Wigton

S.19 Flood Investigation Report

Burnfoot, Wigton, Cumbria

Flood Event 3rd – 5th December 2015

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

Version	Prepared by	Reviewed by	Approved by	Date
Draft for client comment	Evi Papadopoulou Richard James	Jaime Ball	Ruth Goodall	May 2016
Final draft for client comment	Richard James	Jaime Ball	Ruth Goodall	June 2016
Final version	Chris Evans	Doug Coyle	Doug Coyle	January 2017

Contents

Executive Summary

Wigton experienced severe flooding on the 3rd December 2015 with further flooding on the 5th of December 2015 as a result of Storm Desmond. As a precursor of Storm Desmond, a period of intense rainfall fell across north-west Cumbria. This was prior to the prolonged rainfall that impacted the whole of the county. These rainfall events, falling on an already saturated catchment, led to record high river levels and surface water flooding throughout Cumbria and beyond.

In response to the flood event, this Section 19 Flood Investigation Report has been completed by the Environment Agency as a key Risk Management Authority (RMA) working in partnership with Cumbria County Council as the Lead Local Flood Authority (LLFA), under the duties as set out in Section 19 of the Flood and Water Management Act 2010. This report provides details on the flooding that occurred in Wigton on the 3rd and 5th of December 2015, and has used a range of data collected from affected residents, site visits, surveys of the area, data collected by observers and river & rainfall telemetry during the flood event.

There are no formal Environment Agency flood defences within Wigton. There are, however, a number of informal structures which may act as a defence during times of flood. In 2013 a Flood Storage Basin was constructed upstream of Wigton on the Wiza Beck designed to hold just less than 10,000 cubic metres of flood storage. A number of residents within Wigton also employ property resilience measures and as a result it is estimated that 16 residential properties and a number of commercial businesses (including the large Innovia Films Factory) were impacted by the December 2015 flood event.

This report details the flooding that occurred from the Wiza Beck, Flosh Beck, Speet Gill and the Black Beck, plus flooding from other watercourses and from surface water. It identifies the flow routes and the causes of the flooding including where river banks were overtopped in a number of locations in Wigton.

Eleven actions have been recommended in this report to manage future flood risk in Wigton, which will require the involvement of a number of organisations and local communities. In response to the flooding, community meetings have taken place, and these will continue in order to ensure that all those affected are given the opportunity to be involved in reducing the flood risk in their area of the town.

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

The Flood Investigation Report

Under Section 19 of the Flood and Water Management Act (2010) Cumbria County 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 Cumbria County Council to carry out a detailed investigation into every flood incident that occurs in the County, but every incident, together 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 and
- there is a risk to life as a result of flooding.

As a flood Risk Management Authority (RMA), the Environment Agency have partnered with Cumbria County Council (CCC) to produce the 53 flood investigation reports across Cumbria.

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 5th-6th December 2015 flooding event and
- 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 the 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.

For further information on the S19 process, including a timetable of Flood Forum events and associated documentation, please visit the County Council website at:

http://www.cumbria.gov.uk/floods2015/floodforums.asp

To provide feedback on the report please email **LFRM@cumbria.gov.uk**.

Introduction

Geographical Setting

Wigton is a market town in Cumbria, located approximately 15 miles south west of Carlisle. The town is located at Ordnance Survey National Grid Reference NY 255 481 and lies at the confluence of Wiza Beck, Speet Gill, Black Beck and the Flosh Beck on the relatively low lying North Cumbrian Plain. This area is part of the River Wampool river catchment and drains to the Solway Firth. The upland catchment is flashy, responding rapidly to rainfall events, although the town itself is located on flatter land, where river channels merge and have been constrained by buildings and other development on the adjacent flood plains. **Figure 1** provides an overview of the location of Wigton and the surrounding catchment.

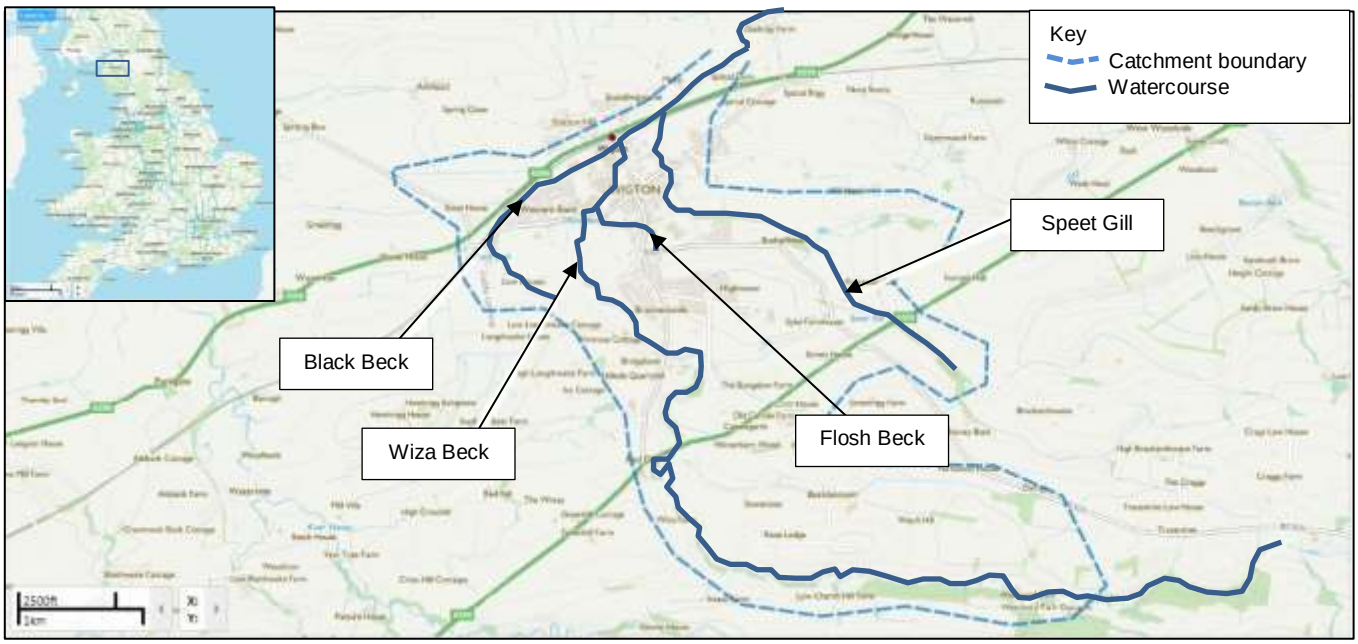


Figure 1: Location of Wigton and surrounding catchment

Flooding History

The Allerdale Strategic Flood Risk Assessment (SFRA) indicates that Wigton has a long history of flooding, with newspaper reports that can be traced back through the past 300 years[1]. The SFRA identifies that there have been 5 significant flood events within recent years, with the largest occurring in January 2005 where 22 residential properties were affected from the Wiza Beck and the Speet Gill. This event also impacted on critical infrastructure, a school, fire station and an electricity substation.

The annual exceedance probability (AEP) describes the likelihood of a specified flow rate (or volume of water with specified duration) being exceeded in a given year. There are several ways to express AEP, two are shown in **Table 1**. Throughout this report AEP is expressed as a percentage. As such an event having a 1 in 100 chance of occurring in any single year will be described as a 1% AEP event.

The River Derwent Catchment Flood Management Plan (CFMP)[2] identifies that within Wigton there are approximately 155 properties at risk of flooding in a 1% annual exceedance probability (AEP) event and 72 properties in a 10% AEP.

AEP (as percent)	AEP (as probability)
50%	0.5
20%	0.2
10%	0.1
4%	0.04
2%	0.02
1%	0.01
0.1%	0.001

Table 1: Probabilities of Exceedance

The main sources of the flooding are the Wiza Beck, Speet Gill and Black Beck. The Environment Agency currently manages flood risk by maintaining the river channels and there are no formal flood defences in Wigton. The Environment Agency operates a Flood Warning service in Wigton for one Flood Warning Area.

