

Acton Bridge and Weaverham Final Report Details

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Acton Bridge and Weaverham Main Report Details

This Acton Bridge and Weaverham specific Main Report should be read in conjunction with the Section 19 Flood Investigation – Main Report (January 2021 Storm Christoph Flooding Event).

1. Introduction

This chapter titled Acton Bridge and Weaverham consists of details relating to a number of small villages and hamlets including Acton Bridge, Pickering's Lock, Crowton, Little Leigh, Weaverham and Dutton Locks.

These locations are all either just north or south of the River Weaver, west of Northwich Town Centre. There are a number of main rivers including the Weaver, Dane's Gutter, Acton Brook, Crowton Brook and Cliff Brook. The River Weaver in this section is navigable and maintained by Canal and River Trust (the Trust). The Trent and Mersey Canal runs almost parallel to the Weaver in this area as well, which is also maintained by the Trust.

2. Affected Areas

2.1. Crowton

2.1.1. Background

Crowton is a village approximately 5 miles west of Northwich. Small Brook, classified as main river, flows through the village of Crowton and through a culvert under Kingsley Road, to a mill pond, which discharges over a weir into Crowton Brook. Crowton Brook is culverted beneath Ainsworth Lane. The catchment area for Crowton Brook extends from Norley to the south and Kingsley to the west. Upstream of the mill pond, Crowton Brook is classified as an ordinary watercourse and downstream of the mill pond Crowton Brook is classified as a main river. There is a United Utilities (UU) foul water pumping station on Ainsworth Lane, this does not discharge to the watercourse.

Ainsworth Lane floods regularly in heavy rain and some residents were flooded internally during the September 2012 flooding. Many of the affected properties are located within Environment Agency (EA) flood zones 2 and 3, and some are within the very high surface water flood risk zone (Appendix I).

2.1.2. Flood Review

During the Storm Christoph event, it was observed that water levels in Small Brook and Crowton Brook were raised, water was turbulent and fast flowing. The retaining walls for small Brook at Pool Bank, just after the Kingsley Road culvert, collapsed and Ainsworth Lane flooded. Water backed up at the entrance to the culvert under Ainsworth Lane, the water level in Crowton Brook rose 1.2m. Ainsworth Lane is the low point within the village and was inundated with water from each direction.

The following narrative provides a summary of how the flood event unfolded:

- Small Brook, flowing past the Hare and Hounds Pub, came out of bank, flooding Station Road and the pub car park. Water appeared to be backing up from the point where the brook is culverted under Kingsley Road. The water level at this culvert is frequently up to the culvert soffit (weekly in winter).
- Water then flowed down Ainsworth Lane from the Station Road junction.
- Small Brook in Pool Bank, downstream of the Station Road / Kingsley Road Bridge, came out of bank (damaging the retaining wall within the property) and flowed through the garden onto Ainsworth Lane and down the hill to the Old Mill properties.
- The pond just before the weir at the confluence of Small Brook and Crowton Brook (within Pool Bank property) overflowed due to the high water levels and flowed east onto Ainsworth Lane.
- Water appeared to be backing up where Crowton Brook is culverted under the Ainsworth Lane bridge which subsequently overtopped the southern wall just upstream of the bridge.
- The channel downstream of the Ainsworth Lane bridge was reported to have had sufficient capacity.

- The properties affected in Crowton are largely in Flood Zone 3.

Issues raised by local residents:

- There were no local response plans in place and no safe egress for residents of the Poplar Vale development and the Old Mill apartments who were trapped by floodwater on Ainsworth Lane.

Figure 1 shows details of the flooding in Crowton, developed in consultation with Cheshire West and Chester Council (CWaC), as Lead Local Flood Authority (LLFA), and affected property owners.

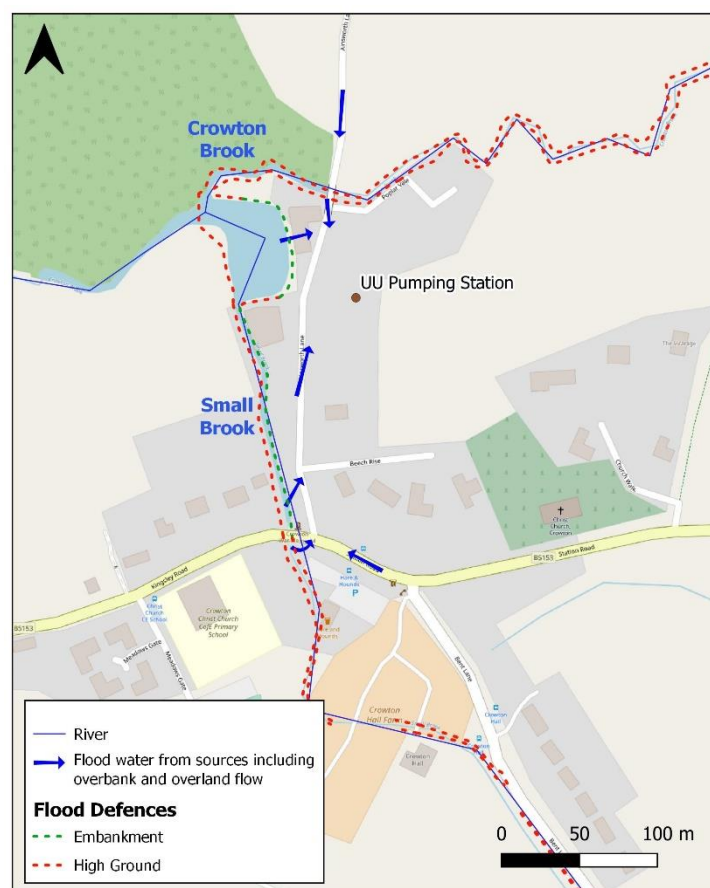


Figure 1 - Crowton flood overview

Photographs that illustrate the severity of the flood event in Crowton can be seen in Figure 2 and Figure 3. A detailed timeline of the event is given in Appendix II.



Figure 2 - Small Brook. 16:09 20/01/21

Source: Resident



Figure 3 - Ainsworth Lane culvert inlet. 15:59 20/01/21

Source: Resident

The following actions were undertaken prior to the interim report

- Residents committee established in March 2021, dialogue with the local council continues.
- Meeting on site with affected residents 8th July 2021 with CWaC, as LLFA, and EA.

2.1.3. RMA Responses

- Crowton is not within a Flood Warning area; therefore, no Flood Warning was issued and there were no EA Operational Staff present on site during the flood event.
- EA Community Information Officers were able to attend site on January 24th to speak with residents impacted from the floods and to collate flood information.
- Community Flood Risk Action Group (FRAG) meetings have been carried out to discuss open questions, meeting with key stakeholders and to discuss future action plans.

2.1.4. Recommended Actions

The following further actions are recommended:

- CWaC to increase its gully emptying frequency for the area covered by this Section 19 investigation in line with its risk-based approach to gully emptying.
- Individual property owners to investigate opportunities to install individual property level protection measures. CWaC, as LLFA, to provide support and guidance.
- CWaC, as LLFA, to investigate whether there are opportunities to provide upstream storage.
- Establish whether the UU pumping station is vulnerable to flooding and whether any action is required to ensure foul water is unable to escape.
- Establish ownership, and hence responsibility, of the culvert under Ainsworth Lane.
- Residents to be encouraged to sign up to the EA flood alert service for the River Weaver and LLFA and EA to consider the feasibility of implementing a flood warning service.
- Residents to be encouraged to sign up to the EA flood warning service.
- LLFA to promote the use of the FloodHub for information on flooding.

2.2. Little Leigh

2.2.1. Background

Little Leigh is a civil parish and village approximately 2 miles north of Weaverham. The affected property in Little Leigh is located on a hill above Brakeley Rough, it is not located within a flood risk zone. There is an ordinary watercourse that flows through Brakeley Rough which receives the agricultural drainage between Little Leigh Village, the A533 Runcorn Road and Hole House Lane. After flowing through Brakeley Rough, the watercourse flows south, through a culvert under the Trent and Mersey Canal, before discharging into the River Weaver just downstream of Saltersford Locks.

2.2.2. Flood Review

The affected property in Little Leigh is a small farm of 11 acres.

During the event, water ran off from the agricultural land and into a ditch on the north-western boundary of the property, adjacent to a public right of way. Normally, water drains into the ditch and is cleared via a series of underground 75mm pipes to discharge into Brakeley Rough. However, during the event, the drainage system in place was not able to effectively take the water away from the area and the ditch overtopped. Water flowed down the public right of way, before flowing across the affected property's front garden and driveway before flowing to Brakeley Rough.

