

Cumwhinton

Flood Investigation Report No.CC5



Flood Event 22/23 May 2024

This flood investigation report has been produced by Cumberland Council as a Lead Local Flood Authority (LLFA) under Section 19 of the Flood and Water Management Act 2010.

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1. Executive Summary

Exceptionally wet weather was experienced across parts of England, North Wales, southern and eastern Scotland between the 21st and 23rd May 2024. A slow-moving weather front associated with low pressure in the North Sea resulted in 50mm of rain over a wide area of northwestern England, with 75mm to 100mm experienced in the wettest locations. On the 22nd May northern England recorded its wettest spring day since 1891, with many stations recording their wettest May day on record.

High rainfall totals in small, agricultural catchments that don't generally experience such events resulted in rivers and watercourses rising quickly, with very little warning in some instances. Over 100 properties in and around the Carlisle area were flooded internally during the event and this Section 19 report investigates the flood event, considers the causes, and makes recommendations for further actions in the Cumwhinton area.

Cumberland Council as the Lead Local Flood Authority has prepared this report with the assistance of other Risk Management Authorities (RMA) as it considers necessary to do so under Section 19 of the Flood and Water Management Act 2010.

Any additional information that residents and others can provide to Cumberland Council to help develop our understanding of the flooding is welcomed. Information has already been provided, much of which has been used to inform this report. Any additional information should be sent to lfrm@cumberland.gov.uk.

1.1 The Flood Investigation Report

Under Section 19 of the Flood and Water Management Act (2010) Cumberland Council, as Lead Local Flood Authority (LLFA), has a statutory duty to produce Flood Investigation Reports for areas affected by flooding. Section 19 of the Flood and Water Management Act states:

- 1) *On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate:*
 - a. *which risk management authorities have relevant flood risk management functions, and*
 - b. *whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.*

- 2) *Where an authority carries out an investigation under subsection (1) it must –*
 - a. *publish the results of its investigation, and*
 - b. *notify any relevant risk management authorities.*

This section of the Act leaves the determination of the 'extent' of flood investigation to the LLFA. It is not practical or realistic for Cumberland Council to carry out a detailed investigation into every flood incident that occurs in the County, but every incident with basic details will be recorded by the LLFA. Only those with 5 or more properties/businesses involved will have investigations published.

An investigation will be carried out, and a report prepared and published by the LLFA when the flooding impacts meet the following criteria:

- Where there is ambiguity surrounding the source or responsibility of flood incident
- Internal flooding of one property that has been experienced on more than one occasion
- Internal flooding of five properties has been experienced during one single flood incident
- There is a risk to life as a result of flooding.

1.2 Scope of this report

This Flood Investigation Report **is**:

- An investigation on the what, when, why, and how the flooding took place resulting from the 22nd to 23rd May 2024.
- A means of identifying potential recommendations for actions to minimise the risk or impact of future flooding.

This Flood Investigation Report **does not**:

- Interpret observations and measurements resulting from this flooding event. (Interpretation will be undertaken as part of any subsequent reports).
- Provide a complete description of what happens next.

The Flood Investigation Reports outline recommendations and actions that various organisations and authorities can do to minimise flood risk in affected areas. Once agreed, the reports can be used by communities and agencies as the basis for developing future plans to help make areas more resilient to flooding in the future.

2. Event Background

This section describes the location of the flood incident and provides details on the rainfall event that occurred at the time.

