

Section 19 Flood Investigation

Flooding on Shuckburgh Grove, Leamington Spa

11 June 2023

Warwickshire County Council as Lead Local Flood Authority

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1 EXECUTIVE SUMMARY

Areas of Warwickshire experienced localised heavy rainfall on the evening of Sunday 11 June 2023. This resulted in the LLFA receiving 12 flood reports of internal flooding to residential properties in Shuckburgh Grove, Leamington Spa for the event which has therefore triggered the requirement for this report.

As required by Section 19 of the Flood & Water Management Act 2010, Warwickshire County Council (WCC) 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 Local Flood Risk Management Strategy (LFRMS). Threshold number 2 was achieved where five or more residential properties internally flooded.

This investigation explores the causes of the flooding, the volume of rainfall received in the area and surrounding catchment, the condition of the existing drainage infrastructure, remedial works carried out and highlights recommendations such as maintenance practices required to help mitigate future flooding.

The impacts of the flooding in Leamington Spa were highly localised however, the LLFA also received reports of residential and commercial flooding in North Warwickshire which will receive their own Section 19 reports.

2 INTRODUCTION

2.1 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 event. See Appendix B for the responsibilities of the various RMAs involved in this flood event.

Warwickshire County Council's Local Flood Risk Management Strategy (LFRMS) 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 live 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.

In this instance threshold number 2 was met on the evening of Sunday 11 June 2023 where 12 residential properties flooded internally, this number is believed to be greater however the LLFA were unsuccessful in gaining communication with a number of property owners and therefore were unable to confirm the properties flooded internally. Letter drops were undertaken in the area on 14th June and 7th July 2023 to gain information from the residents that may have been affected.

2.2 Scope of this report

This report summarises the completed and ongoing investigations carried out by risk management authorities into the flooding which occurred on Shuckburgh Grove on 11th June 2023.

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.

2.3 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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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.

3 WEATHER AND FLOOD INFORMATION

3.1 Weather Conditions

The Met Office issued several national Yellow and Amber Thunderstorm warnings, in addition to Yellow Rain warnings in the days leading up to the flood event on 11th June. These Thunderstorm warnings issued highlighted Warwickshire as an area that may be affected. An Amber Thunderstorm warning was issued on Saturday 10th June highlighting the possibility of thunderstorms and heavy showers.

The UK experienced a prolonged period of warm, dry weather leading up to the event on the 11th June, with temperatures reaching 25°C on the 11th June 2023. Due to these high temperatures, 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.

3.2 Rainfall

Rainfall radar data for Shuckburgh Grove and the surrounding catchments were obtained through Hydromaster, a software which WCC utilises which provides real time and historic rainfall data from the Met Office. A band of heavy rainfall can be seen travelling across Warwickshire on the evening of Sunday 11th June 2023 between 18:00 and 00:00hrs, with Shuckburgh Grove and the surrounding catchments experiencing the most intense rainfall between 19:00 and 22:00hrs. The highest rainfall intensities are displayed through shades of pink, red and purple and lower intensities through shades of blue and green.

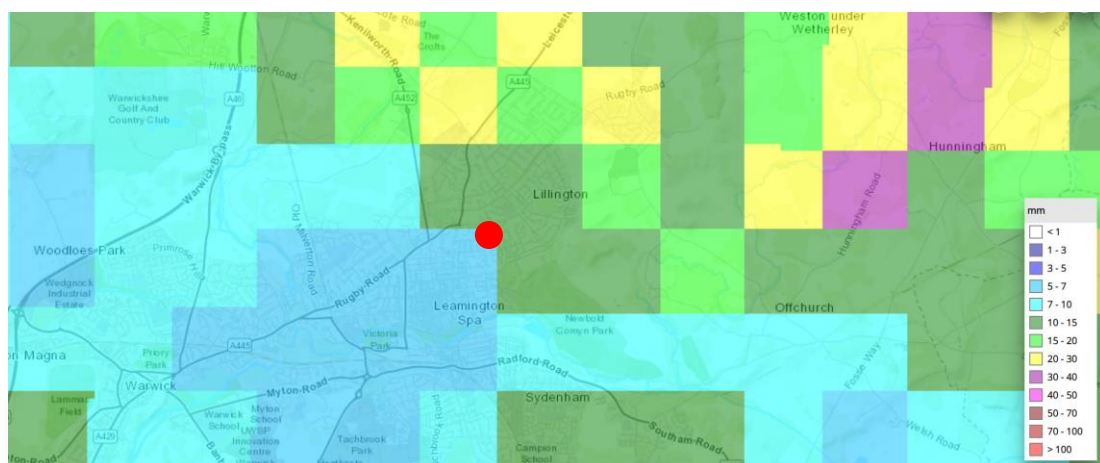


Figure 1 – Rainfall radar data from HydroMaster displaying the 3 hour moving accumulation total between 19:00 and 22:00 on 11th June 2023. The red point shows the location of Shuckburgh Grove.

