2020 Flood Events:

Flood and Water Management Act

Section 19 - Investigation

Brookside, Rolleston

Figure 1: Flooding from the Rolleston Brook at Brookside, Rolleston, February 2020 (Image provided by the Environment Agency)

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 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 Brookside, Rolleston**		
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Executive Summary

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

Several storms occurred in 2020 across the Midlands region which impacted many areas. Storm Dennis, in February, was a long duration, low-to-moderate intensity event, causing widespread flooding nationwide. The event led to a severe weather warning over much of Wales and the Midlands. As a result of these storms, a significant number of flooding incidents were reported to Staffordshire County Council, including Brookside located in Rolleston-on-Dove.

Following the storm events, Staffordshire County Council worked closely with the various Risk Management Authorities (RMAs) and local residents to gather information and determine the impact of the flooding.

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

This report focuses on flooding associated with Storm Dennis that internally affected several properties at Brookside, Rolleston, on 16th of February 2020. The investigation undertaken has been summarised, outlining the extent of flooding reported, the most likely cause of flooding, and the actions that have been completed, or are proposed to be completed in the future.

Introduction

Several storms occurred in the Midlands in 2020 resulting in flooding at several locations in Staffordshire. Storm Dennis hit the Rolleston-On-Dove area on the 16th February 2020.

This storm 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 at providing a broad overview of the cause of the flooding at Brookside, Rolleston, resulting from the event in February 2020 and identifies the next steps, if any, that need to be taken by the relevant Risk Management Authorities (RMAs).

Although this report specifically focuses on Brookside, Rolleston-On-Dove, flooding associated with Storm Dennis resulted in more than 130 applications for grant support from residential and business properties across East Staffordshire. Many areas also experienced incidents in which five or more properties were internally flooded, reaching the criteria for a Section 19 investigation.

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 food risk, groundwater flood risk and the flood risk from ordinary watercourses[1].

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 (EA), who hold responsibility for Main Rivers.
- Severn Trent Water (STW), who hold 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.

[1]An ordinary watercourse is defined as any watercourse not designated as 'Main River,' i.e. watercourse that are not managed by the Environment Agency.

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*[2], 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.

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:

- Five or more residential properties are reported to have been internally flooded during a single flood event in one location;
- Two or more business properties are reported to have been internally flooded during a single flood event in one location, or;
- One or more items of critical infrastructure are reported to have been adversely affected during a single flood event in one location

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 is being verified and quality checked for accuracy.

[2] https://www.staffordshire.gov.uk/environment/Flood-Risk-Management/Local-Flood-Risk-Management-Strategy.aspx

Investigation into Flooded areas

Step 1: During the Flood Event

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

During the flood event, the LLFA coordinated with multiple Risk Management Authorities (RMAs) to ensure that flooding was managed effectively and the risk to people and properties was mitigated as far as reasonably practicable.

Step 2: Initial Investigations

Using call records, flooding investigation questionnaires and site visits, the LLFA identified the locations where flooding occurred.

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 Flood Survey responses, the LLFA identified areas where at least one property experienced internal flooding.

Step 3: Detailed Investigation and Analysis

The LLFA conducted detailed investigation and individual location analysis of each of the areas generally where the thresholds for a Section 19 report, defined above, have been met. Namely, this occurs where 5 or more properties have 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.'

These investigations typically included a review of existing infrastructure and topography, identification of predominant flow paths, site visits and local knowledge gathering.

Through a detailed analysis, the LLFA have identified the types of flooding that occurred at each location during the events of February 2020.

As a general rule, the LLFA does not undertake investigation of external flooding to garages, gardens, and highways due to limited resources and funding. Indeed, gardens often act as flood storage areas and highways can be designed to convey flood waters reducing the extent/level of internal property flooding.

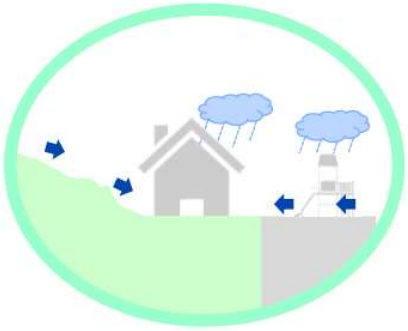
Step 4: Recommended Actions

Following the analysis of the affected area, 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.

Types of Flooding

Surface Water 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.



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

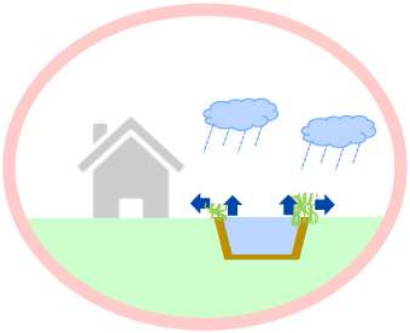
Impermeable surfaces, sometimes colloquially known as *'hard surfaces'*, do not allow any rainfall to soak into the ground and this rainfall will become (surface water) runoff. Runoff is usually very quick. These are typically in the form of highways and roads, roofs, car parks and public squares.

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



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 watercourse through their land.

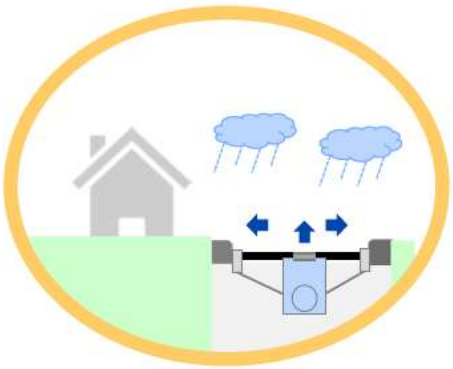
River flooding occurs under a number of circumstances, most commonly occurring when:

- 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 that 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 sewers, including:

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

Foul Water Sewer, that 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 when:

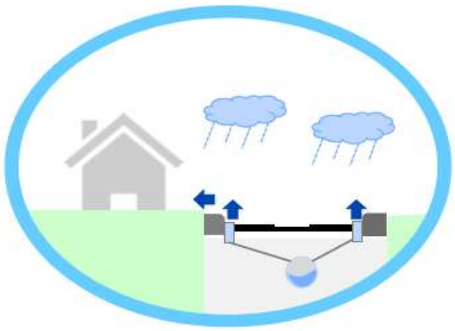
- There is a blockage, or the sewer itself collapses, which restricts or prevents flow within the sewer network. This causes water to back-up through the network and find its way to the surface, typically through a manhole or associated drainage structure.
- There is a period of heavy and/or prolonged 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 (8th Edition, published 2018). 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 approximately the last 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 typically 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 East Staffordshire Borough. This work includes maintenance of the highway drainage 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: https://flood-warning-information.service.gov.uk/long-term-flood-risk/postcode

Figure 2: Example of Environment Agency updated Flood Map for Surface Water Flooding

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

Figure 3: Example of Environment Agency River Flood Zones mapping

Analysis of Flooding Location

Brookside, Rolleston-On-Dove

The following sections of this report describe the flood event that occurred at Brookside, Rolleston on Dove, on 16th February 2020. The event has been assessed through the review of anecdotal evidence from local residents and through consultation with the various Risk Management Authorities (RMAs).

Event Background

Several storms occurred in winter 2019-2020 across the UK and Midlands. The combined impacts of Storms Ciara, Dennis and Jorge led to exceptionally high rainfall totals across the UK, with associated flooding in several areas.

Storm Dennis (15-16 February 2020) was the fourth named storm in the 2019/20 season, which arrived one week after Storm Ciara and brought with it heavy and persistent rainfall[3]. In the six months and twelve months prior to Storm Dennis, Staffordshire had exceptionally high rainfall compared to the average (**Figure 4**). Rainfall in December and January was unremarkable. However, rainfall totals in February were exceptionally high, with February the wettest month in a series from 1862; the England figure was 258% of the long-term average (1981-2010). Crucially, soil moisture deficit from December 2019 through to February 2020 was generally practically zero/remained close to zero in Central England[3] (**Figure 5**). This means in the time running up to Storm Dennis there was generally little to no capacity within soils to drain or infiltrate rainfall. River flows in large rivers were also exceptionally high through February.

[3] Met Office – Winter 2019/2020 https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/summaries/uk_monthly_climate_summary_winter_2020.pdf

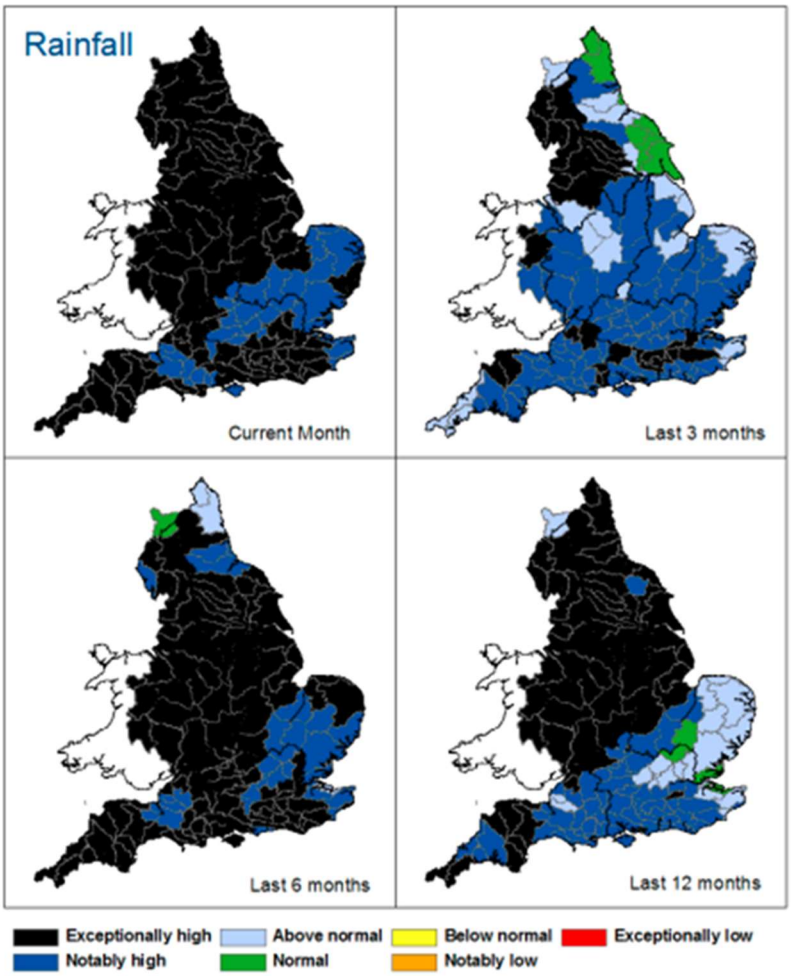


Figure 4: Total Rainfall Across England up to February 29, 2020 (Source: Environment Agency)

