



Flooding in Cumbria, December 2015

Impact Assessment

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1 Key points of impact

During the first week of December 2015, Cumbria was subjected to its third extreme flood event in a decade. The impact of Storm Desmond on the county was unparalleled in many respects: i.e. in terms of record rainfall and river flows, the number of properties flooded and flood affected

The scale of flooding in December 2015 was unprecedented in Cumbria. In total 7,465 properties were flooded equating to an estimated 14,694 persons. Carlisle district shows a higher proportion of households flooded in more deprived areas.

At the peak of the flooding in early December 2015, there were an estimated 17,911 customers without electricity. 667 properties in the county initially lost their clean water supply, mainly across Allerdale (Keswick; Borrowdale) and Eden (Glenridding; Patterdale; Scalehouses near Penrith). 127 incidents over December 2015 and January 2016 caused total delays on the Network Rail network of 100,364 minutes.

In total 45 schools were affected, including one in Lancashire attended by some Cumbrian pupils. This resulted in 3,034 children not attending school at the end of the autumn term.

1,051 operations, clinics, treatments and diagnostics were cancelled or rescheduled (elective theatre; and outpatients (specialists)). Services provided by number of General Practice surgeries, health centres, pharmacies and dental practices were disrupted.

Organisations were involved in a variety of ways providing a range of support and an immediate emergency response including: support with housing and accommodation; funding applications and emergency support grants (for carers); emotional support and counselling; resources and provision at Flood Advice Centres.

Around 1,000 offers of help and support were received from individuals and organisations from both within and without the county.

Due to the number of properties affected there was a large scale requirement for a variety of housing accommodation across the county.

The storms forced road closures in 107 different locations across the county. Closures were the result of a number of reasons including: flooding; subsidence; landslip; damaged carriageway; bridge damage; bridge requiring safety inspection; culvert subsidence. It was estimated that 354.8km of carriageway had been damaged, with damage to carriageway and bridges.

Of the 354.8km of affected highway, damage to over half (56.0%, 198.8km) was considered to be significant. The highest lengths of damaged highways and the highest costs were found in South Lakeland. It is estimated that around 792 of Cumbria's bridges were affected. Diversions were in place, the longest approximately 70 miles around Langwathby following structural failure of the A686. Normal journeys to and from 35 schools were severely disrupted.

Across Cumbria, Public Rights of Way both within and without the Lake District National Park were affected. In total 429 Public Rights of Way bridges and 267 paths covering 576km were damaged, with combined repair and reinstatement costs estimated to be in the region of £7.9m.

Across Cumbria 228 listed buildings or structures are located within flooded areas, 22 of which are Grade I or II listed. 32 public buildings / property assets were damaged, nine in Allerdale, 12 in Carlisle, seven in Eden and four in South Lakeland.

Businesses in areas designated by the Environment Agency as flood extent areas accounted for 25,112 employees and £871m of Cumbria's economic output, representing 10.3% of all businesses in Cumbria, 13.0% of all employment and 13.2% of all economic output.

Two thirds (65%) of businesses throughout Cumbria responding to the Cumbria Business Survey reported being negatively impacted by the floods. This increased to over four fifths (86%) of businesses in the EA flood extent areas. Around half (48%) of businesses that suffered financial losses in the EA flood extent expected to recover these from insurance.

One in eight businesses responding to the Cumbria Business Survey experienced an increase in new orders and sales, with construction businesses most likely to benefit from this impact (30%).

Most Cumbria Business Survey respondents expected to be fully trading again by the autumn 2016; one in eight anticipated limited trading until the spring of 2017 and one business expected to close.

Around 600 farming businesses across Allerdale, Carlisle, Eden and South Lakeland experienced some degree of impact, either directly from flooding or from water run-off.

Recreational facilities were impacted by deposits of gravel, sediment, silt and debris.

An additional 4,858 tonnes of municipal waste were directly attributable to flooding.

Of the £3.86 million paid out from Community Foundation flood appeal the majority (77.8%) was for flood damage.

Six months after the storms, a quarter of households were unable to return to their homes with the proportion varying from 8% in South Lakeland to 57% in Carlisle. A year after the storms, 11% were still unable to return home, ranging from 3% in Allerdale to 27% in Carlisle. In May 2018, 99% of households had returned to their homes. The severity of the flooding in Carlisle was higher than in other areas and is considered to be a major reason why residents returning to their flooded properties has taken longer in Carlisle.

In the longer term there are anticipated impacts on mental health and wellbeing.

Communities and businesses in Cumbria fear future flooding.

2 Introduction

Communities in Cumbria have unfortunately suffered several incidents of severe flooding in recent years most notably in 2005, 2009 and 2012. A gauge at Honister Pass recorded 341.4mm of rainfall in the 24-hours up to 6.00pm on 5 December 2015, making for a new UK record for any 24-hour period. A new record for the UK for the amount of rainfall in a 48-hour period was set at Thirlmere, where 405.0mm fell in just 38 hours.

On Friday 4th December 2015 weather warnings were issued across the North West as Storm Desmond threatened strong winds and heavy rain. On Friday night heavy rain continued and by Saturday morning there were 23 flood warnings and 21 flood alerts across Cumbria issued by the Environment Agency. Public transport and the road network throughout Cumbria continued to be disrupted throughout Saturday. By Saturday afternoon a major incident was declared and severe flooding had been reported in Cockermouth, Appleby, Keswick, and Kendal as well as outlying areas. In Carlisle water levels rose to 7.9m in the early hours of Sunday and flood defences were breached. The village of Glenridding after being flooded on Saturday, was flooded twice more as further heavy rain caused the river to burst its banks again.

The overall scale of flooding caused by Storm Desmond was significantly greater than previous floods in Cumbria, being spread over four of Cumbria's six districts. This factor combined with its flooding of more than twice as many properties than the previous storms, illustrate that the event can realistically be seen to meet the United Nations definition of a disaster¹.

The impact of Storm Desmond on the county was unparalleled in many respects: i.e. in terms of record rainfall and river flows, the number of properties flooded and flood affected. In effect, Cumbria, its institutions and its communities were faced with recovering from a disaster. The following assessment is a collation of the impacts across Cumbria due to the flooding in December 2015. Impacts are provided at a thematic level and within the theme at a Cumbria and district level.

¹ "A disaster is defined by the United Nations as: *"a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.*

The effect of the disaster can be immediate and localized, but is often widespread and could last for a long period of time. The effect may test or exceed the capacity of a community or society to cope using its own resources, and therefore may require assistance from external sources, which could include neighbouring jurisdictions, or those at the national or international levels."

<https://www.unisdr.org/we/inform/terminology>

3 Impact on Households

3.1 Numbers of flooded properties

The number of flooded properties varies depending on methodology. Table 1 provides the figures based on data provided by the districts and the Environment Agency. Of the districts in Cumbria that had flooded properties Barrow-in-Furness had the fewest properties and South Lakeland had the highest number flooded.

