Section 19 Flood Investigation

Flooding 11th June 2023 Hurley, Atherstone

Warwickshire County Council as Lead Local Flood Authority

Version	Date	Issued to
Version 1: Draft	15.08.2023	Flood Risk Management Team
Version 2: Draft	01.12.2023	Partner Organisations
Version 3: Final	02.02.2024	Public

1 CONTENTS

2 EXECUTIVE SUMMARY

Parts of Warwickshire experienced a period of isolated heavy rainfall on 11th June 2023 resulting in internal flooding to property and businesses from surface water county wide. One of the areas affected by this flood event was Hurley, Atherstone. Within Hurley, at least 9 properties internally flooded due to surface water, with businesses also affected. Internal property flooding was also experienced elsewhere in the county which also met the threshold for formal investigation identified in Warwickshire County Council's (WCC) Local Flood Risk Management Strategy (LFRMS). Due to this, WCC have produced separate Section 19 reports for the locations affected.

As required by Section 19 of the Flood & Water Management Act 2010, Warwickshire County Council as Lead Local Flood Authority (LLFA) has a duty to investigate flooding where the appropriate thresholds have been met. Our thresholds for investigation are outlined in our LFRMS and have triggered the requirement for this report.

In the recovery phase that followed, WCC's Flood Risk Management team worked with North Warwickshire Borough Council, Hurley Community Association, Severn Trent Water and WCC Highways to identify affected residents, provide advice and guidance and undertake remedial works to the drainage infrastructure where required. Whilst considerable work has already taken place, some remedial works required are still ongoing. Whilst WCC were able to confirm 9 properties flooded internally, it is suspected more properties were impacted however no response was received when WCC reached out to such properties.

3 INTRODUCTION

3.1 The requirement to undertake this report

Section 19 of the Flood & Water Management Act 2010 (FWMA) requires that the Lead Local Flood Authority (LLFA) undertake an investigation (to the extent that it considers it necessary or appropriate) upon becoming aware of flooding in its area.

The role of the LLFA in Warwickshire is carried out by the Flood Risk Management team at Warwickshire County Council (WCC).

The flood investigation must also determine the risk management authorities (RMAs) that have relevant flood risk management functions and whether each of those authorities have exercised or is proposing to exercise those functions in response to the flood. See Appendix I for the responsibilities of the various RMAs involved in this flood event.

Warwickshire County Council's Surface Water Management Plan (SWMP) identifies the thresholds that will apply when determining whether an investigation under Section 19 of the FWMA is required. These thresholds are as follows:

1. Flooding that poses a threat to the safety of the public or may directly result in serious injury or death
2. Five or more residential properties internally flooded
3. Two or more commercial properties internally flooded
4. One or more piece of critical infrastructure affected that impact on the wider area
5. Flooding that places vulnerable individuals or vulnerable communities at risk e.g. hospitals, care and nursing homes, schools, etc.
6. Where one or more residential properties have flooded internally from the same source on five or more occasions within the last five years

3.2 Scope of this report

This report summarises the completed and ongoing investigations carried out by Risk Management Authorities into the flooding which occurred on June 11th 2023 in Hurley, Atherstone.

This report does not obligate the LLFA or other risk management authorities into resolving the flooding issues investigated herein, nor is it possible for the LLFA to impose others to undertake any of the recommended actions.

3.3 Disclaimer

This report has been prepared as part of WCC's responsibilities under the FWMA. The findings of the report are based on a subjective assessment of the information available by those undertaking the investigation and therefore may not include all relevant information. As such it should not be considered as a definitive assessment of all factors that may have triggered or contributed to the flood event.

The opinions, conclusions and any recommendations in this report are based on assumptions made by WCC when preparing this report including reliance on information provided by others.

WCC expressly disclaims responsibility for any error in, or omission from, this report arising from or in connection with any of the assumptions being incorrect. The opinions, conclusions and any recommended actions in this report are based on conditions encountered and information reviewed at the time of preparation and WCC expressly disclaims responsibility for any error in, or omission from, this report arising from or in connection with those opinions, conclusions and any recommended actions.

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WCC does not accept any liability of any nature and howsoever arising for the use of this report or its contents by any third party. WCC shall not be liable for any loss or damage of whatever nature (direct, indirect, consequential, or other) which may arise as a result of the use of this report by a third party.

Nothing in this legal disclaimer will limit any of our liabilities in any way that is not permitted under applicable law or exclude any of our liabilities that may not be excluded under applicable law.

4 WEATHER AND FLOOD INFORMATION

4.1 Weather and flood warnings

In the days preceding the flood event in question, commencing from 8th June, the Met Office issued several national Yellow and Amber Thunderstorm warnings, in addition to Yellow Rain warnings. All Thunderstorm warnings issued listed Warwickshire and neighbouring authorities as potential areas that may be affected, with the Amber Thunderstorm warning issued on 10th June headlining that heavy showers and thunderstorms would be likely to cause surface water flooding that would impact travel and property.

Due to high temperatures seen across the weekend in question, heavy rain and thunderstorms were expected. Thunderstorms in the UK are often associated with breakdown following hot and humid weather with torrential downpours accompanied by hail and lightning strikes. The thunderstorms were caused by hot humid air resulting from the hot spell being experienced.

Warnings were issued for isolated surface water flooding by the Flood Forecasting Centre, characterised as having the potential for significant impacts and a low likelihood of occurrence. Flood Alerts were also issued by the Environment Agency with regards to rivers across the county, as intense rainfall was experienced across Warwickshire.

From rainfall radar data obtained through Hydromaster, a piece of software which WCC utilises of which provides real time and historic rainfall data from the Met Office, an evident belt of heavy rain can be seen travelling across Warwickshire between 18:00-20:00hrs on 11th June. This band of high rainfall intensity is seen to pass over Hurley at around 19:00hrs. With reference to the images below taken from Hydromaster between the hours of 18:00-20:00 hours, the higher rainfall intensities are denoted through shades or red, purple and pink. Lower intensities are represented through colours of blue and green.