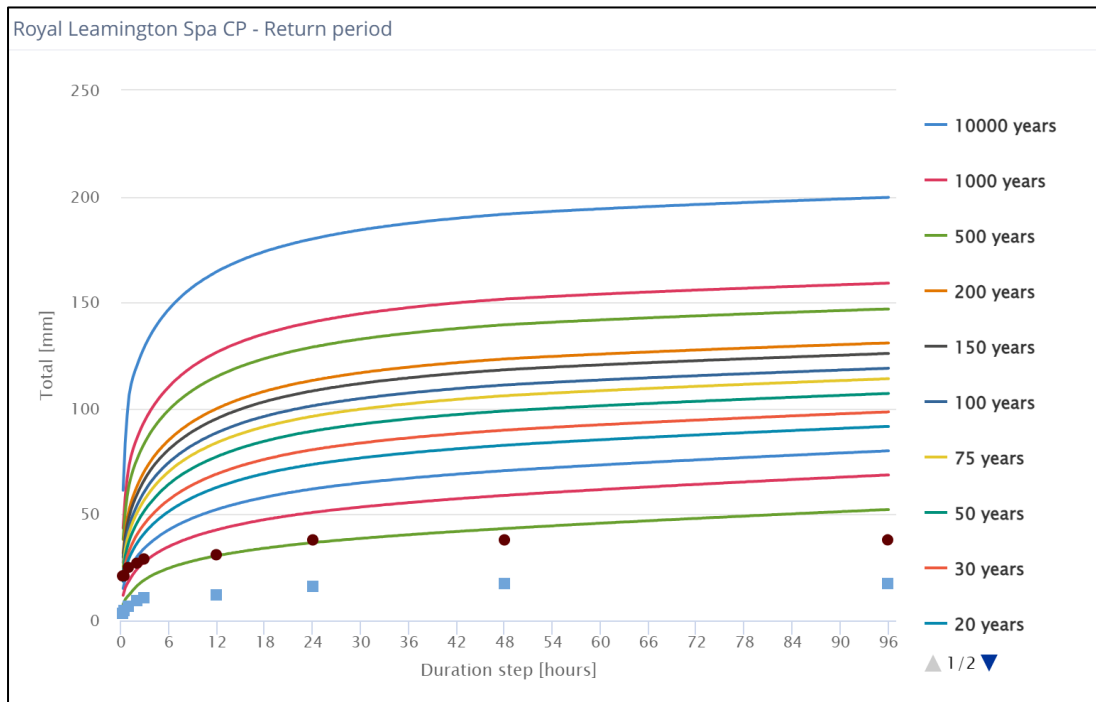


Figure 2 – Return Period mean and maximum values taken from HyrdoMaster for the Royal Leamington Spa catchment between 11th-12th June 2023.

When analysing the rainfall data over a wider catchment area, Royal Leamington Spa had a recorded intensity of 9.7mm/hr, with a total of 29mm of rainfall. This suggests a return period of between > 5 and <10 years this can be seen in Figure 2 above. Return periods are used to describe the probability of a flood event occurring, with larger numbers being associated with a lesser frequency.

Figure 3 shows the return period mean and maximum values over the same period for the catchment of the River Itchen and the River Avon. The intensity was recorded at 18.0mm/hr, with a total of 54mm of rainfall being recorded, suggesting a rough return period for the event of between 50 and 75 years.

