Staffordshire County Council

Flooding in Marchington, East Staffordshire

October 2023

Investigation under Section 19
of the Flood and Water Management Act 2010

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 Highway Authority, 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.

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1 Executive Summary

This Section 19 Flood Investigation Report has been prepared in response to the flood event that occurred in Marchington, East Staffordshire, during Storm Babet in October 2023. The purpose of this report is to investigate the causes, impacts, and responses to this flooding event and to provide recommendations to mitigate future flood risks.

Flooding to properties previously occurred in Marchington on 16th February 2020. Following this event, a Section 19 Flood Investigation Report was published by Staffordshire County Council. This previous report is referred to during this report and is available on the Flood Studies and Investigations page of the Staffordshire County Council website[1].

Flooding to roads and properties in Marchington was reported to Staffordshire County Council (SCC) as a result of heavy and persistent rain from Storm Babet, that affected the area between 18 and 21 October 2023. The flooding was primarily caused by an exceedance event when the Marchington Brook reached its highest recorded river level since the gauge was installed in November 2000 and overwhelmed the capacity of the main river channel. This subsequently overwhelmed the surface water drainage system and caused significant impacts on homes and businesses, roads and vehicles.

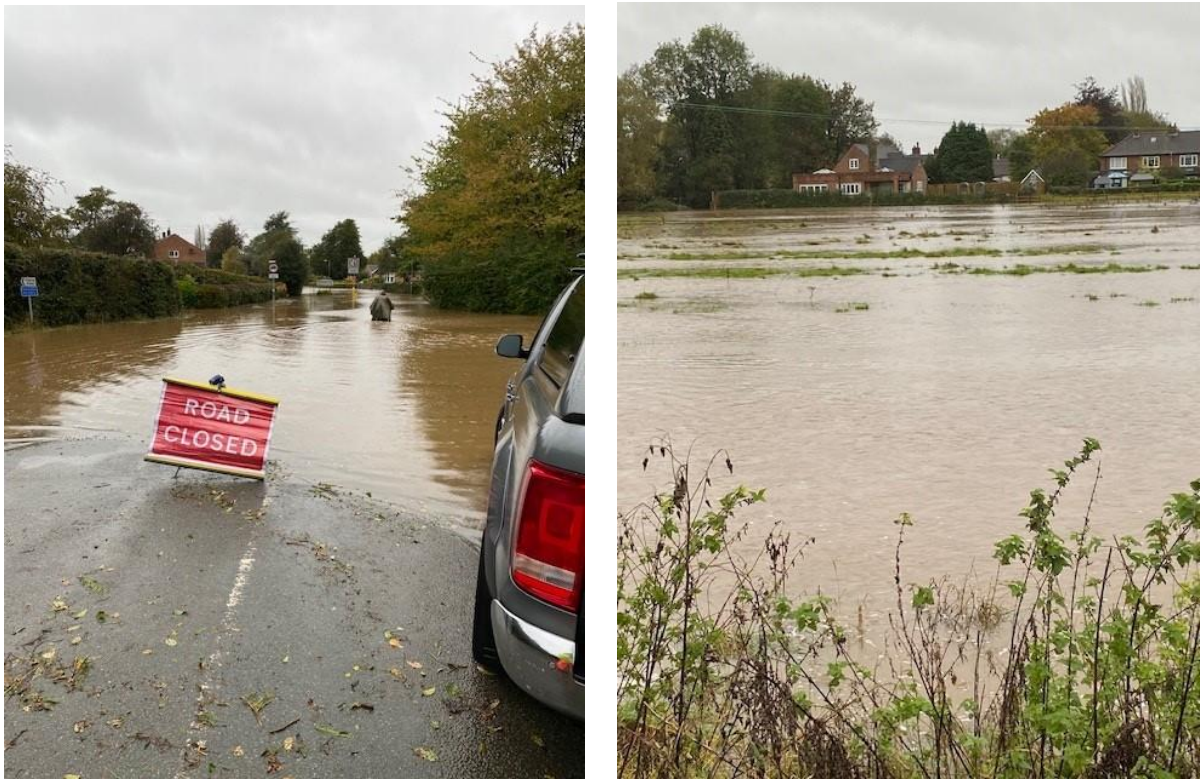


Figure 1 – Flooding in Marchington during Storm Babet, October 2023. Photos copyright of the Environment Agency.

[1] Staffordshire County Council – Flood Studies and Investigations https://www.staffordshire.gov.uk/Environment/Flood-Risk-Management/Flood-studies-and-investigations.aspx

The Risk Management Authorities (RMAs) with relevant flood risk management functions are:

The Environment Agency – oversee flooding from main rivers.

Staffordshire County Council Lead Local Flood Authority – oversee flooding from ordinary watercourses and surface water and have a requirement to produce Section 19 Flood Investigation Reports.

Staffordshire County Council Highway Authority – responsible for the highway gullies and drains within the highway.

Severn Trent Water – responsible for the foul sewer network.

Each RMA was notified of the flooding and asked to investigate and report on the status of assets under their responsibility, and whether they have taken or are proposing to undertake actions to mitigate the risk of future flooding.

The primary cause of flooding was found to be heavy and persistent rain from Storm Babet that overwhelmed the capacity of the main river channel. However, several specific actions were identified where improvements can be made to reduce potential flooding impacts in the future.

2 Legislative Context

Under Section 19 of the Flood and Water Management Act 2010, Lead Local Flood Authorities (LLFAs) are required to investigate flood incidents in their area (Figure 2). This investigation aims to determine the causes of the flooding, the responsible authorities, and the actions taken to manage the risk and impact of the flooding.

Flood and Water Management Act 2010

19 Local authorities: investigations

(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.

Figure 2 - Flood and Water Management Act 2010 - Section 19

2.1 Staffordshire County Council Policy

Staffordshire County Council 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:

- Five or more residential properties are reported to have been internally flooded during a single flood event in one location; or
- 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; or
- One or more residential properties in the same location are reported to have been internally flooded more than once during a 5-year period.

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 report describes the flooding that occurred in Marchington during Storm Babet on the 18th-21st of October 2023, providing an overview of the flood events, data and analysis, risk management authorities with relevant functions, and the actions taken or proposed.

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. It should also be noted that this investigation does not obligate the LLFA or other RMAs into resolving the flooding issues investigated herein, nor is it possible for the LLFA to impose others to undertake any of the recommended actions.

3 Incident Overview

3.1 Location Description

Marchington is a small village in East Staffordshire (Figure 3), situated between the towns of Burton upon Trent and Uttoxeter.

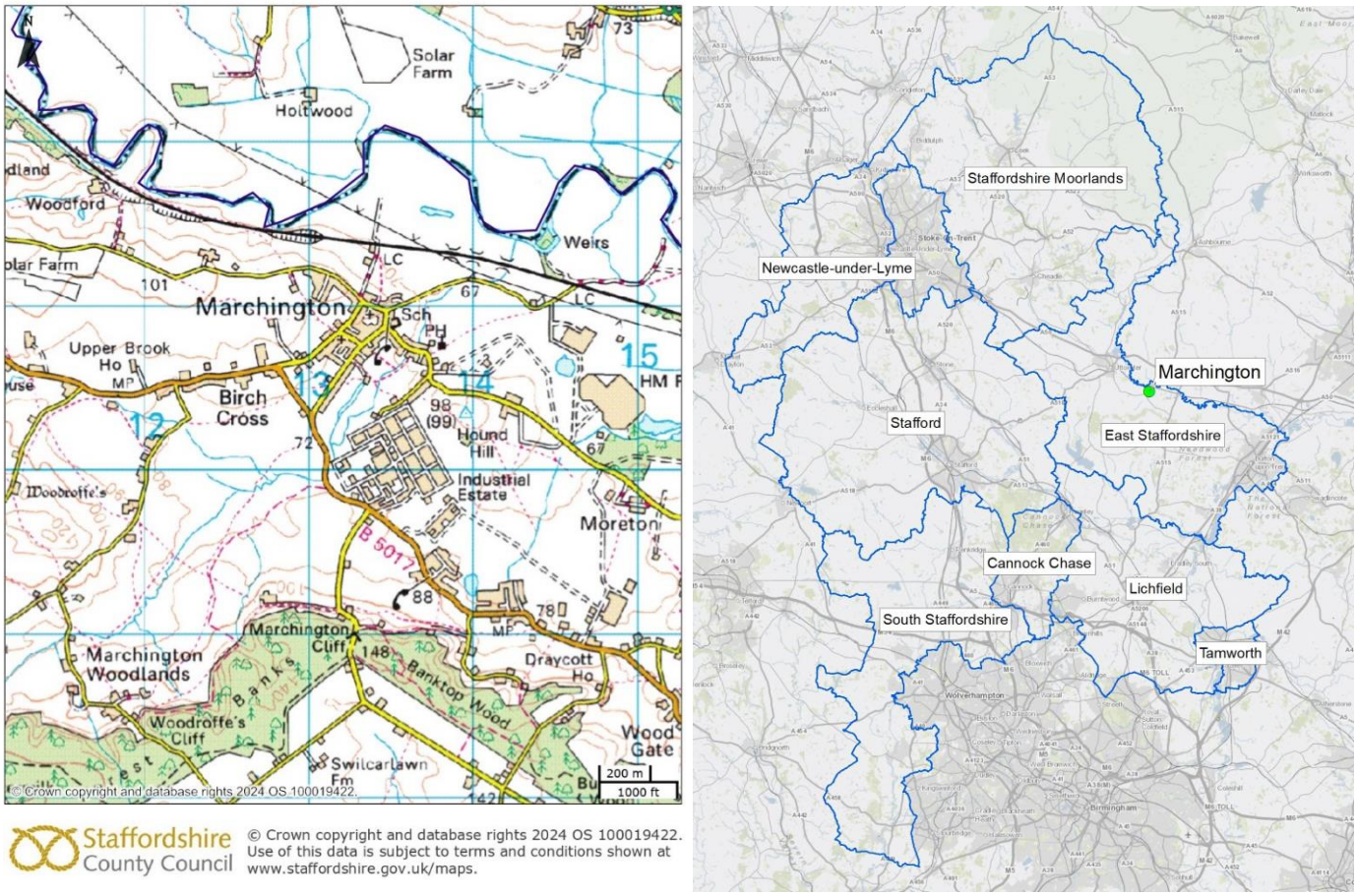


Figure 3 - Location of Marchington within Staffordshire

3.2 Summary of the Event – Storm Babet

Storm Babet[2] (18 – 21 October 2023) brought heavy, persistent and widespread rain to much of England, Wales, Eastern Scotland and Northern Ireland. This was the third wettest independent 3-day period for England in a series since 1891, with the Midlands provisionally recording its wettest 3-day record ever.