2.1 Location of flood incident

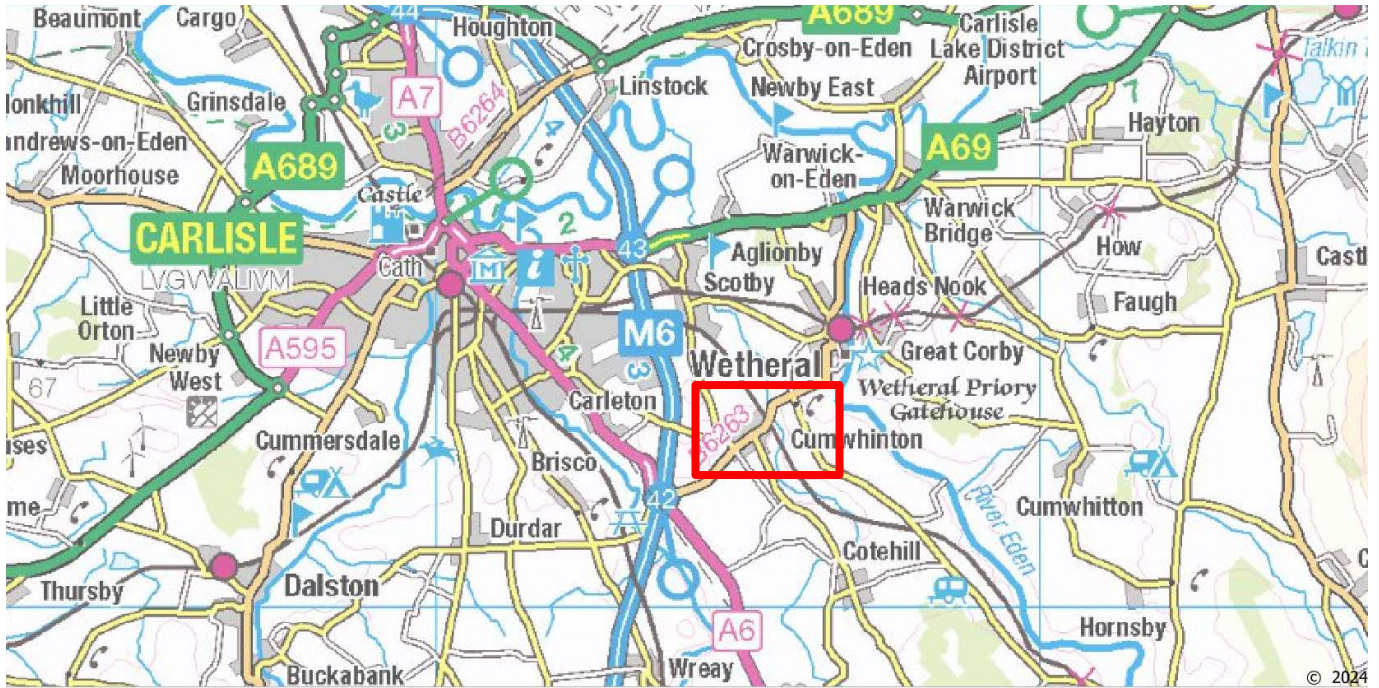
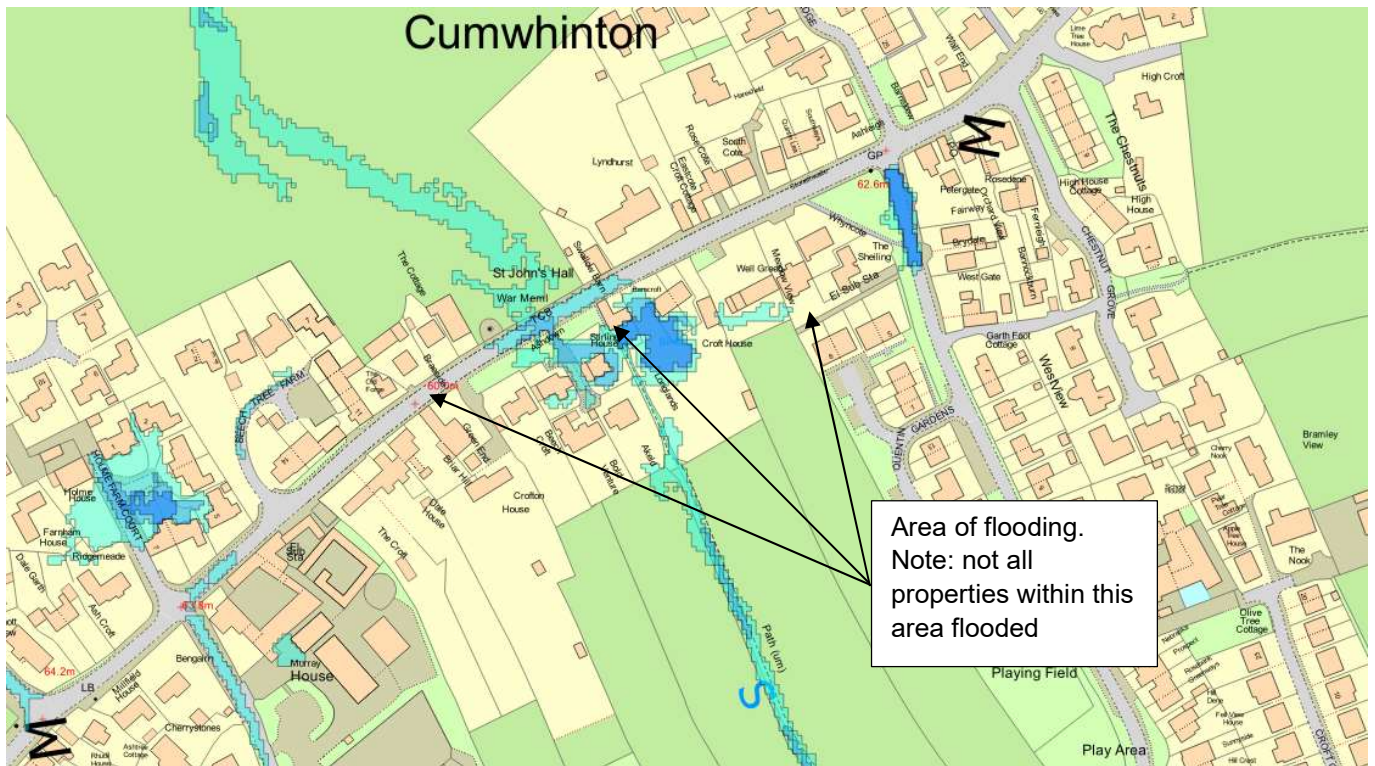


Figure 1: Cumwhinton location plan

Cumwhinton is located approximately 3 miles to the south-east of Carlisle. The worst affected area was in the central part of the village, where unmapped culverts became overwhelmed by the high intensity of the rainfall event. Five properties flooded internally, to depths varying from ‘seepage’ to three inches. Action by local residents prevented internal flooding to an additional property.

Cumwhinton has a long history of flooding, attributed to the low-lying nature of the land and the condition and size of the existing drainage infrastructure. Prior to this flood event, Cumberland Council as LLFA has received reports of flooding in Cumwhinton in 2020, 2019 and 2002, though previous flood reports indicate flooding has occurred intermittently as far back as the 1960s. Some of the properties investigated as part of this report are not known to have flooded previously.

In terms of the Environment Agency’s flood risk mapping, only one of the properties affected on this occasion lies within an area considered to be at risk from surface water or fluvial flooding (figure 2).



- ✓ Surface Water 1:30
- ✓ Surface Water 1:100
- ✓ Surface Water 1:1000
- ✓ Flood Zone 2
- ✓ Flood Zone 3

Figure 2: Environment Agency risk of flooding from surface water outlines

Historic mapping shows that the lowest point in the village was once a pond (figure 3), corroborating with the 'at risk' areas shown on the map above.

