

# Thursby Village

## Flood Investigation Report No.CC6



## Flood Event 22 and 23 May 2024

This flood investigation report has been produced by Cumberland Council as a Lead Local Flood Authority 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 a 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 worst affected locations. On the 22<sup>nd</sup> 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 do not generally experience such high rainfall totals meant that rivers and watercourses rose quickly, with very little warning in some instances. Over 100 properties in and around the Carlisle area were flooded internally during the event and the Section 19 reports investigate the flood event, considers the causes and makes recommendations for further actions.

Cumberland Council as the Lead Local Flood Authority has prepared this report with the assistance of other Flood Risk Management Authorities (FRMA) 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 the Environment Agency and 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 provided to [ifrm@cumberland.gov.uk](mailto:ifrm@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.

As a flood Risk Management Authority (RMA), the Environment Agency have partnered with the Cumberland Council to produce this flood investigation report.

## **Actions that might be taken following an investigation**

It is not within the remit of any Section 19 flood investigation to provide designed solutions. The process does not provide the council, nor any other organisation, with the funding or mandate to undertake works on the ground. The intention is instead to provide a clear understanding of the issues.

It will be for the relevant responsible body or persons to assess the recommendations within the Section 19 report in terms of:

- their legal obligation
- resource implications
- priority
- the costs and benefits of undertaking such options

## 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 22<sup>nd</sup> to 23<sup>rd</sup> 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.
- Resolve the flooding issues or provide designed solutions
- Force risk management authorities (the Environment Agency, the LLFA, the relevant water company and highways authorities) to undertake any of the recommended actions
- Investigate incidents of structural dampness or where basements are affected by groundwater entering through cracks in the basement walls or floors.

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 Background

The month of May 2024 was relatively dry prior to the event. From the 1<sup>st</sup> to the 21<sup>st</sup> May, the north-west region received 46 mm of rainfall which represents 62% of the long term average monthly rainfall for May. Local rain gauges suggest there was no rainfall from 15<sup>th</sup> May to the 22<sup>nd</sup> May, and therefore catchment conditions would not have been unusually wet at the start of the event.

The majority of the heavy rainfall associated with this event fell between 21<sup>st</sup> and 23<sup>rd</sup> May 2024, (figure 2). Rainfall on 21<sup>st</sup> May was focused across central England and East Anglia, with 20-30mm falling widely and over 50mm falling in the wettest locations. On 22<sup>nd</sup> May, the main rain-bearing front tracked north with the focus of the rain across North Wales, much of northern England, southern and eastern Scotland, with over 50mm falling widely.