[1] Allerdale Strategic Flood Risk Assessment 2010: **http://www.allerdale.gov.uk/downloads/EB20c_SRFA_2011_Vol_2_of_2.pdf**

[2] River Derwent Catchment Flood Management Plan. December 2009: **https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289419/Derwent_Catchment_Flood_Management_Plan.pdf**

Flood Event 3rd – 5th December 2015

Background

Wigton experienced severe flooding on the 3rd December 2015 as a precursor of Storm Desmond when a period of intense rainfall fell across north-west Cumbria. Further flooding occurred on the 5th of December 2015 as a result of Storm Desmond. These rainfall events, falling on an already saturated catchment, led to record high river levels and surface water flooding throughout Cumbria and beyond. Between the 3rd and 5th December 2015 multiple areas and properties across Wigton experienced severe flooding.

Rainfall Event

December 2015 was the wettest calendar month on record for the UK, with much of northern England receiving double the average December rainfall. This also followed a particularly wet November and as such, much of the ground within the Cumbria catchments was already saturated.

Between 3rd and 7th December, the period of prolonged, intense rainfall caused by Storm Desmond and precursor event set new 24 hour and 48 hour rainfall records for the UK. Both of these records were recorded within Cumbria and broke the previous records, also within Cumbria, set during the November 2009 flood events.

Location	3 December 2015 00:00 – 23:59
	mm
Honister Pass – Highest recorded rainfall (5 December)	341.4
Thursby WWTW	31.8
Abbeytown	40.6
Quarry Hill	35.6
Sunderland	39.8

Table 2: Cumbria 24 Hour Rainfall Totals/Records in December 2015

River Levels

The Environment Agency operate two river level gauges on the Wiza Beck near Wigton. These are level only (and do not provide an estimate of river flows). These gauges are as follows:

- Station Road, Wigton (NGR NY 25392 48735)
- Wiza Beck Storage Basin, Wigton (NGR NY 25185 47524)

These level gauges are used to deliver flood warning services to the community at Wigton. Both river gauges recorded levels that were more than 2m above gauge datum on the 3rd and 5th of December 2015, as shown in **Figure 2** and **Figure 3**.

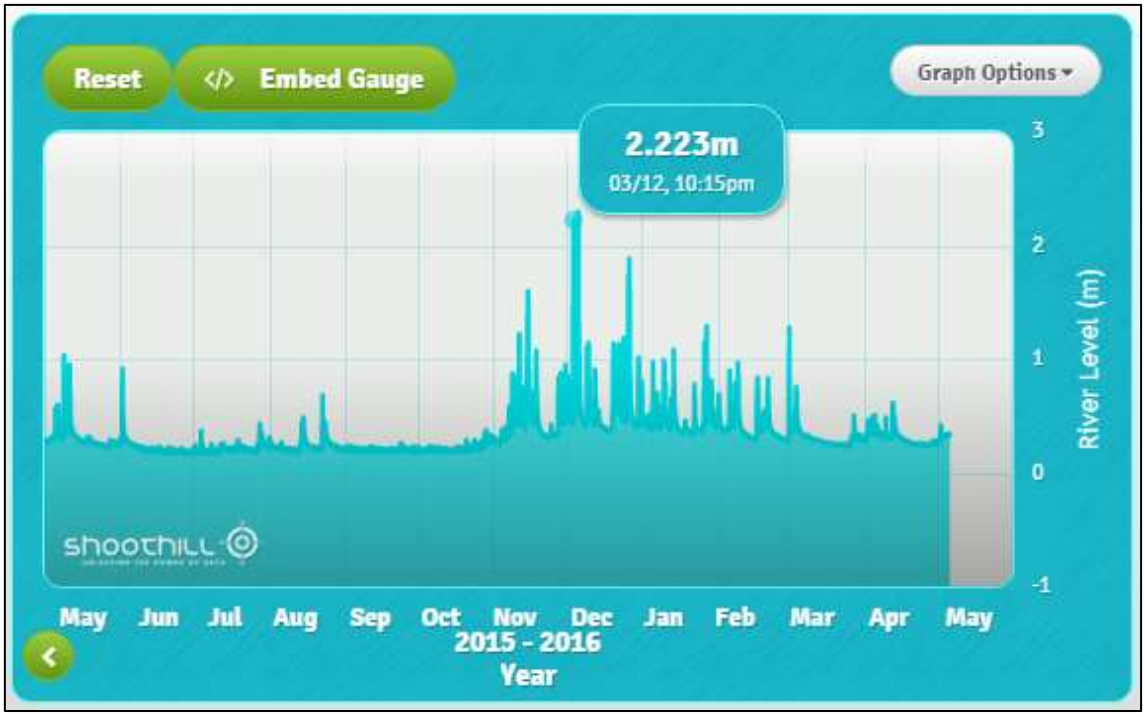


Figure 2: Recorded Levels at the Wiza Beck Storage Basin

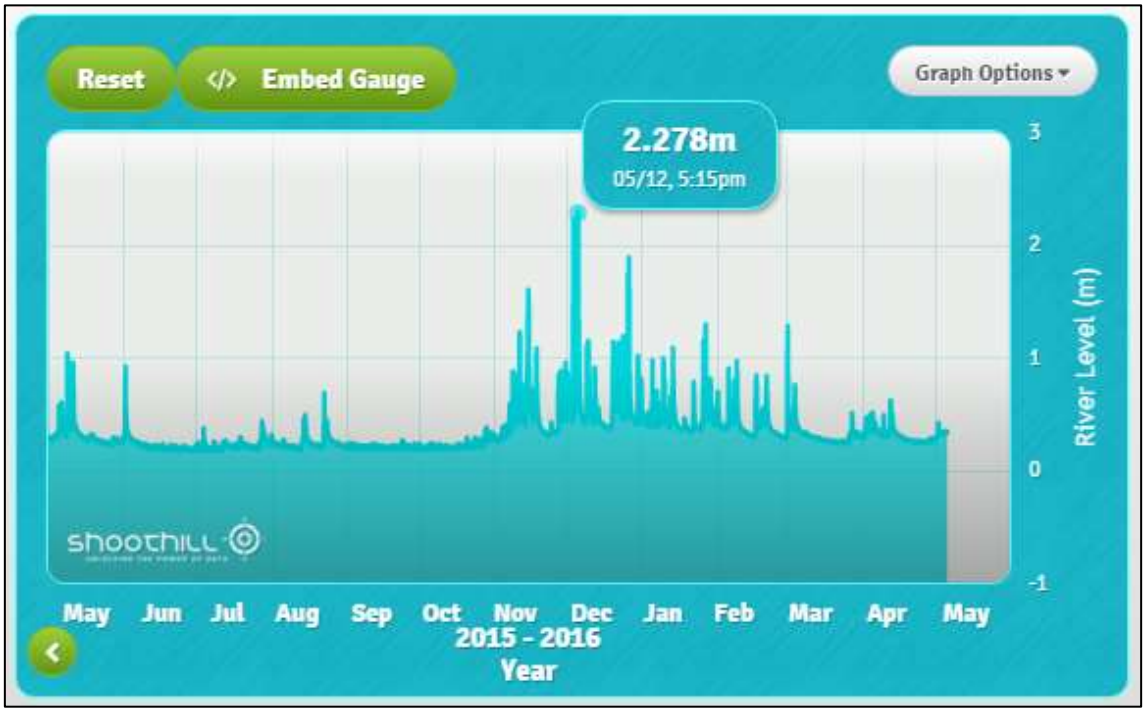


Figure 3: Recorded Levels at the Station Road Level Gauge

Existing Flood Defences

There are no formal Environment Agency flood defences within Wigton. There are, however, a number of informal structures which may act as a defence during times of flood. A number of residents within Wigton also employ property resilience measures.

In 2013 a Flood Storage Basin was constructed upstream of Wigton on the Wiza Beck, north of Stubb Bridge off Longthwaite Road (as shown in **Figure 4**). This basin is designed to hold just less than 10,000 cubic metres of flood storage and is throttled by a short-length of culvert. Whilst the basin does not directly defend adjacent properties, it serves to provide additional time for residents on Station Road to install their property resilience measures. Once the capacity of the basin is exceeded, it overtops into Wiza Beck. Flood warning telemetry is also present at this location and is used to provide the Environment Agency's flood warning service in Wigton.

Investigation

This investigation was carried out by the Environment Agency through surveys of the area and data collected from the communities affected with help from Cumbria County Council.