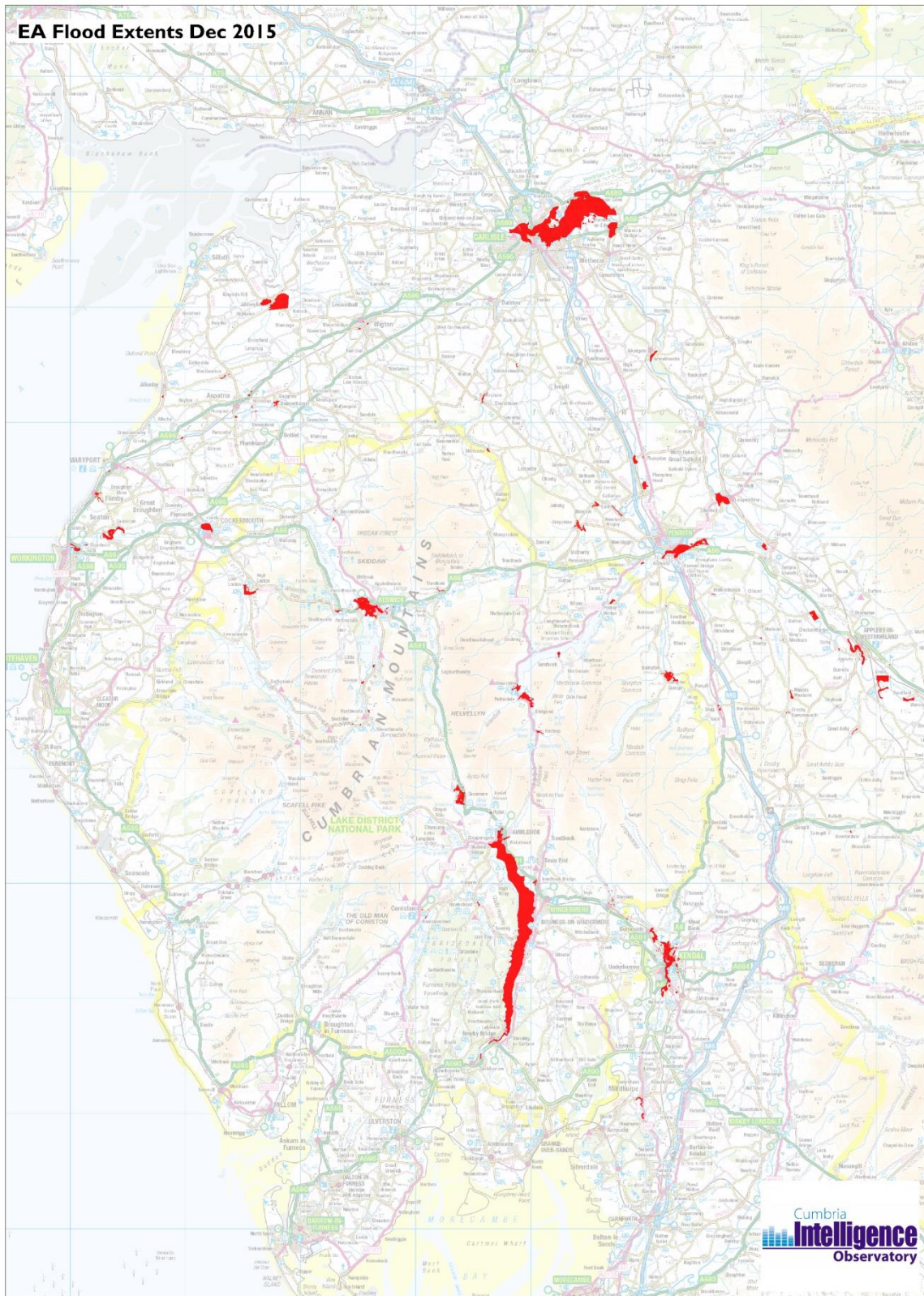
Table 1: Flooded properties by district and type

	Households Flooded	Businesses Flooded	Residential properties flooded	Business properties flooded
<i>Source</i>	<i>District data extracted from DCLG Portal</i>		<i>Environment Agency</i>	
Cumbria	5,529	1,029	6,568	897
Allerdale	1,425	366	1,620	191
Carlisle	1,667	205	2,186	184
Eden	425	108	432	87
Barrow-in-Furness	4	0	0	0
South Lakeland	2,008	350	2,330	435

(DCLG Portal 2017 and Environment Agency, 2016)

The flood extent data provided by the Environment Agency has been used to provide a graphical representation of the areas flooded and is displayed in Figure 1.

Figure 1: Flood extents in Cumbria, December 2015

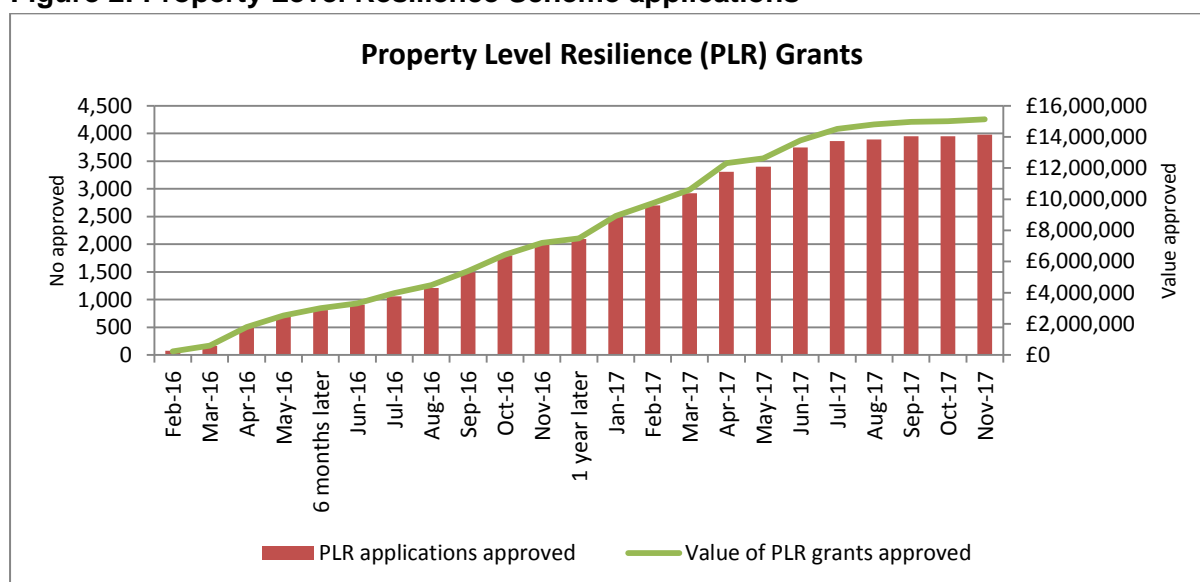


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Due to the number of properties affected there was a large scale requirement for a variety of housing accommodation across the county.