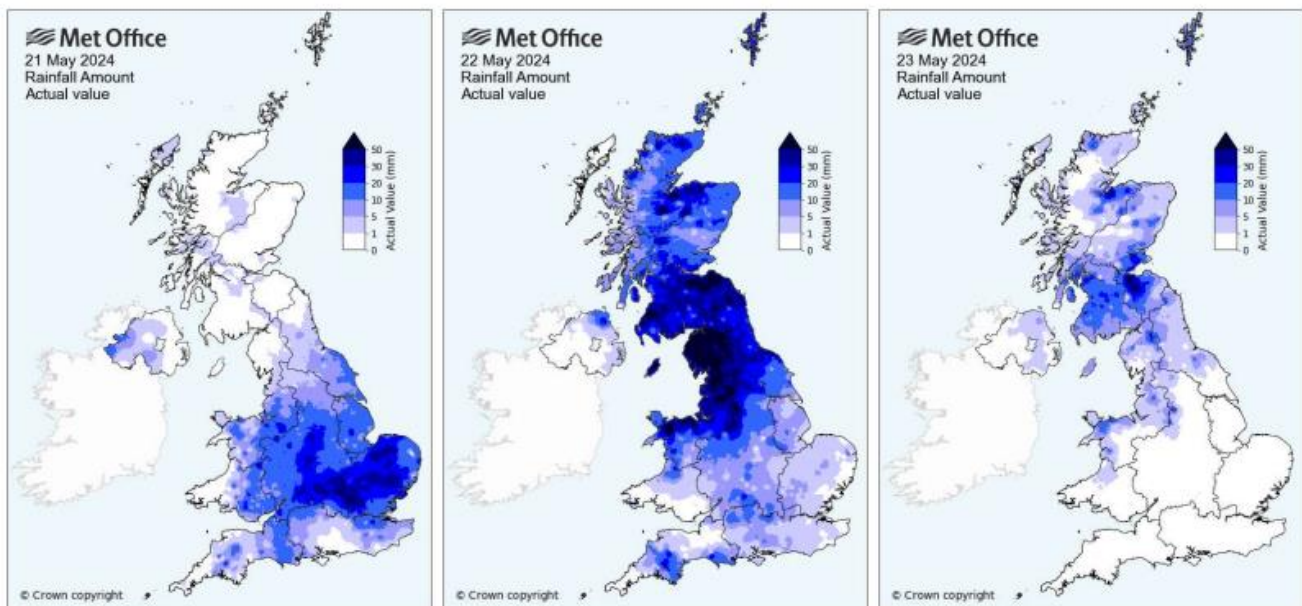


Figure 1: Met Office Rainfall amounts

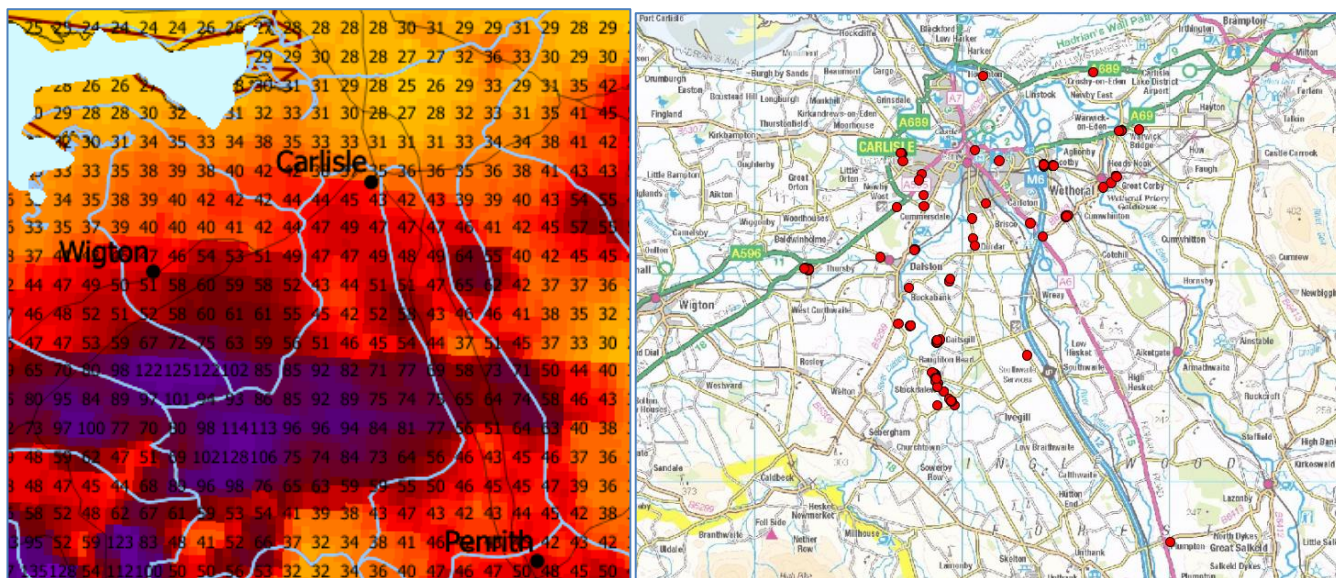
### 2.2 Rainfall event

On Wednesday 22<sup>nd</sup> May to Thursday 23<sup>rd</sup> May 2024 locations in North-West England experienced heavy rainfall resulting from a slow-moving low-pressure system moving across England and Wales. Rain fell consistently from the morning of 22<sup>nd</sup> May until the afternoon of 23<sup>rd</sup> May, with the heaviest totals between 5pm on 22<sup>nd</sup> May and 2am on 23<sup>rd</sup> 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.