Owing to the amount of water, the ground became saturated and eventually gave way as a large landslide into Brakeley Rough. A considerable number of trees and shrubs were swept down into the gorge along with a significant volume of earth.

Local residents believe that the culvert beneath the Trent and Mersey Canal is partially blocked by silt which caused water to back up, contributing to the landslide.

Figure 4 - Little Leigh flood overview shows the direction of overland flow towards the property affected and the area of land which collapsed into the Rough. This plan was developed in consultation with CWaC, as LLFA, and the affected property owner.

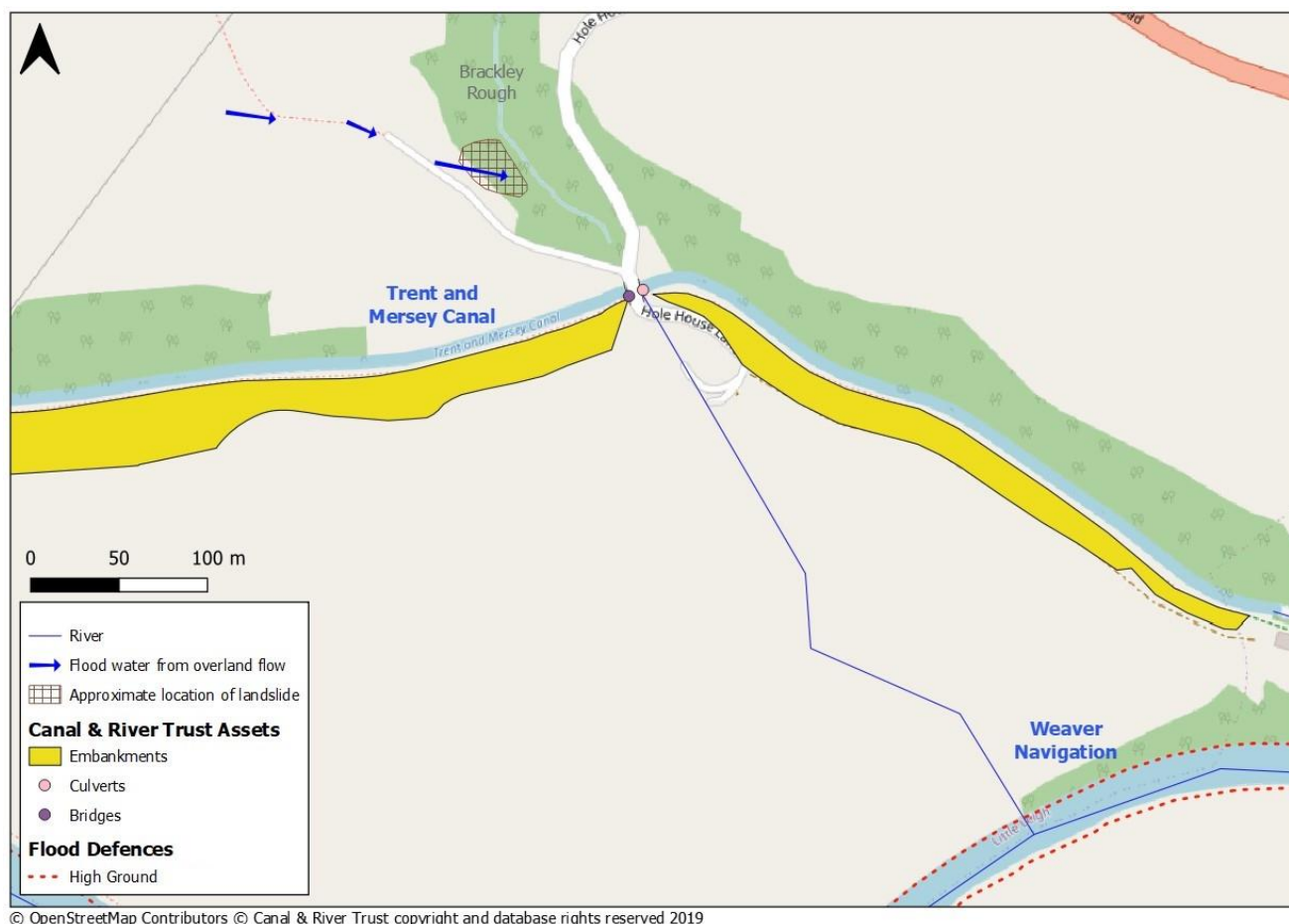


Figure 4 - Little Leigh flood overview

Figure 5 shows the severity of the landslide at Little Leigh. A detailed timeline of the event is given in Appendix II.



Figure 5 - Little Leigh landslide

Source: Resident

The following actions were undertaken prior to the completion of the interim report:

- Meeting on site with affected residents 8th July 2021 with CWaC, as LLFA.
- The resident has engaged a geological surveyor to assess the slope stability at the site of the landslip between the property and Brakeley Rough.
- New property level drainage system installed. Landowners have installed a new pipe, which conveys water from the ditch that overflowed, to Brakeley Rough. This enables flood water to be diverted away from the area of the house to discharge into the gorge upstream, at a shallower angle.
- Scottish Power have moved electricity supply poles away from the edge of the landslide.

2.2.3. Recommendations

This section has set out the site background and conditions that resulted in the flooding in January 2021 in Little Leigh. However, some brief recommendations can be made without further investigation:

- Resident to install new drainage pathways for surface water down the property driveway to the south, to alleviate some of the flood water that flowed over the property driveway eastwards into Brakeley Rough.
- CWaC to engage with the Trust to investigate the condition of the culvert beneath the canal and, if applicable, undertake works to clear and repair.
- LLFA to investigate whether there are opportunities for attenuation to the east of Brakeley Rough.
- LLFA to promote the use of the FloodHub for information on flooding.

2.3. Pickering's Lock

2.3.1. Background

The River Weaver runs through Pickering's Lock, located between the Dutton Sluices and Sutton Sluices. On the south side of the river, the old course of the River Weaver meanders parallel to the navigable River Weaver. Just west of the properties on the north bank of the River Weaver, there is a small watercourse that discharges into the River Weaver. The River Weaver here is influenced by tide levels.

Properties affected by the Storm Christoph flood event were on both the north and south bank of the River Weaver and located in Flood Zones 2 and 3 (Appendix I).

There is an EA river level gauge (Pickering's Cut CM (682223)) located on the River Weaver. The Trust's sluice gates operate based on SCADA data upstream of each respective sluice site, namely Dutton and Sutton Swingbridge.

2.3.2. Flood Review

During the Storm Christoph event, the River Weaver overtopped the banks at Pickering's Lock. The period of high water associated with fluvial flow coincided with a high tide which caused the river levels to remain high for several hours after the initial peak.

Of the two properties located on the north bank, only one property was flooded internally. Water came onto the gardens directly from the Weaver to the south and, water flowed towards the houses from the west due to backing up in the watercourse that runs behind the properties.

The residents usually access the properties via boats from the south side as the only access route to the properties on the north side is a private road owned by the Woodland Trust. During the event, the water level was too high to evacuate by boat, the road egress route was blocked by water behind the properties and the Woodland Trust access road was gated and locked.

Residents are reliant on mobile phone signals, which were intermittent during the event, as there is no landline service due to the remote location of the properties. During the event residents managed to contact the EA to confirm their safety. This is the first out of bank internal flooding reported on the north side of the river in over 20 years.

On the south bank of the river several properties and a caravan park were flooded. One property located between the River Weaver and the old course of the River Weaver was internally flooded although it was unoccupied at the time. Residents report that the old course of the River Weaver is heavily silted and vegetated. Some residents in the caravan park have constructed structures over the old course that reduce its capacity.

Figure 6 shows details of the flooding, developed in consultation with CWaC, as LLFA, and the affected property owners.

