

CUMBRIA COMMUNITY
CONSULTATION SUBMISSION 2018

*IMPROVING CURRENT FUNDING AND
FLOOD RISK MANAGEMENT STRATEGIES
IN CUMBRIA*

Report by Faith Cole

(Flooded 2009 & 2015)

Contributions from:

Dr Brian Campbell & Sue Cashmore

DRAFT COPY



Cumbria Flooded Communities

Illustration by Emma Lindley

EXECUTIVE SUMMARY

This report has been produced by a community representative on the Cumbria Strategic Flood Partnership Board, who is also a committee member of Cumbria Rivers Authority Governance Group (CRAGG) and Coordinator of the Derwent River Catchment Group, which is chaired by Sue Hayman MP. Sue is the Shadow Secretary of State for Environment, Food and Rural Affairs. She has worked alongside cross party MPs in Cumbria to support flooded communities. Sue requested that a Cumbria Submission be put together to investigate the true impacts on the county following Storm Desmond, to explore why current flood alleviation strategies are not working, and to investigate why Cumbria has difficulty in accessing funding for effective flood alleviation measures. She asked if fair and reasonable proposals could be put forward to Government for consideration to provide a fairer allocation of funds, not just for Cumbria but also for other flooded communities who may be having difficulties accessing funding under the current formula rules.

This report illustrates the wider impacts of flooding on communities, providing an assessment of the impacts of recent severe flood events on homes, communities, businesses, essential infrastructure and mental health. It also discusses resilience measures and the unfair funding formula for flood defences.

Cumbria has experienced three extreme flood events within the space of 10 years, in 2005, 2009, and 2015. Some areas also flooded in 2012. These significant storm events have resulted in five fatalities and caused major damage to infrastructure, homes and businesses, and devastated people's lives. Storm Desmond was the latest extreme flood event to hit the county in December 2015 with a cost to the economy of over £5 billion. It brought widespread and unparalleled devastation to four of Cumbria's six districts with record rainfall and river flows causing flooding to twice the number of properties than previous storms and overtopping recently constructed flood defences in Carlisle, Keswick and Cockermouth. The key characteristic to recognise is that the Storm Desmond flood was not a 'one-off'. Being the third extreme flood in ten years emphasises that Cumbria suffers from repeat flooding. This is further emphasised by the overtopping of defences only three years after they were completed. This suggests that risks have been underestimated alongside the Standard of Protection (SOP) being compromised due to insufficient funding.

It is important that the government understands the true extent and consequences that repeat flooding has on people's lives. There must be greater support to help mitigate and prevent future disasters in high risk areas like Cumbria. The current policy-based Flood Risk Management (FRM) strategy has not worked in Cumbria's favour. Since Storm Desmond the emphasis has been on Natural Flood Management (NFM) and Working with Natural Processes (WWNP) with significant tree planting and river restoration projects taking place across the county. However, flooded communities are angry that these measures have since been proven not to have any significant flood risk reduction qualities in larger catchments. Funds that could have been used for flood risk reduction have been side-lined for the benefit of habitats, ecology, biodiversity, and water quality.

The Storm Desmond flood of 2015 was an extreme flood event which brought widespread devastation to the county, impacting infrastructure, communities and businesses over and above the number of homes flooded. Many flooded communities are concerned that they are continually left in an extremely vulnerable position, suffering the same constant cycle of disruption, devastation and risk to life, which has had a significant impact on mental health.

The impacts of Storm Desmond on infrastructure include:

- 7,465 flooded properties equating to an estimated 14,694 people affected.
- Destruction of A591 near Grasmere and closure for six months.
- 107 road closures.
- 354.8 km of carriageway damaged.
- Damage to approximately 792 bridges.
- Damage to public buildings.
- People out of homes for up to three years.
- Closure of the west coast main rail line.
- 1,029 businesses were reported to having been flooded.

Flooding, along with protracted reinstatement works can be extremely traumatic, and the negative impacts on well-being can last for years. In Cumbria, this is exacerbated by the repeating nature of severe flooding. For Cumbrian flood victims, home is no longer viewed as a safe-haven and many are left suffering from stress, anxiety, depression, PTSD and some with suicidal thoughts.

The word 'resilience' is commonly used these days in discussions on flood risk and there have been some efforts to investigate how communities can be made more resilient. This report challenges this approach as it infers that people can somehow be resilient to flooding and fails to properly appreciate the scale of the impacts of flooding, particularly on mental health. How can communities be mentally resilient to frequent severe floods? The current FRM strategy has included pushing the responsibility for reducing flood risk onto communities and households with property level resilience measures. However, due to the depths of flood waters experienced in Cumbria these measures alone are futile.

This report also considers the unfairness of the formula for flood defence spending. Nationally, the provision of flood defences is based on the value of assets protected and therefore the priority of protection is towards wealthy urban areas. This leads to an inequality of opportunity to lead a normal life and impacts profoundly on mental health, as it condemns less wealthy communities, particularly rural ones, to a continuous cycle of overwhelming suffering and disruption, as they are simply treated as collateral damage, and ignored. More urban areas like Carlisle and Kendal are subsequently reliant on the Government's promised Booster Funding for their protection.

Flooded communities urge the government to provide a fairer prioritisation assessment and allocation of funds, with weighted emphasis on the frequency and severity of flood events endured, the depths of flood waters experienced, and the impact on mental health due to the persistent disruption and devastation to life. The inappropriate costing formula and inadequate floods budget for flood alleviation measures needs to be urgently addressed by government as it is clear that funding is not commensurate to need.

ACKNOWLEDGEMENTS

Special thanks to Richard Milne (CRAGG), Dr Ed Henderson (Hydrologist), and Lynne Jones MBE (Chair of Keswick Flood Action Group) for aiding this report.

CONTENTS

EXECUTIVE SUMMARY	2
ACKNOWLEDGEMENTS	3
1 INTRODUCTION.....	6
2 BRIEF OVERVIEW OF CUMBRIA	7
3 IMPACT ASSESSMENT	8
3.1 Introduction	8
3.2 Severe Weather.....	8
3.3 Level of Disruption.....	8
3.4 Impact on Homes	9
3.5 Impact on Community Welfare.....	11
3.6 Critical Infrastructure.....	12
3.6.1 Impact on Rail services.....	12
3.6.2 Impact on Roads	13
3.6.3 Impact on Bridges	15
3.6.4 Impact on Utilities.....	17
3.6.5 Impact on Public Buildings and Education	18
3.6.6 Impact on Municipal Waste	19
3.6.7 Impact on Land and Assets.....	19
3.6.8 Impact on Work	20
3.6.9 Impact on Local Economy and Business	20
3.6.10 Impact on Tourism	20
3.7 Conclusions	21
4 IMPACTS ON MENTAL HEALTH DUE TO SEVERE REPEATED FLOOD EVENTS.....	22
4.1 Introduction	22
4.2 A Snapshot of Statistics for Cumbria	22
4.3 Floods and Mental Health.....	23
4.4 Impact on Mental Health Assessment by Cumbria County Council	23
4.5 Cumbria Community Group - Flood Recovery Questionnaire	23
4.6 Flooding is Classed as a Traumatic Event	24
4.7 Post-Traumatic Stress Disorder.....	25
4.8 The Resilience Myth	25
4.9 Flood Health Survey - Carlisle 2016.....	26

4.10	Rural Needs and Concerns Side-Lined	28
4.11	Economic Wellbeing.....	28
4.12	'Super Ageing Population'	28
4.13	Overwhelming Reinstatement Works.....	29
4.14	Housing is Important to Mental Health	29
4.15	Quotes from Flood Victims.....	29
4.16	Conclusions.....	31
5	RESILIENCE MEASURES OFFER NO MITIGATION FOR DEEP WATER FLOODING	32
5.1	Introduction	32
5.2	Resilience Measures	32
5.3	Contamination.....	33
5.4	Conclusions	33
6	IMPROVING THE CURRENT FLOOD DEFENCE FUNDING FORMULA	34
6.1	Introduction	34
6.2	Some of the Wider Impacts & Costs of Storm Desmond	35
6.3	Fair and Equitable Policy Outcomes for Rural Areas?.....	39
6.4	Partnership Funding	39
6.5	Standard of Protection	40
6.6	The Current System	40
6.7	Reality Needs to Eclipse Modelling	41
6.8	Preserve Cumbria's World Heritage Status	41
6.9	Overall Conclusions	41
7	REFERENCES.....	43
8	APPENDIX	44

1 INTRODUCTION

This report has been put together at the request of Sue Hayman MP, Shadow Secretary of State for Environment, Food and Rural Affairs. She is working together with all cross party MPs in Cumbria to support flooded communities. Sue requested that a Cumbria Submission be put together to investigate the true impacts of repeat flooding on people's lives and the county as a whole and explore why the current flood alleviation strategies are not working for Cumbria. She asked if fair and reasonable proposals could be put forward to Government for consideration to provide a fairer allocation of funding for defences, not just for Cumbria but also for other flooded communities who may be having difficulties accessing funding under the current formula rules.

The report illustrates that flooding not only has devastating consequences for the homeowner but also has much wider negative impacts on communities, businesses, essential infrastructure, and the local economy. It reveals how flooding can be a deeply traumatic experience for those affected and have a significant negative impact on mental health. It discusses resilience measures and examines how the use of property level resilience measures used in isolation cannot withstand deep water floods.

The last section examines the necessity of a much more realistic floods budget and the requirement of a fairer prioritisation assessment and allocation of funds, and provides considerations towards how this might be achieved.

2 BRIEF OVERVIEW OF CUMBRIA

Cumbria is the most north-westerly county in England. It is also the second largest county with an area of 6,768 sq km and yet has a sparse population of just under 500,000 people. The largest employer is the Sellafield nuclear fuel reprocessing and nuclear decommissioning site with a workforce of around 10,000. Carlisle is the only city and has the largest settlement. The highest mountain peaks in England are situated in Cumbria with Scafell Pike being the highest (978 m). Cumbria is home to the Lake District and the Lake District National Park is considered to be one of England's most scenic regions and a favourite holiday destination for walking and climbing, receiving 47 million visitors in 2017 and adding £2.9 billion to the local economy (Source: Cumbria Tourism website) [1]. There are sixteen water bodies that are considered to be the main lakes. The Lake District recently received international and global recognition and was awarded UNESCO World Heritage Status.

Figure 1: Map of Cumbria Districts:



(Source: Cumbria County Council)

3 IMPACT ASSESSMENT

3.1 Introduction

Storm Desmond brought severe gales and record amounts of rainfall to Cumbria in December 2015. This resulted in widespread flooding, damage and devastation to homes, businesses, whole communities, critical infrastructure, and impacted the local economy. This section examines the impacts of flooding on the county.

3.2 Severe Weather

Cumbria is susceptible to significant rainfall and the steep slopes of the mountainous terrain, much of which is low permeability rock and thin frequently saturated soils, create a high volume of surface water runoff leading to torrential river flows and flooding. Experts, such as Professor Richard Dawson¹ (2018), predict a dramatic increase in flooding across the UK over the next few years, with Cumbria projected to be one of the worst hit areas.

Cumbria receives an above average amount of rainfall due to westerly air flows from the Atlantic, and is the wettest part of England. Large precipitation events can be difficult to accurately forecast and complicated by the geography of the county with its mountainous terrain with microclimate valley conditions and the localized orographic enhancement of rainfall. This also creates a disparity in the amount of rainfall within the Eastern and Western Lake District, with North West areas receiving substantially higher amounts than the South East. For example, Keswick has an average rainfall of 1550 mm per annum, yet Penrith, which is situated 18 miles inland to the east of Keswick receives only of 900 mm.