The measured total rainfall over a 12 hour period was up to 100mm in the northern fell areas south of Carlisle, equivalent to a 1 in 300 year storm at its peak. The intense and localised



nature of the event meant that the catchments were quick to react and the watercourses rose quickly to unprecedented levels in some locations.



**Figure 2. 24 hr rainfall totals and flooded properties from this event**

The sheer volume of water in the watercourses and on roads overwhelmed the hydraulic capacity and the riverbanks were breached and roads flooded in many locations, with very little warning in some instances. Over 100 properties in and around the Carlisle area were flooded internally during the event and these reports investigate the rainfall event, the causes and makes recommendations for further actions.



**Figure 3 – Location Plan**



Thursby experienced prolonged rainfall starting on the morning of Wednesday 22<sup>nd</sup> May 2024 approx. 08.35 which continued throughout the day peaking approx. 02.00 on Thursday 23<sup>rd</sup> May when the rainfall rate was approximately 13mm/hr..

Steady rainfall occurred throughout the day as recorded at the Thursby rainfall gauge <https://environment.data.gov.uk/hydrology/station/23aaf2a7-2b8c-4a2c-9b83-c7d0515f237e>

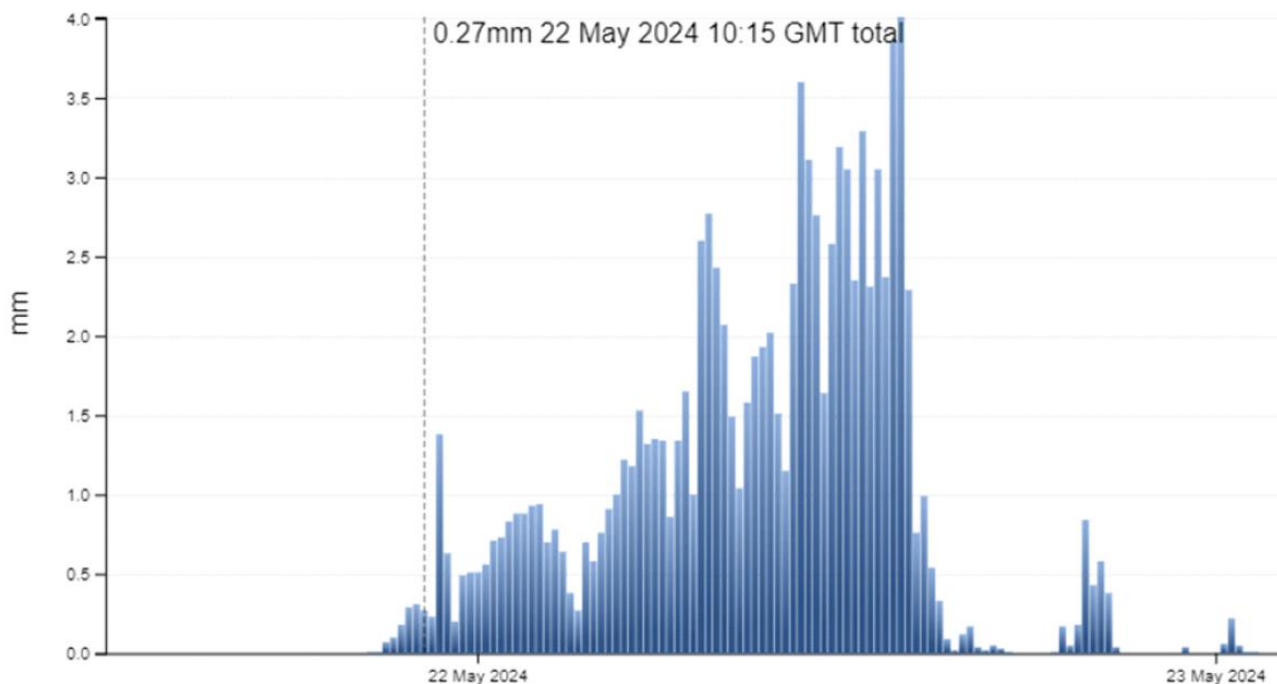


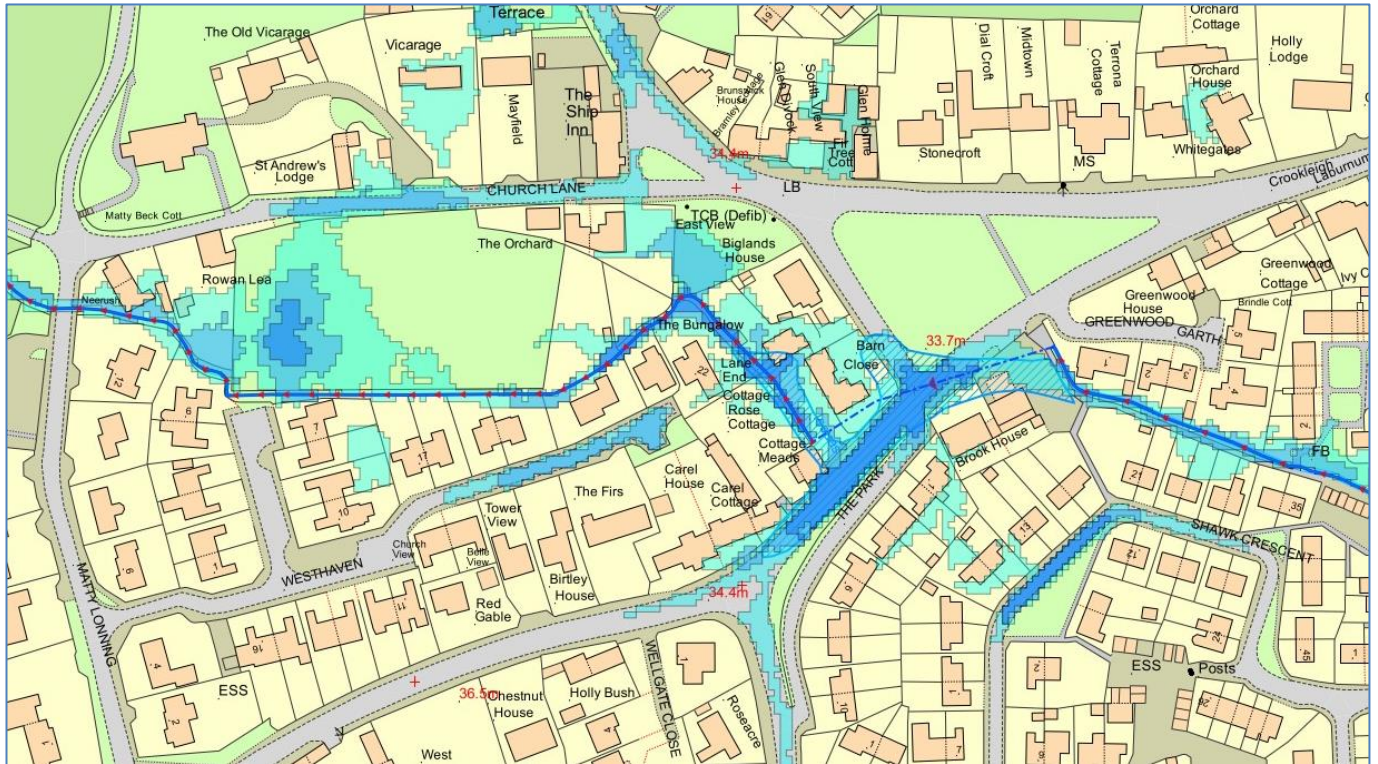
Figure 4 – Rainfall data from Thursby Guage