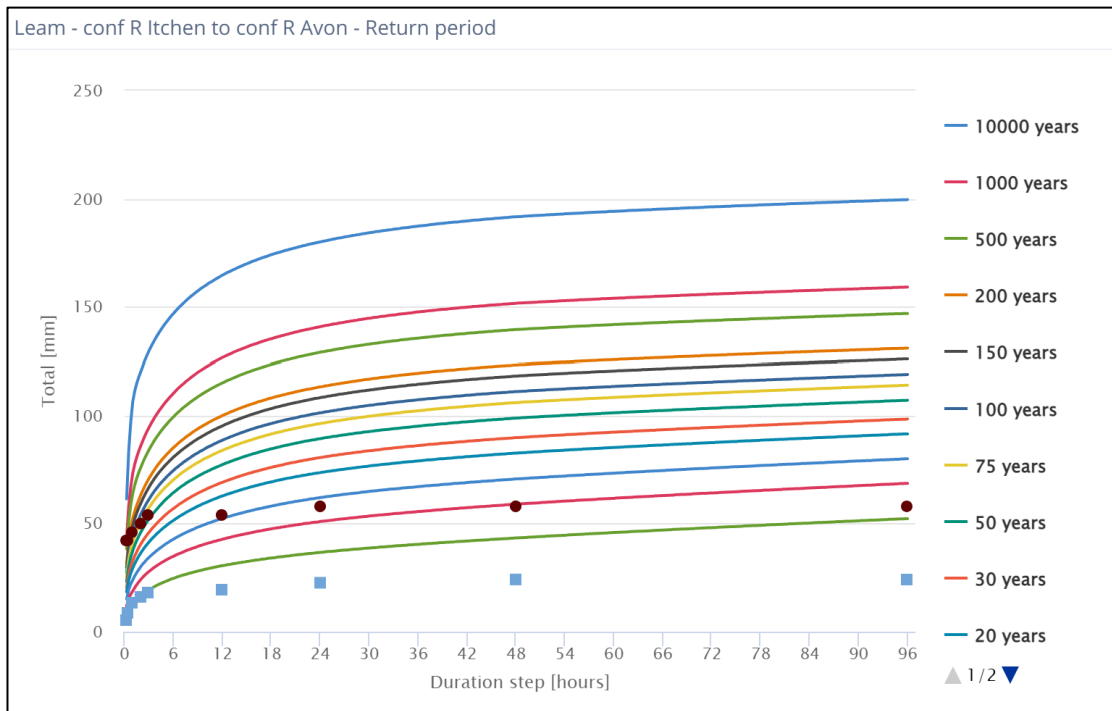


Figure 3 – Return Period mean and maximum values taken from HydroMaster for the River Itchen to the River Avon catchment between 11th-12th June 2023.

