

2020 Flood Events:
Floods and Water Management Act
2010 Section 19 - Investigation
Great Wyrley, Cheslyn Hay &
Featherstone Staffordshire



This report has been prepared by Staffordshire County Council as Lead Local Flood Authority for Staffordshire County, under Section 19 of the Flood and Water Management Act 2010, with the assistance of Severn Trent Water and the Environment Agency.

This report is based on the information available at the time of preparation. Consequently, there is potential for further information to become available, which may lead to future alterations to the conclusions drawn in this report for which Staffordshire County Council cannot be held responsible.

Document Ref:

**2020 Flooding: Section 19 Flood
Investigation for Great Wyrley
Cheslyn Hay and Featherstone,
South Staffordshire**

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Executive Summary

When made aware of flooding, Staffordshire County Council, in its role as Lead Local Flood Authority, has a duty to investigate the flood to determine the causes of the flooding and determine appropriate actions that may be undertaken by the relevant Risk Management Authority.

A number of storms occurred in 2020 across the Midlands region which impacted many areas, including South Staffordshire District, particularly the villages of Great Wyrley, Cheslyn Hay and Featherstone. Storm Dennis in February was a long duration, low-to-moderate intensity event, causing widespread flooding nationwide. The June and August storms which occurred were typical of summer storms in the UK, being short, intense and highly localised storms.

As a result of these storms, a significant number of flooding incidents were reported to Staffordshire County Council.

Immediately following the events, Staffordshire County Council with the assistance of South Staffordshire District Council, Great Wyrley Parish Council, Cheslyn Hay Parish Council and Severn Trent Water distributed flood questionnaires to all residents within, or in close proximity to areas where flooding was reported or identified.

Staffordshire County Council, in partnership with the Environment Agency and Severn Trent Water, has undertaken an investigation in each of the areas where internal property flooding was reported, to identify the most likely cause of flooding (surface water flooding, flooding from rivers, flooding from sewer infrastructure and flooding from highway drainage).

For each of the areas, the investigation undertaken has been summarised, outlining the extent of flooding reported, the most likely cause of the flooding and what actions that have been identified and are proposed to be completed.

Introduction

A number of storms occurred in the Southern Districts of Staffordshire, and Northern Boroughs of the Black Country, namely Walsall and Wolverhampton in 2020, with the most significant storms occurring on 16th February, 16th June, and 16th and 17th August 2020.

These storms caused widespread flooding to highways and properties across Staffordshire and as a result, Staffordshire County Council has undertaken investigations in the areas where flooding occurred.

This report will aim to provide a broad overview of the causes of flooding in February, June and August 2020, and identify any next steps that can be taken.

Lead Local Flood Authority

Following Royal Assent of the Flood and Water Management Act in 2010 (FWMA), Staffordshire County Council (SCC) became the Lead Local Flood Authority (LLFA) for Staffordshire. As such, SCC is responsible for the management of surface water flood risk, groundwater flood risk and the flood risk from ordinary watercourses. An ordinary watercourse is defined as any watercourse not designated as 'Main River,' i.e. watercourse that are not managed by the Environment Agency.

As LLFA, SCC is required to work in partnership with other agencies and authorities to manage flood risk. These agencies and authorities include, but not exclusively:

- Environment Agency, who holds responsibility for Main Rivers;
- Severn Trent Water, who holds responsibility for the public sewer network;
- Emergency service providers; and,
- Other public agencies and bodies.

Section 19 Requirements

The FWMA also places a duty on Lead Local Flood Authorities to investigate incidents of flooding. This is set out in Section 19 of the act and the investigations are therefore typically termed '*Section 19 Reports.*' The Act states:

- 1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate
 - a) Which risk management authorities have relevant flood risk management functions, and
 - b) Whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.
- 2) Where an authority carries out an investigation under subsection 1) it must
 - a) Publish the results of its investigation, and
 - b) Notify any relevant risk management authorities.

It should be noted that not all flooding will require a formal investigation and report.

SCC has set out in its *Local Flood Risk Management Strategy*, the process which will be used to determine to what extent it considers is 'necessary or appropriate' to investigate and what constitutes a significant flood event. The Strategy can be found at <https://www.staffordshire.gov.uk/environment/Flood-Risk-Management/Local-Flood-Risk-Management-Strategy.aspx>

Stage 1 is an initial assessment, sufficient to ascertain with some confidence the extent of the flooding consequences. The second stage is to carry out a detailed investigation of the sites where it has been deemed necessary and appropriate. Reporting and publishing is the third, and final, stage. These stages may be described as: -

- Stage 1: Initial assessment
- Stage 2: S19 Investigation
- Stage 3: S19 Report and publish

It follows that there will be requirements for coordination and cooperation between Risk Management Authorities at each stage and, where required, following the outcome of a S19 Investigation. This will be undertaken via day-to-day officer communication, and through the LLFA's governance process for flood risk management.

Flood Investigation Methodology

SCC will undertake/coordinate a Flood Investigation in accordance with Section 19 of the Flood and Water Management Act (2010) when one or more of the following thresholds are exceeded.

Consequence Staffordshire Flood Investigation Thresholds: -

Human Health Flooding of 5 residential properties

Economic Activity Flooding of 2 businesses

Critical Services Flooding of 1 critical service or the marooning of one critical service, or

Road and Rail The flooding of a motorway or strategic road where it is closed for over 2 hours

Environment - Harmful consequence to 1 nationally or internationally designated site or nationally or internationally recognised heritage site

SCC may investigate flooding outside these categories, but only when all outstanding issues with a higher priority have been considered. These guidelines set numerical thresholds, however, in recognition of the fact that all floods will be different; a certain amount of discretion will be required in order to implement this policy effectively.

This policy only relates to how flood investigations will be prioritised and does not guarantee that any flood risk mitigation works will be installed at the locations where investigations are undertaken.

This report has been based on the number of reported incidents of flooding; however, it is likely that the actual number of incidents of flooding was higher than that reported. This data is the best currently available and continues to be verified and quality checked for accuracy.

February 2020

As a result of Storm Dennis in February 2020, more specifically the storms that occurred over the weekend of 15th and 16th February 2020, widespread flooding occurred across the whole West Midlands region including Staffordshire. Numerous incidents of flooding were reported, ranging from waterlogged gardens, impassable roads, and water inundating highways. Numerous watercourses breached their banks, and combinations of all these factors resulted in internal property flooding.

From analysis, the Storm Dennis flood event on the 15th and 16th February was characterised as long duration, low to moderate intensity rainfall, spread over large catchments, typical with winter rainfall storm events. Some rain gauges recorded a significant total rainfall

DEFRA Environment Agency rain gauges on Cannock Chase recorded daily (24hr) total rainfall as 17mm on during the day of 15th February, and 37.2mm falling on 16th February.

June 2020

As a result of the storms in June 2020, more specifically the thunderstorms that occurred during the early evening on 16th June 2020, widespread flooding occurred across South Staffordshire. Numerous incidents of flooding were reported, ranging from waterlogged gardens, impassable roads and water outflowing from highway gullies to watercourses breaching banks, manholes and sewers surcharging and internal property flooding.

From analysis, the events recorded on the 16th June were of high intensity and highly localised which is consistent with storms typically experienced in summertime. Some rain gauges recorded a significant total rainfall depth

Rain gauges on Cannock Chase recorded daily (24hr) total rainfall as 25mm during 24 hrs on 16th June 2020. The intensity of these storms can be illustrated by the recording of 11mm of this daily rainfall falling over just a 60-minute period. Similarly rain gauges at Brownhills recorded daily (24hr) total rainfall as 43.4mm during 24 hrs on the day of 16th June, with a recording of 32.4mm of this daily rainfall falling over just a 60-minute period.

August 2020

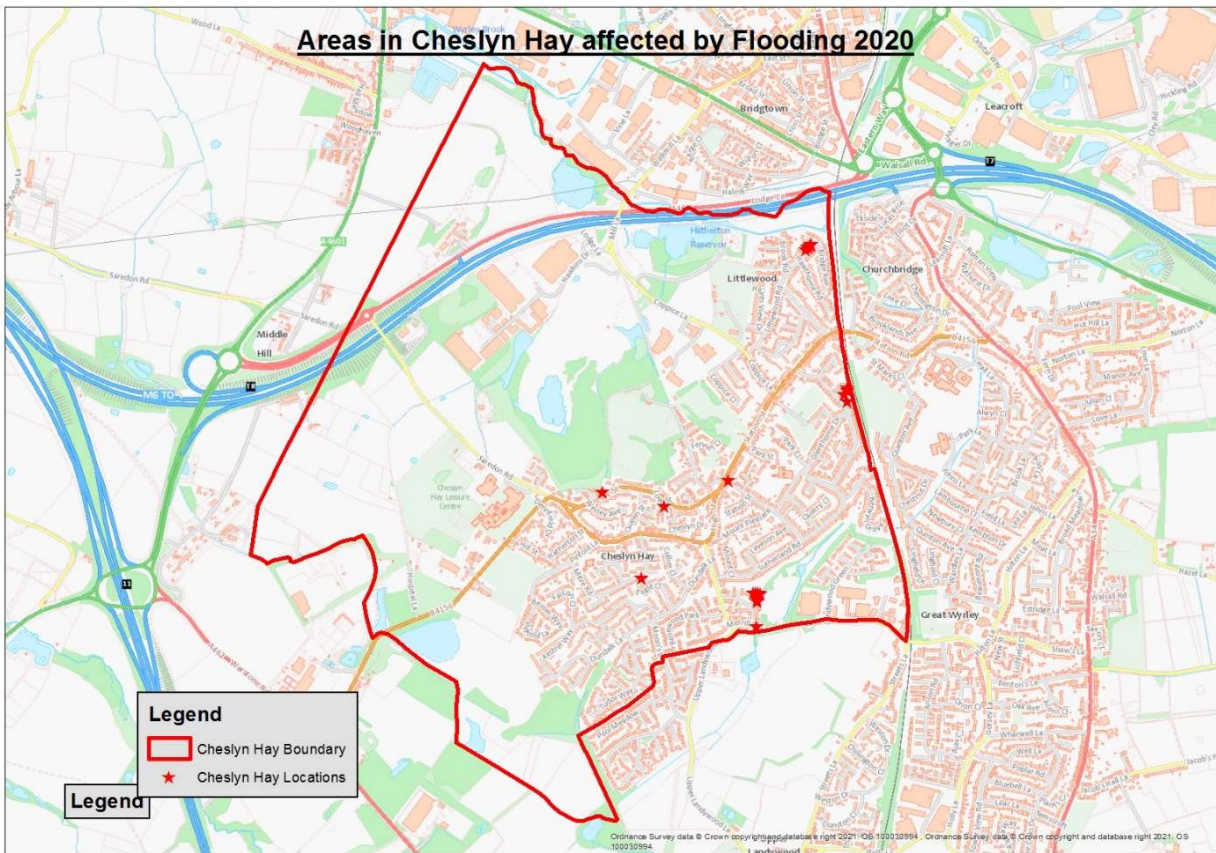
As a result of the storms in August 2020, more specifically the storms that occurred on 16th/17th August; widespread flooding occurred across Staffordshire. Numerous incidents of flooding were reported, ranging from waterlogged gardens, impassable roads and water outflowing from highway gullies to watercourses breaching banks, manholes and sewers surcharging and internal property flooding.

From analysis, the events recorded on 17th August were of high intensity and highly localised which is consistent with storms typically experienced in summer. Some rain gauges recorded a significant total rainfall depth whilst other gauges recorded very little further supporting the above assertion.