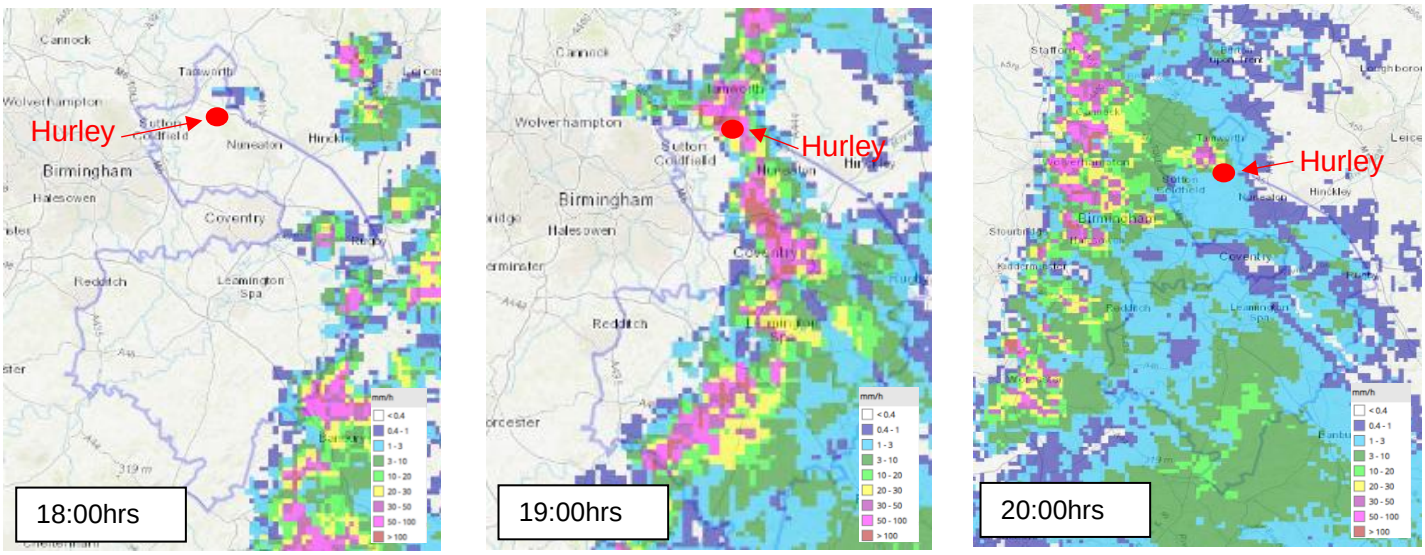


Figure 1 - Rainfall data from Hydromaster representing rainfall between 18:00-20:00 hrs on June 11th 2023. The Warwickshire County border can be seen in the images denoted by a blue outline as the banding of heavy rainfall crosses over the county.

By using Hydromaster, rainfall data of both real time and historical can also be analysed at a localised catchment level, or even analysed within more precise 'pinned' locations. On 11th June 2023, a pinpoint created within Hydromaster at the centre of Hurley provides data representing that a daily rainfall of 29.46mm was experienced within the village. Rainfall levels peaked at 24.8mm/hr between 19:00-20:00 hours. For comparison, as stated by the Met Office within their 'Hazard Manager User Guide', rainfall rates of 4mm/hr or more are deemed heavy. This comparison emphasises the extent of heavy rainfall that fell within quick succession. The below figure represents the total amount of rainfall that fell over the weekend in question, also supporting that peak rainfall fell between 19:00-20:00 hours across Hurley.

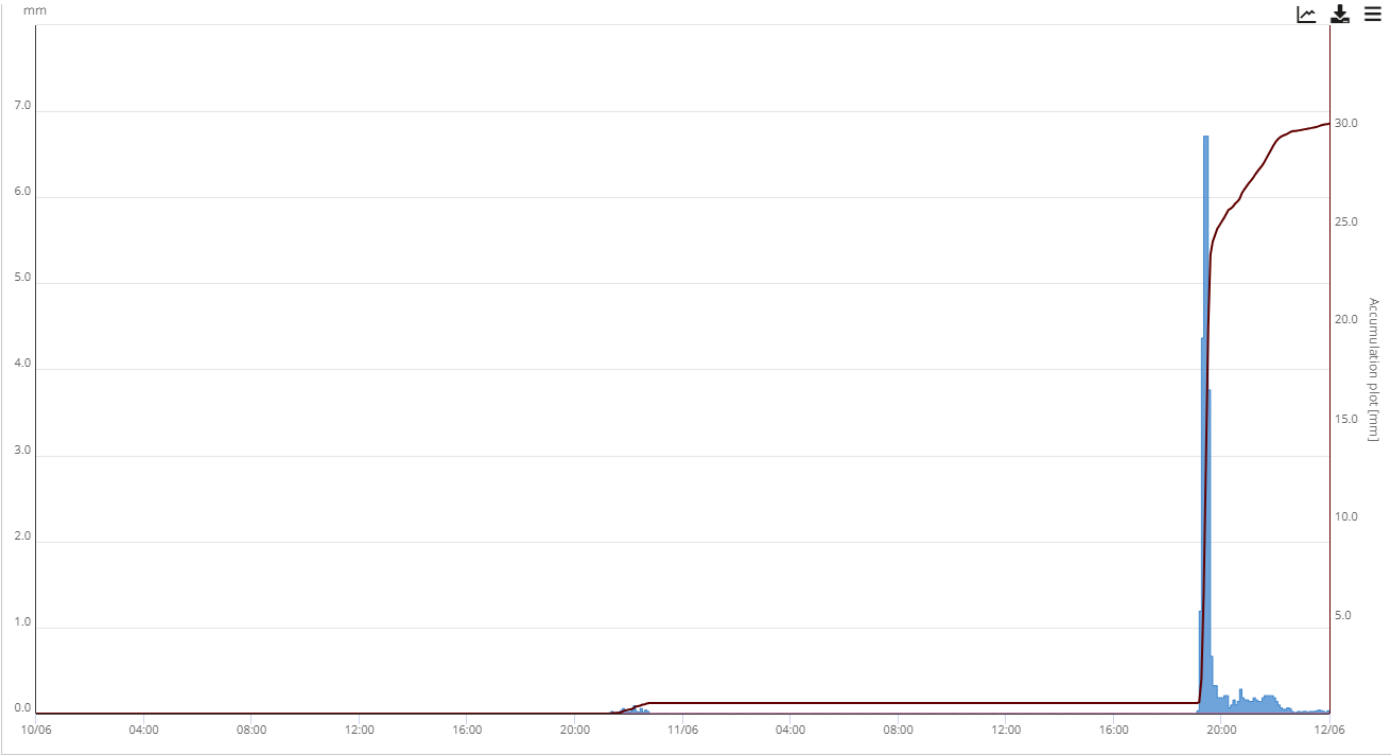


Figure 2 – Hurley rainfall accumulation sourced from Hydrometer over a 48 hour period, showing the rainfall peaking on the evening of Sunday 11th June 2023.