To put rainfall amounts into perspective, the average annual amount of rainfall in London is 600 mm per annum, whilst the average amount of rainfall in Ambleside in Cumbria is 2061 mm. It is also interesting to note that Seathwaite in Borrowdale, west Cumbria, is the wettest inhabited place in England with an average of 3553 mm per annum.

On the 5th December 2015 a gauge at Honister Pass measured 341 mm of rainfall in just a 24 hours, a new UK record. This amount of rainfall is more than half the amount of rainfall that London receives in a whole year. Further to this, a new UK 48-hour record was set at Thirlmere, with 405 mm.

With the latest trend of unprecedented storm events and record rainfall amounts to hit Cumbria and with predictions of more intense and more frequent storm events in the future, it is clear that Flood Risk Management needs to be critically reviewed. Measures need to be put in place to better protect and defend vulnerable communities in flood-prone areas in a much more fair and reasonable manner.

3.3 Level of Disruption

It is difficult to convey the high level of disruption and impact that Storm Desmond had on the county. The recovery process for all those involved has been comprehensive, substantial and protracted due to the scale of disruption and devastation.

¹ Richard Dawson, Professor of Earth System Engineering, Newcastle University.

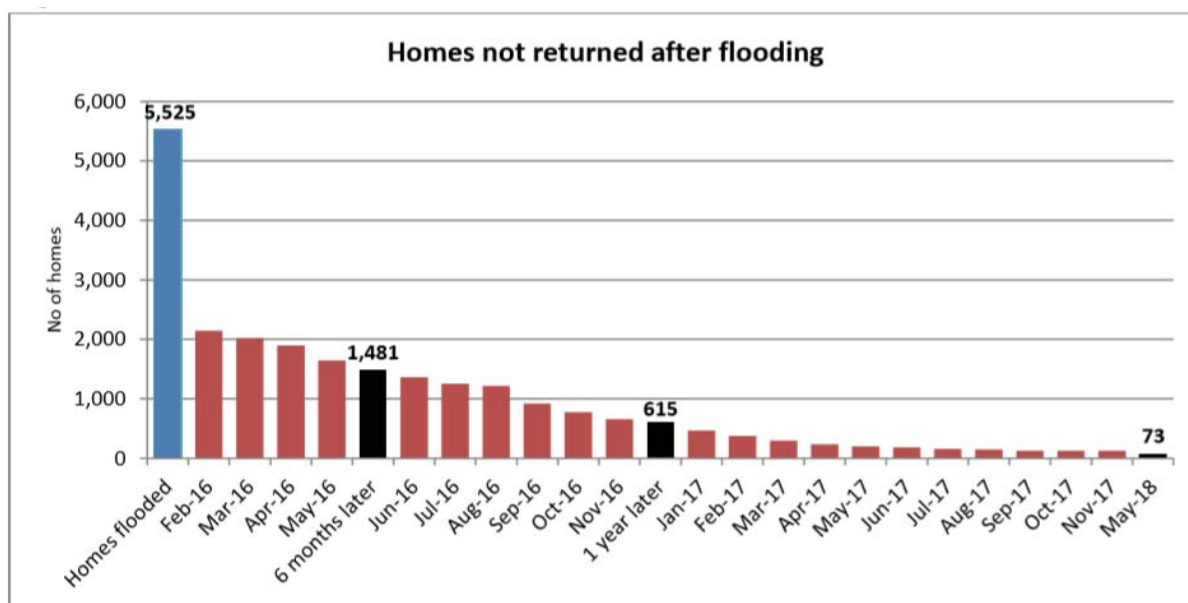
The following section contains evidence and statistics from the Cumbria County Council report – ‘Flooding in Cumbria, December 2015: Impact Assessment’ (July 2018) [2]. On 5/12/15, Storm Desmond wreaked havoc across the county of Cumbria with record breaking amounts of rainfall and river flows causing devastating flooding, which led to:

- 7,465 flooded properties equating to an estimated 14,694 people affected.
- Estimated 17,911 without electricity.
- Clean water supply was lost to some 667 properties.
- 127 incidents of Network Rail delays equating to 100,364 minutes.
- 107 road closures.
- Damage to approximately 792 bridges.
- Diversions as long as 70 miles were necessary in some places.
- 45 schools were affected.
- 3,000 children unable to return to school until the New Year 2016.
- Health services were also severely disrupted with over 1,000 operations cancelled.
- One hospital had to switch to an emergency generator.
- 429 public rights of way across the county were damaged, with repairs and reinstatement works costs amounting to almost £8m.
- 65% of businesses across the county were negatively impacted.
- 4,858 tonnes of flood-related waste.

3.4 Impact on Homes

With such a large number of flooded properties, temporary accommodation was in short supply and difficult to find. Due to the severity and height of the flooding, particularly in Carlisle, residents were unable to return home for some time. For example, six months after Storm Desmond a quarter of households were unable to return to their homes and by May 2018 there were still 73 homes not returned to (see Figure 2 and table 1).

Figure 2: Details of households unable to return home.



(Source: District Councils, Nov 2017 via DCLG Portal)

Table 1: Homes not returned

	Allerdale	Carlisle	Eden	South Lakeland	Cumbria
Homes flooded	1,425	1,667	425	2,008	5,525
Not returned after 6 months	245	958	112	166	1,481
Not returned after 12 months	48	448	42	77	615
Not returned after 18 months	9	77	14	25	125

(Source: District Councils, Nov 2017 via DCLG Portal)

The level of displacement and length of time taken to return home is extremely concerning and has a huge impact on home life and normality. It is also important to note that many people chose to make do with make-shift living arrangements within their property to oversee the necessary works.

Figure 3: Illustration of the depths of water during Storm Desmond 2015 (Carlisle)



(Source: Roger Michael, 2015) [3]

Emergency Services

Emergency services cannot cover such a wide geographical area effectively, leaving many communities cut off and extremely vulnerable. Due to the extent of the flooding over such a wide area, resources are used up quickly, targeting those communities affected first and more densely populated areas such as main towns, often leaving smaller communities fending for themselves.

3.5 Impact on Community Welfare

Utilising data provided by the EA regarding the number of flooded properties and by calculating population to household ratios using data provided by CACI Ltd, estimates were made to the likely number of persons affected by flooding by district. See Table 2.

Table 2: Estimates of persons affected by flooding to properties by district

	Allerdale	Carlisle	Eden	South Lakeland	Total Estimate
Estimate of affected persons in flooded properties	3,380	4,951	1,087	5,276	14,694

(Source: Environment Agency & CACI Ltd, 2016)

Some of the most vulnerable members of the community were affected by the flooding, for example, a care home in Penrith had to be evacuated and sheltered housing residents had to move to temporary accommodation. 237 social housing properties were affected and a vulnerable persons accommodation unit had to be evacuated and two day centres were unable to provide services. Carlisle had a higher proportion of flooded properties within more deprived areas.

Uninsured Households

CACI Ltd data indicated that there were potentially many households without home structure insurance. They estimated that Carlisle and Kendal each had an estimated 1,000 households without home structure insurance. Towns such as Keswick, Flimby, Cockermouth and Appleby each had an estimated number of 100 households without home structure insurance. Further analysis of CACI Ltd data indicated that over a quarter of flooded households were also potentially without home contents insurance.

Flooded households have been under immense pressure trying to cope with increased premiums and/or policy excesses since the spate of floods during 2000s. Many flooded households have experienced extreme hardship, stress and worry as a result of being uninsured. Hopefully this will now stabilise with the introduction of FloodRe and the ability to access affordable insurance for the scheme's 25 year life span at least.

Wider impacts on community welfare and services

Cumbria County Council [2] stated that *'The overall impact on the community was more widespread than the households and individuals directly affected by flooding. Tragically, a male lost his life after he fell into fast flowing floodwater in the swollen River Kent in Kendal. Access to a range of services for the wider community was also affected.'*

'An estimated 1,051 operations, clinics, treatments and diagnostics were either cancelled or rescheduled (elective theatre and outpatients (specialists)). Services provided by a number of general practice surgeries, health centres, pharmacies and dental practices were unavailable for a variety of reasons including flooding of premises, or as a result of areas being isolated by damaged roads and bridges and consequently inaccessible to patients and staff alike. People with learning disabilities were not able to access some day centres. Three adult social care team offices were affected, with the result that in some cases some people were unable to access their benefits for a period of time.'

3.6 Critical Infrastructure

The County of Cumbria is a 'Border' county with Scotland, and a principal interconnector of road and rail with the rest of England and Wales, Scotland, Northern Ireland and the Irish Republic. The county, therefore, has a critical role servicing these economies, as Storm Desmond impacted national, regional and local infrastructure.

3.6.1 Impact on Rail services

Cumbria County Council's Impact Assessment [2] stated *'Storms of early December caused flooding and landslips affecting First Trans Pennine Express and Virgin Train services between Oxenholme Lake District and Penrith. Services were disrupted and degraded in this area for just over two weeks until 20 December 2015 (Source: National Rail Enquiries).'*

'However, at the end of December, Storm Frank caused further damage to the West Coast Main Line at Lamington Viaduct in southern Scotland between Lockerbie and Motherwell. Bus replacement services were introduced, and journeys for passengers travelling from Cumbria to Glasgow increased by around one hour. These arrangements continued until late February 2016 (Source: Rail News <http://www.railnews.co.uk/news/2016/01/19-westcoast-main-line-to.html>)'.

Network Rail – Carlisle to Leeds line disruption

'In addition to West Coast Main Line damage and disruption, repeated storms in December and saturated ground following further poor weather in January caused a landslip at Eden Brows, 3km north of Armathwaite on the Carlisle to Settle line. An estimated 500,000 tonnes of earth moved and were still on the move at mid-March 2016, with ground movement causing a twist fault in the track. The extent of the landslip made it unsafe to run trains, and therefore services provided by Northern Rail in both directions between Carlisle and Appleby were replaced by a bus service, extending journey times for passengers by up to 60 minutes. Repairs involved building a support structure under the railway, complicated by the scale of the landslip, earth continuing to move, and an inaccessible location (Source: National Rail Enquiries). The Carlisle to Settle line re-opened in March 2017'.

'As a result of severe weather impacts beyond Network Rail's responsibility, 127 incidents over December 2015 and January 2016 caused total delays on the Network Rail network of 100,364 minutes, resulting in Schedule 8 costs to compensate train operators for the financial impact of delays in the region of £9.3m'.

'Public Performance Measure (PPMs) indicate the percentage of trains arriving at their terminating station on time, combining figures for punctuality and reliability into a single performance measure. There were approximately 3,750 PPM failures in Period 9 (16 November to 12 December 2015) for all operators across the London North Western route, and around 2,200 in Period 10 (13 December 2015 to 09 January 2016). In comparison, PPMs for Periods 09 and 10 in 2014/15 were around 400 and 550 respectively" (Source: Network Rail via Cumbria County Council Community Rail Manager, 2016)'.

3.6.2 Impact on Roads

Cumbria is the second largest county in England and yet the most sparsely populated with an extremely lengthy narrow country road network connecting smaller communities. These can be difficult to reach often over old stone bridges, which may have been destroyed during a flood, or deemed unsafe for critical periods of time post-flood. This leaves many individuals vulnerable to injury and significantly increases the risk to loss of life.

The M6 motorway is the principle road connector with Scotland, Northern Ireland and Eire and was over-topped in two places, East of Kendal, and East of Carlisle. The consequences of closure nationally is significant as there is no real alternative route capable of carrying the volume of traffic.

Storm Desmond caused a significant amount of damage to Cumbria's highway network. An assessment of highway damage was completed by May 2016 revealing that an estimated 354.8 km of carriageway had been damaged (see table 3), 56% of which was considered to be significant damage.