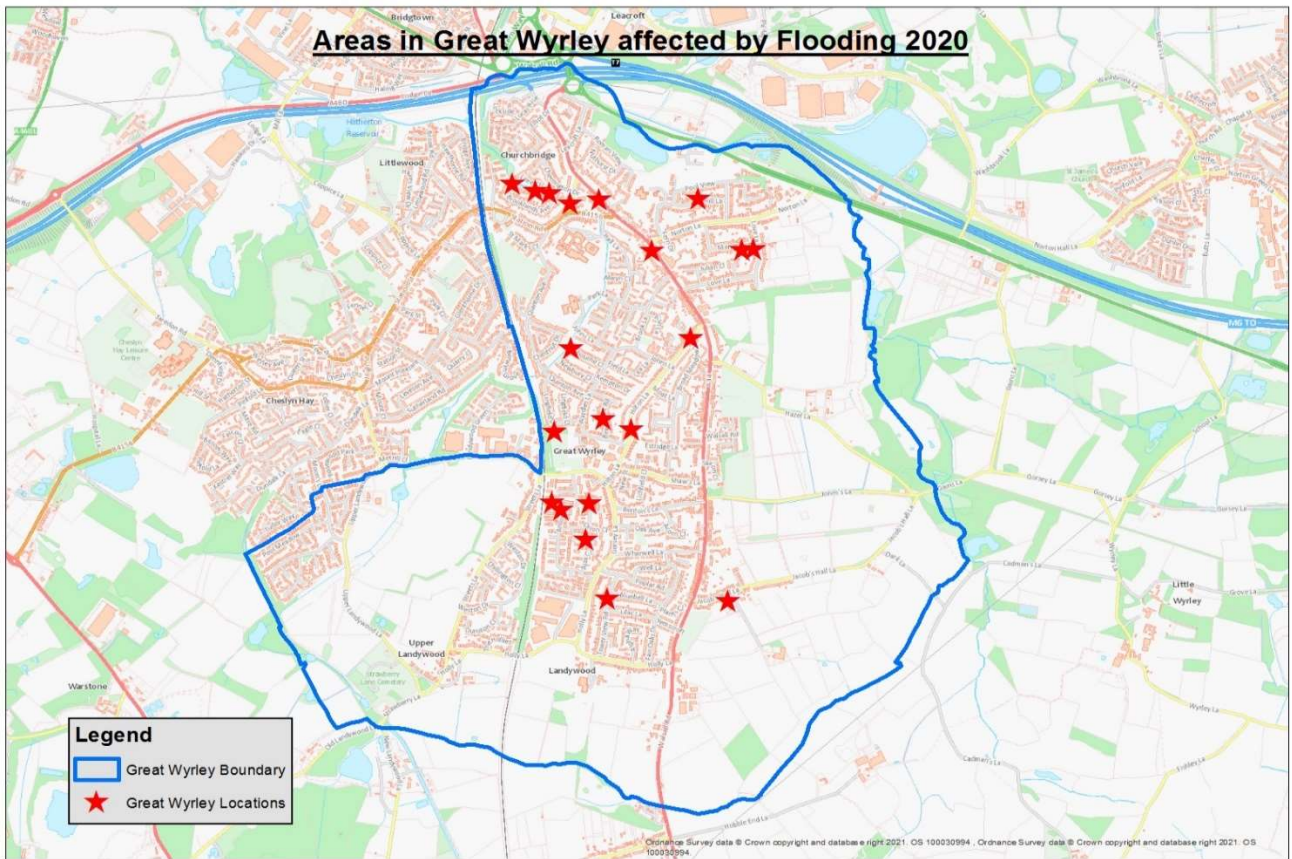
DEFRA Environment Agency rain gauges on Cannock Chase recorded daily (24hr) total rainfall as 31.2mm on 17th August however, the intensity of these storms can be illustrated by the recording of 8 m of this daily rainfall on the 17th august falling over just a 15-minute period.

The main areas affected by the June and August 2020 storms are shown in the following figures

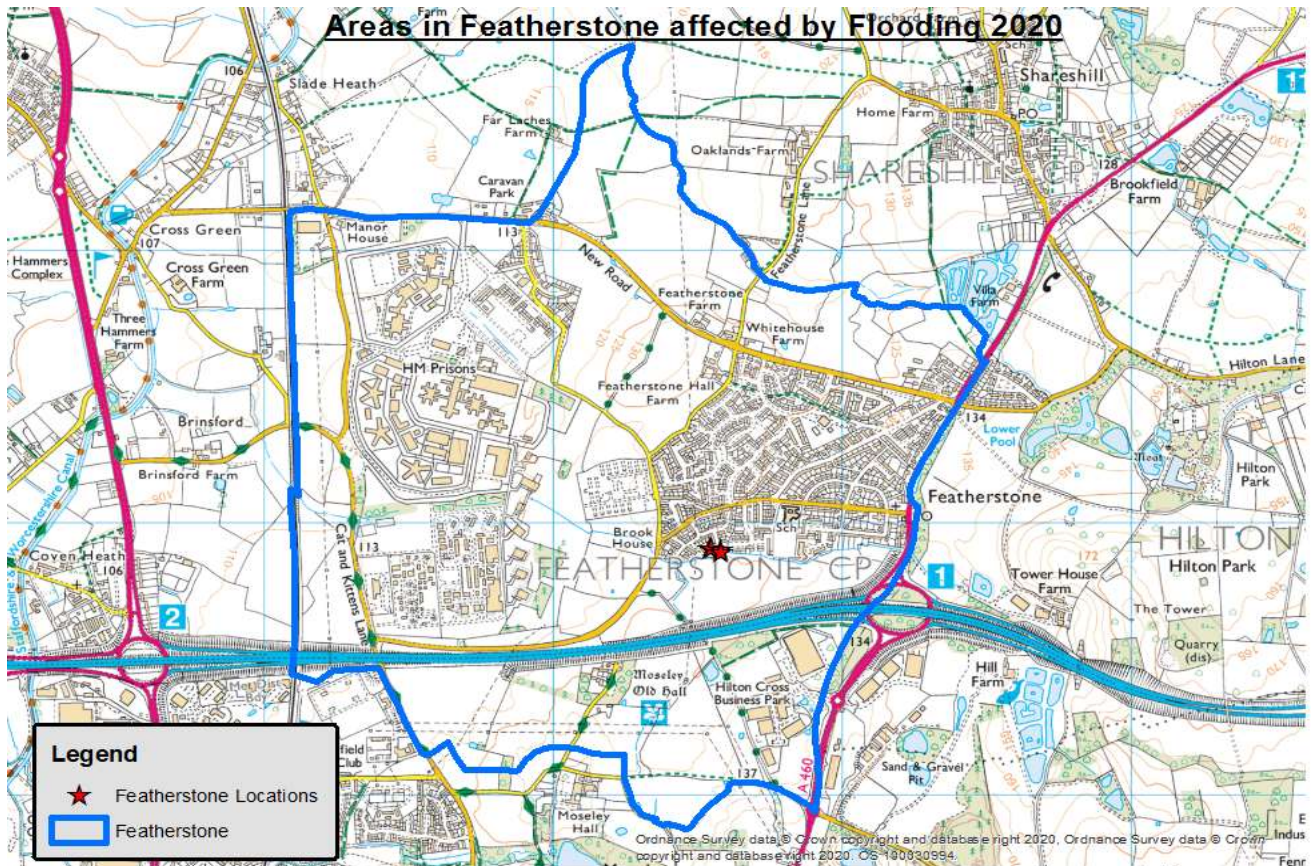
Areas affected by flooding in 2020 - Cheslyn Hay



Areas affected by flooding in 2020 - Great Wyrley



Areas affected by flooding in 2020 - Featherstone



Investigations into Flooded areas

Following the events of February, June and August in 2020, SCC in its role as LLFA, has undertaken the steps as outlined below:

Step 1: During the Flood Event

SCC received a high number of calls during the event, which reported flooding of properties, gardens and highways.

Step 2: Initial Investigations

Using call records, social media sweeps, testimonies from residents and site visits, SCC identified most of the locations where flooding occurred and then distributed 'Flood Questionnaire Surveys' to all property owners and residents affected by flooding and those within the surrounding area.

Responses were received, providing personal accounts of the flood event including the estimated time, duration, extent and depth with any other information which was felt pertinent. Following receipt of the questionnaire responses, the LLFA identified areas where at least five properties experienced internal flooding.

Step 3: Detailed Investigation and Analysis

The LLFA conducted detailed investigation and location analysis of each of the areas where a minimum of five properties experienced internal flooding. It should be noted that SCC have defined internal property flooding as:

'Flooding that occurs in a habitable room within a single property, excluding garages, porches and underfloor ingress of water.'

SCC did not undertake detailed investigation of flooding to garages, gardens and highways due to criteria depicting in the Local Flood Risk Management Strategy.

Due to the restrictions imposed by the Covid 19 Pandemic, these investigations typically included a table-top review of known existing infrastructure and topography, identification of predominant flow paths, compared with the survey responses and photos, local-knowledge gathering with community leaders, and limited site visits. Individual face to face interviews with residents were not permitted. As the restrictions ease, it is expected that community liaison events will be planned.

Through this detailed analysis, the LLFA identified the types of flooding that occurred at each location during the events of June and August 2020.

Step 4: Recommended Actions

Following the analysis of the affected areas, the LLFA have worked in collaboration with other RMAs to identify opportunities and options to mitigate the potential that a similar rainfall event will result in similar outcomes. These have been summarised as 'Recommended Actions' and a lead RMA has been identified to undertake these actions.

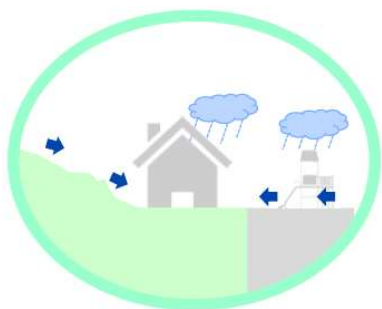
The following sections of this report provides an overview of the different types of flooding, which is then followed by the summary of the findings from the works undertaken to date regarding the affected areas.

Types of Flooding

The following section explores the various types of flooding that were experienced during the events in June and August 2020.

Surface Water Flooding - Pluvial Flooding

Surface water is rainwater which is on the surface of the ground and has not soaked into the ground or entered a watercourse, drainage system or sewer. During a storm event, rainfall will land on the ground and depending on the characteristics of the ground it will behave in different ways.



Soft surfaces, known as *permeable surfaces*, allow water to soak (infiltrate) into the ground. These are typically in the form of gardens, parks, fields and green spaces,

Hard surfaces, known as *impermeable surfaces*, do not allow any rainfall to soak into the ground and this rainfall will become (surface water) runoff. Runoff is usually very quick too. These are typically in the form of highways and roads,

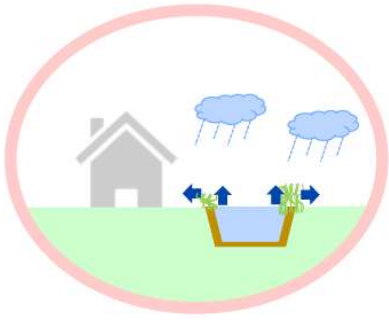
roofs, car parks and public squares.

Surface water flooding occurs under a number of circumstances, most commonly occurring when:

- There has been a prolonged period of rainfall and the permeable surface becomes saturated therefore no more water can infiltrate into the ground;
- The rainfall intensity is very high, and the rain is falling faster than it can infiltrate into the ground;
- There has been a prolonged warm dry period, the permeable surface may be baked hard and effectively turn the permeable surface into hard impermeable surface;
- It rains on impermeable surfaces, and there is no formal means of managing the rainfall;
- There is heavy rainfall on impermeable surfaces and surface water cannot enter the drainage system provided to manage rainfall as the system is at capacity.

During most storm events, the rainfall rate is low enough to allow surface water to soak into the ground or drain into formal drainage systems (e.g. gully pots). However, during an extreme event, where the intensity of the rainfall is high or there is an excessive volume of water, it is unable to soak into the ground or enter formal drainage systems and as such it will flow across a surface in an uncontrolled manner.

River Flooding - Fluvial Flooding



River flooding occurs when the amount of water in a river channel exceeds its capacity. This causes the water level in the river channel to rise above the riverbanks, where water flows from the channel into the surrounding area.

In terms of flood risk management there are two classifications of rivers/watercourses:

Main River and Ordinary Watercourse

The Environment Agency holds responsibility for the management of flood risk on Main Rivers. All other watercourses, which are not specified as Main Rivers are termed Ordinary Watercourses. Flood risk management of these watercourses is the responsibility of the LLFA.

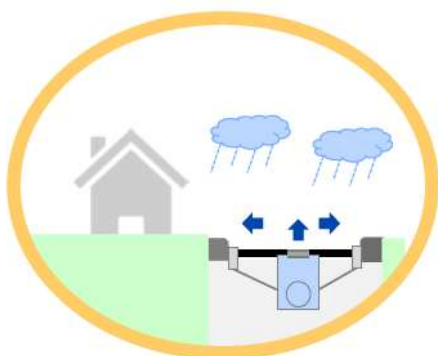
However, in both cases, the riparian owner, that is anyone who owns land or property next to, or over, a watercourse, is responsible for maintenance of watercourses through their land.

River flooding occurs under a number of circumstances, most commonly occurring when:

- There has been a prolonged period of rainfall and the river levels have risen due to surface water runoff and inflow from sewer infrastructure;
- There has been a prolonged period of rainfall whereby permeable surface become saturated and the rate of surface water runoff increases thereby reaching the river faster;
- There is heavy rainfall on impermeable surfaces and the provided drainage system conveys water to the river quickly;
- There are high flows within the river which become restricted by structures (e.g. bridges and culverts) which results in water levels upstream rising and spilling from the banks;
- Sediment and debris building up in the river channel and reduces the capacity of the river channel causing flows to spill from the banks.

During most storm events, rivers are capable of conveying flows within their channels however, during an extreme event where the volume of water may be significant, flows may exceed the channel capacity and spill from the river in an uncontrolled manner.

Flooding from Sewer Infrastructure



Where rainfall falls on an impermeable surface, it will typically be served by a formal drainage system, most commonly this is a sewer.

