

## Section 19 Flood Investigation

Flooding in Warwick 12<sup>th</sup> August 2020

Warwickshire County Council as Lead Local Flood Authority

<b>Version</b>	<b>Date</b>	<b>Issued to</b>
Version 1: Draft	October 2021	FRM Team
Version 2: Draft	November 2021	Partners
Version 3: Final	December 2021	
Version 4: Final	December 2022	Public

## CONTENTS

1	Executive Summary.....	2
2	Introduction.....	3
3	Weather and Flood Information .....	5
4	Investigation Summary .....	6
5	Key conclusions of the investigation.....	8
6	Appendix A – Glossary of terms .....	14
7	Appendix B – Risk Management Authorities .....	16

# 1 EXECUTIVE SUMMARY

Warwick experienced a period of intense thunderstorm activity on the 12 August 2020 resulting in 9 reports of internal flooding to residential and commercial properties and triggering the requirement for a section 19 investigation. Strong winds and associated damage were also reported during the event.

This resulted in internal property flooding to 5 commercial premises and 4 residential properties in Warwick. Additionally, the highway at the junction of St Johns, Priory Road and Smith Street flooded, bow waves from cars were evidenced to be caused by drivers speeding through the flood water.

The impacts of the flooding in Warwick were highly localised due to the localised nature of the thunderstorm weather system. Other impacts from strong winds such as damage from fallen trees also occurred during the event.

As required by Section 19 of the Flood & Water Management Act 2010, Warwickshire County Council (WCC) as Lead Local Flood Authority 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) and have triggered the requirement for this report.

The LLFA have gathered further information following this flood event, however due to the COVID-19 pandemic, data has been gathered using non face to face methods wherever possible.

## 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 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

### 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 in the Warwick area on the 12<sup>th</sup> August 2020.

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.

The information in this report is provided “as is” and no warranties, promises, and/or representations of any kind, expressed or implied, are given as to the nature, standard, accuracy, or otherwise of the information provided in this report nor to the suitability or otherwise of the information to your particular circumstances.

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.

## 3 WEATHER AND FLOOD INFORMATION

### 3.1 Weather and flood warnings

The UK experienced extremely hot weather with temperatures in England reaching 35 degrees on the 11<sup>th</sup> & 12<sup>th</sup> of August 2020. A Public Health warning was issued due to the heat experienced during the week of the 11<sup>th</sup> of August and into the week of the 17<sup>th</sup> of August. A thunderstorm warning was in force for parts of England and Wales throughout the week of this flood event. 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 heatwave being experienced.

In addition to intense rainfall, high winds and lightning were experienced during the thunderstorm. Some reports from the event outline rainfall coming through the ceiling and windows of older buildings due to the wind and intensity. Damage was caused to local park buildings due to fallen trees as a result of strong winds.

There were no fluvial (river) flood alerts or warnings in force prior or following the flood event on the 12<sup>th</sup> August.

### 3.2 Rainfall

The rainfall for the event on the 12<sup>th</sup> of August was highly localised due to the popcorn convection, which are showers and thunderstorms formed on a scattered basis with little or no organisation, experienced as a result of heating during the day. Data collected regarding this event suggest that 10-20mm/hr<sup>1</sup> rainfall intensity was experienced with further intensity shown close by of 20-30mm/hr and 30-40mm/hr.

Local rain gauges in the vicinity of Kenilworth and Wellesbourne did not pick up any rainfall on the 12<sup>th</sup> or 13<sup>th</sup> of August<sup>2</sup>, this may be due to inaccuracies with the gauges or demonstrate the narrow area over Warwick and Leamington where the storm developed.

### 3.3 River response

Due to the intensity and localised rainfall river levels at the Warwick gauge did not rise significantly before or during the event. However, it should be noted that the gauge at Warwick on the River Avon is located upstream of the area affected and the St Johns, Saltisford and Racecourse Brooks are currently ungauged. The Environment Agency weekly river flow data showed the Avon to be exceptionally high for the time of year in the week following the event as further thunderstorms developed across the catchment.