For the purpose of this report Wigton has been divided into 5 flood cells for further investigation. The division of the flood cells is outlined below.

1. **Flood Cell A1:** Covering land around the upper reach of the Wiza Beck, Wigton Bowling Green, Sports Pitch and the southern entrance to the Innovia Films Factory.
2. **Flood Cell A2:** Covering land around the Innovia Films Factory, Station Road, Royal Mail Post Office and the Station Road Business Park.
3. **Flood Cell B:** Covering land around Lowmoor Road, Wigton Swimming Baths and the Nelson Thomlinson School.
4. **Flood Cell C:** Covering land around the ATS Garage and Burnfoot Bridge.
5. **Flood Cell D:** Covering the land around Spittal Farm and the Wiza Beck.

Please note references to left and right bank are taken looking downstream with the flow of water. The location of the flood cells are shown in **Figure 4**.

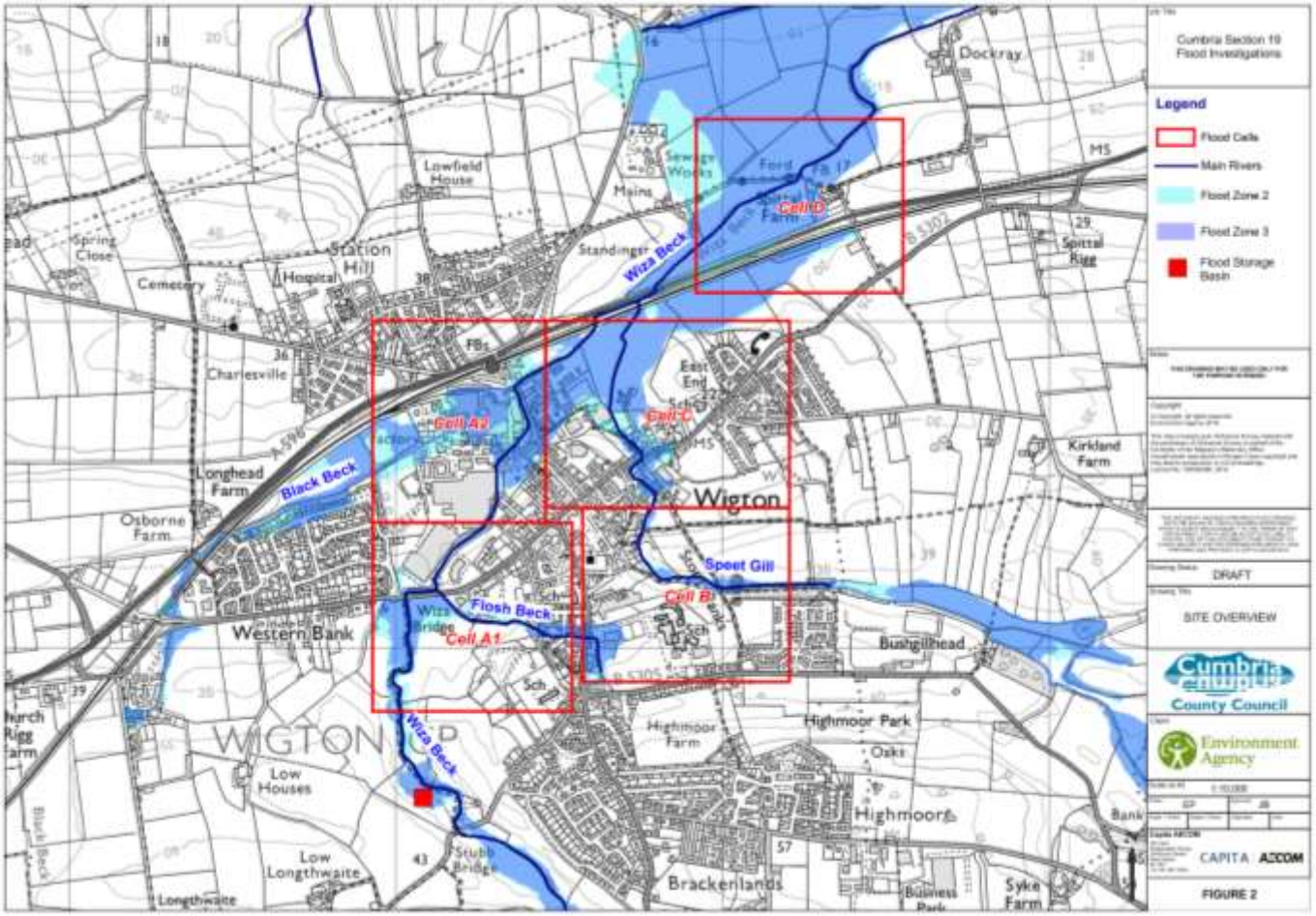


Figure 4: Wigton Flood Cells

Impacts and Likely Causes of Flooding

Timeline

Table 3 below shows the times of key events during the December 2015 flooding events.

3rd December	**Event**
06:30 approx.	Onset of flooding to Station Road area
21:15 approx.	Floodwaters receded
4th December	**Event**
	No additional flooding reported
5th December	**Event**
12:20 approx.	Onset of flooding to Station Road area
21:00 approx.	Floodwaters receded

Table 3: Wigton 3rd – 5th December 2015 flood incident timeline

Table 4 below shows the total number of properties flooded compared to other recent flood events.

Month / Year	Jan 2000	Jan 2004	Jan 2005	Oct 2005	Jan 2008	Nov 2009	Jun 2012	May 2013	Dec 2015
Total number of flooded properties	9	53	22	3	17	2	2	42	16

Table 4: Number of flooded properties

Overview of Flow Routes

There were a number of flooding flow routes during the event as shown by **Figure 5**. The details of these flow routes and the flooding within each of the identified areas are discussed in greater detail in the following sections of this report.