Figure 4 shows the Met Office[2] rainfall-radar sequence images from 0000UTC 20 October 2023 to 0000UTC 21 October 2023 at 6-hour intervals and the widespread, heavy rain, from weather fronts associated with Storm Babet that affected much of central England. Figure 5 further shows the

[2] Storm Babet, 18 to 21 October 2023. Met Office. https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2023/2023_08_storm_babet.pdf

accumulated daily rainfall for 18 – 21 October 2023 as actual totals in mm (left) and as a percentage of the October whole-month average from 1991 to 2020 (right).

Large parts of the UK received over 50mm of rain, with 75 to 100mm falling widely across eastern Scotland, the Pennines, North Wales, Northern Ireland and parts of the West Midlands, East Anglia and south-east England, and over 100mm in the wetter locations (in some places over 150mm). Much of the Midlands received over the whole-month average rainfall, with significantly more than this in some areas. Additionally, soil moisture deficits across the midlands were lower than the long-term average (based on historic records) for October[3], and therefore soils were wetter than average with less capacity for rainfall to infiltrate into soils.

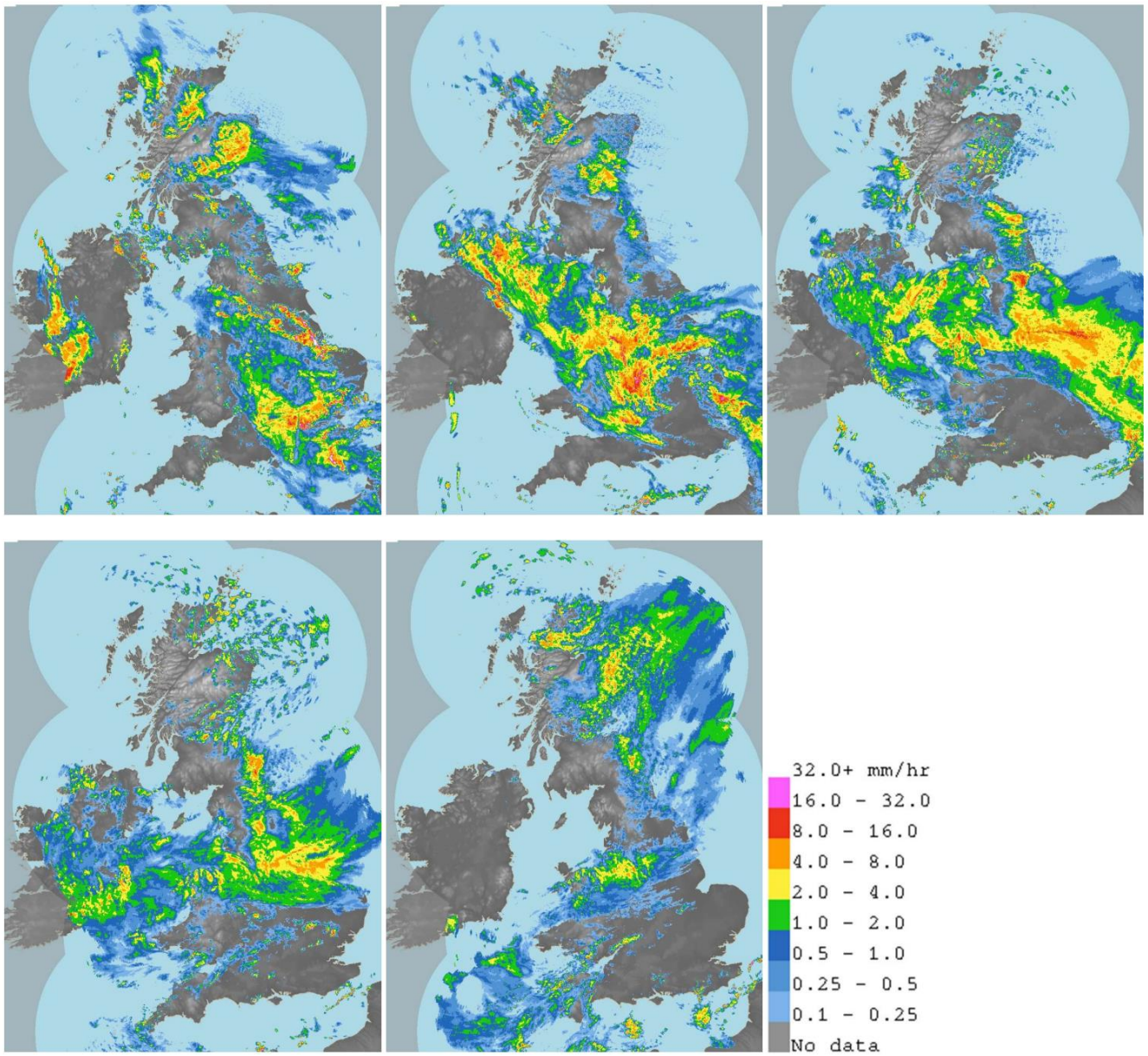


Figure 4: Rainfall radar sequence images from 0000UTC 20 October 2023 to 0000UTC 21 October 2023 at 6-hour intervals. Source: Met Office[1]

[3] Monthly water situation report: Midlands. October 2023. Environment Agency. https://webarchive.nationalarchives.gov.uk/ukgwa/*/https:/www.gov.uk/government/publications/water-situation-local-area-reports

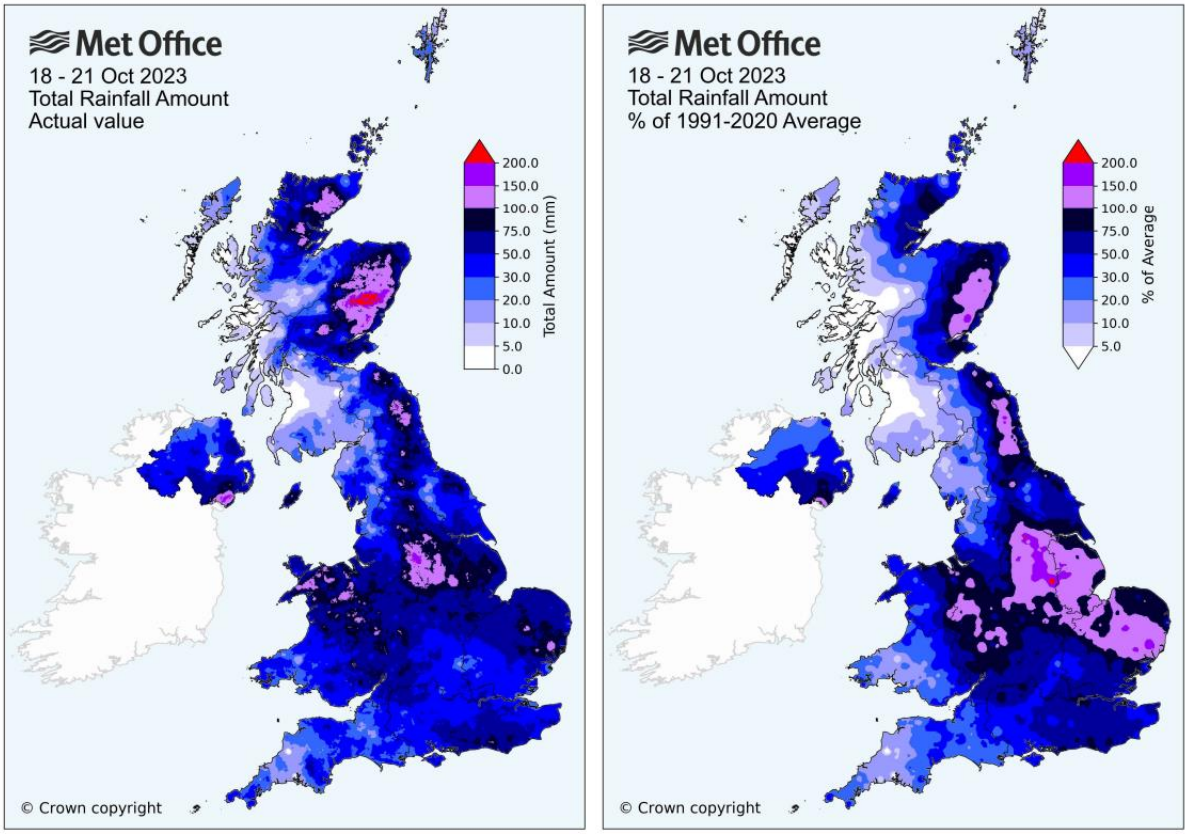


Figure 5: Total rainfall amounts in actual value (mm) and percentage of the 1991-2020 average that fell across the UK during Storm Babet, 18 to 21 October 2023. Source: Met Office[1]

The resulting impacts of Storm Babet were the most severe and disruptive of 2023. Multiple severe flood warnings were issued by the Environment Agency (EA) and the Scottish Environment Protection Agency (SEPA). At least seven people were reported to have died from weather-related impacts of Storm Babet, at least 2146 properties were reported (as of 27 October 2023) to have flooded across England[4], and thousands of people were affected by disruptions to services and transport across the country.

Environment Agency information[5] indicates that all the river flow gauges in Midlands for October recorded above normal monthly mean flows compared to long term average. Nine of the sites recorded exceptionally high while a further 9 flow recording sites recorded notably high flows while the remaining 3 sites recorded above normal monthly mean flows.

In Marchington, the Marchington Brook reached its highest recorded level since the gauge was installed in November 2000. This flow overwhelmed the capacity of the main river channel and resulted in floodwater accumulating in the middle of the village along Church Lane.