When analysing data at a slightly wider catchment area, the catchment encompassing Hurley also includes sections of the River Blythe and River Anker, and also includes nearby villages such as Wood End, which also reached the threshold for Section 19 investigation by WCC as LLFA. This dataset as shown in Figure 3, indicates that maximum rainfall level totals across the catchment peaked at 92mm across the weekend, resulting in maximum rainfall that would conclude a rainfall event of a 1 in 100 year to 150 year return event probability. Return periods are used to describe the probability of a flood event occurring, with larger numbers being associated with a lesser frequency.

Reviewing the mean values of the catchment, within the initial hour of the flood event, 68mm of rain fell. From this data it can be seen that extreme rainfall was evident.

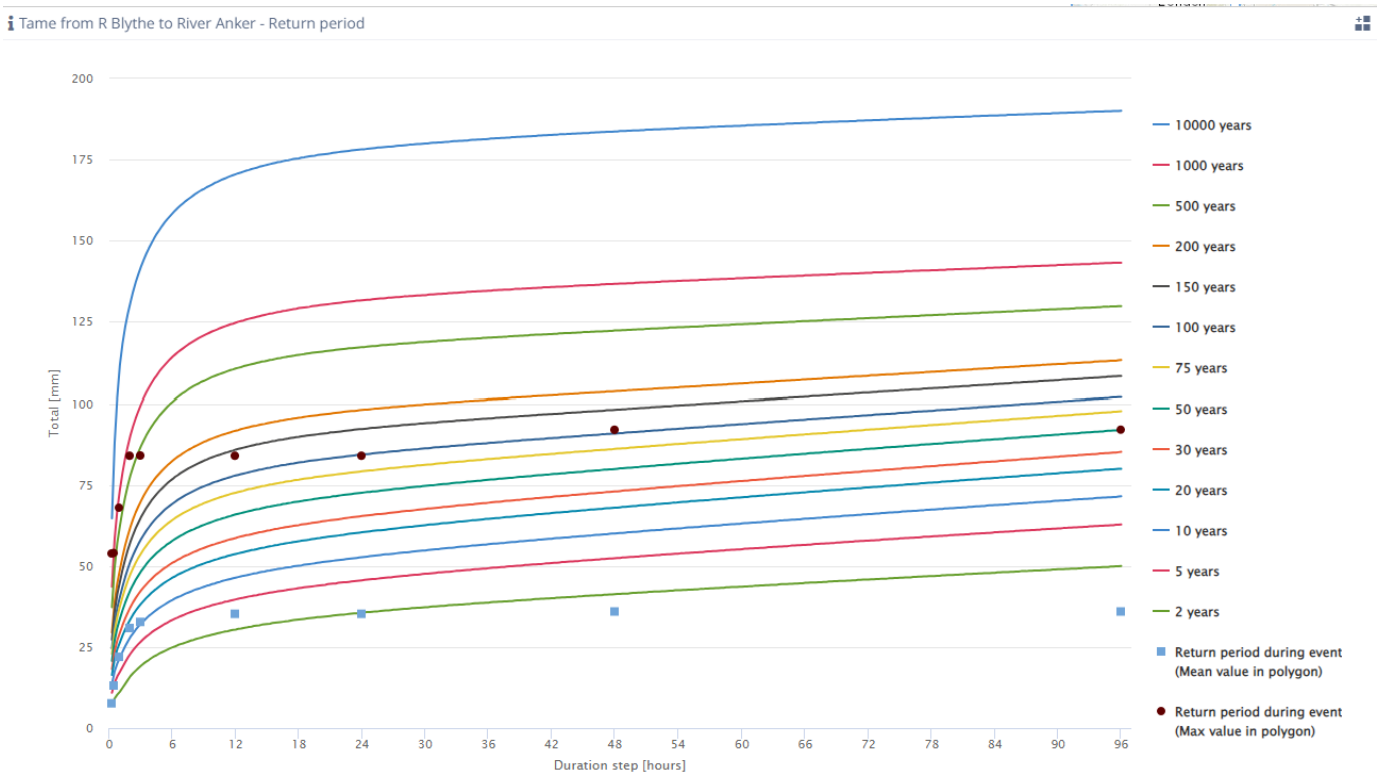


Figure 3 – Return Period mean and maximum values taken from Hyrdomaster for the catchment between 11th-12th June 2023.

Anecdotal reports, in conjunction with reports made from Hurley residents suggest the intensity of rainfall that fell in short succession resulted in highway flooding, several properties enduring external flooding to their gardens and garages, and further properties experiencing internal flooding. Whilst the LLFA received reports across the village of Hurley, two areas with high volumes of reports were Knowle Hill and Kings Close. A comparable amount of flood reports was also received regarding Wood End, which is located 2 miles away from Hurley.

Given the highly localised rainfall associated with an event of this nature, it is therefore conceivable that in the absence of a local rain gauge, that the true intensities discussed above may have been higher.

5 INVESTIGATION SUMMARY

5.1 Locations included in the investigation

The details in this investigation relate only to flooding experienced within Hurley. Flooding experienced in Wood End and other affected areas within Warwickshire will be covered in separate Section 19 reports.

Whilst the below figure encompasses the area within Hurley which received the highest concentration of flood reports and consequentially where investigations were largely focused, the LLFA have also received flood reports outside of the zone highlighted and have investigated such reports and contributing factors appropriately. Our recommendations following this flood event, as discussed within this document consider information contained within all flood reports collated.