As part of the recovery work various grants were available to households. The initial recovery scheme was a £500 payment to the household that was flooded. This was followed up with a scheme to enable flood resilience measures to be implemented to prevent impact in the future. This Property Level Resilience scheme (PLR) was open to applications from households and businesses up to a maximum £5,000 grant. At a point six months after the flooding, data on the PLR scheme indicated that up to 21% of household / businesses properties had applied for the scheme, a year after the floods 46% had done so and by November 2017 (the last date at which statistics have been collated), 67% had done so. Details for each district are provided in Table 2. It is worthy of note that the administration of the PLR scheme had an impact on the district councils as a result of the level of administration required.

Figure 2: Property Level Resilience Scheme applications



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

Table 2: Property Level Resilience Scheme

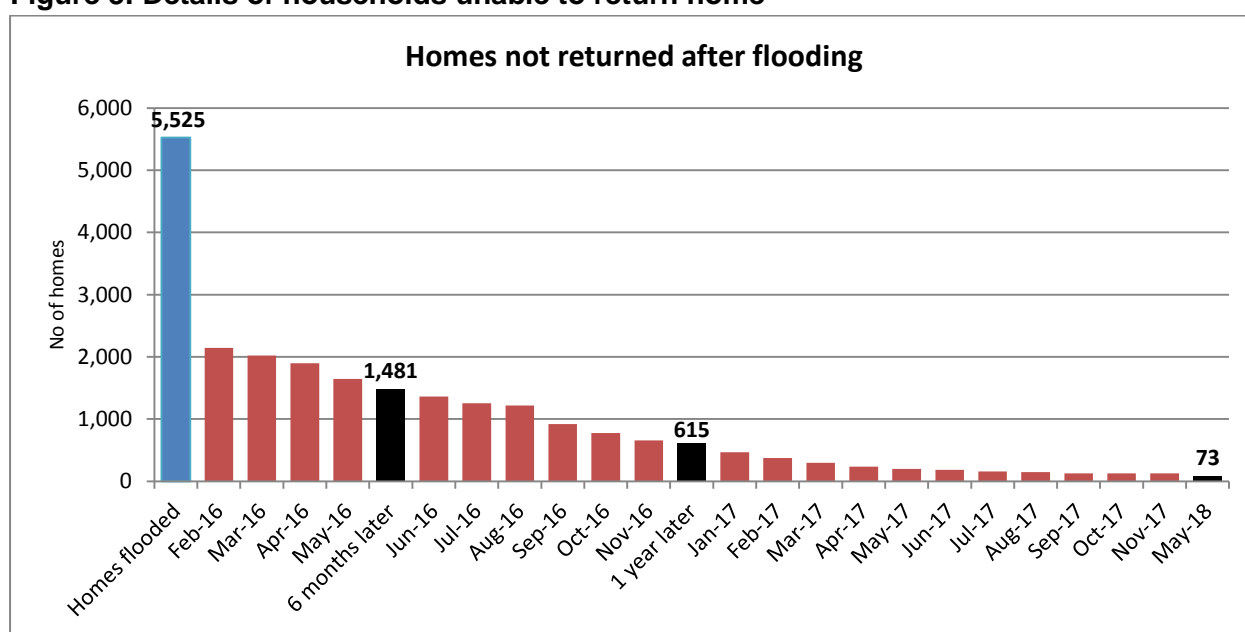
	Allerdale	Carlisle	Eden	South Lakeland	Cumbria
Homes flooded	1,425	1,667	425	2,008	5,525
Number of PLR applications approved					
After 6 months	212	310	117	175	814
After 12 months	706	707	236	444	2,093
After 18 months	1,181	1,353	396	1,051	3,981
Value of PLR applications approved					
After 6 months	£879,926	£1,364,517	£481,102	£280,275	£3,005,820
After 12 months	£2,732,015	£2,368,891	£931,660	£1,438,129	£7,470,695
After 18 months	£4,557,788	£5,515,879	£1,657,378	£3,409,371	£15,140,416

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

Barriers to applications for flood resilience measures were considered to relate to the lack of locally available independent professional advice and a lack of confidence in being able to find suitable local contractors. This resulted in confusion from the public regarding when to install resilience measures. A further barrier to applications in the early phase related to properties still in the process of drying out six months after the event and therefore not in a position to install resilience measures.

Six months after the storms, a quarter of households were unable to return to their homes with the proportion varying from 8% in South Lakeland to 57% in Carlisle. A year after the storms, 11% were still unable to return home, ranging from 3% in Allerdale to 27% in Carlisle. The severity of the flooding in Carlisle was higher than in other areas and is considered to be a major reason why residents returning to their flooded properties has taken longer in Carlisle.

Figure 3: Details of households unable to return home



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

Table 3: 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)

3.2 Insurance

Throughout the recovery period, insurance was raised as an area that flood victims found difficult. Although many insurance companies were particularly helpful, there were significant delays with some companies. In these cases, additional work by partners was been required to reduce the impact.

There were fears among individuals that properties would become uninsurable or that claims may result in significantly high premiums; furthermore, there were concerns that it would make trying to sell property difficult. Many flood victims did not inform their insurance companies. Furthermore, these individuals did not apply for the resilience grants to which they may have been entitled. In some cases, district councils reported that some flood victims had returned their £500 Community Grant payment due to concerns over insurance and the potential effect on property value.

The “Estimating the economic costs of the 2015 to 2016 winter floods; January 2018” report produced by the Environment Agency, reports that insurance claims via the ABI were significantly lower than the total number of flooded properties (covering the UK including Cumbria), indicating that households were either uninsured or excesses were too high, however, this is not confirmed.

A Housing Association in Cumbria reported around 80% of their flooded tenants had no insurance; while some with insurance had excesses of up to £10,000; emphasising that those who are already on low incomes and who are already vulnerable are even more vulnerable and hit harder by flood events.

The Cumbria Flood Recovery Fund 2015 (managed by Cumbria Community Foundation) supported 3,157 flood affected households, through grant awards totalling £7,232,112. In total, 5,211 grants were awarded as some households made more than one application. 56% (1,767 households) of applicants had some form of insurance, 44% (1,389 households) were uninsured. The average grant awarded to a household with flood damage was £2,313, however, larger grant awards were made to uninsured households suffering significant hardship. Further information can be found here: <https://www.cumbriafoundation.org/2017/12/04/making-difference-cumbria-flood-recovery-fund-2015/>

A joint government and insurance industry initiative has been set up to enable people to find affordable insurance for qualifying properties that are at risk of flooding or have been flooded. The Government has made £100m of funding available to enable people living in flood affected areas to still obtain insurance. However, there are limitations and restrictions. For example, properties built after 2009 are not included in the scheme as these should be covered already by stricter planning rules.