Cumbria is an international major tourist attraction and substantial employer within the National Park. The county was paralysed for some six months with the major structural failure of the A591. Approximately 21 miles of the route became completely impassable due to a serious landslide dividing the county North and South. This caused considerable local economic hardship, and access to work, education and other public services was impeded, with lengthy diversions and delays which doubled the travel distance to 41 miles. The road reopened in May 2016. The longest diversion route was 70 miles following structural failure of the A686.

Table 3: Length of damage by carriageway classification

	Length of route affected (km)
Strategic routes (strategic A class roads)	62.6
Main distributors (other A class roads)	32.0
Secondary distributors (mainly B class roads)	225.9
Local access roads (mainly unclassified, U-class roads)	33.9
Link roads	0.5
TOTAL	354.8

(Source: Cumbria County Council, 2016)

Road Closures

Road closures following Storm Desmond brought long diversions and widespread disruption to 107 different locations across the county. Roads were closed as a result of flooding, subsidence, landslides, damaged carriageways, bridge damage and bridges awaiting safety inspections, and culvert subsidence. This had a major impact on bus services. Some routes opened relatively quickly, for example, once flood waters had receded. However, some remained closed for longer awaiting safety inspections or essential works to be carried out.

Table 4: Number of Roads closed across Cumbria

District	Allerdale	Barrow	Carlisle	Eden	South Lakeland
Number of roads closed	37	1	16	28	26

(Source: Cumbria County Council, 2016)

3.6.3 Impact on Bridges

Flooding of bridges has raised concerns about the ability of these essential structures to cope with severe flooding. Losing the ability to access this crucial infrastructure can cause major disruption. The scale of the problem is illustrated in Figure 5. There are 1,700 bridge structures within Cumbria's highway network. 131 bridges were identified as being of strategic importance and requiring immediate inspection. Pedestrian access was hampered with certain bridge closures dividing towns and preventing those on foot accessing services. By mid-May 2016, Cumbria County Council estimated that 792 bridges had been affected across the county:

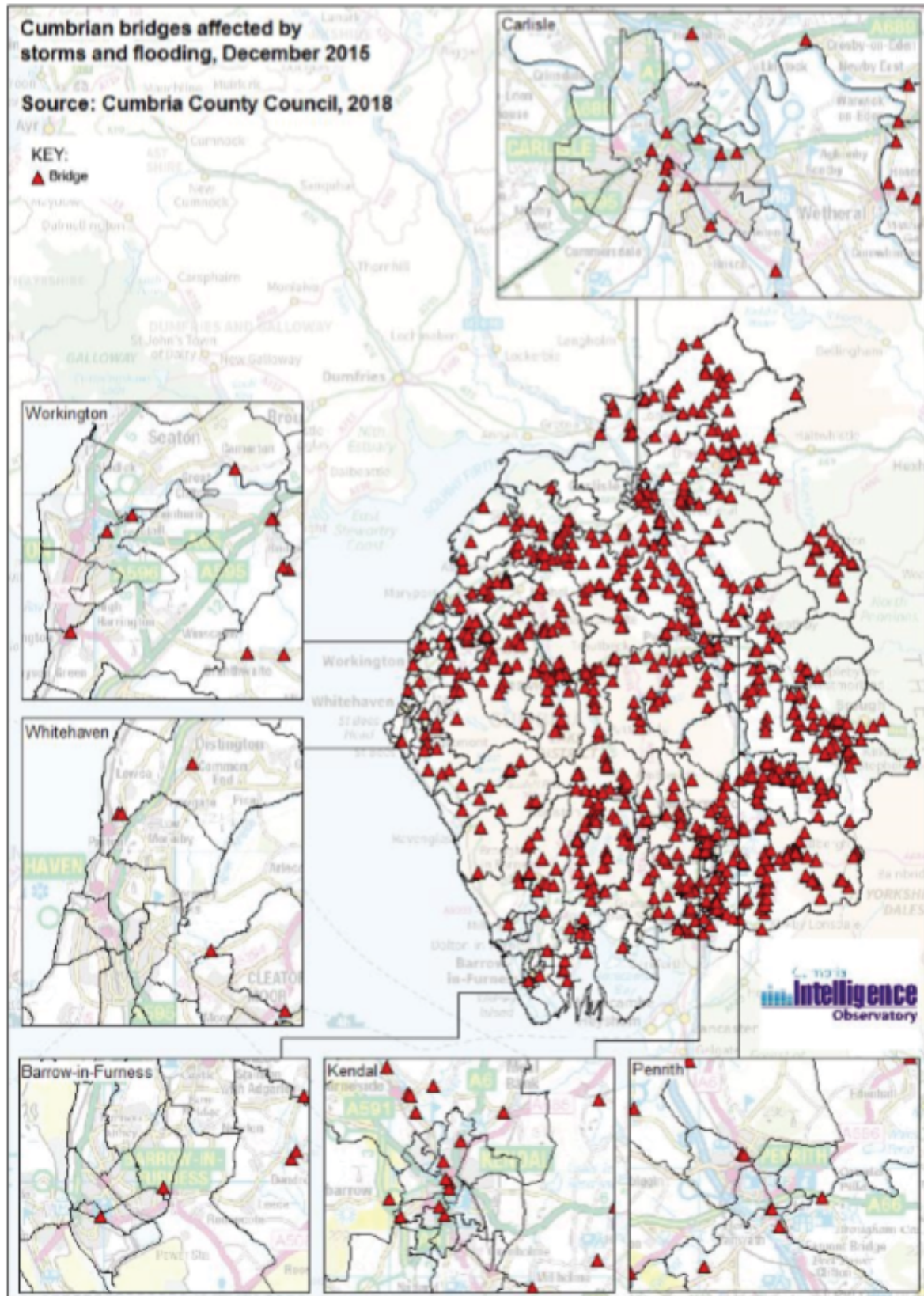
- 216 bridges had incurred minor damage.
- 504 had been affected by flood, and required further detailed assessment.
- 30 had signs of significant damage.
- 42 were structurally and functionally impaired.

Figure 4: Forge bridge (Grade 2 listed) in Keswick



(Source: Keswick Flood Action Group, posted 2016) [4]

Figure 5: Cumbrian bridges affected by storms and flooding, December 2015



(c) Crown Copyright and Database Right, 2018 Ordnance Survey Licence Number 100019596

3.6.4 Impact on Utilities

Estimated 17,911 customers without electricity

Flooding to a number of smaller sub-stations resulted in an estimated 17,911 customers without electricity. This is illustrated in Table 5 by district.

Table 5: Customers without power 5th December 2015

District	Customers without power at peak of flooding
Allerdale	1,486
Carlisle	13,000
Eden	2,417
South Lakeland	1,008
Total	17,911

(Source: Electricity North West, 2016)

Time taken to restore power:

- 9.8% had power restored by 7pm on 5th December.
- 1,454 remained without power by the end of 7th December.
- 750 still without power 6 days after the event.
- Majority of customers had power restored by 8 days.
- After 8 days some properties were still flooded so electricity could not be restored.
- Several properties were so badly damaged electricity could not be safely restored.

Gas supply

Although gas supply was only affected to a small number of properties, it is not clear if this was as a direct result of flooding. However, following the floods, supply was cut off to 70+ properties near Ambleside due to failure of an underground regulator. Further to this, 170 residential properties were without gas near Carlisle, as a result of water in the gas main. (Source: Northern Gas Networks referenced from Cumbria County Council 2016) [2].

Communications – Fibre optic connector

A substantial number of customers were affected by several flooded power stations resulting in disruption to 57 Digital Subscriber Line Access Multiplexer fibre cabinets. These came back into service once power was restored. Flood waters also directly affected telecoms infrastructure completely flooding 37 copper cabinets and water pressure caused 19 cables to fail. The full extent of the impact on customers is unknown but British Telecom showed the status of faults on the 16/12/18 as 3,007 which was 11 days after flooding.

Impact on water supply and waste water assets

Around the county flooding caused damage and disruption to around 70 wastewater treatment works and around 110 pumping stations and a total of 731 United Utilities assets were impacted. Some sites were completely flooded or experienced high flows which

damaged electrical and mechanical equipment and biological processes. As a result 667 properties initially lost their clean water supply. It is estimated that the cost of damage to water assets affected was in excess of £50 million (Source: United Utilities referenced from Cumbria County Council 2016) [2].

3.6.5 Impact on Public Buildings and Education

Several public buildings (excluding schools) were damaged and users had to be relocated during the storms and flooding across the four districts included police stations, a custody complex, police headquarters, and fire stations. Further to this a total of 32 assets were damaged across 4 districts including care homes, a homeless hostel, community centres, libraries, museum and leisure centres.

A total of 44 schools in the county and one school in Lancashire attended by students from Cumbria were closed following the floods. This disruption affected an estimated 12,251 children. Three schools were used as Emergency Assistance Centres, others were damaged by flooding. Some had issues with lack of utilities and heating, staffing shortages and accessibility issues. Four schools in Carlisle had to remain closed with over 3,000 children unable to attend for the remainder of the Autumn Term. Parents had to organise childcare or stay with children, which had a significant impact on jobs. This period disrupted December exams for some students. Across the county, nursery schools were similarly impacted, with a total of 17 closed leading to the disruption of 914 pupils.

By April 2018 two schools were still using temporary classrooms, or alternative temporary accommodation and one of these schools will be relocating to a new site which should be operational by 2020.

Table 6: School premises closed by storms and flooding at 11/12/15

District	Schools	Pupils Affected	Nurseries	Pupils Affected
Allerdale	11	2,945	1	6
Carlisle	15	6,456	7	592
Eden	7	1,464	2	74
South Lakeland	11	1,386	7	242
Total	44	12,251	17	914

(Source: Cumbria County Council, 2016)

Disruption to school transport

Many school children in Cumbria are eligible for free school transport. However, in the aftermath of the storms a number of roads and bridges became impassable, leading to disruption and lengthy diversions. The cost to Cumbria County Council for providing alternative transport was in the region of £99k (Source: Integrated Transport Team referenced from Cumbria County Council 2016) [2].

3.6.6 Impact on Municipal Waste

There was a familiar sight of skip-lined streets and large volumes of flood waste on pavements. Due to the number of residential properties and businesses affected the volume of municipal waste increased significantly. Such was the demand for disposal of flood waste that district councils had to work around the clock for several weeks. A total of 4,858 tonnes of flood related waste was received which was sent to landfill due to high levels of contamination. This understandably had a negative impact on landfill performance and recycling rates and disposal of flood damaged waste cost the County Council an estimated £844k (Source: Waste Services referenced from Cumbria County Council 2016) [2].

3.6.7 Impact on Land and Assets

Damage to Forestry Assets, rural landscape, habitats, and nature

Forestry assets were damaged within Allerdale and South Lakeland, including riverside woodlands, forest paths, tracks, bridges, forest drainage infrastructure and culverts with an estimated £185k cost of repairs. Concerns that damage to recreational infrastructure and visitor facilities could have a medium to long term impact on the tourism industry. (Source: Forestry Commission referenced from Cumbria County Council 2016) [2].

Damage to the rural landscape was caused by several landslides with an estimated cost of repair in the region of £2m. However, river restoration works could be in the region of £7m (Source National Trust: Environment Agency referenced from Cumbria County Council 2016) [2]. Damage occurred to peat bunds, bog areas and upland planting with estimated cost of repair in the region of £7m (Source: Natural England referenced from Cumbria County Council 2016) [2].

Impact on farmland, assets and businesses:

- Approximately 600 farming business across the county were impacted.
- Damage experienced to boundaries, stock proof fencing, dry stone walls, access tracks and bridges.
- Land damaged by debris deposits of gravel and silt from rivers up to 10 hectares in some instances.
- Removal of gravel challenging as consents required from EA to prevent further damage to fragile habitats.
- Livestock health and welfare affected.
- Forage lost as silage and straw washed away.
- 702 cattle and sheep are known to have drowned.