---

<sup>1</sup> Met Office (2020)  
[https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2020/2020\\_07\\_august\\_rain.pdf](https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2020/2020_07_august_rain.pdf)

<sup>2</sup> Hydromaster (2020)

## 4 INVESTIGATION SUMMARY

### 4.1 Locations included in the investigation

The location of this investigation is shown spatially below in Figure 1.

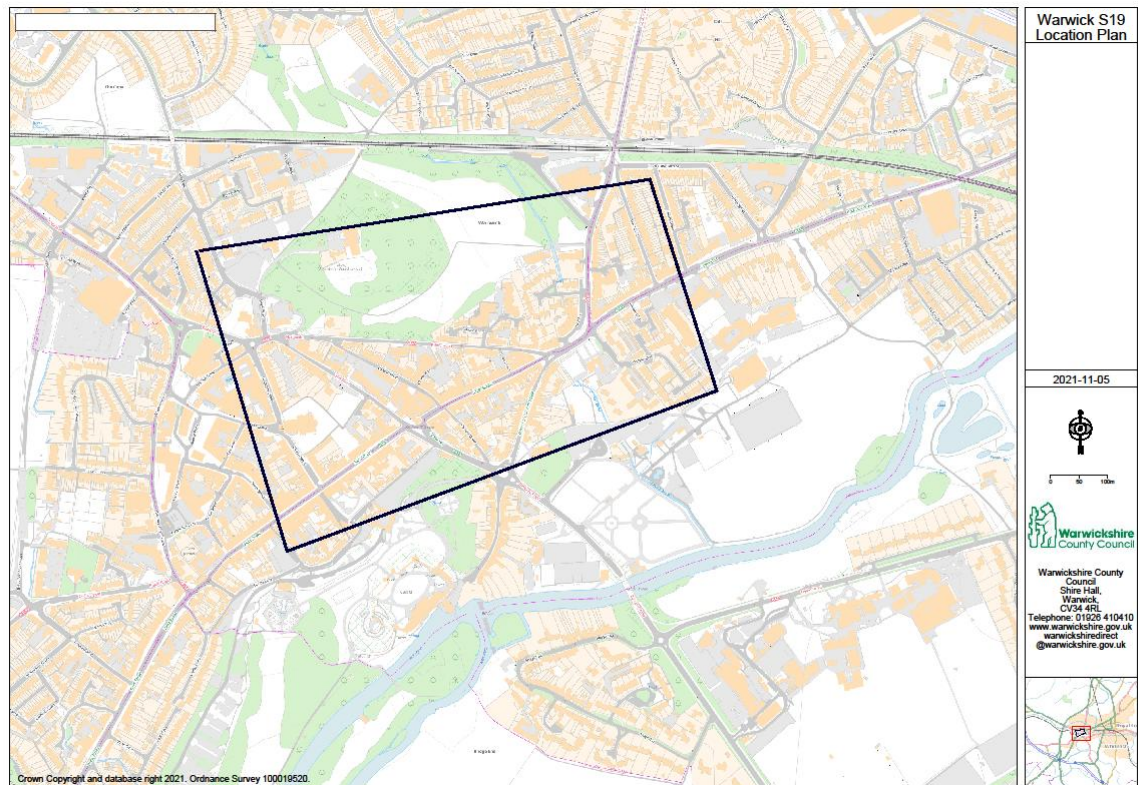


Figure 1 – Plan of investigation areas

In total, 5 commercial premises and 4 residential properties were internally flooded in the event on the 12<sup>th</sup> August, these properties were distributed in the area shown above.

### 4.2 Wider impact summary

The impacts of the event on the 12<sup>th</sup> of August were mainly contained to the town of Warwick, although some reports of highway flooding were also received for areas of Leamington.

The village of Snitterfield suffered internal flooding around the same time due to high intensity rainfall on the 16<sup>th</sup> August. A further section 19 report has been produced for the flood event in Snitterfield by the LLFA.

#### 4.2.1 Highway flooding

The highway at the junction of St Johns, Smith Street and Priory Road became flooded across the junction of the traffic lights, and up to commercial premises, on St Johns to depths well in excess of the kerb height of the carriageway. Videos posted on social

media show the extent of flooding over the entire highway and footway and up to the frontages of business premises along St Johns.