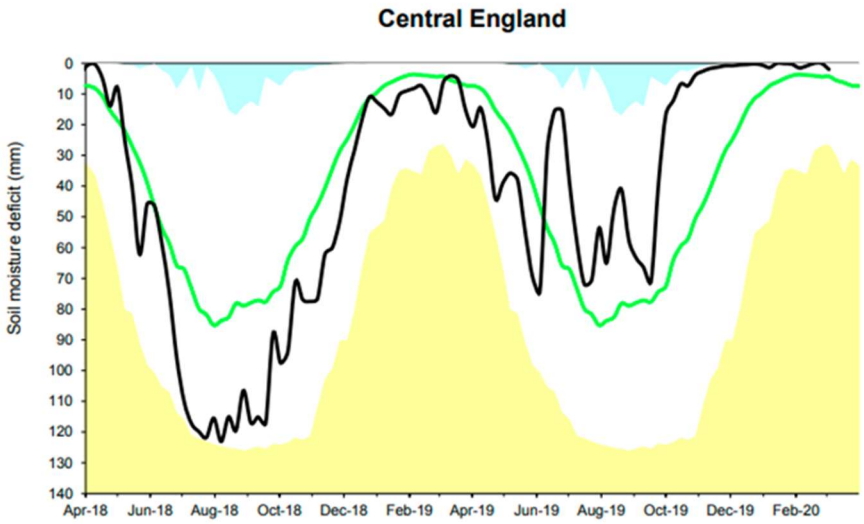


Figure 5 Central England Soil Moisture Deficit (Source: Environment Agency[4])

[4] Environment Agency – Monthly water situation report: England
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/871949/Water_situation_February_2020.pdf

On 14 February, Storm Dennis developed off the west coast of Ireland moving east and arriving in England by early afternoon. By mid-afternoon the front swept into Staffordshire and by late Friday night/early hours of Saturday morning this front had passed east out of Staffordshire. On Saturday 15th February a large front of rainfall developed in the morning and approached Staffordshire quickly, sustaining through to mid-day and continuing to remain over Staffordshire until early afternoon on Sunday 16th February. **Figure 6** shows radar-images of the rainfall across the UK. Through the rest of Sunday, the sustained/persistent rainfall moved over the rest of Europe, leaving scattered rainfall showers over Staffordshire through to Monday. For a more detailed account of Storm Dennis please refer to The Met Office[5] and Centre for Ecology and Hydrology[6].

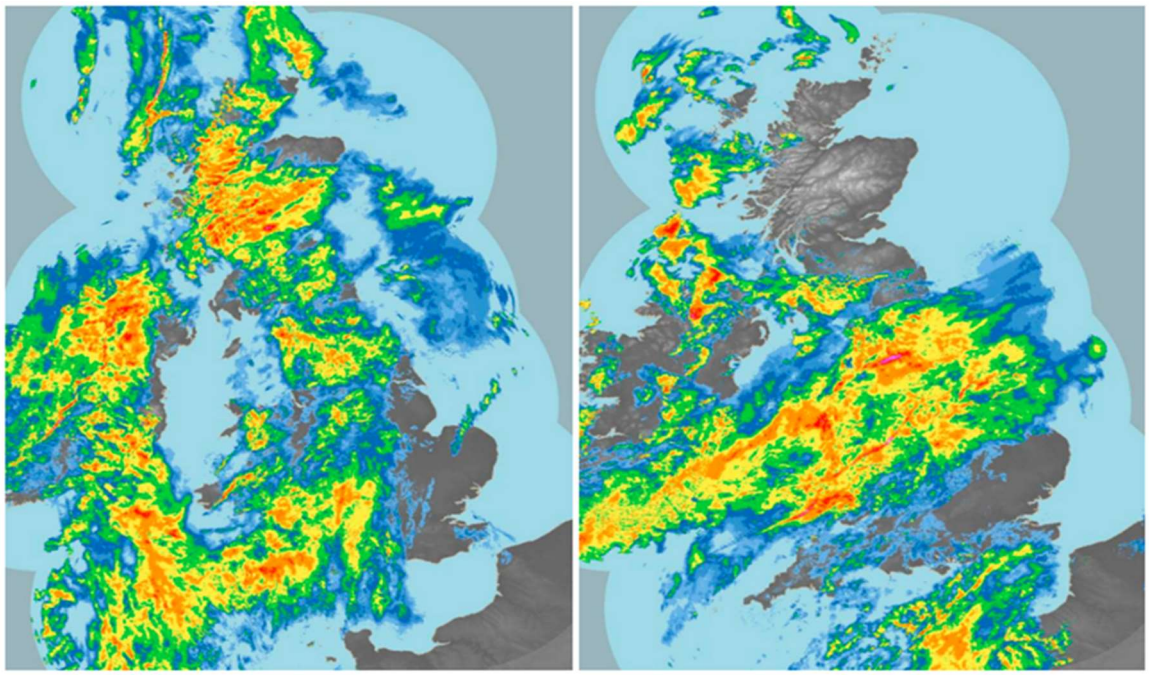


Figure 6: Rain-radar images at 12 UTC 15th and 00 UTC 16th February 2020 show the heavy and persistent rainfall from storm Dennis with the fronts sweeping across the UK (Source: The Met Office[5])

[5] Met Office – Storm Dennis https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2020/2020_03_storm_dennis.pdf

[6] Centre for Ecology and Hydrology – Briefing note: Severity of the February 2020 floods – preliminary analysis https://nrfa.ceh.ac.uk/sites/default/files/Briefing_Note_V6.pdf

Location Background

Brookside is a small residential road located in Rolleston-on-Dove, a village on the northern boundary of Burton-upon-Trent, East Staffordshire (Figure 7). The village lies in the Dove Valley between the River Dove and River Trent and is surrounded by agricultural land. Rolleston itself is centred around Rolleston Brook, which flows through the village alongside Brookside and Burnside. The village is predominantly residential with several shops and facilities located along Burnside and Church Road. Several other community facilities are also located within the village including a primary school, nursery, Scout Hut and Church.

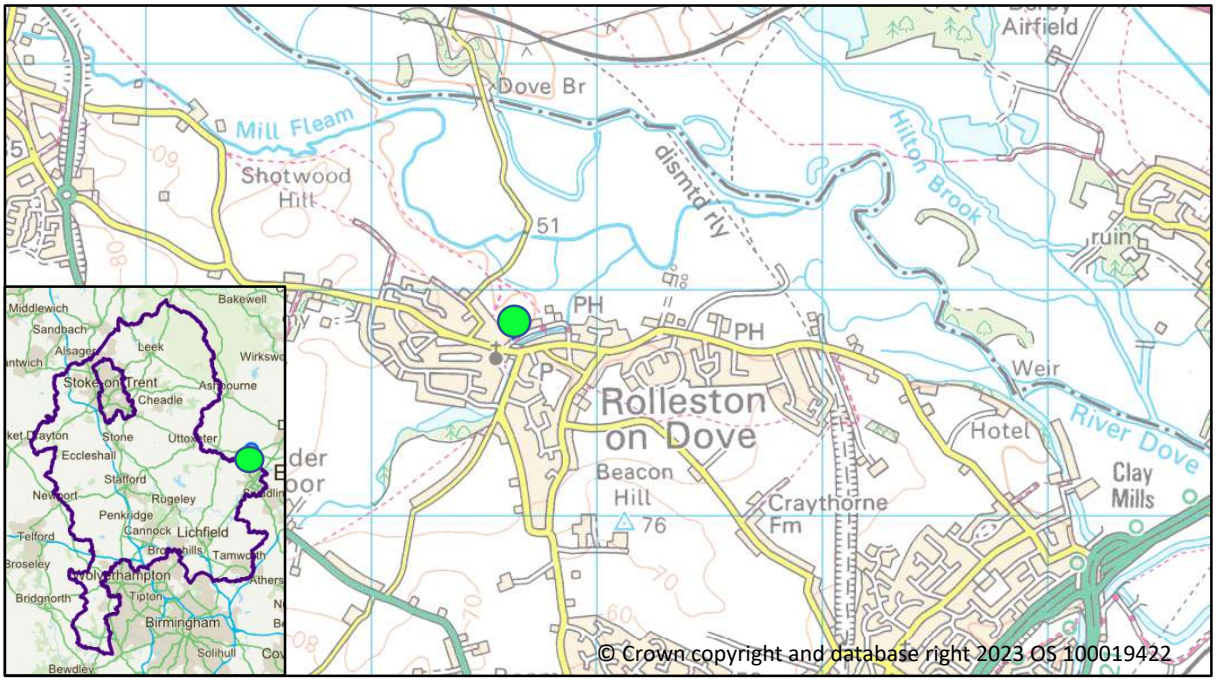


Figure 7: Location map of Brookside in Rolleston-on-Dove. Flood location shown by green circle and Staffordshire County boundary in purple.