Damage to non-agricultural land, recreational facilities and public rights of way

Non-agricultural land and recreational facilities were impacted across the county by deposits of gravel, silt and debris. For example, leisure facilities, public parks, fencing and car park facilities required significant reinstatement works. Storms caused extensive damage to 165 public paths, 257 missing or damaged bridges, and 108 damaged gates and stiles across 64 parishes. The overall cost to the Public Rights of Way network in the Lake District National Park was £5,790,381 (Source Lake District National Park Authority, 2016 referenced from Cumbria County Council) [2]. Outside the National Park the total cost of repairs of damage to footpaths and network bridges was in the region of £2,117m (Source: Cumbria County Council, 2018) [2].

3.6.8 Impact on Work

Work for many was impacted by power cuts, poor internet and communication systems and many homes and businesses became a scene of devastation. Many roads and bridges were inaccessible increasing journey times significantly. Both employers and employees were caught up in the aftermath of flooding and tasked with rescuing belongings, clearing up, organising alternative accommodation, childcare, meeting with loss adjusters, and trades people.

3.6.9 Impact on Local Economy and Business

Flooding has damaged the local economy with lost productivity and has also had a negative impact on tourism of which the region heavily relies.

Key Findings:

- An estimated 2,923 active businesses were located in flood extent areas employing around 25,112 people (not including public corporations, central / local government)
- Businesses located in flood extent areas represent 10.3% of all business in Cumbria and 13% of all employment and account for £871m of economic output.
- 1,029 businesses were reported to having been flooded.
- 65% of businesses throughout Cumbria reported being negatively impacted by floods.
- 60% of affected businesses reported financial losses as a result of the floods.
- £54,600 was expected to be the average cost of financial loss to businesses with less than a third being able to claim losses back through insurance.
- 73% of businesses were concerned about further risks of storms and flooding in the near future.
- 68% of businesses were worried about the future costs of insurance.

(Source: Cumbria Intelligence Observatory website referenced from Cumbria County Council) [2]

3.6.10 Impact on Tourism

Tourism is a major part of the economy in Cumbria. However, following the floods, the tourist industry significantly downplayed the impact across the region, sending out the message almost immediately 'open for business' which increased the stress levels of business owners and left many feeling their issues were being ignored. However, the images of devastation had a negative impact on tourism and people stayed away which had a negative impact on the local economy.

Key Findings:

- Following two years of strong performance and positive upward trends in visitor numbers and profits, the situation was reversed post floods with 76% decrease in tourism business profits down and the same proportion of visitor numbers down.
- Overseas markets affected with 57% of Cumbria's tourism businesses reported reduced numbers of international visitors.
- Four months on from the floods 77% of businesses were suffering from reduced bookings and enquires.

- More than half of tourism businesses were affected from bridge and road closures four months on from the floods and the same number had cancellations from pre-booked visitors.
 - 45% of tourism businesses had issues around recruitment, retaining and accommodating staff. 17% of staff lost their jobs.
 - £25,000 was the average loss to each affected business.
 - 57% of businesses had to offer price reductions to entice customers.
- (Source: Cumbria Intelligence Observatory website referenced from Cumbria County Council) [2]

3.7 Conclusions

The Impact Assessment clearly illustrates the catastrophic level of damage and destruction that Storm Desmond inflicted on homes, businesses, communities, and critical infrastructure across much of Cumbria. This extraordinary level of chaos and disruption to people's lives is unacceptable, particularly when they have already had to deal with other similar flood events in such a short space of time.

Flooding has a serious impact on people's lives with some of the most vulnerable members of the community affected. Local resident, Dr Ed Henderson stated *"The effects of the floods are personal. Thousands of Cumbrians, like people in other flood-affected parts of the country, have seen their lives upturned. Many have experienced life-changing financial losses and incredible stress. Speaking with flood victims, the words that come out are despair, fear and anxiety of an approaching winter. Floods don't just take your home, the place where you should feel safe, they often take your future as well"* (Source: Dr Ed Henderson, Cumbria resident and co-author of the National Hydrological Monitoring Programme Review [5])

The Committee on Climate Change (2015) [6] pointed out that the UK Government's investments in flood defences were insufficient to take account of the impacts of climate change and other factors. It stated *"Over the last four years there has been underinvestment in flood and coastal risk management in England, totalling more than £200 million. Due to this underinvestment, expected annual flood damage will be higher now than it was in 2010."* The Committee recommended that the Government should develop a strategy to address the increasing number of homes in areas of high flood risk but the Government rejected this advice.

Inadequate government spending on flood alleviation measures in the wettest part of the country is incomprehensible, not justifiable, and is totally unacceptable. The failure of the government to invest more in flood alleviation measures leaves people like those in Cumbria with a huge price to pay.

4 IMPACTS ON MENTAL HEALTH DUE TO SEVERE REPEATED FLOOD EVENTS

4.1 Introduction

“In high income countries such as the UK, flood events usually cause few immediate deaths, and the greatest burden on health is the increase in mental illnesses. One study estimated that 80% of all the disability adjusted life-years attributable to floods in the UK were due to mental health” (Source: The Lancet Planetary Health, 2017) [7] It must be recognised that there are significant risks to life and substantial impacts on mental health caused by severe repeated flood events which can have costly repercussions over long periods of time.

Cumbria has suffered some of the most severe repeated flood events over the past few years. Flooding can be a deeply traumatic experience for those affected and have a significant negative impact on mental health. The impact on mental health, and the capability of individuals and communities to cope with the stress generated is currently under-researched. However, it is acknowledged that there is a long term psychological effect with negative impacts on wellbeing exhibited for years, not months. Repeat severe flooding places individuals and communities under severe stress and can cause anxiety, pain, depression, social dysfunctions, and Post Traumatic Stress Disorder (PTSD). This for many has been exacerbated by a lack of progress in reducing the exposure and vulnerability through the current Flood Risk Management strategy, political decision making and policies.

The trauma for many in Cumbria has been acute with thousands of people trying to cope with the high level of disruption to life and normal daily routines. For numerous people there has been an unacceptable level of re-traumatisation as many have memories of coping with previous events. They clearly recall the stress, length of time and endurance involved in attempting to return to normal life. Research has shown that the higher the level of exposure to flooding, the higher the levels of mental health related problems prevail.

4.2 A Snapshot of Statistics for Cumbria

Life in Cumbria is not the perfect picture postcard image that is often portrayed. It is a county of contrasts with some communities facing real poverty and disadvantage. Cumbria Community Foundation [8] highlighted some of the major persistent problems in Cumbria, based around the 498,000 people who live there:

- 1 in 5 have a long-term health problem or disability.
- 1,800 are diagnosed with dementia every year.
- 1 in 4 people will be aged over 65 in 2020.
- 32,000 pensioners live alone.
- Apart from one district, household incomes are below the national average.
- 1 in 8 people have an income of less than £10,000 a year.
- 11,700 children live in poverty.
- 1 in 10 children are estimated to have an emotional/wellbeing problem.
- Life expectancy varies by almost 20 years between the poorest and the wealthy.
- 34,000 people experience depression.

4.3 Floods and Mental Health

Floods exacerbate, instigate or provoke mental health problems. Risk factors include previous flood experiences, greater flood depth or flood trauma, existing illnesses, low education or socio-economic status and social connectedness.

Severe repeated flooding across Cumbria, along with several close calls, has taken its toll on the ability of many individuals to cope. Many Cumbrians have suffered with repeated loss and damage to personal possessions and property, disruption and deterioration to the quality of life, alongside time off work and dealing with the financial consequences, loss adjusters, builders, and security issues. Home is no longer viewed as a safe-haven and many are left suffering from stress, anxiety, depression, PTSD and some with suicidal thoughts.

Many people across Cumbria have not returned to experiencing higher levels of wellbeing before another flood is upon them. Some constantly check river levels and feel physically sick every time there is heavy rainfall. Sadly, relationships are put under enormous strain and unfortunately some have fallen apart.

4.4 Impact on Mental Health Assessment by Cumbria County Council

Cumbria County Council [2] reported *'The impacts on mental health and wellbeing are anticipated in the long term, both due to the trauma of flooded homes and fears of future flooding. Stress, depression, anxiety and panic attacks are conditions often reported by flood victims. Mental health service providers in Cumbria reported a spike in the number of mental health referrals immediately following the floods and then again 6 months after. However, it is thought that the number of people accessing mental health services in Cumbria (linked to flooding) were significantly underreported and that individuals may have been accessing support in other ways such as directly with GP Practices. Work is ongoing to understand and document this impact.'*

Cumbrian residents raised concerns about a number of other issues. Information gathered by a number of organisations shows that some residents in isolated areas found it difficult to access food and home supplies, either as a result of road and bridge closures, or by the closure of a number of local food stores and the flooding and closure of two major supermarkets in Carlisle (Sainsbury and Tesco). Some communities perceived that they had been overlooked, and felt forgotten or ignored by their local authority, feeling that the focus was on the worst affected areas. There was a perceived lack of communication from local authorities. Concern was also raised about the disruption caused by the cleaning up process, and the overall impact on tourism. Some residents reported feeling traumatised'

4.5 Cumbria Community Group - Flood Recovery Questionnaire

Cumbria County Council [2] also stated *'The survey carried out by the Cumbria Community Recovery Group reported that in the areas that were cut off by the floods, a sense of vulnerability and loss of control was created which re-emerged following further heavy rainfall. People reported anxiety and symptoms of PTSD which were worsened for those who were at risk of losing their jobs due to taking time off work. Often those who are already vulnerable due to low income, disability, caring responsibilities, existing physical or mental health conditions, or older people find the recovery process more difficult. Families with*

children, older and frail adults as well as single people in Cumbria have found it difficult; elderly residents have felt vulnerable; families with young children have felt over stretched and overwhelmed; while for others there is a sense of loss and sadness about their communities. It can often take a long time for people to come forward and seek help; often they simply do not have time to consider their mental wellbeing, or do not feel safe enough to explore their feelings as they are worried that they may not be able to cope with them in addition to the physical and practical issues they have to deal with'

4.6 Flooding is Classified as a Traumatic Event

Flooding is a traumatic event which causes moderate to severe stress reactions. The common responses to a traumatic event are summarised in Table 7. The effects on individuals suffering multiple flood events are likely to be cumulative.

Table 7: Common Responses to a Traumatic Event

Cognitive	Emotional	Physical	Behavioural
<ul style="list-style-type: none"> • Poor concentration • Confusion • Disorientation • Indecisiveness • Shortened attention span • Memory loss • Unwanted memories • difficulty making decisions 	<ul style="list-style-type: none"> • Shock • Numbness • Feeling overwhelmed • Depression • Feeling lost • Fear of harm to self and/or loved ones • Feeling nothing • Feeling abandoned • Uncertainty of feelings • Volatile emotions 	<ul style="list-style-type: none"> • Nausea • Light headedness • Dizziness • Gastro-intestinal problems • Rapid heart rate • Tremors • Headaches • Grinding teeth • Fatigue • Poor sleep • Pain • Hyperarousal • Jumpiness 	<ul style="list-style-type: none"> • Suspicion • Irritability • Arguments with friends and loved ones • Withdrawal • Excessive silence • Inappropriate humour • Increased/decreased eating • Change in sexual desire or functioning • Increased smoking • Increased substance use or abuse

(Source: Health Protection Agency, The effects of flooding on mental health, 2011 [9])

Figure 6: Struggles of deep water flooding (Carlisle)



(Source: RSOE EDIS, posted 2015) [10]

4.7 Post-Traumatic Stress Disorder

Severe repeated flooding in Cumbria has had a major impact on mental health with many suffering symptoms of PTSD. This is defined as a delayed and/or protracted response to a stressful event of an exceptionally threatening or catastrophic nature.