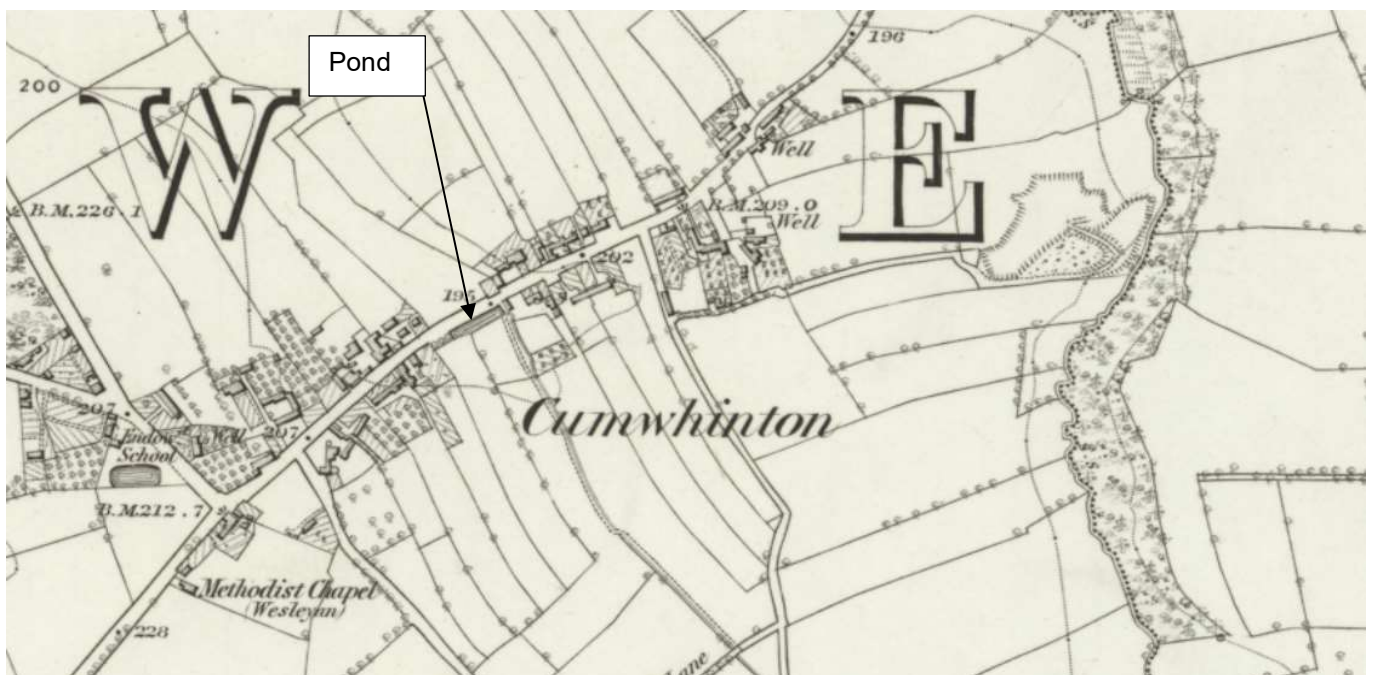


Figure 3: Historic mapping (1888-1913). Source: [Georeferenced Maps - Map images - National Library of Scotland \(nls.uk\)](http://www.nls.uk)

2.2 Rainfall Event

The month of May was relatively dry prior to the flood event. Local rain gauges suggest there was no rainfall from 15th May to the 21st May, and therefore catchment conditions would not have been unusually wet at the start of the event. The majority of the heavy rainfall fell between 21st and 23rd May 2024.

On Wednesday 22nd May to Thursday 23rd May 2024 locations in Northwest England experienced heavy rainfall resulting from a slow-moving low-pressure system moving across England and Wales. Rain fell consistently from the morning of 22nd May until the afternoon of 23rd May, with the heaviest totals between 5pm on 22nd May and 2am on 23rd May. 24-hour rainfall totals exceeded 100 mm at several rain gauge sites, approximately twice the long-term average rainfall for the month of May.

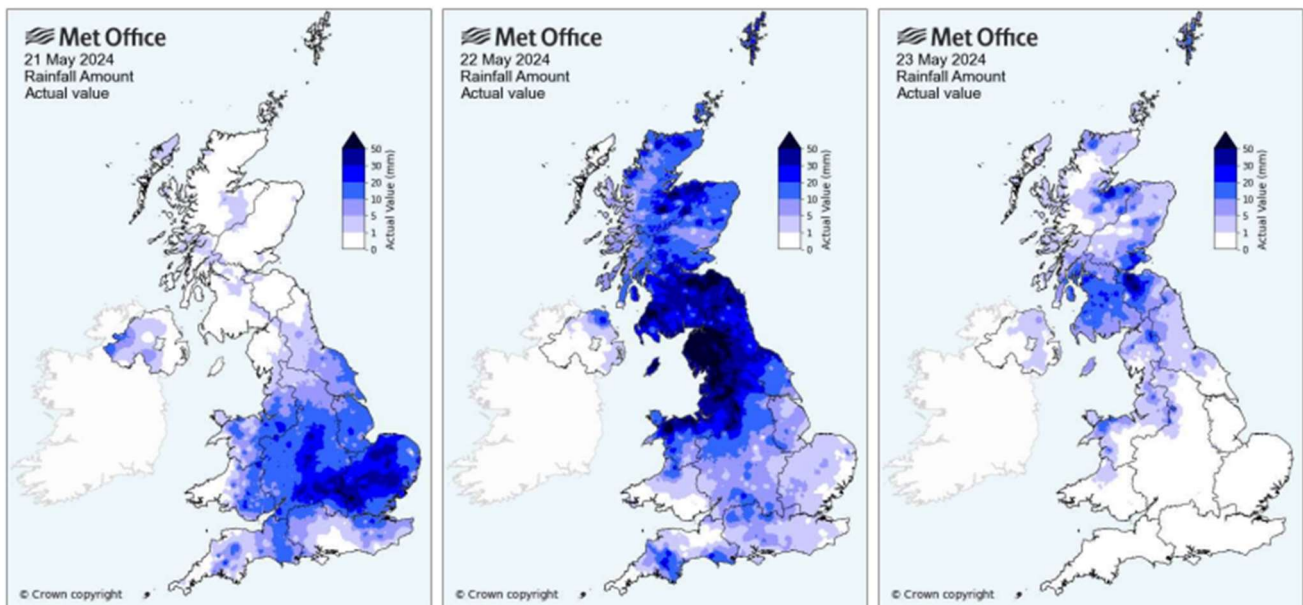


Figure 4: Met office radar maps for 21st – 23rd May 2024

Rainfall data has been analysed and 90mm of rain was recorded in 24 hours at the Cumwhinton rain gauge station on 22nd May 2024 (note: unverified data - [Hydrology Data Explorer - Cumwhinton](#)). This exceeds any previous total daily rainfall records for the site since 1993 – notably 62.4mm in June 2016 and 59.8mm in October 2005.