[4] Nearly 100,000 properties protected from flooding during Storm Babet, but threat remains. Gov UK. https://www.gov.uk/government/news/rolling-news-story-flooding-from-storm-babet

[5] Monthly water situation report: Midlands. October 2023. Environment Agency. https://webarchive.nationalarchives.gov.uk/ukgwa/*/https:/www.gov.uk/government/publications/water-situation-local-area-reports

4 Data and Analysis

4.1 Catchment

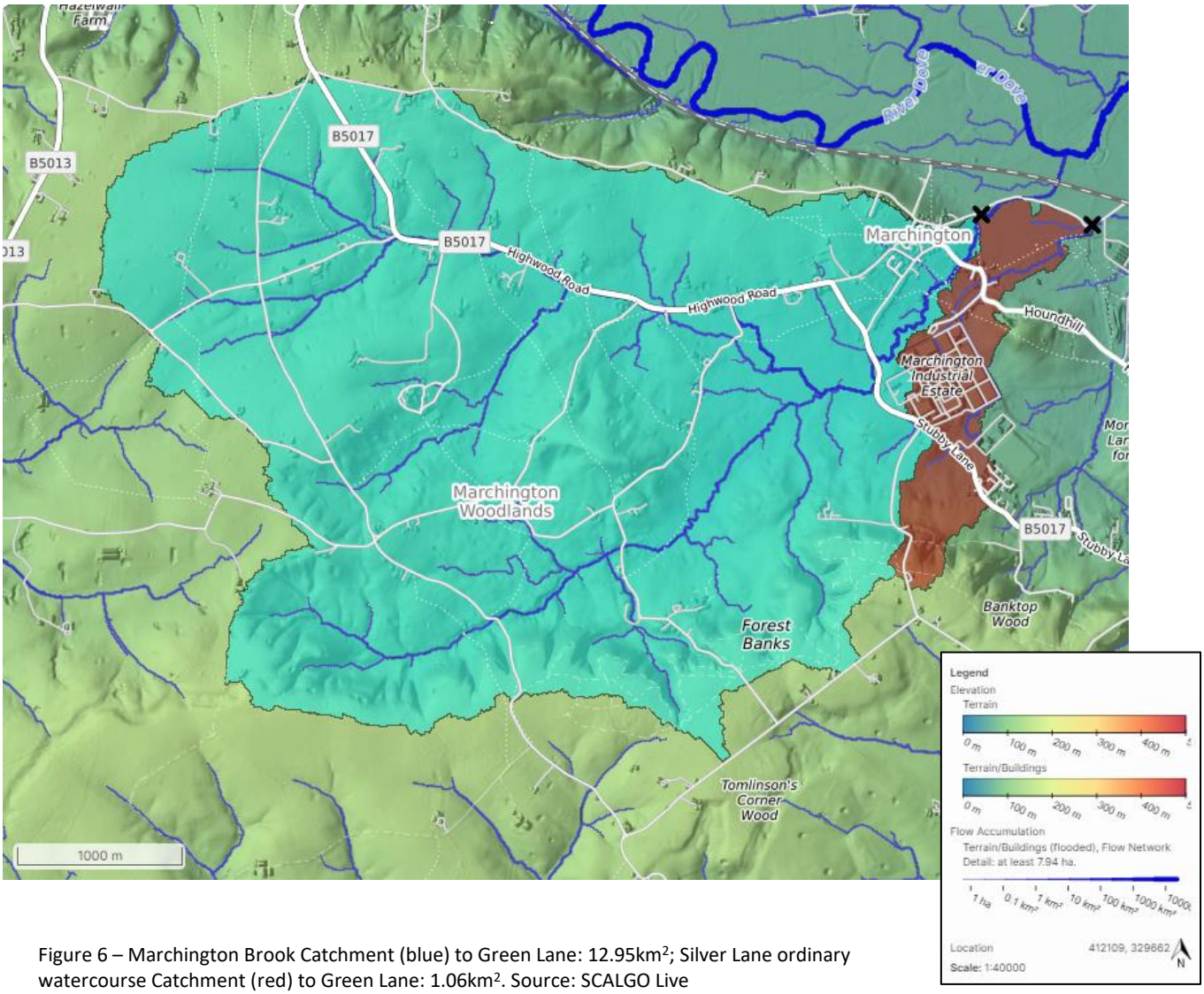


Figure 6 – Marchington Brook Catchment (blue) to Green Lane: 12.95km^2; Silver Lane ordinary watercourse Catchment (red) to Green Lane: 1.06km^2. Source: SCALGO Live

The Marchington Brook, a tributary of the River Dove, flows predominantly in a north easterly direction though Marchington village and drains a catchment area of approximately 12.95km^2. The watercourse rises in the south-west of the village and is fed by two headwaters that originate from Marchington Cliff (to the southwest) and low-lying farmland (to the west). The headwaters combine upstream of Stubby Lane before continuing through Marchington Village.

An unnamed drainage ditch (referred to as Silver Lane ordinary watercourse) is located south of the village and drains approximately 1.06km^2 of surface water from the Marchington Industrial Estate. This drainage ditch is also culverted under Church Lane and continues east to join the River Dove.

4.2 Rainfall

15-minute recorded rainfall for Marchington between 18 and 21 October 2023 are included in Figure 7. Hydromaster data has identified that a smaller rainfall event was recorded between 14:10 18 October and 01:30 19 October, in which 11.8mm of rainfall fell over the area. Heavier and more persistent rainfall then occurred from 14:25 19 October until 22:25 20 October, where 43.2mm fell over this 34-hour period. In total, 55.7mm fell in a 67-hour period from 14:10 18 October to 09:10 21 October.

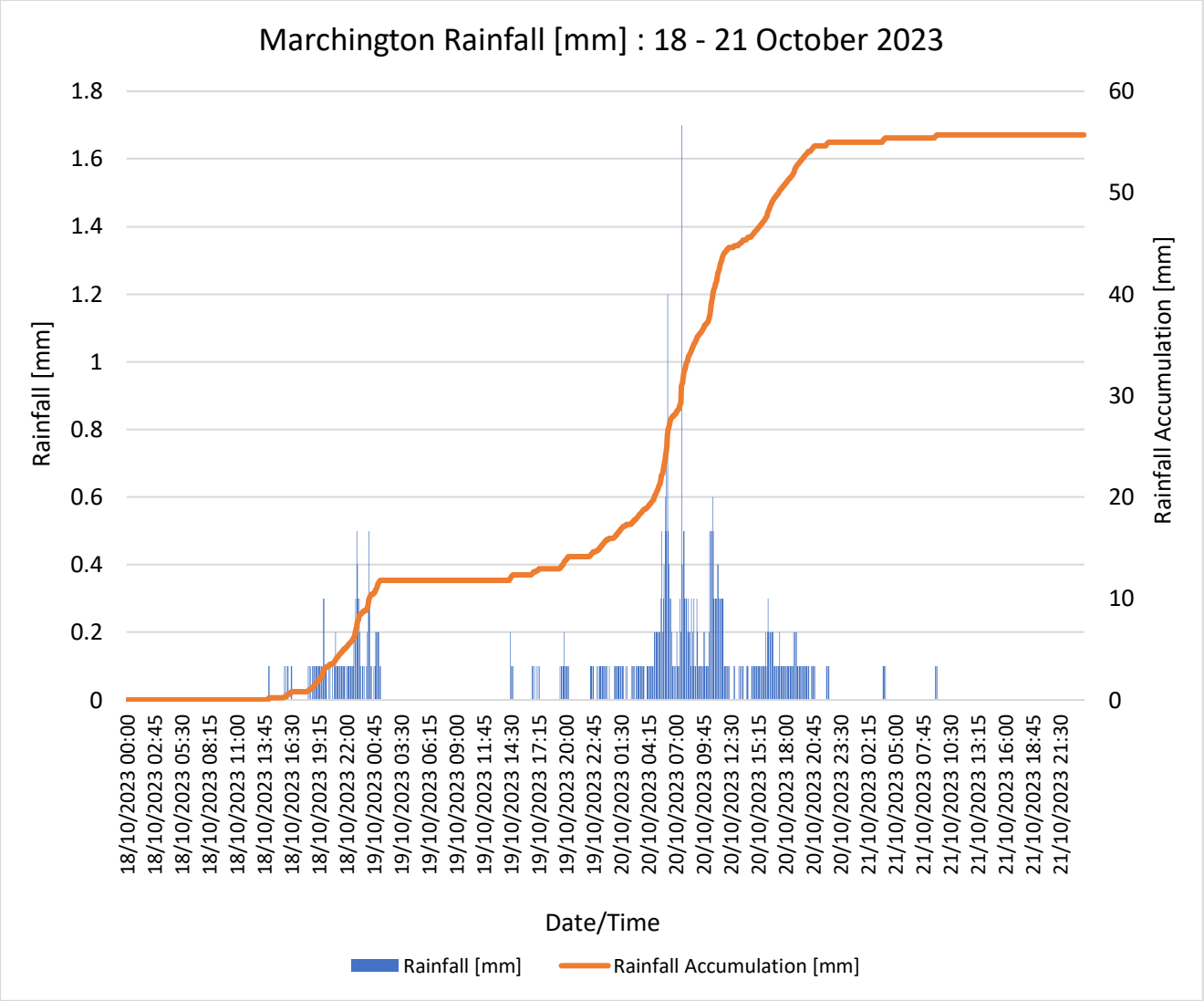


Figure 7: 15-minute recorded rainfall for Marchington between 18 and 21 October 2023. Source: Hydromaster

Rainfall recorded from the Uttoxeter gauge station, the closest gauge station and 3 miles from Marchington (Figure 8) is included in Figure 9. The gauge also recorded the small rainfall event between 18:00 18 October and 01:00 19 October, where 16.8mm of rainfall was recorded to have fallen over the area. From 19:00 19 October to 08:00 21 October, 53.8mm of rainfall was recorded at Uttoxeter rainfall gauge. This is higher than data recorded for the Marchington catchment and indicates that there was a slight increase in rainfall north-west of Marchington during the Storm Babet event.

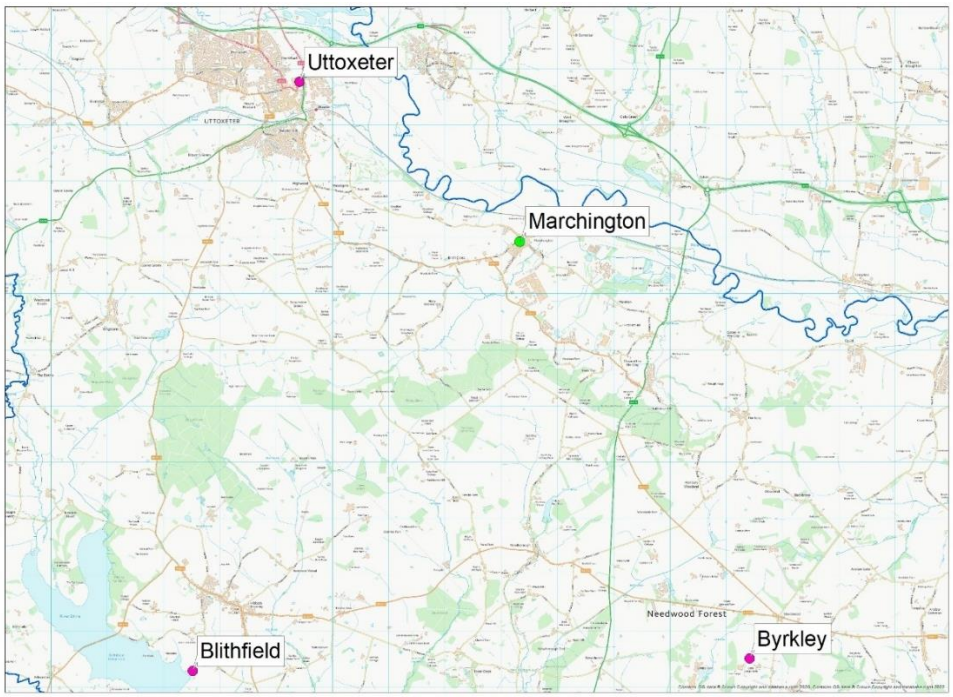


Figure 8: Rainfall gauge locations (pink dots) closest to Marchington, East Staffordshire (green dot). Blue line shows the boundary of East Staffordshire.