### 2.2.1 Thursby Rain Gauge Analysis






Duration (hours)	6 hour	8 hour	10 hour	12 hour	14 hour	16 hour	18 hours	20 hours	22 hours	24 hours
MAX accumulation (mm)	58.3	73.0	82.9	87.9	94.6	99.6	101.8	102.5	103.7	105.1
return period of rainfall (years) [FEH22]	96	198	266	265	298	310	282	243	219	202

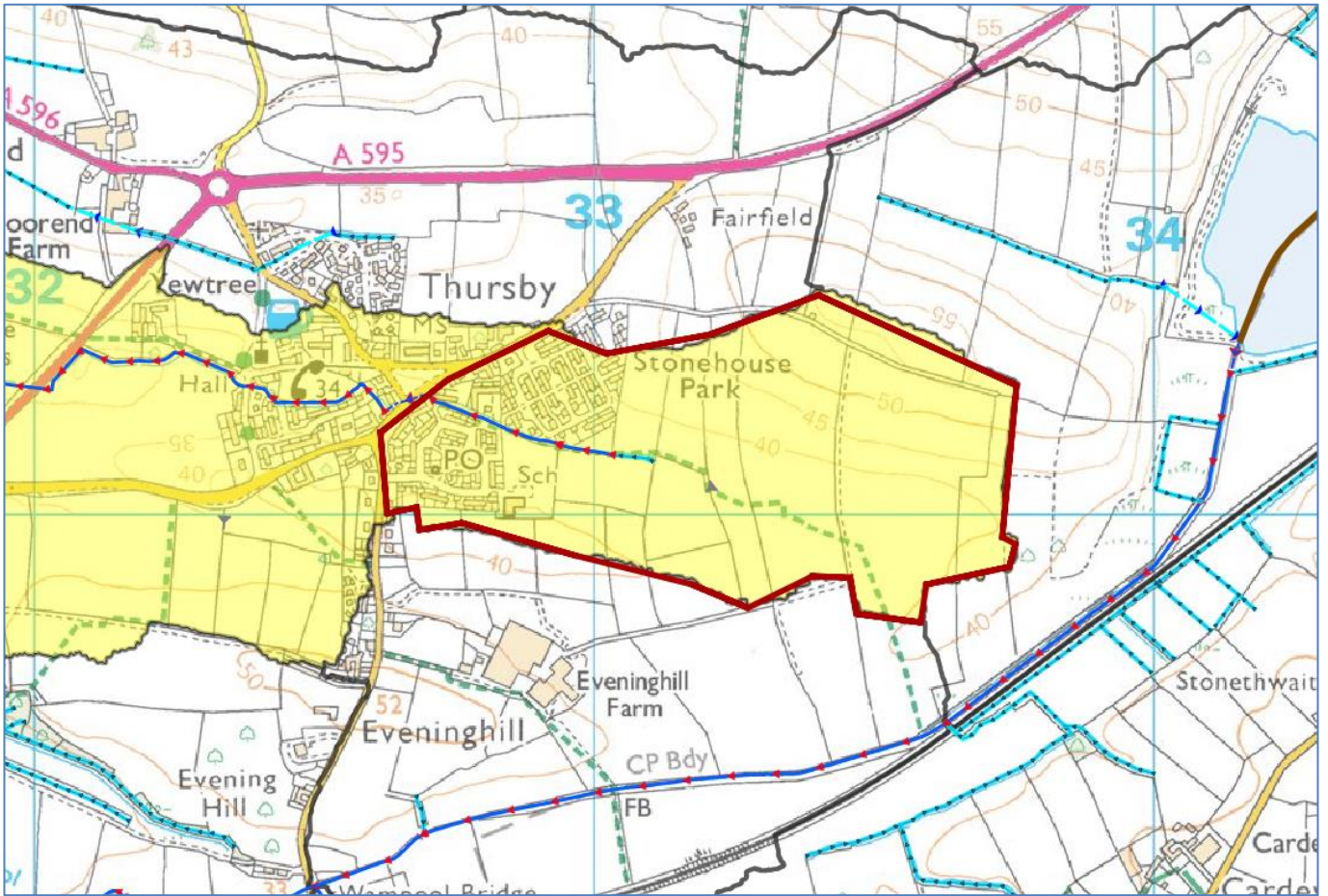
Rainfall analysis provided by the Environment Agency suggests that there was 99.6mm of rainfall over a 16hr period, from the above records it is apparent that this rainfall event was extreme and broke several records. The analysis shows that it was a 1:300-year event (approximately)