PTSD can have a significant impact on day to day life with those affected re-experiencing the trauma in the form of flashbacks, nightmares, repetitive and distressing images or sensations. Symptoms may also include depression and physical sensations such as pain, sweating, nausea and trembling. People can suffer constant negative thoughts about their experience whilst others try to push memories of the event out of their mind. This can lead to withdrawal or the use of drugs and/or alcohol to numb the distress and blunt the emotion.

Those suffering from PTSD may find it hard to relax and feel anxious, irritable and prone to angry outbursts. They may suffer from insomnia and find it difficult to concentrate. Children can be affected by PTSD and suffer similar symptoms to adults but may also suffer from bedwetting and/or separation anxiety and clingy behaviour and complain of stomach aches and headaches.

4.8 The Resilience Myth

Resilience is a key term used in flood risk management and has often been applied to describe flood victims following flooding in Cumbria. However, it must be appreciated that flooded communities across the county interpret this term in an extremely negative and offensive way. It implies that flood victims are just able to bounce back and recover quickly or easily from flooding. That somehow people in Cumbria are more unique or hardy, robust and

adaptable. The term appears to indicate that people have an ability to maintain or return to a stable state with ease when this is clearly not the case.

The Express newspaper [11] reported *‘Cumbria Alcohol and Drug Advisory Service (CADAS) has revealed that they have seen an increasing number of residents turn to drink or drugs after seeing their lives torn apart’*. This was backed up by Paul Hendy, manager of the Carlisle Flood Recovery & Advice Centre who carried out a Flood Health Survey in October 2016 [12]. He reported that there had been an increase in flood victims taking anti-depressants, sleeping tablets, and turning to drink and substance misuse. Unfortunately, according to the Cumbria Community Foundation report, self-harm, suicide, and hospital admissions due to alcohol, are all worse than the national average in Cumbria. It is clear that individuals in Cumbria are extremely vulnerable and it would be wrong to call them resilient.

4.9 Flood Health Survey - Carlisle 2016

Due to a significant lack of research on the impacts on health following the scale of repeat flooding to deep levels experienced in Cumbria over a short period of time, Paul Hendy, manager of the Carlisle Flood Recovery & Advice Centre carried out a Flood Health Survey [12] with a total of 155 respondents in October 2016. Community Flood Leads believe that these results could be mirrored throughout all flooded communities across Cumbria. The results of the survey are summarised in Figure 7 and Figure 8. These results clearly indicate that flood victims are extremely affected by flooding.

Paul Hendy reported in December 2017 that there were eight people still receiving counselling for PTSD at the Carlisle Recovery Centre following Storm Desmond. However, these are not isolated incidents as there are other individuals across the County also suffering from PTSD.

Figure 7. Results of Carlisle Flood Recovery & Advice Centre Flood Health Survey [12].

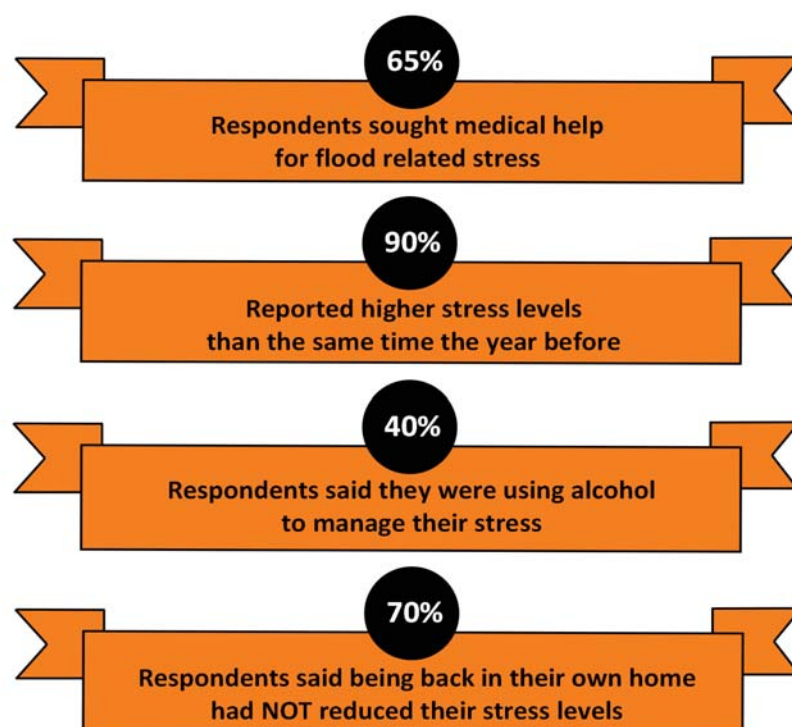
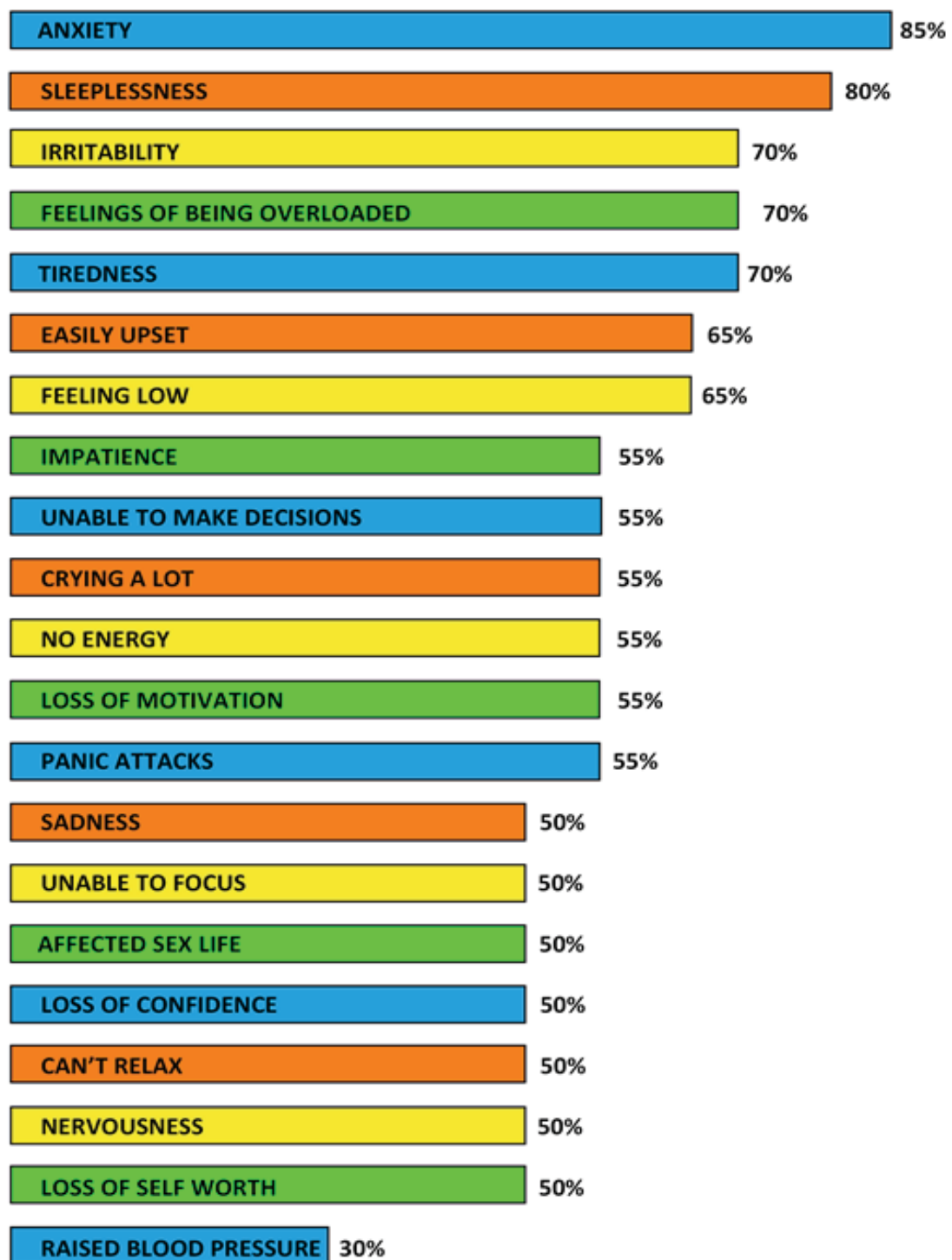


Figure 8. New Symptoms Experienced by Respondents to the Carlisle Flood Recovery & Advice Centre Flood Health Survey [12].



4.10 Rural Needs and Concerns Side-Lined

Rural communities are at a further disadvantage to urban areas as they are unable to achieve funding for flood alleviation measures and therefore may feel derelict of hope with no light at the end of the tunnel. Negative impacts for them could be magnified. The House of Lords Select Committee on the Natural Environment and Rural Communities Act 2006 (2017) [13], stated that the Government has neglected its duty of care towards rural communities.

Areas such as Allerdale, for example, already suffer from economic underperformance, low paid employment, social disadvantage, poor educational outcomes and poor connectivity to transport. In conjunction with this, they also have extremely limited access to any effective flood alleviation measures. Nationally, the provision of flood defences is based on the value of assets protected and therefore the priority of protection is towards wealthy urban areas. This leads to an inequality of opportunity to lead a normal life and impacts profoundly on mental health, as it condemns less wealthy rural communities to a continuous cycle of overwhelming suffering and disruption, as they are simply treated as collateral damage, and ignored.

4.11 Economic Wellbeing

A huge stressor to flood victims is the devastating impact that flooding has on economic wellbeing. The financial stress can have a serious impact on both physical and mental health. The Guardian newspaper [14] reported that properties were appearing on the market at 60% of their pre-Desmond value, resulting in a significant loss of equity, or possible negative equity, and of course, with many people unable to sell. The wealth of many people who reside in Cumbria is tied up in the ownership of their property and this sudden loss of value can be catastrophic. Further to this, Cumbria generally has lower income households compared to other regions of the UK making it much harder to recover from economic loss.

4.12 'Super Ageing Population'

Cumbria Community Foundation stated that Cumbria is a popular place to retire resulting in a 'super ageing' population with 1 in 4 people over the age of 65. Older adults can be more vulnerable than younger people as 80% of older people may have at least one chronic condition already. Older people are much more susceptible to physical danger and injury.

These people are particularly vulnerable when flooded, with reports of exploitation during the reinstatement process, and sadly some have lost their desired independence putting more pressure on social care. Further to this, the stress can exacerbate illnesses and unfortunately hasten their deaths. Sadly, there have been reports of elderly people trying to carry belongings upstairs every time it rains heavily, or being out in treacherous conditions clearing culverts and drains. Elderly people should have the right to feel safe and secure in their homes. Many are worn down by the stress of repeated flooding and have expressed that it is unacceptable to wait so long for any resolution.

4.13 Overwhelming Reinstatement Works

The depths of the flood waters entering people's homes in Cumbria means that reinstatement works can be overwhelming. Due to the scale of damage across the County, trades people are in short supply increasing displacement times significantly and many reduced to living in poor conditions whilst reinstatement works drag on. Contractors inevitably take on more work than they can deal with and homeowners are critical that the work is often sub-contracted to 'cowboys'. Many trades people are brought in from out of the County. They can be incompetent and unable to carry out satisfactory restoration works, adding to the victim's stress and suffering. Frictions can also be caused within rows of terraced properties or cottages where some essential resilience works could be carried out, but some residents are uninsured and unable or unwilling to make contributions to essential works. This puts an enormous strain on neighbour relationships.

Cumbria is a popular place for second homes and holiday cottages. This means that there are less people available to help in times of flood. With emergency services overstretched, local people are the ones assisting vulnerable residents and clearing blocked drains, gullies and watercourses. Restoration works to holiday homes is often slow, impeded by owners not living locally, and these properties can often appear unsightly, as with the many that have been uninsured and have insufficient funds to carry out restoration works.

