Tebay

Flood Investigation Report

Flood Event 5 December 2015

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

Version	Undertaken by	Reviewed by	Approved by	Date
Draft	Peter Allan	Helen Renyard	Doug Coyle	June 2016
Published				

Contents

Executive Summary

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

On the 5 December 2015 an extreme rainfall event (Storm Desmond) caused flooding in Tebay. It was in the Old Tebay part of the village that flooding to 13 properties took place. Old Tebay is located to the north of the A685 roundabout of the M6 at Junction 38. Storm Desmond was the fourth named storm of the season and brought severe gales with gusts up to 81 mph. This was accompanied by record breaking rainfall, which brought flooding to areas across the north of England.
The flooding was caused by the cumulative effect of Storm Desmond and the three proceeding storms, which caused the ordinary watercourse Tebay Gill Beck to the south east of Old Tebay bursting its banks, the main river Lune spilling into the same area from the north and finally surface water from overwhelmed highway drainage on the local roads.

The report makes 6no recommends which will be followed through by the Making Space for Water group (MSfWG) to reduce the flood risk, including identifying sources of funding to facilitate options recommended.

Any additional information that residents and others can provide to the Environment Agency and Cumbria County Council to help develop our understanding of the flooding is welcomed. A lot of information has already been provided, much of which has been used to inform this report. The scale of this report means that not every piece of information can be incorporated into the document. Any additional information should be provided to;

http://www.cumbria.gov.uk/planning-environment/flooding/floodriskassessment.asp

Event Background

Flooding Incident

Tebay is located in the upper Lune Valley, at the head of the Lune Gorge approximately 36 miles south of Carlisle along the M6 motorway and 12 miles North East of Kendal. Tebay has approximately a population of 776. Dwellings within the village are generally split into Old and New Tebay: old to the north of the M6 junction 38 and the A685, and the new dwellings to the south.

Figure 1: Location plan

Thirteen properties were flooded internally from water seeping slowly under floors. The local pumping station run by UU was also flooded out