## 2.3 Flood Risk as Indicated by EA Modelling and Mapping



**Figure 5. Flood Zone Mapping** – Note: SW 1 in 1000yr layer and FZ2 (between 100 and 1000 yr.) show almost exact area of actual flood as indicated on Figure 7 below

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



**Figure 6: Catchment for Matty Beck and Thursby. (Approx just 46 Ha. Upstream of village)**



# 3. Investigation

## 3.1 Impact of the flood event

A cluster of six properties, five residential and one commercial suffered internal flooding when Matty Beck exceeded. Two more residential properties were affected within the village, this is thought to be a combination of surface water flows from the highway and existing drainage surcharging.

## 3.2 Likely Causes of Flooding (Flood Mechanism)

### 3.2.1 Flood Mechanism

Due to the extreme volume of water Matty Beck exceeded its channel, escaping just as it changes from open channel to culverted water course. Local observations suggest that as the river channel bends adjacent to property No1 Greenwood Garth, water can strike the wing wall and surcharge out of channel running across the garage forecourt then using the carriageway as a flow route, flows to a low point adjacent to Cottage Meads and Carel Cottage the height of the water was enough to breach the thresholds of some properties, internal flooding was also exacerbated by vehicles passing creating bow-waves pushing water towards the properties

Localised highway drainage outfalls to the culverted main river and during weather events this can surcharge and exceed back onto the highway, residents also witnessed flow routes along the highway edges and coming down from Curthwaite Rd, this is thought to be overland flows from nearby fields such was the extent and duration of the rainfall.

There has been concerns raised in relation to the highway drainage after recent re-surfacing works, and general maintenance issues, however it should be noted that the highway system outfalls to Matty Beck, and its performance is related to the river level and can suffer from surcharging.

It should also be noted that highway drainage systems are only designed to manage rainfall falling on the highway and not run-off from fields or surcharging rivers etc. Therefore, considering the extreme nature of this event and the volume of water flowing onto the roads in such a short space of time, even if the highway drains were working at 100% it is likely that it would have made very little difference to the extent of the flooding, although the drain-down time might have been shorter.



**Figure 7 – Flood Routing and Indicative Recorded Extent**

Note: The recorded flooded areas closely align with the theoretical fluvial (river) and pluvial (surface water) flood map risk layers, especially Flood Zone 2 and SW Risk 1:1000. (See Figure 5)



