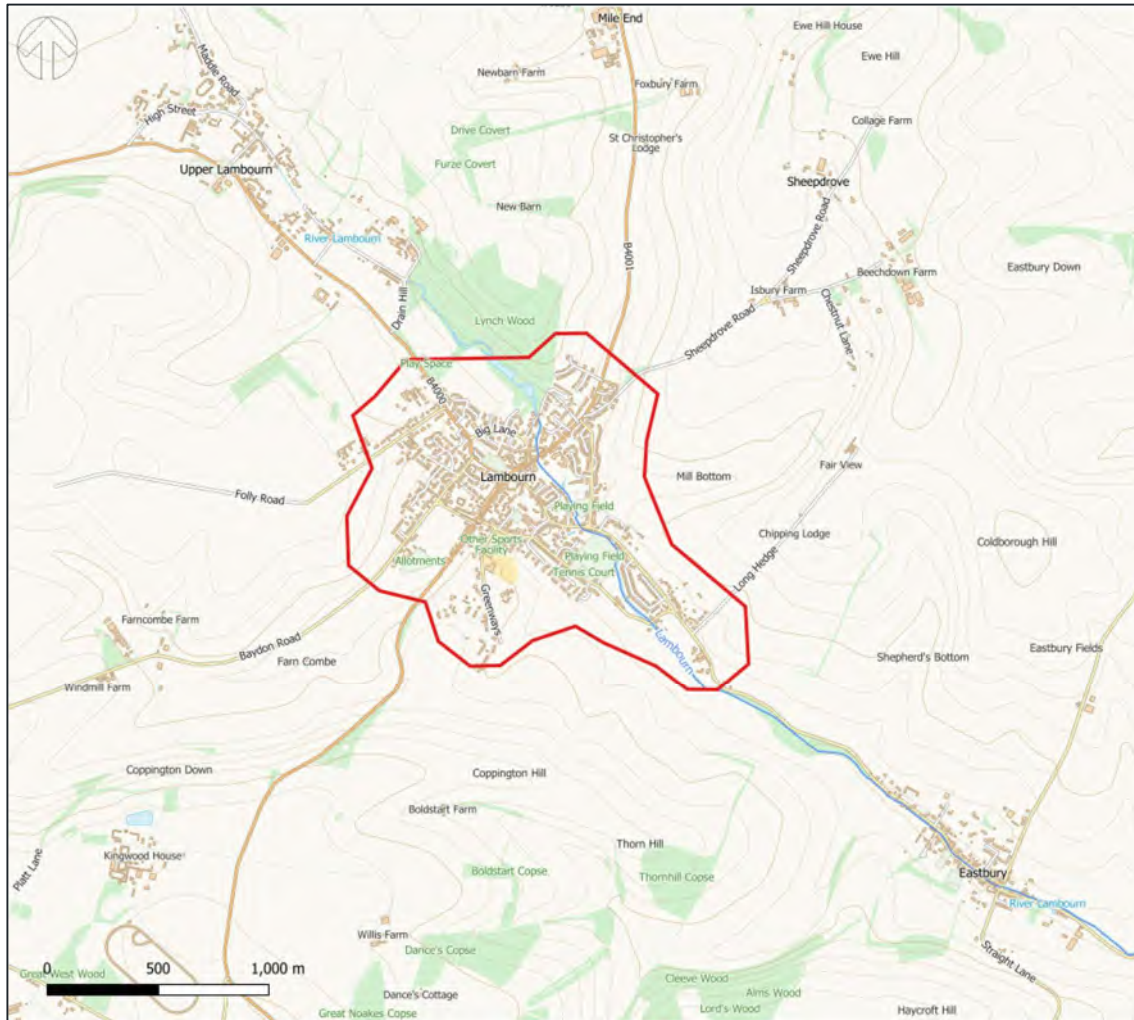
closures where required. Thames Water were also in regular attendance to carry out ongoing remedial works. Recommendations have been identified to help manage the impact of any future flooding events.

10 LAMBOURN

10.1 LOCATION

- 10.1.1. The village of Lambourn is located in the west of West Berkshire and is located at the head of the River Lambourn; upstream from Eastbury and Great Shefford. The village has a National Grid Reference of 432672, 178895 and is shown in Figure 10-1.
- 10.1.2. Previous flooding has occurred in Lambourn during the following events:
- 1947
 - 1992
 - 2000/01
 - 2003
 - 2012/13
 - 2013/14
- 10.1.3. Most recently, during the winter 2013/14 flood event, approximately 12 properties were flooded internally and approximately nine properties were flooded externally across Lambourn. Similar to the 2024 flood event, flooding was the result of fluvial, sewer, and surface water sources. Historic flood outlines are mapped within Appendix E.11.

Figure 10-1 – Lambourn Location Map



- 10.1.4. The village is situated in a low point in comparison to the surrounding agricultural fields and hills to the east, south, and west, and an area of woodland to the north. The village is accessed by four main routes, including Wantage Road, Newbury Road, Hungerford Hill, and Upper Lambourn Road.
- 10.1.5. The source of the River Lambourn is located just north of the village in an area of woodland. The River Lambourn is classed as a winterbourne river through Lambourn however it does not behave as typically expected. Typically, flow stops for a few months in late autumn / early winter but this varies from year to year and during the 2023/24 autumn and winter seasons it flowed continuously. The river flows through Lambourn and is bridged where it passes under Oxford Street and Newbury Street.

10.2 FLOODING

- 10.2.1. From questionnaire responses and interviews with the Lambourn flood wardens, it is understood that flooding in early 2024 resulted from different sources, including groundwater, fluvial, surface water, and sewer. Local flood wardens and residents reported that flooding in early 2024 was not as bad as it was in 2013/14, however it was more prolonged.

- 10.2.2. The flooding generally occurred in areas categorised as Flood Zone 2 where there is also a high surface water flood risk, according to the Environment Agency's flood maps (refer to Appendix E.11).
- 10.2.3. Lambourn has four main routes into the village, including Wantage Road, Newbury Road, Hungerford Hill, and Upper Lambourn Road. The sloping topography encourages surface water to runoff down the surrounding hills and roads into the village, as was experienced in January 2024.
- 10.2.4. Flood wardens reported that in early 2024, Hungerford Hill was the only access route in and out of Lambourn that was not affected by flooding. According to flood wardens, Wantage Road was affected by floodwaters reaching depths of approximately 200mm deep and was impassable for approximately eight weeks.
- 10.2.5. In addition to this, Newbury Road was affected by sewer flooding from the 4th of December 2023 and sewers were still surcharged during WSP's site visit on the 19th of April 2024. Sewer flooding also affected Oxford Street, where foul water had been discharging since January, allowing it to runoff into the road, and directly into the River Lambourn. Some roads within Lambourn also had springs coming up through the road, for example in Newbury Street. The paddock located south of Crowle Road had been flooded with groundwater since January and had still not fully subsided during WSP's site visit on the 19th of April 2024.
- 10.2.6. One property along Newbury Street suffered internal fluvial flooding and external sewer and surface water flooding in January 2024. Following Storm Henk, it was reported that surface water runoff flowed down Mill Lane causing the external flooding of this property. This property backs onto the River Lambourn and experienced internal flood depths of approximately 50mm from the river. Residents here reported that river levels rose higher than the garden bridges that cross the river and logs and debris built up against them.
- 10.2.7. Two properties along Sheepdrove Road suffered internal groundwater flooding on the 4th of January 2024 with floodwater reaching depths of approximately 250mm. Both properties had flood barriers and / or doors, however groundwater came up through the floor and the use of a sump pump was not successful in preventing internal flooding.

Figure 10-2 – Flooding at Wantage Road



10.3 CAUSES

- 10.3.1. The winter of 2023/24 was one of the wettest on record, which served to elevate groundwater levels for prolonged periods of time in areas of West Berkshire. High groundwater levels in and around Lambourn were noted as being a significant contributing factor to the flooding experienced. This was exacerbated by significant rainfall during storms Henk, Isha, and Jocelyn in January.
- 10.3.2. Infiltration of groundwater into the sewer system contributed to it being inundated. In addition to this, it is understood that Lambourn has a gravity fed sewage system which receives flows from pumped systems. This added to the flooding issue.
- 10.3.3. Whilst high groundwater levels are thought to be the main contributing factor to the 2024 flood event, other factors were noted during WSP's site visit to the area. For example, on the 19th of April 2024 many of the road gullies in the area were either blocked or full of groundwater, potentially contributing to floodwater taking a prolonged period of time to subside. In addition to this, it was noted there is a lack of road drainage along Wantage Road, which creates a flow path of water flowing into the village and encourages surface water flooding.
- 10.3.4. Finally, during WSP's site visit to Lambourn, flood wardens expressed concerns that the ditches either side of Wantage Road, from Mile End and Seven Barrows, do not have sufficient capacity to

accommodate runoff from Wantage Road. These ditches feed water into the culvert that runs under Gwynn's Piece and Millfield into the River Lambourn. Under flood conditions, the ditches can provide a useful holding function to avoid the culvert becoming overwhelmed and allowing the flooding of Oxford Street.

Figure 10-3 – Signage on Newbury Street



10.4 FLOOD DEFENCES/ASSETS

- 10.4.1. Lambourn benefitted from a Defra funded, Council promoted and administered Property Level Protection scheme. Fifty-seven properties were contacted and offered PLP, however 21 properties took the Council up on the offer and benefitted from the project. The work was completed in 2020.

10.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 10.5.1. During WSP's site visit to Lambourn, local flood wardens provided details of actions they are aware Thames Water carried out prior and in response to the 2024 flood event. It is understood that Thames Water extracted foul water from the sewer network from the 3rd of December 2023 and used an Atac unit to filter the foul water before discharging it into the River Lambourn, under a license

from the Environment Agency. Initially the Atac unit was positioned next to Brookside Cottage before it was moved next to the fire station.

- 10.5.2. It is also understood that tankering was undertaken at Goose Green. However, an area near the Wheelwright Arms pub was not relieved and led to the pub not being able to use its toilets. Finally, it was noted that Thames Water and West Berkshire Council put up signs to warn local residents of the raw sewage in the road and river.
- 10.5.3. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 10.5.4. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation.
- 10.5.5. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 10.5.6. Consultation with the Environment Agency has confirmed that there are no flood defences benefiting Lambourn. Furthermore, the Environment Agency do not own any gauges within Lambourn to measure river flows however, the Lambourn gauge is used to measure river levels. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.
- 10.5.7. The following flood alert was in place during the 2024 flood event:
 - River Lambourn and its tributaries from Upper Lambourn down to Newbury (061WAF22Lambourn) – In force (04/01/2024 – 05/06/2024)
- 10.5.8. The following flood warning was in place during the 2024 flood event:
 - River Lambourn from Upper Lambourn to Great Shefford (061FWF22UpLamGSh) – In force (04/01/2024 – 11/02/2024)
- 10.5.9. The Environment Agency did not receive any reports of flooding in Lambourn during the 2024 flood event. Community Information Officers (CIOs) visited the area on January 11th, 2024, to provide advice to the community and gather information on the flooding situation.
- 10.5.10. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Lambourn within Lambourn and that there are no plans to carry out improvement works. However, the Environment Agency has confirmed they are currently working in partnership with West Berkshire Council to raise community awareness and encourage property level flood protection across the village.