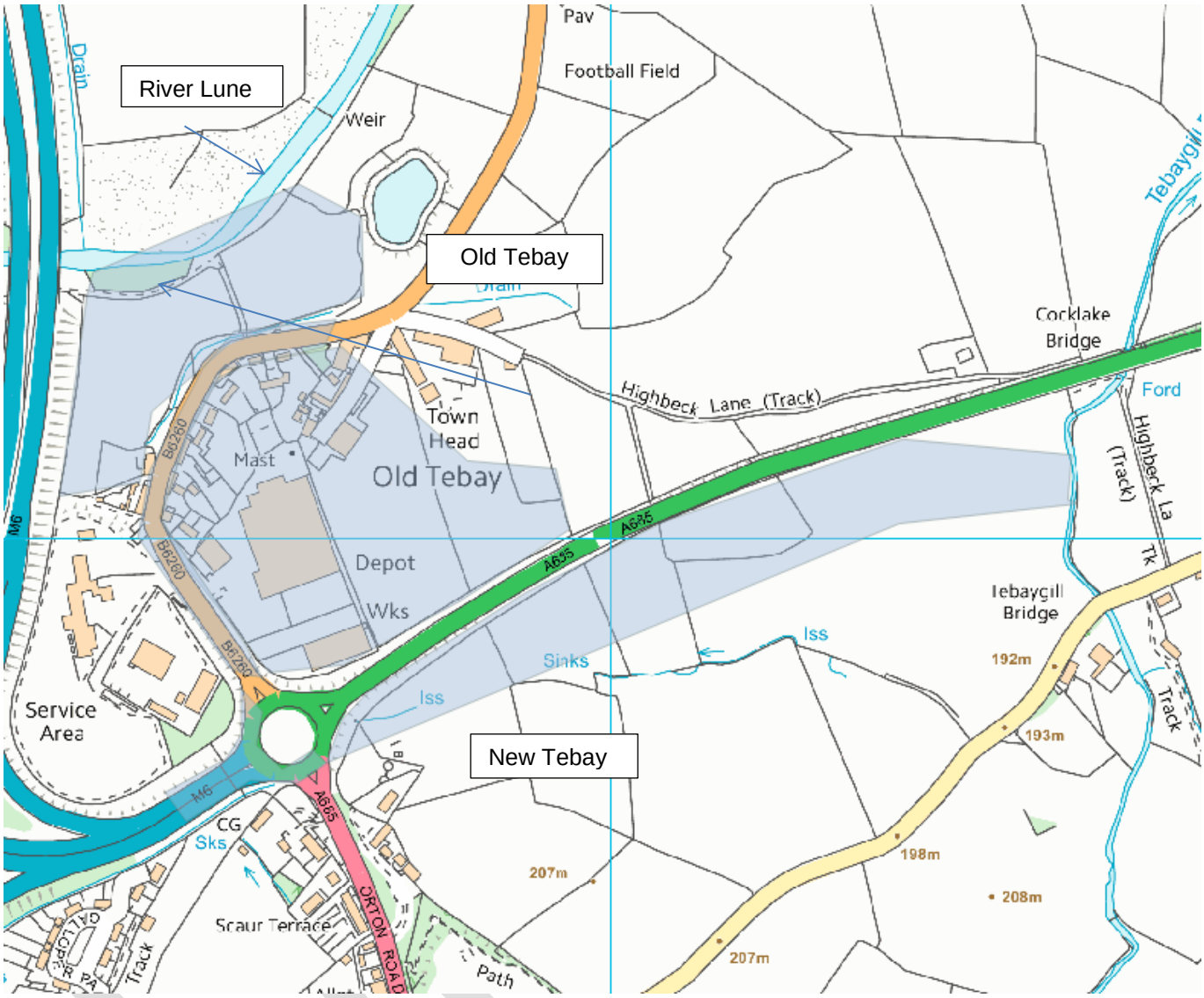
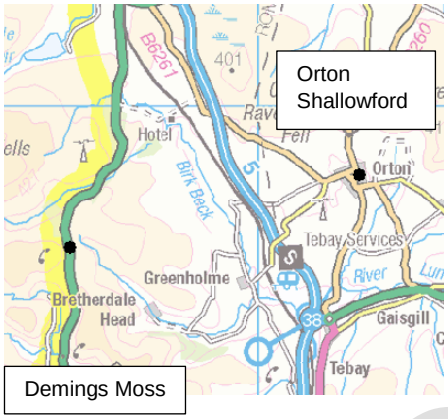


Figure 2: Flooding extent in Tebay

Investigation

Rainfall Event

In November to December 2015 slow-moving low pressure systems driven by a sustained moist south-westerly airflow brought prolonged heavy rainfall to northern and western areas with the persistent unsettled weather (including the named storms 'Desmond', 'Eva' and 'Frank') causing widespread and repeated flooding. Based on data released by the Met Office, December 2015 was the wettest calendar month on record (in a series from 1910) with new 24-hour and 48-hour rainfall totals of 341.4mm (Honister Pass, Cumbria) and 405.0mm (Thirlmere, Cumbria), respectively, delivered by Storm 'Desmond'.



Specifically for Tebay, the two nearest rainfall gauging stations are Orton Shallowford (NY 62465 08323) and Demings Moss (NY 55452 06553) which recorded rainfall totals of 174.8mm and 179.8mm on 5 December 2015. The rainfall levels experienced throughout the 5 December 2015 at the two rainfall gauging stations are illustrated in *Figure 3* below.