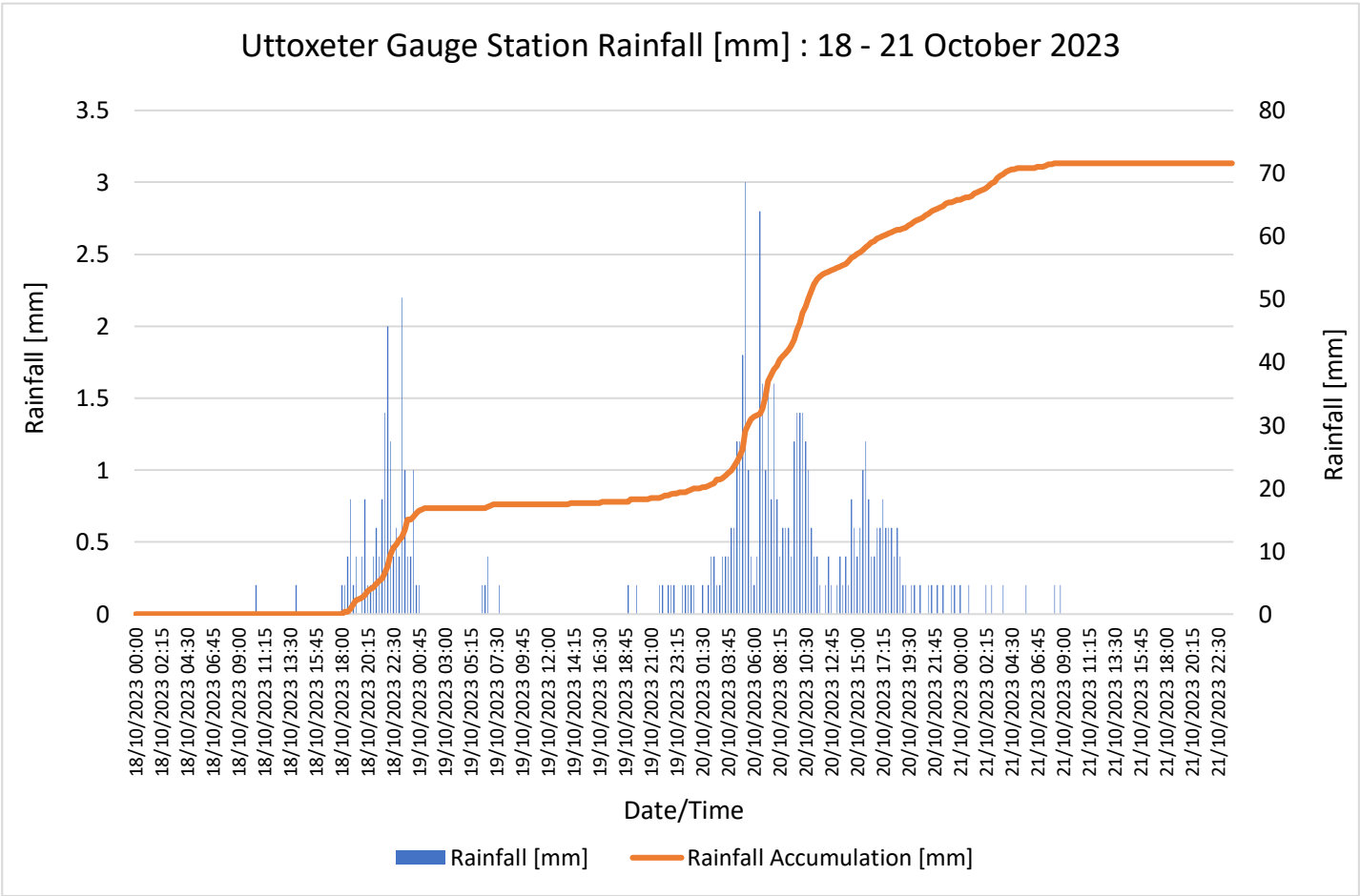


Figure 9: Recorded rainfall at Uttoxeter rainfall gauge, the closest rainfall gauge station to Marchington (3 miles)

Hydromaster software has identified the return period for this rainfall that fell over Marchington as between a 2- and 5-year rainfall event for 24-hour and 48-hour storm durations (Figure 10). Rainfall modelling from FEH (Flood Estimation Handbook) has further identified the rainfall return period as a 4.3-year rainfall event for the entire storm duration (55.7mm of rainfall during a 67-hour period). This is higher than then previously calculated 3-year rainfall return period during the February 2020 flood event. Figure 11 shows the amount of rainfall that correlates to specific return periods for the Marchington catchment, identifying that 55.7mm of rainfall in 67 hours from 18 to 21 October 2023 is lower than a 10-year return period.

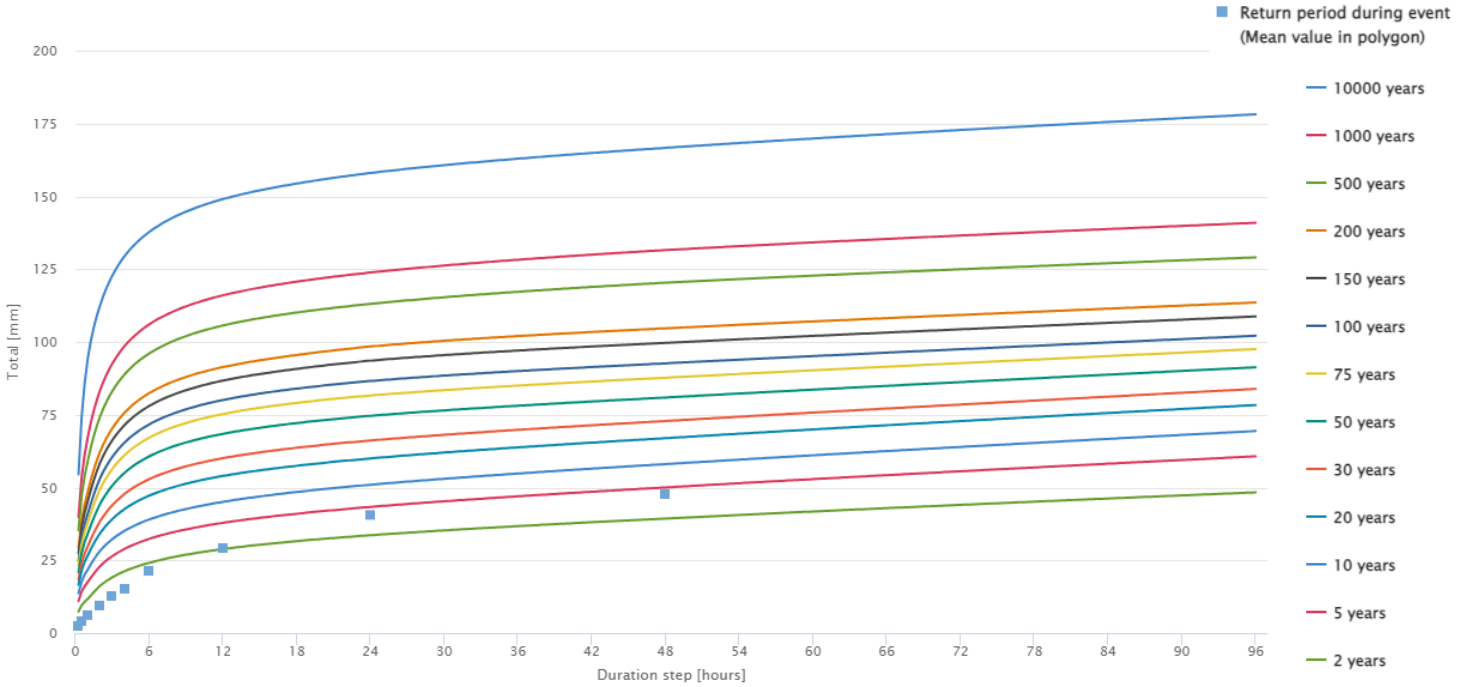


Figure 10: Hydromaster rainfall return periods for different storm durations during Storm Babet in Marchington. 24-hour and 48-hour storm durations have been calculated as between a 2-year and 5-year rainfall event, with shorter duration (6-hour and 12-hour) calculated as between 1-year and 2-year rainfall events.

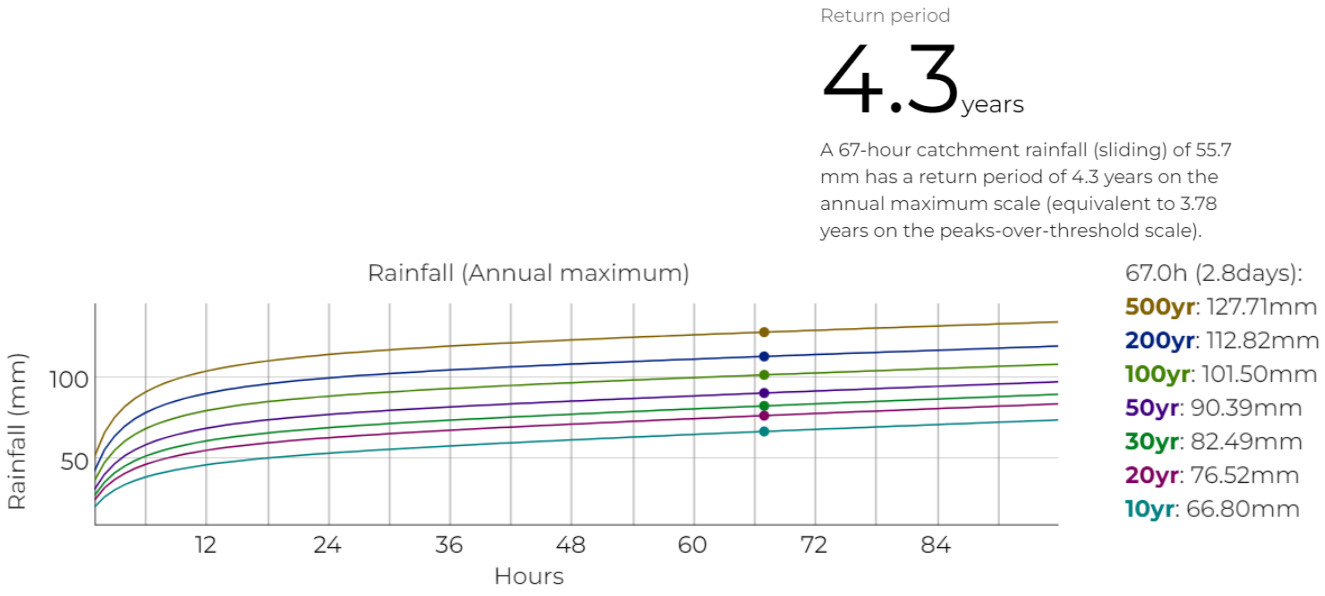
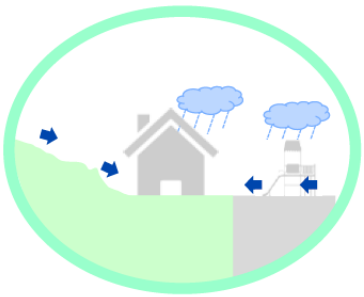