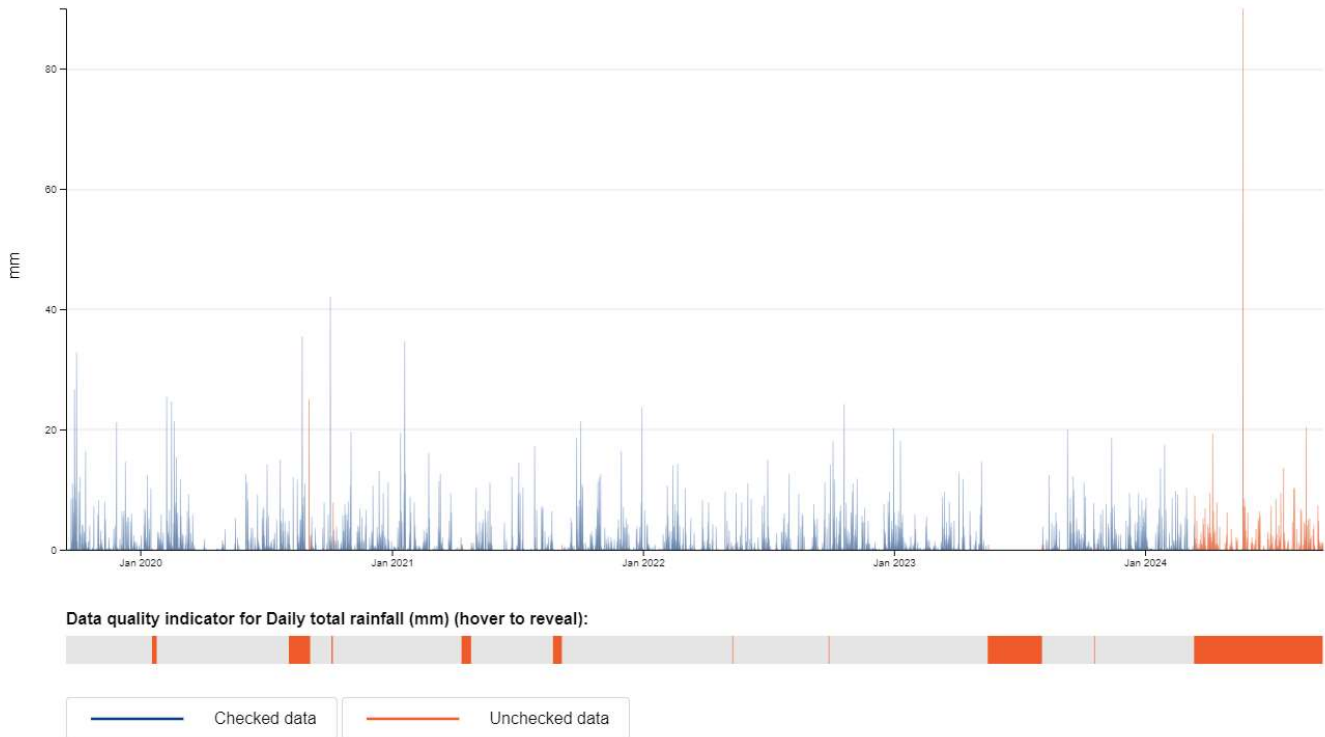


Figure 5: Cumwhinton rain gauge station 5-year record

Although this data is unchecked at present, the statistics align with verified data from other nearby rain gauge stations for the same day:

Location	22 nd May total (mm)
Castle Carrock	92.96
Thursby	105.24
Skelton	95.05
Geltsdale	100.8

Table 1: Total rainfall (24 hours) recorded at rain gauge stations

In addition, the below graph further highlights the magnitude of the rainfall event, when compared to other significant storms.

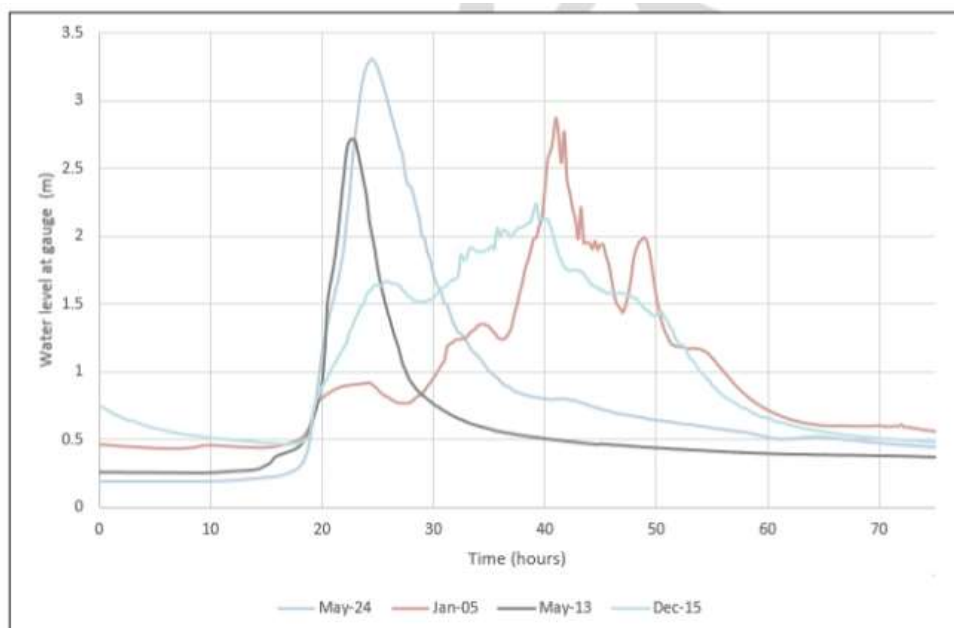


Figure 6: Comparison of duration and rate of rise for the four largest flood events recorded at the Stockdalewath river gauge

3. Investigation

This investigation has been compiled by Cumberland Council using information collected on the ground after the event, residents accounts, where available, and with information provided by other Risk Management Authorities, including United Utilities. Post flood event walkovers were not able to confirm the flow routes and flood mechanisms for all properties as the event occurred throughout the night and not all residents were present when information was being collected. Data gathered as a result of previous flood events (e.g. CCTV surveys of drainage networks) was also used to inform the investigation.

3.1 Impact of the flood event

The existing surface water drainage system in the affected part of the village consists of culverted pipes which change in size, shape and material, leading from the U1165 to the west, to the outfall in an agricultural field to the north. It is assumed that the drainage system in the east of the village (in the vicinity of the Peter Gate junction) also joins this system. Overland surface water flows try to access this drainage infrastructure at various points via private drains and highway gullies.

On the 22nd May 2024 surface water from the surrounding agricultural land and highways inundated the culverted drainage infrastructure, with some flows exceeding through a manhole lid displaced by the water pressure in the grounds of a residential property, flooding the property beneath the floorboards and within the garage. Significant overland surface water flows trying to access the drainage infrastructure were observed to be flowing on the public highway, from the U1165 (west). Further pooling of water occurred on Peter Gate at the junction with the B6263, affecting properties in this vicinity.