Figure 3: Location of rain gauges

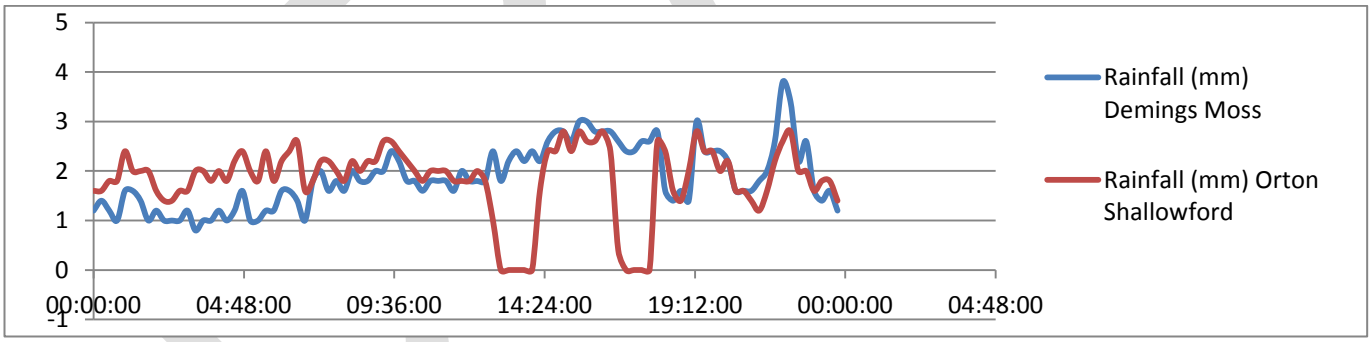


Figure 4: Rainfall data for the 2 rainfall gauging stations closest to Old Tebay on 5 December 2015.

Throughout the 5 December 2015 the rainfall averages 1.75mm per 15 minute interval throughout the day at the two gauging stations. The rainfall therefore was relatively constant until a peak was experienced at 22:00 of 3.8mm.

River Gauge Data

Figure 5: River Gauge Data

Map of Flow Routes

The flow routes depicted in Figure 6 below correspond very closely to the existing surface water outline for flooding for the Tebay area.

http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=ufmfsw#x=361935&y=504967&scale=10

Figure 6: Environment Agency's surface water mapping

Figure 7 below shows the reported overland flows in the area (Over topping from Tebay Gill Beck, surface water flooding on Orton Road and Fluvial flooding from the river Lune)