There are several areas of local green space within the village and the wider area including: the village cricket pitches, The Croft, Old Dove Site of Special Scientific Interest (SSSI), Jinny Nature Trail, Brook Hollows and Jubilee Orchard and allotments.

Local Watercourses:

Several watercourses flow through and around Rolleston-on-Dove (Figure 8). Rolleston Brook (also referred to as Alderbrook) is situated to the south of Brookside and flows through the western extent of the village. To the north of Rolleston-on-Dove, the River Dove flows in a south-easterly direction, along with its tributary, Tutbury Mill Fleam. An unnamed drain is situated to the north of Dovecliff Road. Downstream of River Cottage View, the drain is referred to as Clay Mills Fleam and discharges into the River Dove to the southeast, approximately 2.5km downstream of the village.

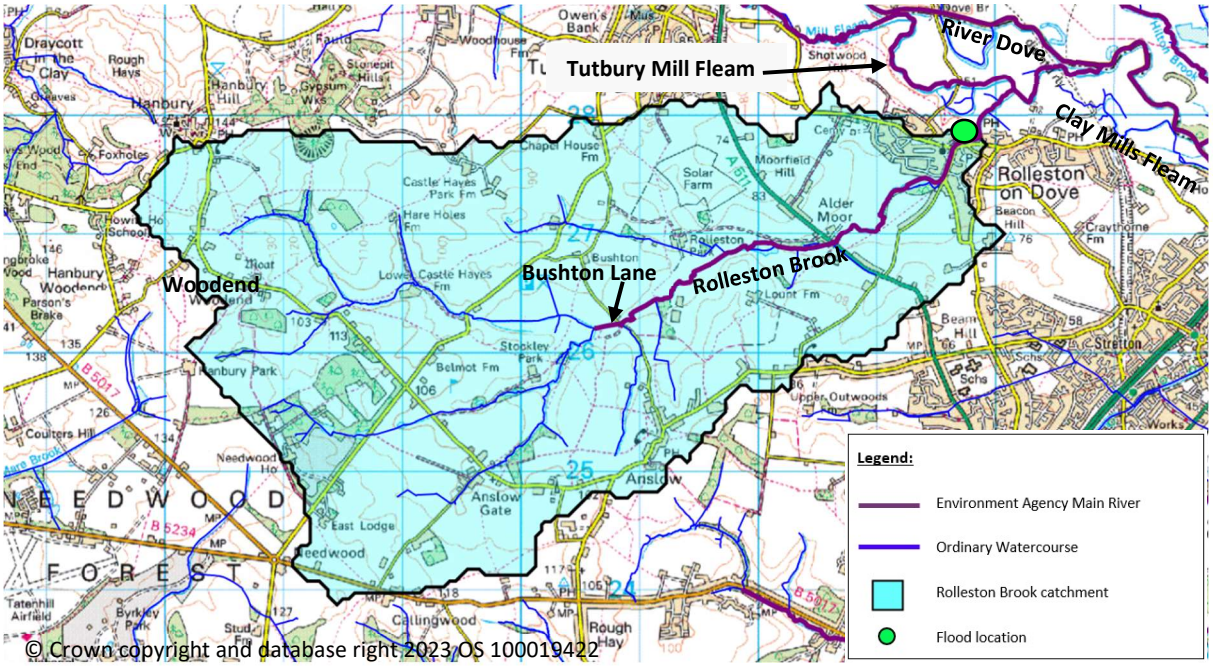


Figure 8: Watercourses discharging within and around Rolleston-on-Dove

Rolleston Brook itself rises to the south-west of Rolleston-on-Dove in agricultural land at Woodend. The watercourse flows in a predominantly north-easterly direction through Rolleston-on-Dove, ultimately discharging into Tutbury Mill Fleam which discharges into the River Dove, approximately 1.5km downstream of the village. Figure 8 presents the catchment area of Rolleston Brook, which drains an area of approximately 18km^2. In its upper reaches, the catchment is predominantly rural, with the watercourse flowing through agricultural land. The catchment is steep, particularly in its upper reaches, and responds quickly to heavy rainfall events. The underlying geology at the flood location is dominated by the Mercia Triassic Mudstone group, comprising moderately permeable clays and mudstones. Overlying superficial drift deposits are found adjacent to the watercourse and comprise clay, silts, sands and gravels. Such deposits can exhibit high water tables, particularly in times of high flow and the ground is saturated.

The watercourse is classified as Main River from a point approximately 200m upstream of Bushton Lane and is managed and maintained by the Environment Agency between this point and its confluence with the River Dove (Figure 8). From here, the watercourse continues to flow in a north-easterly direction, through rural landscape before passing beneath the A511 (Tutbury Road). At the western edge of Rolleston, the watercourse enters Brook Hollows Spinney, flowing through a lake, pond and series of weirs.

Downstream of Brook Hollows Spinney, the watercourse turns to flow in a more northerly direction, flowing through the village parallel to Burnside (Figure 9). At this point, the brook flows downhill in an artificial channel with a series of weirs. Several footbridges are situated across the watercourse connecting the properties on the left bank to the highway at Burnside. It is understood that work was undertaken by the National River's Authority in 1984 to improve the capacity of the brook at this location. Downstream of the final weir, the brook reverts to a natural channel before being culverted beneath Church Road and emerging on the southern side of Brookside approximately 17m

downstream. The brook continues to flow in a north-easterly direction parallel to Brookside. At the end of Brookside, there is a vehicle ford that runs through to the hotel on the opposite bank. The watercourse passes beneath a footbridge, then at Brookside Hotel, turns sharply to flow in a northerly, then north-easterly direction, discharging into Tutbury Mill Fleam approximately 540m downstream. There are no formal flood defences along the Rolleston Brook.

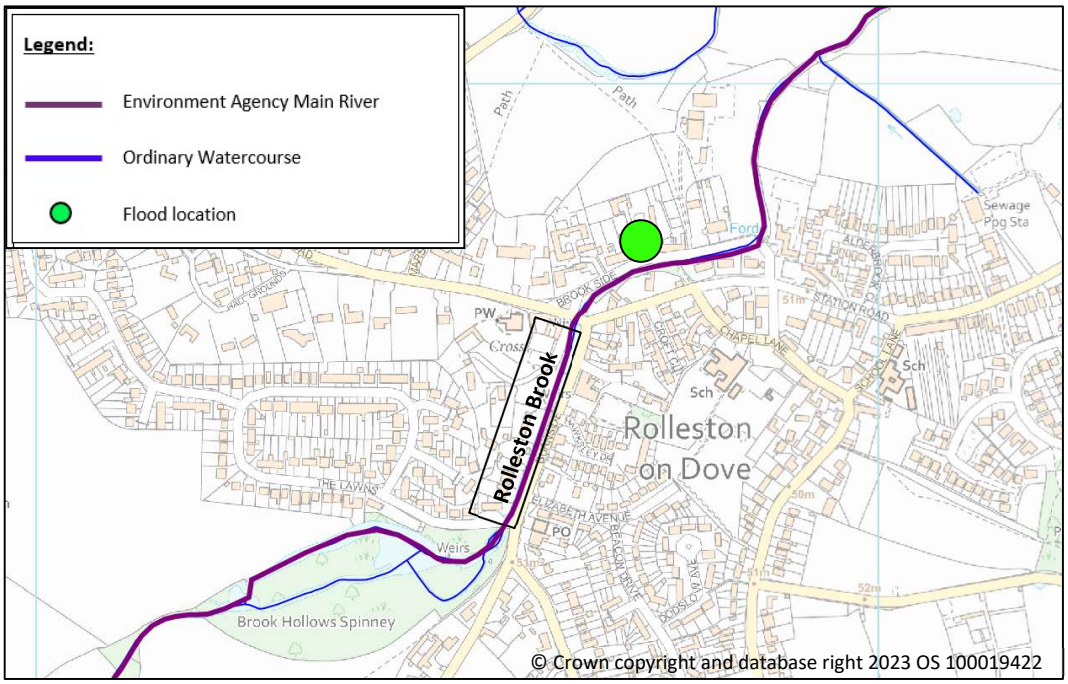


Figure 9: Rolleston Brook as it flows through Rolleston-on-Dove village

Public Sewer Network:

Rolleston-on-Dove is predominantly served by gravity fed foul and surface water sewers which are owned and maintained by Severn Trent Water. At Brookside itself, a gravity fed foul sewer serves the properties which discharges into a STW combined sewer at the eastern end of Brookside. The combined sewer network drains to Rolleston Pumping Station situated off Station Road on the northern edge of the village. From here, combined flows are pumped to a sewage pumping facility to the north of the village and then onto the sewage works at Claymills Severn Trent Sewage Works at Meadow Lane, Burton-upon-Trent.

Review of data provided by STW indicates that there are no surface water sewers within the vicinity of Brookside. However, several surface water sewers are located within the wider Rolleston-on-Dove village area and are shown to discharge into Rolleston Brook.

Highway Drainage Network:

The local highway drainage network comprises of traditional highway gullies and connections. A series of highway gullies are located along Brookside, Chapel Lane, Beacon Road, School Lane, Station Road and Dovecliff Road. Staffordshire County Council highways department are responsible for the maintenance of this network of highway gullies and connections.

Current flood risk management at Brookside:

Consultation with the Environment Agency has indicated that there are no main river flood defences on the Rolleston Brook. A Flood Briefing Note issued by the Environment Agency following the February 2020 event details that the Rolleston Brook is inspected annually by the Environment Agency's Asset Inspector. The inspection comprises a visual assessment of the watercourse and any structures on it and any issues or defects are reported. Informal visual inspections of the channel through the village are also undertaken by the Environment Agency during other routine maintenance activities.

The Environment Agency have indicated that larger scale debris removal and tree/vegetation management works were undertaken on the Rolleston Brook in October 2016, November 2017 and January 2020. The watercourse is also included in their revenue maintenance bid works for every 2-3 years. Prior to any works taking place, the Environment Agency undertake a site visit to assess the extent of the works required.