West Berkshire Council

- 10.5.11. A request for information was sent to West Berkshire Council to confirm their response to the 2024 flooding events. The information received confirmed that Wantage Road was closed on the 5th of

January 2024. In addition to this, representatives of West Berkshire Council visited Lambourn on the following dates:

- 7th of January 2024
- 10th of January 2024
- 12th of January 2024
- 16th of January 2024
- 18th of January 2024
- 23rd of January 2024
- 25th of January 2024

10.5.12. It is understood that traffic lights were put in place on Newbury Street, following a request by flood wardens. This was aimed at slowing the traffic driving through sewer flooding and prevent it splashing into houses.

Royal Berkshire Fire and Rescue Service

10.5.13. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) have been consulted for information. RBFRS reportedly did not attend any incidents in relation to the 2024 flood event in this area.

10.6 RECOMMENDATIONS

Local Residents

- 10.6.1. Residents and business owners affected by fluvial and surface water flooding may benefit from property flood resilience measures, such as flood doors / barriers, waterproof airbricks, and placing electrical sockets at raised levels, to provide resilience to their premises during storm events.
- 10.6.2. In contrast, residents and business owners affected by groundwater flooding may benefit from the installation of hard flooring and sump pumps or by tanking their property to provide resilience during times of high groundwater. It is noted that some properties in Lambourn already do have property flood resilience measures installed, such as flood doors.
- 10.6.3. Residents should report any highway drainage issues to West Berkshire Council and any surface and foul water sewer issues to Thames Water as soon as they become apparent. In addition, those affected by sewer flooding may benefit from the installation of one-way valves to prevent sewage backing up into their properties.

Riparian Owners

- 10.6.4. Confirmation should be sought around which authority / landowners are responsible for the ditch located along the road by Northfields and North Farm Close and measures should be put in place to ensure the ditch is appropriately managed to reduce flood risk.

West Berkshire Council

- 10.6.5. Two recommendations following WSP's flood investigation, are that WBC could review the current highway drainage maintenance schedule across Lambourn, and consider a CCTV survey of the sewerage network, specifically along Mill Lane and Oxford Street. It is acknowledged that the design standard of existing highway drainage is likely to be lower than the rainfall event recorded and that it will also not be designed to cope with groundwater. However, the condition of the highway drainage

network could be assessed, and the cause of the blocked gullies explored. Remedial works should then be prioritised in areas at higher risk of flooding to prevent the gullies from becoming blocked.

- 10.6.6. Another recommendation is an investigation into road drainage along Oxford Street and Wantage Road. Hydraulic modelling could be undertaken to understand the hydraulic dynamics of surface water flowing along the road. Surface water runoff from Sheepdrove Road should also be considered, as it was noted that this can flow into Wantage Road if it cannot enter the culvert on Sheepdrove Road. The results of this modelling could then determine the requirement for more road drainage, for example in the form of gullies, or SuDS measures, such as rain gardens, at a local and/or catchment scale.
- 10.6.7. Finally, West Berkshire Council could consider the addition of flap valves to highway drainage outfalls to watercourses, to prevent river water from backing up into the road drainage system during high flows.

Environment Agency

- 10.6.8. It is recommended that a feasibility study could be undertaken into the potential for a flood alleviation scheme to be implemented in Lambourn. This could include the temporary storage of river water during high flows, at sites such as Lynch Wood or Lambourn Playing Field. It is noted, however, that although a contributing factor, fluvial flooding was not considered as the main factor to the complex flooding experienced in Lambourn in early 2024.

Thames Water

- 10.6.9. It is recommended that Thames Water could carry out a CCTV survey to investigate the capacity and condition of the sewer network in Lambourn. Once it is understood what is causing inundation of the sewer system, remedial works can be undertaken to prevent it. Potential works could include the relining of the sewer network using new technologies, the sealing of manholes to prevent surcharging, and the addition of non-return valves.
- 10.6.10. It is understood that in some situations these measures may have limited effectiveness and Thames Water should prioritise the best possible outcome for the available budget.
- 10.6.11. Investigation into the effectiveness of a flip pump located in Newbury Road should be carried out following reports of the system being inundated with groundwater and having to continuously pump it down to the main sewer.

Parish Council

- 10.6.12. The Parish Council should continue to support local flood wardens in Lambourn and provide education and communication to local residents on the following:
- How to monitor river levels and flows;
 - How to sign up to the Environment Agency flood alerts and warnings;
 - How to report concerns to the relevant flood risk management authorities;
 - Guidance on effective property level protection;
 - What to do and when, in preparation for a flood; and
 - Where to find support following a flood event.
- 10.6.13. During WSP's site visit to Lambourn, it was noted that West Berkshire Council did not provide sandbags and that the Parish Council provided the bags but not the sand. Therefore, communication with residents could be improved to educate on why sandbags are no longer provided and details of

what support to expect from flood risk authorities during a flood event to allow better preparation for future flood events.

10.7 SUMMARY

- 10.7.1. The flooding generally occurred in areas categorised as Flood Zone 2 where there is also a high surface water flood risk, according to the Environment Agency's flood maps (refer to Appendix E.11).
- 10.7.2. Table 10-1 summarises the flooding experienced in Lambourn as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.11 which details the locations of the flooded areas.

Table 10-1 – Summary of Flooding in Lambourn

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
5	Fluvial, Groundwater, Sewer, and Surface Water.	3	2	1 – Wantage Road

**Excluding properties recorded as having flooded internally.*

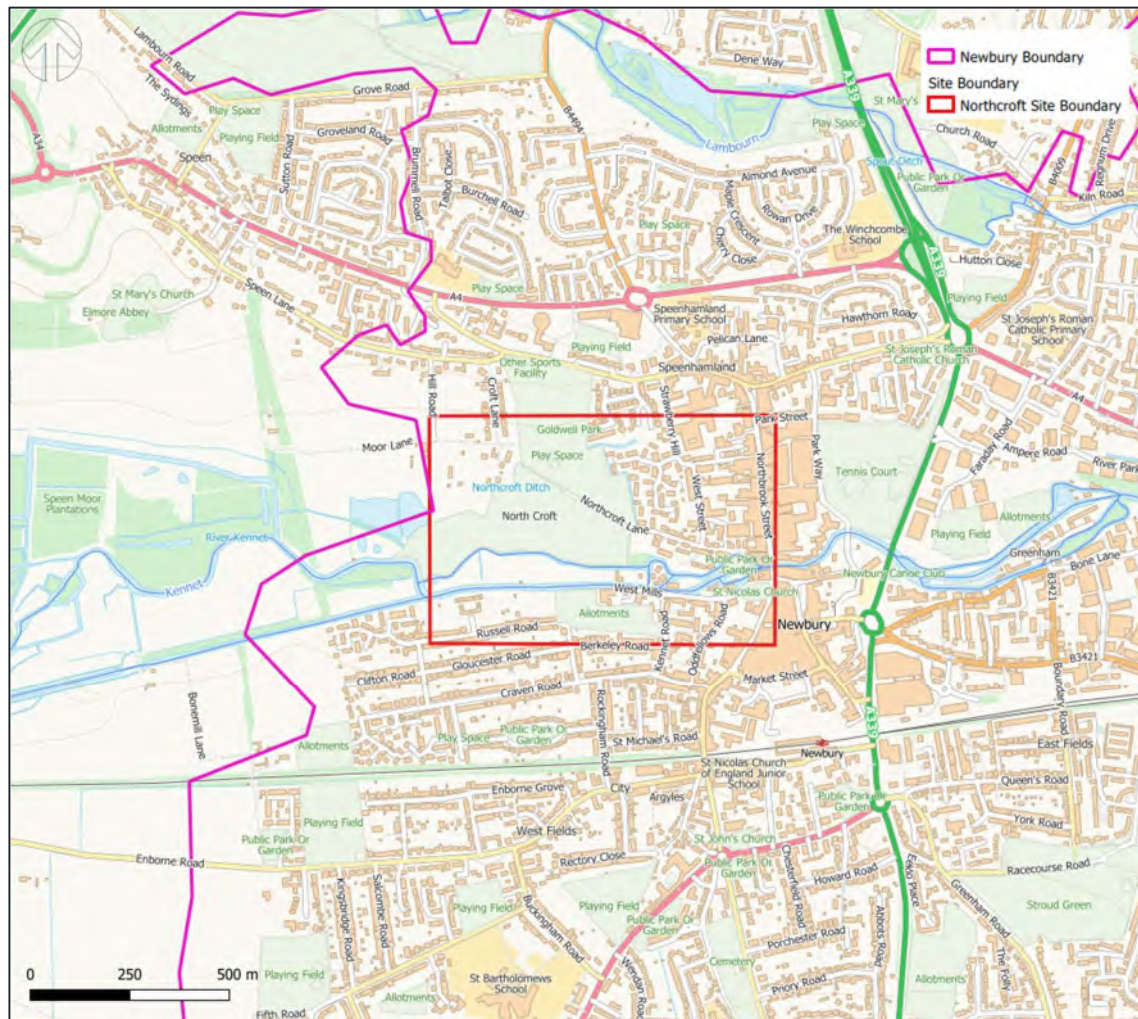
- 10.7.3. West Berkshire Council, Thames Water, and the Environment Agency each had flood management responsibilities related to this event due to the multiple flood sources and assets involved. West Berkshire Council attended the area during the flood event to monitor the situation and enforce road closures where required. Thames Water were also in regular attendance to carry out ongoing remedial works. Recommendations have been identified to help manage the impact of any future flooding events.

11 NEWBURY (SOUTH)

11.1 LOCATION

- 11.1.1. The town of Newbury is located in the south of West Berkshire and is located downstream along the River Lambourn from Great Shefford. The town is built around the River Lambourn which flows from the north-west, and the River Kennet which flows in conjunction with the Kennet and Avon Canal from the west.
- 11.1.2. The area classed as Newbury (south) includes Northcroft and West Mills and is located in the south-west of Newbury. It is influenced by the River Kennet and the Kennet and Avon Canal. The area of Newbury (south) has a National Grid Reference of 446932, 167216 and is shown in Figure 11-1.
- 11.1.3. Flooding has previously occurred in Newbury South during the following events:
- 1971
 - 1979
 - 2000/01
 - 2007
 - 2012/13
 - 2013/14
 - 2016
- 11.1.4. During the winter 2013/14 flood event, approximately 41 properties were flooded internally and approximately 19 properties were flooded externally across the whole of Newbury. Similar to the 2024 flood event, flooding in Newbury South was the result of fluvial and surface water sources.
- 11.1.5. More recently, during the 2016 flood event, areas of Newbury were affected by surface water flooding following a period of heavy rainfall. According to the September 2016 Flood Investigation Report, these areas included:
- Bartlemy Road
 - Bartholomew Street / Pound Street
 - Church Road
 - Mill Lane
 - Paddock Road
 - Essex Street
 - Ivy Cottage
 - Newbury Train Station
- 11.1.6. Historic flood outlines are mapped within Appendix E.5.