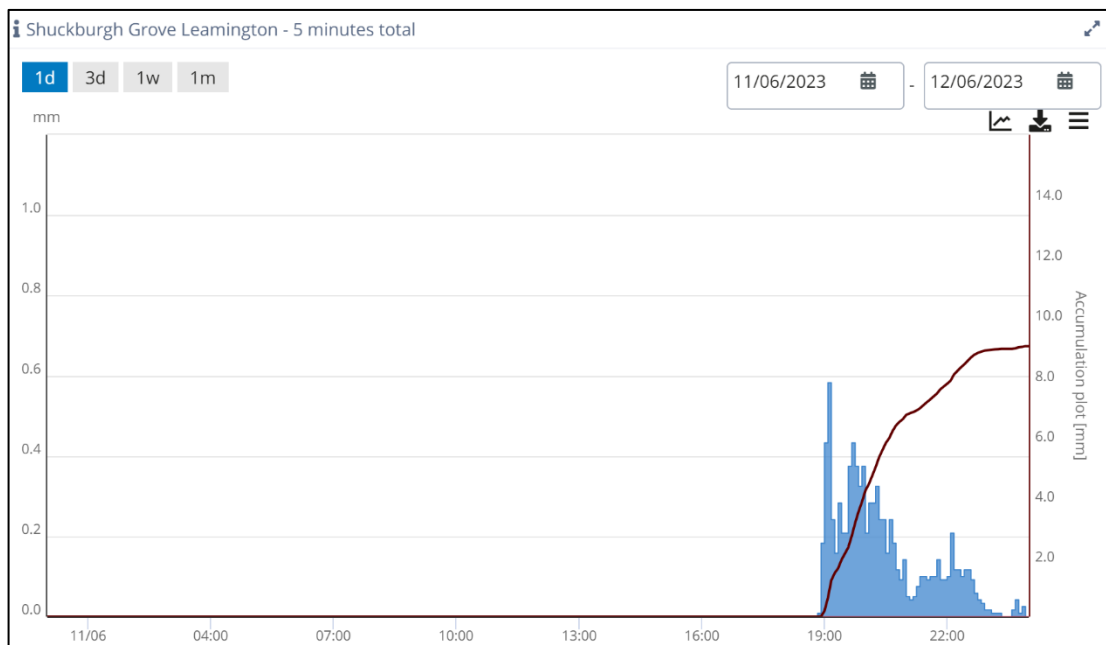


Figure 4 – Shuckburgh Grove rainfall accumulation sourced from Hydrometer over a 24 hour period, showing the rainfall peaking in the early evening of Sunday 11th June 2023.

HydroMaster allows rainfall data of both real time and historical can be analysed at a localised catchment level or analysed within more precise ‘hotspot’ locations. A hotspot was created for Shuckburgh Grove for the event however the rainfall and accumulation values were significantly lower than the surrounding catchment. This shows that the rainfall in the wider geographical area was more intense and will have resulted in water flowing through the catchment towards lower lying areas such as Shuckburgh Grove and potentially overwhelming the system downstream.

INVESTIGATION SUMMARY

3.3 Location of the investigation

The location of this investigation is shown spatially below in Figure's 1 and 2.

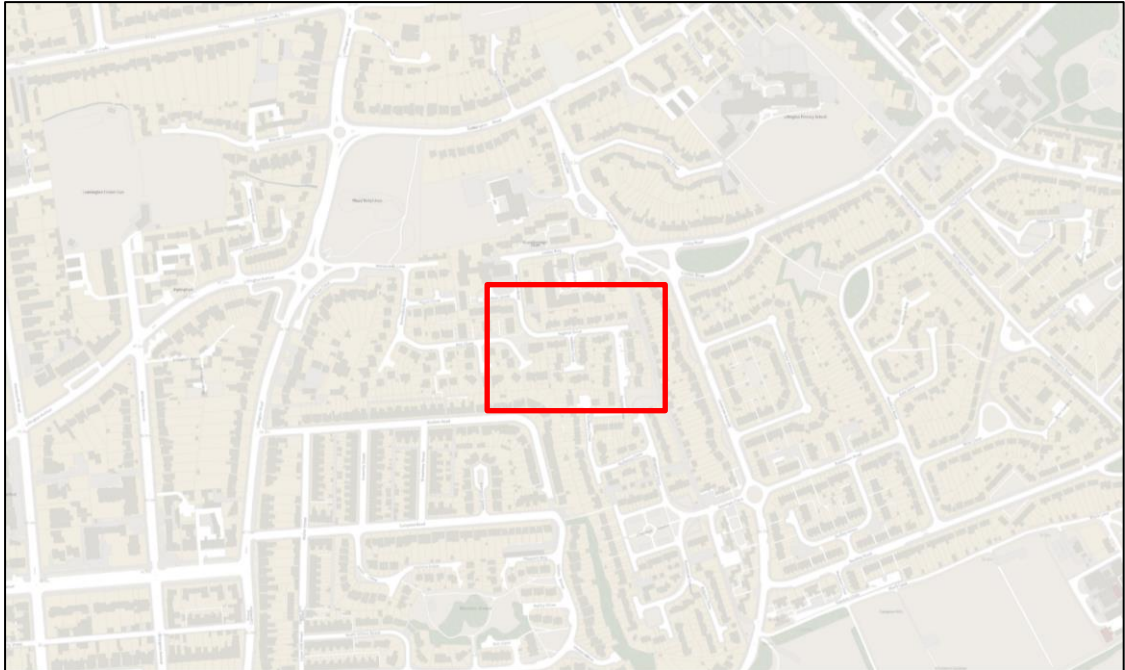


Figure 5 – Area of focus within the red box.



Figure 6 – Area of focus within the red box.

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3.4 Wider impact summary

In total, 34 residential and 1 commercial property(s) were internally flooded in the event on the 11th of June 2023. The impacts of the event on the 11th of June were mainly contained to North Warwickshire, although some reports of highway flooding were also received for areas of Kenilworth and Leamington.

Warwickshire County Council received 12 flood reports from the site of interest on Shuckburgh Grove during this event. The LLFA has also undertaken separate Section 19 investigations into this rainfall event due to the number of internal flooding reports received in Hurley and Wood End as a result.