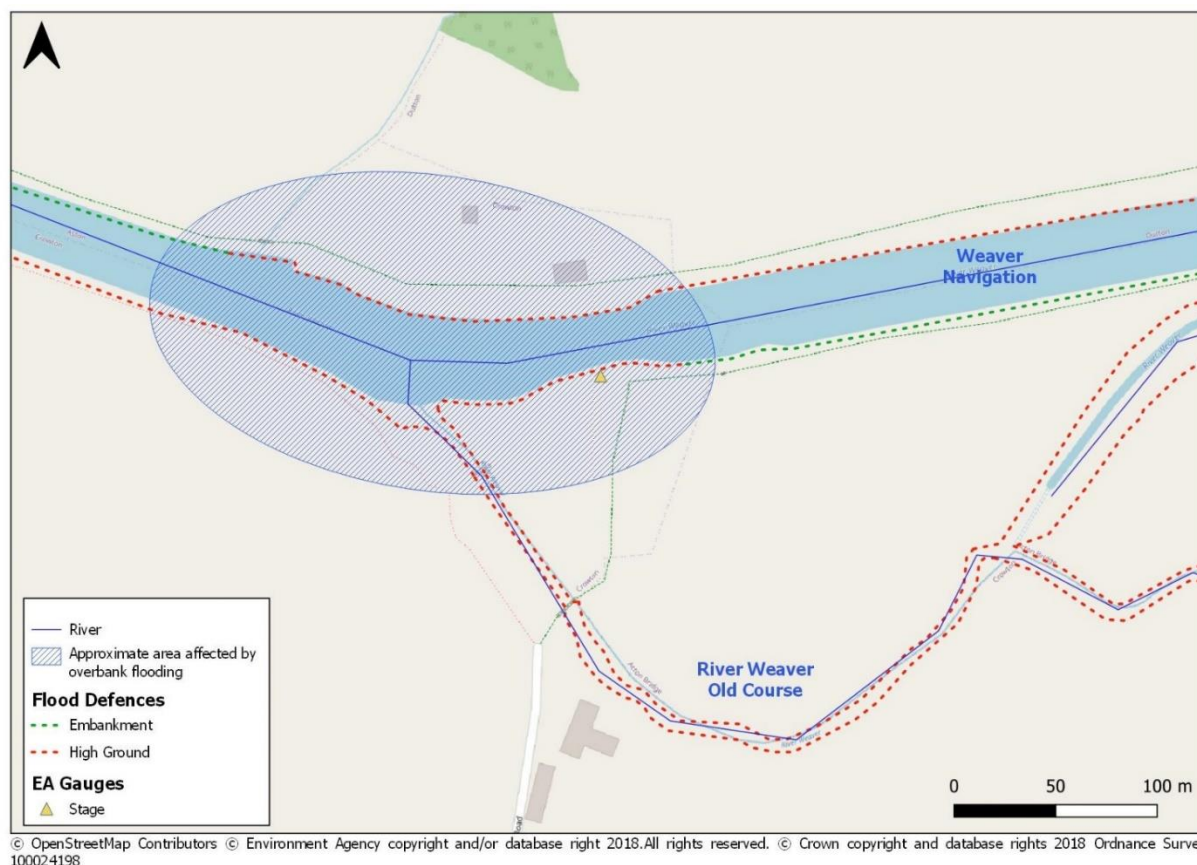


Figure 6 – Pickering's Lock Flood Overview

Photographs that illustrate the severity of the flood event at Pickering's Lock can be seen in Figure 7 and Figure 8. A detailed timeline of the event is given in Appendix II.



Figure 7 – Pickering's Lock, North Bank. 21/01/21

Source: Resident



Figure 8 – Pickering's Lock, North Bank. 21/01/21

Source: Resident

2.3.3. Flooding Mechanism

It is evident that the overwhelming flooding at Pickering's Lock occurred as a direct result of high water levels on the River Weaver and subsequent out of bank flow. Despite the Pickering's Cut water level gauge being inundated to the point of being unable to confirm peak water level, water levels recorded at Pickering's Lock were the highest on record.

2.3.4. RMA Response

- The EA issued a Flood Alert at 19:38 on the 18th January 2021 for the Weaver catchment including Nantwich, Frodsham, Crewe, Winsford and Northwich.
- The EA issued the following Flood Warnings:
 1. CH41 – River Weaver at Acton Bridge and Weaverham issued on the 19th January 2021 at 21:57.
 2. CH42 – River Weaver at Little Leigh and Higher properties in Acton Bridge and Weaverham issued on the 20th January 2021 at 18:18.
 3. CH37 – River Weaver at Pickering's Bridge issued on the 20th January 2021 at 14:52.
- The EA Duty Officer spoke with community contacts at Pickering's Bridge to provide forecast updates on the 18th January 2021 at 13:19 and on the 19th January 2021 at 10:24.
- A meeting between CWaC, as LLFA, the EA, the Trust and residents on the 14th July 2021.
- Flood Risk Action Group (FRAG) established to improve lines of communication and information dissemination of information between RMAs and residents.

2.3.5. Recommendations

It is suggested that the recommendations made within this report are taken on board by the relevant RMAs and reviewed on a regular basis. This Section 19 report recommends the following actions be taken:

- CWaC, as LLFA, ensure that future modelling work should include the Pickering's Lock area.
- LLFA and the EA to review the existing maintenance regime of the old course of the River Weaver and determine whether any changes to this regime, or management thereof, could reduce flood risk.
- Residents, the EA and CWaC, as LLFA, to discuss and develop an emergency response plan that enables safe evacuation during flood events. The Woodland Trust should be consulted in the development of this plan to ensure access routes are available.

- Residents to consider implementation of Property Level Protection measures. The EA and CWaC, as LLFA, to provide guidance as appropriate.
- LLFA to promote the use of the FloodHub for information on flooding.
- Residents to be encouraged to sign up to the EA flood warning service.

2.4. Acton Bridge

2.4.1. Background

Acton Bridge is a village and civil parish in Cheshire, located approximately 4 miles west of Northwich. The River Weaver is located to the east and north of the village. Other watercourses in the area include Acton Brook, classified as a main river, located to the south and west of the village, and Grange Brook, classified as an ordinary watercourse, which joins Acton Brook to the south of the village.

The properties affected by Storm Christoph are located to the north of Acton Bridge, just south of the River Weaver. Affected properties are located within Environment Agency Flood Zones 2 or 3 and some were located within high to medium risk surface water flood zones (Appendix I). The last recorded incident of flooding for properties on Acton Lane was 1946, highway flooding did occur on Acton Lane in September 2019.

2.4.2. Flood Review

During the Storm Christoph event properties on Warrington Road were affected initially from surface water coming from the road and subsequently by water spilling out of bank from the River Weaver. Water was first observed to begin pooling on Warrington Road between the Riverside Inn and the Woodbine Caravan Park, as the amount of water unable to discharge through the highways drains increased, water began to flow northwards on the road, spilling down towards the riverside properties. Surface water flowed directly from the fields to the west onto the road, increasing the amount of water that was flowing towards and inundating the property. It is worth noting that the affected riverside properties on Warrington Road are lower than the road itself. Subsequent to the initial surface water flooding, the River Weaver began to flow out of bank which caused further flooding to the property.

The junction between Warrington Road and Acton Lane is located in a low spot and as such water pooled in this area causing internal flooding to property on Acton Lane. This area retained water after the River Weaver water levels dropped, interventions were required to drain this water by way of a temporary drainage channel running northwards to discharge to the Weaver downstream of the Acton Swing Bridge.

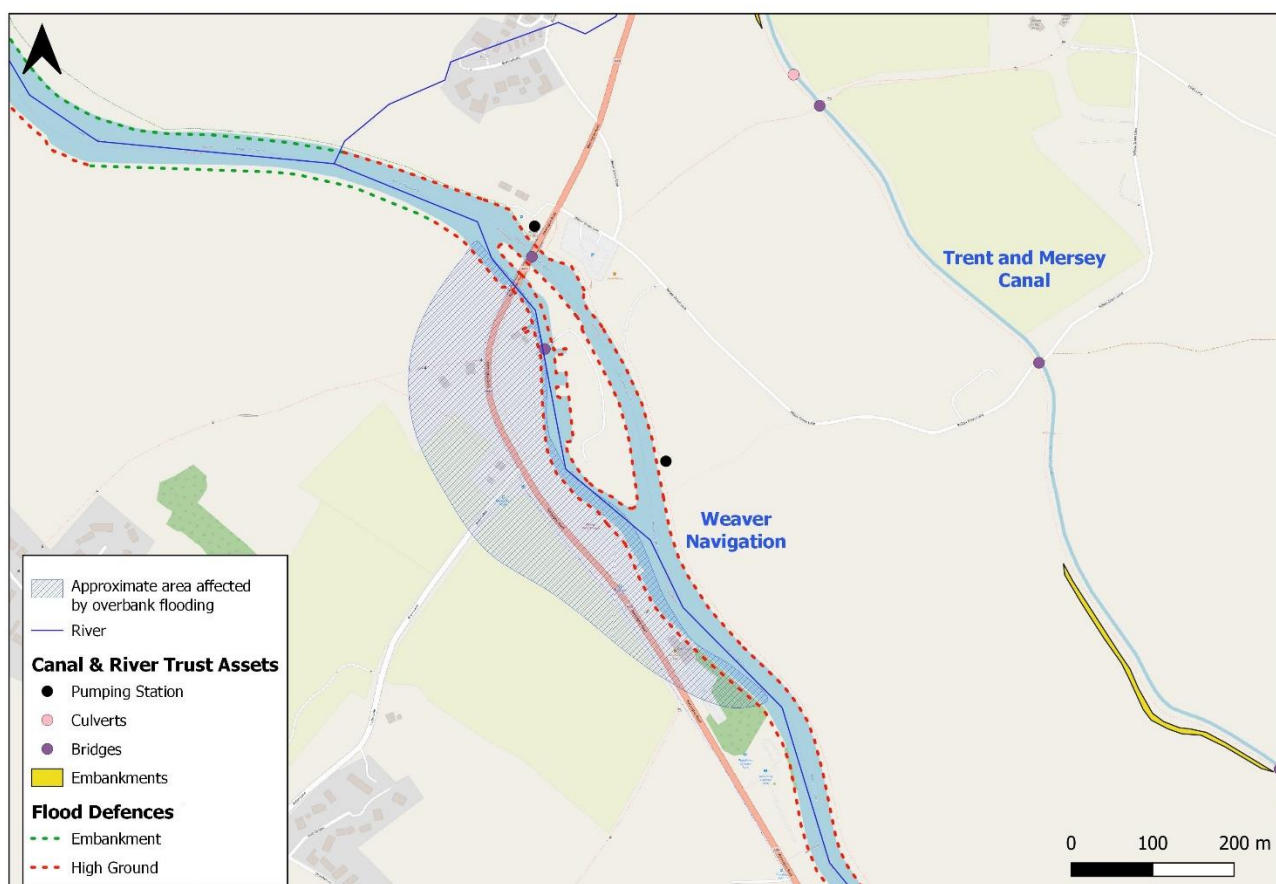
The Acton Bridge Cruising Club and the Grange Rowing Club were inundated during Storm Christoph causing damage.