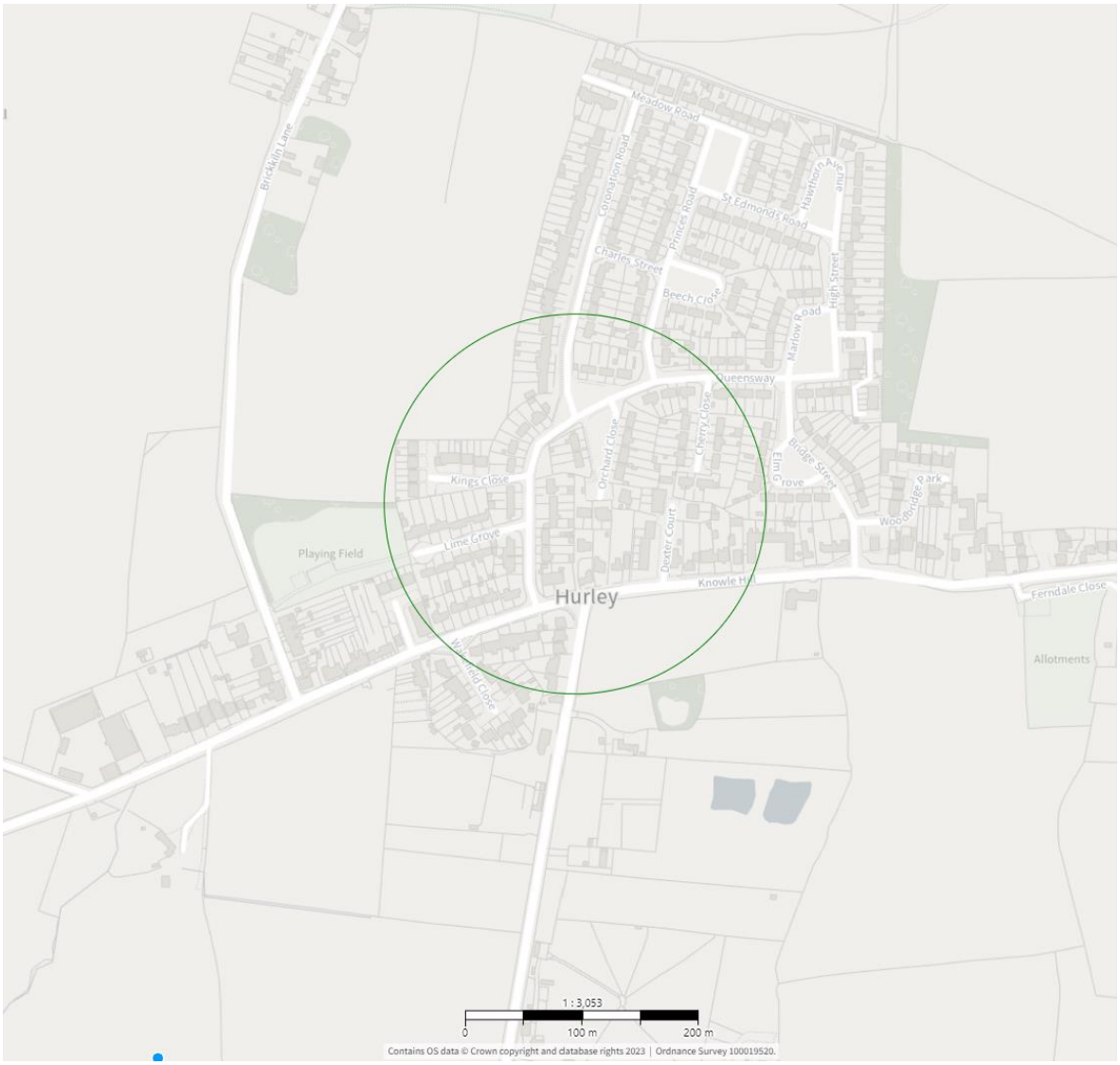


Figure 4 – Map of Hurley showing locations of investigation focus.

6 KEY CONCLUSIONS OF THE INVESTIGATION

6.1 Source of flooding

The flood impacts in Hurley during this event were characterised by short duration high intensity rainfall. When analysing the data available, the majority of rainfall fell across Hurley within a one-hour period, with 29.46mm of rainfall falling over the 24-hour period of the 11th June as stated above, and 24.8mm of that complete total falling between 19:00-20:00 hours.

No fluvial response was reported during this event within Hurley, meaning that reports relating to the flooding of watercourses were not received. The flooding observed instead, resulted from surface water flows and the inundation of artificial drainage networks such as sewers.

Where surface water flows were present, many of the resulting flow routes exploited the built environment, such as the highway, with the resulting effect of channelling water and inhibiting infiltration. This was evidenced by the large amounts of surface water ponding on the highway and routing towards properties as a result of the existing highway drainage systems reaching capacity.

Flooding was reported in two mains areas within Hurley, which are detailed below:

Kings Close

Given the intensity of rainfall and resulting amount of surface water flooding across Hurley, flooding to low lying areas would be expected, and did occur on Kings Close. Kings Close is a small housing development situated off of Queensway with no through road.

Due to the topography of the area, Kings Close is situated at an angled decline. A number of properties sit on low lying land in comparison to the adjacent Queensway road, and Kings Close road itself. Garden flooding was reported at several properties on Kings Close as the gradient of the highway resulted in surface water exceedance flows creating flood paths between properties, and into rear gardens. Internal flooding was also reported across Kings Close, as the volume of surface water and restriction in artificial drainage infrastructure (drains and highway gullies) prevented water from entering the drainage network at a sufficient speed in comparison to the speed in which rain fell. The Severn Trent Water combined sewer system located on Queensway Road was also reported to surcharge, contributing to flood water that travelled towards properties on Kings Close due to the topography of the area. This resulted in exceedance flows also travelling towards the front of properties and entering through front doors.

Kings Close has not been adopted by Warwickshire County Council, meaning that the drainage infrastructure including highway drains located within this stretch of highway remains the responsibility of the developers (or appointed management company) to clear and maintain as necessary. The development does outfall into the Severn Trent Water surface water sewer network, where any issues with the sewer network then become responsibility of Severn Trent Water.