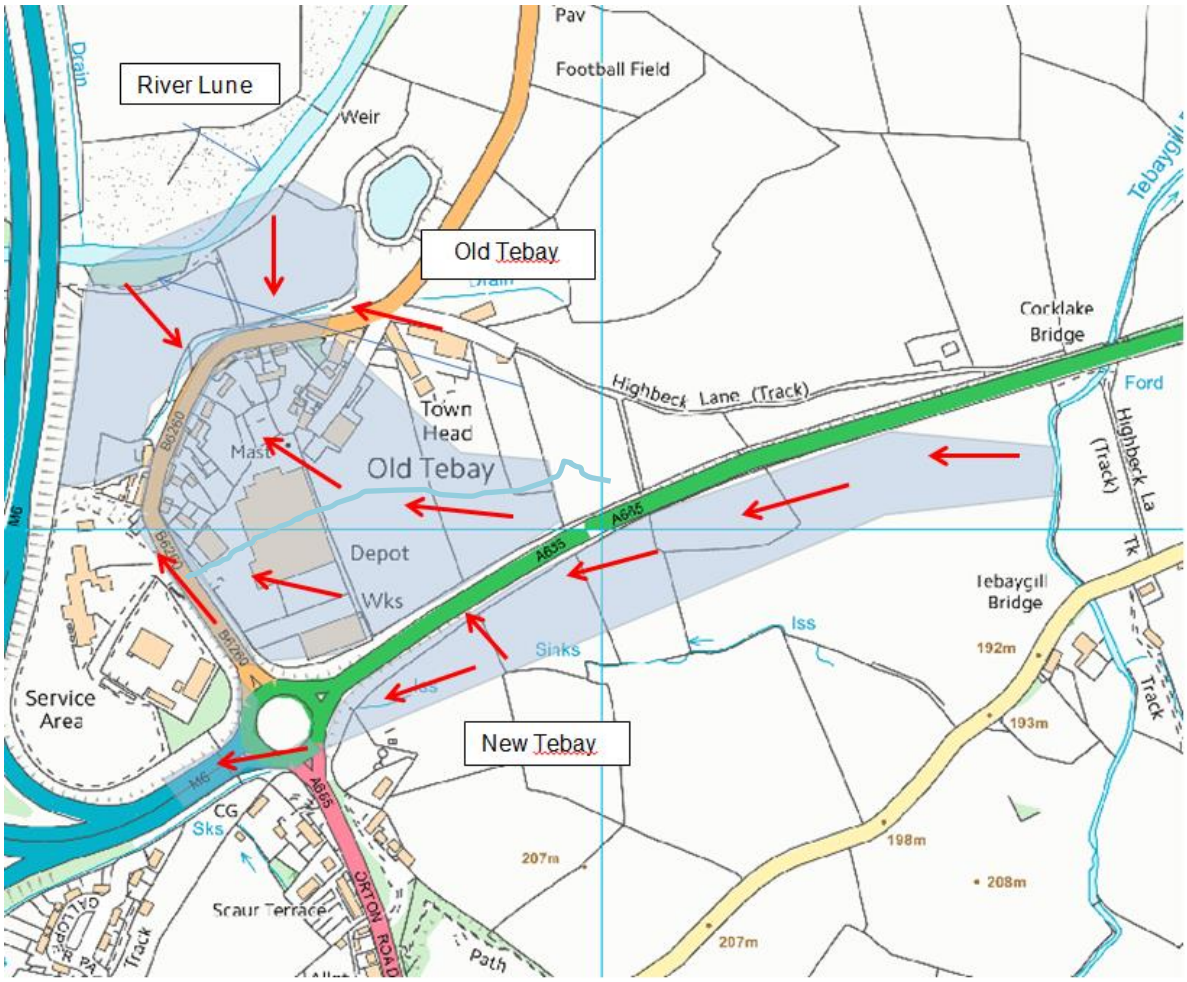


Figure 7: Surface water flow routes in Old Tebay

Likely Causes of Flooding

It is evident from the information gathered that the primary cause of the flooding was the rainfall event which created large volumes of surface water that overwhelmed the watercourses and soils in the area. The overtopping of Tebay Gill Beck created flow routes through the field adjacent to the A685 along the bottom of the road embankment, underneath the A685 carriageway and then through the field and into Old Tebay.

Photographs 1 – 4: Various Flow Routes

To compound this source of flooding, the outfall for the surface water drainage systems is into the River Lune which also overtopped river banks. The highest ever level on the River Lune was recorded during Storm Desmond. This caused surface water drainage on the B6260 to surcharge back into the Orton Road area. It is also likely that the gullies along the A685 and B6260 could have been blocked due to organic material which could increase surface water flows flowing through Old Tebay. Residents also reported that the continuation of vehicles to use the B6260 also increased the problems of the flooding due to the bow waters caused by the vehicles passing through the flood water.

Flooding History

Residents reported the Old Tebay area had experienced flooding approximately 40 years ago. It is understood that the circumstances and the sources of the flooding had been similar to that of the December 2015 flooding.

Recommended Actions

The following table details recommended actions for various organisations and members of the public to consider using the Cumbria Floods Partnerships 5 Themes: Community Resilience, Upstream Management, Strengthening Defences, Maintenance, and Internal Drainage Boards (IDB's). Some of these recommendations may have already been carried out and or are ongoing.

Cumbria Flood Partnership Theme	Action by	Recommended Action	Timescale
Maintenance	Cumbria Highways	Maintain highway drainage features, ensuring they are clear of organic material and waste on the B6260 and adjoining roundabout	Gullies Cleaned 30th December 2015. Ongoing routine cleaning
	Eden MSFWG	Review and investigate drainage and sewage systems for which they are responsible to better understand where improvements are required.	2016
Upstream Management	Eden MSFWG	Investigate flood attenuation scheme on the South embankment of the A685. Restricting flow underneath the road which flows through to Old Tebay.	2016
	Eden MSFWG	Investigate raising the banks of Tebay Gill Beck on the western bank to the south of the A685 up to the next bridge	2016
Community Resilience	Residents	Investigate property level protection for affected homes (flood doors, concrete floors etc). Grants available via Eden District Council	2016
	Environment Agency	Confirm if it is possible to provide a flood warning and then ensure all properties at risk can register to receive flood warnings and details are up-to-date.	Summer 2016