Residents reported the following issues:

- The highway drains opposite the Woodbine Caravan Park have caused concern for many years, water has been seen to pool at these locations for as long as 20 years. Works were undertaken to resolve these issues but after a short period the problem persisted once more. Following Storm Christoph further works were undertaken which so far have resolved the issue.
- The highway drain opposite the Riverside Inn has, like that at the caravan park, caused concern for many years. No works have been undertaken to resolve this and the problem of water pooling here continues.
- Water levels were reportedly 1m inside the property on Warrington Road and up to 2m of flooding affected the stables.
- Vehicular traffic on Warrington Road continued throughout the afternoon of the 20th January 2021 until the evening causing waves of water towards the affected property, residents believe this contributed to the initial flood impact.
- Animals, including 7 horses, had to be evacuated during the flood.
- The Cheshire Fire and Rescue Service attended on the afternoon of the 20th January 2021. They returned on the morning of the 21st with the ambulance service to evacuate flooded properties by boat.
- Pumps were deployed at the low spot of Acton Lane and Warrington Road for 3 days with little impact. This area was successfully drained after the excavation of a temporary relief channel to the north.

- CWaC had minimal presence on site during the peak of the event, due to severity and extent of flooding, but were present and heavily involved in the clean-up operations from the 23rd January 2021; including the excavation of the relief channel.

Figure 9 shows details the flooding, developed in consultation with CWaC, as LLFA, and affected property owners.



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Figure 9 - Acton Bridge flood overview

Photographs that illustrate the severity of the flood event in Acton Bridge can be seen in Figure 12 through to and Figure 13. A detailed timeline of the event is given in Appendix II.



Figure 10 – Warrinton Road. 8:00am 21/01/21

Source: Resident



Figure 11 – Junction of Acton Lane and Warrington Road. 8:00am 21/01/21

Source: Resident



Figure 12 - Acton Bridge. 21/01/21

Source: Resident



Figure 13 - Acton Bridge. 21/01/21

Source: Resident

2.4.3. Flooding Mechanisms

2.4.3.1. Fluvial Flooding

The River Weaver overtopped its banks at Acton Bridge causing out of bank flow. At the point when fluvial flooding commenced surface water flooding was already occurring.

This section of the watercourse is part of the Weaver Navigation and the water levels are managed by the Trust through the operation of the Dutton Sluices. The Dutton Sluices are a series of eight sluice gates mounted within a masonry and cast-iron structure which spans the river. The gates open in response to rising water levels.

The Trust's SCADA data reports that six of the eight gates (no. 1, 2, 3, 4, 6 and 8) were fully open during the event by 20:25 on the evening of the 20th January 2021. Gates no. 5 and 7 remained closed throughout the event due to being serviced at the time.

Without detailed hydraulic modelling of the flood event it is not possible to categorically state whether flooding would have occurred if the two gates being serviced had been available.

2.4.3.2. CWaC Highway Drainage

Surface water flooding was the initial cause of flooding on the A49. The system could not take the volumes of water on the highway, contributed to by overland flow from the surrounding fields, resulting in surcharge and the build-up of surface water. The highway system discharges directly to the river and its ability to discharge is linked to river levels.

It is unknown whether the capacity of the drainage system is adequate as there were long reported concerns of the network on the A49.

Initial flooding of the A49 and property was directly related to surface water flooding.

2.4.3.3. Summary

The onset of flooding occurred as a result of surface water flooding, this was from a combination of overland flow from surrounding fields and water unable to enter the highway drainage network. This was the initial cause of flooding to property.

Subsequent to the surface water flooding, the River Weaver spilt out of bank and further increased water depth. Water levels were high in the River Weaver due to heavy rainfall, further artificial increases in depth may have resulted as two gates were being serviced at Dutton Sluices. However, without detailed hydraulic modelling of the event it is not possible to determine the impact of the Dutton Sluices to water levels at Acton Bridge.

2.4.4. RMA Response

- During the event, sandbags were delivered to residents by CWaC.
- The EA issued a Flood Alert at 19:38 on the 18th January 2021 for the Weaver catchment including Nantwich, Frodsham, Crewe, Winsford and Northwich.
- The EA issued the following Flood Warnings:
 1. CH41 – River Weaver at Acton Bridge and Weaverham issued on the 19th January 2021 at 21:57.
 2. CH42 – River Weaver at Little Leigh and Higher properties in Acton Bridge and Weaverham issued on the 20th January 2021 at 18:18.
 3. CH37 – River Weaver at Pickering's Bridge issued on the 20th January 2021 at 14:52.
- The Cheshire Fire and Rescue Service attended on the afternoon of the 20th January 2021 and the morning of the 21st January 2021 with the ambulance service to evacuate flooded properties with inflatable dinghies.
- The EA supported the excavation by CWaC contractors of a flood relief channel from the low spot at the junction of Acton Lane and Warrington Road. This relief channel ran in a northerly direction, entering the River Weaver downstream of the Acton Swing Bridge. This followed the unsuccessful attempts to pump flood water away.
- CWaC deployed work teams on the 19th January 2021 to alleviate standing water opposite the terraced houses on Warrington Road.
- CWaC work teams were deployed on the 20th January 2021 on Warrington Road, by the Woodbine Cottage Caravan Park, to clear standing water associated with highway drainage. This team reportedly left site at 4:00pm but the drains continued to surcharge.

- CWaC, as LLFA, coordinated attendance on site of tractors with tankers, although not in person, on site.
- Throughout the flood event from the 20th to the 22nd of January 2021, there was minimal intervention by CWaC or Cheshire Police to close the road to stop vehicles travelling on the A49. This resulted in multiple vehicle movements through flood water resulting in water being pushed towards, and into, property.
- CWaC attended Acton Bridge late on the day of the 22nd January 2021.
- CWaC teams attended the blocked drains opposite the Woodbine Cottage Caravan Park once more on the 24th January 2021. During this visit the team confirmed the removal of a large tree root which had intruded the drain further along the A49. Following the removal of this root the drain no longer overflowed.
- Meeting on site with residents with CWaC, as LLFA.
- CWaC have undertaken investigations and improvement works to the highway drains on Acton Lane, Sandy Lane and Warrington Road, this work is ongoing.
- Flood Risk Action Group (FRAG) established to improve lines of communication and information dissemination of information between RMAs and residents.
- Following the October 2019 flooding, the EA have held discussions with the Trust to look for a location for a river level gauge in Acton Bridge. Since the floods, the Trust now share level data from Dutton sluices with the EA, and the EA have used this to improve their flood warning capability to allow for specific warnings to be generated for Acton Bridge.
- Although undertaken prior to Storm Christoph, it should be acknowledged that the Trust are continually undertaking maintenance, refurbishment and modernisation of their assets. Unfortunately, these works meant that two of the gates at Dutton Sluices had been removed for refurbishment at the time of the flooding, and the SCADA controlled panels were also being replaced and upgraded at the time.
- CWaC, as LLFA, hosted a public engagement event on the 2nd December 2021 in Acton Bridge to provide the opportunity for residents to raise issues and ask questions of RMAs. The event was well attended by residents affected.