### **4.3 Historic flooding**

Anecdotal data gathered post-flooding from business owners and residents outlined that flooding has been experienced previously, especially prior to the upgrade of the surface water sewer system in Smith Street. Additionally, residents outlined that historically the cause of water ingress was often due to bow waves from cars speeding through flood water otherwise contained within the highway on St Johns. This was also highlighted as one of the main causes of internal flooding during the August 2020 event. Reports from July 2014 report a similar extent of highway flooding at St Johns/Coton End from high intensity rainfall.

Additionally, the LLFA had flooding reported in December 2019 along the St Johns Brook, upstream of the culverted section of the river passing beneath the highway of St Johns. The St Johns Brook is designated main river in this location and as such this report was shared with the Environment Agency as the appropriate Risk Management Authority.



## 5 KEY CONCLUSIONS OF THE INVESTIGATION

### 5.1 Source of flooding

#### Surface Water

Warwick is an urban setting with a large percentage of impermeable areas and limited permeable surfacing, apart from the areas of public open space such as Priory Park. The observed flow routes closely mimic the national Risk of Flooding from Surface Water (RoFSW) mapping for the area, as shown below in Figure 2. The intensity of rainfall meant that surface water was unable to drain to highway and surface water drainage systems and followed surface water flow routes. A number of commercial and residential properties that flooded have level thresholds, meaning there is no step up into the building from the footway and a such surface water that exceeded the height of the kerb flooded these properties internally.

Flow paths could be seen to have cut into footpaths and washed silt out on to footpaths where overland flows had come from Priory Park, which is at a higher level than Priory Road. These are not picked up on the RoFSW mapping, however this was evidence to have also contributed silt to the highway and sewer systems, as shown in Figure 3.