Other works have been undertaken within the wider Rolleston-on-Dove area in recent years to improve drainage and resilience to flooding within the village including installation of property level resilience, drainage improvements along Beacon Road/Craythorne Road, clearance of roadside ditches and the installation of property level resilience measure. These measures are not related to the flooding experienced at Brookside from the Rolleston Brook.

Historical Flooding at Brookside, Rolleston-on-Dove

Rolleston-on-Dove has a long history of flooding with records of flooding along Brookside dating back to the early 1900s. The East Staffordshire Borough Council (ESBC) Strategic Flood Risk Assessment (SFRA) and other historic records indicate that flooding along Brookside has been experienced on several occasions including July 1983, November 2000, 2007, July 2012, November 2012, March 2018, November 2019 and 2020; although flooding to property is not thought to have been experienced on all these occasions.

Review of anecdotal evidence received from residents indicates that prior to February 2020, two significant flood events occurred along Brookside, these being 6th November 2000 and 25th November 2012. On both occasions, it is understood that flooding occurred as a result of water from Rolleston Brook flowing across the highway towards properties, resulting in significant internal damage to property.

Environment Agency Flood Maps:

Rolleston-on-Dove is at risk from multiple sources of flooding. Figures 9 and 10 overleaf present the Environment Agency Risk of Flooding from Rivers and Sea (Flood Zone mapping, RoFRS) and Risk of Flooding from Surface Water (RoFSW) maps for Rolleston-on Dove.

The flood zone maps show several properties along Brookside lie within both Flood Zone 2 (projected flood risk between 1% and 0.1% Annual Exceedance Probability AEP event) and Flood Zone 3 (flood risk greater than 1% AEP event). The maps show that most of this risk is likely to be from Rolleston Brook, situated to the south of the highway. However, downstream of the hotel at Brookside, in the lower lying parts of the floodplain, both Flood Zones 2 and 3 are significantly larger in extent demonstrating the influence of the River Dove.

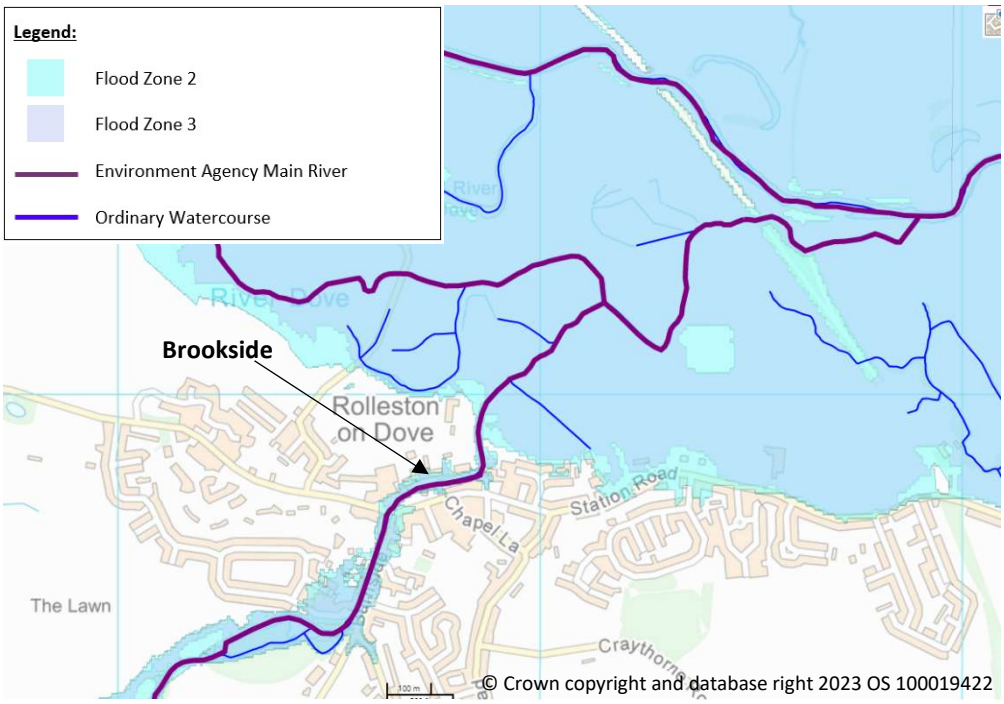


Figure 10: Environment Agency Risk of Flooding from Rivers and Sea (RoFRS) map showing the Flood Zone 2 and Flood Zone 3 outlines for Rolleston-on-Dove

The Risk of Flooding from Surface Water (RoFSW) maps show a similar extent in flooding to the Flood Zone maps, with the highway and several properties along Brookside shown to be situated within the 1 in 30yr RoFSW, 1 in 100yr RoFSW map and the 1 in 1000-year RoFSW map. This means each year, the area has a chance of flooding of greater than 1 in 30 (3.3%), or greater than 1 in 100 (1%).

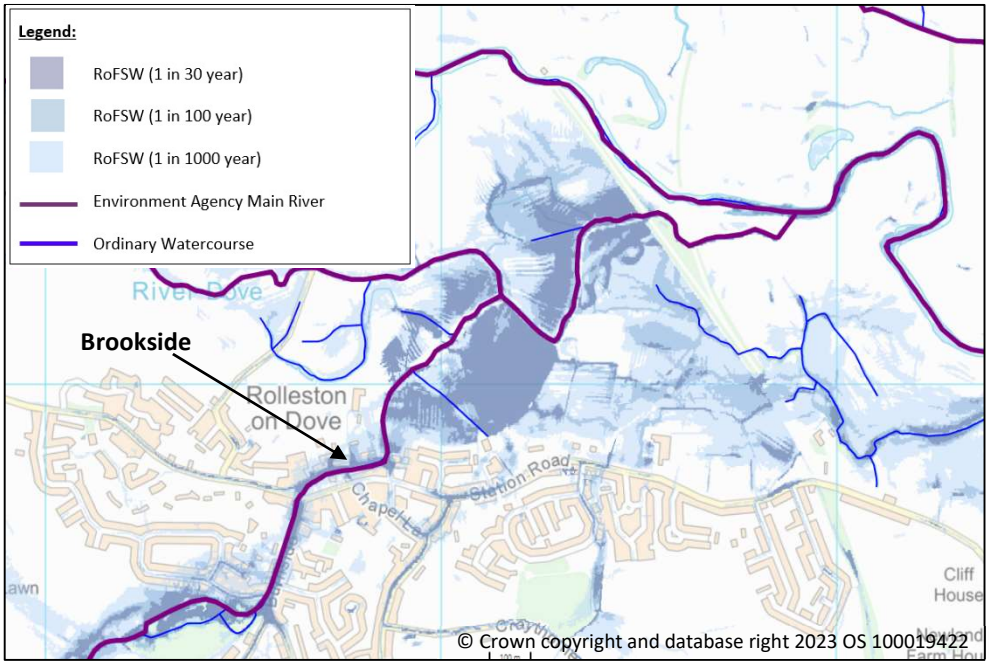
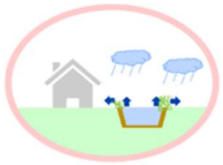


Figure 11: Environment Agency Risk of Flooding from Surface Water (RoFSW) maps showing the outlines for a 1 in 30-year event (3.3% AEP), 1 in 100-year event (1% AEP) and 1 in 1000-year event (0.1% AEP).

February 2020 - Flood Event Description

On the 16th of February 2020, multiple properties on Brookside reported that they had experienced internal flooding. Accounts from residents describe flood water entering properties in the early hours of Sunday 16th February 2020. Records passed to us by East Staffordshire Borough Council (ESBC) indicate that 6 properties experienced internal flooding. It is however thought that a greater number of properties were affected, with Environment Agency records indicating that 12 properties reported internal flooding to property.

Identified Flooding Types
River Flooding


Property owners described flood depths within their dwellings ranging from 2 to 16 inches, with significant damage to interior decoration, carpets and flooring with many items that were beyond salvage. Whilst some properties along Brookside have flood gates installed, anecdotal evidence has indicated that these proved ineffective during the Storm Dennis event. Several residents described that the water contained mud and silt which is likely to comprise silt and soil run-off from upstream fields. It is understood that many residents were unable to leave their properties for several hours. Flooding to outbuildings, gardens, driveways and the highway was also experienced.

Figures 12 to 14 present photographs of flooding along Brookside in February 2020. Whilst the photographs were taken after the peak of the flood had subsided, they demonstrate the extent of flooding and the significant depth of water that was experienced.

Figure 12: Flooding along Brookside in February 2020 (Looking in a westerly direction) (Photograph provided by the Environment Agency).

Figure 13: Flooding along Brookside in February 2020 (Looking in a westerly direction) (Photograph provided by the Environment Agency).

Figure 14: Flooding at Brookside in February 2020 (looking in an easterly direction) (Photograph provided by the Environment Agency).

Information received suggests that the main source of flooding at Brookside was from Rolleston Brook directly and has therefore been identified as main river flooding. Whilst some of the records received indicate that floodwater may have been contaminated, residents commented that this was a result of agricultural contaminants that entered the water from nearby fields.

Consultation with Severn Trent Water has indicated that they had no incidents of sewer flooding reported at Brookside during the Storm Dennis event.

Flood Incident Response:

Rolleston-on-Dove is covered by the Lower Dove Brooks Flood Alert. Flood Alerts are issued to inform those signed up that flooding is possible and is also covered by its own flood warning area. Records from the Environment Agency show that the flood warning for Rolleston was issued at 02:24 on 16th February 2020.

On Sunday 16th February 2020, Staffordshire County Council and East Staffordshire Borough Council received a significant number of calls through its emergency telephone lines informing the Council of localised flooding throughout the Borough, including the Burton-on-Trent area. Officers immediately put the Town Hall on standby in case it needed to be mobilised as a rest centre.