There are different types of sewer, including:

Surface Water Sewers carry rainfall and surface water away from properties to watercourses.

Foul Water Sewer, carries wastewater away from properties to be treated; and,

Combined Sewer, drain both wastewater from properties along with runoff from highways, roofs, car parks and other sources. These systems were typically constructed up to the 1950s and hence are still found in historic areas of cities.

Flooding from sewer infrastructure occurs under a number of circumstances, most commonly occurring when:

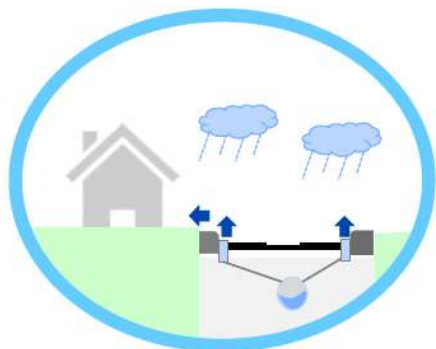
- There is a blockage, or the sewer itself collapses, which restricts or prevents flow within the sewer network. This causes water to back-up through the network and find its way to the surface, typically through a manhole or associated drainage structure.
- There is a period of heavy and/or prolonged rainfall, which results in significant flows that exceed the capacity of the sewer network. This prevents water from entering the sewer network and may result in surface flooding.

Severn Trent Water, as the sewerage company, is responsible for the operation and maintenance of the public sewers within the Staffordshire area.

Surface water and foul water sewers are currently designed in accordance with Sewers for Adoption (6th Edition, published 2006). This guidance states that sewers should have to capacity to deal with all runoff from a storm with a 3.33% or greater probability of occurring in any given year and not cause any above ground flooding. This guidance is relatively recent having been brought into effect in the last 10 to 15 years. In addition, improvements in computer aided design and calculations also ensure designs are in agreement with the existing standards.

Therefore, at the time of construction of much of the sewer network across Staffordshire, the design standards may have been to accommodate a smaller storm event. The designs will likely have been done by hand and may have used "rules of thumb" to determine the required sizes. As a result, the drainage network is complex with some sewers able to accommodate storms well above current design standards and other sewers much lower. Thus, when a large storm event occurs, the existing drainage network (combined or surface water sewers) may be significantly overwhelmed.

Flooding from Highway Drainage



Highway drainage consists of gullies, drainage channels and other features which collect and drain rainfall away from the highway. These features are typically located on one, or both, side(s) of the highway where they connect to an underground highway drainage system which ultimately connects to the public sewer infrastructure. Where rainfall falls onto the highway, this will enter the highway drainage system or flow within the highway channel until a point where it enters the system or ponds on the surface.

In new development, it is common practice to use highways to contain and convey heavy rainfall events away from properties, however historically this practice has not happened.

Across Staffordshire, properties can be seen at or below the level of the adjacent road. This means that should a carriageway not be able to contain the water flowing within it, flow will overtop the kerbs on the highway and spill over adjacent land into properties. Flooding from highway infrastructure occurs under a number of circumstances, most commonly occurring when:

- There is a blockage or build-up of surface debris in the vicinity of a gully, typically trash, leaves and twigs, which prevents, or restricts, the highway runoff from entering the gullies and subsequent highway infrastructure.
- There is a period of heavy and/or prolonged rainfall, whereby the volume of rainfall falling onto the highway overwhelms the highway drainage features and is unable to be captured. The resulting flows are then conveyed or contained within the highway, until such times as the water level overtops the kerbs and flows overland into properties.
- The sewer, culvert or watercourse to which the highway drainage is connected is at full capacity and therefore the highway run-off has no-where to drain to.

Staffordshire County Council, in their role as the local highway authority, is responsible for the highway drainage and gullies across South Staffordshire District. This work includes maintenance of the adopted highway drainage infrastructure including roadside gully pots.

Flood Risk Mapping

Flooding is traditionally very difficult to predict, and while there are many local factors that influence flooding, there are a number of publicly available, national information tools which can enhance our understanding of the potential flood risks within a local area, more specifically risk of flooding from surface water and from rivers.

Surface Water Flood risk

In 2013, the Environment Agency, working with LLFAs, produced the Risk of Flooding from Surface Water map.

This is the third national surface water map produced by the Environment Agency under their Strategic Overview role and is the first publicly available surface water flood risk map.

Storms are usually given with an annual probability or the chance of occurring in any given year. Typically, smaller storms have a higher probability of occurring in any given year and larger storms have a lower probability of occurring. However, the probability only describes the chance a storm will occur and not when.

This means that if a large, low probability storm occurs, it can happen again soon after or can happen a long time after.

This mapping assesses surface water flood risk as a result of the chance of rainfall occurring in any given year, and is categorised into the following three scenarios:

High Risk: Flooding occurring as a result of rainfall with a greater than 1 in 30 chance in any given year or 3.3% chance that the storm will occur in a single year

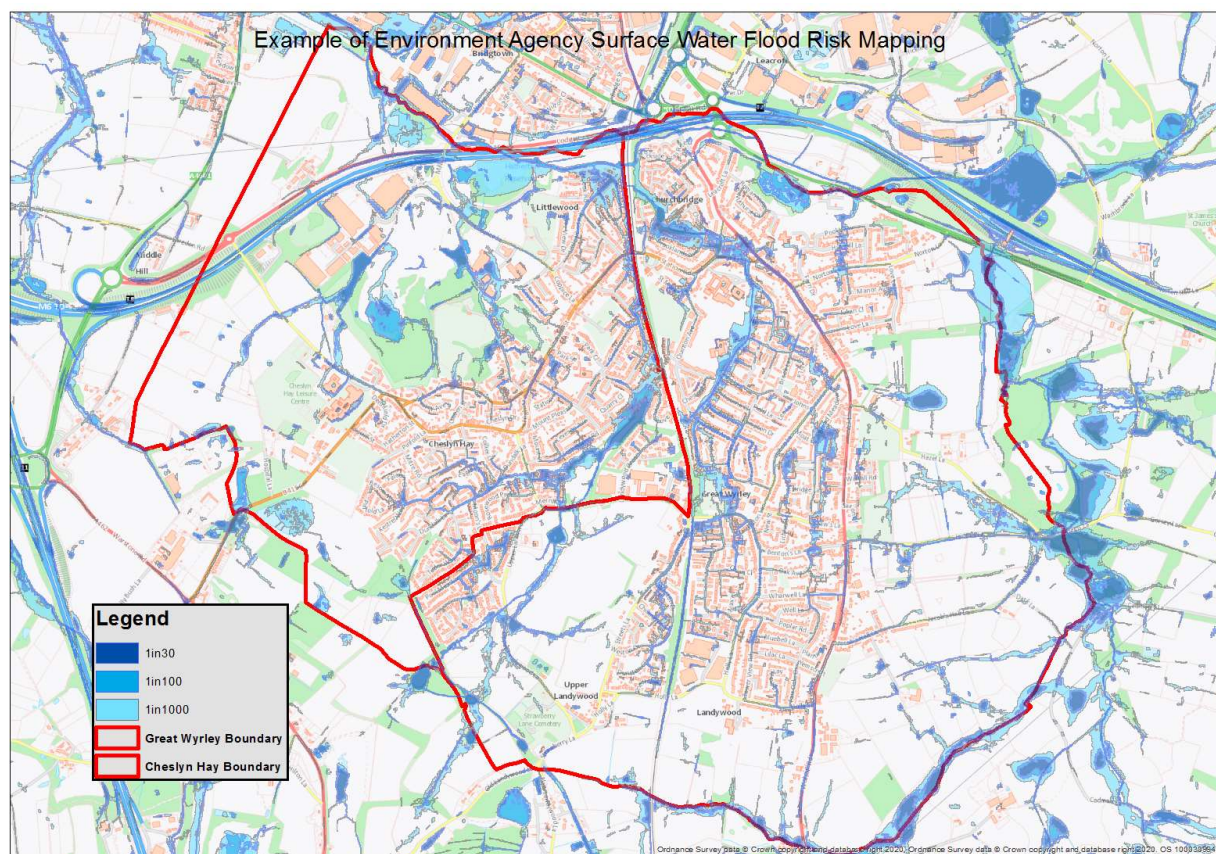
Medium Risk : Flooding occurring as a result of rainfall between 1 in 100 and 1 in 30 chance in any given year or between 1% and 3.3% chance that the storm will occur in a single year

Low Risk: Flooding occurring as a result of rainfall between 1 in 1000 and 1 in 100 chance in any given year or between 0.1% and 1% chance that the storm will occur in a single year

Very Low Risk: Flooding occurring as a result of rainfall with less than 1 in 1000 chance in any given year or less than 0.1% chance that the storm will occur in a single year.

It should be noted that this mapping has been produced at national scale with a number of assumptions and therefore there are some limitations at a local scale and is not appropriate for identifying individual property level flood risk. This mapping is publicly available for use and is available online.

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/postcode>



River flood risk

With regards to river flooding the Environment Agency publish the Flood Risk from Rivers or the Sea map. This shows the flood risk from Environment Agency Main Rivers and from the sea, taking into account any flood defences that may be present.

Storms are usually given with an annual probability or the chance of occurring in any given year. Typically, smaller storms have a higher probability of occurring in any given year and larger storms have a lower probability of occurring. However, the probability only describes the chance a storm will occur and not when. This means that if a large, low probability storm occurs, it can happen again soon after or can happen a long time after. This mapping assesses flood risk from rivers or the sea as a result of the chance of rainfall occurring in any given year, and is categorised into the following four scenarios:

High Risk: Flooding occurring as a result of rainfall with a greater than 1 in 30 chance in any given year or 3.3% chance that the storm will occur in a single year

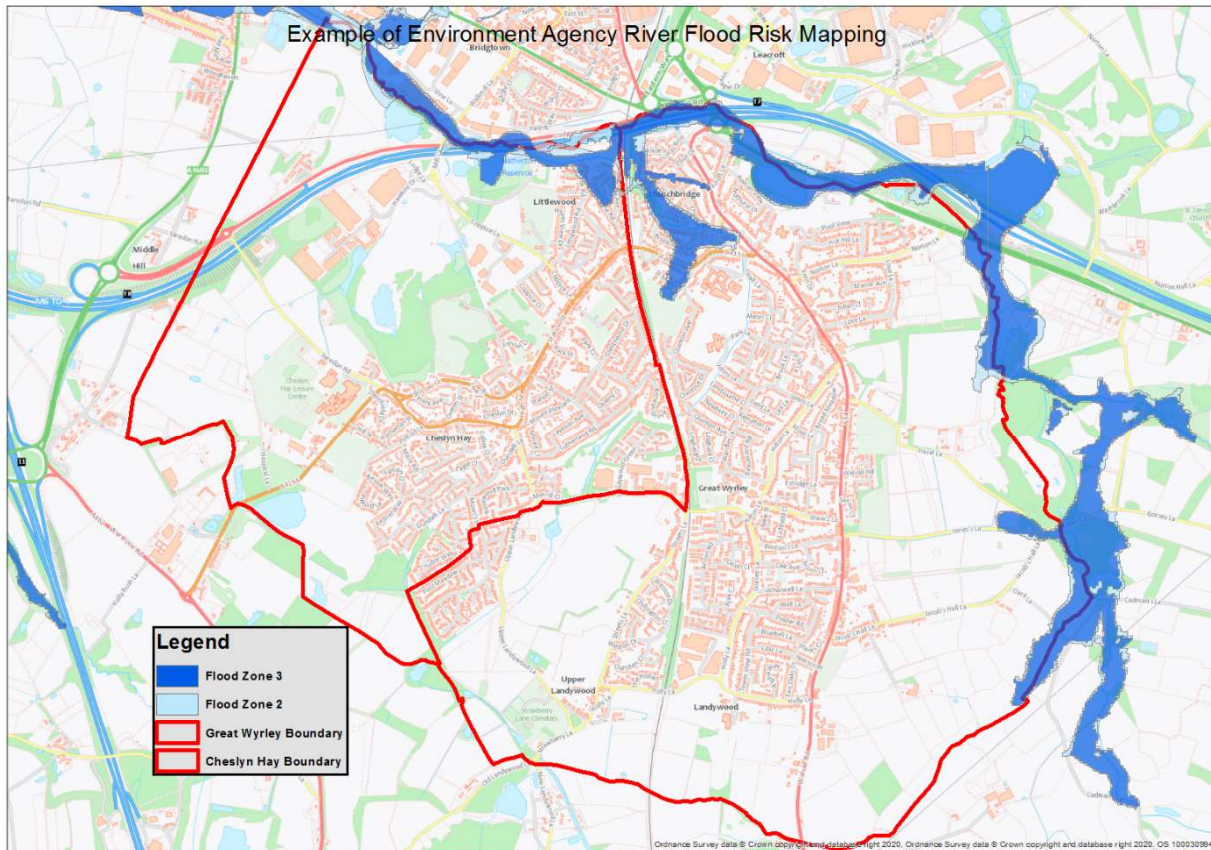
Medium Risk: Flooding occurring as a result of rainfall between 1 in 100 and 1 in 30 chance in any given year or between 1% and 3.3% chance that the storm will occur in a single year

Low Risk: Flooding occurring as a result of rainfall between 1 in 1000 and 1 in 100 chance in any given year or between 0.1% and 1% chance that the storm will occur in a single year

Very Low Risk: Flooding occurring as a result of rainfall with less than 1 in 1000 chance in any given year or less than 0.1% chance that the storm will occur in a single year.