2.4.5. Recommendations

The LLFA role is to coordinate the management of flood risk within their administrative area. It is suggested that the recommendations made within this report are taken on board by the relevant RMAs and reviewed on a regular basis. This Section 19 report recommends the following actions be taken:

- A Community Emergency Plan should be developed between CWaC and Acton Bridge Parish Council to set out clearly the roles and responsibilities of the different organisations, before during and after a flood event, and the communication lines between different organisations. This plan should extend to all RMAs and the emergency services. This communication plan would benefit from setting out clear strategies for managing flood events in order for all parties to be working collaboratively towards agreed aims and objectives.
- CWaC, as LLFA, and the EA to consider whether there are economically viable options to reduce flood risk to property at Acton Bridge. Options considered could include, but not be limited to, individual property protection measures, attenuation on the fields to reduce rates of run off, improvements to the highways drainage system, raised defences (permanent and temporary) and works to increase conveyance of the River Weaver; specifically at Dutton Sluices in conjunction with the CRT.
- CWaC to increase its gulley emptying frequency for the area covered by this Section 19 investigation in line with its risk-based approach to gulley emptying. In addition, CWaC to consider 'fast track' approach to resolving drainage concerns reported at Action Bridge.
- When resourcing allows, CWaC to take more of a proactive role in managing flood response on the ground at Action Bridge. Given the widespread nature of the impact of Storm Christoph and their available resources, CWaC were not present to coordinate responses at the peak of the event.
- CWaC to provide sandbags in advance of the event to enable residents more time to prepare.
- At the first onset of highway flooding, or following the forecast of heavy rain, A49 road closures should be enforced to stop traffic traveling through the affected area. A more proactive approach to enforcing these closures is required to stop drivers ignoring road closure signage.

- CWaC, as LLFA, alongside EA, to encourage farmers and owners of livestock using the floodplain between Warrington Road (A49) and from Acton Lane downstream to the West as far as Dutton locks to sign up to Flood Warning service.
- CWaC, as LLFA, and the EA to determine the most appropriate method for allowing the return of floodwaters to the Weaver, should the Weaver flood again at Acton Bridge.
- The EA and the Trust continue to work together to improve flood warning services.
- The EA, CWaC and the Trust to continue discussions to understand whether there is scope to operate the level control structures on the Weaver to manage water levels for the purpose of limiting flood risk. To date these have been exploratory discussions which should now be formalised under the leadership of CWaC, and additional funding sought to enable dual functionality of the Trust's water level control assets.
- EA and CWaC to ensure any temporary or permanent flood management activities undertaken upstream, specifically at Northwich, do not increase risk at Acton Bridge.
- Residents to consider implementation of Property Level Protection measures. The EA and CWaC, as LLFA, to provide guidance as appropriate. Residents to be encouraged to sign up to the EA flood warning service.
- LLFA to promote the use of the FloodHub for information on flooding.

2.5. Weaverham (including Sandy Lane)

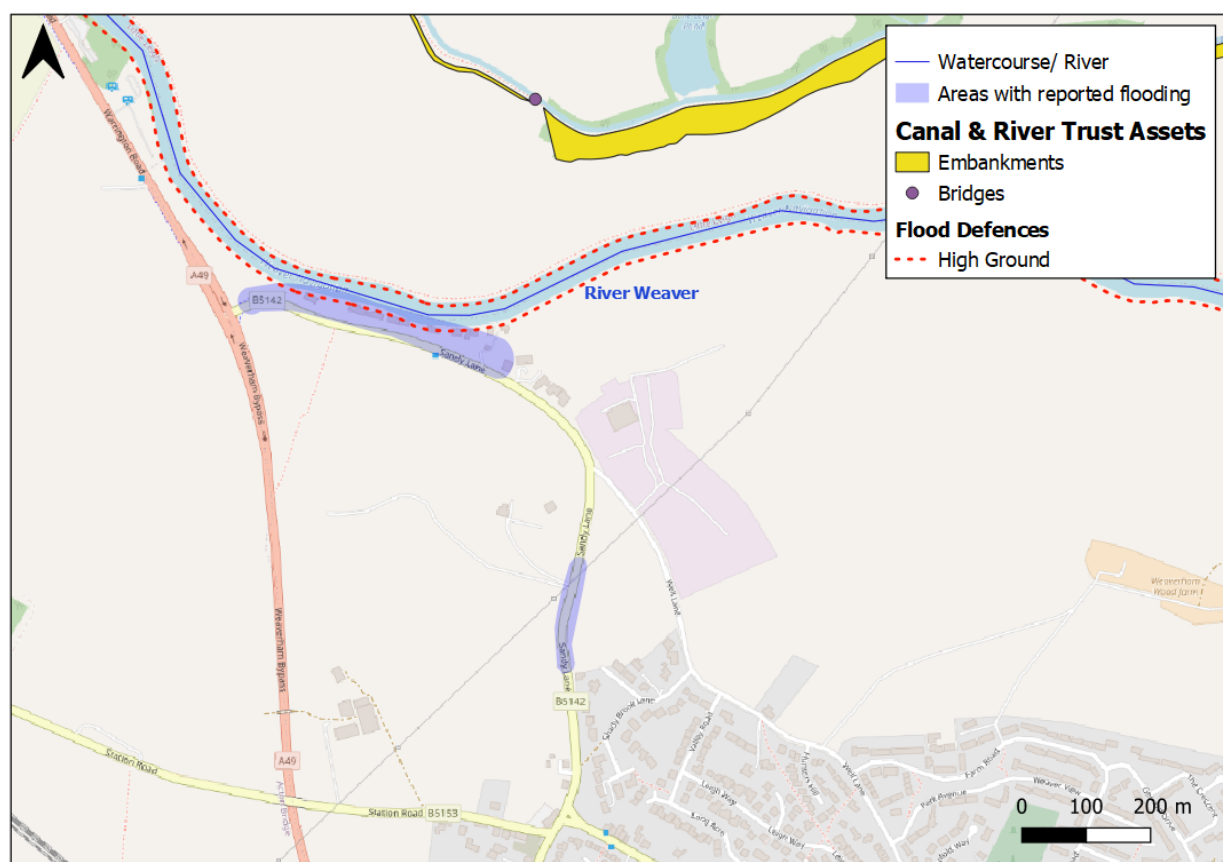
2.5.1. Background

Weaverham is a village and civil parish in Cheshire, located approximately 3 miles west of Northwich. The River Weaver is located to the north and east of the village. Grange Brook, classified as an ordinary watercourse, is located south of the village.

The properties affected by Storm Christoph are on Sandy Lane, to the west and north west of the village. Affected properties on Sandy Lane adjacent to the River Weaver are located in the Environment Agency Flood Zone 2 or 3 and those immediately west of the village in Flood Zones 1. Some affected properties were located within high to medium risk surface water flood zones (Appendix I).

2.5.2. Flood review

Seven properties are reported to have flooded internally on Sandy Lane in Weaverham. Figure 14 shows details the flooding, developed in consultation with CWaC, as LLFA.



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Figure 14 - Weaverham flood overview

During the Storm Christoph event water began to pool on the fields to the south of Sandy Lane and on Sandy Lane itself. The highway drainage system was not able to drain the amount of water that was accumulating. It is not known whether the surface water in isolation caused internal flooding to property. Subsequently, as the River Weaver rose, the water flowed out of bank and caused flooding to the properties on Sandy Lane adjacent to the River Weaver. There was reportedly over 1m depth of water on Sandy Lane at the peak depth.

Residents reported the following issues:

- Flooding on Sandy Lane was approximately 1m deep.
- Local residents had concerns regarding the maintenance and clearance of highway gullies prior to the event.
- There were concerns that the Dutton sluice gates could have been opened further to allow more water to pass and therefore help manage water levels in the Weaver.

2.5.3. Flooding Mechanisms

2.5.3.1. Fluvial Flooding

The River Weaver overtopped its banks at Weaverham causing out of bank flow. At the point when fluvial flooding commenced surface water was already flooding the road and property gardens. It is not known when whether onset of property flooding occurred as a result of surface water flooding or as a result of the increased water depths associated with the Weaver.