Figure 11: FEH rainfall return period for the Marchington catchment estimated as 4.3 years for the 55.7mm of rainfall that fell during the entire event (67-hours). The graph indicates rainfall values for return periods of 67-hour storms from 10-years upwards.

4.3 Drainage Network

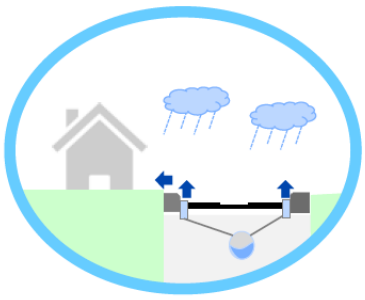
The various elements of the drainage network are illustrated below:



Surface Water

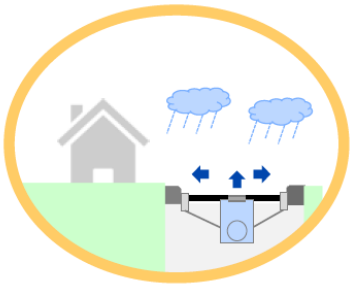
Soft surfaces, known as *permeable surfaces*, allow water to soak (infiltrate) into the ground. These are typically in the form of gardens, parks, fields, and green spaces.

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.



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.

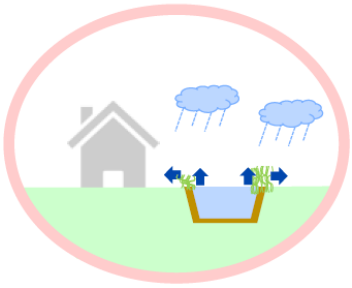


Sewer Infrastructure

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

Foul Water Sewers carry wastewater away from properties to be treated.

Combined Sewers 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.



River Channels

Main rivers are usually larger rivers and streams.
Other rivers are called **ordinary watercourses**.
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.

4.3.1. Highway Drainage

The local highway drainage network comprises traditional highway gullies that connect into two clay pipes that run underneath Church Lane and discharge into the Marchington Brook under the Church Lane road bridge. Highway drains from roads to the south of Marchington from Silver Lane also discharge to Marchington Brook. Staffordshire County Council Highways department are responsible for the maintenance of the highway drainage network and connections.

Both culverts for the Marchington Brook and Silver Lane ordinary watercourse beneath Church Lane are owned and maintained by Staffordshire County Council Highways department.

4.3.2. Sewer Infrastructure

The village of Marchington is served by a gravity fed foul sewer network, owned and maintained by Severn Trent Water. The head of the foul sewer originates to the rear of Chestnut Corner and runs northerly to a manhole on Church Lane opposite the Dog and Partridge Public House. From here the sewer takes a 90-degree turn, continuing down Church Lane and Silver Lane, towards Silver Lane pumping station south of the village. A second foul sewer network system runs south from Marchington Hall along The Square, taking a 90-degree turn at the junction of High Street and Church Lane to continue down Church Lane. Just before the Church Lane road bridge, the network takes another 90-degree turn to run south-west alongside the Marchington Brook to take another 90-degree turn to also join the pumping station. A series of storage tanks hold water at the pumping station before flows are pumped to a sewage treatment works approximately 2km east of Marchington.

There is an emergency overflow at the pumping station that discharges into an existing ditch to the north. There is also a rising main from a pumped Combined Sewer Overflow (CSO) that pumps spill flows to a discharge point in the Marchington Brook, downstream of Church Lane.

4.3.3. River Channels – Marchington Brook and Silver Lane ordinary watercourse

Upstream of Marchington village, the Marchington Brook is designated as an ordinary watercourse and the responsibility of riparian owners with regulatory powers by the LLFA. Upstream of Church Lane, by the naturally high land in Figure 12 (green line), the Marchington Brook is designated as main river and is the responsibility riparian owners with permissive powers by the Environment Agency who oversee flood risk management. The Marchington Brook joins the River Dove north-east of the village.

There is a privately owned earth embankment located behind Church Close to prevent water flowing towards Church Lane (Figure 12, red line). This embankment was raised and improved to a 1 in 30-year standard of protection as part of the 2023 Marchington Flood Scheme that reduced the risk of flooding to 34 properties. The scheme also closed the gap in the flood wall location on the Church Lane bridge to hold water off road in small and frequent floods (1 in 2-year protection standard) and provide more time to close the road (Figure 12, orange line), and installed Property Flood Resilience (PFR) measures on 16 properties.

A Natural Flood Management (NFM) project has been undertaken in the Marchington catchment by the Environment Agency and Staffordshire Wildlife Trust. NFM measures installed include temporarily storing water, increasing soil infiltration and surface roughness, intercepting and slowing

flow pathways, and reducing flow connectivity. These are delivered in several ways including establishing riparian buffer strips, tree/hedgerow planting, leaky barriers in watercourses and in field storage. These measures also provide other benefits for biodiversity, water quality, carbon sequestration and farm efficiencies. The key factor in this approach is the engagement with landowners undertaken through the medium of the "whole farm plan". This represents the main investment made during the project and these plans and the engagement "capital" generated through the project remains in place should there be an appetite to continue with the work. Overall, the project resulted in the production of 11 whole farm plans; 6.15ha of wet grassland enhanced with wetlands created, grazing regime changes and/or seeding for improved biodiversity; 2.07km of streams, ditches and/or gullies restored for nature with woody material added to slow the flow; 0.06ha and three gateways resurfaced with two trough installations to manage pollution pathways; and 3.551km of fencing constructed to manage livestock access to Marchington Brook and newly created wetlands. The NFM project is now complete, though there may be potential for further work and additional monitoring in the catchment that would build on the investment made through this project.

A sluice gate/penstock at Dovefields Farm, by the railway (downstream of the village centre), is closed when the flood level of the River Dove is predicted to rise above 2.4m to prevent floodwater flowing backwards towards Marchington. When the penstock is closed, the floodwater from Marchington Brook flows eastwards and beneath the A515 to Moreton Lane Pumping Station, which then pumps the water over the flood bank and into the River Dove. The penstock and pumping station are owned and operated by the Environment Agency, with the channel that takes the flood flows designated as ordinary watercourse.

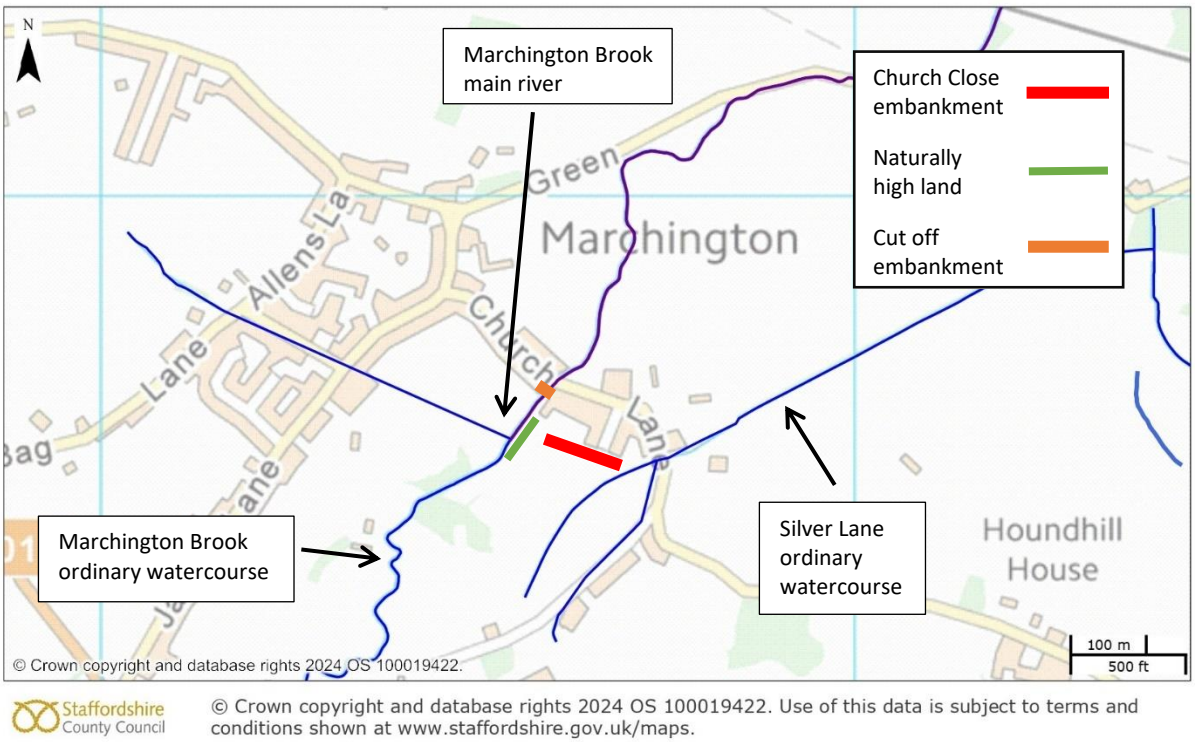


Figure 12: Map showing the Marchington Brook as main river and ordinary watercourse and the Silver Lane ordinary watercourse and the location of the Church Close embankment (red line); naturally high land (green line); and cut off embankment to hold water off road (orange line)

4.4 Previous Flood Events

Marchington village has previously flooded on several occasions since the 1940s, with more recent flood events affecting properties recorded in November 2000, July 2012, November/December 2012, 2013, 2016, April 2018, 2019, February 2020 and January 2021.