Figure 11-1 – Newbury (South) Location Map



11.2 FLOODING

- 11.2.1. WSP conducted a site visit to the south of Newbury on the 15th of March 2024 and from this it is understood that flooding issues started on Thursday 4th January. From questionnaire responses and interviews with the Northcroft flood warden and affected residents, it is understood that flooding resulted from groundwater inundation, sewer surcharging, and fluvial factors.
- 11.2.2. The flooding generally occurred in areas categorised as Flood Zone 3 according to the Environment Agency's flood maps (refer to Appendix E.5).
- 11.2.3. As a result of Storm Henk, three properties on Northcroft Lane were flooded internally with flood depths peaking on Sunday the 7th of January at approximately 250mm. These properties experienced external flooding to the back of the properties which then flowed inside and caused internal flooding. Although these properties are located next to the River Kennet, the source of this floodwater is considered unlikely to be fluvial due to the flood wall that runs along the back of the properties and provides protection from high river levels. The flood wall was not overtopped during the 2024 flood event; however, it is possible that river water influenced groundwater levels by pushing them up, resulting in above ground flooding. These properties were also flooded to the front from surface water in the road.

- 11.2.4. It was reported that two further properties on Northcroft Lane experienced internal groundwater flooding, however further details have not been provided. Two other properties on West Mills reported internal fluvial flooding, one on the 5th of January 2024 and another on the 7th of January 2024. It is believed that additional properties on the island between the River Kennet and the Kennet and Avon Canal may have been affected by flooding, however the flood extent has not been reported and is therefore unknown. It is understood that West Berkshire Council Officers are in contact with residents of the island and are investigating several mitigation measures including removal of vegetation and the repair of a potential breach in Northcroft.
- 11.2.5. It is understood that Northcroft Lane flooded because of sewers surcharging, with the local flood warden and residents commenting that it appeared to be clean. This road flooding backed up along West Street and flooded the road up to the Scout Hut and, as a result, road closures were put in place on both roads.
- 11.2.6. During WSP's visit to Northcroft, it was also reported that floodwater was flowing out of Swan Court and onto Northcroft Lane, contributing to the flooding. No internal flooding was reported in Swan Court or the offices at the front of Swan Court, however the site flooded externally, affecting the car park. Swan Court is also protected by the flood defence wall, which runs along the back of the site; however, it was reported that floodwater surcharged from the drains in the car park.
- 11.2.7. It is believed that floodwaters in Swan Court flowed west causing the external flooding to the Northcroft Terrace properties. In addition to this, the gravel car park, located south of the terraced properties, flooded with flood depths reported to have reached 1 – 2m approximately. This car park is located on the river side of the flood wall meaning that flooding would likely have been fluvial.
- 11.2.8. In addition to flooding, during WSP's site visit to Northcroft, it was noted that several properties in the area experienced issues with wastewater facilities, however no internal sewer flooding was reported.

Figure 11-2 – Flooding at Swan Court



11.3 CAUSES

- 11.3.1. Following WSP's site visit to the south of Newbury, it is understood that flooding was caused by fluvial, groundwater, and sewer sources. The winter of 2023/24 was one of the wettest on record, which served to elevate groundwater levels for prolonged periods of time in areas of West Berkshire.
- 11.3.2. High groundwater in and around Newbury was noted as a significant contributing factor to the flooding experienced. This was exacerbated by significant rainfall during storms Henk, Isha, and Jocelyn in January. As a result, the sewer system in Northcroft was inundated and surcharged into roads. It is not clear what specifically has caused the sewer system to become over capacity, however groundwater infiltration and extreme rainfall are likely.
- 11.3.3. In addition to this, flood wardens commented that during high flows, levels in the River Kennet were high enough to submerge road drainage outfalls. WSP is not aware of these outfalls having one-way valves installed, meaning it is possible that river water backed up the road drainage and caused road gullies to surcharge. Local residents and flood wardens reported that the road drainage continued to surcharge for approximately one week after the rain stopped.

Figure 11-3 – Flooding at Northcroft Park



11.4 FLOOD DEFENCES/ASSETS

- 11.4.1. Northcroft benefits from two flood alleviation schemes. The first is a bund in Goldwell Field which was built in 2014 for temporary floodwater storage and to protect properties in Cleaveland Grove and Crawford Place from fluvial and above ground flooding from the functional floodplain. During WSP's site visit to Northcroft no reports of flooding to Cleaveland Grove or Crawford Place were reported, so it is assumed that the alleviation bund was successful in preventing flooding to these properties.
- 11.4.2. The second flood defence benefitting Northcroft is the flood wall that runs along the north bank of the River Kennet from The Lock, Stock & Barrel pub to Northcroft Field. The flood wall was built in February 2014 to protect properties in Northcroft from fluvial flooding as a result of high river levels. During the 2024 flood event, the flood wall worked as planned and was not exceeded.

11.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 11.5.1. During WSP's site visit to the south of Newbury, flood wardens provided details of actions that they believe Thames Water may have carried out in response to the 2024 flood event. It was believed

that Thames Water may have cleared a blockage in the sewer system because there had been no more road flooding since January.

- 11.5.2. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 11.5.3. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 11.5.4. During WSP's site visit to Newbury, local flood wardens commented that the Environment Agency attended site to complete a survey of the flooding experienced.
- 11.5.5. Consultation with the Environment Agency has confirmed that they do not own any flood defences benefiting the Newbury area. Furthermore, the Environment Agency own the Newbury gauge that measures river flows along the River Kennet. However, due to an issue with the equipment the Newbury gauge is believed to have been overreading by more than 10% during the flood event. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.
- 11.5.6. The following flood alert was in place during the 2024 flood event:
 - River Kennet and its tributaries from Berwick Bassett down to Newbury (061WAF22UpperKen) – In force (02/01/2024 – 07/03/2024).
- 11.5.7. Upon consultation with the Environment Agency, no information was received regarding flood warnings along the River Kennet, suggesting there were no warnings in place during the 2024 flood event.
- 11.5.8. The Environment Agency receive multiple reports of flooding across Newbury during the 2024 flood event. This includes flooding from groundwater and fluvial sources from the River Kennet across the south of Newbury. It is noted that the Environment Agency received reports of external fluvial flooding to three properties in Ampere Road, which was not reported to WSP during site visits, or West Berkshire Council through the flooding questionnaire. Subsequently, this information has been added to Table 1-1 and Table 11-1.
- 11.5.9. Community Information Officers (CIOs) visited the area of Newbury multiple times from the 4th of January to the 12th of January 2024 to provide advice to the community and gather information on the flooding situation.
- 11.5.10. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Kennet within Newbury. Furthermore, details of the Thames Valley Flood Scheme have been provided. The scheme, led by the Environment Agency, is investigating the possibility to store water across the Thames catchment. This is likely to include a

combination of flood storage and natural flood management currently across approximately 17 locations.

West Berkshire Council

11.5.11. A request for information was sent to West Berkshire Council to detail their response to the 2024 flooding events. With regards to the south area of Newbury, WBC confirmed that Northcroft Lane was closed on the 10th of January 2024 until the 14th of January 2024.

11.5.12. In addition to this, representatives of West Berkshire Council visited the Newbury area on the following dates:

- 7th of January 2024
- 9th of January 2024
- 10th of January 2024
- 12th of January 2024
- 15th of January 2024
- 17th of January 2024
- 19th of January 2024
- 23rd of January 2024
- 24th of January 2024
- 26th of January 2024

Canal and River Trust

11.5.13. A request for information has been sent to the Canal and River Trust, however no response has been received at this time.

Royal Berkshire Fire and Rescue Service

11.5.14. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) have been consulted for information. RBFRS reportedly attended one incident in Newbury during Storm Henk however, no further information has been provided.

11.6 RECOMMENDATIONS

Local Residents

- 11.6.1. Residents should report any highway drainage issues to West Berkshire Council and any foul and surface water sewer issues to Thames Water as soon as they become apparent. In addition, those affected by sewer flooding may also benefit from the installation of one-way valves to prevent sewage backing up into their properties.
- 11.6.2. Residents and business owners affected by groundwater flooding may benefit from the installation of hard flooring and sump pumps or tanking their properties to give resilience to their premises during times of high groundwater. Additionally, the area may benefit from the preparation of a groundwater flood plan to help inform flood risk. Owners of properties affected by surface water flooding may benefit by considering the installation of property flood resilience measures such as flood gates / barriers.

- 11.6.3. During WSP's site visit to Northcroft it was noted that much of the residential area is designed and built with flood risk in mind. For example, Swan Court has non-return valves and a ramp up to the property from the car park. Despite this, it is recommended that the owners could carry out a feasibility study into whether additional drainage storage could be installed within the car park areas to reduce the risk of excess runoff entering Northcroft Lane.

West Berkshire Council

- 11.6.4. It is acknowledged that the design standard of existing highway drainage is likely to be lower than the rainfall event recorded and that it will also not be designed to cope with groundwater. However, it is recommended that West Berkshire Council could conduct a CCTV survey along Northcroft Lane to assess the condition of the highway drainage network. Any required remedial works could then be considered to prevent the gullies from becoming blocked and reduce flood risk.
- 11.6.5. It is also recommended that West Berkshire Council could review the current highway drainage maintenance schedule across Northcroft and, where appropriate, increase the frequency of inspections, specifically along Northcroft Lane. Alternatively, these assets could be marked as a priority, and arrangements should be made for pre-emptive inspections on receipt of forecasts of heavy rain.

Environment Agency

- 11.6.6. It is recommended that a feasibility study could be undertaken by the Environment Agency into the potential for a flood alleviation scheme benefitting the island between the River Kennet and the Kennet and Avon Canal. This scheme could be similar to the flood wall that was implemented on the north bank of the River Kennet in 2014, however further investigation and modelling would be required to understand the suitability of this type of defence to ensure it does not increase flood risk downstream.
- 11.6.7. It is also recommended that the design of the 2013 flood defence wall, to the south of Northcroft Lane, be reviewed to determine whether there is a potential pathway below the wall, allowing fluvial flooding to affect the rear of properties in Northcroft Lane.

Thames Water

- 11.6.8. It is recommended that Thames Water could carry out a CCTV survey to investigate the capacity and condition of the sewer network in Northcroft, prioritising areas known to be at risk of flooding. Once it is understood what is causing inundation of the sewer system, remedial works could be considered to prevent it. Potential works could include the relining of the sewer network using new technologies and the sealing of manholes to prevent surcharging.