This modelling is publicly available as the Environment Agency's Flood Risk from Rivers or the Sea map and is available online.

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/postcode>



Analysis of Flooding Locations

Locations where 5 or more properties were identified
to be affected by internal flooding

16 June 2020	Littlewood Lane Cheslyn Hay
16 June 2020	Peace Close/Westbourne Avenue Cheslyn Hay
16 June 2020	Lingfield Drive Great Wyrley
16 June 2020	Love Lane/Manor Avenue/Huthill Lane Great Wyrley
16 June 2020	Walsall Road Brooklands Avenue Station Road and Darges Lane Great Wyrley


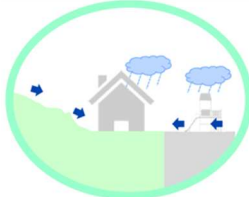
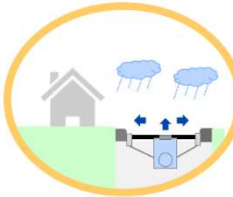
Locations where less than 5 properties were identified
to be affected by internal flooding

16 June 2020	Anson Close Ramillies Crescent Great Wyrley
16 June 2020	Coltsfoot View Cheslyn Hay
16 June 2020	Appledore Close Great Wyrley
16 June 2020	Beaumont Road and Hilton Lane Great Wyrley
16 June 2020 17 August 2020	Tower View Road Great Wyrley
16 June 2020	Jacobs Hall Lane Great Wyrley
16 June 2020	Whilmot Close Featherstone

Littlewood Lane Cheslyn Hay WS6 7EL

Event Background

On the 16th June 2020, Littlewood Lane was affected by surface water flooding, affecting the Sewer Infrastructure, Highway Drainage Infrastructure, driveways and residential properties.

Identified Flooding Type(s)	
 <p>Highway Flooding</p>	 <p>Fluvial Flooding</p>
 <p>Sewer Flooding</p>	



Investigation

Following reports by community leaders and residents, questionnaires were issued to the properties directly affected. Following the collation of information, SCC (LLFA) collaborated with SCC Highways and Severn Trent Water to request that all infrastructure assets were inspected. Information has come to light that potentially there is drainage infrastructure in this vicinity that is unrecorded, and this requires further investigation.

It is also understood that some residential properties in the catchment drain their surface water flows generated from roofs and impermeable areas to individual soakaways within the property's curtilage. The condition of these individual soakaways is unknown, but due to the age of the properties it's likely that they may not be functioning as originally designed.

Conclusion

The flooding in this area has been identified to be as a result of overwhelmed drainage infrastructure, and the further exploration of unrecorded infrastructure is required. The responsible body for this exploration is still to be identified.

Recommended Actions

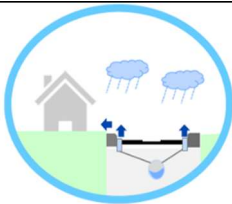
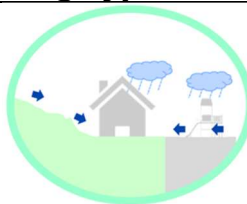
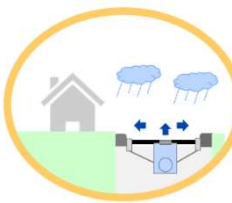
The following table outlines the recommended actions for this area to be undertaken by the appropriately identified RMA.

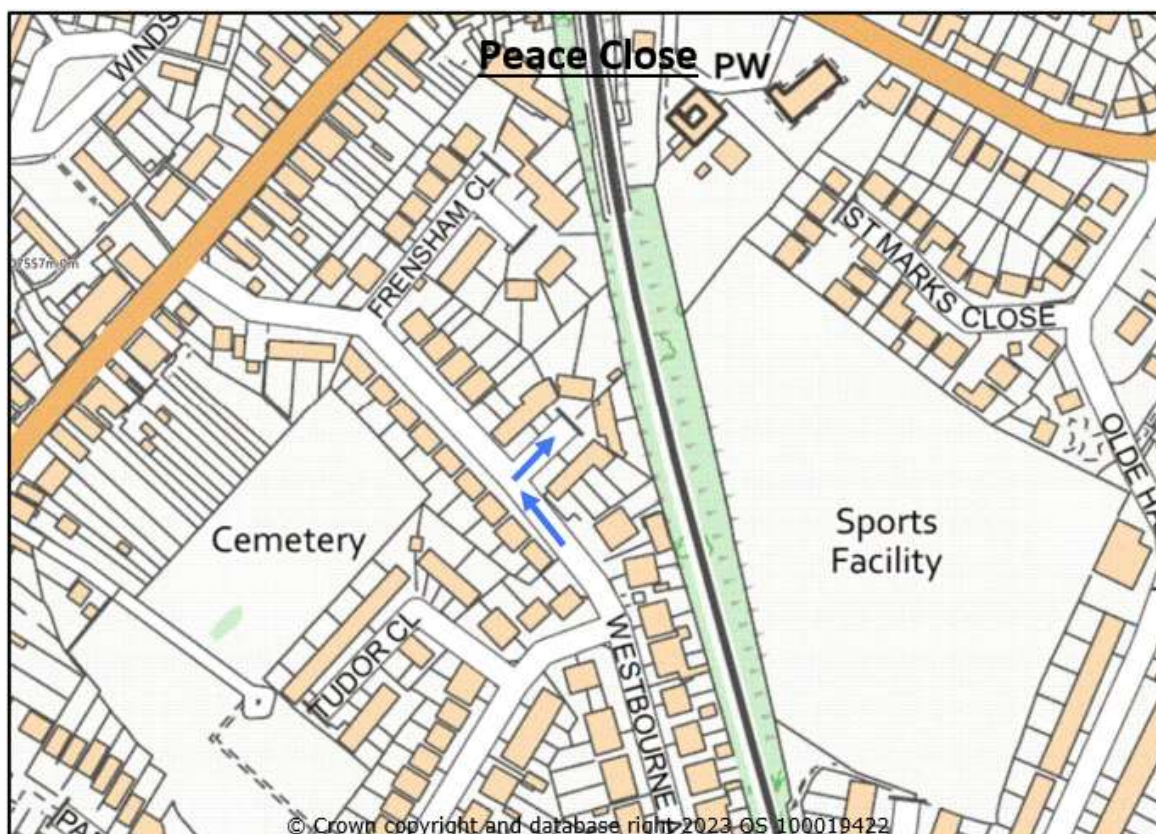
Recommended Actions	Identified Party / RMA	What will happen next?
Severn Trent Water to assess capacity and inspect for blockages in local sewer systems, manholes and local property causes. This network discharges directly into the Wash Brook (Main River) which in peak conditions is below surface.	STW/EA	Public drainage network has been explored. The interaction with the Wash Brook (Main river) will need further focussed discussion
Staffordshire County Council Highways to ensure gullies are maintained and kept clear. Important to ensure existing gully infrastructure is regularly maintained.	Highways (SCC)	This is ongoing in line with policy parameters
Staffordshire County Council Lead Local Flood Authority to collaborate with STW and SCC Highways explore feasibility of identifying and inspection of unrecorded drainage infrastructure to undertake its impact on the catchment, and whether it is functioning as originally designed.	SCC LLFA/ STW/Highways (SCC)	This is ongoing in line with policy parameters
Staffordshire County Council Lead Local Flood Authority to explore feasibility to introduce additional property resilience measures.	SCC LLFA/STW	This will be assessed as part of a wider scheme addressing properties in Cheslyn Hay and Great Wyrley. / In Partnership with STW
Staffordshire County Council Lead Local Flood Authority to consider leading a community awareness campaign to inform property owners of the need to maintain individual soakaways to ensure they have full functionality.	SCC LLFA	This will be assessed as part of a wider scheme addressing properties in Cheslyn Hay and Great Wyrley.

Peace Close/Westbourne Avenue Cheslyn Hay WS6 7DJ

Event Background

On the 16th June 2020 multiple properties in Peace Close cul-de-sac and Westbourne Avenue suffered internal flooding.

Identified Flooding Type(s)	
 <p>Highway Flooding</p>	 <p>Fluvial Flooding</p>
 <p>Sewer Flooding</p>	



Investigation

The flooding in this area has been identified to be surface water flooding and flooding from highway drainage infrastructure.

It is understood that most residential properties in the vicinity drain their fluvial flows generated from roofs and impermeable areas to individual soakaways within the property’s curtilage. The condition of these individual soakaways is unknown, but due to the age of the properties it’s likely that they may not be functioning as originally designed.

Whilst several other drains, gullies and sewers are identified at this location, the capacity of these features are limited to design standards and perhaps became overwhelmed. As a result, properties became inundated with water in this significant rainfall event.

Conclusion

Following the June 2020 storms, Staffordshire County Council as Lead Local Flood Authority collaborated with Staffordshire County Council (Highways) who has been advised to check all local highways-maintained highway assets, are operating as designed. Severn Trent Water have also been consulted to ensure they are aware that their assets should be inspected.

Recommended Actions



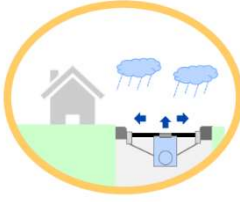
The following table outlines the recommended actions for this area to be undertaken by the appropriately identified RMA.

Recommended Actions	Identified Party/ RMA	What will happen next?
Severn Trent to assess capacity and inspect for blockages in local sewer systems, manholes and local property causes	STW	Public drainage infrastructure has been explored
Staffordshire County Council Highways to ensure gullies are maintained and kept clear. Important to ensure existing gully infrastructure is regularly maintained. Look at additional gullies in highway.	Highways (SCC)	This is ongoing in line with policy parameters
Staffordshire County Council Lead Local Flood Authority to explore feasibility to introduce additional property resilience measures.	SCC LLFA / STW	This will be assessed as part of a wider scheme addressing properties in Cheslyn Hay and Great Wyrley. In Partnership with STW
Staffordshire County Council Lead Local Flood Authority to consider leading a community awareness campaign to inform property owners of the need to maintain individual soakaways to ensure they have continued functionality.	SCC LLFA	This will be assessed as part of a wider scheme addressing properties in Cheslyn Hay and Great Wyrley.

Lingfield Drive Great Wyrley WS6 6LS

Event Background

On 16th June 2020 numerous properties in Lingfield Drive reported flooding, some internal, together with flooding to gardens from the rear.

Identified Flooding Type(s)	
 <p>Highway Flooding</p>	 <p>Fluvial Flooding</p>
 <p>Sewer Flooding</p>	



Investigation

Following the June 2020 storms, Staffordshire County Council (LLFA) advised that all local assets are checked to be operating as designed. Questionnaires were issued to the Parish Council who kindly distributed and gathered the responses.

The flooding in this area has been identified to be surface water flooding and flooding from highway drainage infrastructure. Drains, gullies and sewers are identified at this location, the capacity of these features are limited to design standards and perhaps

became overwhelmed. As a result, surface water accumulated, flowed downhill and flooded the recreation ground and properties became inundated with water in this significant rainfall event

Conclusion

Following the June 2020 storms, Staffordshire County Council as Lead Local Flood Authority collaborated with Staffordshire County Council (Highways) who has been advised to check all local highways-maintained highway assets, are operating as designed. Severn Trent Water have also been consulted to ensure they are aware that their assets should be inspected

The flooding in this area has been identified to be surface water flooding and flooding from local sewer drainage. Over the course of the storm event, the prevailing topography directed rainwater to the low point in the Parish Recreation ground, which then over slipped in properties downstream on Lingfield Drive. Whilst several sewers are identified at this location, the capacity of these features became overwhelmed. As a result, the area became inundated with water.

Recommended Actions



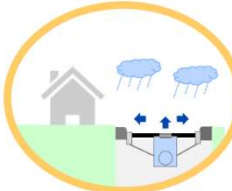
The following table outlines the recommended actions for this area to be undertaken by the appropriately identified RMA.