This historic flooding is primarily from Marchington Brook levels exceeding the capacity of the culvert under Church Lane, as well as coming out of bank further upstream of the village and flowing towards the Silver Lane ordinary watercourse. A combination of out of bank Marchington Brook levels, overland flows and road drainage issues have also previously been identified as a cause of extreme flooding in the village (for example, during the 2012 event).

The February 2020 flood event during Storm Dennis was the result of an exceedance event, with flooding experienced from river, surface water, and overwhelmed sewers and highway drainage and resulted in 11 residential and 2 business properties experiencing internal flooding.

4.5 Flood Event – 20 October 2023

On 20 October 2023, the Marchington Brook reached its highest recorded level (1.85m) since the level gauge on the Church Lane culvert was installed in November 2000 (Figure 13). This surpassed the recent levels of 1.748m in February 2020 that resulted in 11 residential and 2 commercial properties internally flooding, and the previously highest record of 1.79m in July 2012.

While the Marchington Brook gauge records river levels, it does not record the amount of flow. ReFH (Revitalised Flood Hydrograph) software has been used to create a hydrograph from the observed rainfall that fell during Storm Babet event (included in Figure 7 in section 4.2), the antecedent rainfall conditions for three months prior to the event, and the FEH catchment characteristics, along with a series of uncalibrated modelled hydrographs for design storms of different return periods. Comparison of peak flows enable the flow return period to be estimated (Figure 14).

Flow within the Marchington Brook responded quickly to both the smaller rainfall event between 18 – 19 October and the heavier, more persistent rainfall between 19 – 20 October. This heavy rainfall resulted in a peak flow of approximately 6.1m3/s. The modelled hydrograph indicates this peak flow is equivalent to between and 1 and 2-year return period. This is larger than Marchington Brook flows during the previous Storm Dennis event in February 2020, than resulted as less than a 1-year return period

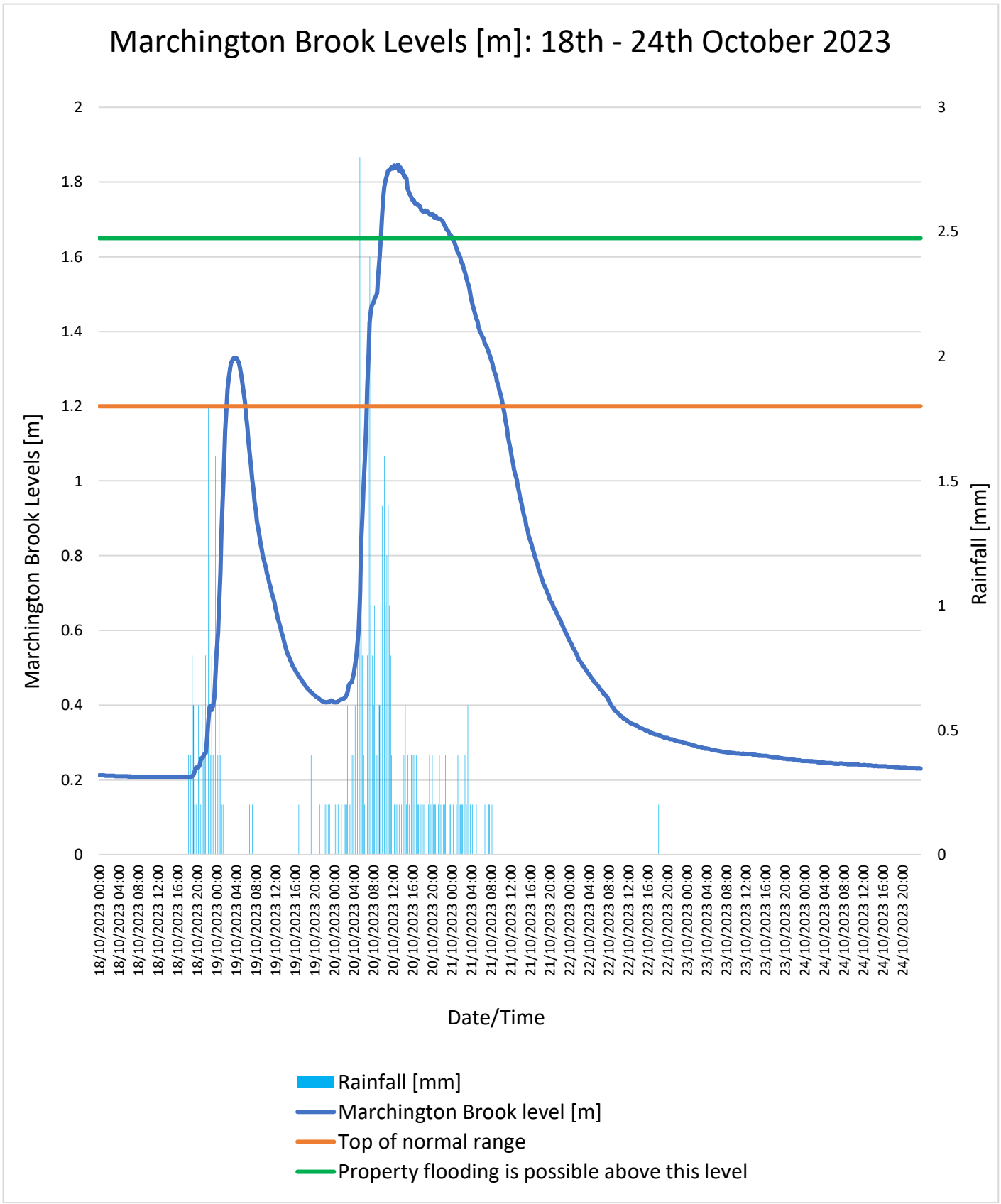


Figure 13: Marchington Brook levels between 18 and 24 October 2023, showing highest record level of 1.85m, alongside Uttoxeter rainfall gauge data for the same period

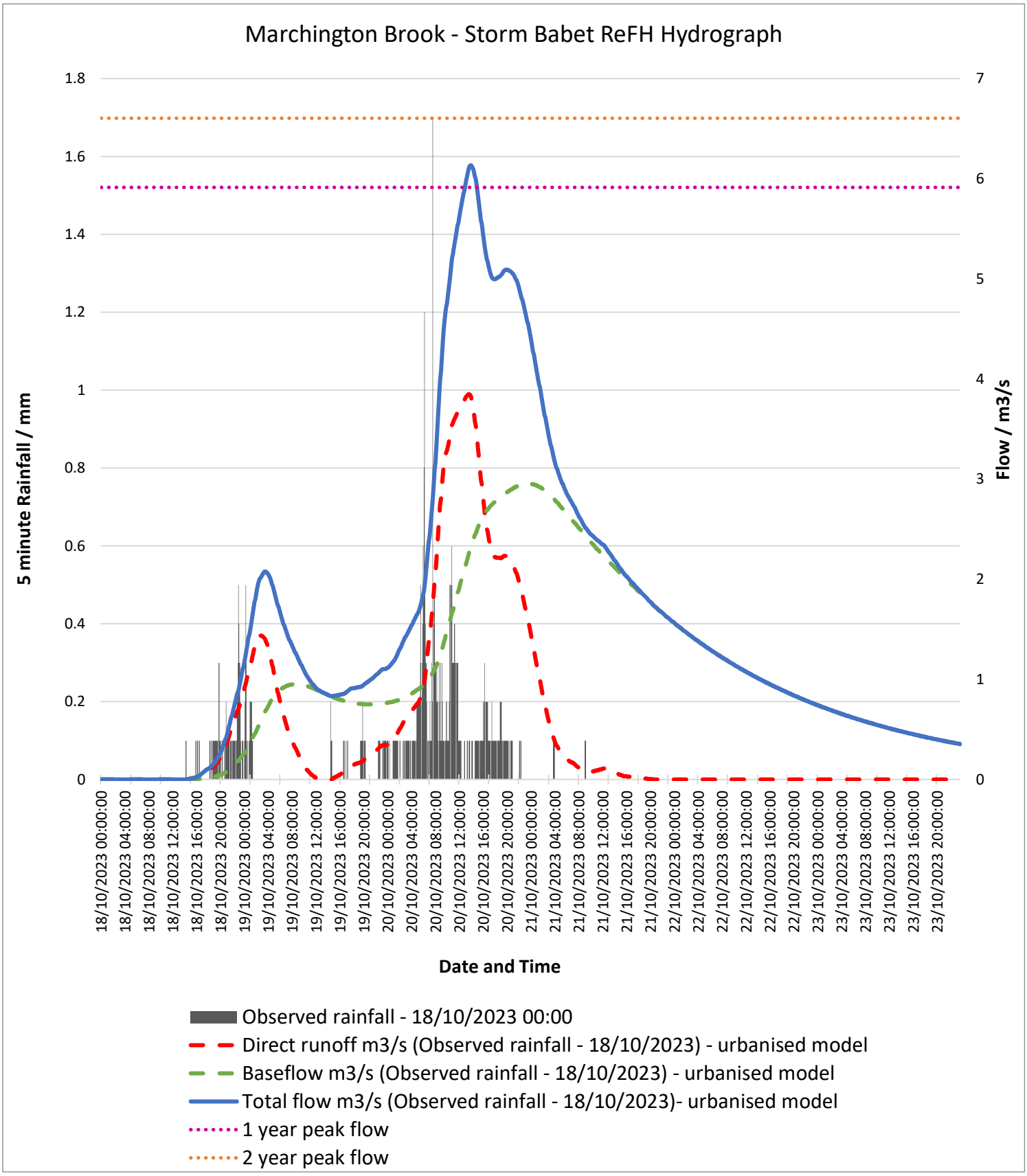


Figure 14: ReFH design flood hydrograph for the Marchington Brook during the Storm Babet rainfall event (18 to 23 October 2023)

The high Marchington Brook levels exceeded the capacity of the Church Lane road bridge culvert and caused out of bank flows to spill onto Church Lane. Floodwater from the Marchington Brook also enters the Silver Lane ordinary watercourse upstream of Church Lane, Church Close and the Church Close embankment. This increased flow in the Silver Lane ordinary watercourse caused the watercourse to also exceed its culvert capacity under Church Lane and caused further floodwater to spill onto Church Lane (Figure 15). Floodwater also exceeded culverts along the Silver Lane ordinary watercourse further downstream of the village. Flood flows from the back of properties may have further exacerbated flooding in the village.