Parish Council

- 11.6.9. The Parish Council should continue to support local flood wardens in the south of Newbury and provide education and communication to local residents on the following:
- How to monitor river levels and flows.
 - How to sign up to the Environment Agency flood alerts and warnings.
 - How to report concerns to the relevant flood risk management authorities.
 - Guidance on effective property level protection.
 - What to do and when, in preparation for a flood.

- Where to find support following a flood event.

11.6.10. During WSP's site visit to Northcroft, it was noted that the area currently only has one flood warden. If possible, it may prove beneficial to increase the number of flood wardens in the area to aid communication and advancements, with regards to flood risk, between the local community and West Berkshire Council.

11.7 SUMMARY

11.7.1. The flooding generally occurred in areas categorised as Flood Zone 3 according to the Environment Agency's flood maps (refer to Appendix E.5).

11.7.2. Table 11-1 summarises the flooding experienced in the south of Newbury as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.5 which details the locations of the flooded areas.

Table 11-1 – Summary of Flooding in Newbury (South)

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
10	Fluvial, Groundwater & Sewer.	7	3	2 – Northcroft Lane & West Street

**Excluding properties recorded as having flooded internally.*

West Berkshire Council, Thames Water, and the Environment Agency each had flood management responsibilities related to this event due to the flood sources and assets involved. West Berkshire Council attended the area during the flood event to monitor the situation and enforce road closures where required. Recommendations have been identified to help manage the impact of any future flooding events.

12 NEWBURY (NORTH)

12.1 LOCATION

- 12.1.1. The town of Newbury is located in the south of West Berkshire and is located downstream along the River Lambourn from Great Shefford. The town is built around the River Lambourn which flows from the north-west, and the River Kennet which flows in conjunction with the Kennet and Avon Canal from the west.
- 12.1.2. The area classed as north Newbury includes Clay Hill, Shaw-cum-Donnington, and Newbury North and is influenced by the River Lambourn before it flows into the River Kennet further downstream. The north area of Newbury has a National Grid Reference of 447540, 168481 and is shown in Figure 12-1.
- 12.1.3. Flooding has previously occurred in Newbury North during the following events:
- 1979
 - 2007
 - 2012/13
 - 2013/14
 - 2016
- 12.1.4. During the winter 2013/14 flood event, approximately 41 properties were flooded internally and approximately 19 properties were flooded externally across the entirety of Newbury. Similar to the 2024 flood event, flooding in Newbury North was the result of fluvial, sewer, and surface water sources.
- 12.1.5. More recently, during the 2016 flood event, areas of Newbury were affected by surface water flooding following a period of heavy rainfall. According to the September 2016 Flood Investigation Report, these areas included:
- Bartlemy Road
 - Bartholomew Street / Pound Street
 - Church Road
 - Mill Lane
 - Paddock Road
 - Essex Street
 - Ivy Cottage
 - Newbury Train Station
- 12.1.6. Historic flood outlines are mapped within Appendix E.6.

Figure 12-1 – Newbury (North) Location Map



12.2 FLOODING

- 12.2.1. WSP conducted a site visit to the north area of Newbury on the 22nd of March 2024 and from this it is understood that the first signs of flooding began on approximately the 5th of January 2024. Levels in the River Lambourn had risen causing it to breach in several places, resulting in internal and external flooding. During the 2024 flood event, levels in the River Lambourn peaked at a height of 2.06m, which is believed to be just 40mm less than the peak during the 2014 flood event. From questionnaire responses and interviews with the local flood wardens and affected residents, it is understood that the flooding experienced in 2024 was the result of fluvial, groundwater, and sewer sources.
- 12.2.2. From interviews with affected residents, it is understood that Newport Road was affected by fluvial, groundwater, and sewer flooding, beginning on the 5th of January. Fluvial flood depths are believed to have been at their deepest along the two alley ways that lead away from the river and into the estate, where it reached approximately 20cm.
- 12.2.3. Due to the complexity of multiple contributing factors, it is not clear what properties were affected by external fluvial flooding and which were affected by external groundwater flooding. However, it is

believed that approximately 24 properties along Newport Road were affected by external flooding from fluvial or groundwater sources.

- 12.2.4. Although fluvial floodwaters on the south side of the river receded relatively quickly, groundwater flooding remained an issue for months, and some properties were still inundated during WSP's site visit on the 22nd of March 2024. During WSP's site visit, it was reported that approximately four properties along Doveton Way were affected by a mixture of external fluvial, groundwater, surface water, and sewer flooding. Local flood wardens reported that foul sewer flooding began on the 4th of December 2023 and was still evident during the 2024 flood event.
- 12.2.5. Approximately eight properties along Newport Road were affected by external sewer flooding. WSP is aware that after Storm Henk, one property on Newport Road experienced internal sewer flooding, which continued for 11 weeks until Thames Water cleared a blockage within the sewer network. Sewer flooding also affected Pike Street and Trout Walk where drains were surcharging foul water, which then flowed into the road gullies on Pike Street.
- 12.2.6. From WSP's site visit to the north of Newbury, it is understood that debris-filled, fluvial floodwaters flowed from Newport Road to a care home. No reports of internal flooding to the care home have been received, however the property was confirmed to have been affected by significantly deep external groundwater and fluvial flooding.
- 12.2.7. Floodwaters are also believed to have breached and backed up from the River Lambourn to flood St Richards Road and Coachman's Court on or around the 20th of January. Fluvial floodwater was approximately 30cm deep in Coachman's Court and approximately 20cm deep on St Richards Road. This resulted in external fluvial flooding to several properties and internal fluvial flooding to one property along St Richards Road.
- 12.2.8. Further downstream along the River Lambourn, River Side Lane was also significantly impacted by fluvial flooding for approximately three weeks in January 2024. Flood depths varied across this time; however, it was reported by local residents that vehicular access was not possible for a few of these days. River Side Lane is also a main route for children walking to school, meaning they were at high risk when walking through floodwaters.
- 12.2.9. From discussions with local residents, it is understood the lane was tarmacked in response to the 2013/14 flood event, however residents have reported concerns of the tarmac beginning to break apart with river water bubbling up from underneath it. Furthermore, the high river levels have encouraged bankside erosion, causing concerns that the lane will be undercut and eventually begin to subside into the River Lambourn. One property along River Side Lane was significantly affected by external fluvial flooding, however no internal flooding has been reported.
- 12.2.10. To the north of the River Lambourn, approximately eight properties in Glebefields only have access and egress through the back of their properties. In early 2024, these gardens and the alleyway used to access Kiln Road, were affected by fluvial flooding. Therefore, some residents were trapped inside their properties until floodwaters receded. Due to the proximity to the River Lambourn, these levels fluctuated throughout early January, and it was noted during WSP's site visit to Newbury, that the access alleyway was still flooded. Glebefields car park was also affected by flooding, meaning vehicles had to be relocated during flood warnings.
- 12.2.11. Floodwaters from Newport Road are reported to have flowed past Lambourn Court Care Home and onto Walton Way and Trout Walk. WSP is not aware of any internal flooding as a result of this; however, following discussions with local flood wardens, it is believed external flooding of garages

along Trout Walk may have occurred. During the early months of 2024, drainage along Trout Walk was already overloaded, meaning fluvial flooding exacerbated these issues. Although no internal flooding along Walton Way was reported, two residents are only able to access their properties via River Walk path, which runs parallel to the River Lambourn. This created an issue for safe access and egress during times of high river levels.

- 12.2.12. One property on Church Road suffered internal groundwater flooding. Several properties with basements along Shaw Road were also affected by internal groundwater flooding up to depths of approximately 600mm. Another property situated along Shaw Road and the River Lambourn was affected by internal groundwater flooding and external fluvial flooding as a result of Spout Ditch overtopping its banks.
- 12.2.13. Further upstream along the River Lambourn, south facing properties on Dene Way were affected by external fluvial flooding as a result of the River Lambourn overtopping its banks. During WSP's site visit to Newbury, it was reported that flooding began in early January, and it was noted that some properties were still inundated at the time of WSP's visit. Shaw Recreation Park was also flooded twice for approximately three days in January and February. This is also a main route for children walking to school, meaning they were a high risk when walking through floodwaters, specifically in the flooded underpass to the east of Shaw Park.
- 12.2.14. Finally, following further consultation with local flood wardens, it has been reported that businesses in Hambridge Lane suffered groundwater infiltration into their foul sewage systems for several months. It was also reported that tankering occurred in this area, however WSP have not received further details.

Figure 12-2 – Flooding to the North of Newport Road



12.3 CAUSES

- 12.3.1. Following WSP's site visit to Newbury, it is understood that flooding was caused by groundwater, fluvial, and sewer sources. The winter of 2023/24 was one of the wettest on record, which served to elevate groundwater levels for prolonged periods of time in areas of West Berkshire. High groundwater in and around Newbury was noted as a significant contributing factor to the flooding experienced. This was exacerbated by significant rainfall during storms Henk, Isha, and Jocelyn in January. As a result, levels in the River Lambourn were higher than the typical range from the 5th of January 2024. These raised levels caused the River Lambourn to overtop its banks which resulted in internal and external flooding.
- 12.3.2. As a result of high groundwater levels, short periods of rain falling on already saturated ground encouraged repetitive flooding throughout January and February 2024. During WSP's site visit, local flood wardens expressed concerns that high groundwater levels may be damaging the clay pipes and drains in Newbury, leading to inundation, and therefore surcharging of the sewer network on Newport Road and Pike Street.
- 12.3.3. Further contributing factors to the flooding experienced in Newbury include blockages in the downstream channels of the River Lambourn and the erosion of Spout Ditch. During WSP's site visit, residents expressed concerns of a channel blockage, approximately half a mile downstream of

River Side Lane, which could be preventing high flows from moving downstream and encouraging water storage upstream.

- 12.3.4. During WSP's site visit, it was noted that the bank between Spout Ditch and the River Lambourn has been eroded, causing the River Lambourn to flow into Spout Ditch. Due to a blocked trash screen downstream of Dene Way, the water cannot flow freely downstream and instead backs up Spout Ditch, leading to the fluvial flooding to gardens along Dene Way.

Figure 12-3 – Flooding to the North of Coachman's Court



12.4 FLOOD DEFENCES / ASSETS

- 12.4.1. Since WSP's site visit to Newbury, we have been made aware of Shaw Flood Alleviation Scheme which benefits Wellington Close and Cromwell Road. WSP are not aware of any flooding along these roads, so it is assumed the alleviation scheme worked as intended.
- 12.4.2. Furthermore, the north area of Newbury has several embankment style spatial flood defences including from Shaw Bridge to the confluence with the River Kennet, at the bottom of Dene Way, and at the exit of the Lake in Donnington Grove Hotel and Country Club. It is believed these defences are in a varying state of maintenance and require restoration to allow improved flood resilience, specifically with an allowance for climate change.