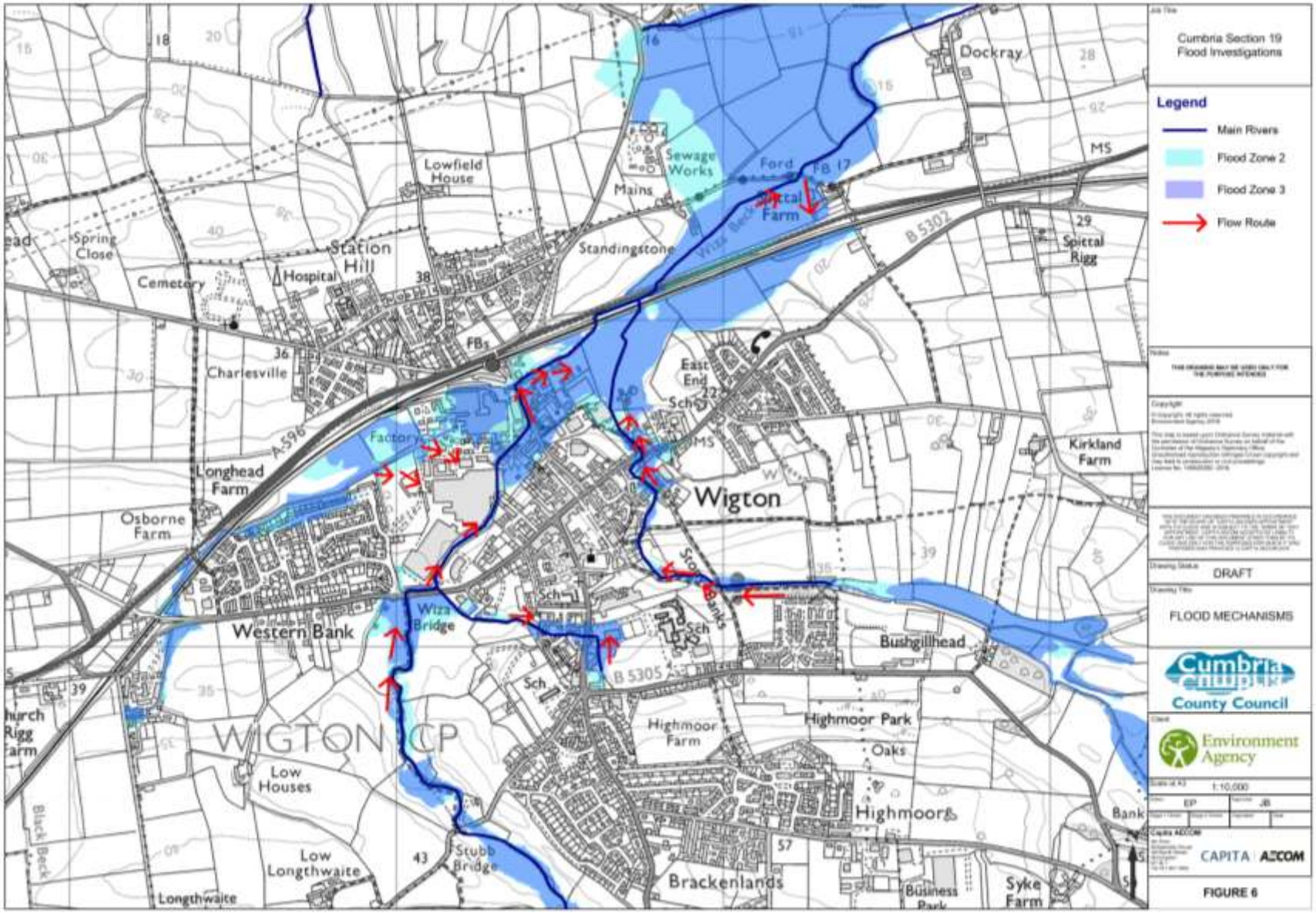


Figure 5: Map of flood flow routes*

*The flood outline identifies the maximum extent of flooding. Not all properties within the extent area were flooded.

Flood Cell A1: Upper reach of the Wiza Beck, Wigton Bowling Green, Sports Pitches and the southern entrance to the Innovia Films Factory

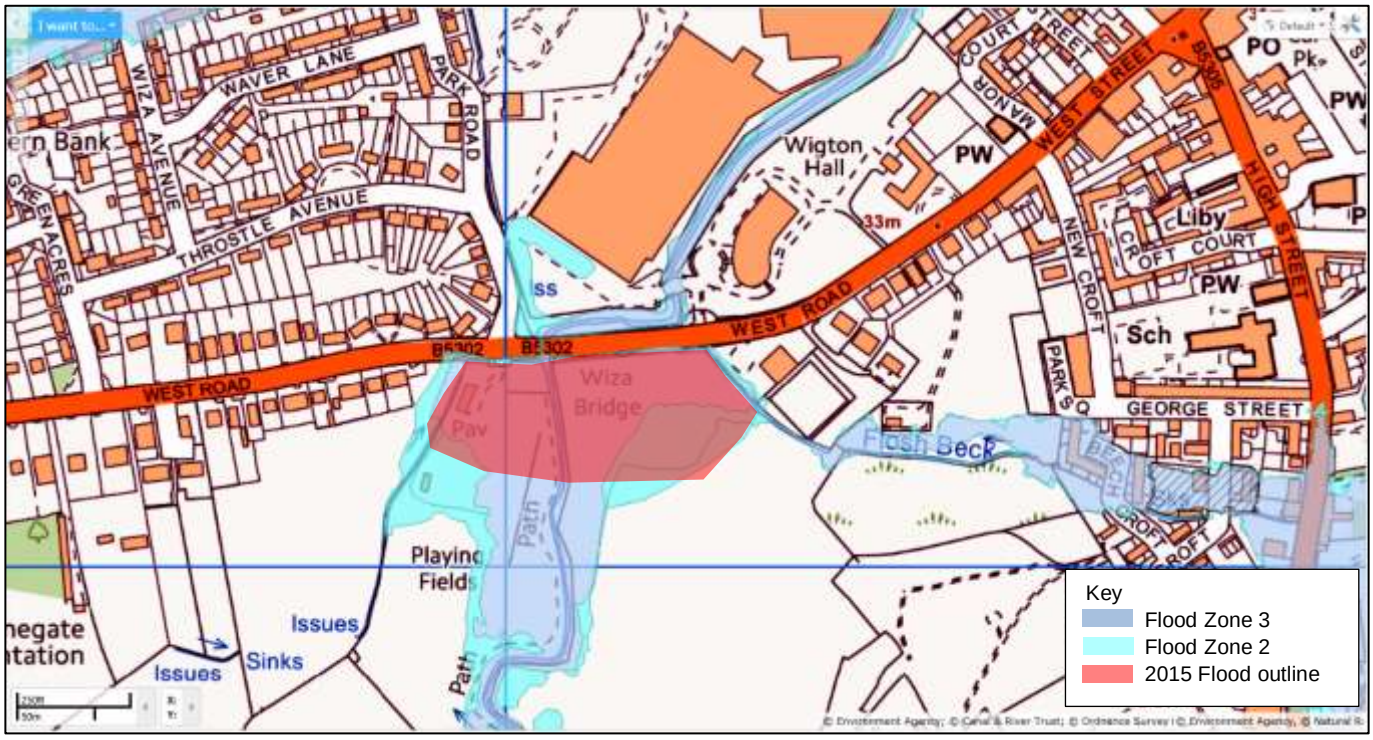


Figure 6: Flood Cell A1 – Flooding mechanisms

A number of the fields near the Flosh Beck and Wiza Beck were flooded during the December 2015 flooding (**Photograph 1)**. This did not impact on residential property, although the playing fields and changing room facilities were affected by the flooding. The flood flows also resulted in bank erosion, scour and damage to a kissing gate near the sports pitches (**Photograph 2**).

Photograph 1: Flooding from the Flosh Beck (15th December 2015)

Photograph 2: Bank damage near the Sports Pitches (15th December 2015)

Key Site Observations

The Wiza Beck is a main river that flows south to north along the sports pitches south of the B5032. Significant gravel deposition was observed in the watercourse upstream of the B5032. Bank erosion on the Wiza Beck near the sports field had resulted in a kissing gate collapsing into the watercourse.

North of the B5032 the Wiza Beck flows north-east, following the alignment of the main road and is flanked on either side by raised banks before a 90 degree turn at the entrance to the Innovia Films Factory.

The Flosh Beck is a main river that flows east to west alongside the Wigton Bowling Club (**Photograph 4**). This watercourse forms a tributary of the Wiza Beck (**Photograph 3)** via a large box culvert beneath the B5032. The confluence is throttled at the downstream end by a circular conduit that discharges into the Wiza Beck at the 90 degree bend at the entrance to the Innovia Films Factory.

The Black Beck is an ordinary watercourse that flows from the south to the north-east through residential properties between the B5032 and the A596. This Innovia Films Factory is therefore situated between the Black Beck and the Wiza Beck. The Black Beck later discharges into the Wiza Beck and is discussed further within Flood Cell B2.

The survey team could not access the full length of the Black Beck or the Wiza Beck due to restricted access and private land ownership.

Photograph 3: Wiza Beck, Looking Upstream

Photograph 4: Flosh Beck, Looking Upstream

Summary of observations

It is concluded that the flooding in this cell was a result of:

- Flood flows in the Wiza Beck exceeding the capacity of the channel in the area upstream of the B5032, resulting in lateral flooding of the sports pitch. This also resulted in bank erosion and collapse of a kissing gate and footpath.

- Flood flows on the Flosh Beck being throttled by the capacity of the culvert which outfalls into the Wiza Beck downstream of the B5302. This issue may have also been compounded by elevated water levels within the Wiza Beck causing a backwater effect on the Flosh Beck. This resulted in the flooding of the fields adjacent to the Wigton Bowling Green.

- Flood flows on the Black Beck exceeding the capacity of the culverted reach beneath the Innovia Films Factory. This resulted in widespread internal flooding within the factory as flows continued in a north-easterly direction towards Station Road.