3.3 District area key points

3.3.1 Allerdale

- Flooding was geographically wider than first anticipated.
- Resources were stretched to the limit during both the emergency and recovery phases, and also for the administration of the flood resilience grants.
- Ongoing major infrastructure works across Allerdale made travelling difficult in some areas.
- There was financial cost to the council, outside any government related contributions.
- Housing Association tenants were concerned that they would have to return to their flood-risk homes and would not be considered for transfers.

- Initially, 555 properties were receiving Council Tax discount: 60 as residents were living upstairs; 64 properties were second homes (or were empty before the floods); 68 households were in temporary accommodation (decanted); 363 households were flooded out of their homes.

3.3.2 Carlisle

- Increased number of Houses in Multiple Occupation (HMO) inspections; while domestic families affected by the floods were being moved into HMO properties.
- No market for HMO properties prior to the floods and therefore rooms were empty.
- Many private sector properties were occupied by flood affected households resulting in a lack of stock and choice for both existing tenants and new tenants moving into the area.
- Concerns relating to accommodation supply for the student market in September 2016.
- Significant impact on numbers of empty properties, empty flooded properties, and empty private rents vacated by families returning to homes.
- Carlisle City Council's *Homelessness Team* provided advice and assistance to 208 applicants who were directly affected by the floods; 34 of those were accepted under statutory duty. Residents of the John Street single men's hostel had to be rehoused.

3.3.3 Eden

- Advice and assistance was provided to 37 households directly affected by the flooding.
- Eden Housing Association (EHA) housing teams remained in regular contact (at least monthly) with all displaced tenants in order to keep in touch and provide advice as required.
- EHA supported and assisted private rented households where there were delays with remedial works.

3.3.4 South Lakeland

- 115 households received assistance from the district's *Housing Options* service; 2-3 required longer term support 4 months after the flooding.
- 2 households were accepted as homeless.
- Resources were stretched to the limit both during both the emergency and recovery phases, and also for the administration of the flood resilience grants.
- Impact on the deliverability of housing sites and treatment of drainage issues ahead of the next Local Plan is a possible impact.
- Significant impact on the capacity of the housing teams.
- Impact on the availability of temporary accommodation.

4 Impact on Community Welfare

4.1 Number of people directly affected by flooding

Utilising data provided by the Environment Agency (EA) regarding the number of flooded properties across postcode areas within the identified EA flood extent area, and by calculating population to household ratios related to those postcodes using data provided by CACI Ltd, estimates can be made of the number of persons who were likely to have been affected by flooding to properties. Details are provided in Table 4.

Table 4: Estimates of persons affected by flooding to properties

	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)

In the immediate aftermath of flooding some communities were cut off. As a result of bridge and road closures, some communities experienced long diversions and limited access to some areas. Further details are provided in the [Impact on Infrastructure](#) section.

4.2 Households affected by flooding

Utilising the data on flooded properties provided by the Environment Agency, assessment of the flooding in most and least deprived areas can be considered. Carlisle shows a significantly higher proportion of households flooded in the most deprived areas. In comparison to Cumbria, where 10% of flooded properties were situated within the 30% most deprived communities, Carlisle had 28% of flooded properties in the 30% most deprived communities. Table 5 shows the number of properties within each decile of deprivation across the districts, and the percentage of flooded properties within each decile in the county. Six properties could not be assigned to a decile.

Table 5: Decile of Indices of Multiple Deprivation (IMD) of flooded properties

IMD Decile	Allerdale	Carlisle	Eden	South Lakeland	Cumbria	% of total flooded properties
1	9	6	-	-	15	0.20%
2	72	59	-	-	131	1.75%
3	76	663	-	-	739	9.90%
4	59	1	36	23	119	1.59%
5	17	270	77	570	934	12.51%
6	702	1,189	219	428	2,538	33.99%
7	462	108	15	92	677	9.07%
8	398	43	163	1,585	2,189	29.31%
9	10	30	8	65	113	1.51%
10	5	1	-	1	7	0.09%

(Source: DCLG Indices of Multiple Deprivation / Environment Agency)

Flooding had an impact on some of the most vulnerable members of the community:

- Edenside Care Home was flooded and had to be evacuated
- One Extra Care Housing facility was affected;

- 31 Sheltered Housing residents were affected and moved to temporary accommodation;
- Vulnerable persons accommodation that was flooded also required evacuation;
- Two Day Centres were not able to provide services.

Around 237 social housing properties were also affected.

4.3 Types of households affected by flooding

Utilising ACORN, a socioeconomic profiling tool supplied by CACI Ltd, it is possible to further understand the types of householders affected by flooding. Within Cumbria, flooded properties mainly affected residents in households categorised as “fading owner occupied terraces” (estimated 1,679; 11.4% of all affected Cumbrian residents) and “semi-skilled workers in traditional neighbourhoods” (estimated 1,231; 8.4%).

The type of households affected differed across the four districts that experienced flooding. Table 6 illustrates the type of household that made up at least one third of affected households in each district.

Table 6: Proportion of affected persons by household type

District	ACORN type: household description (ACORN Socio-economic category)	Estimated nr (%) of district's affected residents
Allerdale	Type 13: Upmarket downsizers (Category: <i>Affluent Achievers</i>)	522 (15.5%)
	Type 26: Semi-professional families, owner occupier neighbourhoods (Category: <i>Comfortable Communities</i>)	362 (10.7%)
	Type 49: Young families in low cost private flats (Category: <i>Urban Adversity</i>)	247 (7.3%)
Carlisle	Type 39: Fading owner occupied terraces (Category: <i>Financially Stretched</i>)	1,115 (22.5%)
	Type 49: Young families in low cost private flats (Category: <i>Urban Adversity</i>)	405 (8.2%)
	Type 28: Owner occupied terraces, average income (Category: <i>Comfortable Communities</i>)	349 (7.1%)
Eden	Type 21: Farms and cottages (Category: <i>Comfortable Communities</i>)	298 (27.4%)
	Type 23: Owner occupiers in small towns and villages (Category: <i>Comfortable Communities</i>)	207 (19.0%)
South Lakeland	Type 38: Semi-skilled workers in traditional neighbourhoods (Category: <i>Financially Stretched</i>)	677 (12.8%)
	Type 26: Semi-professional families, owner occupied neighbourhoods (Category: <i>Comfortable Communities</i>)	493 (9.3%)
	Type 10: Better-off villagers (Category: <i>Affluent Achievers</i>)	446 (8.4%)
	Type 32: Educated families in terraces, young children (Category: <i>Comfortable Communities</i>)	425 (8.1%)