12.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 12.5.1. During WSP's site visit to Newbury, local residents and flood wardens commented that Thames Water had been tankering on the corner of Pike Street and Newport Road to remove the mix of groundwater, fluvial, and sewer water from the sewer system. Initially 24 hour tankering commenced on the 18th of January, reducing to every other day from the beginning of February. Following further consultation with local flood wardens, it was reported that tankering remained in place until the 20th of July 2024.
- 12.5.2. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 12.5.3. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 12.5.4. During WSP's site visit to Newbury, local residents and flood wardens commented that the Environment Agency were in attendance during the flood event to conduct surveys. The Environment Agency also visited a property affected by internal groundwater flooding, on Church Road, on seven occasions to gather information.
- 12.5.5. Consultation with the Environment Agency has confirmed that they do not own any flood defences benefiting the Newbury area. Furthermore, the Environment Agency own the Shaw gauge that measures river flows along the River Lambourn. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.
- 12.5.6. The following flood alert was in place during the 2024 flood event:
 - River Lambourn and its tributaries from Upper Lambourn down to Newbury (061WAF22Lambourn) – In force (04/01/2024 – 05/06/2024)
- 12.5.7. The following flood warning was in place during the 2024 flood event:
 - River Lambourn from Donnington to Newbury (061FWF22LowLamb) – In force: (07/01/2024 – 30/01/2024)
- 12.5.8. The Environment Agency receive multiple reports of flooding across Newbury during the 2024 flood event. This includes flooding from groundwater, sewer and fluvial sources from River Lambourn across the north of Newbury.
- 12.5.9. Community Information Officers (CIOs) visited the area of Newbury multiple times from the 4th of January to the 12th of January 2024 to provide advice to the community and gather information on the flooding situation.

12.5.10. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Lambourn within Newbury. Funding has been provided by the Environment Agency for the study carried out by Berkshire County Council in the Clayhill area of Newbury. Furthermore, details of the Thames Valley Flood Scheme have been provided. The scheme, led by the Environment Agency, is investigating the possibility to store water across the Thames catchment. This is likely to include a combination of flood storage and natural flood management currently across approximately 17 locations.

West Berkshire Council

12.5.11. A request for information was sent to West Berkshire Council to detail their response to the 2024 flooding events. With regards to the north area of Newbury, the information received details that Pike Street and Walton Way were closed, however the date of closure is not confirmed as West Berkshire Council were only made aware of the closure on the 15th of January 2024.

12.5.12. In addition to this, representatives of West Berkshire Council visited the Newbury area on the following dates:

- 7th of January 2024
- 9th of January 2024
- 10th of January 2024
- 12th of January 2024
- 15th of January 2024
- 17th of January 2024
- 19th of January 2024
- 23rd of January 2024
- 24th of January 2024
- 26th of January 2024

Royal Berkshire Fire and Rescue Service

12.5.13. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) have been consulted for information. RBFRS reportedly attended one incident in Newbury during Storm Henk however, no further information has been provided.

12.6 RECOMMENDATIONS

Local Residents

- 12.6.1. Residents should report any highway drainage issues to West Berkshire Council and any foul and surface water sewer issues to Thames Water as soon as they become apparent. In addition, any issues with river maintenance, such as debris build up on the River Lambourn, should be communicated as soon as possible to the Environment Agency.
- 12.6.2. Residents and business owners affected by groundwater flooding may benefit from the installation of hard flooring and sump pumps or the tanking the property to improve their premises' resilience during times of high groundwater.

- 12.6.3. Those affected by fluvial flooding may benefit from the installation of flood barriers or doors, if they are not already in use. Furthermore, general property level resilience and resistance measures should be considered, such as raising plug sockets, and the use of air brick covers.

West Berkshire Council

- 12.6.4. During WSP's site visit to Newbury, it was noted that the area is complexly hydraulically connected and is at risk from flooding from a variety of sources. Therefore, it is recommended that West Berkshire Council could commission a flood study to identify these sources and gain an understanding of the interaction between them.
- 12.6.5. During WSP's site visit to Newbury, it was noted that a blocked trash screen along Spout Ditch is obstructing flow from moving downstream. It is recommended that West Berkshire Council remove this blockage in stages during times of lower flows to ensure that the backed-up flows do not suddenly inundate further downstream and cause flooding. A maintenance schedule and flow monitor could then be put in place to ensure blockages are easily identified and regularly cleared in Spout Ditch.
- 12.6.6. West Berkshire Council also could consider the implementation of a raised footpath through Shaw Park, for use by members of the public, including school children, to ensure safe passage when the floodplain is inundated. However, this should be appropriately modelled and investigated prior to installation to ensure there is no loss of floodplain storage or impact on existing flow routes.
- 12.6.7. West Berkshire Council could aid residents along River Side Lane and work with the agreed riparian owner(s) to implement flood mitigation measures. These measures could include the use of Nature Based Solutions (NBS) in the form of bank stabilisation.
- 12.6.8. Furthermore, it has been reported that the drains in Glebefields car park appear to be unmaintained. It is not known who is responsible for the maintenance of this drainage so West Berkshire Council could work with residents to discover ownership and ensure a maintenance schedule is implemented.

Environment Agency

- 12.6.9. During WSP's site visit to Newbury, affected residents reported that the Environment Agency's flood alerts and warnings were issued too late, however no information or verification has been provided by the Environment Agency in relation to this. Therefore, the Environment Agency should review the levels at which alerts and warnings are issued to the Shaw area to ensure sufficient time is provided to residents to allow flood plans to be followed and preparations put in place.
- 12.6.10. The Environment Agency could consider the implementation of riverbank protection in the form of NBS along the River Lambourn. This could include taking the trees and natural debris out of the river and using it to line the river as a form of bank reinforcement. Specifically, bank reinforcement could be considered along River Side Lane to prevent high flows from undercutting the lane.
- 12.6.11. Additionally, Newbury may benefit from the installation of boreholes used for groundwater monitoring and the preparation of a groundwater flood plan to help inform flood risk, specifically in the area near Newport Road and the River Lambourn.
- 12.6.12. During WSP's site visit to Newbury, it was noted that there is no official appointed individual who is responsible for the operation of sluice gates along the River Lambourn. It may prove beneficial for the Environment Agency to provide specific sluice gate operation guidance to riparian owners, who

are already undertaking sluice gate operation along the River Lambourn, to ensure that gates are correctly operated, thereby reducing the risk of flooding.

- 12.6.13. Finally, the Environment Agency could consider determining the viability of a flood alleviation scheme upstream of the River Lambourn from Newbury. There may be the potential to divert flow from the River Lambourn into fields as a form of temporary storage and controlled release. However, further data needs to be collected to ascertain the potential benefits and options for the provision of practicable solutions in addition to its financial and technical feasibility.

Thames Water

- 12.6.14. It is considered that Thames Water could carry out a CCTV survey to investigate the capacity and condition of the sewer network, specifically along Newport Road and Pike Street. Once it is understood what is causing inundation of the sewer system, remedial works could be undertaken to prevent it. Potential works could include the relining of the sewer network using new technologies and the sealing of manholes within the area to reduce flood risk.
- 12.6.15. During WSP's site visit, local residents expressed concerns that the pumping station in Shaw Park has not been upgraded despite significant housing developments at Donnington Heights. It is recommended that an assessment of its capacity should be undertaken, if not already done.

Parish Council

- 12.6.16. The Parish Council should continue to support local flood wardens in Newbury and provide education and communication to local residents on the following:
- How to monitor river levels and flows.
 - How to sign up to the Environment Agency flood alerts and warnings.
 - How to report concerns to the relevant flood risk management authorities.
 - Guidance on effective property level protection.
 - What to do and when, in preparation for a flood.
 - Where to find support following a flood event.

12.7 SUMMARY

- 12.7.1. The fluvial and groundwater flooding generally occurred in areas categorised as Flood Zone 2 and Flood Zone 3, according to the Environment Agency's flood maps (refer to Appendix E.6). It is also noted that significant portions of the sewer flooding occurred in an area of high surface water flood risk. The flooding reported within this investigation all occurred within the area designated as the Environment Agency's Newbury Flood Risk Area for both groundwater and surface water. It is also noted that some flooding occurred across critical drainage areas, including River Walk and Walton Way.
- 12.7.2. Table 12-1 summarises the flooding experienced in Newbury (North) as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.6 which details the locations of the flooded areas.

Table 12-1 – Summary of Flooding in Newbury (North)

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
51	Fluvial, Groundwater & Sewer	4	47	2 – Walton Way & Pike Street

*Excluding properties recorded as having flooded internally.

- 12.7.3. West Berkshire Council, Thames Water, and the Environment Agency each had flood management responsibilities related to this event due to the multiple flood sources and assets involved. West Berkshire Council attended the area during the flooding to monitor the situation and enforce road closures where required. Thames Water were also in regular attendance to carry out ongoing remedial works. Recommendations have been identified to help manage the impact of any future flooding events.

13 PANGBOURNE

13.1 LOCATION

- 13.1.1. The village of Pangbourne is located in the east of West Berkshire and is located along the River Thames; upstream of Purley on Thames and downstream of Streatley. The village has a National Grid Reference of 463491, 176517 and is shown in Figure 13-1.
- 13.1.2. The village is situated on the south side of the River Thames in a topographical low point. Other watercourses in Pangbourne include the River Pang and Sulham Brook.
- 13.1.3. Flooding has previously occurred in Pangbourne during the following events:
- 1947
 - 1992
 - 2000/01
 - 2007
 - 2013/14
- 13.1.4. During the winter 2013/14 flood event, approximately four properties were flooded internally and approximately 20 properties were flooded externally across Pangbourne. Similar to the 2024 flood event, flooding in Pangbourne was the result of fluvial sources from the River Thames, Sulham Brook, and the River Pang. Historic flood outlines are mapped within Appendix E.10.

Figure 13-1 – Pangbourne Location Map



13.2 FLOODING

- 13.2.1. WSP conducted a site visit to Pangbourne on the 5th of April 2024 and from this it is understood that the first signs of flooding began on the 4th of January 2024. From questionnaire responses and interviews with the Pangbourne flood warden and affected residents, it is understood that the flooding experienced in 2024 was the result of fluvial and groundwater sources.
- 13.2.2. The flooding generally occurred in areas categorised as Flood Zone 2 and Flood Zone 3, according to the Environment Agency's flood maps (refer to Appendix E.10).
- 13.2.3. It is understood that four properties in Pangbourne were affected by internal flooding, of varying degrees, in early 2024. During WSP's site visit, the owners of each affected property were interviewed. Two of the affected properties were residential and two were commercial.
- 13.2.4. One residential property was affected internally by groundwater flooding, likely influenced by high river levels, which started on the 6th of January and lasted approximately three days. The flood depth reached approximately 75mm. The property was also affected by external fluvial flooding from the River Thames; however, the use of flood sacks prevented overland flows from entering the property.