Figure 7: Presumed overland surface water flow routes (represented by blue arrows)

A CCTV survey of the local drainage network was carried out by Andidrain Ltd on behalf of Cumbria County Council (now Cumberland Council) in 2020. Figures 8 and 9 below, highlight the complex surface water drainage network in the village. In 2020, some parts of the network were found to be collapsed, causing blockages. These areas were subsequently repaired by the relevant riparian landowner.

A further survey of the network commenced on 30th September 2024, to ascertain whether blockages or collapses exacerbated the flooding on 22/23rd May, and to establish the location of further unmapped drains, exceedance from which may have contributed to property flooding. It is clear from the recent CCTV survey that there are major issues with the main culverts downstream of MH05 at St John's Hall.

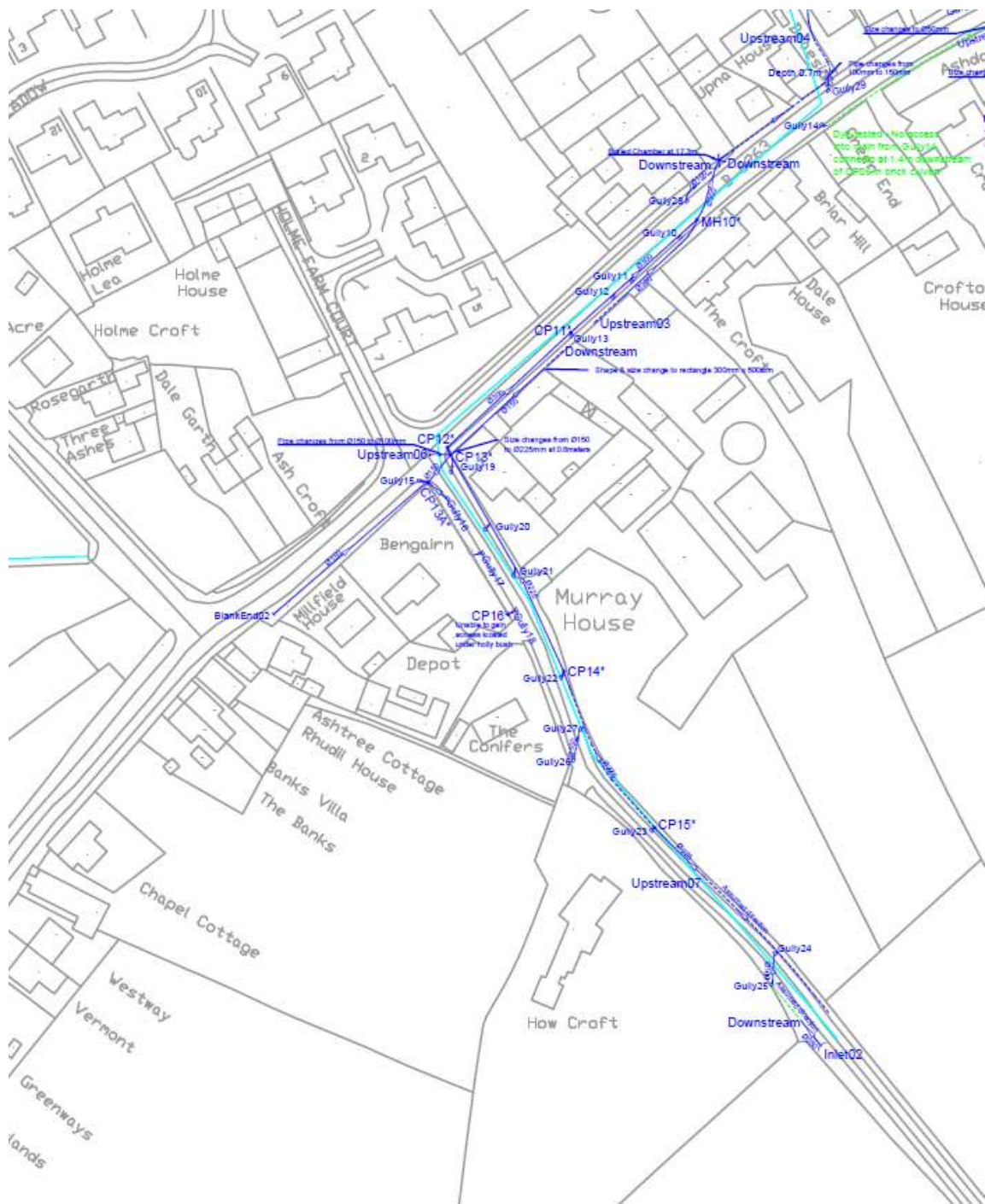


Figure 8: Snapshot of 2020 CCTV survey showing location of culverted watercourse (surface water drain)