Flood Cell A2: Innovia Films Factory, Station Road, Royal Mail Post Office, and Station Road Business Park

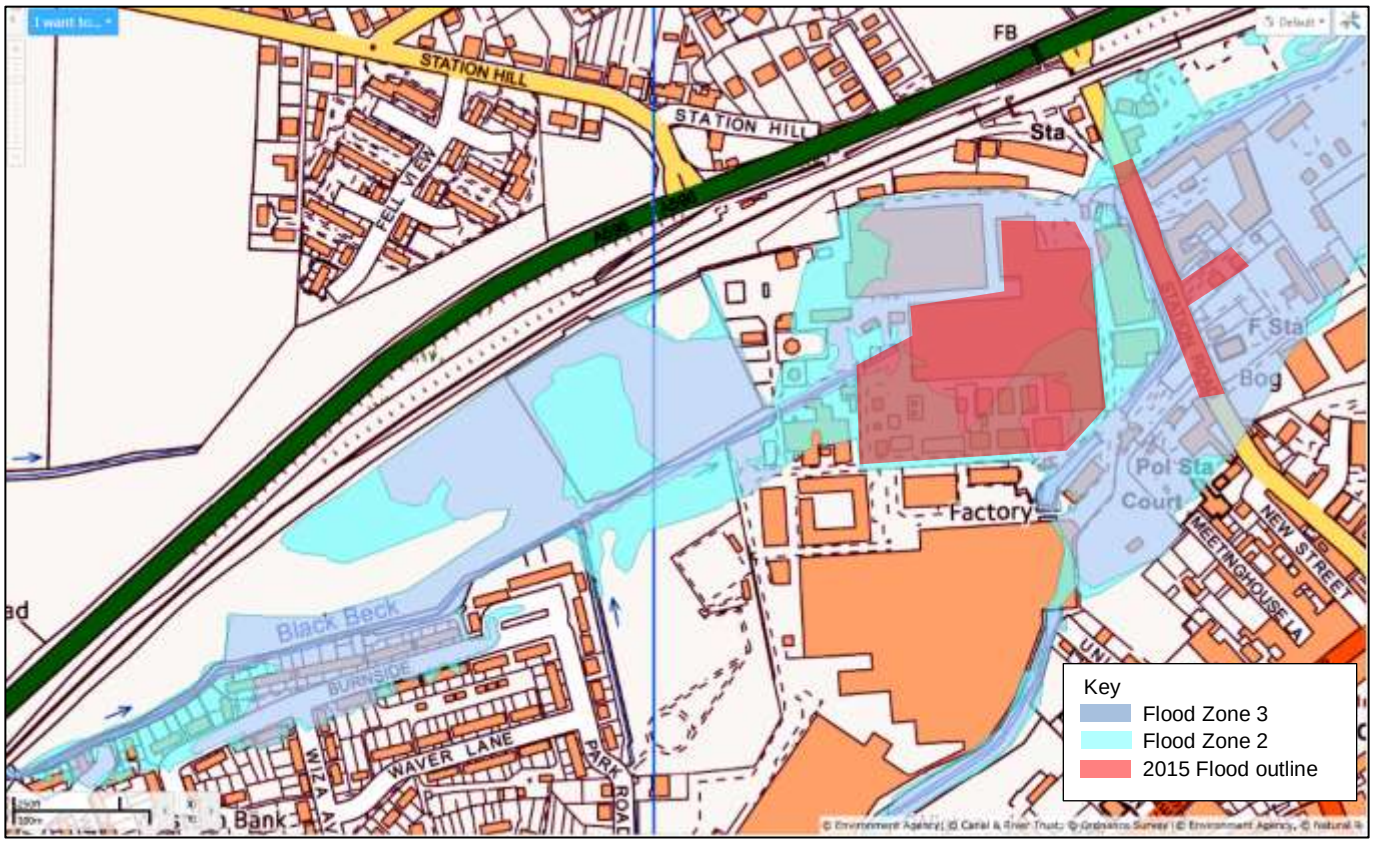


Figure 7: Flood Cell A2 – Flooding mechanisms

The Station Road area is occupied by one of the main roads through Wigton, local businesses and homes including a residential static caravan park. Station Road was flooded from Wiza Beck on the 3rd December 2015 (**Photograph 5**).

A number of residents on Station Road use flood gates and other resilience measures to defend their properties from flooding. On the 3rd and 5th December 2015 floodwater is reported to have reached approximately half a metre up the streetside floodgates, although this did not result in residential property flooding as resilience measures had been put in place.

The Station Road Business Park was protected by sandbags and bags of salt (stock) provided by a local business which diverted the water (**Photograph 6**). The area was also helped by the Fire & Rescue Service pumping water away from property. The Post Office was flooded during the December 2015 event and also on two other previous occasions.

Photograph 5: Flooding on Station Road (3rd Dec 2015)

Photograph 6: Temporary Sandbags and bags of salt on Station Road (7th Dec 2015)

The Innovia Films Factory experienced severe internal flooding, with various locations within the factory being inundated from the Black Beck.

Key Site Observations

The main entrance to the Innovia Films Factory is located on Station Road. As detailed in Flood Cell A1, upstream of this point, the Wiza Beck flows south to north through the Innovia Films Factory and subsequently follows the alignment of Station Road towards the junction with the A596.

The Wiza Becks passes west to east beneath Station Road via a brick arch conduit (**Photograph 7**). The watercourse continues in an easterly direction before later passing beneath the A596. The Black Beck discharges into the Wiza Beck via a pair of large concrete conduits immediately upstream of the Station Road Bridge. An Environment Agency level gauge is located on the Wiza Beck and there is Environment Agency telemetry at this location.

Property-level resilience measures (i.e. flood gates and doors) were observed at multiple properties on Station Road and evidence of post-flood refurbishment works was observed. Sandbags were present at the entrance to the small business trading estate on Station Road.

Photograph 7: Wiza Beck and Station Road

Photograph 8: Flood Gates on Station Road

Summary of observations

It is concluded that the flooding in this cell was a result of:

- The Wiza Beck overtopping the right bank of the watercourse next to Station Road. This consequently led to widespread flooding on Station Road and impacted on residential property, the small business estate and the Royal Mail Post Office.
- The flooding on Station Road may have also been compounded by surface water runoff and flows from the Black Beck.
- The Innovia Films Factory grounds were impacted by flooding from the Wiza Beck and the Black Beck.

Flood Cell B: Lowmoor Road, Wigton Swimming Baths and the Nelson Thomlinson School