Recommended Actions	Identified Party / RMA	What will happen next?
Severn Trent Water are to carry out a catchment wide study covering the Wyrley Brook and all its inputs to feed into a scheme to reduce the overall reduce flood risk to those at known risk to internal flooding	STW	This is already covered within the Wyrley Brook Catchment Wide Scheme with potential improvement works programmed for 2027/28
Staffordshire Highways have been asked to support Severn Trent Water to offer resource to identify the condition of their assets	SCC	Exploration works have been undertaken and feed into the wider catchment model
Great Wyrley Parish Council have been involved in providing space within the parishes recreation ground for surface water attenuation		This agreement is in place
Staffordshire LLFA will look at all funding sources to contribute to and partner the Severn Trent Water Scheme	SCC	Flood Grant in Aid and Local Levy Funding streams have been identified.

Love Lane/Manor Avenue & Huthill Lane
Great Wyrley

Event Background

On 16th June 2020 properties in Love Lane Manor Avenue and Huthill Lane reported internal flooding, together with flooding to surrounding highway and gardens.

Identified Flooding Type(s)	
 <p>Highway Flooding</p>	 <p>Fluvial Flooding</p>
 <p>Sewer Flooding</p>	



Investigation

Following the June 2020 storms, questionnaires were issued to the Parish Council who kindly distributed and gathered the responses. The flooding in this area has been identified to be surface water flooding and flooding from highway drainage infrastructure

It is understood that most residential properties in this vicinity drain their surface water flows generated from rooves and impermeable areas to individual soakaways within the property's curtilage. The condition of these individual soakaways is unknown, but due to the age of the properties it's likely that they may not be functioning as originally

designed. Whilst several other drains are identified at this location, the capacity of these features are limited to design standards at the time of construction and perhaps became overwhelmed. As a result, properties became inundated with water in this significant rainfall event

Conclusion

Following the June 2020 storms, Staffordshire County Council as Lead Local Flood Authority collaborated with Staffordshire County Council (Highways) who has been asked to check all highway assets are operating as designed. Severn Trent Water have also been consulted to ensure that if they have any unrecorded assets that they should be inspected also.

Recommended Actions

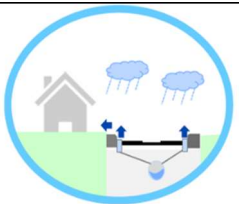
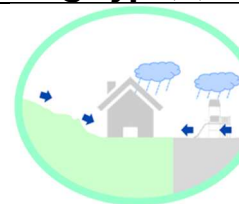
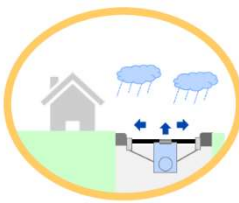
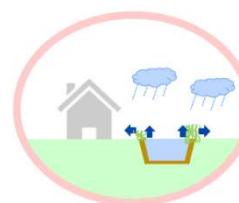
The following table outlines the recommended actions for this area to be undertaken by the appropriately identified RMA.

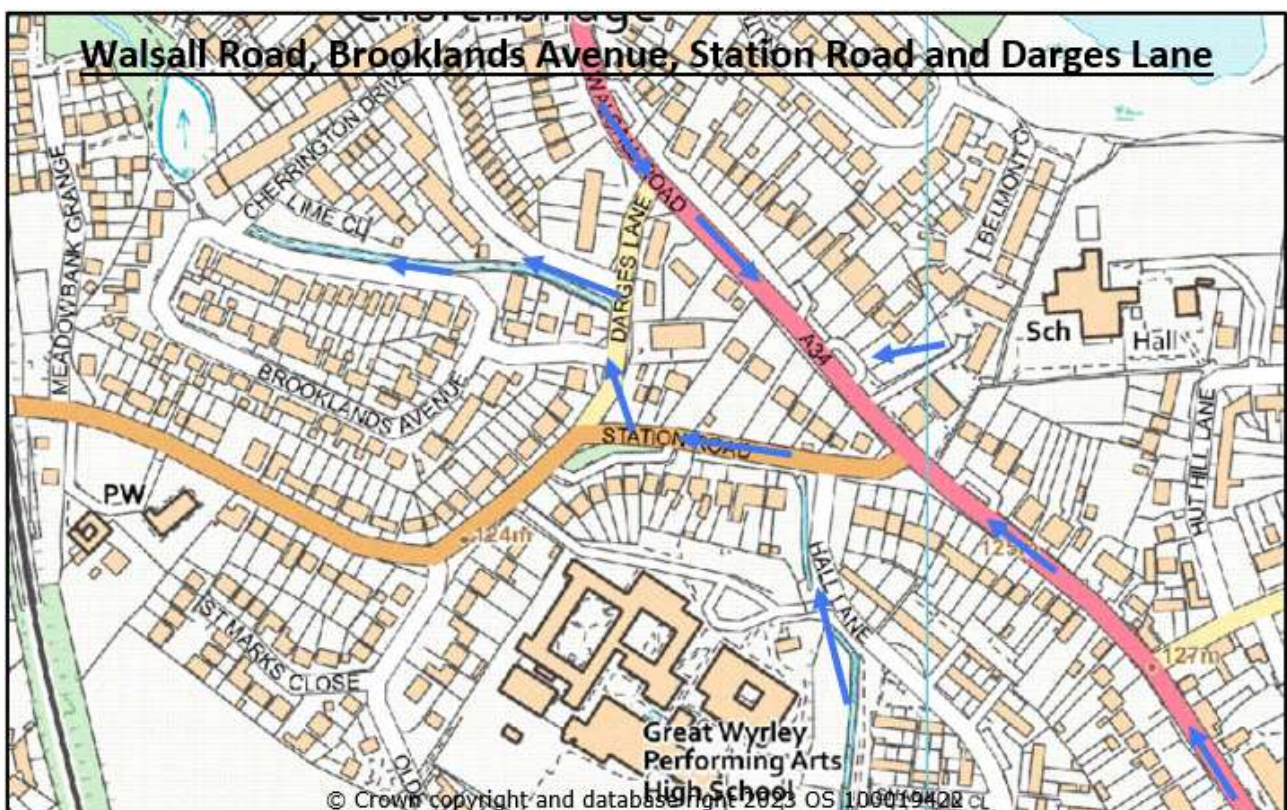
Recommended Actions	Identified Party/ RMA	What will happen next?
Staffordshire County Council Highways to ensure gullies and highway drains are maintained and kept clear. Important to ensure existing gully infrastructure is regularly maintained. Potentially look at additional drainage infrastructure in highway if feasible.	Highways (SCC)	This is ongoing in line with policy parameters
Severn Trent Water to help identify unrecorded assets and to assess capacity and inspect for blockages	STW	Some work has been undertaken as part of an overall community wide review of the infrastructure feeding into the Wyrley Brook Resilience Scheme
Staffordshire County Council Lead Local Flood Authority to explore feasibility to introduce additional property resilience measures.	SCC LLFA	This will be assessed as part of a wider scheme addressing properties in Cheslyn Hay and Great Wyrley.
Staffordshire County Council Lead Local Flood Authority to consider leading a community awareness campaign to inform property owners of the need to maintain individual soakaways to ensure they have continued functionality.	SCC LLFA	This will be assessed as part of a wider scheme addressing properties in Cheslyn Hay and Great Wyrley.

Walsall Road Brooklands Avenue Station Road and Darges Lane Great Wyrley

Event Background

Properties in Brooklands Avenue reported internal flooding occurred on 16th June 2020 together with flooding to surrounding highway and gardens.

Identified Flooding Type(s)	
	
Highway Flooding	Fluvial Flooding
	
Sewer Flooding	River Flooding



Investigation

Following the June 2020 storms, questionnaires were issued to the Parish Council who kindly distributed and gathered the responses. The flooding in this area has been identified to be surface water flooding, flooding of Sewer infrastructure and flooding of highway drainage infrastructure

Conclusion

The flooding in this area has been identified to be all types of flooding. Over the course of the storm event, the prevailing topography directed flows towards the flow path of the

Wyrley Brook. The resultant effects impacted the Highway Drainage Infrastructure and the Sewer Infrastructure causing surcharge. Numerous properties along the flow path were affected by flooding

Recommended Action

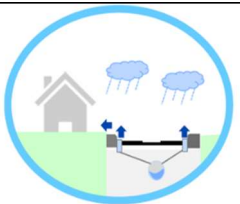
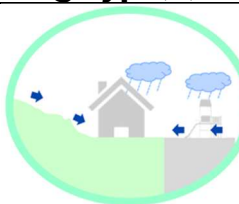
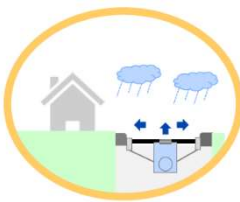
The following table outlines the recommended actions for this area to be undertaken by the appropriately identified RMA.

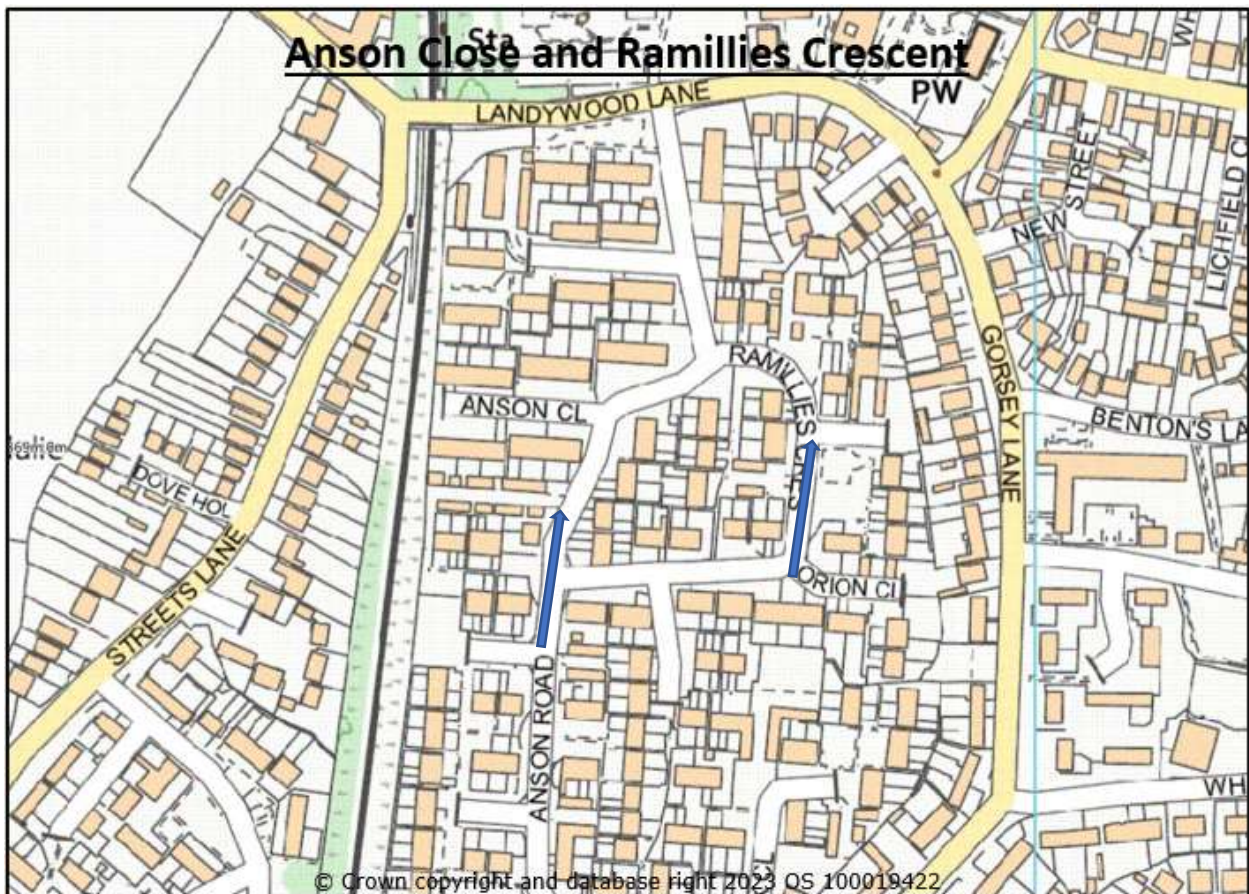
Recommended Actions	Identified Party / RMA	What will happen next?
Severn Trent Water are to carry out a collaborative catchment wide study with the Environment Agency, Staffordshire County Council covering the Wyrley Brook and all its inputs. This study will then feed into a scheme designed to increase capacity in the infrastructure and to reduce the overall the current flood risk	STW/EA/SCC (Highways).	This is already covered within the Wyrley Brook Catchment Wide Scheme with potential improvement works programmed for 2027/28

Anson Close Ramillies Crescent Great Wyrley

Event Background

Properties in Ramillies Crescent reported internal flooding occurred on 16th June 2020 together with flooding to surrounding highway and gardens.