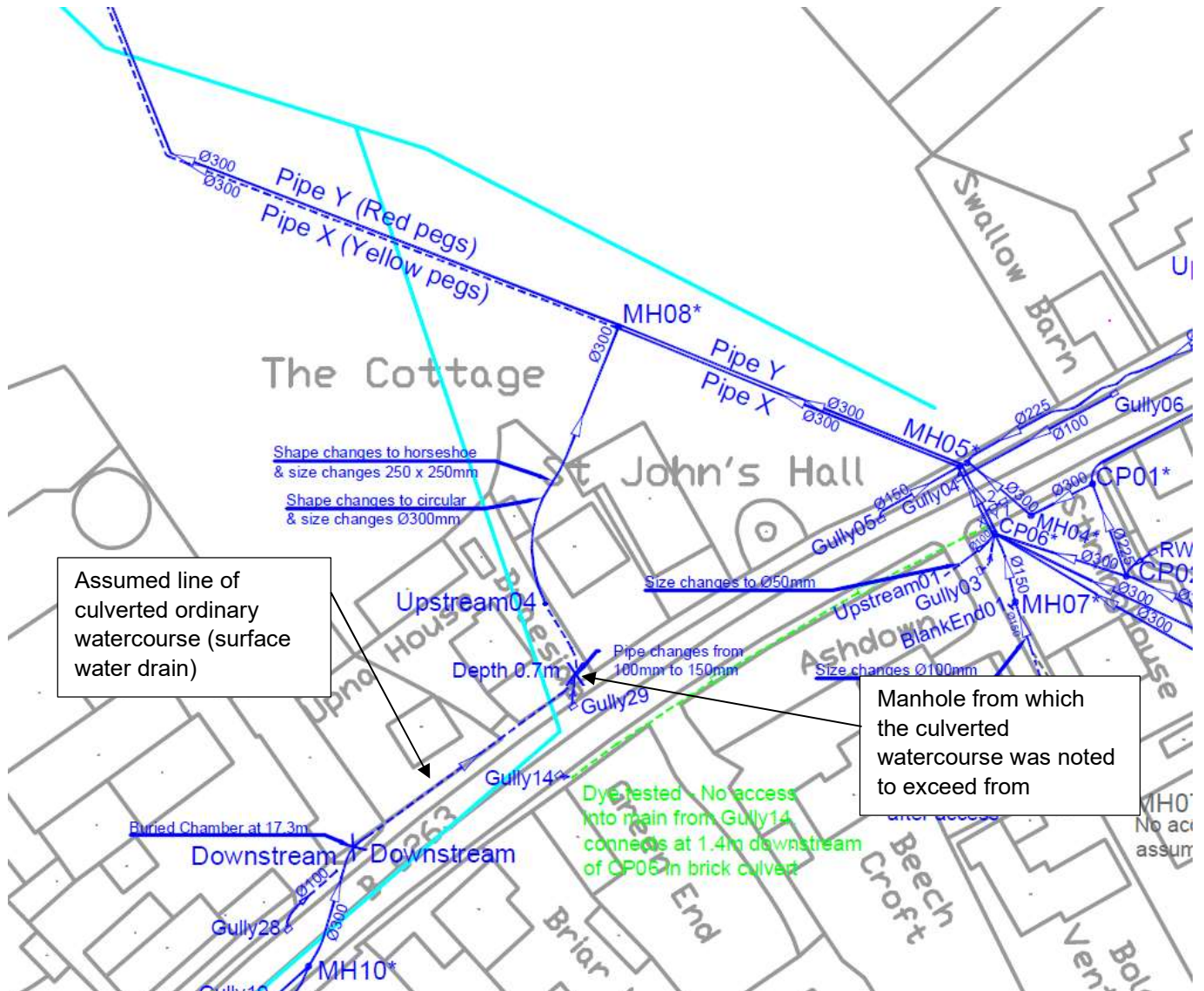


Figure 9: Snapshot of CCTV survey of drainage network undertaken in 2020. The culvert exceeded from a manhole in a private driveway (adjacent to Gully 29).

Figure 10 depicts the United Utilities sewerage network. Following the flood incident United Utilities attended the site and carried out preliminary surveys. No issues were found with the foul sewer network. However, it is also thought that overland surface water flows, including those from the exceeding culvert, inundated the United Utilities wastewater sewer causing some of the flooding to properties.



Figure 10: United Utilities map showing location of sewers

There is no flood warning service in this area.

3.2 Photographs during the flood event



Figure 11. Exceeding manhole in private driveway



Figure 12. Fire brigade in attendance to pump flood water away from properties

3.3 Flood incident response

The fire service was informed about the flood incident and attended the scene to pump surface water, firstly on to the highway, and then into an adjacent agricultural field. The fire service had multiple flood incidents to attend to during the storm event.

Some residents used makeshift sandbags to help prevent further ingress of water.

4. Next steps

4.1 Recommended actions

No.	Action by	Recommended Action	Timescale
1	Cumberland Council Lead Local Flood Authority and local land/property owners	CCTV survey to investigate the current condition of the surface water drain, to ascertain whether there are further blockages / collapses. Establish how the drains to the rear of flooded properties link to main drainage. Ensure riparian landowners are aware of their duties.	Ongoing – commenced October 2024
2	LLFA	Add Cumwhinton to the flood programme to undertake a flood risk appraisal of current flood issues. Bid for appraisal funding as per the FCERM guidance. Investigate opportunities to mitigate flooding and establish next steps following completion of appraisal.	Ongoing.
3	Residents / LLFA / United Utilities / Flood Hub	Provide residents with information regarding property flood resilience.	
4	United Utilities	React and respond to incidents if / when they occur to support customers including follow up investigations.	Ongoing.

Residents and property owners who are aware that they are at risk of flooding should take action to ensure that they and their properties are protected. Community resilience is important in providing information and support to each other if flooding is anticipated. Actions taken can include laying sandbags and moving valuable items to higher ground, to more permanent measures such as installing floodgates, raising electrical sockets and fitting non-return valves on pipes. Anyone affected by flooding should try to document as much information about the incident as possible.

Appendices

Appendix 1: Glossary

Acronyms

AEP	Annual Exceedance Probability
ARI	Annual Recurrence Interval
AOD	Above Ordnance Datum
CC	Cumberland Council
EA	Environment Agency
FIAG	Flood Action Group
FWD	Flood Warnings Direct
FWMA	Flood and Water Management Act 2010
LDA	Land Drainage Act 1991
LLFA	Lead Local Flood Authority
LFRM	Local Flood Risk Management
MSfWG	Making Space for Water Group
RMA	Risk Management Authority
UU	United Utilities
WRA	Water Resources Act 1991