This section of the watercourse is part of the Weaver Navigation and the water levels are managed by the Trust through the operation of the Dutton Sluices. The Dutton Sluices are a series of eight sluice gates mounted within a masonry and cast-iron structure which spans the river. The gates open in response to rising water levels.

The Trust's SCADA data reports that six of the eight gates (no. 1, 2, 3, 4, 6 and 8) were fully open during the event by 20:25 on the evening of the 20th January 2021. Gates no. 5 and 7 remained closed throughout the event due to being serviced at the time.

Without detailed hydraulic modelling of the flood event it is not possible to categorically state whether flooding would have occurred if the two gates being serviced had been available.

2.5.3.2. CWaC Highway Drainage

Surface water started to pool on the Sandy Lane prior to any fluvial flooding. Overland flow occurred from the fields to the south, flowing onto the road and subsequently unable to drain through the highway gullies. This surface water flooded across Sandy Lane and into the riverside properties gardens.

It is not known whether the capacity of the drainage system was sufficient to take the volume of surface water or whether there were blockages or restrictions to flow.

2.5.3.3. Summary

The initial onset of flooding to Sandy Lane was caused by surface water unable to drain away. Subsequent to this, water levels in the River Weaver rose causing out of bank flow which inundated the south bank of the Weaver. Properties were affected, leading to their evacuation.

Water levels were high in the River Weaver due to heavy rainfall, further artificial increases in depth may have resulted as two of the sluice gates at Dutton were being serviced at the time. However, without detailed hydraulic modelling of the flood event it is not possible to categorically state whether flooding would have occurred if the two gates being serviced had been available.

2.5.4. RMA Response

The following actions have been undertaken since Storm Christoph:

- The EA issued a Flood Alert at 19:38 on the 18th January 2021 for the Weaver catchment including Nantwich, Frodsham, Crewe, Winsford and Northwich.
- The EA issued the following Flood Warnings
 4. CH41 – River Weaver at Acton Bridge and Weaverham issued on the 19th January 2021 at 21:57.
 5. CH42 – River Weaver at Little Leigh and Higher properties in Acton Bridge and Weaverham issued on the 20th January 2021 at 18:18.
 6. CH37 – River Weaver at Pickering's Bridge issued on the 20th January 2021 at 14:52.
- The Cheshire Fire and Rescue Service attended on the afternoon of the 20th January 2021 and the morning of the 21st January 2021 with the ambulance service to evacuate flooded properties with inflatable dinghies.
- CWaC deployed work teams on the 19th January 2021 to alleviate standing water opposite the terraced houses on Warrington Road.
- Throughout the flood event from the 20th to the 22nd of January 2021, there was minimal intervention by CWaC or Cheshire Police to close the road to stop vehicles travelling on Sandy Lane. This resulted in multiple vehicle movements through flood water resulting in water being pushed towards, and into, property.
- Meeting on site with residents with CWaC, as LLFA.

- CWaC have undertaken investigations and improvement works to the highway drains on Acton Lane, Sandy Lane and Warrington Road, this work is ongoing.
- Flood Risk Action Group (FRAG) established to improve lines of communication and information dissemination of information between RMAs and residents.
- Following the October 2019 flooding, the EA have held discussions with the Trust to look for a location for a river level gauge in Acton Bridge. Since the floods, the Trust now shares level data from Dutton sluices with the EA, and the EA have used this to improve their flood warning capability to allow for specific warnings to be generated for Acton Bridge.
- Although undertaken prior to Storm Christoph, it should be acknowledged that the Trust are continually undertaking maintenance, refurbishment and modernisation of their assets. Unfortunately, these works meant two of the Dutton Sluices had been removed for refurbishment at the time of the flooding, and the SCADA panels were also being replaced and upgraded at the time.
- CWaC, as LLFA, hosted a public engagement event on the 2nd December 2021 in Acton Bridge to provide the opportunity for residents to raise issues and ask questions of RMAs.

2.5.5. Next steps

The LLFA role is to coordinate the management of flood risk within their administrative area. It is suggested that the recommendations made within this report are taken on board by the relevant RMAs and reviewed on a regular basis.

If, following a review of this Flood Investigation Report and its recommendations, and liaison with RMAs, flood risk is considered unacceptable, CWaC should investigate, alongside the RMAs, potential capital schemes which could provide flood alleviation within these areas.

This Section 19 report recommends the following actions be taken:

- A Community Emergency Plan should be developed between CWaC and Weaverham Parish Council to set out clearly the roles and responsibilities of the different organisations, before during and after a flood event, and the communication lines between different organisations. This plan should extend to all RMAs and the emergency services. This communication plan would benefit from setting out clear strategies for managing flood events in order for all parties to be working collaboratively towards agreed aims and objectives.
- CWaC, as LLFA, and the EA to consider whether there are economically viable options to reduce flood risk to property at Weaverham. Options considered could include, but not be limited to, individual property protection measures, attenuation on the fields to reduce rates of run off, improvements to the highways drainage system, raised defences (permanent and temporary) and works to increase conveyance of the River Weaver; specifically at Dutton Sluices.
- CWaC to increase its gulley emptying frequency for the area covered by this Section 19 investigation in line with its risk-based approach to gulley emptying. In addition, CWaC to consider 'fast track' approach to resolving drainage concerns reported at Weaverham.
- When resourcing allows, CWaC to take more of a proactive role in managing flood response on the ground at Weaverham. Given the widespread nature of the impact of Storm Christoph and their available resources, CWaC were not present to coordinate responses at the peak of the event.
- EA and CWaC, as LLFA, to consider whether the provision of temporary defences would deliver economically viable and technically feasible flood management.
- The EA and the Trust continue to work together to improve flood warning services.
- Residents to consider implementation of Property Level Protection measures. The EA and CWaC, as LLFA, to provide guidance as appropriate. Residents to be encouraged to sign up to the EA flood warning service.
- LLFA to promote the use of the FloodHub for information on flooding.

2.6. Dutton

Flooding was reported at Dutton but no information regarding the exact source and nature of flooding during Storm Christoph.

2.6.1. Background

Dutton is a civil parish and village based in Cheshire and is approximately two miles east of Runcorn. The River Weaver is to the south.

The full extent of properties that experienced flooding during Storm Christoph is not known at present from the available information. It is understood, however, that Island Farm was affected and that the residents sandbagged the property and cleaned up themselves once the waters resided.

2.6.2. Flood Review

No information is available to review.

2.6.3. Next Steps

Without knowledge of the exact nature of the flooding at Dutton making specific recommendation is not possible. That said, the following generic actions should be considered:

- CWaC to increase its gulley emptying frequency for the area covered by this section 19 investigation in line with its risk-based approach to gulley emptying.
- The EA, CWaC and the Trust to continue discussions to understand whether there is scope to operate the level control structures on the Weaver to manage water levels for the purpose of limiting flood risk. To date these have been exploratory discussions which should now be formalised under the leadership of CWaC, and additional funding sought to enable dual functionality of the Trust's water level control assets.
- Residents to consider implementation of Property Level Protection measures. The EA and CWaC, as LLFA, to provide guidance as appropriate. Residents to be encouraged to sign up to the EA flood warning service.
- LLFA to promote the use of the FloodHub for information on flooding.

3. Area Summary

Key statistics of the Storm Christoph Flooding in the area are summarised in Table 1. Detailed timelines of the flood events can be found in Appendix II.

Table 1 - Flood Impact Summary

Residential properties affected:	Commercial premises affected:-	Number of properties evacuated:	Number of properties flooded:	Number of domestic properties flooded:	Number of commercial premises flooded:	Comment
34	2	20	29	28	1	As reported to CWaC prior to publishing