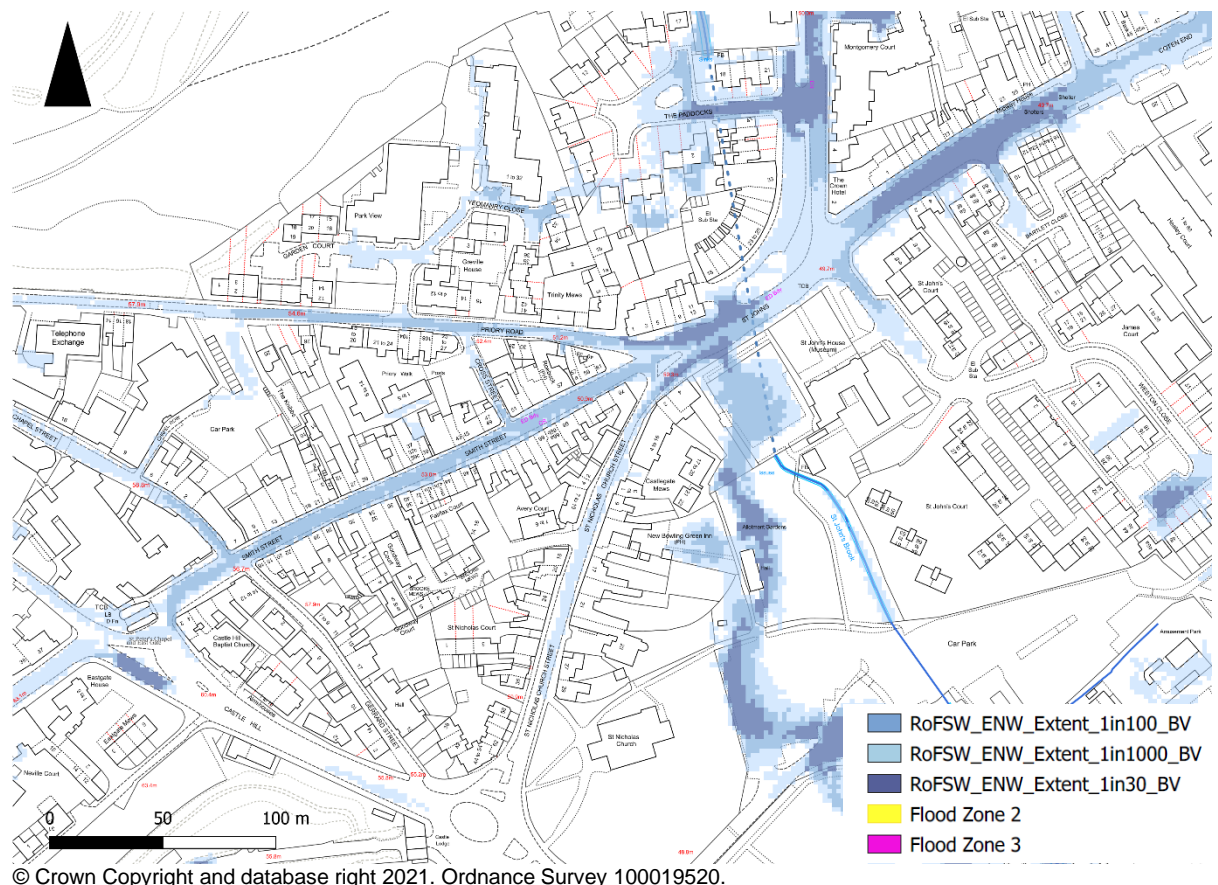


Figure 2 – National surface water mapping showing flow paths down Smith street and Priory Road cumulating at St Johns.



Figure 3 – site photos taken the day after the flood event showing evidence of a flow path from Priory Park issuing on to the highway.

### **Fluvial**

The location of the flooding event in Warwick is at fluvial flood risk from the St Johns Brook as shown in Figure 4. The St Johns Brook is culverted beneath the highway and private property under St Johns and Coton Road. The St Johns brook is designated as a main river and the appropriate risk management authority is the Environment Agency. The St Johns brook is currently ungauged and does not have a flood warning in place for fluvial flooding. No evidence from reports during the event suggests that the sources of flooding during this event were fluvial in nature. Flows were evidenced to follow surface water flow routes previously identified and the St Johns brook was reported to be at a low summer level in the days leading up to the flood event.

Notwithstanding the above, the surface water sewer network and the highway drainage network both discharge into the St Johns Brook culvert and as such if the culvert had been running at full capacity this may have impacted the ability of the surface water drainage to discharge freely. However, as no gauge data is available to show the water level in the St Johns Brook the LLFA has insufficient evidence to determine if this was the case.