Over the course of Monday 17th February, the Council was advised that flooding was potentially becoming more widespread within the Borough and at 5pm on Monday, officers chaired a multiagency conference call which resulted in formal Strategic and Tactical Co-ordinating groups being set up. This included Staffordshire County Council, Police, Fire, West Midlands Ambulance Service and the Civil Contingencies Unit (CCU) as part of the local resilience forum response.

As part of the response, it was highlighted that a number of properties may need to be evacuated and the Town Hall was mobilised as a rest centre, to accommodate any residents displaced due to

flooding. However, emergency services indicated that this would not be required, and rest centre facilities were closed shortly after.

On the morning of 18th February, the Strategic Coordinating Group stood down the response phase and moved into the recovery phase. Following the event, East Staffordshire Borough Council collected information from local residents that had experienced flooding in order to process Flooded Property Claims to help fund repairs for the damages caused by the February 2020 event.

Following the event, the Environment Agency sent questionnaires to local residents to gather information about the flood event and also met with local residents on site to walk the length of the watercourse and obtain further knowledge of the Rolleston Brook catchment. In response to questions raised by residents, the Environment Agency issued a Flood Briefing Note to address resident's concerns surrounding the flood response and the events that happened both leading up to and during the event. This document is discussed further in the following sections of this Section 19 Investigation.

East Staffordshire Borough Council (ESBC) received more than 130 applications for grant support from residential and business properties across East Staffordshire. By the end of the scheme, the DEFRA Property Flood Resilience grant scheme and ESBC will have provided grants to approximately 86 properties that equals an approximate value of £370,840 across the Borough.

Investigation

Flooding at Brookside is an ongoing issue and several investigations have been undertaken in recent years to obtain a better understanding of the flooding mechanisms and identify potential solutions to reduce the risk of flooding at both Brookside and within the wider village of Rolleston-on-Dove. Following the flood event in February 2020, SCC LLFA have worked in conjunction with the relevant Risk Management Authorities (RMAs) to obtain data to help understand what happened on 16th February 2020.

Rainfall Analysis:

Rainfall data has been obtained from various sources to obtain a better understanding of the February 2020 event. On the 15th and 16th of February, Storm Dennis generated a severe weather warning over much of the Midlands. The Storm Dennis event has been characterised as a long duration, low to moderate intensity rainfall event that spread over large catchments, which is typical with winter rainfall storm events.

Figure 15 shows the 5-minute HydroMaster rainfall data for Brookside. A total of 28.7mm of rainfall was recorded over the 24-hour time period 15th February 2020 to 16th February 2020. Of this total, 25.4mm was recorded during a 17-hour period between 21:10 on February 15th and 13:40 on 16th February 2020 demonstrating that the storm was relatively intense, with rainfall falling continuously throughout the duration of the storm.

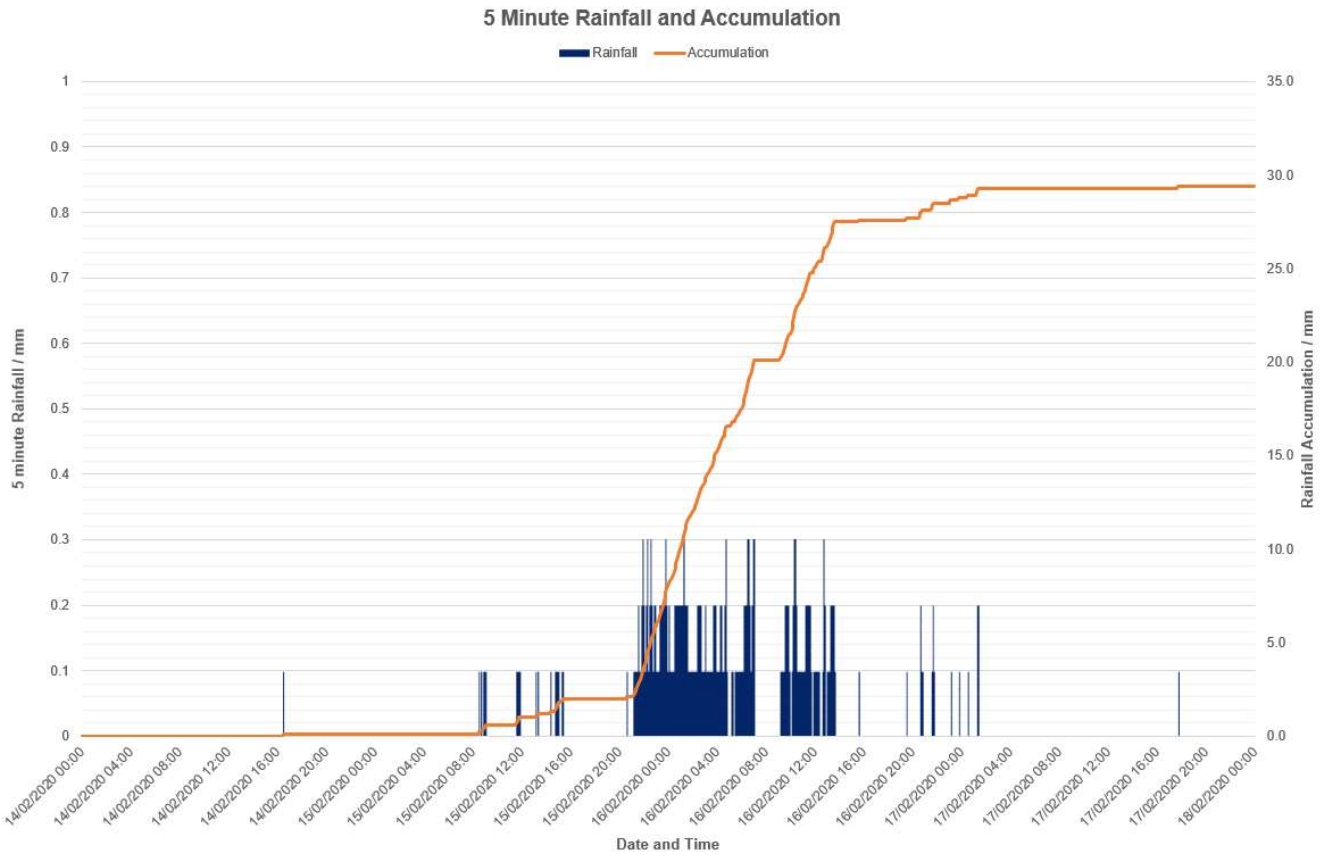


Figure 15: 5-minute Rainfall data for Brookside, Rolleston-on-Dove, from February 14th, 2020, to February 18th, 2020 (Source: Hydromaster)

The rainfall return period of the February 2020 event has been estimated as less than a 1-year event by HydroMaster software (Table 1). Although this presents as relatively insignificant, the average rainfall for February (1981-2010 baseline) for the area, recorded by the closest Staffordshire MET Office climate station in Denstone, is 62.1mm. Therefore, almost 50% of the monthly rainfall fell in the Rolleston-on-Dove area within 24-hours, making it significant to the area.

Table 1: Rainfall event return periods for Storm Dennis on February 16th and 17th 2020

Event duration	Event occurrence (date / time)	Total rainfall (mm)	Rainfall Intensity (mm/hr)	Event return period
6-hour	15/02/2020 21:45 – 16/02/2020 03:45	12.2	2.0	<1-year
12-hour	15/02/2020 21:45 – 16/02/2020 09:45	18.4	1.5	<1-year
24-hour	15/02/2020 13:45 – 16/02/2020 13:45	26.7	1.1	<1-year
48-hour	15/02/2020 02:25 – 17/02/2020 02:25	30.9	0.6	<1-year

This intense rainfall was widespread across the catchment and wider area of Staffordshire (Figure 16). Review of DEFRA Environment Agency rain gauges within the area shows that similar rainfall

totals were recorded for the same time-period. The closest gauge to Brookside, Byrkley Park gauge, recorded a total of 40.6mm for the two days of February 15th and 16th 2020. Of this total, 31.8mm of rainfall was recorded between 21:30 on February 15th and 07:00 February 16th, demonstrating that a significant amount of rainfall fell within a relatively short period of time. Comparable values were also recorded at Clay Mills (43.8mm) and Uttoxeter (35.8mm) rain gauges within the same period. This rainfall data for the surrounding area, including the intense period of rainfall recorded at Byrkley Park at a similar time to Brookside, shows an excess of 40mm of rainfall fell over the wider area surrounding Brookside prior to the flood event on 16th February 2020.

The intense period of rainfall prior to the flooding incidents that occurred across the County resulted in significant volumes of surface water flooding over what was already saturated ground and several watercourses within the County were elevated from Storm Ciara the previous week.

Whilst the magnitude of the rainfall event alone was not exceptional, when combined with the preceding conditions and extremely saturated ground it resulted in a more extreme, lower probability flooding event.