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4.4 Uninsured households

Data available from CACI Ltd indicated that there were potentially many households without home structure insurance within the areas affected by flooding, possibly leaving householders vulnerable to falling victim to rogue traders. Carlisle and Kendal were each considered likely to have more than 1,000 households without home structure insurance. Four towns were likely to have at least 100 households without home structure insurance:

- Allerdale District: Keswick, Flimby and Cockermouth
- Eden District: Appleby

Around 90% of the households estimated to be without home structure insurance were likely to be found in the following 8 towns:

- Allerdale District: Keswick; Flimby; Cockermouth; Aspatria
- Carlisle District: Carlisle
- Eden District: Appleby; Langwathby
- South Lakeland: Kendal

Analysis of CACI Ltd data also indicated that over a quarter of households (28.3%) were potentially without home contents insurance. This has the potential to cause extreme hardship, stress and worry for residents, particularly for those identified within the ACORN “urban adversity” and “financially stretched” socio-economic categories (Table 6) and has the potential for residents to become victim to rogue traders. In total, 17 streets were identified as likely to contain 20 or more households without home contents insurance; these could contain an estimated 490 uninsured households, representing around 1 in 7 of all households likely to be without home contents insurance within the Environment Agency flood extent area. These streets were located in the following towns:

- Allerdale district: Flimby, Keswick
- Carlisle district: Carlisle
- South Lakeland district: Kendal

One street in Flimby, two in Carlisle and three in Kendal were considered likely to have 30 or more households without home contents insurance.

4.5 Cumbria Community Foundation flood appeal

Cumbria’s Community Foundation flood appeal provided additional support to flooded households. Payments made (as published in 2017) have shown that individuals living in districts with higher proportions of properties in the most deprived areas received higher proportions of the flood appeal.

Table 7: Cumbria Flood Appeal Spend, July 2016

District	Award amount (£)	Proportion (%)
Allerdale	£1,780,985	25%
Carlisle	£3,037,372	42%
Eden	£698,554	9%
South Lakeland	£1,715,200	24%
TOTAL	£7,232,112	

(Source: Cumbria Community Foundation, 2017)

Of the £7.23 million paid out, the majority awarded was for “flood damage and recovery”.

Table 8: Cumbria Flood Appeal Spend by theme, 2017

Grant type	Award amount (£)
Flood Damage and Recovery	£4,313,414
Flood Damage, Recovery & Loss of Income	£385,519
Household Flood Resilience Measures	£1,964,796
Loss of Income	£552,373
Increased Travel Costs	£16,010
Total	£7,232,112

(Source: Cumbria Community Foundation, 2017)

4.6 Cumbria Community Group - Flood Recovery Questionnaire

The Community Recovery Group, part of Cumbria's flood recovery structures, developed a questionnaire targeted at third sector organisations and community groups. This aimed to capture the contributions organisations had made to flood recovery, their views on what had and hadn't gone well during recovery, and areas where additional support was still required.

Complete responses were received from a total of 51 organisations from across all 4 districts (Allerdale, Carlisle, Eden and South Lakeland) that suffered significant flooding. These included: welfare response; health and care; faith and BME; sports clubs; public sector organisations; parish councils; businesses; and rescue organisations.

In around half of the responses, community support was reported as having gone well during the flood recovery; this includes support from local people, community groups, local businesses, and from volunteers. Some of the things that didn't go well included difficulties or frustrations with joint working – including issues with data sharing, a slow start to registering flooded properties, and communication difficulties between organisations. Further information can be requested via Cumbria CVS: <https://cumbriacvs.org.uk/>

4.7 Offers of help and support

Following the flooding event, Cumbria County Council set up a contact number and coordinated offers of help and support from businesses and members of the public.

Around 1,000 offers of help and support were recorded with the proportion of offers fairly evenly split between individuals and organisations from within and without the county. Offers included accommodation, clothing, bedding, food, cleaning products and equipment, toys, furniture, carpets, electrical goods, flood pumps and legal advice. As part of the recovery process, work was undertaken to link offers of help with areas of need.

4.8 Wider impact on community welfare and services

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 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.

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.

4.8.1 The Cumbria Flood Recovery Fund 2015

The Cumbria Flood Recovery Fund 2015 (managed by Cumbria Community Foundation) awarded grants to community organisations including groups, charities and third sector organisations who provided support and advice to flood affected people. A total of £132,058 was awarded for “community wellbeing and emotional” support. Further information can be found in “The Cumbria Flood Recovery Fund 2015 – Making a Difference” <https://www.cumbriafoundation.org/2017/12/04/making-difference-cumbria-flood-recovery-fund-2015/>

4.8.2 Cumbria Community Group - Flood Recovery Questionnaire

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.

5 Impact on Infrastructure

5.1 Roads, bridges and structures

5.1.1 Destruction and severe damage to the highway

The December 2015 storms caused a significant amount of damage to Cumbria’s highway network. Assessment of highway damage by mid-May 2016 estimated that 354.8km of carriageway had been damaged. Across the county, all classes of functional highway were affected to some extent, as illustrated in the following table:

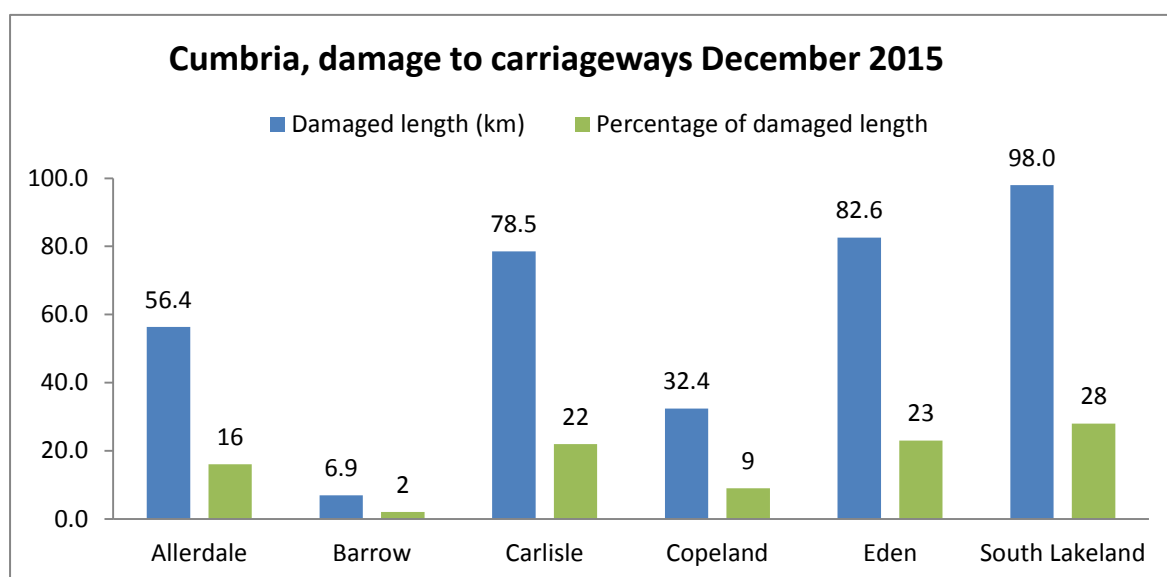
Table 9: Length of damage and repair costs by carriageway classification

	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)

Damage to over half of the affected highway network (56.0%, 198.8km) was considered to be significant. Overall, Barrow-in-Furness had the least amount of damage. The highest lengths of damaged highways and the highest costs were found in South Lakeland, as Figure 4 illustrates.