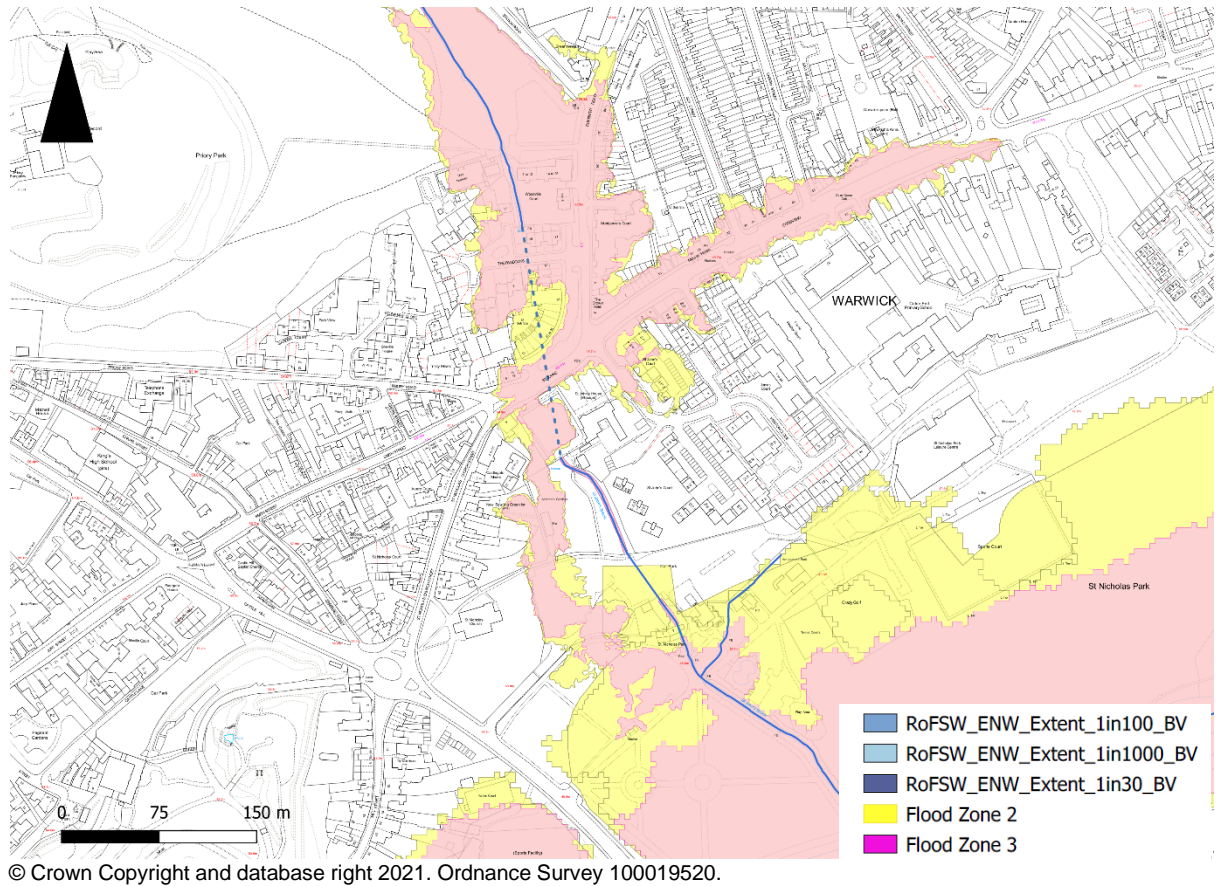


Figure 4 – National fluvial flood risk mapping showing flood risk from the St Johns Brook and the River Avon.

### Surface Water Sewer & Highway Drainage

A surface water sewer was shown to have surcharged and suffered damage as a result of the intensity of rainfall. Previous work has been undertaken to upsize the surface water sewer system in Smith Street, which did not surcharge in this event. However, the system in Priory Road surcharged and damaged the manhole cover in Priory Road as shown in Figure 5 and Figure 6.



Figure 5 – Damage to highway and manhole cover sectioned off on site visit on 13<sup>th</sup> August.



Figure 6 – Damage to surface water sewer manhole cover.

Highway drainage overwhelmed by the rainfall intensity, current highway gullies, acting as inlets to the highway drainage system, are typically designed to a 1 in 10 year return period, however historic systems may not be designed to this return period. The highway system would not have been designed to cope with the intensity of rainfall experienced, previously additional gullies have been installed at the junction of Coton Road and St Johns to try and reduce the incidences of highway flooding. Road users driving through the flooded junction also increased the ingress of water by creating 'bow waves' that increased the amount of surface water overtopping the kerb heights. This has been reported by residents as happening during the August 2020 event and historically.

### Other

Following site investigations following the event, it was highlighted that some properties in Warwick suffered water ingress as a result of the age of the buildings due to the window and doors having limited seals. The wind and intensity of rainfall due to the thunderstorm activity caused water ingress into buildings via this route.

## 5.2 Gathering data for the investigation

The day after the flood event, an officer from WCC FRM team attended the locations included in this report to gather information on the extent of flooding and offer support and guidance to those affected. However, this was difficult in light of the COVID-19 pandemic as information packs were not able to be handed out and speaking to residents and business owners had to be conducted outside at a social distance.

Subsequent to this WCC worked to confirm those properties affected by flooding through a postal letter to limit face to face contact. The LLFA has to date received 28 responses to the letter which asked if their properties had been flooded during the event in August 2020. 3 of the responses confirmed flooding to residential properties during the event which was added to the report received on site by the LLFA of 1

residential property flooding. Many of the returns also mentioned flooding to the highway.

### 5.3 Summary of investigations

A number of the business premises that were internally flooded have level thresholds to the footway with no increase to the finished floor levels from the footway, this meant that there was no protection from surface water ingress. The LLFA recommended to business owners investigating Property Flood Resilience measures or alterations to external doors to mitigate future ingress. This recommendation was also made to one of the residential properties where the finished floor level is below the carriageway/footway level.