Identified Flooding Type(s)	
 <p>Highway Flooding</p>	 <p>Fluvial Flooding</p>
 <p>Sewer Flooding</p>	



Investigation

Following the June 2020 storms, questionnaires were issued to the Parish Council who kindly distributed and gathered the responses. The flooding in this area has been identified to be surface water flooding and flooding from highway drainage infrastructure

Conclusion

The flooding in this area has been identified to be surface water flooding, with some interactions with impacted drainage infrastructure. Over the course of the storm event, the prevailing topography directed rainwater towards affected properties.

Recommended Action

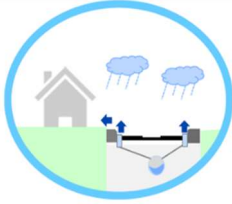

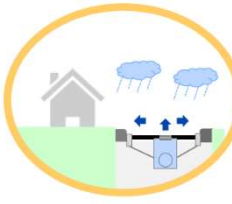
The following table outlines the recommended actions for this area to be undertaken by the appropriately identified RMA.

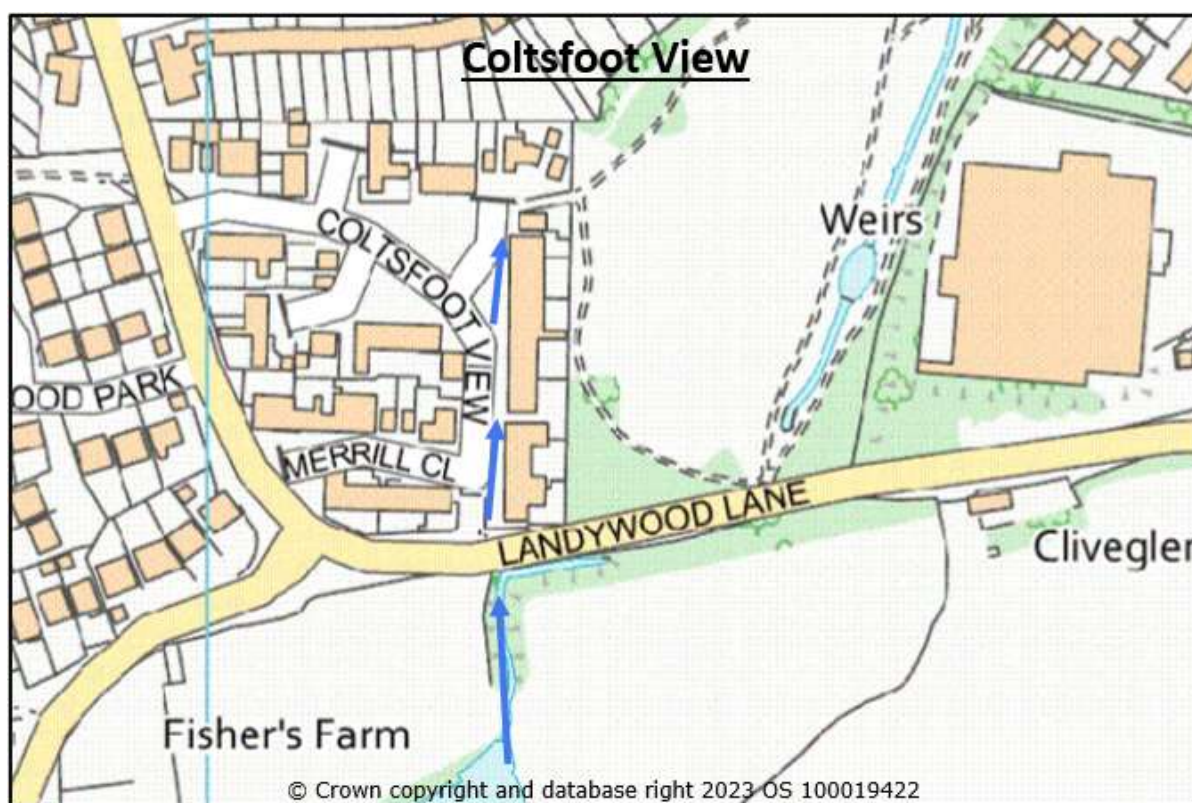
Recommended Actions	Identified Party / RMA	What will happen next?
Severn Trent Water are to carry out a collaborative catchment wide study covering the Wyrley Brook and all its inputs to feed into a scheme to reduce the overall reduce flood risk	STW/EA/SCC (Highways).	This is already covered within the Wyrley Brook Catchment Wide Scheme with potential improvement works programmed for 2027/28.

Coltsfoot View Cheslyn Hay

Event Background

Properties in Coltsfoot View reported flooding to garages, driveways, and gardens that occurred on 16th June 2020.

Identified Flooding Type(s)	
 <p>Highway Flooding</p>	 <p>Fluvial Flooding</p>
 <p>Sewer Flooding</p>	



Investigation

Questionnaires were issued to the Parish Council who kindly distributed and gathered the responses. The flooding in this area has been identified to be predominantly surface water flooding to several garages, gardens, and driveways. Testimonies from the responses suggest that surface water flowed downhill into Coltsfoot View instead of following the Wyrley Brook in the open space land. Following site inspections after the event, partial obstructions were identified involving the watercourse upstream of the Landywood Lane culvert..

Conclusion

The flooding in this area has been identified to be predominantly surface water flooding. Over the course of the storm event, accumulated volumes flowed along the prevailing

topography, directed towards gardens, garages, and driveways of properties. It is likely that overflows from a watercourse entered the public sewer system when flows travelled across Landywood Lane and into Coltsfoot View. This may have caused all piped drainage infrastructure to become overwhelmed.

Recommended Action



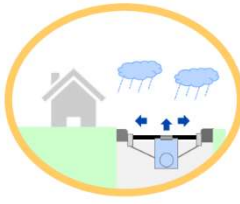
The following table outlines the recommended actions for this area to be undertaken by the appropriately identified RMA.

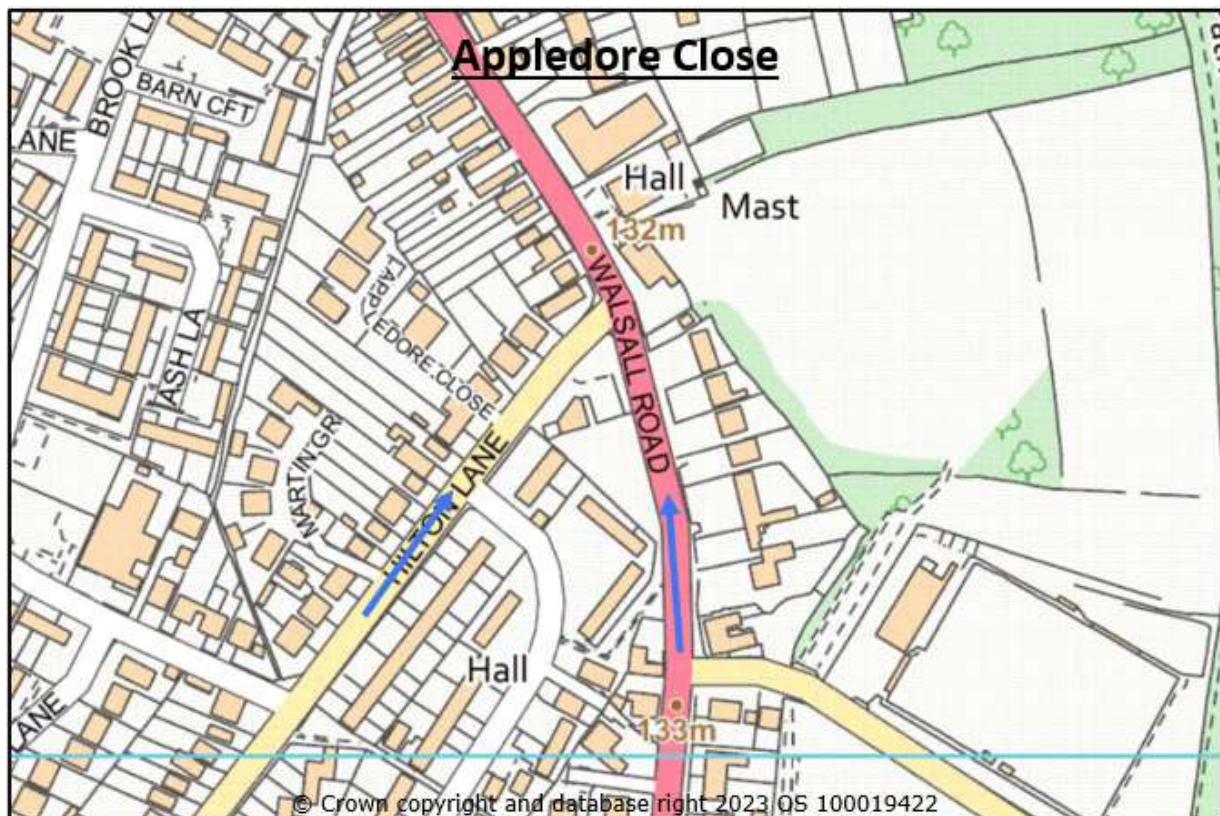
Recommended Actions	Identified Party / RMA	What will happen next?
Severn Trent Water to assess capacity and inspect for blockages to their network	STW	This is already covered within the Wyrley Brook Catchment Wide Scheme with potential improvement works programmed for 2027/28
Staffordshire County Council to review any identified drainage infrastructure and determine whether the Gully Cleaning Regime needs are as required	SCC (Highways).	Ongoing but works have been completed to reduce the risk of obstructions entering subsurface infrastructure
Staffordshire County Council LLFA to ensure that riparian owners of ordinary watercourses are aware of their duties rights and responsibilities. Namely to ensure that watercourses are free flowing and any identified blockages to the normal flow are removed.	SCC LLFA	Ongoing but nearby residential development proposals have lead to further scrutiny of options for holding back the flow to increase capacity at pinch points

Appledore Close Great Wyrley

Event Background

Properties in Appledore Close reported flooding to private driveway and gardens that occurred on 16th June 2020.

Identified Flooding Type(s)	
 <p>Highway Flooding</p>	 <p>Fluvial Flooding</p>
 <p>Sewer Flooding</p>	



Investigation

Following the June 2020 storms, questionnaires were issued to the Parish Council who kindly distributed and gathered the responses. The flooding in this area has been identified to be predominantly surface water flooding to grounds and driveway, and testimony suggests that property flooding was prevented. There were some likely interactions with surface flooding from Hilton Lane and there are unrecorded drainage assets on Hilton Lane. These are subject to further inspection particularly around the junction of Walsall Road.

Conclusion

The flooding in this area has been identified to be surface water flooding. Over the course of the storm event, the prevailing topography directed rainwater towards properties. Fortunately flooding affected gardens and driveway only at this time

Recommended Action

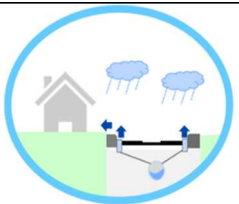
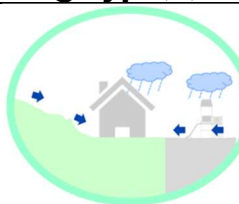
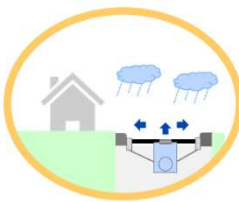
SCC Highways have been notified and it is recommended that they ensure their assets in the location and surrounds are maintained to prevent run off onto third party property.