### 3.3 Photographs (flooding)



Figure 1. Carriageway and Property Flooding



Figure 2. Property flooding



**Figure 3. Carriageway Flooding**



**Figure 4. Carriageway flooding adjacent to Cottage Meade, Carel Cottage & Rose Cottage**





Figure 5. Barn Close



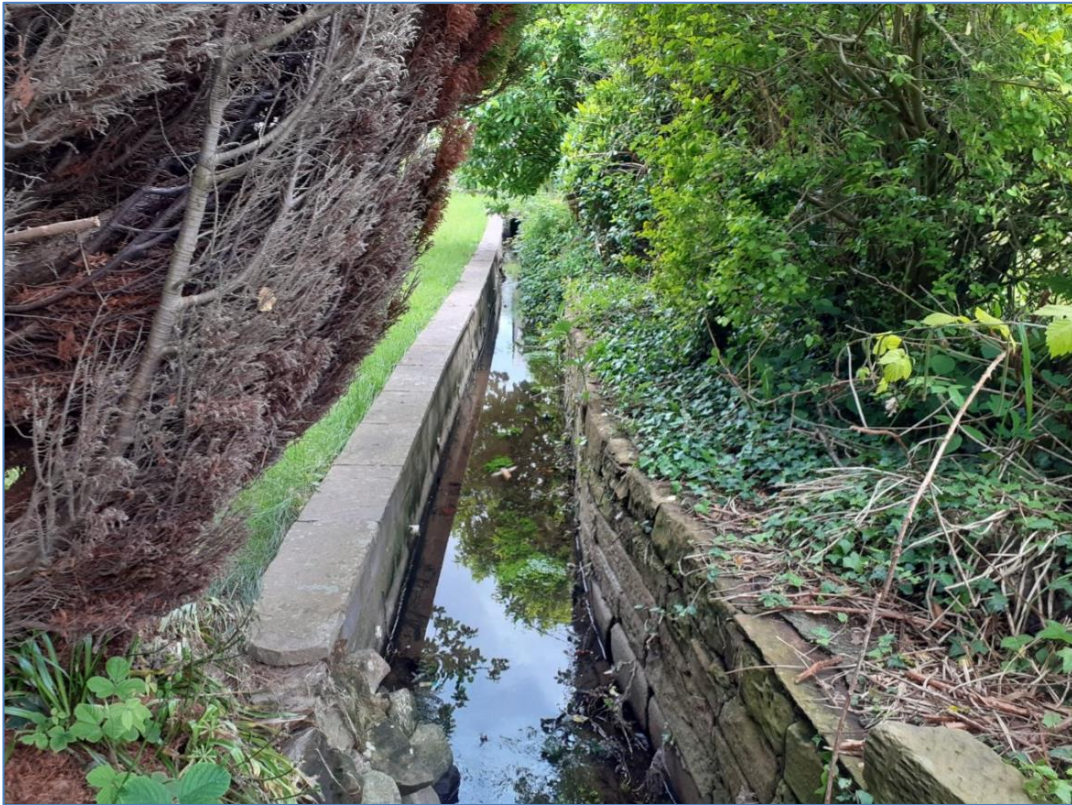
Figure 6. Barn Close

### 3.4 Photographs (post flooding)



Figure 7. Matty Beck, Channel and culvert entrance.





**Figure 8.** Matty Beck as it emerges from the culverted section in the highway flowing through the property boundary of Prospect House (north of Barn Close)



**Figure 9.** Matty Beck looking downstream through garden of Prospect House (north of Barn Close)





**Figure 10.** Highway channel drainage outside Cottage Meads and Carel Cottage



**Figure 11.** Channel drainage outside Rose Cottage and Joiners Shop, water in this location was approx. 300mm deep.



## 3.5 Flooding History

Circa 2020, there is anecdotal evidence of sporadic flooding in the locality, from the same mechanism, occurring every few years which has not caused widespread damage.

While the catchment area of Matty Beck is relatively small, it is constrained, engineered and winding nature through the village with little open space to safely exceed, means that there will always be an inherent risk to properties.

## 3.6 Existing Flood Protection Measures

Some properties have taken measures to prevent further flooding, porches have been built with a high threshold to attempt to keep flood water out, unfortunately once water breached the threshold it was trapped inside until it was pumped out by fire brigade.

One has had a gated entrance from the front garden walled off to prevent flood water entering the property boundary, however on this occasion flood water breached the property from a different direction.

Residents expressed interest in future support for information on how to maintain the main river that passes through their property, or other measures to reduce flood risk and ensure a standard of protection in future.

The Highway Authority will cleanse and inspect the channel drains and gullies following this event. Going forward the inspection is on a 12 monthly basis in the Thursby area.

Residents should be reminded that any drainage, or indeed highway defect, should be reported to the Highways Hotline where each case is given a unique reference number and can be tracked.