- 13.2.5. No reports of sewer flooding were received during WSP's site visit to Pangbourne, however one property owner reported having blocked drains approximately three weeks after the flooding had occurred.
- 13.2.6. Another affected residential property initially experienced internal groundwater flooding before river water entered the back of the property, causing internal fluvial flooding. It is believed internal flood depths peaked around the 12th/13th of January, having reached a depth of approximately 200mm, before subsiding. It is also believed that some properties along Thames Avenue may have been affected by external fluvial flooding, however no further information has been provided and no reports of this were made in the questionnaire responses.
- 13.2.7. One commercial property was affected internally by fluvial flooding, despite having flood gates installed. From WSP's site visit to Pangbourne, it is understood that the River Thames overtopped its banks, which subsequently caused the flooding of the property's car park. At the beginning of January, the property was flooded internally, with flood depths ranging between 200mm and 1m across the property for approximately one week.
- 13.2.8. Another affected commercial property was flooded internally from both groundwater and fluvial sources for approximately four weeks from the 4th of January. Initially, external fluvial flooding began in the car park of the property and groundwater flooding affected the property internally. However, river levels continued rising until the patio at the back of the property was flooded and water flowed into the property to add to existing floodwaters. By Saturday 6th of January, flood depths had reached approximately 50cm and flows of floodwaters had become dangerously strong, so residents were evacuated to hotels.
- 13.2.9. During WSP's site visit, the local flood warden also provided details of flooding that affected roads across Pangbourne. This included flooding that was impassable on Mill Lane, between Mill Corner and Oaklands Farm in Tidmarsh. The Wharf was also affected by flooding as a result of high river levels in the River Thames backing up along the River Pang, causing it to overtop into the road. A medical surgery car park was flooded directly from the River Thames, and, as a result, the surgery had to be moved elsewhere for approximately three days.

Figure 13-2 – Flooding at Shooters Hill



13.3 CAUSES

- 13.3.1. Following WSP's site visit to Pangbourne, it is understood that flooding was caused by groundwater and fluvial sources. The winter of 2023/24 has been one of the wettest on record, which served to elevate groundwater levels for prolonged periods of time in areas of West Berkshire.
- 13.3.2. High groundwater in and around Pangbourne was noted as a significant contributing factor to the flooding experienced. This was exacerbated by significant rainfall during storms Henk, Isha, and Jocelyn in January. As a result, throughout January and February, levels in the River Thames rose higher than the typical range. These raised levels caused the River Thames to overtop its banks and back up the River Pang.
- 13.3.3. Another contributing factor to the flooding in Pangbourne may have been the build-up of debris on Whitchurch Weir. Residents reported that high river levels and flows encouraged the transportation of sediments and debris from upstream, which were then deposited on the weir, creating an obstruction to flows. As a result, water was prevented from flowing as efficiently as possible downstream. During WSP's site visit, it was also noted that there is currently no lock keeper for Whitchurch Lock. This meant there was reduced communication to residents on river levels and warnings of flooding, as there has been during previous flood events.
- 13.3.4. Flooding on Mill Lane was likely caused by the lack of maintenance of the grips along the road. During WSP's site visit to Pangbourne, it was noted that the grips had silted up and were filled with sediment, meaning they were no longer effectively draining runoff from the road.

- 13.3.5. One property also experienced indirect flooding from burst pipes after turning off gas, electricity, and water supplies when floodwaters first entered the property. This was then followed by a period of cold weather which caused the pipes to freeze and subsequently burst when the supplies were turned back on.
- 13.3.6. It was also noted that there is a blocked or damaged road gully along Shooters Hill by The Swan Pub, reducing drainage of surface water. This caused runoff to bypass the gully and flow directly into the pub car park. Although it was not the main cause of flooding, it worsened the flood depths experienced in January 2024.

Figure 13-3 – Flooding at Whitchurch Road



13.4 FLOOD DEFENCES / ASSETS

- 13.4.1. Pangbourne currently benefits from a flood alleviation scheme which was implemented in response to the 2013/14 flood event. The scheme involves the use of a spillway that allows the Sulham Brook to overspill into a field located along Purley Rise Road. It was reported that, during the 2024 flood event, no internal flooding was caused as a direct result of the River Pang or the Sulham Brook and therefore it is assumed the flood alleviation scheme was effective in reducing flood risk.
- 13.4.2. Briars Close off the Reading Road also benefits from flood protection barrier around the rear of the properties and no reports of flooding were received from these properties.

13.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 13.5.1. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 13.5.2. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 13.5.3. During WSP's site visit, local residents reported that the Environment Agency cleared debris from the top of the weir on the River Thames after the first set of high river levels. However, at the time of WSP's site visit, river levels had risen again, and we understand that the Environment Agency were unable to clear anymore debris because of health and safety risks.
- 13.5.4. Consultation with the Environment Agency has confirmed that they do not own any specific flood defences benefiting the Pangbourne area however, the River Thames has weirs which are primarily used for navigation purposes but do have an effect on river flows and therefore flood risk. These are operated by trained lock and weir keepers in accordance with procedures to maintain water levels for navigation.
- 13.5.5. The Environment Agency own the Pangbourne gauge that measures river flows and the Whitchurch Lock that measures river levels along the River Thames. However, due to a reset on a site visit in March the data for the Whitchurch Lock is estimated and therefore unreliable. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.
- 13.5.6. The following flood alerts were in place during the 2024 flood event:
 - River Pang from East Ilsley to Pangbourne and Sulham Brook (061WAF21PangSulm) – In force: 04/01/2024 – 18/02/2024 and between 31/12/2023 – 02/06/2024
 - River Thames from Pangbourne to Purley (061WAF23PrlyPang) – In force: 01/01/2024 – 14/01/2024
- 13.5.7. The following flood warning was in place during the 2024 flood event:
 - River Thames at Pangbourne and Whitchurch (061FWF23PngWitch) – In force: 05/01/2024 – 14/01/2024
- 13.5.8. The Environment Agency received five reports of flooding across Pangbourne during the 2024 flood event. This includes internal fluvial flooding from the River Thames of two properties and external fluvial flooding from the River Thames of three properties. Community Information Officers (CIOs) visited Pangbourne on the 4th of January to the 5th of January 2024 to provide advice to the community and gather information on the flooding situation.

- 13.5.9. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Thames within Pangbourne and that there are no plans to carry out improvement works. Furthermore, details of the Thames Valley Flood Scheme have been provided. The scheme, led by the Environment Agency, is investigating the possibility to store water across the Thames catchment. This is likely to include a combination of flood storage and natural flood management currently across approximately 17 locations.

West Berkshire Council

- 13.5.10. A request for information was sent to West Berkshire Council to detail their response to the 2024 flooding events. The information confirmed that no road closures were put in place in early 2024.

- 13.5.11. Representatives of West Berkshire Council visited the Pangbourne area on the following dates:

- 7th of January 2024
- 9th of January 2024
- 12th of January 2024
- 15th of January 2024
- 17th of January 2024
- 19th of January 2024
- 23rd of January 2024
- 25th of January 2024

Royal Berkshire Fire and Rescue Service

- 13.5.12. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) have been consulted for information. RBFRS reportedly did not attend any incidents in relation to the 2024 flood event in this area.

Parish Council

- 13.5.13. During WSP's site visit to Pangbourne, local residents reported that the Parish Council had distributed flood sacks.

13.6 RECOMMENDATIONS

Local Residents

- 13.6.1. Residents should report any highway drainage issues to West Berkshire Council as soon as they become apparent. In addition, any issues with river maintenance, such as debris build up on the weir on the River Thames, should be communicated as soon as possible to the Environment Agency.
- 13.6.2. Residents and business owners affected by groundwater flooding may benefit from the installation of hard flooring and sump pumps or the tanking the property to increase the resilience of their premises, especially basements, during times of high groundwater.
- 13.6.3. Those affected by fluvial flooding may benefit from the installation of flood barriers or doors. Furthermore, some properties that are located directly on the bank of the River Thames, may benefit from the installation of a flood wall to provide better flood protection during times of high flows. General property level resilience and resistance measures should be considered, such as raising plug sockets.

- 13.6.4. Owners of properties with outfalls discharging into the River Thames should consider installing flap valves to prevent backing up of river water. Another option is the use of temporary caps that can be used to cover the outfalls during times of high river levels.

West Berkshire Council

- 13.6.5. It is recommended that WBC should investigate the road gully located at the entrance to The Swan Pub. During WSP's site visit to Pangbourne, it was noted that the road gully was blocked, thereby increasing the risk of road runoff flowing directly into the pub carpark. Remedial works should be carried out to prevent the gully from becoming blocked/damaged again and reduce flood risk.
- 13.6.6. West Berkshire Council should review their current highway drainage maintenance schedule and, where appropriate, increase the frequency of inspections in areas at risk of flooding.
- 13.6.7. A schedule should be put in place for the maintenance of drainage grips across Pangbourne. If this is already in place, the schedule should be reviewed, with grips along Mill Lane and the River Pang highlighted as priority locations for inspection.
- 13.6.8. Another recommendation is a consideration of whether there is sufficient road drainage along Mill Lane, because during WSP's site visit it was noted that there appears to be a lack of drainage features.

Environment Agency

- 13.6.9. A schedule should be put in place for the regular inspection and removal of debris, if necessary, from Whitchurch Weir to prevent flows backing up and flooding upstream. If this is already in place, then the schedule should be updated to allow for more frequent inspections, specifically upon receipt of forecasts of heavy rain.
- 13.6.10. Another recommendation is for the employment of a new lock keeper, since WSP was made aware on their site visit that the role is currently vacant. The new lock keeper would be responsible for communication of river levels and flood risks to local residents.

Parish Council

- 13.6.11. The Parish Council should continue to support local flood wardens in Pangbourne and provide education and communication to local residents on the following:
- How to monitor river levels and flows;
 - How to sign up to the Environment Agency flood alerts and warnings;
 - How to report concerns to the relevant flood risk management authorities;
 - Guidance on effective property flood resilience measures;
 - What to do and when, in preparation for a flood; and
 - Where to find support following a flood event.

13.7 SUMMARY

- 13.7.1. The flooding generally occurred in areas categorised as Flood Zone 2 and Flood Zone 3, according to the Environment Agency's flood maps (refer to Appendix E.10).
- 13.7.2. Table 13-1 summarises the flooding experienced in Pangbourne as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.10 which details the locations of the flooded areas.