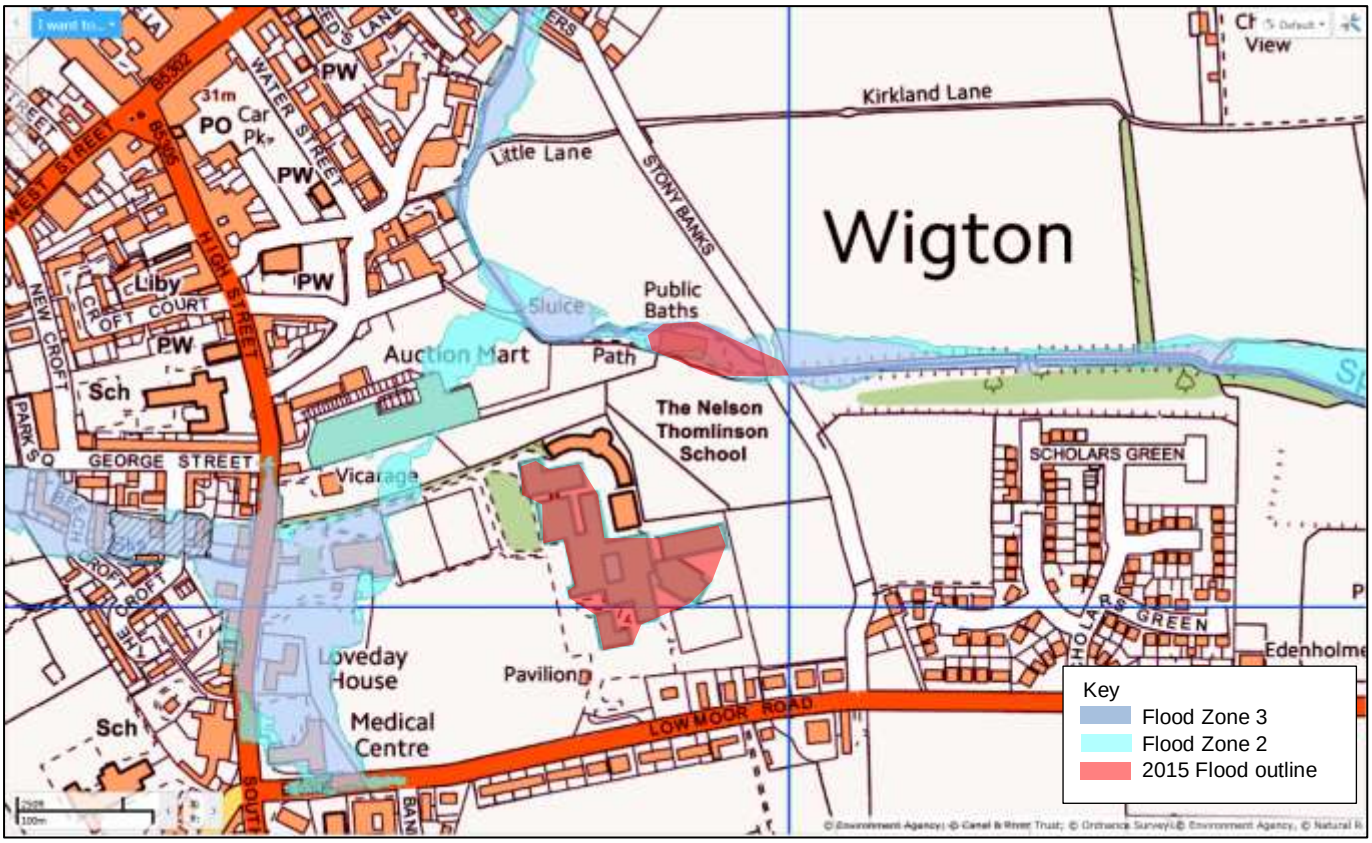


Figure 8: Flood Cell B – Flooding mechanisms

The Wigton Swimming Baths was flooded twice during December 2015. On the 3rd of December the floodwater reached chest height within the building. The water flooded the boiler room and caused damage to pool plant motors, starter motor and electrical circuitry.

The Nelson Thomlinson Secondary School was also affected during the event. The boiler room and the sports hall were flooded resulting in extensive damages (**Photograph 9**). Consequently the school was closed for the day and the sports hall was closed until further repairs and refurbishment could be undertaken. Flooding is likely to have resulted from surface water sources rather than floodwater from Speet Gill or the Flosh Beck.

Photograph 9: Nelson Thomlinson School – Sports Hall Flood Damage

Key Site Observations

The Speet Gill flows east to west through the agricultural land north of the Nelson Thomlinson School at this location. The Speet Gill is constrained by relatively steep valley topography, although Wigton Swimming Baths is located at the bottom of the hillslope adjacent to the watercourse.

The Wigton Swimming Baths (**Photograph 10**) were observed to be closed and a number of sandbags were observed as partially covering the airbricks and access points to the basement.

The Nelson Thomlinson School is, for the most part, located at the crest of a hill between Lowmoor Road and the Speet Gill. The gradient of the site slopes away from the main facility towards its south-west corner where the Sports Hall is located (**Photograph 11**).

Photograph 10: Wigton Swimming Baths

Photograph 11: Nelson Thomlinson School

Summary of observations

It is concluded that the flooding in this cell was a result of:

- The Speet Gill flooding the basin of the valley that contains the Wigton Swimming Baths
- The Sports Hall at the Nelson Thomlinson School is located next to the Flosh Beck that is culverted beneath the B5304. Flooding is likely to have resulted from surface water sources rather than floodwater from Speet Gill or the Flosh Beck. Flood flows on the Flosh Beck watercourse exceeded the capacity of the channel.
- The Sports Hall is also located at the bottom of a hill in a topographic hollow. Given the wet antecedent conditions rainfall would have been unable to effectively infiltrate into the ground and would have resulted in the generation of surface water. This would have consequently been routed across the playing fields, along the topographic gradient, and would have compounded the ponding around the Sports Hall.

Flood Cell C: ATS Garage and Burnfoot Bridge

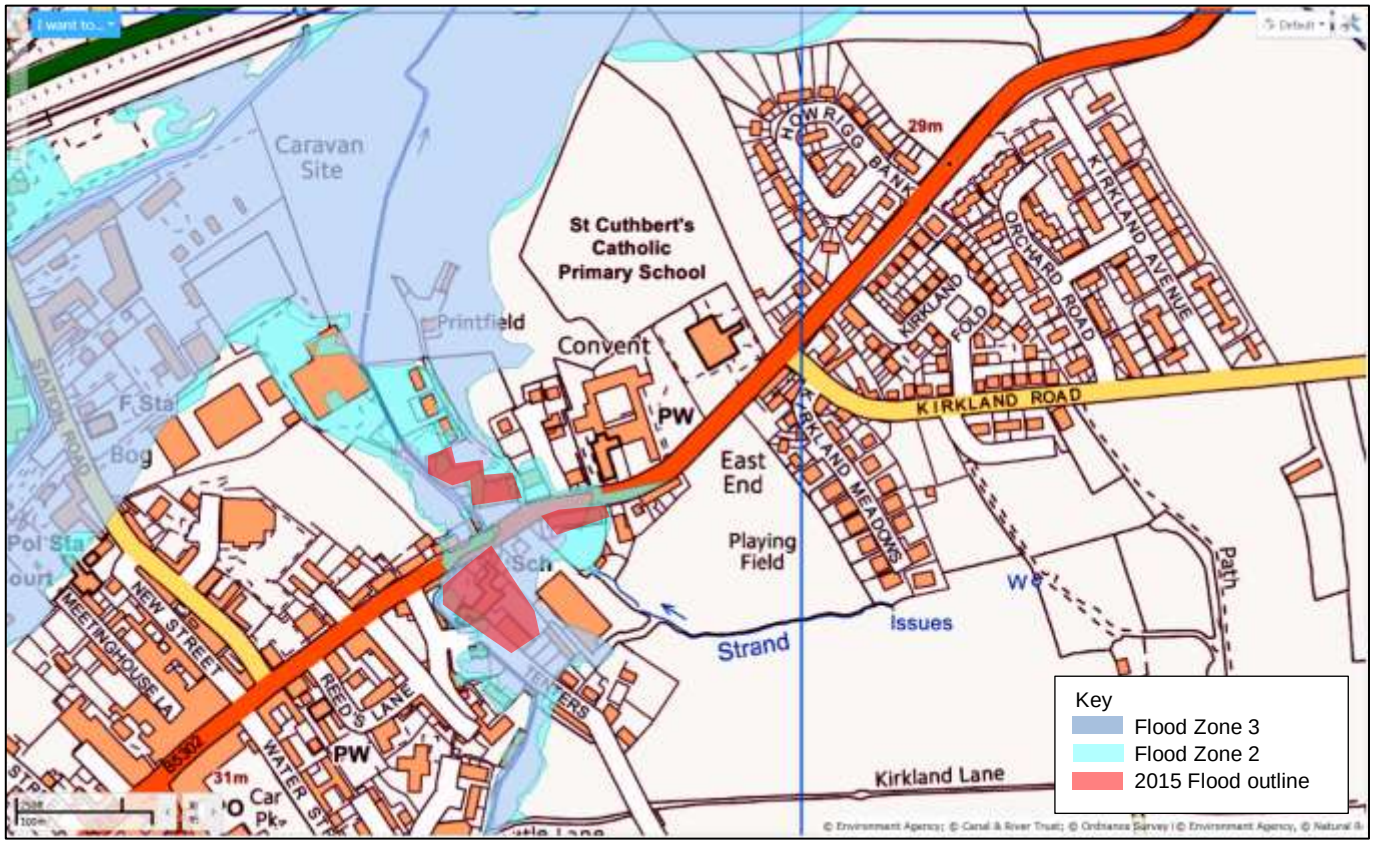


Figure 9: Flood Cell C – Flooding mechanisms

On the east side of Wigton, the ATS Garage and 9 residential properties were affected by flooding from the Speet Gill and an unnamed ordinary watercourse due to a blocked trash screen on a non-main river and severe volumes of flow (**Photograph 12**). This resulted in flooding of the public highway (**Photograph 13**) and ingress to residential properties via air-bricks and other similar openings to property basements. Although water reached Lidl, no ingress occurred.