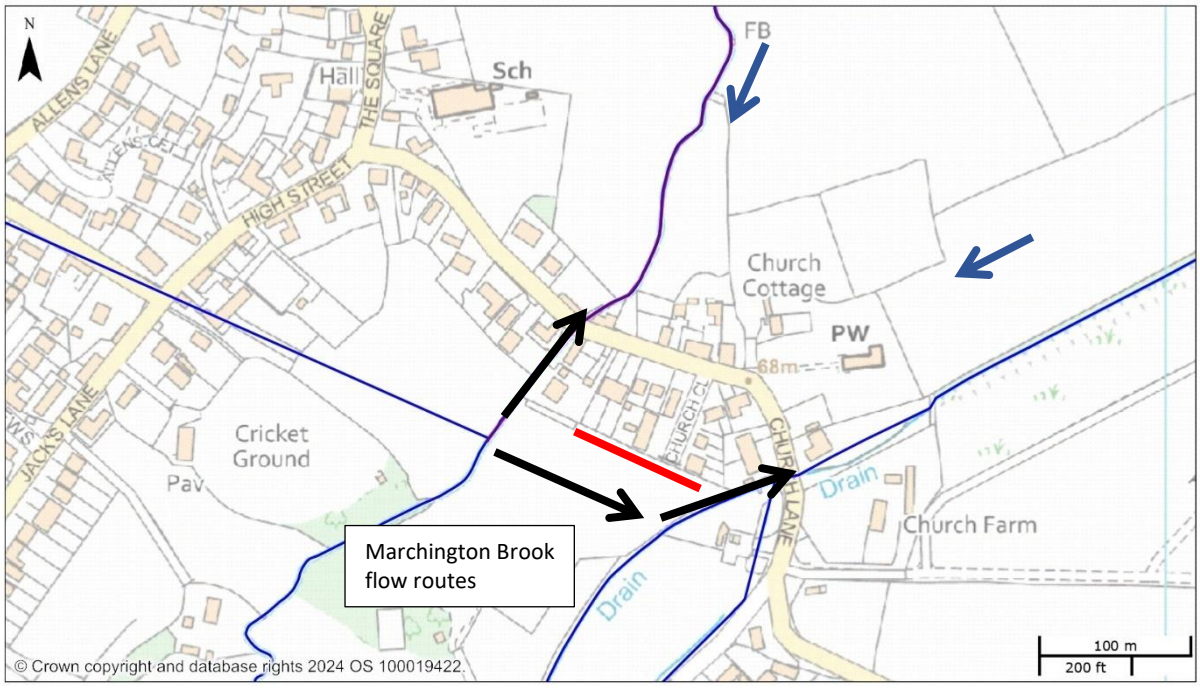


Figure 15: Flow mechanisms from Marchington Brook and Silver Lane ordinary watercourse (black arrows) where flood flows continued along Marchington Brook but also joined the Silver Lane ordinary watercourse behind the Church Close embankment (red line). Flows from the back of properties (blue arrows) may have further exacerbated flooding in the village.

Resulting information obtained by Staffordshire County Council and the Environment Agency indicates that 9 residential and 2 business properties were flooded internally, with further properties impacted by external property flooding. This exceeds the threshold for a Section 19 flood investigation (5 or more residential properties internally flooded, 2 or more business properties internally flooded, and/or one or more residential properties in the same location internally flooded more than once during a 5-year period).

Some properties affected during the event have previously had PFR measures installed through the Marchington Flood Scheme. While there were some issues and water ingress through additional pathways (for example through property floors), the impact on properties from the flooding was much less than during previous floods in 2000, 2012, and 2020 that recorded lower Marchington Brook levels than the October 2023 flooding. Where PFR was successfully deployed, residents did not have to move out of their homes like they did in previous events, for example Storm Dennis in February 2020.

4.5.1 Immediate Response

A Flood Alert for Lower Dove Brooks in Staffordshire was issued on 13th October 2023 at 07:42, followed by a Flood Warning for Marchington that same day at 09:42. The Flood Warning was removed on 14th October 2023 at 08:19 as river levels began to fall, but was later reissued on 20th October at 08:46 as river levels began to rise again. The Flood Warning is issued at 1.40m when river levels cause highway flooding along Church Lane and Green Lane, and there is a risk of property flooding from 1.45m as a result of bow waves from vehicles once floodwater is on Church Lane.

A community-led road scheme to prevent vehicles from driving along Church Lane was recently introduced following the previous Section 19 Investigation for flooding in February 2020. This road closure was implemented successfully and was in place at the time of the flooding.

Following the event, Environment Agency officers visited the area to assess the impact and number of properties internally inundated. This information was provided to Staffordshire County Council who subsequently worked with East Staffordshire Borough Council to send out information for residents to complete as part of the Government's announced Flood Recovery Framework.

4.5.2 Flood Recovery Framework

The Flood Recovery Framework (FRF) to help communities recover from the impacts of Storm Babet was announced by the UK Government on 25 October 2023[6].

Following an initial survey to gather information on potential impacted residents and businesses across the County, East Staffordshire Borough Council and Staffordshire County Council worked in partnership to contact affected residents and establish whether they were eligible to access the relevant funding, that required properties to be internally inundated or for residents to be without access or services for 48-hours during the Storm Babet event. All properties that reported internal flooding in Marchington, and were confirmed as being eligible, received the FRF Recovery Grant funding and/or council tax or business rates relief for 3-months.

A further aspect of the FRF included identifying the eligibility of residents to receive a grant towards Property Flood Resilience (PFR). However, properties that have previous had PFR through other grants or schemes, for instance the Marchington Flood Scheme, are not eligible for the FRF PFR repair grant scheme. Properties eligible for this scheme in Marchington have been contacted by Staffordshire County Council and will have PFR surveys and installation undertaken as part of a combination of the FRF PFR repair grant scheme and a wider PFR scheme.

[6] Government announces support for flood-hit areas. Gov UK. https://www.gov.uk/government/news/government-announces-support-for-flood-hit-areas

5 Risk Management Authority Functions

The Risk Management Authorities (RMAs) with relevant flood risk management functions are:

- **The Environment Agency** – oversee flooding from main rivers.
- **Staffordshire County Council Lead Local Flood Authority** – oversee flooding from ordinary watercourses and surface water and have a requirement to produce Section 19 Flood Investigation Reports.
- **Staffordshire County Council Highway Authority** – responsible for the highway gullies and drains within the highway.
- **Severn Trent Water** – responsible for surface water sewers which convey surface water to the watercourse.

5.1 Previous Section 19 Flood Investigations

A Section 19 Flood Investigation was conducted following the flooding in February 2020 in Marchington. Table 1 below presents the recommendations and actions from this previous report.

Table 1: Recommendations and actions from the February 2020 flood event Section 19 Investigation

Lead RMA	Actions undertaken prior to publication of February 2020 investigation	Future actions following publication of February 2020 investigation
Environment Agency (EA)	Development of Marchington Brook Flood Alleviation Scheme (FAS) in partnership with relevant RMAs. Assessment of potential flood alleviation options including option modelling and development of Strategic Outline Case for Local Levy funding (completed April 2021). Final business case approved May 2022.	Capital Scheme is ongoing with Capital build due to start in Nov 2022. Works include closing the gap option on Church Lane, embankment works in field to south of Church Close and clearing of culvert on Church Lane.
Environment Agency (EA)	Opportunities to provide Property Flood Resilience (PFR) measures to homeowners have been explored and initial property surveys undertaken with recommendations put forward to residents. Initial business case approved with project expected to go to contract in May 2022.	Continue to progress PFR options and further consultation with residents with view to complete works by end of 2022.
Environment Agency (EA) & Staffordshire Wildlife Trust (SWT)	Natural Flood Management (NFM) project in progress. Whole Farm Appraisals completed and EA working with landowners to deliver priority measures. Initial measures successfully installed by EA and plans to create additional storage in place.	The NFM project that is currently in progress and likely to run until March 2024. Next update expected in November 2022.

Lead RMA	Actions undertaken prior to publication of February 2020 investigation	Future actions following publication of February 2020 investigation
Severn Trent Water (STW)	Sewer cleansing work and sealing of manholes along Church Lane completed. Commenced assessment into the condition and capacity of the sewer network and investigations into feasibility work at Silver Lane pumping station to consider upgrades to pumping station, improve performance and increase resilience.	Continue to progress investigative works including monitoring of existing sewer network. Review existing maintenance schedules and explore opportunities to increase frequency of maintenance and/or incorporation of additional maintenance tasks.
Staffordshire County Council (SCC) Highways & Staffordshire Civil Contingencies Unit (CCU)	Development of a community led road scheme to prevent vehicles driving along Church Lane during a flood event has been developed.	This scheme has now been signed off and is ready for implementation when required.
SCC / SCC Highways	Assess the condition and capacity of the highway drainage network and investigate effectiveness of gullies / possibility of re-routing to a more appropriate discharge location.	Review maintenance schedules and explore opportunities to increase frequency of maintenance and/or incorporation of additional maintenance tasks (Timescale: on-going).
Environment Agency (EA) & SCC	Provision of support for Marchington Parish Council (MPC) in the formation of a Flood Action Group and in the development of a Flood Action Plan to help residents be prepared for future flood events. EA meeting held with the Parish Council to discuss their flood action plan.	EA continued liaison with the Parish Council to provide support with their flood action plan.
East Staffordshire Borough Council (ESBC) Planning Department	Consideration of the impact of future development on flood risk through the planning application process.	Flood risk challenges within the catchment should be communicated to ESBC planners and Councillor to ensure it has been appropriately considered when assessing future development within Marchington. Timescale: On-going.

5.2 Environment Agency:

The Environment Agency were asked for information on the flooding and actions taken in Marchington. The response received is as follows:

Storm Babet on October 20th 2023 was highest ever recorded, surpassing Storm Dennis in 2020 and the 2 huge events in 2012. However, the impact on residents was less in October 2023 than in the previous events so the work done has had a positive effect.

After Storm Dennis in 2020 there was a flood report with recommended actions for the Environment Agency to take and we have completed them.

The scheme has been constructed to reduce the impact of flooding on properties, not to keep water out of the village. The embankment at the end of Church Close is stronger a consistent height and now fenced off, so it won't be as likely to overtop or fail owing to cattle damage and threaten Church Close. The small embankment at the Dog & Partridge Bridge is to keep Church Lane dry for longer, reducing the amount of times traffic is disrupted, but not changing flood levels in larger floods like Storm Dennis, Babet or Henk. The PFR measures are to reduce the amount of water that gets into properties and the pumps are to remove as much water as possible if it seeps in through the floor or the building fabric. The NFM upstream will start to slow the rate of rise of the flood peak and over time should begin to reduce the peak. Overall, the scheme will not have changed the flood levels experienced locally on Church Lane, it will just have reduced the impact of the flood water.