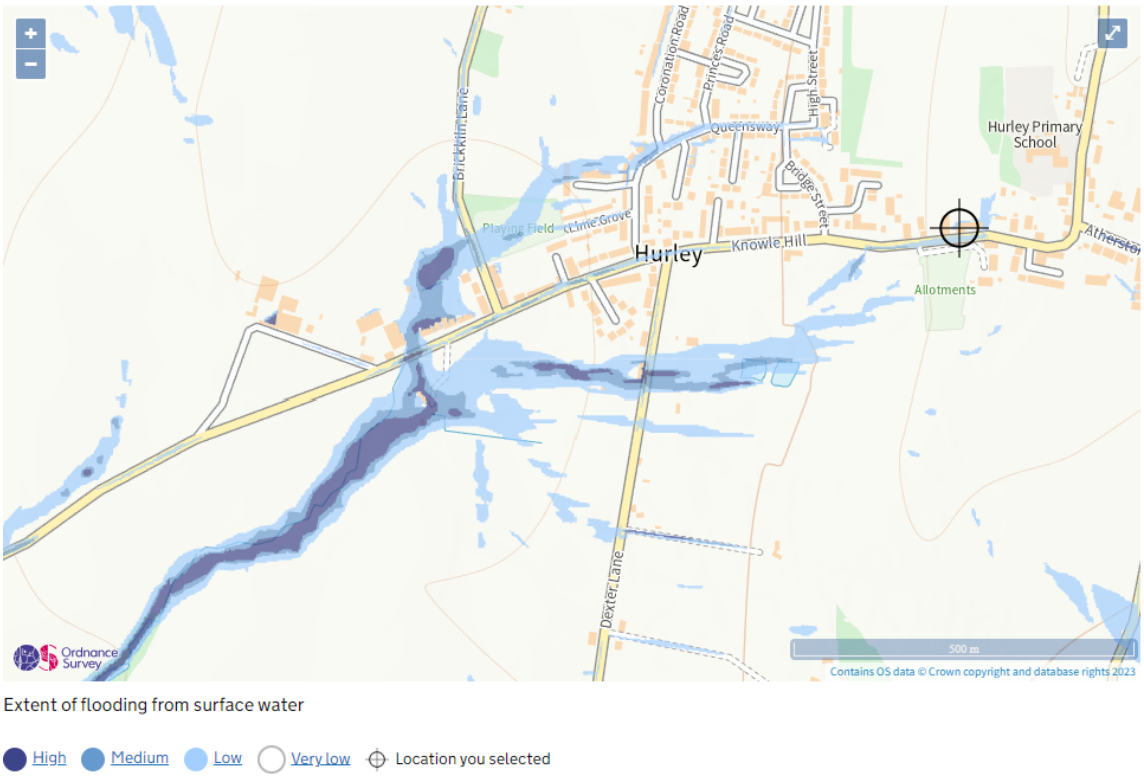
Knowle Hill

Knowle Hill provides a main access route through Hurley, and also sits at a gradual decline. Due to this, a flow route is created which results in surface water travelling down the highway. Many properties on Knowle Hill are set back away from the highway and adjoining footway, however many of the properties themselves have Finished Floor Levels (FFL's) which are lower than the adjacent highway. Due to this, similarly, as discussed above in relation to Kings Close, as the volume of surface water and restriction in artificial drainage infrastructure (such as culverts and drains) prevented water from entering the drainage network along the highway at a sufficient speed in comparison to the rate rain fell, exceedance routes were created. Such exceedance routes led surface water from the highway, over the footway towards a number of properties on Knowle Hill, with surface water entering properties through the likes of front doors and airbricks.

It is also noted that reports also included flooding at the rear of properties due to similar influencing factors and through hydrostatic pressure (groundwater rising through floorboards). Due to the Severn Trent Water combined network reaching capacity, surcharging of the network was also witnessed and contributed to reported garden flooding. From resident reports, the LLFA note the number of properties flooded internally may have been higher, if it was not for residents attempting to move water away from the frontage of their properties. Similarly to Kings Close, due to the Severn Trent Water system reaching capacity due to heavy rainfall, surface water could not be drained away from properties at a sufficient enough speed. The heavy rainfall also affected the capability of the WCC highway drainage.

Figure 5 shows the EA Surface Water Extent Mapping for Hurley. Flood routes can be seen on Queensway and Knowle Hill, which were exacerbated during the storm event.

Figure 5 – Surface Water Extent Mapping, Source – Environment Agency



6.2 Gathering data for the investigation

In the immediate aftermath of the flood events, officers from WCC (Flood Risk Management and County Highways), representatives of North Warwickshire Borough Council and Severn Trent Water attended Hurley to provide advice and to better understand the flooding mechanisms. Several site visits have been held by WCC, and site visits have also been held with local Councillors and the members of the public, including the Hurley Community Association to discuss ongoing issues, and areas of concern.

WCC have been in frequent communication with both internal and external partners to discuss ongoing and planned investigation works to explore contributing factors to the flood event, and possible mitigation measures.

WCC spoke to several residents during site visits, and where residents were not available to talk to in person, questionaries and information packs were left at properties. WCC also had aid from the Hurley Community Association in gathering flood reports from residents, however to date, several questionnaires have not been returned to WCC.

6.3 Summary of investigations

Kings Close

WCC Highways initially attended Hurley village on 13th June 2023 to begin investigations into their own assets including the highways and relating drainage. Due to the highway layout surrounding Kings Close, WCC Highways assessed their assets and jetted their system along Queensway. This is beneficial to the affected properties on Kings Close as by ensuring assets are in a suitable condition on higher land allows for more surface water to enter the drainage network before it travels downwards to Kings Close. As Kings Close is not adopted road, any maintenance required to the drainage infrastructure on and under the highway would fall to the responsibility of the housing company, Platform Housing.

Severn Trent Water also surveyed their network across Hurley and found minimal defects surrounding Kings Close. Representatives of Severn Trent Water have stated that the system reached capacity within Hurley, with the combined system surcharging and flooding out of manholes in areas of the village, with this contributing to the levels of surface water flooding recorded.

WCC FRM attended site several times. Initially, to speak to residents affected by the flood event, to ascertain information regarding flooded properties, and possible contributing factors. As the Kings Close development was built prior to 2015, this precedes the role of the FRM team in reviewing major planning applications. This means that WCC FRM were not consulted on the development and did not provide comments from a flood risk and surface water management perspective. From further investigation, WCC FRM planned a CCTV survey of the drainage network within Kings Close to assess both the condition of the network, and to evaluate if it had been built in accordance with the approved plans. At the point of writing this report, the CCTV survey is yet to be undertaken.

WCC have attempted to contact Platform housing several times to discuss the flood event and possible remedial actions, however no response has been received. Due to

the configuration of the development, ensuring the maintenance of the drainage infrastructure would be beneficial, as well as consideration to the implementation of PFR (Property Flood Resilience) measures such as flood doors and barriers for potential future flood events. Where properties are owned by Platform housing, it would be their responsibility to seek and implement PFR measures.

Knowle Hill

WCC Highways and Severn Trent Water have both undertaken investigative actions regarding Knowle Hill. WCC Highways jetted the highway system within the vicinity of Knowle Hill to clear lines of debris, and also identified a ditch that runs parallel to the highway, adjacent to the properties at the low point of the road. Whilst this ditch is not a WCC asset, clearance works in addition to planned works to increase the size of the culverts within the ditch have been planned by WCC Highways to improve the existing drainage system.

Following flooding in 2020, several houses along Knowle Hill were fitted with PFR (Property Flood Resilience) measures by Severn Trent Water. PFR works by aiding in preventing flood water entering a property, and subsequentially, lessening the damage. Examples of PFR previously fitted within Hurley include flood doors, flood gates and pumps. Whilst these features were fitted, a review of their success and consideration to the implementation of additional measures has been undertaken by Severn Trent Water through a hydraulic modelling exercise. Results of this exercise have not been shared with WCC at the time of writing this report.

Similarly to WCC, Severn Trent Water did survey their drainage network across Hurley including the combined network which runs down Knowle Hill. Across Hurley, defects such as root ingress and slight cracks were identified and spot repairs have been undertaken. As stated above, representatives of Severn Trent Water confirmed that the drainage network reached capacity, causing surface water to collect on the highway, and route towards properties resulting in flooding. The volume of flood water was also worsened by flooding that occurred from surcharged manholes of the combined sewer system.