4.14 Housing is Important to Mental Health

One in six homes in the UK are at risk of flooding. Those who have not flooded may not appreciate the emotional connection and attachment that most people have with their own home. For many, a home provides a safe haven in which to enjoy a normal life. This connection is really hard to re-establish once flooded, and particularly for those in Cumbria who have flooded multiple times. It could be equated to having the rug pulled from under your life. The more people flood, the harder it becomes to build a new attachment to 'home' with the expectation that the attachment could so easily be broken again in a short space of time.

4.15 Quotes from Flood Victims

The following quotes in Figure 9 are taken from a survey undertaken by Wingspan Consulting on behalf of Cumbria Community Foundation [15], who administered £10m worth of flood grants for both hardship and resilience works. These quotes provide an insight into the issues that people are dealing with and the immense pressure and stress that individuals are faced with.

Figure 9: Quotes from Flood Victims.



4.16 Conclusions

Flood Risk Management actions and political decision making and policy has a clear impact on mental health which may improve or decline over time. Further research is required into the prolonged effects of flooding on people's mental health and particularly the effects of repeat flooding on communities. Policy makers need to carefully consider reducing the risks of people developing long term mental disorders that have a costly knock on effect. The recent mortality rates due to flooding have been expectedly low with the level of resources, personnel and army intervention. However, this should not blind policy makers to the substantial risk to life which does exist.

There is a lot of anger, misery and frustration across Cumbria, with many left suffering under immense mental pressure. Dietrich Bonhoeffer (20th century theologian) once said '*A home is a kingdom of its own in the midst of the world, a stronghold amid life's storms and stresses, a refuge, even a sanctuary*'. Unfortunately, for many this ideal has been shattered and the 'home' which once provided safety, comfort, and a tranquil state, has now been shattered and replaced with a 'house' and living in a constant fearful, disturbed and anxious state. Consecutive governments have failed to take flooding seriously and there is no equality of opportunity for many across Cumbria to have that place of refuge that they once had. Although funding has been promised to alleviate flooding in some parts of the County, it is not enough and more needs to be done to ease the suffering of those who currently face a lifetime of their properties remaining vulnerable and either poorly protected or totally unprotected.

Flooded communities are becoming impatient and intolerant to the fact that even though they have flooded multiple times to extreme levels, the plight of those particularly in rural areas, is continually ignored. If no effective flood alleviation measures are put in place to mitigate against future flood events, then the stressor remains. Unfortunately, coping strategies have dwindled and with the fear of repeated future flooding, it is essential that the government places the focus on effective protection, delivering fair and equitable policy outcomes for both urban and rural areas. With the frequency and severity of floods increasing, communities need to see more effective and positive FRM strategies which will ultimately provide people with a greater sense of wellbeing.

This section on the Impacts on Mental Health has been endorsed by Dr Brian Campbell² from MIND in West Cumbria. This mental health charity has been heavily involved with helping people deal with the impacts on mental health following repeated flooding. The letter of endorsement has been included in the appendix.

² Dr Brian Campbell, Chairman Mind in West Cumbria

5 RESILIENCE MEASURES OFFER NO MITIGATION FOR DEEP WATER FLOODING

Report by Sue Cashmore
(Chair of Cockermouth Flood Action Group)

5.1 Introduction

It has been thoroughly documented that Cumbria has experienced frequent floods since the beginning of this century with predictions of increased flooding by more frequent storm events. Unfortunately, the resilience agenda has become the foundation on which public protection strategy is now built. Rainfall volumes are predicted to increase by greater than 30% of what has been seen to date which will inevitably result in more homes experiencing deep water flooding unless mitigation can be provided. Deep water flooding is defined as being over a meter of water in the home and this volume of water may cause structural damage to the building. What is not documented is the number of houses that have experienced deep flooding in the past decade in Cumbria, anecdotal information indicates the number may be many thousands

5.2 Resilience Measures

Home owners are constantly encouraged to employ flood resilience and resistance methods, in fact the home owner has often been accused of not taking enough measures to stop damage to their properties by flood water. Hundreds of small companies have grown as a result of the continued misery of flooding. Their business is to sell flood resistance and resilience measures to the home owner, often at over inflated prices. Home owners are encouraged to use BSI kite marked products. For the owner of homes that flood up to 2 metres, the resistance products cannot be employed as the products are not guaranteed for flood levels over 900 millimetres and their use would actually be potentially structurally harmful and create a risk to life and injury. Like the injected damp proof guarantee scams, the unscrupulous elements within the industry recognise that the market is comparatively limited and seek to market and supply products against untested claims of performance with a view of selling as much as possible following a major flood and then disappearing before accountability is tested. We have already seen the first wave of producers following Desmond cease trading, having plundered the Government grant scheme and left with homeowners often little better protected.

So, what does the owner of the home that experiences deep floods do? They are advised to use flood resilience methods in order to reduce the impact of flooding. For example, they are advised to move their electric sockets to above 1 metre. Where does the home owner who floods to a 2 metre depth move their sockets to? Other resilience measures are to tile the floors. Unfortunately, many insurance companies do not support these measures as they say they cannot guarantee there will not be problems in the future, so the resilience measures are ripped out and replaced.

5.3 Contamination

The next problem the home owner faces is contamination. Deep water floods are black floods, in other words the water is polluted with animal and human faeces along with diesel and petrol. Most flood clean up companies will advise that anything that has been in contact with the water will need to be disposed of, as most fixtures, fittings and soft furnishings cannot be cleaned.

The deep flood home owner often loses more possessions as it is impossible to move many items above the water line, either because the furniture will not fit up the stairs, or there is no help to move the items. Warnings often don't come at all, or come too late, meaning there is not enough time to move possessions. Older, vulnerable people, single parents, and single occupancy homes are often faced with these issues.

Figure 10: Deep water floods



(Source: Cockermouth Flood Action Group, posted 2011) [16]

5.4 Conclusions

Flooding is miserable, recovery is protracted, and can lead to increased depression and anxiety for years. For the home owner of the house that deep floods the effects are magnified as they cannot even attempt to protect their home. No one should have to tolerate having their home filled with filth on numerous occasions and living with the constant fear that flooding will happen again and again.

The current ethos around flooding by the government, and consequently the Environment Agency, County Councils and other organisations, is that the community must adopt resistance and resilience methods, meaning flooding has to be accepted. This approach is short-sighted and completely unacceptable as it exhibits a lack of understanding of the impacts of flooding, particularly deep-water flooding by the relevant authorities. Once again, homes being filled with filth on a frequent basis can never be acceptable.

6 IMPROVING THE CURRENT FLOOD DEFENCE FUNDING FORMULA

6.1 Introduction

The previous sections in this report outline the severe impacts on people's lives and communities with wide-spread devastation. The impacts on mental health have been underestimated as many across Cumbria are struggling to cope with repeated flooding. Accessing funding for flood alleviation schemes has been extremely difficult leaving some areas with nothing and some with standards of protection that have been insufficient and unable to deal with the scale of flooding. The current method used by the British Government to allocate money for flood defences is seriously flawed and fails to support rural Cumbria. This section will provide considerations for an improved funding formula.

With climate change predictions and the frequency and severity of floods increasing it is estimated that a staggering 5.4 million properties in England alone are at risk of flooding from rivers, sea or surface water. This equates to one in six homes, where electorate occupiers are reliant on a government able to deliver a high level of investment towards flood alleviation measures. The Government are proud to state their current commitment to invest £2.6 billion in capital funding to better protect a further 300,000 properties and reduce flooding by 5% by 2021. However, this amount is totally insufficient and is simply a drop in the ocean. People who flood are tired of hearing arguments over which government spent more than the last and seeing figures skewed to cover the fact that funding has been cut, only to be raised when disaster strikes. The facts are clear that millions of properties are still left in a vulnerable position and millions of people's lives, businesses and livelihoods are subsequently left at risk. It is also clear that consecutive governments have failed to take flooding seriously and that funding is not commensurate to need.

In his Conservative Party speech (2018) the Home Secretary Sajid Javid made the following important point. He said *"Home – It's where you feel safe, comfortable and in control. It reflects your identity and your values, and it's your base for going out into the wider world. That's exactly the kind of place we want the UK to be. Here's the pledge of this Party. Britain a home for all its citizens. Together we will build a stronger home."*

Those who have flooded desperately want to feel that their home is indeed safe and comfortable. However, many homeowners in Cumbria have no control over flooding, with water rising to such depths that property level resilience is futile, and water finds its way in to wreak havoc and destruction, uprooting occupants for sometimes years, rather than months. Unfortunately, flooding for many, is repeated in a short space of time and the rug is pulled from beneath people's lives in a constant cycle, which is unacceptable.

The home is considered to be the foundation of a normal life and yet many people who suffer repeated flooding, and have no effective flood alleviation measures in place, have had that stripped away. The United Kingdom is the fifth largest economy in the world and yet we are failing to protect the homes of our citizens, and particularly in Cumbria, where many don't qualify for funding under the current funding formula rules. Flooded communities urge the Government to provide a fairer prioritisation assessment and allocation of funds, and to recognise that particularly with climate change, a much more realistic floods budget is absolutely critical.

Figure 11: Returning a day later to assess damage



(Source: Personal photograph by Mr Cole, Nov 2009)

The Environment Agency's recently produced 25 Year Environment Plan (2018) [17] says *"We will take all possible action to mitigate climate change, while adapting to reduce its impact. We will do this by....Making sure that all policies, programmes and investment decisions take into account the possible extent of climate change this century."* The Natural Capital Committee provided recommendations (Sept 2017) [18] on what the Government should consider in developing the plan in relation to flood risk, stating that *"Everyone is protected against a 0.5% annual probability flood event through a combination of natural flood risk management measures, engineered structures and property level resistance and resilience measures. Everyone is able to return to their homes and businesses within a maximum of five days of a flood event."* A 0.5% standard of protection equates to 1 in 200 years. Many places in Cumbria have flooded three times in the space of ten years! Does returning to homes and businesses within five days simply mean to access the damage? There is clearly some way to go!