The PFR measures installed did seem to work reasonably well, and embankment protected Church Close. Flooding through the floor is the cause for significant proportion that is not resolved with PFR.

The width of floodplain and the volume of water passing Church lane and Silver Lane is so large that no matter what improvements you make to watercourses, culverts or bridges in the village, it is not viable to keep the water in the channel in an event like Storm Babet. An investigation into replacing pipes under Church Lane also found that the solution is highly unlikely to solve the problem of flooding in larger events.

5.3 Staffordshire County Council Highways Authority:

Staffordshire County Council Highways Authority were asked for information on the flooding and actions taken in Marchington. The response received is as follows:

Staffordshire County Council Highways Authority have checked any records for gully emptying and any other reported issues within the timeframe, and can advise as follows :-

All the highway gullies within the village of Marchington, other than Bag Lane and Stubby Lane, are on a triennial cleanse and were last cleaned during June 2023, prior to the October flooding. These were reported as running prior to flooding. Bag Lane was cleansed November 2023, and Stubby Lane (B5017) is on an annual cyclical cleanse and was last visited February 2024.

Additionally, Church Lane had ad hoc gully jetting carried out on 30 April 2024 and 10 September 2024 following reports received opposite the pub. These were reported as running following jetting work.

The frequency of scheduled cleansing has been reviewed in line with the drainage review and the flooding situation in Marchington to determine that increasing gully cleansing would not have any effect on reducing flooding occurrences or the level of flooding. Marchington is primarily affected by main river flooding and once the river level overtops the highway, the gullies become ineffective. Therefore, increasing the frequency of gully cleansing would be of no assistance and the focus should be on gully cleansing following flood events to remove silt and keep systems running efficiently. After flooding events, such as Storm Babet, we inspect the gullies to see if any ad hoc gully cleansing is required and schedule this accordingly. Marchington also has a flood warden

scheme to which they close off the road until the river level subsides, and they report any defects identified through the Staffordshire County Council Highways Report It system.

A report was received for Bag Lane about a land slip and water ponding on the road. Following further investigation, a damaged section of drainage pipe was located and repaired, with works completed April 2024. Jetting and cleansing of gullies at Birch Cross was undertaken in October 2024 following reports of road flooding. Issues have remained with one gully following the cleansing, with a CCTV survey being scheduled to investigate this further.

Further reports of flooding in Marchington were received about Jacks Lane on the 5 December 2023, in which flooding caused water to flow down driveways. Work carried out to clean and jet 3 gullies in location, reported as all running clear. However, another report has since been received that it is still flooding after this work. This is currently being reviewed by the technical review officer to arrange further investigation works.

The community road closure scheme was active during the flooding.

5.4 Severn Trent Water:

Severn Trent Water (STW) were asked for information on the flooding and actions taken in Marchington. The response received is as follows:

The survey phase of a potential project was completed in 2023 and our initial assessments indicate the local sewerage network performance is generally satisfactory. No further activity is proposed in the current funding period up to spring 2025.

Severn Trent is targeting improvements to many combined sewer overflows from 2025. The presence of sewer overflows in Marchington means that a full survey has been conducted which also confirms this is performing as expected.

To confirm the setup of the pump station, there are 3 pumps. One pump is always operational and is sufficient to manage dry weather flows. A second pump will assist in wet weather. The purpose of the third pump is to help manage flows during storm conditions. The pumps are fully automatic and will automatically operate when required, we do not need to operate the pumps manually. All 3 pumps are routinely checked and are on a full maintenance program. The pumping station is an asset that manages flows of foul water and not an asset to pump away flood water from areas other than the sewer network such as water courses. There are currently no plans to upgrade or expand the pumping station.

On the network side, in early 2022 we carried out extensive cleansing work to the network downstream of Brookside House removing silt and debris built up. We also reconfigured the channelling within the manhole also outside of this property, as the sewer turns at this point. Since the reconfiguration, the flow passes forward with ease at this point and to my knowledge we have not received and reports of flooding at this location since the work was completed. We also monitor the network on a regular maintenance plan which will highlight any issues or further cleansing requirements.

The EA raised concerns to Severn Trent on the 20th Oct 2023 of local flooding potentially affecting the Severn Trent pump station. An operative was sent to assess the pumping station the same day,

however the local flooding made the pumping station inaccessible. The telemetry system was checked and confirms the third pump was running correctly. The main pump and second pump were also running as they should. There were no maintenance issues with the pumps around the storm event period. There have been no reported issues to STW networks during 18th-21st Oct 2023.

5.5 Recommendations and Actions

The further recommendations and actions from this Section 19 flood investigation for the October 2023 flood event in Marchington, East Staffordshire, are included in Table 2.

Table 2: Recommendations and actions for RMAs from this Section 19 investigation

Lead RMA	Actions undertaken post publication of February 2020 investigation and prior to publication of the October 2023 investigation	Future actions following publication of October 2023 investigation
Environment Agency (EA)	Implementation of Marchington Flood Scheme that included closing the gap option on Church Lane, embankment works in field to south of Church Close and clearing of culvert on Church Lane.	All work completed and no further actions.
Environment Agency (EA)	PFR measures were installed for properties in Marchington. Following the October 2023 flood event the EA have spoken to residents to discuss PFR effectiveness.	Continue to investigate the impact of flooding on properties that had PFR installed, including ingress of flood water through property floors. EA to arrange for the company that installed the PFR measures to return and undertake refresher training with householders. A property not previously eligible for PFR as part of the Marchington Flood Scheme will also be included in a future EA PFR scheme.
Staffordshire County Council (SCC) LLFA and East Staffordshire Borough Council (ESBC)	Implementation of the Flood Recovery Framework (FRF) for Staffordshire for residents affected by internal property flooding.	Realisation of the PFR aspect of the FRF for properties that previously did not receive PFR under the Marchington Flood Scheme.
Environment Agency (EA), Staffordshire Wildlife Trust (SWT) &	The Natural Flood Management (NFM) project has been completed with measures including temporarily storing water, increasing soil infiltration and surface roughness,	The NFM project is now completed, though there is potential for further work in the catchment that would build on the investment made so far. Staffordshire County Council

Lead RMA	Actions undertaken post publication of February 2020 investigation and prior to publication of the October 2023 investigation	Future actions following publication of October 2023 investigation
Staffordshire County Council (SCC) LLFA	intercepting and slowing flow pathways, and reducing flow connectivity. Project highlights are included in section 4.3.3.	LLFA will work with Marchington Parish Council to identify any additional locations where any other measures including NFM and/or monitoring of the watercourses could benefit the area and reduce flood risk.
Severn Trent Water (STW)	Investigation surveys have been undertaken on the local sewerage network and combined sewer overflows that have identified these as generally satisfactory and performing as expected. Channel reconfiguration within the manhole to ease foul sewerage flows passing the 90-degree turn at the Church Lane road bridge, and network cleansing of silt and debris downstream of this was undertaken in early 2022.	Continue to look for improvements that can be made to the local sewerage network and combined sewer overflows in the next funding period. Continue to monitor the network on the regular maintenance plan and look to review this maintenance schedules and explore opportunities to increase frequency of maintenance and/or incorporation of additional maintenance tasks if appropriate or needed.
Staffordshire County Council (SCC) Highway Authority	Signed off the community road closure scheme to prevent vehicles driving along Church Lane when flooded that was successfully implemented during the flood event.	Continue to support the community and parish council with the road closure scheme.
Staffordshire County Council (SCC) Highway Authority	The frequency of gully cleansing was reviewed in line with the drainage review to determine increasing the scheduled cleansing would not alleviate flooding occurrences or magnitude.	On-going gully cleansing will remain on a triennial cleanse with ad hoc cleansing scheduled following flood events to remove silt and keep systems running efficiently and/or when defects are reported.
Environment Agency (EA) & Staffordshire County Council (SCC) LLFA	EA and SCC attended public meetings held by the MP and Parish Council to discuss flooding issues.	Continue to assist the Parish Council and Flood Action Group with community support, planning development of the Marchington flood action plan.
East Staffordshire Borough Council (ESBC) Planning Department	Consideration of the impact of future development on flood risk through the planning application process.	Flood risk challenges within the catchment should be communicated to ESBC planners and Councillor to ensure it has been appropriately considered when assessing future development within Marchington. Timescale: On-going.

6 Conclusions

Significant flooding occurred in Marchington in October 2023 when the Marchington Brook reached its highest recorded level as a result of heavy and persistent rainfall from Storm Babet that overwhelmed the capacity of the main river channel. The event resulted in internal flooding to 9 residential and 2 commercial properties, as well as significant highway flooding that affected the access and services of further properties and the Marchington community. The rainfall return period for this event has been identified as between a 2- and 5-year event by Hydromaster software, and specifically a 4.3-year rainfall return period for the 67-hour period by FEH. This is higher than then previously calculated 3-year rainfall return period during the previous flooding in February 2020 that internally flooded 11 residential and 2 business properties. Further, the flow return period has been estimated as between a 1 to 2-year return period by RefH. This is again higher than the less than 1-year return period estimated for the previous February 2020 event.

The Risk Management Authorities (RMAs) with relevant flood risk management functions are the Environment Agency, Staffordshire County Council Lead Local Flood Authority, Staffordshire County Council Highway Authority, and Severn Trent Water. Each RMA was notified of the flooding and asked to investigate and report on the status of assets under their responsibility, and whether they have taken or are proposing to undertake actions to mitigate the risk of future flooding.

Following the previous flooding in February 2020, the Environment Agency completed the Marchington Flood Scheme that included closing the gap option on Church Lane, embankment works south of Church Close, clearing of the culvert on Church Lane, installing PFR measures on at-risk properties and additional NFM measures to store water in the catchment. While some properties were repeatedly affected during this recent October 2023 flood event, that was a larger event in rainfall return period and Marchington Brook river levels, the impact on residents was less than during previous events.

Future actions for the Environment Agency and other identified RMAs are included in the previous recommendations section of the report, including ad hoc gully cleansing following flood events to remove silt and keep systems running efficiently. Properties impacted by internal flooding that were not previously offered PFR under the scheme have been contacted by the Environment Agency to be included in a future PFR scheme, or Staffordshire County Council to have PFR through a combination of the FRF PFR repair grant scheme and a wider PFR scheme.

Staffordshire County Council in its role as LLFA will continue to work with the Environment Agency and other identified RMAs to assist the local community in ensuring they are resilient and prepared for flood events should they occur in the future.