3.4.1 Highway flooding and drainage

This section details the flood reports received from the wider area by the LLFA regarding standing water on the highways.

Residents of Shuckburgh Grove reported large volumes of surface water run off travelling down Pound Lane and pooling at the junction of Loxley Way, consistent with the area's natural topography. It was reported that the runoff travelled across a small grassed verge area and into the back of properties on Shuckburgh Grove which sit lower than the Highway.

Modern highway gullies, acting as inlets to the highway drainage system, are currently designed to accommodate a rainfall event with a 1 in 5 year return period as per CG 501 Design of highway drainage systems. However historic systems may not be designed to meet this specification. Both Highway and on-site surface water drainage systems may have been exceeded during this flood event. Highway gullies are only small in surface area, so high intensity rainfall cannot always drain to such a small surface area effectively, even if they are running clear.

3.4.2 Severn Trent Water drainage

The LLFA reviewed Severn Trent Water mapping and identified that highway drainage from the surrounding area and Shuckburgh Grove drainage were likely to enter their system. Immediately following on from the flood event, the LLFA informed STW of the potential issues to the surrounding drainage network. STW raised a job to have their assets surveyed for any signs of blockages or damages, a minor cleanse was carried out however the system was in good, working condition and no further action was required.

3.4.3 Pound Lane Training Centre Culvert

Following investigation by both County Highways and Severn Trent Water concluding that there were no blockages or collapses with their assets that could have contributed to the flooding on Shuckburgh Grove; the LLFA instructed the property services team at Warwickshire County Council to survey the culverted watercourse that runs beneath Pound Lane Training Centre, to ensure that there was not a blockage downstream that could have led to the system backing up. This is due to the Severn Trent Water system which takes the highway and Shuckburgh Grove drainage discharges into a culverted watercourse within Pound Lane Training Centre's land.

A full CCTV inspection was conducted on the 10th July 2023. The contactors concluded that the culvert was in good condition apart from one minor issue, however the impact this would have had on the property flooding is negligible. Water was present at the time of the survey in the holding pond within the flood alleviation area, designed to store water and slowly release excess flows downstream.

3.5 Historic Flooding

The LLFA have no record of previous flooding on Shuckburgh Grove, Leamington Spa. There are a number of historic flood reports in the surrounding area. In June 2005, 5 internal property flood reports were recorded on Loxley Way and Gresham Avenue and a single report of property flooding on Gresham Avenue from August 1999.

It should be noted that this may not be the full extent of historic flooding as not all flooding incidences are reported to the flood risk management team or may pre-date our records.

4 KEY CONCLUSIONS OF THE INVESTIGATION

4.1 Source of flooding

4.1.1 Surface Water

Shuckburgh Grove, Leamington Spa is situated in an urban setting with a large percentage of impermeable areas and limited permeable surfacing, apart from small areas of public open space and individual gardens. Following intense rainfall, surface water drainage systems can become overwhelmed by high volumes of water which will follow surface water flow routes.

The site of interest is identified within an area of medium to low risk from surface water flooding according to the Environment Agency Risk of Flooding from Surface Water map (see figure 8 below). However, Loxley Way and Pound Lane are at a high risk. The area surrounding Shuckburgh Grove is predominantly covered with impermeable surfaces and is at a lower elevation than the adjacent highways. This means that rainfall falling on the site and surrounding area will flow and pool towards the site due to the topography. The prolonged warm, dry period prior to the event meant there was lack of ground infiltration on the minimal grassed areas.