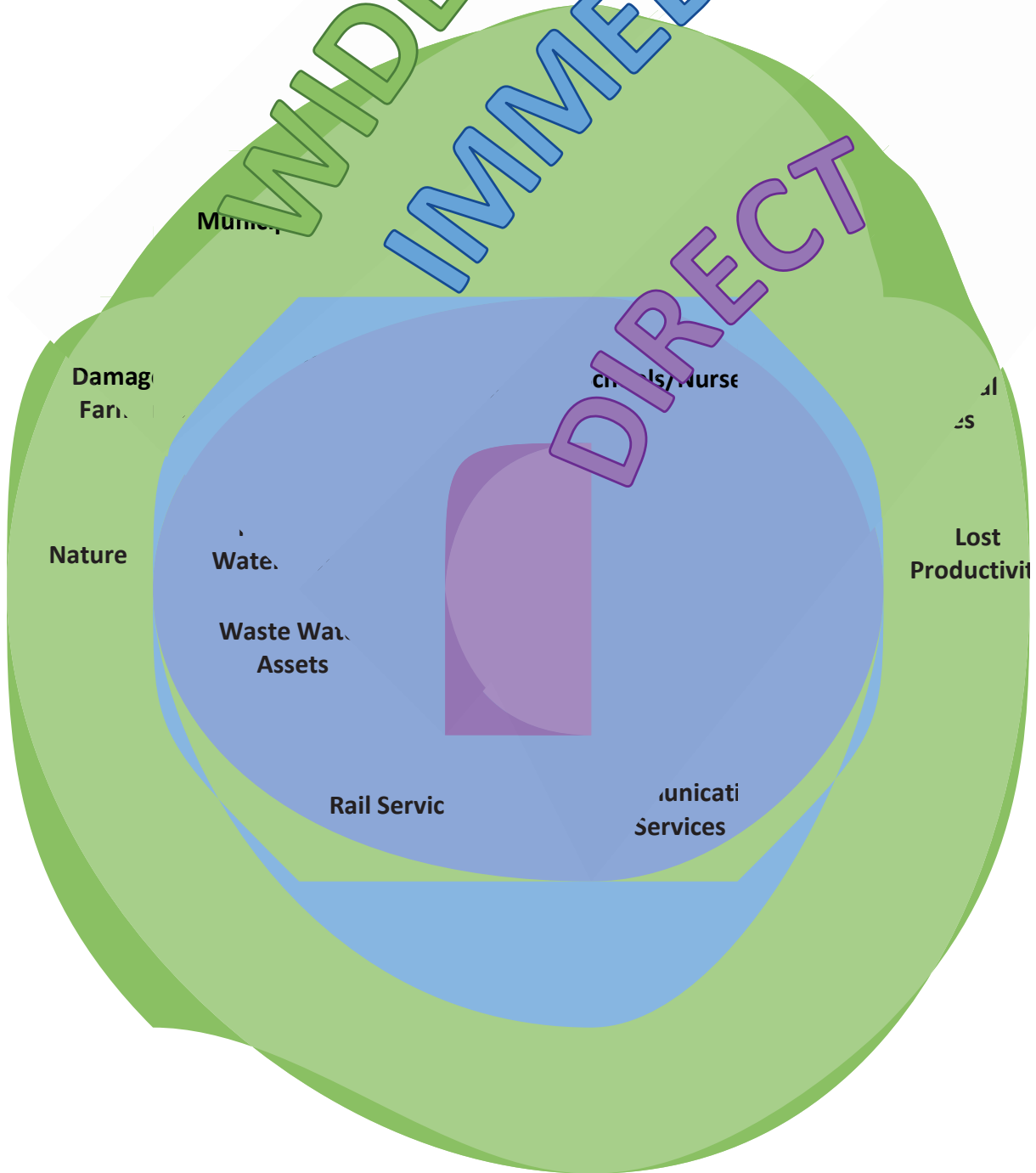
6.2 Some of the Wider Impacts & Costs of Storm Desmond

Anecdotal information indicates that for every person flooded, the lives of another 14 people are disrupted. The following diagram indicates how flooding has a much wider impact on communities and businesses over and above the number of homes flooded. For example, in Cumbria 792 bridges were damaged and 108 roads were closed following Storm Desmond which led to diversions of up to 70 miles. The House of Commons EFRA Committee [19], revealed that Storm Desmond alone cost the economy over £5 billion. Flooding does not just

impact the household but has much wider repercussions on the funding strategy. Footpaths, for example, may be affected if terrain rocks had to be airlifted into position in order to

All of the impacts in Figure 12 potentially could be avoided considering a new scheme there are no alternatives.

Figure 12: Direct impacts



Investment in flood alleviation saves money in the long term.

The Government needs to look more carefully at the whole costs of flooding and strategically plan how to avoid these costs by investing more in flood alleviation measures. DEFRA's funding for flood defences is totally inadequate. Recovery costs at the moment may be hidden and absorbed by other government departments but they all come from the same Treasury pot and tax payers' money. Investment in flood schemes prevents businesses closing down, being out of action, or having a loss of productivity. Schemes help to prevent job losses and ensures tax revenues are not negatively impacted and crucially avoids pushing people into poverty.

The impacts on mental health from repeat flooding in Cumbria are significantly ongoing and the Government needs to bring into the equation the damages avoided to the National Health Service, the national economy in terms of welfare benefits, lost productivity, and other impacts, when considering flood schemes. The Department of Health (2016) [20] estimated that the cost of mental health to the economy, the NHS and society as a whole was £105 billion a year. An EA publication (1995) [21] stated that due to flood events at that time, the NHS was impacted by a 50% increase in the requirements falling on them with a whole range of issues including anxiety and PTSD. It must also be considered that poor mental health has a negative impact on physical health.

Business contributions

The Government also needs to consider which of the big businesses benefit from flood schemes? Insurance companies, for example, would have less to pay out and therefore should make substantial contributions to the floods budget. Likewise, Water Companies are not tasked with recognising and acting on their responsibilities as flood risk authorities and thus they have a tendency to put profits before the safety of people. It is recognised that their assets contribute to the severity of flooding and therefore it should be mandatory for them to make substantial contributions to the floods budget alongside taking action where the management of their assets, be it reservoirs or weirs, can offer improved flood protection to communities. Public money spent on defence schemes protects the profits and avoids substantial costs to both of these industries and other major businesses as well. Therefore it is more than reasonable to ask for contributions.

Whole-catchment Flood Risk Management

Following Storm Desmond significant changes were made to Flood Risk Management policy and practice. The Cumbria Floods Partnership was developed in January 2016 and there was a move toward the integration of 'Working with Natural Processes' (WWNP) and Natural Flood Management (NFM). This was a new approach to whole-catchment Flood Risk Management. However, it is now recognised that NFM is essentially an experiment. There is no evidence to show that NFM can reduce flood risk in larger catchments or for larger storm events. Although NFM is beneficial to the environment, it would be helpful if MPs acknowledged that for flood risk reduction, NFM is only effective in small catchments, as concluded by Dadson, et al. [22]. WWNP alone will not solve the flooding issues in Cumbria.

However, Communities do want the EA to explore working with full river catchment scale approaches, from source to sea, when looking at flood alleviation measures. The Derwent River Catchment, for example, would benefit enormously from the Thirlmere reservoir being managed to create storm water storage with the installation of adequate release valves ahead of storms (Source: Alistair Cook and Ed Henderson, Sept 2018) [23]. Also the role of the lakes

in the Derwent catchment need to be investigated for flood control, with the potential for storm water storage, with outflows being re-engineered to allow discharges at a lower elevation where necessary. Gravel removal at key locations may also be beneficial and there needs to be investigation into the advantages of removing weirs. Landowners also play a vital role in FRM and through the new Agricultural Bill it is important that they are fairly compensated. Agreements need to be put in place for them to allow their land to flood should water be required to be discharged, or to use their land for water storage.

It must be recognised that by creating storm water storage at strategic locations, the whole catchment is much better protected from flooding. This will not just aid the direct impact of homes affected, but will also aid the wider impact zones of Figure 12 as well. There is currently funding available for NFM schemes in Cumbria but they are more successful in providing environmental gains and not flood alleviation. It is essential that opportunities are made available to put forward non-standard schemes for funding with a mechanism within the funding formula to allow for a catchment scale approach to flood alleviation.

Unfortunately for the Derwent River catchment there was no Booster Funding provision following Storm Desmond as there was for other areas. Defences which were overtopped in Keswick and Cockermouth have not been improved except for cosmetic purposes and there are no realistic options of improving outcomes measures. People are angry that after all they have been through they are left with nothing and no hope. At present, there is considerable protection afforded by legislation to preserve habitats and wildlife. Sadly, in comparison, homes and lives are treated with indifference and flooded communities across Cumbria are left fighting for funding in a way that is demeaning and indicates that our needs are ranked significantly below that of wildlife.

Figure 13: Compromised river defences 2015



(Source: Cumbria Community Foundation, posted 2017) [24]

6.3 Fair and Equitable Policy Outcomes for Rural Areas?

The House of Lords Select Committee on the Natural Environment and Rural Communities Act 2006 (2017) [13] concluded that the Government has neglected its duty of care towards rural communities. With the demise of the Commission for Rural Communities, the Regional Development Agencies, and Rural Communities Policy Unit, the responsibility now lies with DEFRA to advocate for rural people, businesses and communities. It is DEFRA's responsibility to ensure fair and equitable policy outcomes for rural areas. However, it is clear that rural needs and concerns have been side-lined and overlooked as resources within DEFRA are focused on the environment, agriculture and the food elements of its responsibilities, alongside the huge task of leaving the EU.

Rural areas such as Allerdale in Cumbria, already experience social disadvantage, restricted opportunities, economic underperformance, low paid employment, poor educational outcomes, and poor connectivity to transport. Further to this, flood victims are also condemned to a continuous cycle of overwhelming suffering and disruption to life, with inadequate equality of opportunity within the current funding formula towards the provision of flood protection. However, if a catchment scale approach could be facilitated then it would have huge potential to protect many more rural properties alongside river systems in conjunction with major towns and villages in a joined-up approach along with delivering a more holistic approach to the impact zones in Figure 12.

6.4 Partnership Funding

In applying the current guidance on Partnership Funding (PF) and outcome measures, the local EA in Cumbria have had little success following the last floods with their objective to provide the required flood alleviation measures across Cumbria. This is because the PF mechanism weights funding towards schemes that protect larger numbers of properties with the focus on urban developments and fails to recognise the wider benefits.

However, it is clear that the PF mechanism has enabled more schemes to be developed following previous floods than would otherwise have been funded by Grant-in-Aid alone. It has also allowed for essential collaborative multi-partner working. However, contributions by this method are becoming more difficult to find particularly in Cumbria. Local Authorities are already stretched and under extreme pressure due to budget cuts and unable to make any substantial contributions to flood defences.

The EA, for example, put together a flood scheme for Cockermouth following the devastating floods of 2009. The funding was made up of contributions from the County Council - £600K, Local Authority - £100K, Town Council - £120K, and the Local Flood Action Group - £215K. Cockermouth is not a large place and this level of giving was completely sacrificial and drained its resources. Unfortunately, the standard of protection was insufficient for Cockermouth and they flooded seriously again in 2015. Reserves through partnership funding are now depleted and harder to secure to improve defences and there is no mechanism to draw down on government funding to deliver more holistic outcomes at a catchment scale. As a result people are left in an extremely vulnerable position.

The Eastern Solent Coastal Partnership state in their "Outcome Measures" (2017) report [25] that *"paradoxically the PF process may be a barrier to the delivery of flood protection benefits that are so evidently required."* They go on to state that there is a risk of targets within DEFRA's 6 year programme not being delivered. *"Perversely this is a result of the funding mechanism developed to help them proceed; against a backdrop of year on year programme*

underspend.” This depletion in reserves of Partnership Funding is a nationwide issue and requires serious consideration and solutions to prevent the collapse of future schemes being able to progress.

6.5 Standard of Protection

It is obviously more cost effective to deliver flood schemes in one phase and ensure the necessary standard of protection (SOP) is applied along with climate change adjustments. This prevents future mobilisation and demobilisation costs alongside additional appraisal costs and inflation. However, the SOP is linked to the amount of partnership funding that can be raised. Unfortunately, it is then that the decision has to be made on what SOP is affordable, when it should be the other way around. The SOP varies widely across the country with wealthy areas more likely to achieve a higher SOP because house prices are higher and therefore the cost benefit works in their favour.

It could be argued that as there is insufficient funding for flood defences, the current flood defences for London already offer a high SOP. Therefore, these expensive schemes could be deferred, and funds used for other more urgently required flood alleviation schemes.

The government have invested a considerable amount of money on demountable flood barriers. However, these take an enormous amount of time and effort to set up. Rivers can be in full spate very quickly in Cumbria, with rapid runoff from high mountains and relatively impermeable underlying geology, alongside having some of the fastest rising rivers in England. As a consequence there is insufficient time to deploy barriers effectively and insufficient staff to reach such a wide area. Therefore, permanent solutions are essential.

6.6 The Current System

The current PF mechanism focuses on the value of assets protected which obviously favours wealthier communities and parts of the country where house prices are higher and homes more densely built. Carbon Brief’s flood protection analysis 2017 [26] revealed that constituencies in London and the South East are to receive 60% of the current flood budget, when they only account for 32% of England’s population. With government cuts and requirements for value for money, DEFRA currently insists on an average of £8 of avoided flood damage for every £1 spent on flood defences and the majority of schemes approved over the last few years have been based on a 10:1 ratio. This discriminates against many areas of Cumbria where property and land values are lower and communities that have suffered from severe repeated floods cannot compete against other more densely populated, and yet comparatively low risk areas of the country.