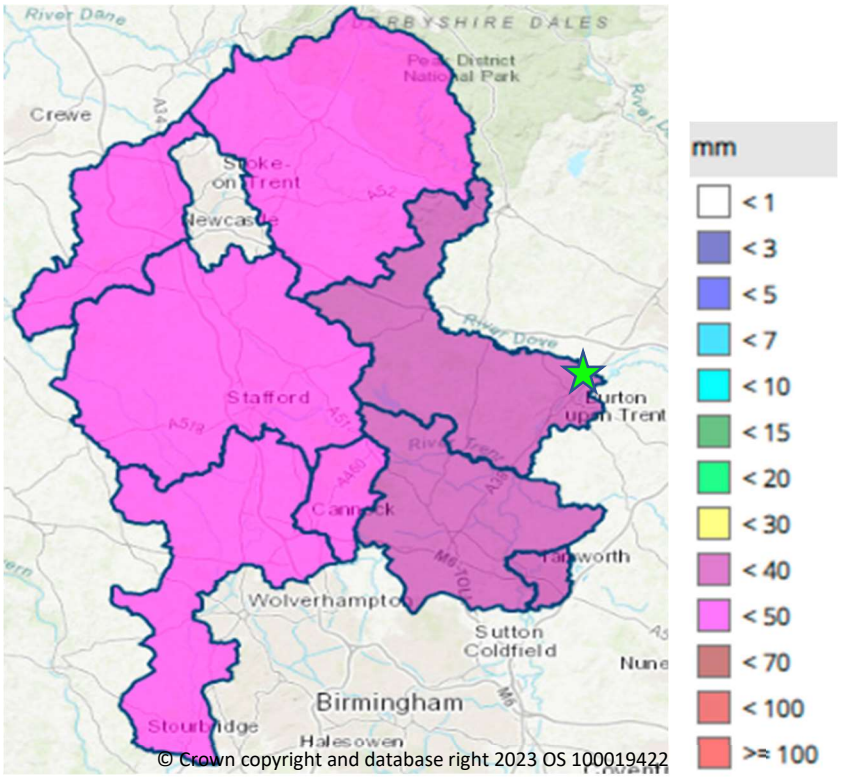


Figure 16: Rainfall totals for districts and boroughs across Staffordshire County with Brookside indicated by a green star (Data Source: Hydromaster)

Flooding Mechanisms:

The flooding experienced at Brookside in February 2020 has been identified as river flooding. The wider catchment received greater than average rainfall for February 2020 resulting in the catchment becoming saturated prior to the flood event. Intense precipitation during the Storm Dennis event resulted in flows within Rolleston Brook rising quickly and subsequently overtopping the banks of the watercourse adjacent to Brookside. Figure 17 demonstrates the main observed flow routes at Brookside.

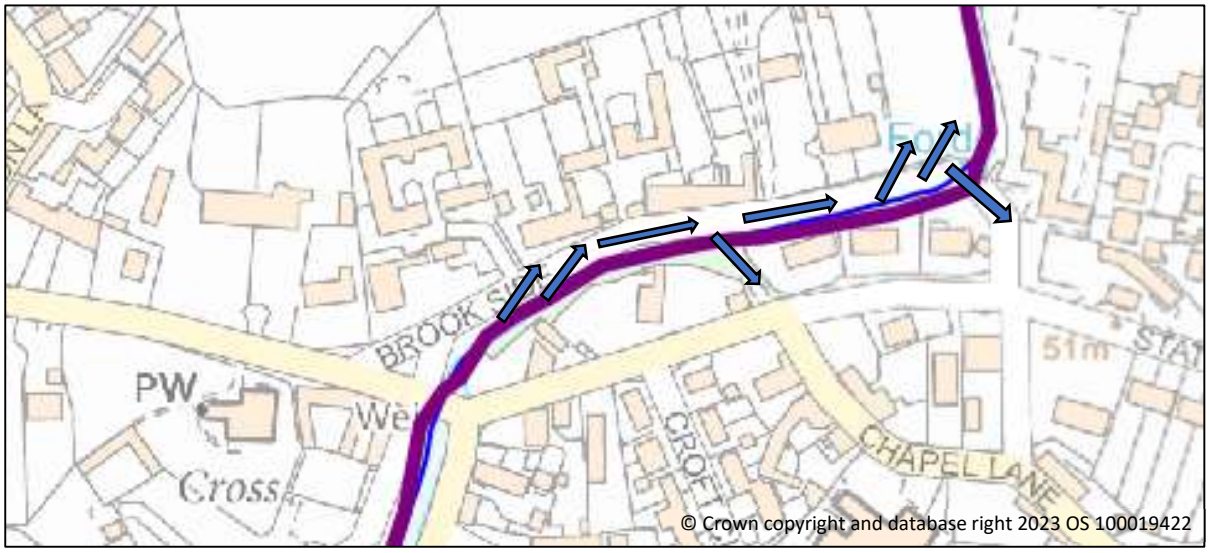


Figure 17: Observed flow routes (blue arrows) from Rolleston Brook at Brookside during the February 2020 flood event. Rolleston Brook shown by purple line.

Comparison of the observed flow routes with the Environment Agency's Flood Zone mapping presented in Figure 10 demonstrates that the flood flow routes correspond with the predicted areas at risk of flooding from the Rolleston Brook. Consultation with the Environment Agency detailed how water typically leaves the channel by the footbridge adjacent to the former Brook House Hotel, spilling out onto both the left and right banks (Points 1 and 2). Water also spills from the left bank at various points upstream of the footbridge, again following the prevailing topography, towards properties along the left bank (Point 3) and also spilling onto the right bank and along the foot bridge which connects the properties with Station Road (Point 4).

Watercourses:

The Storm Dennis event and associated rainfall impacted water levels and flows within many watercourses within Staffordshire. Whilst several locations within the village of Rolleston-on-Dove are known to experience flooding issues resulting from surface water runoff, the flooding at Brookside in February 2020 originated from the Rolleston Brook.

Consultation with the Environment Agency has indicated that there are two main factors that can contribute to flooding at Brookside. Firstly, extremely heavy rainfall over the catchment can result in high water levels within the Rolleston Brook. Typically, these occur over a short period of time, with levels rising and then falling within a 4–5-hour time period.

The second key factor that can influence flooding at Brookside is the level of water in the River Dove. Whilst the Rolleston Brook is a flashy catchment, responding quickly to rainfall, large events on the River Dove tend to occur over a 36–48-hour time period, with levels rising and falling more slowly. If water levels within the River Dove are elevated, water from the Dove can back-up the Rolleston Brook channel, potentially as far upstream as the Brookside Hotel. When this happens, it becomes more difficult for the Rolleston Brook to discharge as the downstream floodplain is already full of water.

The Environment Agency has two continuous river level gauges at Anslow on the Rolleston Brook (located approximately 1.4km upstream of Rolleston) and at Marston-on-Dove on the River Dove (approximately 1.0km north of Rolleston and 1.4km upstream of the point Rolleston Brook discharges into the River Dove (Figure 18). Both of these gauges are used to inform flood alerts and warnings for Rolleston-on-Dove and surrounding villages. A third level gauge is located on the Rolleston Brook on the Tutbury Mill Fleam downstream of the village. This gauge is significantly influenced by flows both in the Mill Fleam channel iteslf and the River Dove, and therefore cannot be used to assess flows in the Rolleston Brook.

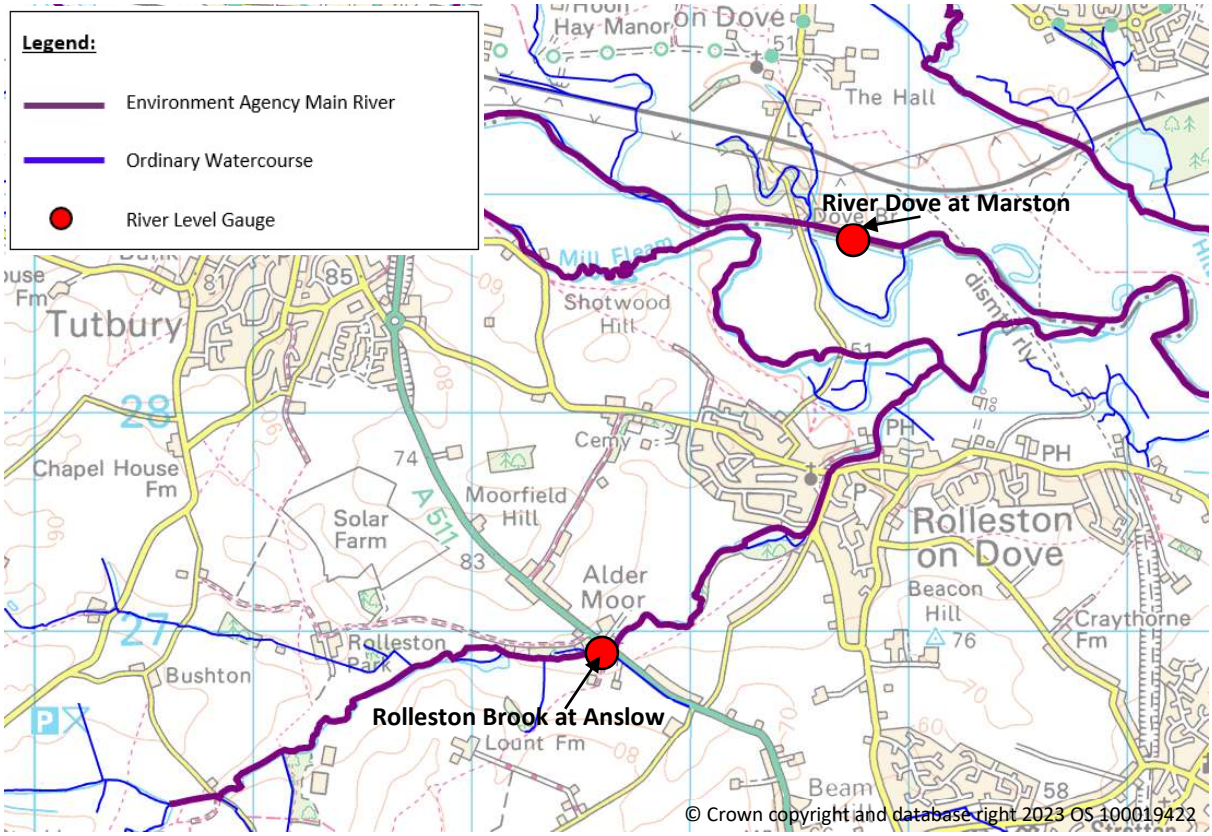


Figure 18: River Level gauges within the Rolleston Brook catchment

Figure 19 presents 15-minute river level data provided by the Environment Agency for the river level gauge at Anslow for the period 14th to 17th February 2020. This demonstrates that prior to the event, river levels were within the normal expected range for the watercourse (0.3m to 1.0m above datum). Shortly after the rainfall event commenced at around 21:00 on 15th February, water levels within the Rolleston Brook rose quickly, peaking at a level of 1.97m at 04:00 on 16th February 2020. This represents the highest recorded level on Rolleston Brook since records began. Levels then began to fall rapidly, returning to a normal range of around 0.5m by the early hours of 17th February 2020. Reports from residents indicate that properties were inundated for a period of approximately two hours.