## 4. Next Steps

### 4.1 Next steps and timescales

Recommended Action	Action by	Timescale
Site visit by highways to clean and check gully system (immediate post flooding cleanse)	LHA	Completed 18 <sup>th</sup> June 2024
Site visit by EA to check Matty Beck and raise maintenance responsibilities with riparian owners	EA & residents	6 Months
Riparian owners to carry out regular inspections of their respective sections of Matty Beck, especially after flood events and clear any debris found	Residents and EA	Regular inspections / ongoing
Residents to report blocked gullies and drainage channels etc, to the Highways Hotline.	Residents	As and when required
Property flood resilience measures	Residents	
CCTV Survey Matty Beck culvert	EA / LLFA	Ongoing

The Cumbria Local Resilience Forum includes emergency services, Local Authorities, Cumberland Council, Environment Agency, Maritime Coastguard Agency, and health agencies along with voluntary and private agencies. Under the Civil Contingencies Act (2004) every part of the United Kingdom is required to establish a resilience forum.

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.

## 4.2 The Cumbria Floods Partnership

The Cumbria Floods Partnership has brought together a wide range of community representatives and stakeholders from a variety of sectors to plan and take action to reduce flood risk. The Cumbria Floods Partnership, led by the Environment Agency, is producing a 25 year flood action plan for the Cumbrian catchments worst affected by the December 2015 flooding, including Carlisle. The plan will consider options to reduce flood risk across the whole length of a river catchment including upstream land management, strengthening flood defenses, reviewing maintenance of banks and channels, considering water level management boards and increasing property resilience. The Cumbria Floods Partnership structure below details how these 5 themes are being delivered in the Flood Action plans which will be completed in July.

The 'Cumbria Floods Partnership' was set up by Flood Minister Rory Stewart following December's floods and includes all of Cumbria's Flood Risk Management Authorities. They are working alongside the existing 'Cumbria Strategic Partnership', which was formed as part of the Flood and Water Management Act and comprises of the county's Flood Risk Management Authorities (RMAs) including the Environment Agency, Cumberland Council, Local Authorities and United Utilities. Both partnerships are working with communities, businesses and relevant stakeholders to understand and reduce flood risk across Cumbria.

This diagram below helps demonstrate how the two partnerships are working together:

### Cumbria FCERM Governance Chart



# 5. Appendices

## Appendix 1: Glossary

### Acronyms

EA	Environment Agency
CC	Cumberland Council
UU	United Utilities
LLFA	Lead Local Flood Authority
LFRM	Local Flood Risk Management
MSfWG	Making Space for Water Group
FAG	Flood Action Group
FWMA	Flood and Water Management Act 2010
LDA	Land Drainage Act 1991
WRA	Water Resources Act 1991

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

The Flood Risk Regulations 1999 and the Flood and Water Management Act 2010 (the Act) have established Cumberland Council (CCC) as the Lead Local Flood Authority (LLFA) for Cumbria. This has placed various responsibilities on CCC 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
<b>RIVERS</b>				
Main river				
Ordinary watercourse				
<b>SURFACE RUNOFF</b>				
Surface water				
Surface water on the highway				
<b>OTHER</b>				
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 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 (ex 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 CCC by the Flood and Development Management Team.

Water and Sewerage Companies manage the risk of flooding to water supply and 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 Cumbria is managed through the Making Space for Water process which involves the cooperation and regular meeting of the Environment Agency, United Utilities, District/Borough Councils and CCC's Highway and LFRM Teams to develop processes and schemes to minimise flood risk. The MSfWGs meet approximately 4 times per year to cooperate and work together to improve the flood risk in the vulnerable areas identified in this report by completing the recommended actions. CCC 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 Medium Term Plan or a partners own capital investment process.

Flood Action Groups are usually formed by local residents who wish to work together to resolve flooding in their area. The FAGs are often supported by either CCC 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](mailto:lfrm@cumberland.gov.uk), [www.cumberland.gov.uk](http://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: 0845 609 6609

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

**Insert Neighbourhood forum contact details**

**United Utilities:** [www.unitedutilities.com](http://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>

## Translation services

If you require this document in another format (e.g. CD, audio cassette, Braille or large type) or in another language, please telephone 01228 606060.

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