The funding package secured post-Desmond for Cumbria of £72 million will hopefully improve defences in Carlisle and Kendal as promised but this is an insufficient amount to provide realistic flood alleviation across the county. It must also be recognised that this provision was made outside of the current funding formula rules and therefore does not help other vulnerable communities applying for funding across the county in the long term.

House values cannot continue to be part of the methodology as this is preventing delivery of schemes to more vulnerable communities at greater risk and need. Flood schemes have the potential to move properties out of a high probability flood risk classification and enable residents to lead normal, uninterrupted lives, whereas many people across Cumbria remain condemned to a life of repeated disruption, risk to life, devastation, misery, and financial insecurity. The financial stress endured can be severe as the Region’s low wages make it

impossible for many to ever fully recover economic losses. Professor Ken Pease, a British forensic psychologist and criminologist, author of 'Repeat Victimisation: An Overview' (1999 ed), suggested recently that these people may have a case for 'Repeat Victimisation'.

6.7 Reality Needs to Eclipse Modelling

During Storm Desmond, new record rainfalls were recorded in Cumbria, and the county has also set the majority of new records for peak river flows within the UK. To put this in perspective, some of the river gauging locations registered more than a 150% increase on the previous maximum peak, as stated by the Centre for Ecology & Hydrology's 2015 report [27]. However, they also stated that the reliable measurement of river flow presents a challenge, and predicting return periods is subject to considerable uncertainty because flood events in Cumbria were well outside the range of observed historical data, and this has undermined confidence in predicting future return periods.

However, within the current funding formula, return periods play an important role in categorising properties into different risk bands. The priority is to move properties out of the 'very significant' 1 in 20 years risk to a lower classification. However, the reality is that the majority of flooded homes across Cumbria have had two to three major flood events in the space of 10 years, and a smaller number have suffered even more floods, and yet may only be classified as having a 'significant' 1 in 75 to 1 in 20 year chance of flooding. Some are still classified as having a 'moderate' 1 in 200 to 1 in 75 year risk. Given that many communities in Cumbria have flooded in 2005 (1 in 100-yr), 2009 (1 in 200-yr), and 2015 (1 in 500-yr).

It is clear that the usual approaches to flood frequency estimation have been underestimated and are now highly questionable for Cumbria and perhaps properties should be placed in the higher category risk bands based on the reality of the last 10-20 years. It is also important to provide a mechanism to build in climate change when banding properties, considering where properties would sit based on future climate change predictions.

6.8 Preserve Cumbria's World Heritage Status

The 25 year Environmental Plan (2018) [17] states *"We will conserve and enhance the beauty of our natural environment, make sure it can be enjoyed, used by and cared for by everyone. We will do this by safeguarding and enhancing the beauty of our natural scenery and improving its environmental value while being sensitive to considerations of its heritage."* The Lake District is well-known for being the most beautiful corner of England and has just received World Heritage Status recognition. Tourism is a huge part of the local economy which needs to be safeguarded. Images of flooding causing widespread destruction and devastation does not benefit the Cumbria Tourism Brand.

6.9 Overall Conclusions

Flooded communities urge the Government to provide a fairer prioritisation assessment and allocation of funds, and to recognise that particularly with climate change, a much more realistic floods budget is required. Whilst it is important to focus on the needs of flooded households, the damage and devastation has a much wider impact and the whole costs of flooding need to be recognised and considered. Treasury needs to be aware that the recovery costs are currently hidden and absorbed by other government departments. The impacts on

mental health from repeat flooding in Cumbria are significantly ongoing and the government needs to bring into the equation the damages avoided to the National Health Service, the national economy in terms of welfare benefits, lost productivity, and other impacts when considering flood schemes.

MPs need to recognise that NFM is only beneficial in smaller catchments and will not prevent flooding in Cumbria's larger catchments. It is essential that opportunities are made available to put forward non-standard schemes for funding with a mechanism within the funding formula to allow for a catchment scale approach to flood alleviation. This more holistic approach would not only protect homes, including more rural homes, but critical infrastructure and whole communities, safeguarding employment, productivity, education, and health and wellbeing.

The government needs to recognise that reserves through partnership funding are now depleted and harder to secure to improve defences or to provide new schemes, and there needs to be an alternative mechanism to draw down on government funding. Industries that benefit from flood schemes should make substantial contributions to the floods budget. There should be an equality of opportunity to have the necessary standard of protection nation-wide without having to compromise to the point that flood schemes are failing with devastating effects. It is clear that the usual approaches to flood frequency estimation are now highly questionable and perhaps homes in Cumbria should be placed in the higher category risk bands based on the reality of the last 10-20 years.

Finally, it goes without saying that house values can no longer be part of the methodology of cost benefit analysis as this is preventing delivery of schemes to more vulnerable communities at greater risk and need. The deprivation factor cannot compete with house prices in some parts of the country. There should be an equality of opportunity to lead a normal life, regardless of where a person lives or where they sit within the economic chain, and to provide relief from a continuous cycle of overwhelming suffering and disruption. With the potential risk to loss of life and increasing long term poor mental health implications, urgent action is required to provide a funding formula, and floods budget, that takes into account the devastating reality of flooding and the much wider impacts. Storm Desmond alone cost the economy over £5 billion. Clearly it is a false economy to not invest more in flood alleviation measures.

7 REFERENCES

1. Cumbria Tourism, (2018). "Research", [Online]. Available at: <https://www.cumbriatourism.org/what-we-do/research/>. (Accessed: 05 Oct 2018).
2. Cumbria County Council, Flooding in Cumbria, December 2015, Impact Assessment, July 2018.
3. Roger Michael (2015) 29 December. Available at: <http://www.facebook.com> (Accessed: 09 Oct 2018).
4. Keswick Flood Action Group (2016) 5 April. Available at: <http://www.facebook.com> (Accessed: 09 Oct 2018).
5. National Hydrological Monitoring Programme. The Winter Floods of 2015/16 in the UK – A Review. Centre for Ecology and Hydrology and the British Hydrological Society.
6. Committee on Climate Change, 2015, "Progress in preparing for climate change 2015: Report to Parliament". London: Committee on Climate Change
7. Munro, Alice et al. "Effect of Evacuation and Displacement on the Association between Flooding and Mental Health Outcomes: A Cross-Sectional Analysis of UK Survey Data." *The Lancet. Planetary Health* 1.4 (2017): e134–e141. PMC. Web. 5 Oct. 2018.
8. Cumbria Community Foundation (2017), 'Cumbria Revealed – A County of Contrasts', accessed 27 March 2017, <https://www.cumbriafoundation.org/wp-content/uploads/2017/05/Cumbria-Revealed-Final-web-version.pdf>.
9. Health Protection Agency. The Effects of Flooding on Mental Health.
10. RSOE EDIS (2015) 6 December. Available at: <http://www.facebook.com> (Accessed: 09 Oct 2018).
11. Express, 30 Sept 2016, "Stressed parents 'turning to prescription drugs and alcohol after flood chaos'", *Express*, [Online]. Available at: <https://www.express.co.uk/news/uk/716234/Stressed-parents-turning-prescription-drugs-alcohol-after-flood-chaos>. (Accessed: 27 March 2018).
12. Carlisle Flood Recovery & Advice Centre (2016), 'Carlisle 2016 - Flood Health Survey' used with kind permission of paul@scottishfloodforum.org.
13. Select Committee on the Natural Environment and Rural Communities Act 2006 (2017), 'The countryside at a crossroads: Is the Natural Environment and Rural Communities Act 2006 still fit for purpose?' London: Authority of the House of Lords. Report of Session 2017–19.
14. Brignall, M. and Jones, R., 2 Jan 2016, 'Homeowners count the cost as floods force prices to plummet', *The Guardian*, [Online]. Available at: <https://www.theguardian.com/environment/2016/jan/02/floods-house-prices-plummet> (Accessed: 27 March 2018).
15. Cumbria Community Foundation (2017), 'Evaluation of the Cumbria Flood Recovery Fund 2015 Household Survey', <https://www.cumbriafoundation.org/wp-content/uploads/2017/12/CCF-Flood-Fund-Evaluation-Household-Online-Survey-Results.pdf>. (Accessed: 27 March 2018).

16. Cockermouth Flood Action Group (2011) 3 August. Available at: <http://www.facebook.com> (Accessed: 09 Oct 2018).
17. Gov.uk, 1 February 2018, 'At a glance: summary of targets in our 25 year environment plan' [Online]. Available at: <https://www.gov.uk/government/publications/25-year-environment-plan/25-year-environment-plan-our-targets-at-a-glance>. (Accessed: 05 Oct 2018).
18. Gov.uk, 28 Sept 2017, 'Natural Capital Committee advice on government's 25 year environment plan'. (Accessed: 05 Oct 2018).
19. House of Commons Environment, Food and Rural Affairs Committee (2016), 'Future flood prevention' London: Authority of the House of Commons. Second Report of Session 2016-2017.
20. Gov.uk, 15 February 2016, 'New investment in mental health services' [Online]. Available at: <https://www.gov.uk/government/news/new-investment-in-mental-health-services>. (Accessed: 05 Oct 2018).
21. Lee, E. M., 1995. "The occurrence and significance of erosion, deposition and flooding in Great Britain". Great Britain. Department of the Environment. London: H.M.S.O., c1995.
22. Dadson, S.J. et al. (2017), 'A restatement of the natural science evidence concerning catchment-based 'natural' flood management in the UK'. Proc. R. Soc. A473: 20160706.
23. Cook, A. and Henderson, E., 2018. "Thirlmere Reservoir Water Balance Model".
24. Cumbria Community Foundation (2017) 5 December. Available at: <http://www.facebook.com> (Accessed: 09 Oct 2018).
25. Stratton, M. and Wadey, M., 2017. "Outcome Measures – A help and a hinderance to our Flood & Coastal Erosion Risk Management partnership projects". Research Gate: www.researchgate.net
26. Carbon Brief 2017, 'Mapped: Where £4.4bn is being spent on flood protection in England', [Online]. Available at: <https://www.carbonbrief.org/mapped-where-four-point-four-billion-being-spent-flood-protection>. (Accessed: 2 April 2018).
27. Hannaford J et al. (2015) 'Briefing Note: an assessment of the rarity of the November 2009 floods.' NERC Centre for Ecology & Hydrology.

8 APPENDIX

The next page is a letter from Dr Brian Campbell, the Chairman of MIND in West Cumbria, which endorses section 4 on the Impacts on Mental Health.



Mind in West Cumbria
The Old Town Hall
Oxford Street
Workington
CA14 2RS

01900 66518

admin@mindinwestcumbria.org.uk

Registered Charity Number: 1123448

Company Number: 6461344

October 9th 2018.

Mind in West Cumbria congratulates Mrs Faith Cole on her carefully researched and detailed analysis of the issues involved in her report, “Improving Current Funding and Flood Risk Management Strategies in Cumbria”.

From our work as a Mental Health Charity in this area, and in particular from our work with the victims of flooding, we would wholeheartedly endorse the findings in this report in connection with the impacts on Mental Health due to severe repeated flood events. The impact on the whole population has been significant in terms of the stress caused by the general disruption brought about by repeated flooding as reported by the Cumbria Community Foundation. However, the effects on individuals have been even more severe, as has been so powerfully delineated in section 4.3 of Mrs Coles’ report.

In addition our experience in West Cumbria would endorse the findings of the Carlisle Flood Health Survey (2016) in almost every respect, but especially on the effects on the elderly.

Brian Campbell.

Dr Brian Campbell

Chairman Mind in West Cumbria.