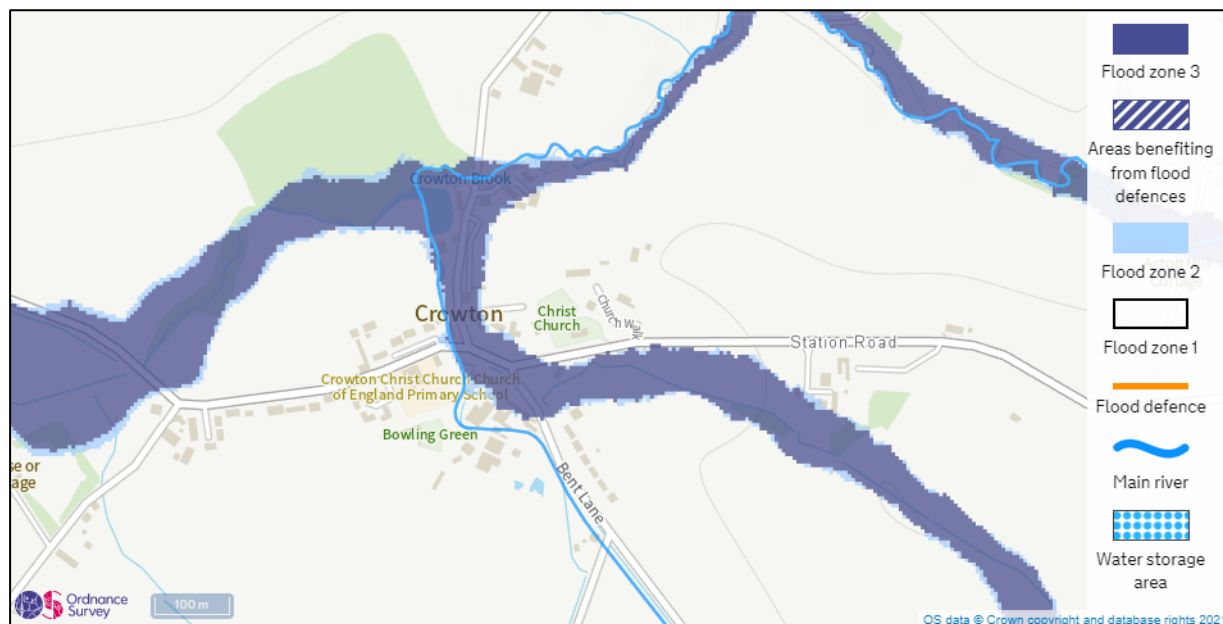
Figure 1 Figure 1 - Crowton flood overview show details of the flooding developed in consultation with CWaC, as LLFA, and affected property owners. Table 2 provides a brief summary of the flood event, impact and response in the area.

Table 2 – Acton Bridge and Weaverham Flooding

Acton Bridge and Weaverham	
Date	<ul style="list-style-type: none"> 20th January 2021 – 23rd January 2021
Affected Roads	<ul style="list-style-type: none"> Station Road, Beech Rise, Larch Close, Wall Hill Way, Wallerscote Road, Warrington Road, Crewood Common Road, Acton Lane, Sandy Lane, Northwich Road and Onston Lane
Flood Alert / warning issued?	<ul style="list-style-type: none"> Weaver catchment including Nantwich, Frodsham, Crewe, Winsford and Northwich- Flood Alert Issued 18/01/21 19:38 Flood Warning issued for the following <ul style="list-style-type: none"> CH41 – River Weaver at Acton Bridge and Weaverham issued 19/1/21 at 21:57 CH42 – River Weaver at Little Leigh and Higher properties in Acton Bridge and Weaverham issued 20/1/21 18:18 CH37 – River Weaver at Pickering's Bridge issued 20/1/21 at 14:52
Flooding Impacts and Observations	<ul style="list-style-type: none"> Property damage Risk to life Landslide Additional stress and mental anguish on the community over such an event happening again
Summary of Flooding Incident Response During Event	<ul style="list-style-type: none"> Property owners moved vehicles to higher ground (Crowton) Sandbags provided on an adhoc basis