Whilst the WCC FRM team believe that ordinary watercourses did not have an adverse impact on this particular flooding event, the team have also made contact with riparian landowners where required, to ensure ordinary watercourses within Hurley and its vicinity, are well maintained, and do not influence flooding within the village. Where riparian ownership applies to a stretch of watercourse (including culverted watercourses), sufficient maintenance should be carried out by the responsible owner. Any defects or blockages should be repaired and removed at the earliest convenience, to prevent adverse effects to flooding.

Other areas of Interest

Investigation has been undertaken across Hurley and does not focus solely on Knowle Hill and Kings Close. Severn Trent Water have jetted their sewer networks, including in areas such as Elm Grove, where significant debris was reported.

During village walkovers with other RMA's, discussions have been held as to how Hurley can be better protected from future flood events. In several locations, such as Elm Grove, the incorporation of further highway gullies may be beneficial. Whilst in extreme events such as the flood event that occurred on 11th June, additional gullies would not provide additional capacity of the system itself, in smaller rainfall events they

may aid in lessening the rate and volume of surface water flooding on the highway which subsequentially may result in property flooding.

Discussions have also been held with North Warwickshire Borough Council, as to how flooding may be alleviated in areas with known historical flooding. Conversations as to how works can improve known flood routing, such as along Lime Grove, are ongoing.

WCC has contacted the responsible housing companies such as Platform and Cottons following reports received across the village for further information, and to engage with them about how they can better protect their properties and tenants moving forward. WCC have not received responses from either company despite multiple attempts.

7 APPENDICIES A-B: LOCATION REPORTS

Appendix A: Hurley Location
Appendix B: Hurley Actions and Opportunities

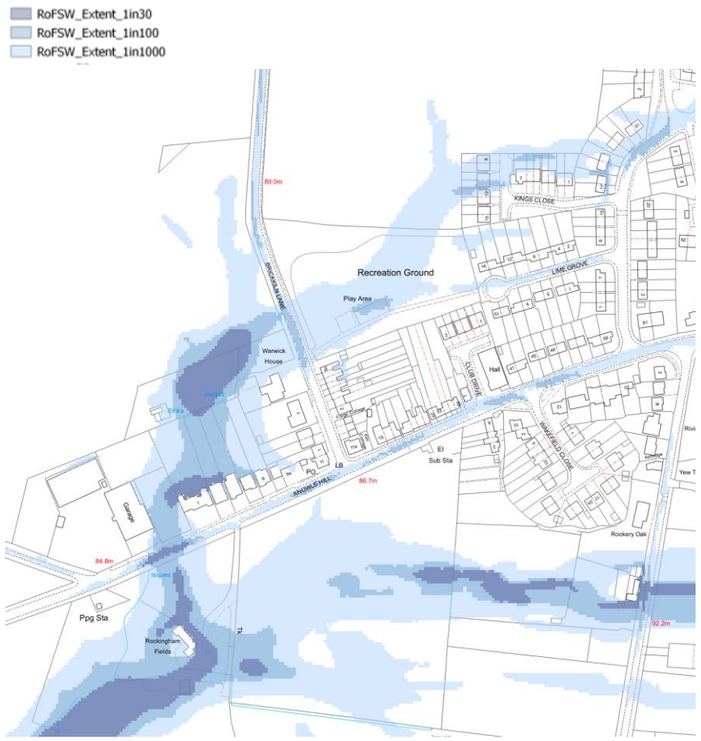
Hurley, Atherstone

What was affected?

Confirmed residential properties internally flooded	9
Confirmed commercial properties internally flooded	1
Properties externally flooded	5

Source of flooding

Surface water	✓
Sewers	✓
Main river	✗
Ordinary watercourse	✗
Other	✗



Source: Environment Agency (Risk of Flooding from Surface Water, Main River Mapping). Note this is modelled information indicative of the main risk areas. It does not indicate the areas that flooded in June 2023. Darker blue shades correlate with higher risk to surface water flooding.

How does the existing system operate?

The village of Hurley is situated in North Warwickshire Borough around 5 miles west of Atherstone.

Whilst the majority of highway within Hurley is adopted, meaning maintenance is carried out by Warwickshire County Council, there are recent housing developments within Hurley in which roads have not been adopted and remain private, such as Kings Close. This means that maintenance and remedial works are the responsibility of the housing development company to organise. Adjacent to the lower end of Knowle Hill, there is a ditch, however this is not the ownership of Warwickshire County Council.

Severn Trent Water have a surface water system that runs throughout much of Hurley, in addition to foul and combined sewers. The combined sewer system crosses through Hurley travelling from south to north. A further combined sewer runs along Knowle Hill and joins the system continuing north. Due to the age of the sewer system within Hurley, foul is collected throughout the village and connects onto the main combined sewer run. The surface water sewer system at the north of the village runs northwards, whereas the rest of the village runs to the west and under the recreation ground and continues southwards, out of the village. It is also noted that as this network leaves Hurley, the piped network discharges into an open watercourse feature and continues as a private asset. This means that it is the responsibility of the riparian landowner in which the network passes through, to ensure the system is functioning and free from defects. Whilst surface water is largely separated from the combined network within the village, surface water is collected in small catchments, and discharged into the combined network that runs across Knowle Hill.

What happened here on 11th June 2023?

Surface water run-off from the surrounding land, highway and properties entered the drainage network across Hurley in quick succession when heavy rainfall started to fall on the evening of 11th June. Due to the significant amount of rainfall, this caused the drainage network to become restricted meaning that the rainfall falling could not enter the network at a quick enough pace. This resulted in surface water flooding in areas of Hurley, which was also contributed to by surcharging of the combined network from chambers located within the highway, and private gardens. This was evident post flood event, where ‘drag’ (remnants of toilet paper) could be seen on the highway gullies.

As a number of properties on Kings Close sit at a lower level in comparison to the height of the highway, flows have then been funnelled towards such properties, finding entry though the front doors and back gardens as flow routes continued down the decline of the road, between properties. Surface water runoff, in addition to surcharge from Queensway contributed to the flood water.

Whilst the drainage network within Kings Close remains private, a CCTV survey has been organised at the request of WCC FRM. The findings will be shared with relative partners accordingly, and the appropriate housing development company to consider appropriate remedial actions.

Similarly to properties on Kings Close, a number of properties on Knowle Hill sit lower than the adjacent highway, some with a ‘step’ down to the property entrance. Due to the drainage network reaching capacity, any additional flows unable to be captured by the Severn Trent Water network and highway gully network pooled on the highway. This water proceeded to overtop the kerb, and eventually flowed towards several properties which flooded both internally and externally. Whilst Property Flood Resilience (PFR) measures were installed to several properties following previous flooding in 2020, this did not prevent flood water entering properties through the likes of brickwork, air vents and through the floors due to hydrostatic tension.