Photograph 12: Trash Screen on the Tributary Next to Lidl

Photograph 13: Wrack Marks on Burnfoot (7th Dec 2015)

Key Site Observations

An unnamed watercourse flows east to west alongside the Lidl car park. This watercourse is a tributary of the Speet Gill, a main river that flows south to north along Tenters, beneath Burnfoot (B5032) and continues north alongside the ATS Garage.

The unnamed ordinary watercourse is culverted beneath Burnfoot and discharges into the Speet Gill via a circular culvert that is covered by a basic trash screen (of a non-standard Environment Agency design as shown in **Photograph 14**). This design results in difficulty removing debris build up and consequently may lead to a backwater effect from the culvert inlet.

The Speet Gill is bounded on the right bank by a small dwarf wall that may act as a defence but is not considered a formal Environment Agency asset. The Speet Gill passes beneath Burnfoot via a brick arch conduit with a low invert level. This capacity issue may constrain flow conveyance during times of flood and result in a local backwater effect from the structure.

Evidence of historic flooding was observed around the residential properties on the right bank of the Speet Gill (i.e. silt wrack marks and mortar loss). It was observed that residents had previously attempted to prevent water from entering into basements by covering airbricks and other access points into the property.

North of Burnfoot, the Speet Gill passes between the ATS Garage and a series of community-owned allotments on the left bank of the watercourse. The main river later passes by a WCF Pet and Equestrian warehouse that is effectively protected by a local informal embankment comprised of made ground.

Photograph 14: Lidl Trash Screen

Photograph 15: Burnfoot Bridge

Summary of observations

It is concluded that the flooding in this area a result of:

- High water levels in the Speet Gill overtopping the de facto defences on the right bank of the watercourse due to capacity issues beneath the Burnfoot road bridge (**Photograph 15**). This would have subsequently resulted in residential property flooding and inundation of basements via unprotected airbrick covers and other openings.

- The trash screen on the unnamed watercourse at the Lidl car park becoming blocked with debris and resulting in a localised backwater effect and potential overtopping of the culvert into the Lidl car park.

- Floodwater would have been routed over Burnfoot as a result of the throttled capacity on both watercourses. This issue would have been compounded by surface water runoff following the gradient of the topography west of Lidl and adjacent to the residential properties.

- The public highway sits in a topographic hollow at this location and is likely to have resulted in localised ponding that consequently impacted on flooding at the ATS Garage.

Flood Cell D: Spittal Farm

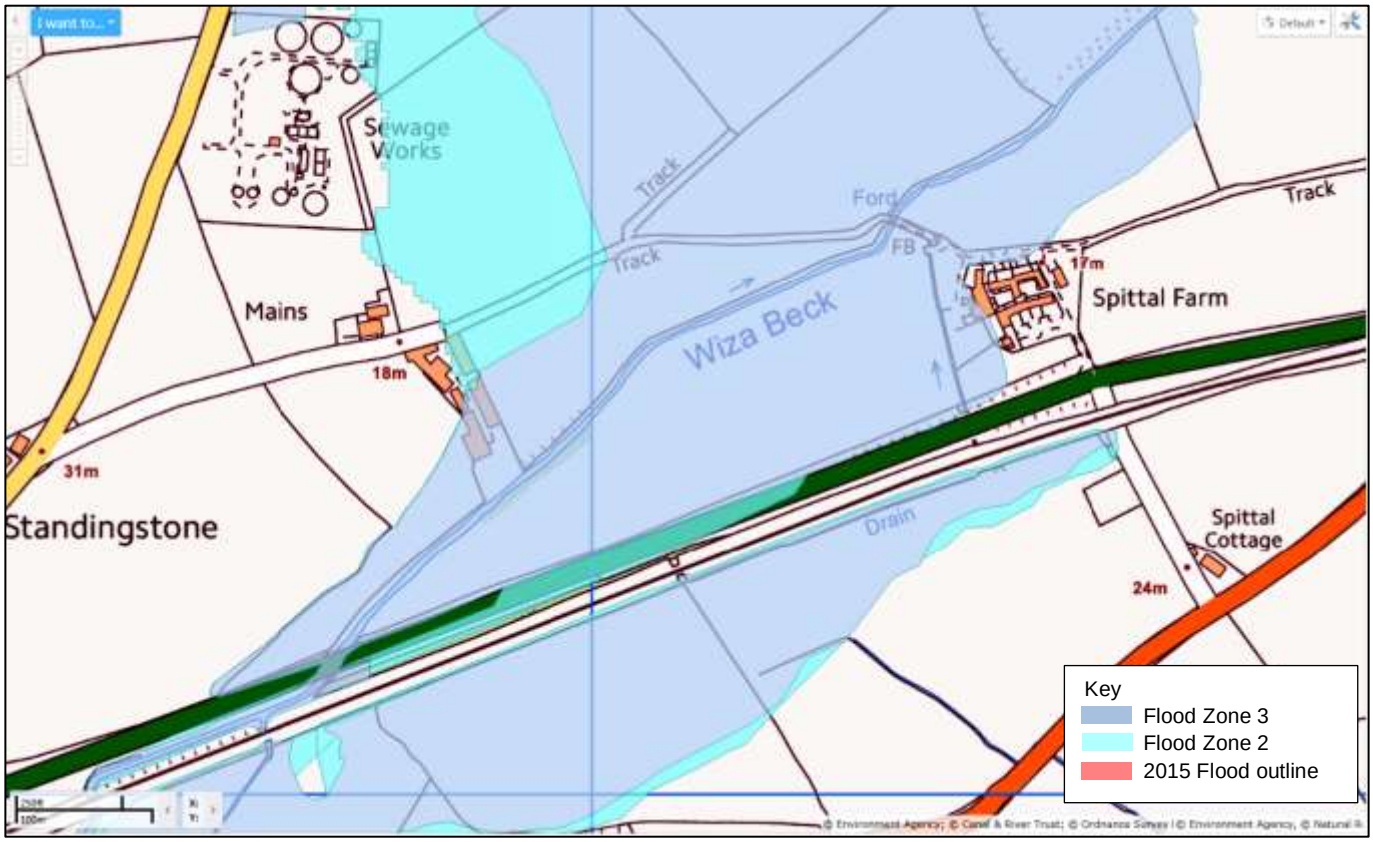


Figure 10: Flood Cell D – Flooding mechanisms

Spittal Farm is a development of approximately 10 houses next to the A596. There is a drainage channel below the Spittal Farm development that discharges into the Wiza Beck. During the December flood event high water levels within this drainage channel caused flooding to two residential properties at Spittal Farm.

Key Site Observations

Spittal Farm is located immediately north of the A596. Spittal Farm has been developed into private accommodation, providing approximately 10 homes. The Farm is bounded on its western side by a drainage ditch from the A596 that subsequently discharges into the Wiza Beck (**Photograph 16** and **17**).

The drainage ditch adjacent to Spittal Farm discharges into the Wiza Beck via a short culverted section. An Environment Agency level gauge with data logger is located immediately upstream of the confluence of the Wiza Beck with the drainage ditch.

Photograph 16: Wiza Beck near Spittal Farm

Photograph 17: Spittal Farm Drainage Channel

Summary of observations

It is concluded that the flooding in this cell was a result of:

- Elevated water levels in the Wiza Beck preventing the drainage ditch from freely discharging into the receiving watercourse. This resulted in a localised backwater effect and consequently flooded properties at Spittal Farm.

Recommendations

Table 5 details recommended actions for various organisations and members of the public to consider.