Appendix I – Map

Crowton flood zones



Source: EA

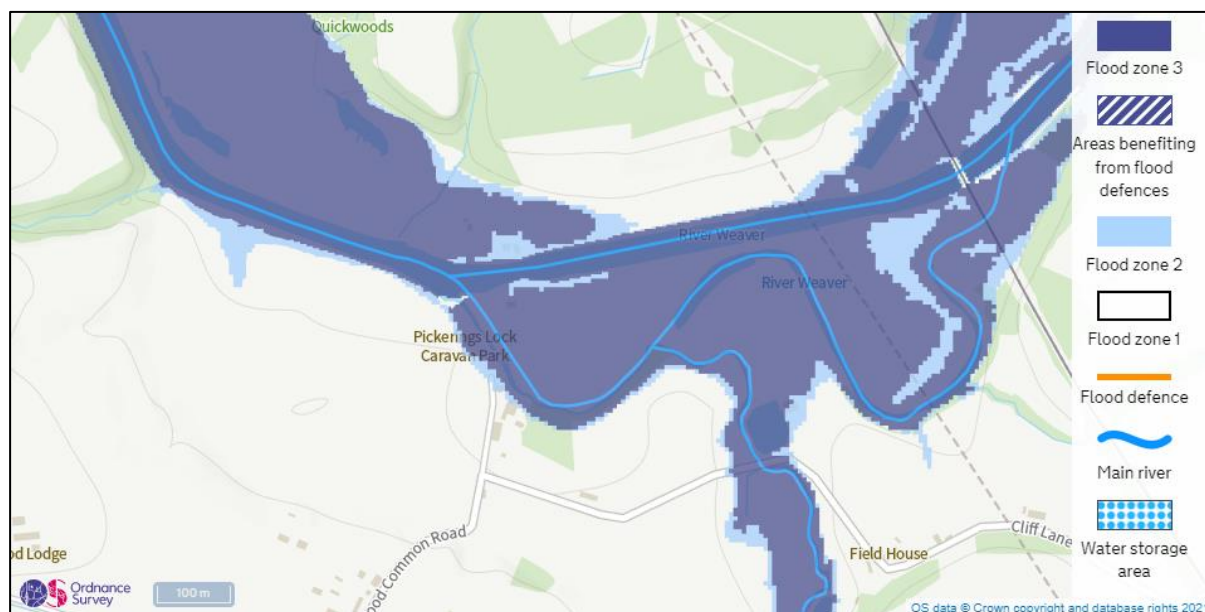


Extent of flooding from surface water

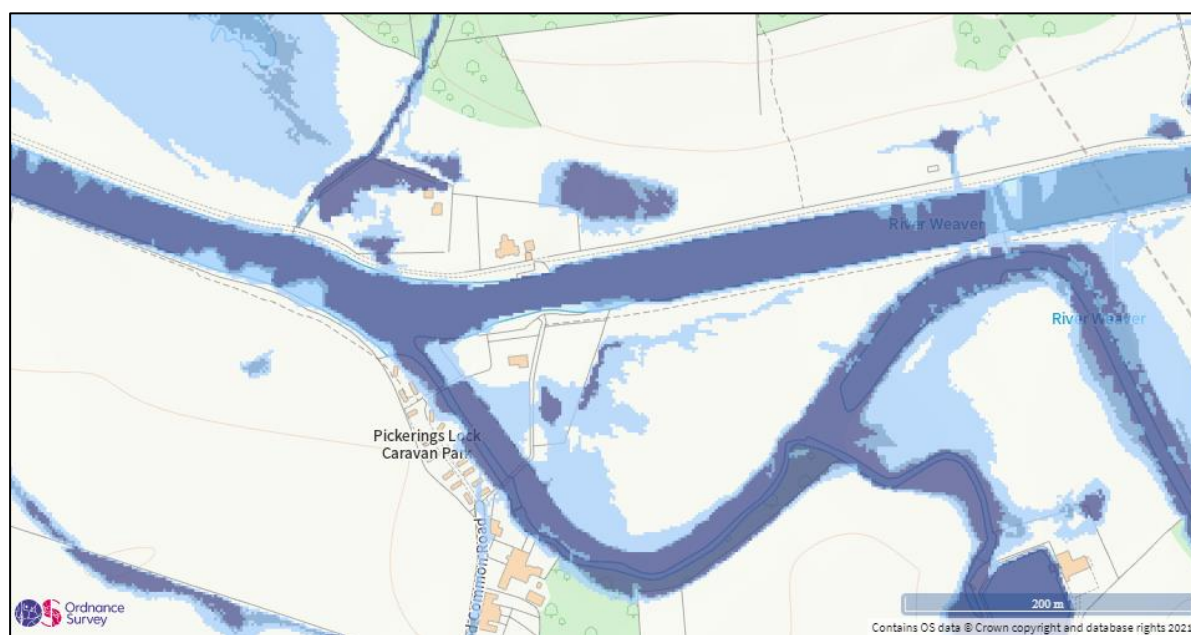
● High ● Medium ● Low ○ Very low

Source: EA

Pickering's Lock flood zones



Source: EA



Extent of flooding from surface water

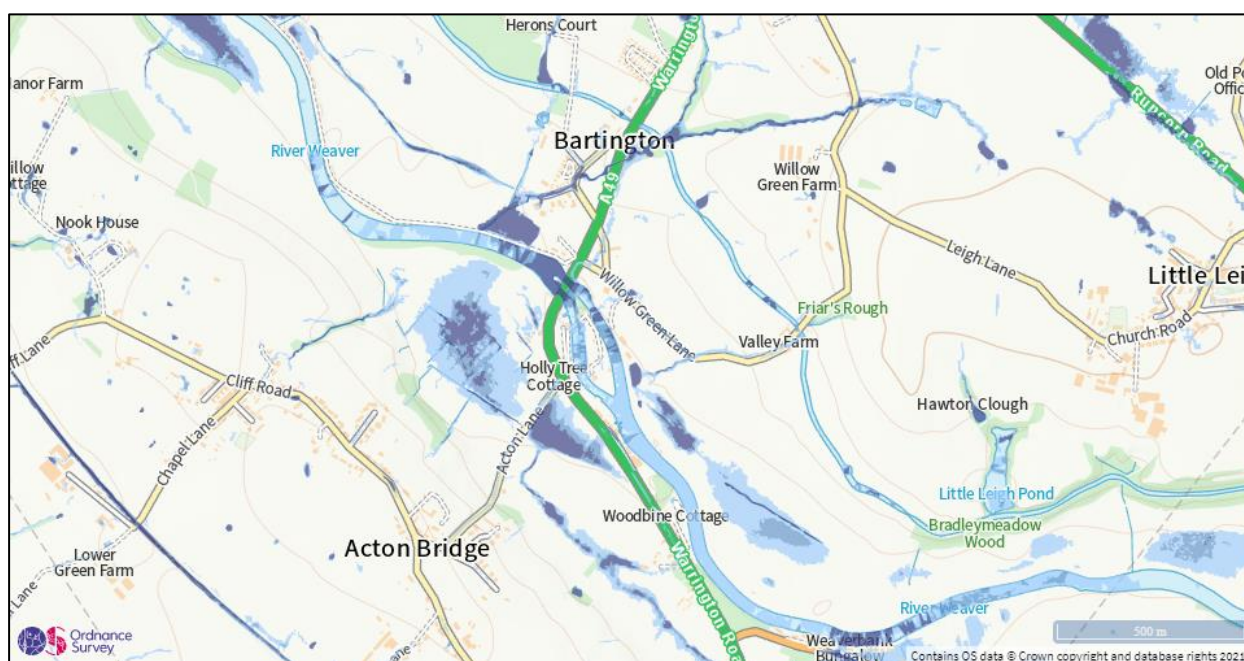
● High ● Medium ● Low ○ Very low

Source: EA

Acton Bridge flood zones



Source: EA



Extent of flooding from surface water

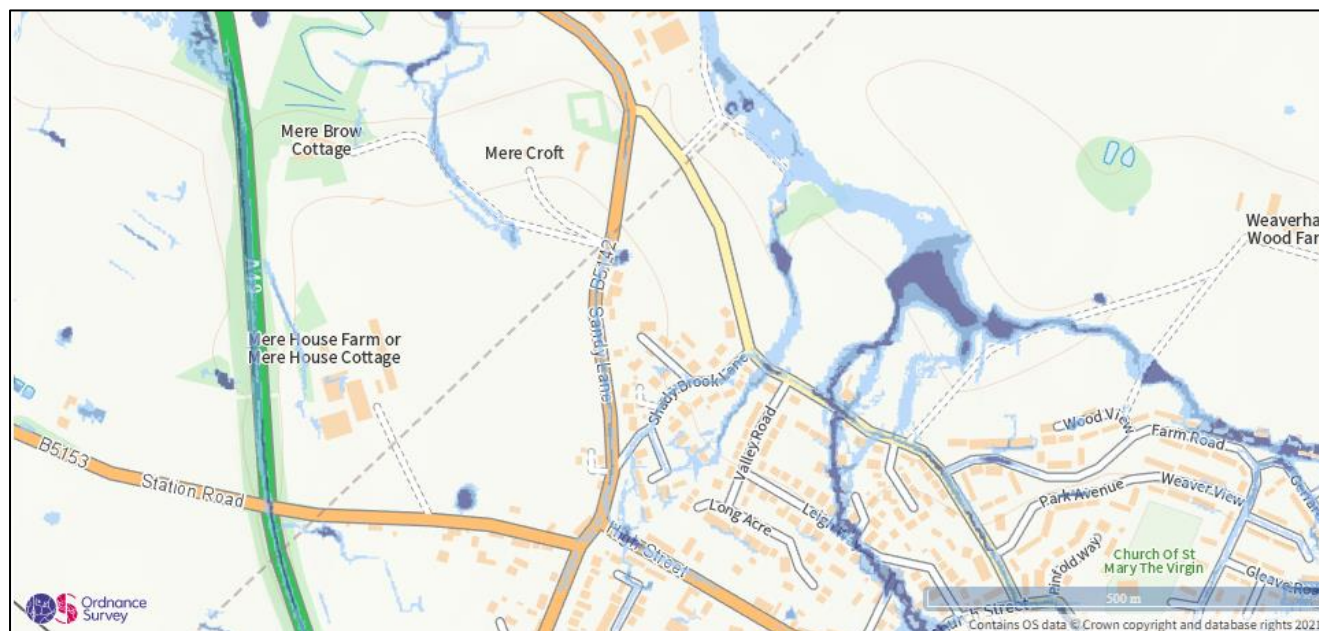
● High ● Medium ● Low ○ Very low

Source: EA

Weaverham flood zones



Source: EA



Extent of flooding from surface water

High Medium Low Very low

Source: EA

Appendix II – Timeline

Time	Crowton
20 th Jan am	Water levels in Small Brook and the Mill Pond were observed to be at capacity.
20 th Jan 13:00	Water backed up at the inlet of the Culvert under Ainsworth Lane. The Pool Bank retaining wall failed and water began to spill out of bank from Small Brook. Residents were stranded as water levels rose.
20 th Jan 15:00	Flood level at Ainsworth Lane culvert inlet were over 3m high and overtopping the banks. The fire service arrived to evacuate Old Mill apartment residents.
20 th Jan 19:00	A person who was stranded at Pool Bank was evacuated by a local garage support vehicle. Water continued to spill out of bank from Small Brook.
21 st Jan 00:00	The rain stopped and water levels began to recede.

Time	Little Leigh
22 nd Jan	Water was flowing down the public footpath through the front garden of the property into Brackely Rough.
23 rd Jan pm	The land slip occurred.

Time	Pickering's Lock
20 th Jan 18:30	Water began to pool in the gardens of affected properties.
21 st Jan 08:00	The River Weaver overtopped the north bank and water surrounded properties. Water entered the cellar of one of the properties on the north bank and the residents evacuated to their neighbour's property.
21 st Jan 11:30	Water levels continued to rise. The resident's boat (used for access) capsized.
21 st Jan 18:00	Peak water levels were observed.
22 nd Jan	Water began to recede.

Time	Acton Bridge
19 th Jan	A team of workmen arrived to clear standing water opposite the terrace houses on Warrington Road
20 th Jan 10:00	A team of workmen arrived to clear or repair the drains opposite the Woodbine Caravan Park
20 th Jan 16:00	Workmen leave site but surface water continues to be problematic Surface water flows from the Weaverham direction in a 1m channel in the gutter opposite Acton Lodge Standing water increased significantly opposite the terrace houses and covers the majority of the carriageway Water reaches the thresholds of the terraced properties A49 remains open with vehicles sending waves of water towards the property
20 th Jan 17:00	Blocked drains and vehicle traffic continue causing concern to residents. The River Weaver is not threatening to flood property
20 th Jan 18:00	Traffic continues on Warrington Road despite the continues surface water flooding
21 st Jan 06:00	Water came out of bank from the River Weaver at Acton Bridge.
21 st Jan 08:00	Extensive flooding of Warrington Road, the terraced houses on Warrington Road, The Riverside Inn, Woodbine Caravan Park and properties on Acton Lane. Warrington Road is impassable. Fire and Ambulance Services help evacuate residents from flooded property.
21 st Jan 8:30	Water was reported to be waist-height at Holly Tree Cottage, Acton Lane.
21 st Jan 14:30	Flood levels on Acton Lane were above car height and still rising. Holly Tree Cottage resident left the property,
22 nd Jan 8:00	Flood water receding but half of Warrington Road is still flooded. Despite road closure signs vehicles continue to travel on the road.
22 nd Jan (unknown time)	CW&C, as LLFA, delivered sandbags to properties
24 th Jan (3/4 days after main flooding)	EA approved CW&C contractors dug a channel North from Holly Tree Farm to return flood water back to the River Weaver

Time	Weaverham (including Sandy Lane)
20 th Jan	Water rose in the river Weaver throughout the day
20 th Jan	Surface water observed on the southern side of Sandy Lane
21 st Jan 11:00	River Weaver came out of bank causing flooding to property, water up to 1.5m deep in the gardens of affected property