Other areas of Hurley which saw internal and external flooding were worsened by lack of, or blocked, private drainage, which is the responsibility of the homeowner (or management company) to maintain. Across the reports received, a constant stimulus for flooding came from surface water flooding from the highway. Investigation into the highway drainage has followed this.

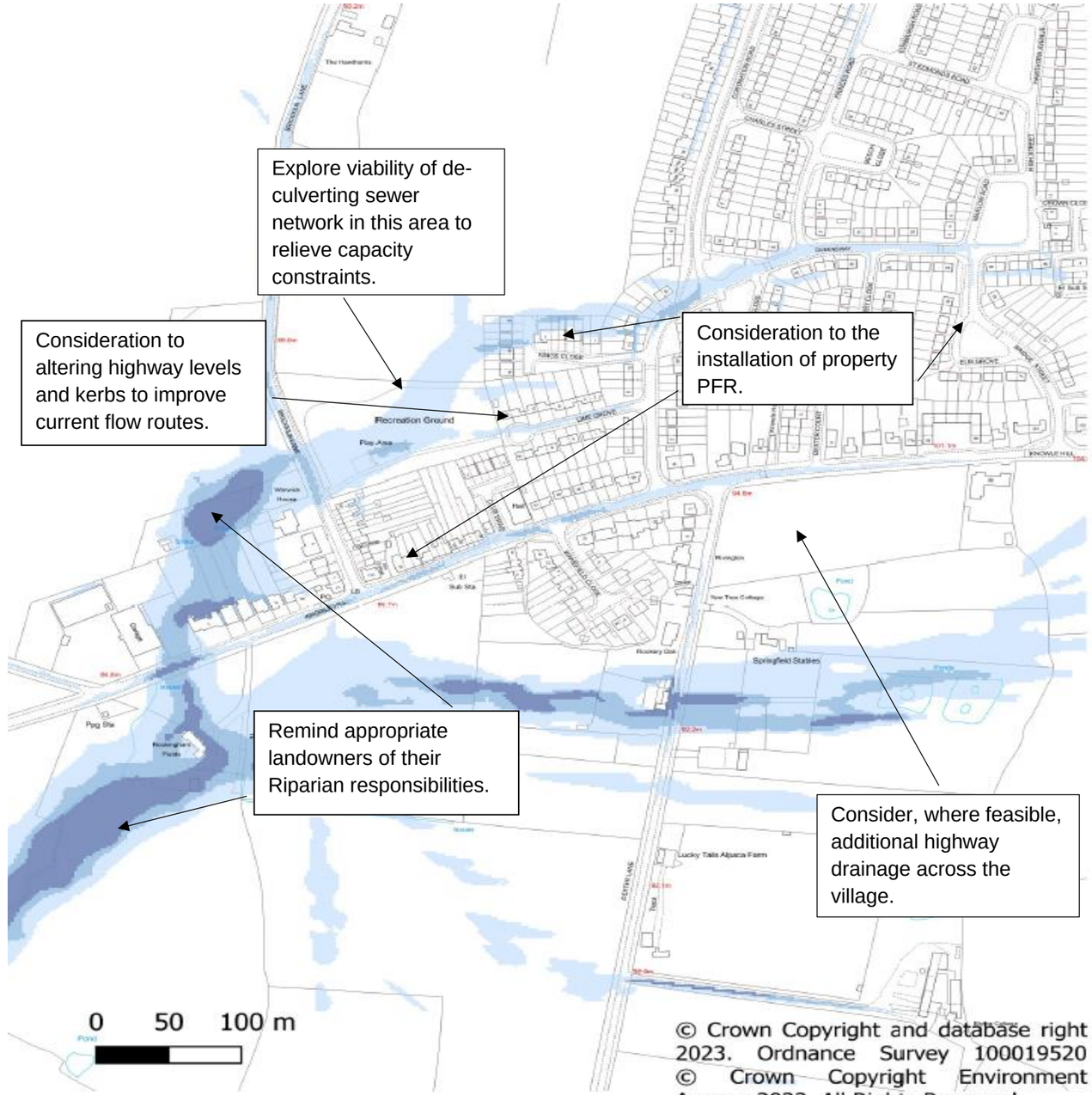
Is there a history of flooding in this location?

WCC as LLFA hold historic records of flooding occurring in Hurley, with standalone reports received relating to highway drainage and localised flooding issues in 2012 and 2021. Records also include flooding from 2020, influenced by surface water run-off. Both internal and external property flooding was endured in 2020, with Severn Trent Water fitting PFR measures in a number of properties following this. Upon investigation, significant root ingress was also found within the Severn Trent Water system, and rectified following the flooding reported to WCC in 2020.

Hurley, Atherstone

No.	Action	Responsible authority	Progress
1	Survey and cleanse of Severn Trent Water network as required to ensure condition and capacity of network. Remedial works such as repatching undertaken as required.	Severn Trent Water	Complete
2	Ensure that highway cyclic gully cleansing is scheduled and undertaken at an appropriate interval on Knowle Hill, and across adoptable highway within Hurley.	WCC Highways	Ongoing
3	Remedial works to be undertaken to ditch adjacent to lower half of Knowle Hill.	Landowner (however remedial works may be undertaken by WCC Highways)	Ongoing
4	Consideration to the implementation of PFR and regular maintenance of drainage features	Housing Companies or homeowner if house has been purchased.	Ongoing
5	Offer advice to residents that have been internally flooded from this flood event.	LLFA	Ongoing
6	Remind local landowners of their riparian duties to maintain watercourses.	LLFA	Ongoing
7	Consider installing additional PFR across effected properties on Knowle Hill.	Severn Trent Water	Ongoing
8	Consideration to altering highway and kerb levels to improve exceedance flow routes and consideration to additional highway drainage.	WCC Highways/ NWBC	Ongoing

What are the future opportunities that may reduce flood risk here?