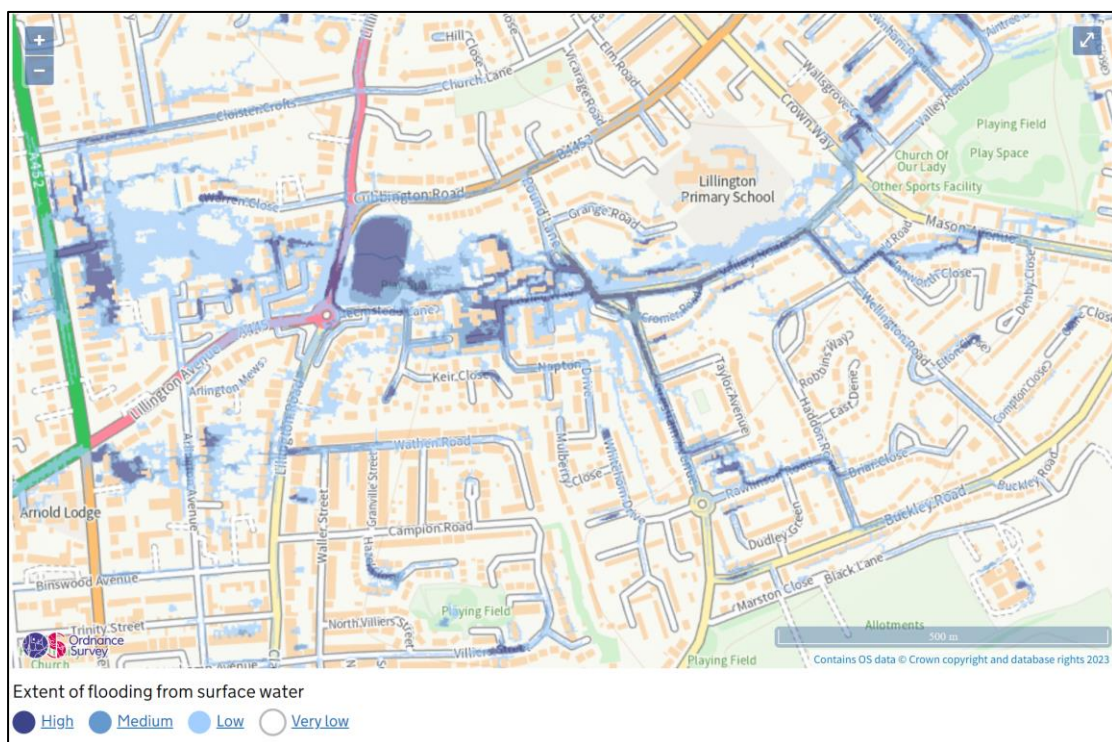


Figure 8: A maps showing the extent of flood risk from surface water in the area of investigation, source: Environment Agency

A number of the residential properties that experienced flooding have a minimal threshold, meaning there is no step up into the building from pathways resulting in surface water exceeding the height of the kerb and subsequently allowing water to enter these properties internally.

4.1.2 Maintenance

The properties in Shuckburgh Grove are predominantly owned by Warwick District Council who have a responsibility to ensure private drains, such as guttering, downpipes and any private below ground drainage are free from blockages. Following the flood event, a job was raised by Warwick District Council for a third-party contactor, Axis to jet and unblock all drainage features around key areas of Shuckburgh Grove as well as the car park and shared drying area.

A large proportion of residents who experienced property flooding highlighted that the individual property downpipes and drains are regularly blocked from leaves, moss and debris from the roof of the buildings. Gutters are also frequently blocked. However, this would not have prevented the flows coming from the highway and into private gardens and properties.

Warwick District Council's property maintenance team were contacted and were unable to provide us with a cyclical maintenance schedule for the area.

4.2 Gathering data for the investigation

Following on from the initial report of flooding, officers from the Warwickshire County Council Flood Risk Management team visited the location to gather information on the extent of flooding and to offer guidance to those affected. Initially, we received a single report of internal property flooding.

The FRM team delivered flood information packs, questionnaires, and details of how to report any flood incidents via email or the online reporting tool. Pictures and videos were also requested to help build a picture of the flood event.

Warwickshire County Council's Highways officers, Warwick District Council property services and Severn Trent Water operatives also visited the location following these incidents for further assessment.

To date the LLFA have received 18 responses to the flood questionnaire which asked residents if their property or business has been flooded and to what extent during the event in June 2023. In total 12 properties confirmed internal property flooding from a combination of face-to-face confirmation on site, questionnaire responses and online reports.

4.3 Summary of investigations

CCTV and jetting surveys of the drainage network surrounding Shuckburgh Grove has been conducted by Warwickshire County Council County Highways team and property services team and Severn Trent Water for their assets. No significant blockages or collapses were reported to the LLFA by the other authorities. All other defects were assessed as deemed negligible. It is the opinion of WCC and partners that all drainage systems were operating as intended at the time of the event and flooding would have still occurred due to the intensity of rainfall in the wider catchment.

5 APPENDICES A AND B: LOCATION REPORTS

Appendix A: Shuckburgh Grove Location

Appendix B: Shuckburgh Grove Actions and Opportunities



What was affected?