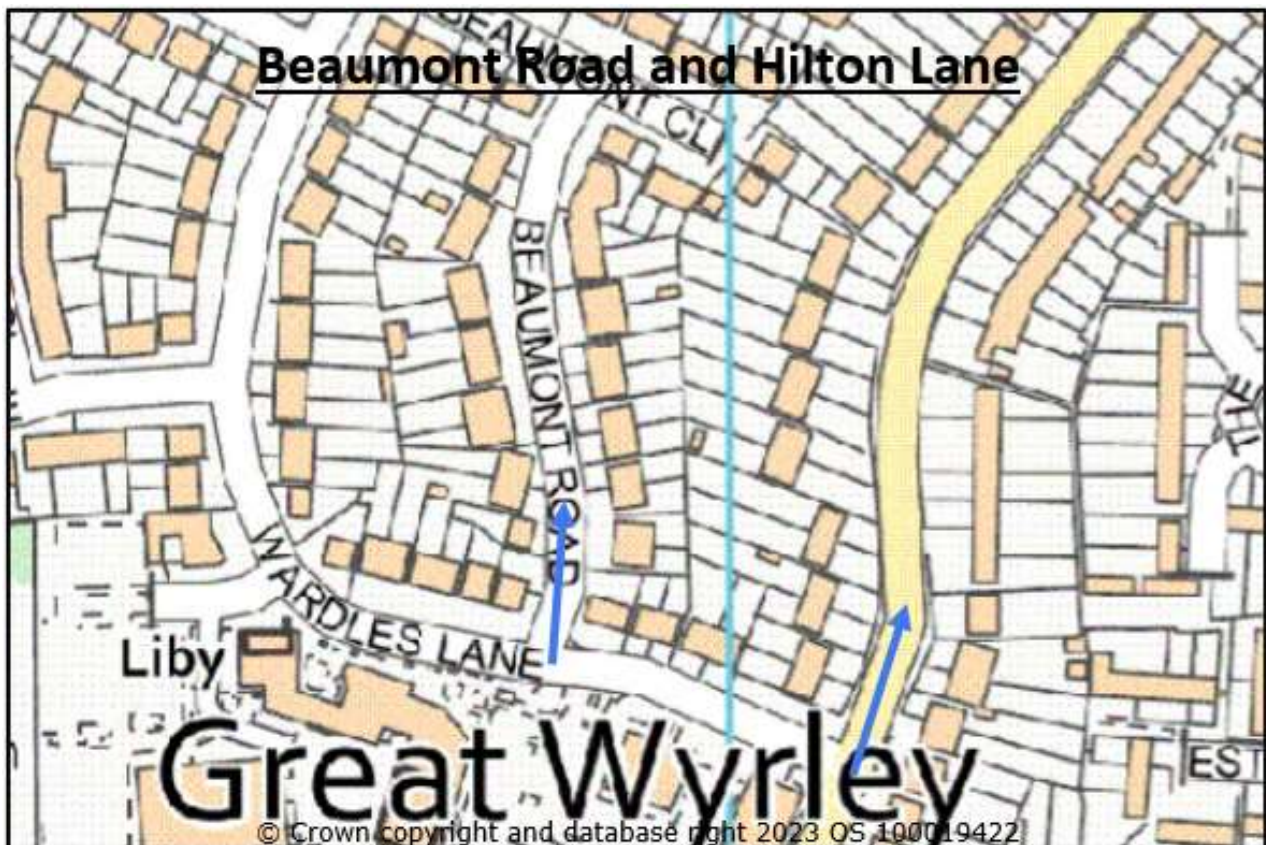
Recommended Actions	Identified Party / RMA	What will happen next?
Staffordshire County Council to review any identified drainage infrastructure and determine whether the Gully Cleaning Regime needs are as required	SCC (Highways).	Works have already been undertaken to identify upstream infrastructure and further works are required to utilise the discovered networks which could bypass this location. This is ongoing in line with policy parameters

Beaumont Road and Hilton Lane Great Wyrley

Event Background

Properties in Beaumont Road and Hilton Lane reported flooding occurred on 16th June 2020 together with flooding to surrounding highway and gardens.

Identified Flooding Type(s)	
 <p>Highway Flooding</p>	 <p>Fluvial Flooding</p>
 <p>Sewer Flooding</p>	



Investigation

Following the June 2020 storms, questionnaires were issued to the Parish Council who kindly distributed and gathered the responses. The flooding in this area has been identified to be surface water flooding, flooding from sewer infrastructure and from highway drainage infrastructure

Conclusion

The flooding in this area has been identified to be surface water flooding. Over the course of the storm event, the prevailing topography directed rainwater towards properties.

Recommended Action




SCC Highways have been notified and it is recommended that they ensure their assets in the location and surrounds are maintained.

Recommended Actions	Identified Party / RMA	What will happen next?
Staffordshire County Council to consider whether the Gully Cleaning Regime needs to be reviewed	SCC (Highways).	This is ongoing in line with policy parameters

Tower View Road Great Wyrley

Event Background

Properties in Tower View Road reported internal flooding occurred on various dates together with flooding to surrounding highway.

Identified Flooding Type(s)	
 <p>Highway Flooding</p>	 <p>Fluvial Flooding</p>
 <p>Sewer Flooding</p>	



Investigation

Following the June 2020 storms, questionnaires were issued to the Parish Council who kindly distributed and gathered the responses. The flooding in this area has been identified to be surface water flooding, flooding from Sewer infrastructure and from highway drainage infrastructure

Conclusion

The flooding in this area has been identified to be 3 types of flooding (highway, fluvial, and sewer). Over the course of the storm events, the prevailing topography directed rainwater

towards properties. This together with exceedance of the infrastructure for both highways and sewers, led to flooding to properties.

Recommended Action

SCC Highways have been notified and it is recommended that they ensure their assets in the location and surrounds are maintained.

Severn Trent Water have been notified and it was recommended that they ensure their assets in the location and surrounds are maintained.


It is understood that surveys have been undertaken to assess the viability to provide products to prevent of flooding to properties.

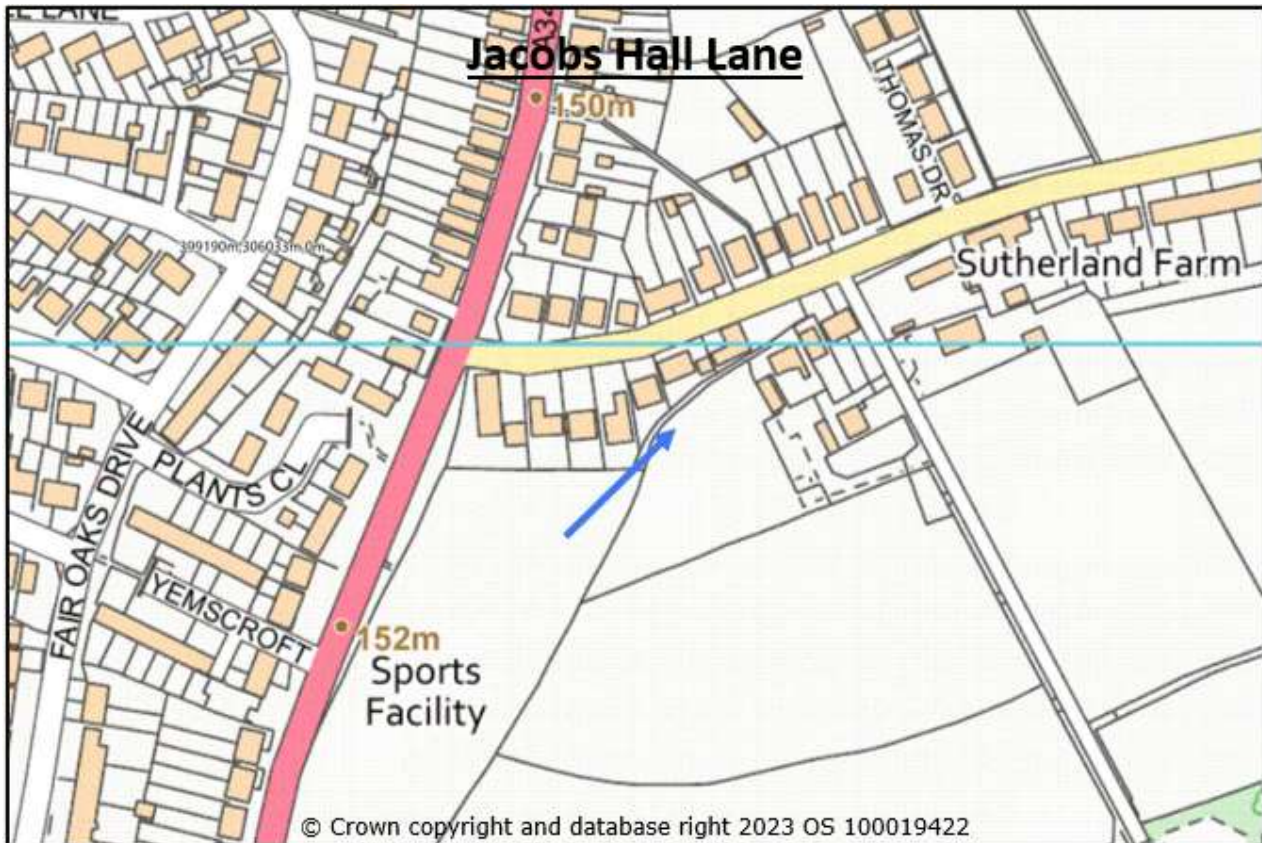
Recommended Actions & Timescales	Identified Party / RMA	What will happen next?
Staffordshire County Council (Highways) to consider the installation of channel drainage.	SCC (Highways).	This is ongoing in line with policy parameters
Staffordshire County Council to review Gully Cleaning Regime to consider whether the Gully Cleaning Regime needs to be reviewed	SCC (Highways).	This is ongoing in line with policy parameters
Severn Trent Water to ensure their existing assets perform as designed	STW	This is ongoing
Staffordshire County Council LLFA to inspect any property survey reports provided to assess feasibility of further funding for the installation of any recommended products	SCC LLFA	This will be assessed as part of a wider scheme addressing properties in Cheslyn Hay and Great Wyrley.

Jacobs Hall Lane Great Wyrley

Event Background

Properties in Jacobs Hall Lane reported flooding occurred on various dates together with flooding to surrounding highway.

Identified Flooding Type(s)	
	
Fluvial Flooding	



Investigation

Following the June 2020 storms, questionnaires were issued to the Parish Council who kindly distributed and gathered the responses. The flooding in this area has been identified to be predominantly surface water flooding running off land affecting properties along the flow route.

Conclusion

The flooding in this area has been identified to be surface water flooding. Over the course of the storm event, the prevailing topography directed rainwater towards properties.

Recommended Action



SCC Highways have been notified and it is recommended that they ensure of their assets in the location and surrounds are maintained.

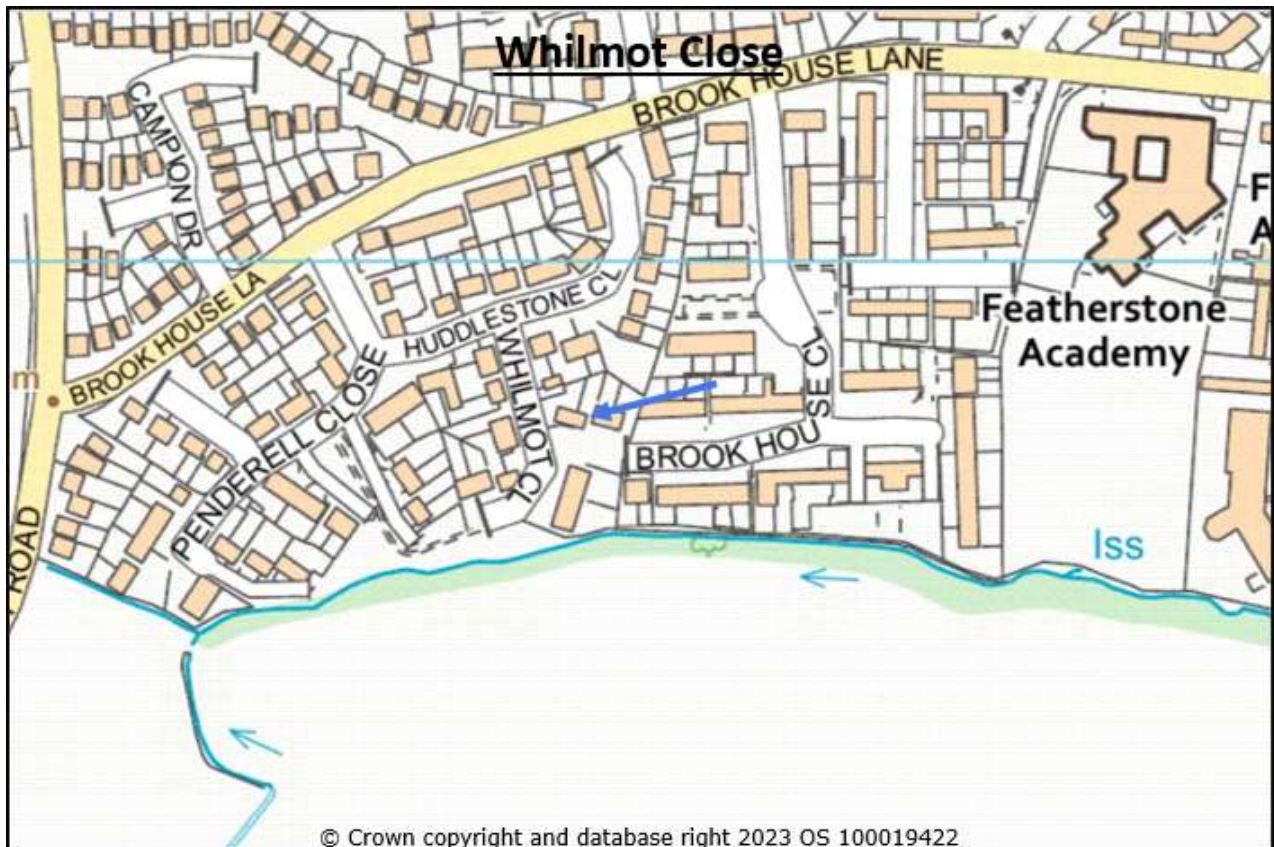
Recommended Actions	Identified Party / RMA	What will happen next?
Staffordshire County Council (Highways) to consider reviewing any drainage infrastructure within their remit.	SCC (Highways).	This is ongoing in line with policy parameters

Whilmot Close Featherstone

Event Background

Properties in Whilmot Close reported flooding occurred on 16th June 2020 together with flooding to highway.