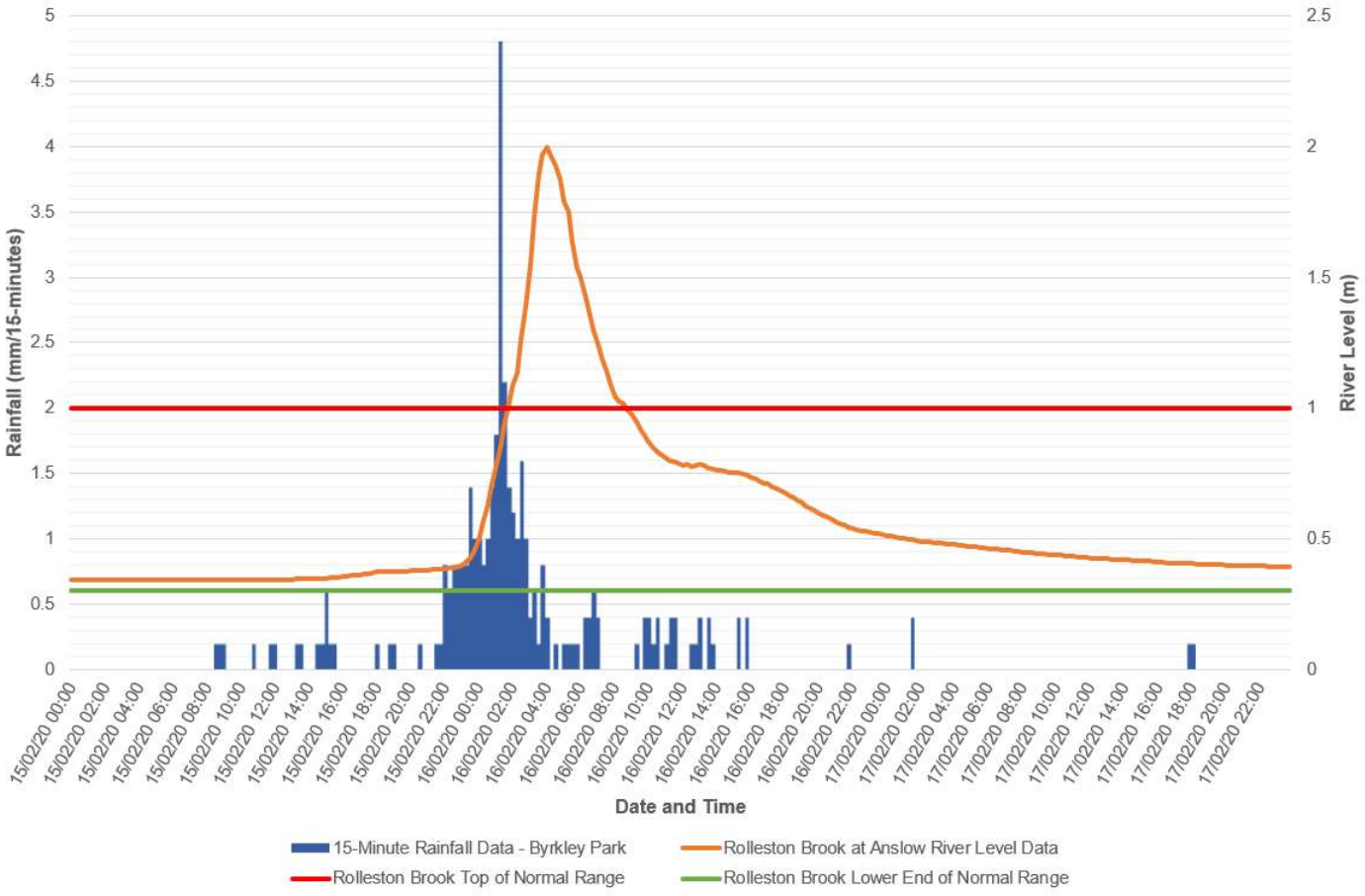


Figure 19: River Level data for Rolleston Brook at Anslow between 14th and 17th February 2020 (Source: Environment Agency)

Figure 20 presents recorded river level data for the River Dove at Marston-on-Dove between 14th and 17th February 2020. This shows that in comparison to Rolleston Brook, water levels increased at a much slower rate and remained elevated for a longer duration. Review of the data indicates that a peak level of 2.6m was reached at 22:30 on 16th February 2020. This was almost 20 hours after the Rolleston Brook peaked and occurred at a point when water levels on Rolleston Brook were known to be receding. Descriptions of the event received from local residents indicate that by the time the River Dove reached its peak, flood water was already receding from their properties. This confirms that the flooding experienced at Brookside in February 2020 was solely the result of flooding from

Rolleston Brook, and the River Dove did not have a significant impact on the flooding to property on this occasion.

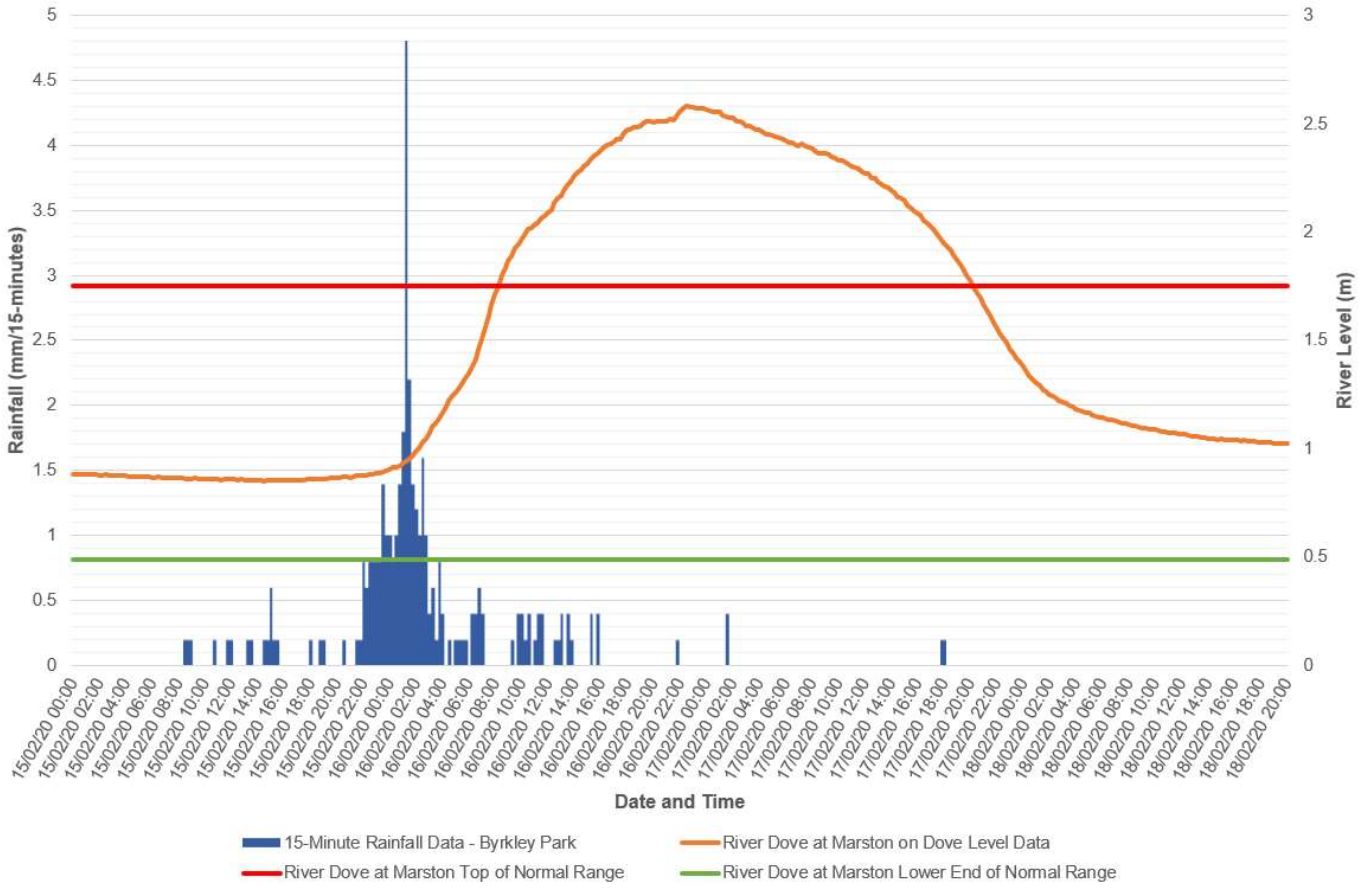


Figure 20: River Level data for River Dove at Marston between 14th and 17th February 2020 (Source: Environment Agency)

As commented previously, residents reported that their properties were inundated for around a period of 2-hours before the flood water started to recede. The river level data presented in Figure 19 demonstrates that Rolleston Brook responded quickly to the rainfall event experienced. In significant storms, water from the hillside above the village can struggle to flow through the channel, down to the floodplain of the River Dove, eventually spilling out at various points within the village.

Site Investigations:

Site investigations and walkovers undertaken by the Environment Agency have identified areas along the watercourse where the channel capacity may have been reduced due to vegetation intruding within the channel, locations where debris can potentially get caught on existing structures and areas where silt has built up in the channel. The sharp bend at the lower end of Brookside is an example of a location where significant volumes of silt have been deposited within the channel. In the past, vehicles used to be able to drive across the ford at this location, however, this is no longer possible due to the deep build-up of silt.