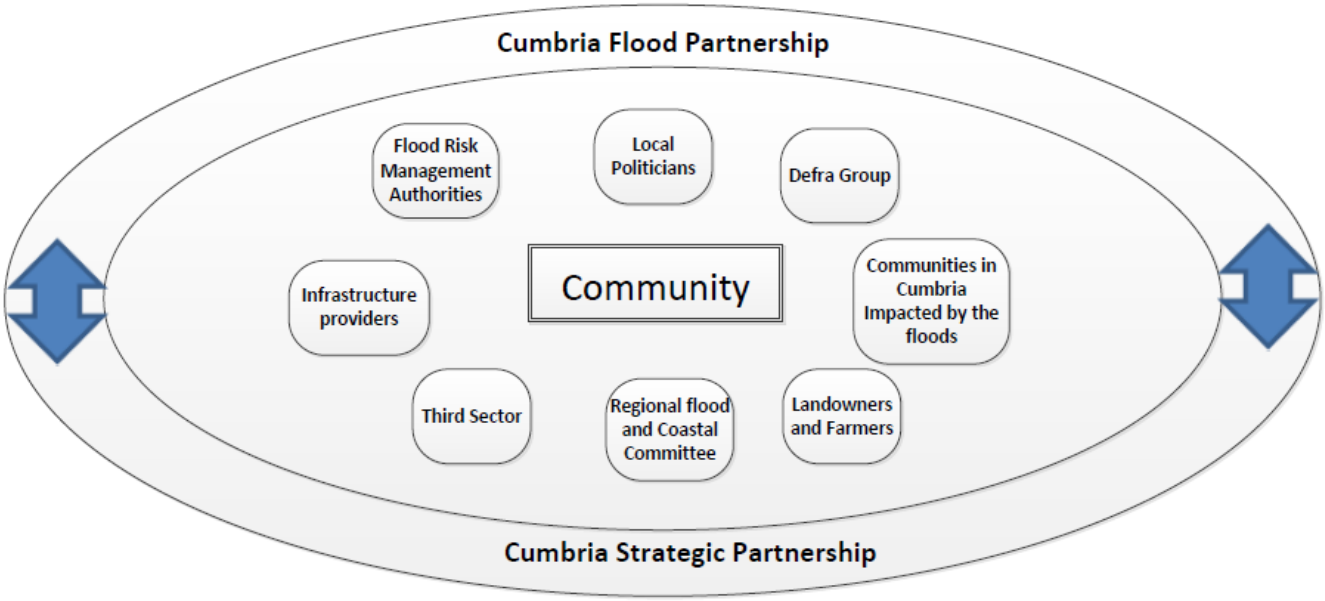
* The Cumbria Local Resilience Forum includes emergency services, Local Authorities, Cumbria County Council, Environment Agency, Maritime Coastguard Agency and health agencies along with voluntary and private agencies. Under the Civil Contingencies Act (2004) every part of the United Kingdom is required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

Next Steps

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 Cambria'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, Cumbria County 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:



Appendices

Appendix 1: Glossary

Acronyms

EA	Environment Agency
CCC	Cumbria County 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 Cumbria County 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	District Council	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 Cumbria County 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) – Cumbria County Council is the LLFA for Cumbria. 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 Local Flood Risk Management Team.

District and Borough Councils – These organisations perform a significant amount of work relating to flood risk management including providing advice to communities and gathering information on flooding.