Figure 4: Damage to Cumbria’s highways network following December’s storms



(Source: Cumbria County Council, 2016)

5.2 District area key points

5.2.1 Allerdale

- 56.4km of Allerdale’s highway network damaged (15.9% of total county damage)
- Significant damage to 33.1km (59.2% of all Allerdale’s damaged routes; 16.7% of the county’s significantly damaged routes)

5.2.2 Barrow-in-Furness

- 6.9km of Barrow-in-Furness’ highway network damaged (2.0% of total county damage)
- Least damage of all the districts
- Significant damage to 1.5km (21.8% of all Barrow-in-Furness’ damaged routes; 0.8% of the county’s significantly damaged routes)

5.2.3 Carlisle

- 78.5km of Carlisle’s highway network damaged (22.1% of county total damage)
- Significant damage to 64.2km (81.9% of all Carlisle’s damaged routes; 32.5% of the county’s significantly damaged routes)
- Highest length of significantly damaged highway of all the districts

5.2.4 Copeland

- 32.4km of Copeland’s highway network damaged (9.1% of county total damage)
- Significant damage to 18.3km (56.4% of all Copeland’s damaged routes; 9.2% of the county’s significantly damaged routes)

5.2.5 Eden

- 82.6km of Eden’s highway network damaged (23.3% of county total damage)
- Second highest district in terms of overall damaged network length and costs

- Significant damage to 36.5km (44.2% of all Eden's damaged routes; 18.5% of the county's significantly damaged routes)

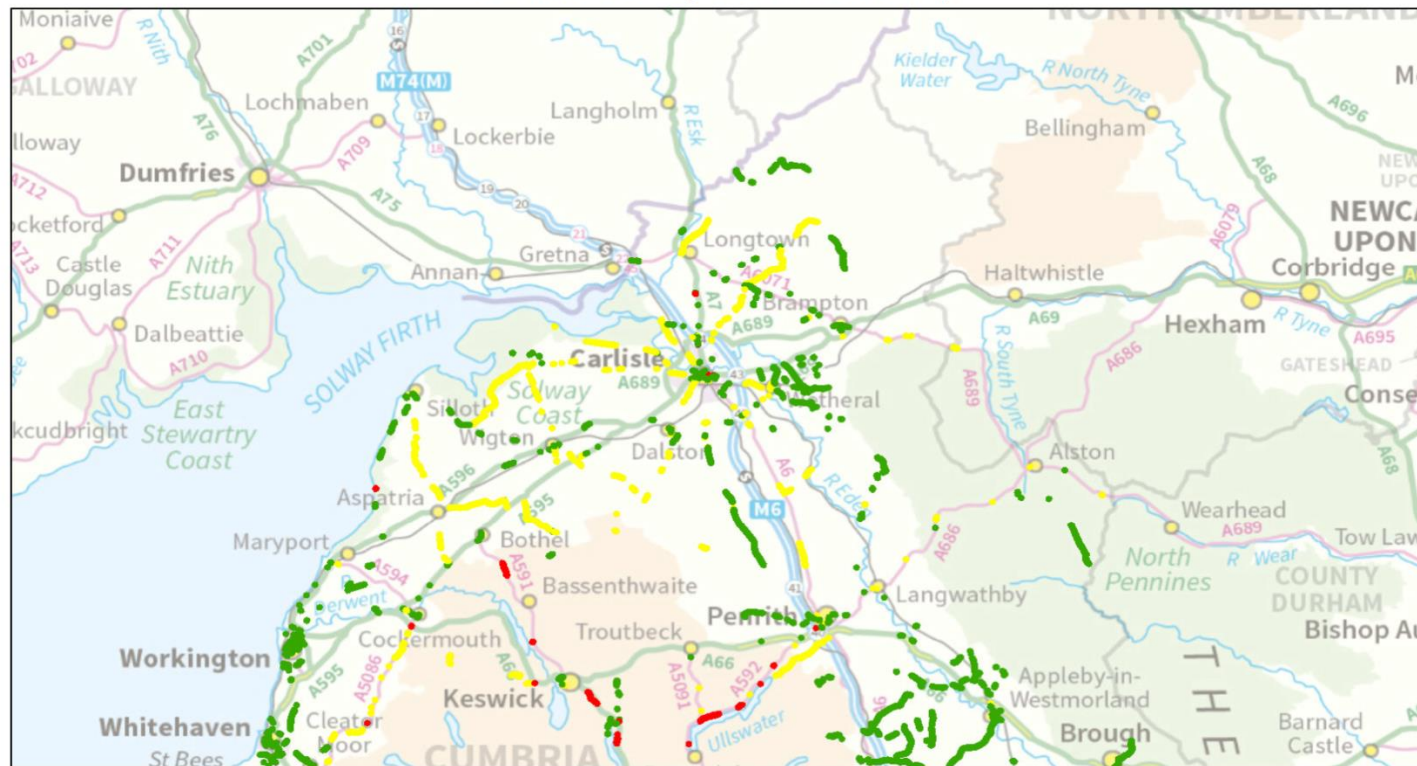
5.2.6 South Lakeland

- 98.0km of South Lakeland's highway network damaged (27.6% of county total)
- Highest of all the districts in terms of overall damaged network length and repair costs
- Significant damage to 44.1km (45.7% of all South Lakeland's damaged routes; 22.3% of the county's significantly damaged routes)
- Second highest district in terms of significantly damaged highway length

Maps illustrating damaged routes across the county identified at May 2016 can be viewed in Figures 5 to 7.