Properties internally flooded	12
Properties externally flooded	0
Critical Infrastructure flooded	0

Source of flooding

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

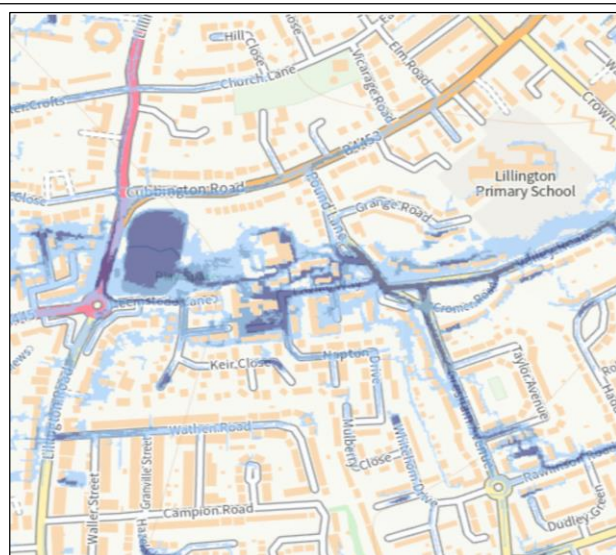
How does the existing system operate?

Shuckburgh Grove is a small area privately managed by Warwick District Council.

A series of WCC Highway gullies take surface water flows off the carriage way on Shuckburgh Grove and Loxley Way and into a STW surface water sewer before it discharges into a culverted watercourse beneath Pound Lane training centre, owned by Warwickshire County Council.

Is there a history of flooding in this location?

WCC as the LLFA hold no record of historic flooding in Shuckburgh Grove, however have 5 reports of flooding in 2005 and 1 in 1999 on Loxley Way and Gresham Avenue. We hold minimal information regarding these flood events however we believe they were both as a result of surface water runoff.



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.

What happened here on 11th June 2023?

A period of prolonged warm dry weather meant that the ground was hard and areas that would typically be permeable were unable to infiltrate rainfall and surface water runoff. This was combined with localised heavy rainfall in the early evening of Sunday 11th June 2023.

Large volumes of surface water run off travelled down Pound Lane, a known surface water flow path, pooling at the junction of Loxley Way. The intense rainfall event resulting in surface water on the highway not being able to enter the drainage network quickly enough. This is not due to a blockage or collapse within the system. The surface run off travelled across a grass verge area and down towards the properties on Shuckburgh Grove which back onto Loxley Way. These properties sit at a lower elevation in comparison to the Highway. As many of the properties at this location have minimal thresholds water was able to enter into properties. Water was also able to enter via the front of properties as many private drains were blocked by leaves and debris, including the shared drying area.

What actions have been/are being taken?

No.	Action	Responsible party	Progress
1	Undertake surveys of the existing drainage network to ensure no blockages or defects	Warwick District Council	Complete
		WCC Highways	Complete
		STW	Complete
		WCC Property Services	Complete
2	Offer advice to residents that have been internally flooded from this event	LLFA	Complete
3	Ensure that Highway gullies are maintained/cleansed at an appropriate cyclical interval	WCC Highways	Ongoing
4	Ensure WDC are carrying out routine clearance works on the drainage assets they are responsible for maintaining	Warwick District Council	Ongoing
5	Consider installing additional highway gullies on the corner of Loxley Way and Pound Lane	WCC Highways	Ongoing
6	Consideration should be given to this location for the installation of retrofit SuDS features.	WCC Highways	Ongoing

What are the future opportunities that may reduce flood risk in this location?



5.1 Appendix C– Glossary of terms

Return Period	This is a technical measure used to indicate how rare and extreme a given rainfall event is. Generally light showers resulting in small water volumes are quite common whereas heavy or prolonged rainfall events resulting in very large volumes of water are rarer. On this basis, the return period quantifies this by giving the probability of a given rainfall event occurring in any given year. For instance, a 1 in 2year event has a 50% or 1 in 2 chance of occurring in any given year and is therefore quite common and unremarkable. A 1 in 100year return period has a 1% or 1in100 chance of occurring in any year and is therefore rarer and more impactful.
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 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.

5.2 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.

5.2.1 *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.

5.2.2 *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.

5.2.3 *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.

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.

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.

5.2.4 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.

5.2.5 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.

5.2.6 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