Cumbria Flood Partnership Theme	Action By	Recommended Action	Timescale
Community Resilience	Cumbria Local Resilience Forum*, Environment Agency	Review and update plans to enable homes & business to be better prepared for flooding & reduce the impacts of flooding.	Complete
	Environment Agency, Cumbria County Council Highways, and Electricity North West.	To review the flood risk and resilience of critical transport, communication, and power supply infrastructure.	2016 - 2017
	Cumbria Planning Group, Allerdale District Council	Review Local Development Plans and Strategic Flood Risk Assessment to reflect current understanding of flooding.	2016 - 2017
	Environment Agency	Ensure all properties at risk can register to receive flood warnings and details are up-to-date.	Complete
	Cumbria Local Resilience Forum*, Environment Agency	Communication: Continue to encourage residents to report issues of flooding. Outline who this should be reported to and what mechanisms are available to report flooding (phone, email, mobile app etc.).	Ongoing
	Cumbria Local Resilience Forum	Records: Ensure systems are set up to efficiently record details of flooding.	2016
Upstream Management	Cumbria Floods Partnership (CFP)	The CFP action plan will consider natural flood management options to reduce flood risk across the	Complete

		catchment. This may also include land use changes and or flood storage.	
Maintenance	Environment Agency	Complete on-going inspections and repairs to assets, which may have been damaged during the flood event.	2016 - 2017
	Environment Agency	Review maintenance programme in response to the flooding events of 2015.	Awaiting recommendations from appraisal - June 2017
Strengthening Defences	Cumbria County Council	As a statutory consultee, CCC will recommend that with any new developments in Wigton, modelling will be submitted to enable a more informed response with regard to flood risk for the Town.	Ongoing
	Environment Agency	Scoping/design of a flood defence scheme in Wigton. Funding has been secured.	Awaiting recommendations from appraisal - June 2017
	Environment Agency	The Environment Agency is carrying out a series of repairs to flood defence assets that were damaged during the floods as part of the c.£10m Asset Recovery Programme which covers Cumbria & Lancashire. This programme of repairs is scheduled to be complete before winter 2016/17.	Complete

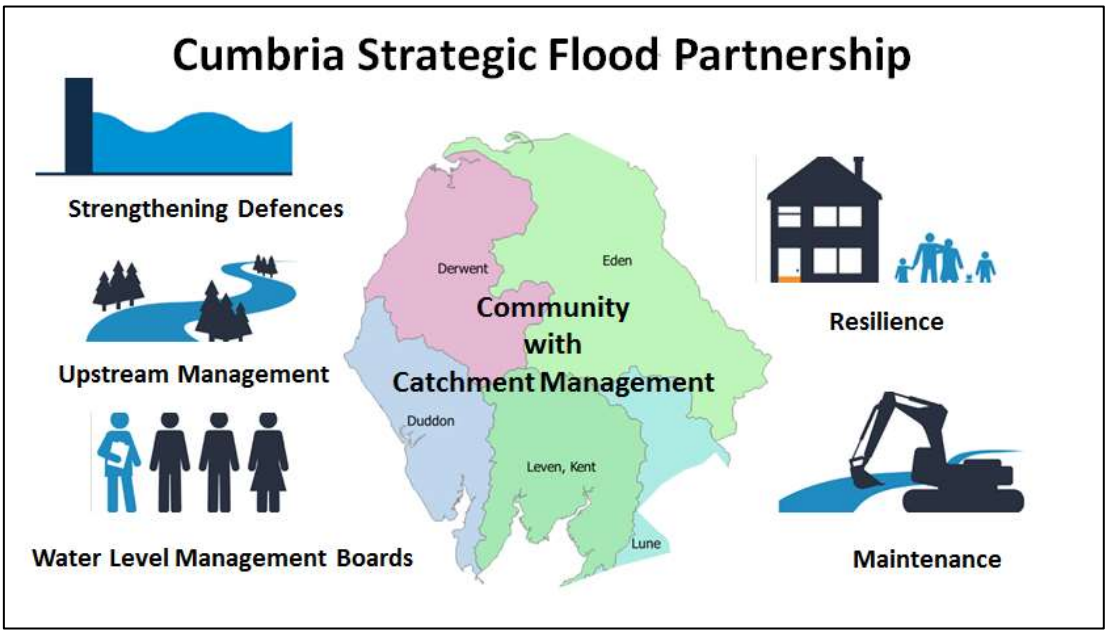
Table 5: Recommended Actions for Wigton

* 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 – Community & Catchment Action Plan

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 defences, 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 diagrams below helps demonstrate how the two partnerships have now come together:



Cumbria Strategic Flood Partnership

RFCC

Cumbria Strategic Partnership Board

Catchment Management Group

Eden

Catchment Management Group

Derwent

Catchment Management Group

Kent and Leven

Steering Groups

(Various per Catchment)

MSFWG

Community

'Farmers, environmental charities, landowners, private companies, councils and government agencies have joined together with a common goal.
To look at the evidence and potential funding sources to find flood solutions for defences, resilience, maintenance, upstream management and water level management boards, so they can work together to help communities at risk of flooding.'

In a dynamic move the Cumbria Strategic Flood Partnership have created three groups whose aim is to look at all options for how flood risk can be reduced in Cumbria.

This group the first of its kind in the country brings together the expertise of all those whose water and land management experience to look at what can be done to protect communities both residential and farming.

They will then discuss their findings to the communities at risk and plan a way forward.

This landmark move will ensure that fully integrated solutions for land and water management are utilised to protect people and the environment in which they live and rely on.

Appendices

Appendix 1: Acronyms and Glossary

Acronym	Definition
EA	Environment Agency
CCC	Cumbria County Council
UU	United Utilities
ABC	Allerdale Borough Council
LLFA	Lead Local Flood Authority
FAG	Flood Action Group
LFRMT	Local Flood Risk Management Team
FWMA	Flood and Water Management Act 2010
LDA	Land Drainage Act 1991
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.
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

Term	Definition
	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, in this case Cumbria County Council.
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.
Mitigation measure	An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere.
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.

Term	Definition
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	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.
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 fail or to allow flooding.

Appendix 2: Additional information from the community

No.	Action
1	Maintenance required to clear Wiza Beck behind Station Road.
2	Ensure compound / cumulative effects are considered.
3	Communicate with landowners and upland rural managers
4	Extend scope of modelling to incorporate the Wampool wetlands. If these are drained, what will be the flood implications for Wigton?
5	Investigate flood storage potential upstream of West Road - use of bailey bridge
6	
7	
8	
9	
10	

Appendix 3: Summary of Relevant Legislation and Flood Risk Management Authorities

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 the LLFA'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 (RMA's). 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 are 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 RMA 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 RMA's 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. These organisations are classed as RMA's.

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. These organisations are classed as RMA's

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. These organisations are classed as RMA's

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 process 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 4: Useful contacts and links

Sign up for Flood Warnings
https://www.gov.uk/sign-up-for-flood-warnings

Environment Agency – Prepare your property for flooding; a guide for householders and small businesses to prepare for floods
https://www.gov.uk/government/publications/prepare-your-property-for-flooding

Environment Agency – What to do before, during and after a flood: Practical advice on what to do to protect you and your property
https://www.gov.uk/government/publications/flooding-what-to-do-before-during-and-after-a-flood

Environment Agency – Living on the Edge: A guide to the rights and responsibilities of riverside occupiers
https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities

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

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আপনি যদি এই তথ্য আপনার নিজের ভাষায় পেতে চান তাহলে অনুগ্রহ করে **01228 606060** নম্বরে টেলিফোন করুন।

如果您希望通过母语了解此信息，
请致电 **01228 606060**

Jeigu norėtumėte gauti šią informaciją savo kalba, skambinkite telefonu 01228 606060

W celu uzyskania informacji w Państwa języku proszę zatelefonować pod numer 01228 606060

Se quiser aceder a esta informação na sua língua, telefone para o 01228 606060

Bu bilgiyi kendi dilinizde görmek istiyorsanız lütfen 01228 606060 numaralı telefonu arayınız

Appendix 4: Flood Warnings and Alerts

- **011FWFNC26A- Wiza Beck & Black Beck at Wigton, Station Rd**

  Flood Warning issued on Thursday 03/12/2015 at 19:56
  Flood Warning removed on Friday 04/12/2015 at 08:12
  Date/Time Warning Level Reached: 03/12/2015 20:00
  Time customers had to take action: 00:03:28
  Customers in Flood Warning area registered on FWD: 48
  Contacts (landline, mobile, email etc) in Flood Warning area registered on FWD: 133
  Successful contacts: 95
  Unsuccessful contacts: 38

  Flood Warning issued on Friday 04/12/2015 at 21:02
  Flood Warning removed on Sunday 05/12/2015 at 18:24
  Date/Time Warning Level Reached: 05/12/2015 13:30
  Time customers had to take action: 16:27:23
  Customers in Flood Warning area registered on FWD: 48
  Contacts (landline, mobile, email etc) in Flood Warning area registered on FWD: 133
  Successful contacts: 96
  Unsuccessful contacts: 37

Two new flood warning areas have since been introduced.