Figure 5: Damaged routes in the north of Cumbria

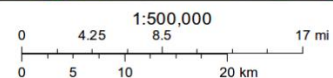
Cumbria County Council WebMap



June 22, 2016

Schemes Workbank (11-05-2016) by Overall Priority

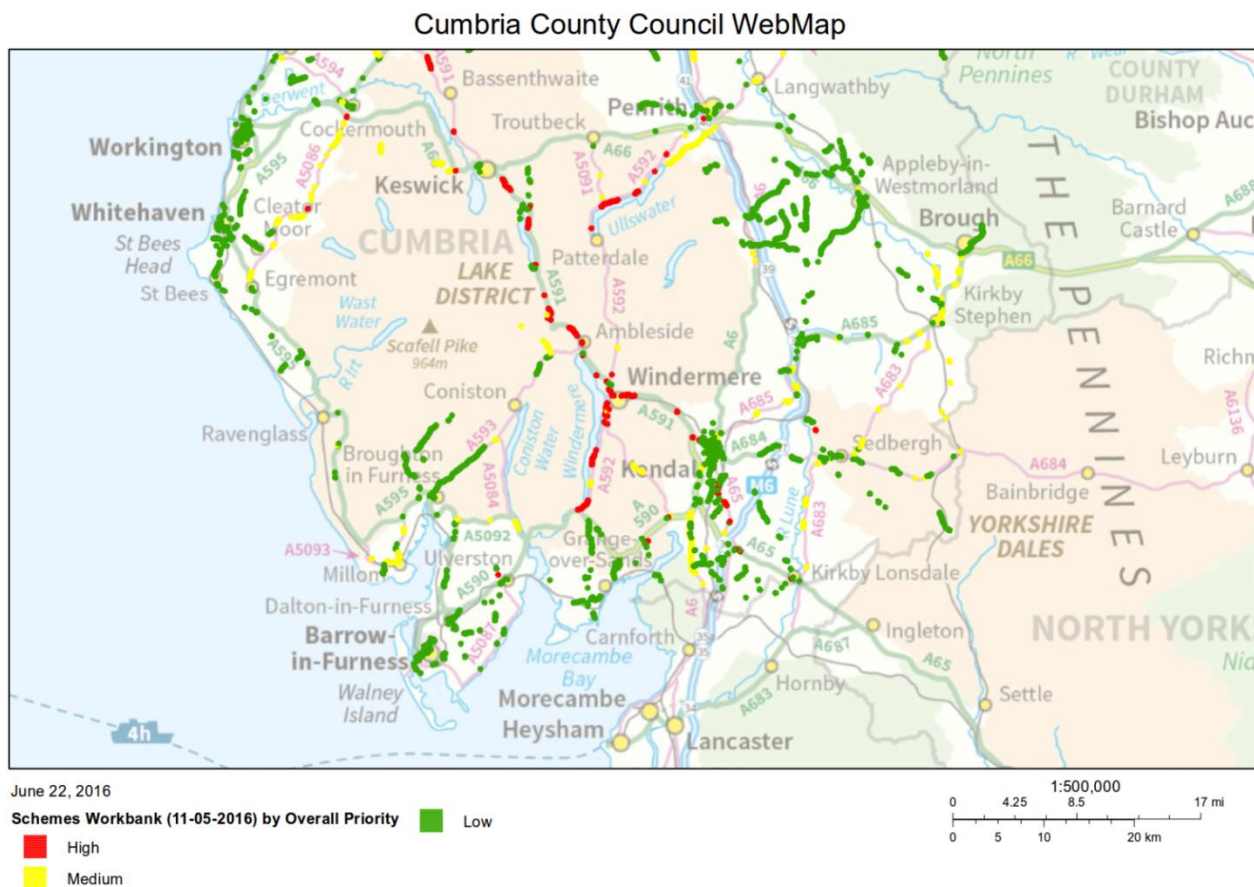
- High
- Medium
- Low



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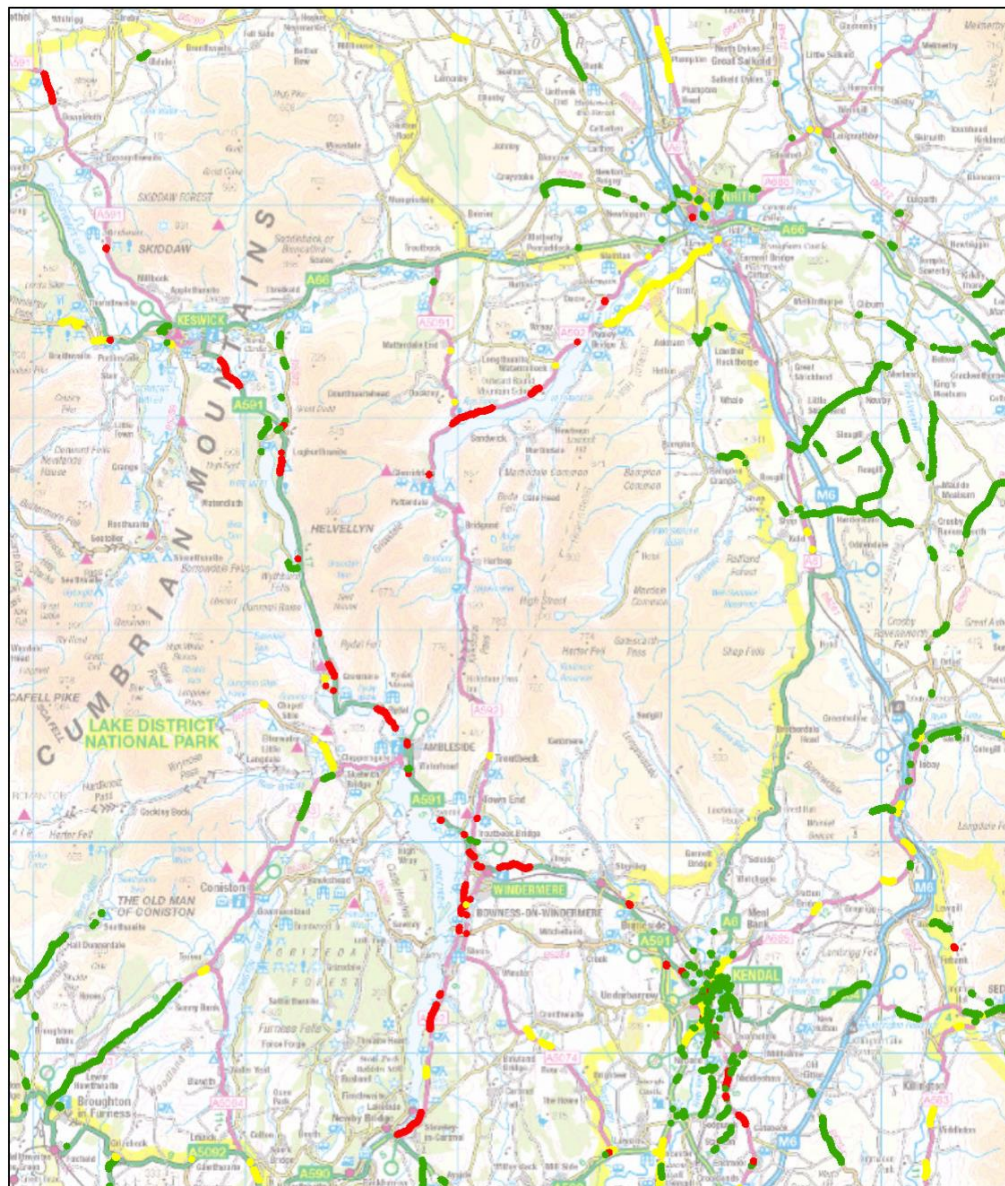
Figure 6: Damaged routes in the south of Cumbria