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

Cumbria County Council (Local Flood Risk Management):
lfrm@cumbria.gov.uk, www.cumbria.gov.uk, tel: 01228 221330

Cumbria County Council (Highways):
highways@cumbria.gov.uk, www.cumbria.gov.uk, tel: 0845 609 6609
Out of hours emergencies should be reported via the Police on 101

Cumbria County Council (Community Development Team)
rhian.davies@cumbria.gov.uk, www.cumbria.gov.uk, tel: 01768 812661

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

Eden District Council
Customer.services@eden.gov.uk, www.eden.gov.uk, tel: 01768 817817

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 – 'Living on the Edge' 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

Appendix 4: Condition of the Watercourse (Tebay Gill Beck)

Tebay Gill Beck (locally known as How Gill) is located 750m upstream of Old Tebay and flows underneath the A685 carriageway, flowing northwards for approximately 530 metres until it enters the River Lune. Figure 8 below is a geographical representation of the stretch of Tebay Gill Beck which is prone to flooding and which is suspected to be the source of the water which flooded Old Tebay. Photographs 5, 6, 7 and 8 were taken along the route of the ordinary watercourse and illustrate the pinch points and potential issues with the watercourse.

Figure 8: Tebay Gill Beck Location Plan

Each of the photographs taken along the watercourse condition survey will be explained in detail in the following pages. The red numbers on the above plan depict the locations where the photographs were taken.

Photograph 5: Entrance of Tebay Gill Beck under the A685 carriageway

Photograph 5 above depicts the entrance of Tebay Gill Beck into a culvert beneath the A685 carriageway via a weir. The photograph was taken on 3 May 2016 and was during a period of low water flows through the watercourse. In light of this, the height between the surface of the watercourse and the bottom edge of the culvert beneath the carriageway is approximately 1 metre. This has the potential to cause a restriction to the watercourse during extreme precipitation events and could cause water to back up from the restriction and increase the height of the watercourse upstream. The banks of the watercourse are of equal height either side of the watercourse (1 metre) and at the entrance to the weir is a ford for farm machinery. The access tracks either side of the ford appear to direct flood water away from the carriageway and into neighbouring fields. The only evidence of a severe flood at this location is that the vegetation on the western bank of the watercourse is flattened and pointing downstream of the watercourse. The carriageway at this location is not known to have flooded during the event. but it is a severe restriction of the watercourse.

Photograph 6: Earth embankment on the western bank of Tebay Gill Beck

Photograph 6 above depicts an earth embankment which is located on the watercourse meander upstream approximately 20metres from the location of Photograph 5. The earth embankment on the western bank of Tebay Gill Beck is 1.2 metres above the surface level of the watercourse in low flow conditions, as shown in the photograph. The height of this earth embankment is approximately the same height, if not fractionally higher than the eastern bank of the watercourse. This feature acts as a funnel for the watercourse, which during storm conditions will increase water velocity and could increase flood risk at the restriction pinpointed in Photograph 5. The watercourse at this location is not known to have burst its banks, but further upstream of this point where the western earth embankment is appears to be lower.

Photograph 7: Raised embankment on the eastern bank of Tebay Gill Beck downstream of the minor road bridge

Photograph 7 above depicts Tebay Gill Beck downstream of the second major restriction of the road bridge facing towards the A685. It can be seen that the western bank is approximately 0.5m below the level of the eastern bank. This will mean that during watercourse bank full conditions that any flooding is likely to spill out of the watercourse and into the flood plain to the west. This section, prior to the earth embankment on the western bank, spans approximately 40m of the watercourse and is the likely source of flooding which affects Old Tebay.

Photograph 8: Minor Road Bridge over Tebay Gill Beck (taken from Google Maps)

Photograph 8 depicts the road crossing of Tebay Gill Beck. It can be seen that the road is approximately 1.3m above the surface level of the watercourse during a period of 'normal' water flows. This represents a major restriction of the watercourse and will act as a throttle during flooding events. Water will back up behind the bridge and flood the eastern bank of the watercourse which is approximately 0.4m below the level of the western bank. This structure will also act as a funnel which increases the velocity of the watercourse downstream and will exacerbate flooding and erosion.

Translation services

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