8 APPENDIX C – GLOSSARY OF TERMS

Critical infrastructure	Infrastructure which is considered vital or indispensable to society, the economy, public health or the environment, and where the failure or destruction would have large impact. Examples include hospitals, communications, electricity sub-stations, water treatment works, transport infrastructure and reservoirs.
Department for Environment, Food and Rural Affairs (Defra)	The government department responsible for policy and regulations on environmental, food and rural issues. This includes all aspects of flood risk management.
Environment Agency (EA)	See Appendix D.
External flooding	Flooding of areas of property that are not under the definition of internal flooding. Examples include gardens, driveways, parking areas and outbuildings such as sheds and garages.
Flood Risk Management (FRM)	FRM aims to reduce the likelihood and/or the impact of floods. This typically includes the following elements: prevention, protection, preparedness, response and recovery. In the context of this report, FRM also refers to the team at WCC which undertakes the LLFA role.
Exceedance flows	Excess surface water flow that occurs when the capacity of the drainage system is exceeded.
Flood and Water Management Act 2010 (FWMA)	Legislation which came into effect in April 2010. The Act takes forward a number of recommendations from the Pitt Review into the 2007 floods and placed new responsibilities on the Environment Agency, local authorities and property developers (amongst others) to manage the risk of flooding.
Internal flooding	Flooding of habitable living or business areas of a property. This does not include gardens and outbuildings such as sheds, garages etc. and not normally basements and porches.
Lead Local Flood Authority (LLFA)	See Appendix D.
Main River	Watercourses designated as ‘main’ are generally the larger arterial watercourses, as shown on the Statutory Main Rivers Map. The Environment Agency has permissive powers, but not a duty, to carry out maintenance, improvement or construction work on designated main rivers.
Ordinary watercourse	A watercourse that is not a designated Main River. On ordinary watercourses the LLFA (or Internal Drainage Board if relevant) have permissive powers, but not a duty, to carry out maintenance, improvement or construction work.
Pluvial or surface water flooding	Caused by rainfall exceeding the capacity of the ground or drainage system and occurs due to water ponding on or flowing over the ground surface before it reaches a drain or watercourse.

Property Flood Resilience (PFR) measures	Measures that are designed to keep flood water out of properties and businesses, and could include flood barriers and doors, non-return valves and airbrick covers. Sometimes also known as Property Level Resilience (PLR).
Riparian landowners	Someone who owns land or property adjacent to a watercourse. Under common law, a riparian owner has a duty to maintain the watercourse and allow flow to pass through freely.
Risk management authority (RMA)	An authority which is defined as such in the Flood & Water Management Act 2010. Such authorities have powers that they can use to carry out their flood and coastal erosion risk management responsibilities. See Appendix I for a summary of these responsibilities.
Risk of Flooding from Surface Water map (RoFSW)	National-scale long-term risk mapping on gov.uk website showing the areas of England at risk of flooding from surface water. Extent, velocity and depth information is available for a range of flood probabilities.
Section 19 Flood Investigation	An investigation of a flood event by the Lead Local Flood Authority under Section 19 of the Flood and Water Management Act 2010.
Severn Trent Water (STW)	See Appendix D.
Warwickshire County Council (WCC)	See Appendix D.

9 APPENDIX D – RISK MANAGEMENT AUTHORITIES

Risk Management Authorities (RMAs) have defined roles and responsibilities with regards to flood risk management, as defined within the Flood and Water Management Act 2010.

All RMAs under the Flood and Water Management Act (2010) have a responsibility to cooperate and coordinate with regards to their flood risk management functions, including raising awareness of flood risk and the sharing of information.

The section below outlines the key roles and responsibilities of the RMAs relevant to this Section 19 flood investigation.

9.1 Environment Agency

The Environment Agency (EA) is responsible for taking a strategic overview of the management of all sources of flooding and coastal erosion in England and Wales. They have prepared strategic plans which set out how to manage risk, provide evidence (for example, their online flood maps), and provide advice to the Government.

They provide support to the other RMAs through the development of risk management skills and provide a framework to support local delivery. The EA also has operational responsibility for managing the risk of coastal erosion and flooding from main rivers, reservoirs and the sea. Main Rivers are defined through an agreed map which is updated annually. These tend to be the larger rivers in the country.

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

9.2 Water and sewerage companies

Severn Trent Water (STW) holds responsibility for managing risks of flooding from water supply and sewerage within the majority of Warwickshire. Thames Water have a small area of responsibility in the south of the county.

Water and sewerage companies (WaSCs) as category 2 responders to national emergencies placing on them duties to share information with other responders in an appropriate manner. They are also responsible for managing risks associated with assets or processes that may cause or be affected by flooding.

Relevant actions include the inspection, maintenance, repair and any works to their water and sewerage assets which typically includes pipes, manholes, attenuation tanks or other infrastructure such as pumping stations.

9.3 Warwickshire County Council as Lead Local Flood Authority

Lead Local Flood Authorities (LLFA) have the lead operational role in managing the risk of flooding from surface water and groundwater.

As a Category 1 Responder under the Civil Contingencies Act the LLFA as a local authority plays a leading role in emergency planning and recovery after a flood event and has plans in place to respond to emergencies, and control or reduce their impact.

Flood risk management functions include (but are not limited to); the provision of a Local Flood Risk Management Strategy (LFRMS) and Surface Water Management Plan, designation and maintenance of a register of structures or features that have a significant effect on flood risk, consenting and enforcement works on Ordinary Watercourses, undertaking works to mitigate surface water and groundwater flooding and undertaking Section 19 investigations.

The LLFA are a statutory consultee on major planning applications for surface water drainage. By working with developers and local planning authorities, the LLFA role is to ensure that runoff arising from major development sites is appropriately managed to avoid increasing flood risk.

9.4 Warwickshire County Council as Highway Authority

WCC also has responsibilities as a Highways Authority which may relate to flooding. Highway authorities are responsible for providing and managing highway drainage which may include provision of roadside drains/ditches and must ensure that road projects do not increase flood risk.

The Highways Authority has a duty under the Highways Act 1980 to maintain existing highways drainage. They also have powers to improve drainage systems but no duty to do so.

Highway drainage systems are designed to take highway surface water. Highway drainage systems are not designed as “storm drains”, and do not have the capacity for the level of rainfall from an extreme flash flood.

9.5 District and Borough Councils

District and Borough Councils can carry out flood risk management works on ordinary watercourses. Through the planning processes, they control development in their area, ensuring that flood risks are effectively managed. This includes the development of plans and strategies to limit or mitigate development in flood risk areas.

Within Warwickshire there are 5 district/borough councils: Stratford-on-Avon District Council, Warwick District Council, Rugby Borough Council, Nuneaton and Bedworth Borough Council, North Warwickshire Borough Council.

9.6 Landowners

Landowners have riparian responsibilities under the Flood and Water Management Act (2010) to maintain and undertake any necessary works on assets on their land (with consent from the relevant RMA) which may have an effect on flood risk including watercourses and drainage assets.

Further information on riparian responsibilities is available on www.gov.uk/guidance/owningawatercourse