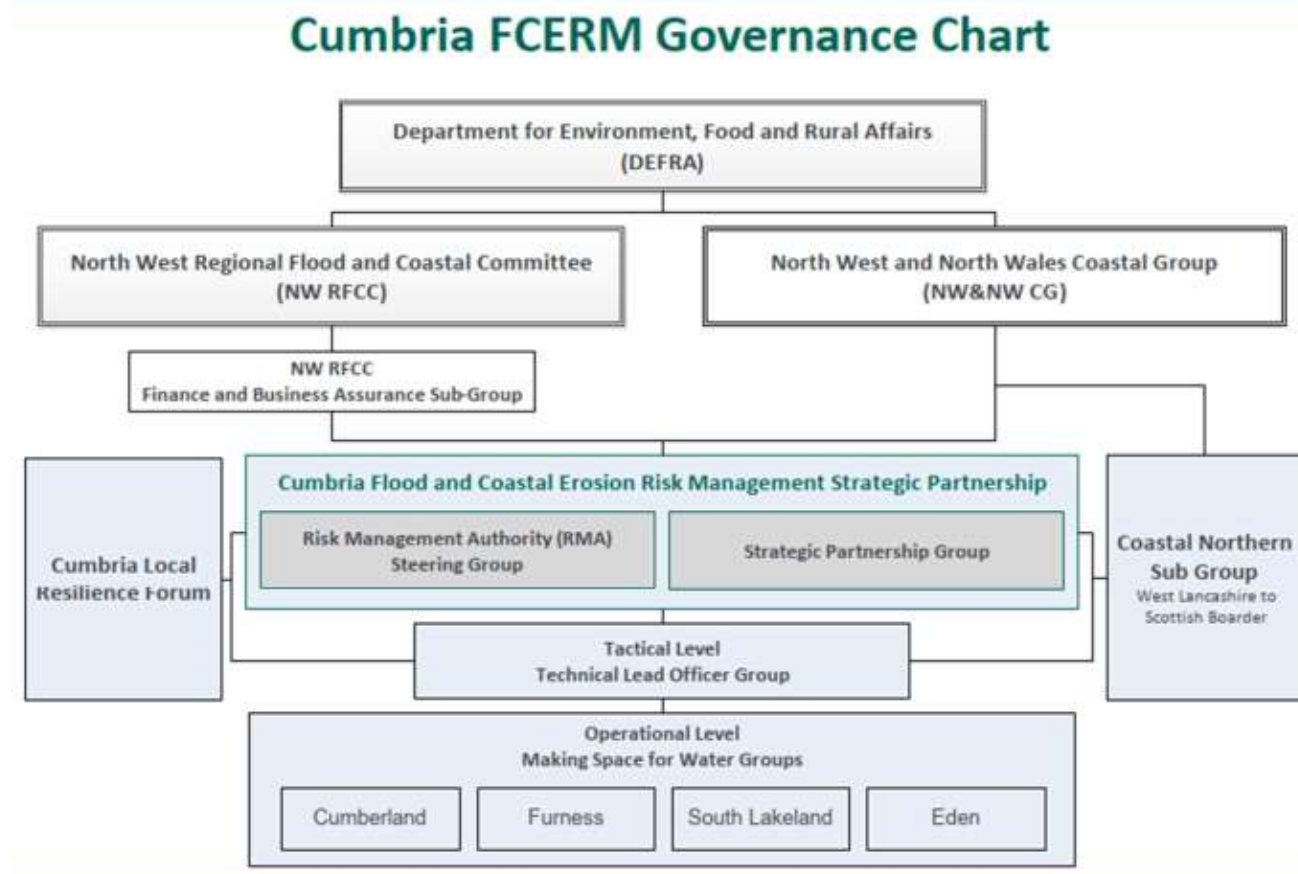
Term	Definition
Aquifer	A source of groundwater comprising water-bearing rock, sand or gravel capable of yielding significant quantities of water.
Annual Exceedance Probability	The AEP describes the likelihood of a specified flow rate (or volume of water with specified duration) being exceeded within a given year.
Attenuation	In the context of this report - the storing of water to reduce peak discharge of water.
Catchment Flood Management Plan	A high-level planning strategy through which the EA works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Culvert	A channel or pipe that carries water below the level of the ground.
De facto flood defence	A feature or structure that may provide an informal flood defence benefit but is not otherwise designed or maintained by the Environment Agency.
Flood defence	Infrastructure used to protect an area against floods as floodwalls and embankments; they are designed to a specific standard of protection (design standard).
Floodplain	Area adjacent to river, coast or estuary that is naturally susceptible to flooding.
Flood resilience	Measures that minimise water ingress and promotes fast drying and easy cleaning, to prevent any permanent damage.
Flood risk	The level of flood risk is the product of the frequency or likelihood of the flood events and their consequences (such as loss, damage, harm, distress and disruption).
Flood Risk Regulations	Transposition of the EU Floods Directive into UK law. The EU Floods Directive is a piece of European Community (EC) legislation to specifically address flood risk by prescribing a common framework for its measurement and management.
Flood and Water Management Act	Part of the UK Government's response to Sir Michael Pitt's Report on the Summer 2007 floods, the aim of which is to clarify the legislative framework for managing surface water flood risk in England.
Flood storage	A temporary area that stores excess runoff or river flow often ponds or reservoirs.

Flood Zone	Flood Zones are defined in the NPPF Technical Guidance based on the probability of river and sea flooding, ignoring the presence of existing defences.
Flood Zone 1	Low probability of fluvial flooding. Probability of fluvial flooding is < 0.1%.
Flood Zone 2	Medium probability of fluvial flooding. Probability of fluvial flooding is 0.1 – 1%. Probability of tidal flooding is 0.1 – 0.5 %.
Flood Zone 3a	High probability of fluvial flooding. Probability of fluvial flooding is 1% (1 in 100 years) or greater. Probability of tidal flooding is 0.5%(1 in 200 years)
Flood Zone 3b	Functional floodplain. High probability of fluvial flooding. Probability of fluvial flooding is >5%.
Fluvial	Relating to the actions, processes and behaviour of a water course (river or stream).
Fluvial flooding	Flooding by a river or a watercourse.
Freeboard	Height of flood defence crest level (or building level) above designed water level.
Functional floodplain	Land where water has to flow or be stored in times of flood.
Groundwater	Water that is in the ground, this is usually referring to water in the saturated zone below the water table.
Inundation	Flooding.
Lead Local Flood Authority	As defined by the FWMA, in relation to an area in England, this means the unitary authority or where there is no unitary authority, the county council for the area.
Main river	Watercourse defined on a 'Main River Map' designated by DEFRA. The EA has permissive powers to carry out flood defence works, maintenance and operational activities for Main Rivers only. Also see "ordinary watercourse".
Mitigation measure	An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere.
Ordinary watercourse	The LLFA and Internal Drainage Boards have permissive powers to carry out flood risk management work, maintenance and operational activities. Also see "Main river".
Overland flow	Flooding caused when intense rainfall exceeds the capacity of the drainage systems or when, during prolonged periods of wet weather, the soil is so saturated such that it cannot accept any more water.
Residual flood risk	The remaining flood risk after risk reduction measures have been taken into account.
Return period	The average time period between rainfall or flood events with the same intensity and effect.
River catchment	The areas drained by a river.
Sewer flooding	Flooding caused by a blockage or overflowing in a sewer or urban drainage system.
Sustainability	To preserve /maintain a state or process for future generations.
Sustainable drainage system	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques.
Sustainable development	Development that meets the needs of the present without compromising the ability of future generations meeting their own needs.
Sustainable Flood Risk Management	Sustainable Flood Risk Management promotes a catchment wide approach to flooding that uses natural processes and systems (such as floodplains and wetlands) to slow down and store water.
Topographic survey	A survey of ground levels.
Tributary	A body of water, flowing into a larger body of water, such as a smaller