Table 13-1 – Summary of Flooding in Pangbourne

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
4	Groundwater & Fluvial.	4	Unknown	0

**Excluding properties recorded as having flooded internally.*

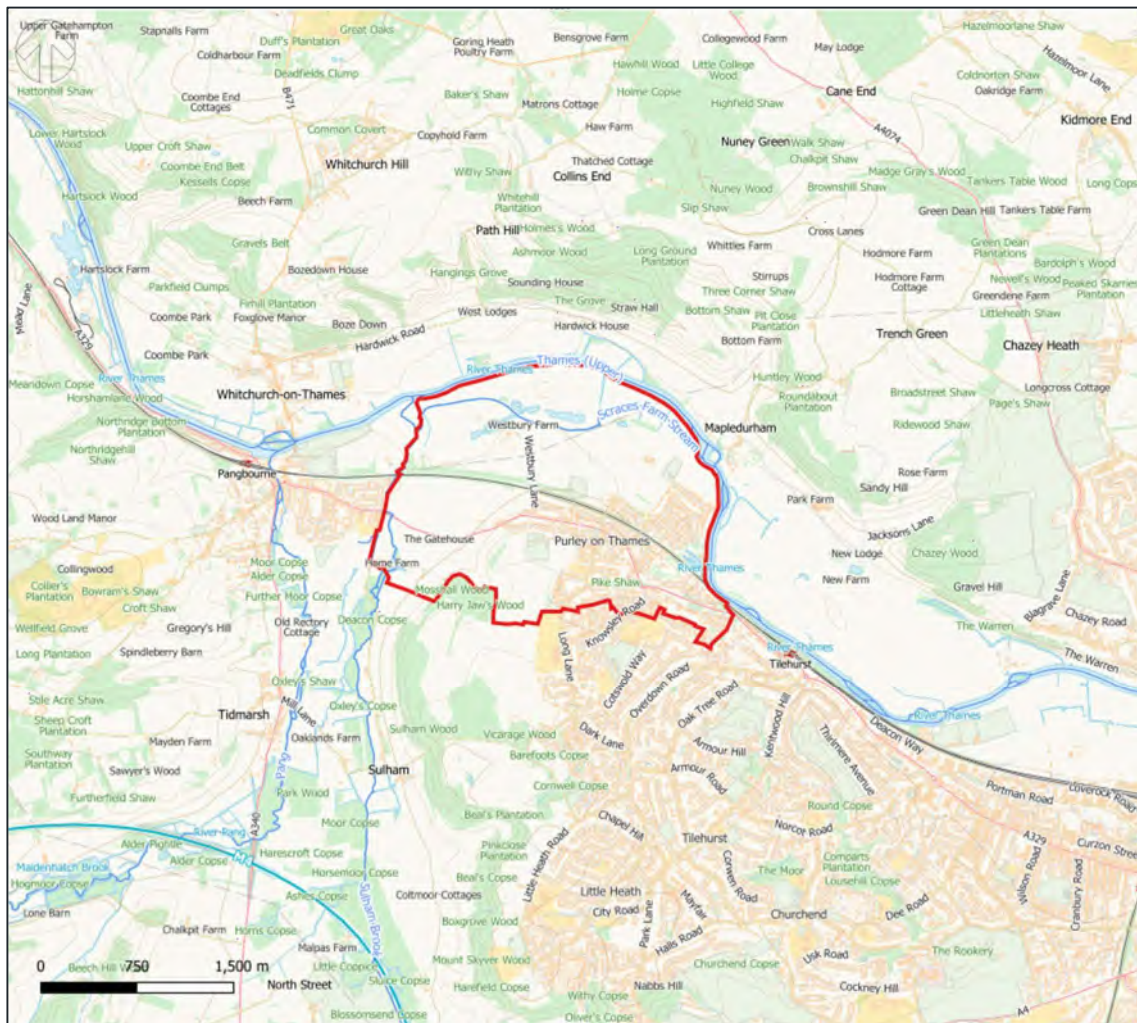
- 13.7.3. West Berkshire Council and the Environment Agency each had flood management responsibilities relating to this event due to the multiple flood sources and assets involved. West Berkshire Council attended the area during the flooding to monitor the situation and enforce road closures where required. Recommendations have been made to help manage the effect of any future flooding events.

14 PURLEY ON THAMES

14.1 LOCATION

- 14.1.1. The village of Purley on Thames is located in the east of West Berkshire and is situated downstream along the River Thames from Pangbourne. The village has a National Grid Reference of 466653, 176284 and is shown in Figure 14-1.
- 14.1.2. The village is situated on the south side of the River Thames. Another waterbody affecting flood risk in Purley on Thames is Scraces Farm Stream.
- 14.1.3. The area most affected by flooding in early 2024 is referred to as Lower Purley, which is the residential area north of St Mary's Church. In comparison to the rest of Purley on Thames, Lower Purley is located in a low point.
- 14.1.4. Flooding has previously occurred in Purley on Thames during the following events:
 - 2000/01
 - 2003
 - 2013/14
- 14.1.5. During the winter 2013/14 flood event, approximately 29 properties were flooded internally and approximately 27 properties were flooded externally across Purley on Thames. Similar to the 2024 flood event, flooding in Purley on Thames was the result of groundwater, sewer, and fluvial sources from the River Thames. Historic flood outlines are mapped within Appendix E.8.

Figure 14-1 – Purley on Thames Location Map



14.2 FLOODING

- 14.2.1. WSP conducted a site visit to Purley on Thames on the 14th of March 2024 and from this it is understood flooding affected large areas of Lower Purley. From questionnaire responses and interviews with the Purley on Thames flood wardens and affected residents, it is understood that approximately 75 properties were flooded either internally and / or externally. Of these 75 properties, approximately 25 were flooded internally.
- 14.2.2. During the 2024 flood event it is believed that fluvial flooding occurred first, followed by groundwater and sewer flooding. WSP is not aware of any internal sewer flooding, however it was reported that most of Lower Purley were unable to use their wastewater facilities effectively.
- 14.2.3. The flooding generally occurred in areas categorised as Flood Zone 2 and Flood Zone 3, according to the Environment Agency's flood maps (refer to Appendix E.8).
- 14.2.4. It is understood that internal flood depths ranged from approximately 250mm to 1.3m in affected properties. Each of the 75 externally flooded properties experienced garden flooding and of these, 41 properties also experienced garage flooding. External flooding is believed to have reached depths of up to 1.5m. In some cases, the source of flooding was likely to have been a combination of one or more of fluvial, groundwater, and sewer sources.

- 14.2.5. It was reported that properties were flooded internally for up to two weeks, although it was noted that some external flooding was still present during WSP’s site visit on the 14th of March 2024. Flood wardens reported that properties located on River Gardens were at highest risk of flooding due to being situated along the bank of the River Thames.
- 14.2.6. Most significantly, fluvial flooding affected River Gardens, where the flow of water and uneven ground became extremely dangerous. Fluvial flooding also affected Chestnut Grove, Wintringham Way, Blount’s Meadow field, The Short, St Marys Avenue, Brading Way, and Bucknell Meadow.
- 14.2.7. Groundwater flooding affected Calleys Alley, Colyton Way, The Short, and Blount’s Meadow field.
- 14.2.8. It is understood that sewer flooding affected St Marys Avenue, between Primrose Close and Chiltern View. During the highest levels, flooding from Mapledurham Drive also flowed to the top end of St Marys Avenue.
- 14.2.9. Flood wardens reported that it was difficult to differentiate whether road flooding was caused by fluvial or groundwater sources, however in many cases it is believed fluvial flooding merged with areas of groundwater flooding.

Figure 14-2 – Flooding at Purley on Thames



14.3 CAUSES

- 14.3.1. Following WSP's site visit to Purley on Thames, it is understood that flooding was caused by groundwater, fluvial, and sewer sources. The winter of 2023/24 has been one of the wettest on record, which has served to elevate groundwater levels for prolonged periods of time in areas of West Berkshire. High groundwater in and around Purley on Thames was noted as a significant contributing factor to the flooding experienced. This was exacerbated by significant rainfall during storms Henk, Isha, and Jocelyn in January.
- 14.3.2. As a result, throughout January and February, levels in the River Thames spiked significantly higher than the typical range. Flood wardens reported that peak flood levels were approximately 2m above normal summer level; the highest recorded since 1947. These raised levels enabled the River Thames to overtop its banks and flood the low-lying area of Lower Purely, notably effecting garages that have been converted into living accommodation.
- 14.3.3. Another significant contributing factor in the 2024 flood event was an overburdened sewer system with reasons likely to be infiltration by groundwater and extreme rainfall.

Figure 14-3 – Flooding at Blount's Meadow



14.4 FLOOD DEFENCES / ASSETS

- 14.4.1. Purley on Thames currently benefits from a flood alleviation scheme which was implemented in response to the 2013/14 flood event. An approximately 1.5m high bund was built in Blount's Meadow to prevent fluvial floodwater from entering the properties along Wintringham Way. Flood wardens reported that usually the bund is sufficient to prevent fluvial flooding from affecting Wintringham Way however, during the 2024 flood event, river levels were higher than the bund. As a result, two properties experienced internal flooding, ten properties experienced garage flooding, and twelve properties experienced external garden flooding.
- 14.4.2. Furthermore, it is believed that although the bund helps to reduce the risk of flooding to properties on Wintringham Way, the water is diverted around its western extent and eventually back down Wintringham Way where it floods the road.
- 14.4.3. 34 Properties in Purley have benefitted from a Defra funded, WBC promoted and delivered property level protection scheme. The scheme was delivered in 2020, and 34 properties were included.
- 14.4.4. As a result of the 2013/14 flood event, it is understood that a temporary A-Frame flood barrier was proposed to be used by the Environment Agency to provide fluvial flood protection to Lower Purley. However, correspondence from the Environment Agency and local flood wardens detailed that following a national review of temporary flood barrier safety, a number of insurmountable safety issues were identified, leading to the withdrawal of plans in Purley on Thames.

14.5 RISK MANAGEMENT AUTHORITIES

Thames Water

- 14.5.1. A request for information has been sent to Thames Water, however no specific response regarding the 2024 flood event in this area has been received.
- 14.5.2. Thames Water reported that proactive planned works, such as cleaning blockages in flood prone areas, are carried out each year. Furthermore, in summer months, Thames Water aim to deliver any work that was identified as required in the previous winter period, such as, to address groundwater infiltration or surface water inundation related issues. Investigations are then carried out over the autumn and winter months in catchments known to have issues with groundwater infiltration and surface water inundation. Thames Water reported having started this work in September 2023 after Swindon received the first storm of the season. Thames Water has reported that it will continue to investigate how water is entering the sewer system and collate information to prioritise works based on likelihood of impact and potential consequences.

Environment Agency

- 14.5.3. A request for information has been sent to the Environment Agency, however no response has been received at this time.
- 14.5.4. During WSP's site visit to Purley on Thames, local flood wardens reported that representatives of the Environment Agency visited Purley on Thames two days after the flooding started, to pump water from the road gullies on Wintringham Way down to the river.
- 14.5.5. In addition to this, flood wardens reported that flood alerts were put in place on the following dates:
 - 1st January 2024
 - 9th February 2024

- 13th March 2024

14.5.6. And flood warnings were issued on the following dates:

- 3rd of January 2024 – 13th January 2024
- 10th of February 2024 – 15th of February 2024
- 21st of February 2024 – 29th of February 2024

14.5.7. During WSP's site visit, local residents reported that the Environment Agency cleared debris from the top of the weir on the River Thames after the first set of high river levels. However, at the time of WSP's site visit, river levels had risen again, and we understand that the Environment Agency were unable to clear anymore debris because of health and safety risks.