Identified Flooding Type(s)	
	
Highway Flooding	Fluvial Flooding



Investigation

Following the June 2020 storms, questionnaires were issued to those affected. The flooding in this area has been identified to be surface water flooding, flooding from sewer infrastructure and from highway drainage infrastructure

Conclusion

The flooding in this area has been identified to be surface water flooding. Over the course of the storm event, the prevailing topography directed rainwater towards properties.

Recommended Action

SCC Highways have been notified and it is recommended that they ensure their assets in the location and surrounds are identified assessed and maintained. It is understood that works have already been completed to redirect surface water accumulations on the highway.

Recommended Actions	Identified Party / RMA	What will happen next?
Staffordshire County Council (Highways) to consider channel drainage if appropriate.	SCC (Highways).	Works have been undertaken already to improve the drainage infrastructure
Staffordshire County Council to consider whether the Gully Cleaning Regime needs to be reviewed	SCC (Highways).	This is ongoing in line with policy parameters

RECOMMENDED ACTIONS

While many of the recommended actions noted above are tailored specifically to the location where the flooding occurred, there are some actions that are applicable in multiple locations.

The following section provides a summary of what these actions may entail:

Sewer Infrastructure:

Assess the condition and capacity of the sewer network that may incorporate multiple tasks including:-

- An assessment of the sewer network, ensuring that the existing infrastructure is capable of draining the catchment effectively
- Investigation and survey of existing assets, for example using CCTV and in-person inspections, to ensure blockages and flow restrictions (e.g., silt accumulation) are removed
- Feasibility assessment and optioneering of means to increase capacity of sewer network using attenuation or techniques to slow the flow
- Review existing maintenance schedules and explore opportunities to increase frequency of maintenance and/or incorporation of additional maintenance tasks
- Hydraulic modelling and performance analysis.

Highway Drainage:

Assess the condition and capacity of the highway drainage network that may incorporate multiple tasks including:-

- Review of the location and condition of existing highway drainage assets, to ensure flows are not impeded and that sufficient gullies are in place to collect flows.
- Assessment of the capacity of the local highway drainage network to explore opportunities to increase capacity
- Review existing maintenance schedules and explore opportunities to increase frequency of maintenance and/or incorporation of additional maintenance tasks

Rivers and Watercourses:

Assess the condition and capacity of watercourses that may incorporate multiple tasks including:-

- Site visits and surveys to identify current condition of rivers, watercourses and assets, including culverts, outfalls and structures
- Rehabilitation works including sediment removal, debris removal, clearance of vegetation and restoration of channels where required
- Exploration of opportunities to enhance flow capacity of channels and storage capacity of adjacent floodplains using attenuation or techniques designed to slow the flow
- Review existing maintenance schedules and explore opportunities to increase frequency of maintenance and/or incorporation of additional maintenance tasks

Property Level Resilience:

Explore the potential for flood mitigation that may incorporate multiple tasks including:-

- Site visits and surveys to identify potential flood resilience/mitigation
- Exploration of property level resilience products and vendors to establish if potential resilience measures may be appropriate
- Investigation into previously installed or existing property level resilience measures to assess the effectiveness of the installed measures
- Explore community and catchment wide solutions including, property flood walls and gates, flood defence walls/banks, flood storage areas.

Hydraulic Modelling:

Construct a hydraulic model that may incorporate multiple tasks including:-

- Construction of computation models to replicate how watercourses and/or sewers behave when subjected to a significant storm to enhance understanding of flooding mechanisms and properties which are most vulnerable
- Feasibility assessment and optioneering of potential measures that may mitigate flood risk. These measures may be strategic or local scale.

RISK MANAGEMENT AUTHORITIES AND OTHER PARTIES

In addition to the recommended actions, an RMA or alternative party has been identified to undertake these actions. While some actions require collaboration and partnership, the RMA or alternative party identified will co-ordinate all parties to ensure that the action is completed in a timely manner.

A summary of each of the RMAs, with regard to their role in flood risk management, is provided below:

Staffordshire County Council (LLFA)

LLFAs are county councils or unitary authorities which are required to prepare and maintain a strategy for local flood risk management in their areas, investigate significant local flooding incidents and publish the results of such investigations and play a lead role in emergency planning and recovery after a flood event.

Staffordshire County Council (Highways)

Highway's authorities have the lead responsibility for providing and managing highway drainage.

South Staffordshire District Council (Housing)

Housing authorities are usually district or borough councils or unitary authorities who are required to provide essential housing for the area and maintain property level drainage systems. In some cases, if the properties back onto a watercourse or are constructed above a culverted watercourse, Housing will hold responsibility for the maintenance and management of this feature within its riparian ownership.

Environment Agency

<https://www.gov.uk/government/organisations/environment-agency>

The Environment Agency has a strategic overview of all sources of flooding and hold responsibility for flood risk management activities on Main Rivers.

Severn Trent Water

<https://www.stwater.co.uk/my-supply/pipes-and-drains/help-with-pipes/sewer-flooding/>
As a water and sewerage company, Severn Trent Water manage the risk of flooding to water supply and sewerage facilities and the risk to others from the failure of their infrastructure. They ensure their systems have the appropriate level of resilience to flooding, and maintain essential services during emergencies, maintain and manage their water supply and sewerage systems to manage the impact and reduce the risk of flooding and pollution to the environment and they provide advice to LLFAs on how water and sewerage company assets impact on local flood risk.

Riparian Owners

<https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities>

A riparian owner is any party or individual who has a watercourse within or adjacent to any boundary of their property. They are responsible for maintaining the riverbed and banks within their section of the watercourse to preventing obstruction to the water flow and mitigate flood risk.

Conclusions

Following the storm events of 16th June and 17th August 2020, incidents of flooding were reported which included internal property flooding, external flooding to gardens, and flooding to highways and other areas.

Four types of flooding have been identified as causes for the instances of reported flooding. These include surface water flooding, flooding from watercourses, flooding from sewer infrastructure and flooding from highway drainage.

In many locations, surface water runoff was channelled by the highway with evidence of ponding in low points. Across the reported areas, it was noted the affected properties were usually at or below the level of the adjacent highway. Therefore, surface water runoff would collect in the low points of the highway and when the highway could not contain any more surface water, it would spill from the highway into properties. Vehicle movements through flood waters would have created waves pushing flood water onto properties.

The surface water flooding was then further exacerbated by the other three types of flooding. In some areas, the capacity of the Severn Trent Water infrastructure was overwhelmed by the magnitude of the storm event.

Along the flow path of the Wyrley Brook, the flow rate and volumes may have exceeded the available capacity, particularly where the brook entered a culvert or at a change in direction. This results in a constriction of flows, causing water to back up, overtopping the banks and spilling over. The blinding of existing trash screens along the brook would have also happened very rapidly and be another cause of constriction.

The flows and volumes experienced in other sewers and drains would have also led it escape out of the sewer manholes and highway gullies. This has been further exacerbated due to highway gullies being unable to adequately capture the surface water runoff, particularly where the intensity of the rainfall, and volume of runoff was such that it flowed over or around a gully.

Following on from the publication of this report Staffordshire County Council, in their role as Lead Local Flood Authority, will continue to work in partnership with all other relevant Risk Management Authorities, such as the Environment Agency, Severn Trent Water and SCC (Highways). The findings of this report will be the basis of evidence for future resilience or flood prevention schemes.

Actions to date

During the compilation of this report, the relevant Risk Management Authorities have already undertaken many of the identified recommendations, plus other additional works have been carried out, namely:-

- Severn Trent Water has taken steps to contact all affected properties that are in the Wyrley Brook catchment to build up an accurate picture of what happened and where. A large number of questionnaires were distributed and returned, and the results of that data capture is still ongoing.
- Severn Trent Water commissioned and with support from Staffordshire County Council undertook numerous asset surveys to feed into their models of the Wyrley Brook catchment. The model data is substantially complete and verified its publication is expected shortly. The data capture has been crucial in the preparations to design a collaborative flood alleviation scheme to the Brook which will provide benefits for a large proportion of its catchment through Great Wyrley and parts of Cheslyn Hay.
- The Environment Agency have commissioned and undertook the installation of flow monitoring devices into the Wyrley Brook at various points to help verify trends and models.
- Staffordshire County Council Highways has undertaken numerous site investigations and operations to identify the condition of drainage infrastructure, and already made improvements to various identified locations.
- Staffordshire County Council LLFA have identified potential funding sources to contribute to the collaborative flood alleviation scheme
- Staffordshire County Council LLFA and Severn Trent Water have already held a stakeholder meeting to demonstrate the findings of the data capture and modelling exercises and gave indications of the possible next steps and timelines. This was held during Summer 2022.
- Consultants have been commissioned jointly by Staffordshire County Council LLFA and Severn Trent Water to undertake a full review of the data and modelling in order to commence the optioneering together with economic appraisals. Once full optioneering has determined the shortlist of solutions, further stakeholder meetings will be planned with further public exhibitions to demonstrate the preferred way forward. It is expected that these meetings will be underway in 2024.

Appendix A

APPENDIX A: HYDROLOGICAL & RAINFALL ANALYSIS

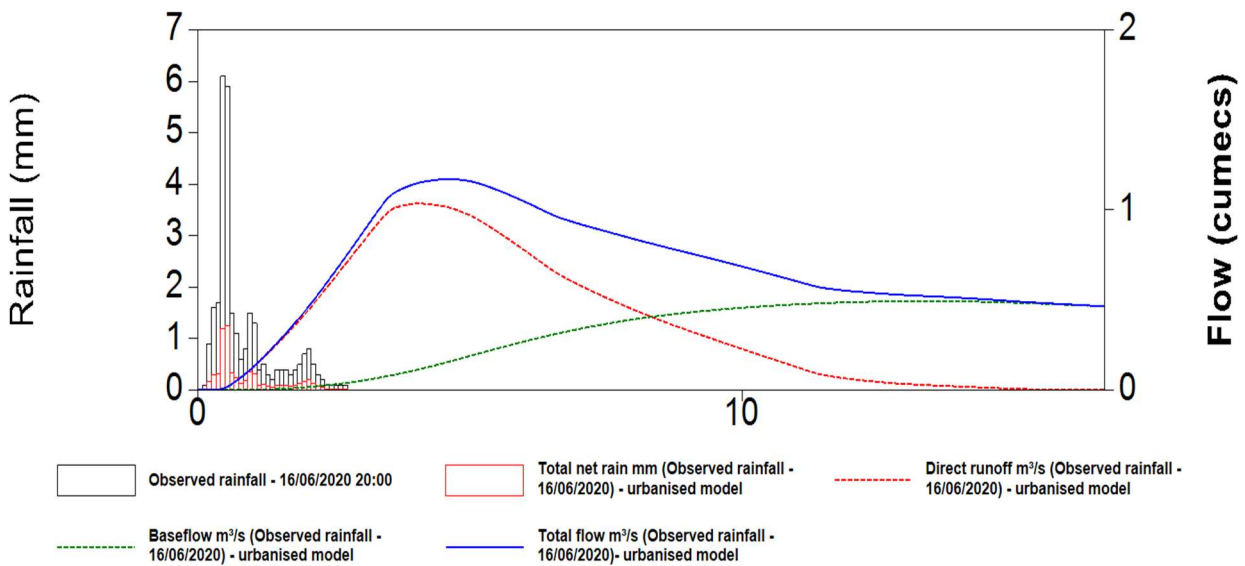
Wyrley Brook

In performing a hydrological analysis utilising Flood Estimation Handbook (FEH) Webservice catchment data and rainfall data sourced through Hydromaster software, the return period on this particular watercourse (the Wyrley Brook), can be estimated. An analysis was performed utilising the Revitalised Flood Hydrograph method in ReFH2 hydrological modelling software.



Catchment Area Analysed

Observed rainfall - 16/06/2020 - urbanised



The above hydrograph- with a peak flow of 1.17m³/s. The 1 in 1 year has a peak flow of 1.08 m³/s and the 1 in 2 year 1.24 m³/s, so the return period of the flow in this watercourse, for this event is between a 1 in 1 and 1 in 2 year event.

The return period on the rainfall event, however, is very different. As this was a very short-lived, extremely sharp and intense storm, it can be seen from HydroMaster that a lot of rain fell in a short time. 50.7mm fell in 65 minutes, according to HydroMaster data. This can be interpolated and analysed in the FEH Webservice Rainfall Modelling widget, as below:

Rainfall modelling FEH13

FEH13 FEH22

Design Rainfall
 Event Rarity

Duration * 65 Minutes Sliding

Depth * 50.7 mm

Annual Max. Peaks over threshold

Return period

135.31 years

A 65 minute rainfall (sliding) of 50.7 mm has a return period of 135.3 years.

Calculate Export