	stream joining a larger stream.
Watercourse	All rivers, streams, drainage ditches (i.e. ditches with outfalls and capacity to convey flow), drains, cuts, culverts and dykes that carry water.
Wrack marks	An accumulation of debris usually marking the high water line.
1 in 100 year event	An event that on average will occur once every 100 years. Also expressed as an event, which has a 1% probability of occurring in any one year or 1% AEP.
1 in 100 year design standard	Flood defence that is designed for an event, which has an annual probability of 1%. In events more severe than this the defence would be expected to be overwhelmed and for flooding to occur.

Appendix 2: Summary of Relevant Legislation and the remit of Flood Risk Management Authorities

The table below shows the governance chart for Cumbria's risk management authorities.



Cumbria governance chart

The Flood Risk Regulations 1999 and the Flood and Water Management Act 2010 (the Act) have established Cumberland Council (CC) as the Lead Local Flood Authority (LLFA) for Cumberland. This has placed various responsibilities on CC including Section 19 of the Act which states:

Section 19

- (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.

A 'Risk Management Authority' (RMA) means:

- (a) the Environment Agency,
- (b) a lead local flood authority,
- (c) a district council for an area for which there is no unitary authority,
- (d) an internal drainage board,
- (e) a water company, and
- (f) a highway authority.

The table below summarises the relevant Risk Management Authority and details the various local source of flooding that they will take a lead on.

Flood Source	Environment Agency	Lead Local Flood Authority	Water Company	Highway Authority
RIVERS				
Main river				
Ordinary watercourse				
SURFACE RUNOFF				
Surface water				
Surface water on the highway				
OTHER				
Sewer flooding				
The sea				
Groundwater				
Reservoirs				

The following information provides a summary of each Risk Management Authority’s roles and responsibilities in relation to flood reporting and investigation.

Government – DEFRA develop national policies to form the basis of the Environment Agency’s and Cumberland Council’s work relating to flood risk.

Environment Agency (EA) – has a strategic overview of all sources of flooding and coastal erosion as defined in the Act. As part of its role concerning flood investigations this requires providing evidence and advice to support other risk management authorities. The EA also collates and reviews assessments, maps and plans for local flood risk management (normally undertaken by LLFA).

Lead Local Flood Authorities (LLFAs) – Cumberland Council is the LLFA for Cumbria’s former Carlisle, Allerdale and Copeland areas. Part of their role requires them to investigate significant local flooding incidents and publish the results of such investigations. LLFAs have a duty to determine which risk management authority has relevant powers to investigate flood incidents to help understand how they happened, and whether those authorities have or intend to exercise their powers. LLFAs work in partnership with communities and flood risk management authorities to maximise knowledge of flood risk to all involved. This function is carried out at Cumberland Council by the Flood and Development Management Team.

Water and Sewerage Companies – manage the risk of flooding to water supply, sewerage facilities and the risk to others from the failure of their infrastructure. They make sure their systems have the appropriate level of resilience to flooding and where frequent and severe flooding occurs, they are required to address this through their capital investment plans. It should also be noted that following the Transfer of Private Sewers Regulations 2011 water and sewerage companies are responsible for a larger number of sewers than prior to the regulation.

Highway Authorities – have the lead responsibility for providing and managing highway drainage and certain roadside ditches that they have created under the Highways Act 1980. The owners of land adjoining a highway also have a common-law duty to maintain ditches to prevent them causing a nuisance to road users.

Flood risk in Cumberland is managed through the Making Space for Water process which involves the cooperation and regular meetings of the Environment Agency, United Utilities and Cumberland Council's Highway and Local Flood Risk Management (LFRM) teams to develop processes and deliver schemes to minimise flood risk. The Making Space for Water Groups (MSfWG) meet approximately 4 times per year to cooperate and work together to reduce the flood risk to vulnerable communities, including those areas identified in this report, by undertaking specific actions. Cumberland Council, as LLFA, has a responsibility to oversee the delivery of these actions.

Where minor works or 'quick-win' schemes can be identified, these will be prioritised and, subject to available funding and resources, will be carried out as soon as possible. Any major works requiring capital investment will be considered through the Environment Agency's capital programme or a partners own capital investment process.

Flood Action Groups (FIAG) are usually formed by local residents who wish to work together to resolve flooding in their area. The FIAGs are often supported by either Cumberland Council or the EA and provide a useful mechanism for residents to forward information to the MSfWG.

Appendix 3: Useful contacts and links

Cumberland Council (Local Flood Risk Management):
lfrm@cumberland.gov.uk, www.cumberland.gov.uk

Cumberland Council (Highways):
<https://www.cumberland.gov.uk/parking-roads-and-transport/streets-roads-and-pavements/road-maintenance-closures-and-improvements/report-problem-street-or-road>
tel: 0300 373 3736

Out of hours emergencies should be reported via the Police on 101

United Utilities: www.unitedutilities.com, tel: 0845 746 2200

Flood and Water Management Act 2010:
<http://www.legislation.gov.uk/ukpga/2010/29/contents>

Water Resources Act 1991:
<http://www.legislation.gov.uk/all?title=water%20resources%20act>

Land Drainage Act:
<http://www.legislation.gov.uk/all?title=land%20drainage%20act>

Highways Act 1980:
<http://www.legislation.gov.uk/all?title=highways%20act>

EA – Owning a Watercourse Guidance: A guide to the rights and responsibilities of riverside occupation:
<http://www.environment-agency.gov.uk/homeandleisure/floods/31626.aspx>

EA – ‘Prepare your property for flooding’ how to reduce flood damage including flood protection products and services:
<http://www.environment-agency.gov.uk/homeandleisure/floods/31644.aspx>

EA - Hydrology Data Explorer. This is a data portal enabling you to access live and historic hydrometric and water quality data from the Environment Agency.