14.5.8. Consultation with the Environment Agency has confirmed the ownership of a flood bund behind Wintringham Way (approximately SU6684976381) that was installed after the 2013/14 flood event. Furthermore, in January 2024, the Environment Agency deployed three pumps which operated in Purley on Thames until property flood risk reduced.

14.5.9. The Environment Agency own the Mapledurham Lock gauge that measures river levels however, there is no gauge in the area to measure river flows. The Environment Agency reported that, weirs along the River Thames are adjusted gradually in response to changes in flows, to maintain levels within a range that allows for navigation. In periods of high river flow, and in advance of any significant flooding, the weirs are fully opened so that water is not held unnecessarily. Consultation also confirmed that the Environment Agency has not yet defined the return period of the 2024 flood event.

14.5.10. The following flood alert was in place during the 2024 flood event:

- River Thames from Pangbourne to Purley (061WAF23PrlyPang) – In force: 01/01/2024 – 14/01/2024

14.5.11. The following flood warning was in place during the 2024 flood event:

- River Thames at Purley Village (061FWF23Purley) – In force: 03/01/2024 – 13/01/2024

14.5.12. The Environment Agency received 12 reports of flooding across Purley on Thames during the 2024 flood event. This includes internal fluvial flooding from the River Thames of two properties and external fluvial flooding from the River Thames of two properties. Furthermore, six properties reported external flooding from unknown sources. Community Information Officers (CIOs) visited Purley on Thames on multiple days across January 2024 to provide advice to the community and gather information on the flooding situation.

14.5.13. Consultation with the Environment Agency has confirmed that there were no specific issues or constraints associated with the River Thames within Purley on Thames and that there are no plans to carry out improvement works. Furthermore, details of the Thames Valley Flood Scheme have been provided. The scheme, led by the Environment Agency, is investigating the possibility to store water across the Thames catchment. This is likely to include a combination of flood storage and natural flood management currently across approximately 17 locations.

West Berkshire Council

14.5.14. A request for information was sent to West Berkshire Council to detail their response to the 2024 flooding events. The information received shows that three road closures were put in place as a result of flooding. St Marys Avenue, Wintringham Way, and Chestnut Grove were all closed from the

5th of January 2024, until the 13th of January 2023. Local flood wardens have reported that Colyton Way and Brading Way were also closed as a result of flooding.

- 14.5.15. In addition to this, representatives of West Berkshire Council visited the Purley on Thames area on the 7th of January 2024 and 11th of January 2024.

Royal Berkshire Fire and Rescue Service

- 14.5.16. As part of the investigation Royal Berkshire Fire and Rescue Service (RBFRS) have been consulted for information. RBFRS reportedly did not attend any incidents in relation to the 2024 flood event in this area.

14.6 RECOMMENDATIONS

Local Residents

- 14.6.1. Residents should report any highway drainage issues to West Berkshire Council and any foul and surface water sewer issues to Thames Water as soon as they become apparent.
- 14.6.2. Residents and business owners affected by groundwater flooding may benefit from the installation of hard flooring and sump pumps or tanking the property to give their properties increased resilience from flooding during times of high groundwater in addition to other property flood Resilient measures.
- 14.6.3. Those affected by fluvial flooding may benefit from the installation of flood barriers or doors, if not already in use. General property level resilience and resistance measures should be considered, such as raising plug sockets.

Environment Agency

- 14.6.4. Whilst it is recognised that the flood alleviation bund in Blount's Meadow protected properties in Wintringham Way it is recommended that the Environment Agency consider reviewing and potentially enhancing the design of the bund, either by raising it and / or extending it to prevent it being overtopped and / or bypassed, thereby providing greater flood protection.

Thames Water

- 14.6.5. It is recommended that Thames Water could carry out a CCTV survey to investigate the capacity and condition of the sewer network in Purley on Thames. Once it is understood what is causing the excessive inundation of the sewer system, remedial works could be considered to mitigate it, with sewers in higher flood risk areas being prioritised. Potential works could include the relining of the sewer network using new technologies and the sealing of manholes to prevent surcharging.

Parish Council

- 14.6.6. The Parish Council should continue to support local flood wardens in Purley on Thames and provide education and communication to local residents on the following:
- How to monitor river levels and flows.
 - How to sign up to the Environment Agency flood alerts and warnings.
 - How to report concerns to the relevant flood risk management authorities.
 - Guidance on effective property level protection.
 - What to do and when, in preparation for a flood.

- Where to find support following a flood event.

14.7 SUMMARY

- 14.7.1. The flooding generally occurred in areas categorised as Flood Zone 2 and Flood Zone 3, according to the Environment Agency's flood maps (refer to Appendix E.8).
- 14.7.2. Table 14-1 summarises the flooding experienced in Purley on Thames as a result of Storms Henk, Isha, and Jocelyn. Refer to Appendix A.8 which details the locations of the flooded areas.

Table 14-1 – Summary of Flooding in Purley on Thames

Total No. of Properties Flooded	Source of Flooding	No. of Properties Flooded Internally	No. of Properties Flooded Externally*	No. of Road Closures
75	Groundwater, Fluvial & Sewer.	25	50	5 – St Marys Avenue, Wintringham Way, Chestnut Grove, Colyton Way, and Brading Way.

**Excluding properties recorded as having flooded internally.*

- 14.7.3. West Berkshire Council, Thames Water, and the Environment Agency each had flood management responsibilities relating to this event due to the multiple flood sources and assets involved. West Berkshire Council attended multiple times during the flooding to monitor the situation and enforce road closures where required. Recommendations have been identified to help manage the impact of any future flooding events.

15 STREATLEY

15.1 LOCATION

- 15.1.1. The village of Streatley is located in the north of West Berkshire and is situated upstream from Pangbourne on the River Thames. The village has a National Grid Reference of 459319, 180770 and is shown in Figure 15-1.
- 15.1.2. The village is situated on the west side of the River Thames. The area most significantly affected by flooding in early 2024 is Cleeve Court, which is situated in a topographical low point. To the west of Streatley, steep topography encourages surface water runoff into the village.
- 15.1.3. Flooding has previously occurred in Streatley during the following events:
- 2000/01
 - 2003
 - 2007
 - 2012/13
 - 2013/14
- 15.1.4. During the winter 2013/14 flood event, approximately 12 properties were flooded internally and approximately 14 properties were flooded externally across Streatley. Similar to the 2024 flood event, flooding the result of fluvial (River Thames), groundwater, sewer, and surface water sources. Historic flood outlines are mapped within Appendix E.7.

Figure 15-1 – Streatley Location Map



15.2 FLOODING

- 15.2.1. WSP conducted a site visit to Streatley on the 7th of March 2024 and from this it is understood flooding issues began at the end of December 2023. It is believed, multiple sources contributed to the flooding experienced in early 2024, including fluvial, groundwater, surface water, and sewer. The most significantly affected area is understood to have been land in between Cleeve Lock and Goring Lock, where the River Thames overtopped its banks. This led to a mixture of fluvial flooding and groundwater flooding where springs arose in the agricultural fields to the north of Cleeve Court Road. As a result, residents had to move vehicles to higher ground because flood depths were too deep for safe vehicular access.
- 15.2.2. From questionnaire responses and interviews with the Streatley flood warden and affected residents, it is understood that approximately 6 properties were flooded internally in early 2024. Approximately 4 properties were affected by internal groundwater flooding, including both residential and commercial. This included The Swan Hotel and the basement of St Mary's Church, which is used by local flood wardens for storage of flood equipment, such as sandbags. The Swan Hotel reported being flooded for approximately 15 days from the 5th of January, with flood depths reaching approximately 1m in the lower levels of the property and approximately 10cm in the higher levels of

the property. The Swan Hotel was also affected by fluvial and surface water flooding as a result of runoff from the high street, resulting in a loss of trading. Surface water runoff was also reported on Streatley Hill, which created a current of debris-filled floodwaters. During WSP's site visit, one resident reported being affected by internal groundwater flooding on three separate occasions, including the 5th of January, the 11th of February, and the 15th of February.

- 15.2.3. It is understood that several properties in Cleeve Court suffered internal sewer flooding, as a result of sewage coming up through shower drains. It is believed that the properties in Cleeve Court are fitted with non-return valves, however despite this, at least 2 (possibly 3) properties were still impacted by sewage backflow. In addition to this, all 11 properties in Cleeve Court and 3 properties along Cleeve Court Road, were affected by external fluvial flooding from the River Thames. During WSP's site visit to Streatley, residents reported that the 2024 flood depths were deeper than experienced in previous flood events. It is understood that maximum flood depths in Streatley reached approximately 1m in the gardens of properties located along Cleeve Court Road.

Figure 15-2 – Flooding at Cleeve Court



15.3 CAUSES

- 15.3.1. Following WSP's site visit to Streatley, it is understood that flooding was caused by groundwater, fluvial, surface water, and sewer sources. The winter of 2023/24 has been one of the wettest on record, which has served to elevate groundwater levels for prolonged periods of time in areas of

West Berkshire. High groundwater in and around Streatley was noted as a significant contributing factor to the flooding experienced. This was exacerbated by significant rainfall during storms Henk, Isha, and Jocelyn in January. As a result, throughout January and February, levels in the River Thames spiked significantly higher than the typical range. These heightened levels enabled the River Thames to overtop its banks and flood Streatley, specifically the low-lying area of Cleeve Court.

- 15.3.2. Cleeve Court is served by a local Sewage Pumping Station (SPS). During the early period of flooding, the sewers from Cleeve Court houses to the SPS began to back up, to the extent that there was some sewage in the lower bathrooms of some properties. It is understood that Thames Water investigated at the time and have been engaged in further discussions since. It appears that there was some flood water getting into the sewers and therefore the SPS (although the exact source has not been identified); and the pumps may have stopped due to the overload.
- 15.3.3. Local residents reported that floodwaters have taken a significantly long time to recede during the 2024 flood event. Areas of perched water have remained due to high groundwater levels and surface water runoff, encouraging further flooding. Furthermore, during WSP's site visit to Streatley, drainage ditches were often noted as being overgrown with vegetation and therefore less effective at storing water and directing it back into the River Thames.
- 15.3.4. Although not direct causes of the flooding in early 2024, other issues have been highlighted as concerns by local residents and flood wardens. It was noted that during times of flood the lock telemetry can fail affecting reaction time and that one lock gate did fail during the flooding. Furthermore, it was noted that an accumulation of debris and tree branches in the river channel may be affecting flow capacity, demonstrated by the dead trees along approximately 6m of the Oxford side of the River Thames.