As Lead Local Flood Authority, WCC has previously produced a Surface Water Management Plan (SWMP) which is due to be updated alongside the Local Flood Risk Management Strategy (LFRMS). The SWMP is produced using data on historic and predicted flood risk. The reports from this event and this investigation will be fed into the update to the SWMP. The SWMP will then inform future schemes to manage surface water.

A flood warning service on the St Johns Brook is being developed by the Environment Agency and may help by indicate when surface water flooding could be a problem, due to surcharging of the surface water systems which discharge into the St Johns Brook culvert.

The Environment Agency are currently developing a Flood Risk Management Scheme to reduce the risk of flooding to properties and businesses within the St. John's Brook catchment in Warwick. An Outline Business Case is being undertaken to assess a range of potential flood risk management options to reduce flood risk to the Woodloes Estate, Exham Close and surrounding area. The feasibility of options will be carried out in due course and it is very likely that a number of funding streams will need to be explored further, including gaining external contributions, in order for the scheme to go ahead.

Previous work has been undertaken on the Severn Trent Water sewer system in Smith Street, however further investigations should be undertaken into the system in Priory Road and likelihood of damage to the chamber shown in Photo 2 reoccurring. The LLFA have reported the issue to Severn Trent Water for further investigation.

Highway gullies are cleansed on an annual basis, with some gullies in higher risk areas cleansed at more regular intervals. Gully cleansing can be difficult if cars are parked over gullies, this is likely to be an issue given the parking spaces for the town centre along roads identified in this report. An assessment of whether the gullies in the area of investigation require more regular cleansing and if parking can be suspended during gully cleansing should be undertaken by WCC County Highways. Additional gullies have previously been installed to reduce surface water build up on the carriageway of StJohns/Coton Road junction. Investigation into raising kerb heights could also be undertaken to reduce the risk of surface water flowing over the footway.

Planning applications submitted in Warwick Town Centre for redevelopment are required by the LLFA to reduce their surface water discharge rate by 50% as a minimum, where restriction to greenfield rates is demonstrated not to be feasible. A number of planning applications have already been reviewed by the LLFA in Warwick Town Centre which connect to the surface water sewer system upstream of where

flooding occurred. Reducing the discharge rate through redevelopment providing attenuation will ease the pressure on sewer systems by slowing the rate of discharge from existing sites. The LLFA will continue to push for reduction in surface water discharges on brownfield sites through the planning process.

**Recommendations:**

No.	Action	Responsible Authority	Progress
1.	Pass on information regarding Property Flood Resilience Measures to Business and Property owners so they may investigate PFR to mitigate the risk of surface water flooding	WCC FRM	Advice issued to Business Owners/Property owners.
2.	Update historic flood reports dataset with reports from August 2020 event to inform updates to the SWMP	WCC FRM	Complete
3.	Complete repair to surface water manhole cover and chamber in Priory Road.	STW	Complete
4.	Continue cyclic gully cleansing and investigate raising kerbs to reduce the risk of surface water flooding form the carriageway.	WCC Highways	Ongoing
5.	Review of planning applications in Warwick Town Centre to reduce surface water discharge rates.	WCC FRM	Ongoing as applications come forward.

## 6 APPENDIX A – 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 I.
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 B.
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.
Ministry of Housing, Communities and Local Government (MHCLG)	The government department which sets policy on local government, housing, urban regeneration, planning and fire and rescue. They provide funding to and agree expenditure plans for Local Authorities.
National Flood Forum (NFF)	A charity to help, support and represent people at risk of flooding.
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).
Resilient network	Approximately 16% of the total WCC maintained highway network. The resilient network is given priority during severe weather to minimise any impact on economic activity and access to key services.
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 B.
Warwickshire County Council (WCC)	See Appendix B.



## **7 APPENDIX B – 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.

### **7.1 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.

### **7.2 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.

### **7.3 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.

#### **7.4 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.

#### **7.5 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.

#### **7.6 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](http://www.gov.uk/guidance/owningawatercourse)