In February 2020, it is likely that due to the significant volume of rainfall in a short amount of time, which followed Storm Ciara the previous week, the Rolleston Brook channel will have reached capacity quickly and spilled out towards the properties along Brookside, resulting in flooding to several properties.

Other Observations:

Additional anecdotal comments from residents following the flood event raised questions as to whether the flooding was caused due to a sluice gate not being opened which prevented water from discharging downstream. In April 2020, the Environment Agency provided an initial response to questions raised by local residents following the February 2020 flood event. Within this document, it was confirmed that the Environment Agency do not operate any level control structures or sluices on the Rolleston Brook. There are however three control gates (sluices) in the area surrounding Rolleston. Two of these prevent the River Dove flood flows from flowing through culverts under the railway to the north towards Hatton and Marston and are operated by third party landowners. A further sluice gate is located at Tutbury and allows a small volume of water to flow down Tutbury Mill Fleam. The function of the Tutbury sluice gate is to keep a sweetening flow of water in the Mill Fleam to prevent it becoming dry or stagnant. This sluice gate can be used to control flows in the Tutbury Mill Fleam and it can be shut to protect Tutbury from flooding from the River Dove.

According to the report, Environment Agency records show that the two control gates under the railway were closed during the weekend of the 16th and 17th February 2020. The sluice gate at Tutbury was closed by Environment Agency representatives on the morning of Monday 17th February. This was done to allow temporary flood defences to be erected in Tutbury and prevented water from the River Dove flowing down Tutbury Mill Fleam towards Rolleston. It is understood that none of the sluice gates in the Rolleston area have the ability to divert a significant volume of flood water from one location to another, and therefore, are unlikely to have been a contributing factor to the flooding experienced at Brookside in February 2020.

Highway Drainage & Sewer Network:

Whilst surface water flooding has been known to cause issues within the village of Rolleston-on-Dove, there were no reported incidents of surface water flooding along Brookside during the February 2020 event.

Consultation with Severn Trent water has indicated that there were no reported incidents of sewer flooding from the sewer network along Brookside during the February 2020 event. It is however understood that during the February 2020 event, some flooding was experienced along Chapel Lane due to a collapsed surface water sewer. It is not thought that the surface water flooding at this location resulted in internal flooding to property. Following the February 2020 event, investigations were undertaken by Severn Trent Water and repairs to the surface water sewer network along Chapel Lane have now been completed.

Rolleston Brook Hydraulic Modelling & Investigation

In response to the February 2020 event and the ongoing flooding issues experienced at Rolleston-on-Dove, the Environment Agency are undertaking an investigation looking at the flooding problems being experienced by residents in Rolleston-on-Dove due to flooding from the Rolleston Brook. The study aims to determine the mechanisms of flooding and investigate potential options to reduce flood risk and increase community resilience. The study is being led by the Environment Agency who are working in collaboration with the various Risk Management Authorities (RMAs) and riparian owners within the catchment.

Since the February flood event, the Environment Agency have undertaken several site-visits and undertaken walk-throughs of the watercourse with residents to obtain further knowledge of the flood risk issues. Several web-meeting have also been undertaken with the Parish Council, County Councillors, the Local MP and local residents. As a result of site investigations, the Environment Agency Asset Performance Team have programmed in works to undertake de-silting at the downstream end of Brookside where the watercourse turns North alongside the Brookside Hotel. This work is programmed to take place within the 2022-2023 financial year.

In July 2021, the Environment Agency issued an update to residents summarising progress with the investigation. This outlined that a tender was going out for a new hydraulic model of the Rolleston Brook to be created as currently there is no model of the watercourse. This work is collaborative and will involve survey of the watercourse, the information from which will be used to create a hydraulic model of the watercourse. Consultation with the Environment Agency has indicated that consultants have now been appointed and have commenced work on the hydraulic modelling study, with survey of the watercourse now complete and the model build stage currently in progress. Once the model build and model calibration stage of the study has been completed, the model will be used to obtain a better understanding of the flood mechanisms from the Rolleston Brook and determine the influence that the River Dove has on the flooding. An assessment will also be undertaken to consider joint probability analysis events in the Rolleston Brook and River Dove. Potential options to reduce flood risk will then be investigated, with the aim of taking a Flood Alleviation Scheme forward to protect properties threatened by flooding from the Rolleston Brook and increase community resilience.

The investigations will also consider opportunities to store water within the upper parts of the catchment. This may take the form of engineered works or look at using more natural techniques known as Natural Floodplain Management (NFM).

In conjunction with the above works, the Environment agency are working in collaboration with East Staffordshire Borough Council and Staffordshire County Council LLFA to investigate opportunities to desilt the pond at Brook Hollows. Site investigations have demonstrated that silt levels within the pond are currently high and likely to be contributing to silt deposits further downstream within the lower parts of Rolleston Brook at Brookside. A reduction of silt at Brook Hollows will reduce the

amount of silt passed downstream and therefore help to increase the channel capacity along Brookside.

Conclusion

The flooding incident that occurred at Brookside, Rolleston-on-Dove, on February 16th, 2020, was the result of an exceedance event, with river flooding from the Rolleston Brook which is designated as main river. A sustained period of prolonged rainfall leading up to the event resulted in the catchment becoming saturated which meant that the ground could not take up any more water. This led to an increase in flows within the Rolleston Brook, which responded quickly to the rainfall experienced on the 15th and 16th February 2020, resulting in flooding to the surrounding land and several properties along Brookside.

Recommended Actions

As part of this flood investigation, it is vital to determine what contributed to the flood event and also to establish a set of recommended actions that may help to alleviate flooding in the future or at least reduce risk to properties. Some of the actions will focus specifically on Brookside, Rolleston-on-Dove, whilst other actions are relevant to the wider catchment.

Table 2 below sets out relevant Risk Management Authorities (RMAs) and other interested parties, actions that have been taken to date and those actions planned for the future, with the relevant RMA who will lead.

Table 2: Recommendations and Actions

Issue/Risk	Recommendations/Actions	Responsibility
River flooding from Rolleston Brook	The Environment Agency will continue with their work to produce a hydraulic model of Rolleston Brook to determine key flooding mechanisms at both Brookside and within the wider Rolleston-on-Dove area and investigate potential options to reduce flooding within the village. This will be undertaken in conjunction with the relevant RMAs	Environment Agency (EA) supported by various RMAs
Siltation within Rolleston Brook adjacent to Brookside Hotel & within Brook Hollows Pond	The Environment Agency Asset Performance Team have programmed in works to undertake de-silting at the downstream end of Brookside where the watercourse turns North alongside the Brookside Hotel. This work is expected to take place within the 2022/2023 financial year. SCC LLFA will continue to work with the Environment Agency and ESBC to investigate opportunities to reduce silt levels within the pond at Brook Hollows.	Environment Agency (EA) Asset Performance Team Environment Agency, SCC LLFA & ESBC
Rapid runoff from developed areas	Ensure that major new developments comply with Technical Standards for Sustainable Drainage Systems	SCC as statutory consultee to the Local Planning Authority

In line with the Local Flood Risk Management Strategy for Staffordshire, information on flooding that has happened will also be used to inform, where appropriate:

- Our understanding of the level of flood risk around the County and how we take a risk-based approach to prioritising our resources,

- Our understanding of where watercourses and assets, such as culverts and trash screens have caused particular issues and future maintenance needs. We will work to achieve these with land and asset owners,

- Where we can support communities to understand flood risk and become more resilient to flooding,

- Responses to major planning applications to ensure new development does not exacerbate existing flood risk issues and where possible, carefully planned Sustainable Drainage Systems on new developments reduce flood risk elsewhere,

- Partnership working with other flood risk organisations to take a joined-up approach to flood risk management,

- Work undertaken by the Staffordshire Local Resilience Forum to be more prepared for future flood events, and

- The future programme for flood alleviation schemes across the County.

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, about 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)
Highways authorities have the lead responsibility for providing and managing highway drainage.

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.

East Staffordshire Borough Council (ESBC)
As the Local Planning Authority, ESBC are responsible for determining planning applications within the Rolleston Catchment in accordance with local and national policies.

Conclusions

Several storms occurred in 2020 across the Midlands region which impacted many areas. Storm Dennis, in February was a long duration, low-to-moderate intensity event, causing widespread flooding nationwide. Following the February 2020 storm event, incidents of flooding were reported to Staffordshire Council, including Brookside, Rolleston-on-Dove.

The flooding at Brookside had a significant impact on the community, with records indicating that 12 residential properties experienced internal flooding. In addition to this, flooding to gardens, driveways and the highway was also reported.

The main type of flooding has been identified as river flooding from the Rolleston Brook which is classified as Main River. The catchment was extremely saturated due to previous weeks of heavy rainfall, which meant that the ground could not take up any more water leading to an increase of flows within the Rolleston Brook. This led to water spilling from the watercourse and flowing towards properties along Brookside.

In response to the February 2020 flooding and the ongoing flooding issues experienced at Rolleston-on-Dove, the Environment Agency are undertaking an investigation looking at the flooding problems being experienced by residents in Rolleston-on-Dove due to flooding from the Rolleston Brook. The study aims to determine the mechanisms of flooding and investigate potential options to reduce flood risk and increase community resilience. The study is being led by the Environment Agency who are working in collaboration with the various Risk Management Authorities (RMAs) and riparian owners within the catchment. This is currently at the model build stage and will enable a more accurate representation of the flooding from the Rolleston Brook to be obtained and determine the influence that the River Dove has on the flooding.

Staffordshire County Council in its role as LLFA will continue to work with the identified RMAs to try and reduce the flood risk to properties and infrastructure, as well as assisting the local community to ensure that it is resilient and prepared for flood events should they occur in the future.