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Figure 7: Damaged routes along the A591 / A592 central corridor

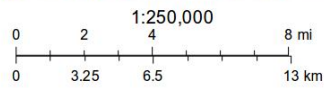
Cumbria County Council WebMap



June 22, 2016

Schemes Workbank (11-05-2016) by Overall Priority

- High
- Medium
- Low



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5.3 Destruction and severe damage to bridges

Within Cumbria's highway network there are around 1,700 bridge structures. In the immediate aftermath of Storm Desmond 131 bridges were identified as being of strategic importance, requiring immediate inspection. Inspections of all bridges progressed over the next few weeks, although for those requiring diving inspections, progress was hampered by river levels and speed of water flow that made it unsafe for divers to enter the water. By mid-May 2016 it was estimated that around 792 of Cumbria's bridges had been affected:

- 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.

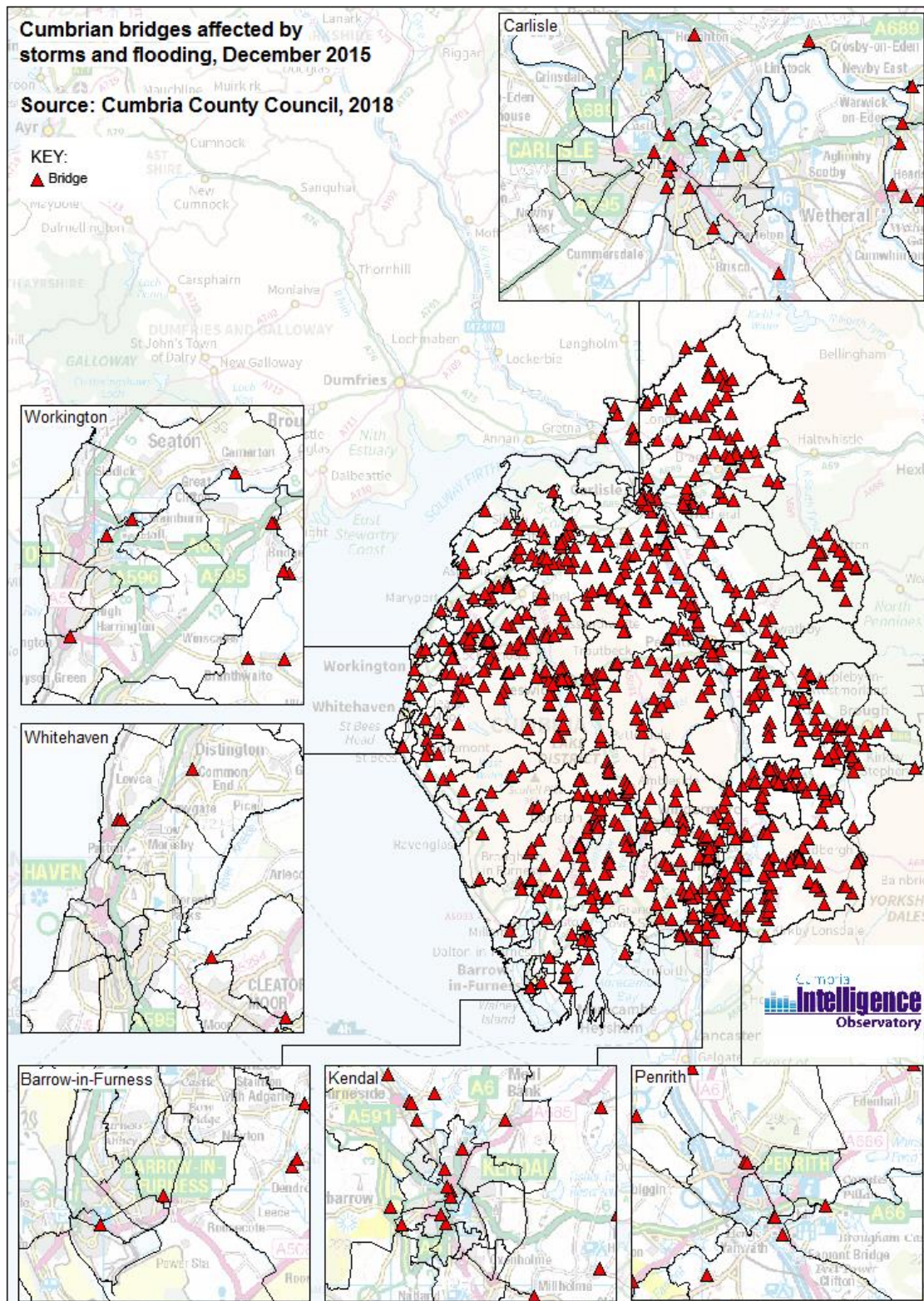
Figure 8 shows all the bridges that were affected by storms and flooding in December 2015.

A repair programme was put together, prioritising works using a variety of criteria, including socio-economic impacts which assessed whether:

- the route had a higher or lower than average traffic volume for the road type hierarchy;
- damage to the bridge affected access to community buildings;
- bridge damage affected local community residential access and / or community connectivity;
- bus routes were affected;
- there was negative business and / or economic impact;
- leisure routes (national or local trail routes) were affected.

Each of the above categories was scored from 1 (low impact) to 5 (significant impact). At May 2016, all bridges across the county had undergone initial scoring with 59 bridges scoring 25 points and above (out of a maximum of 30) in relation to socio-economic impact; 11 of these bridges were situated within Allerdale, six in Carlisle, seven in Copeland, seven in Eden, and 28 in South Lakeland. Of these, one bridge had significant damage, and a further four were structurally and functionally impaired (*Source: Cumbria County Council, 2016*).

Figure 8: Cumbrian bridges affected by storms and flooding, December 2015



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5.4 District area key points

5.4.1 Allerdale

Damaged bridges affected 112 different routes within Allerdale: five A-class roads, 11 B-class roads, 33 C-class roads and 63 unclassified routes (U-class roads).

In total, it is estimated that 177 bridges were affected by flooding in December 2015, over a fifth (22.3%) of all the damaged bridges in the county:

- 73 bridges had minor damage;
- 71 had been affected by flood, and required further detailed assessment;
- 20 had signs of significant damage, three of these are on A class roads;
- 13 were structurally and functionally impaired.

One bridge at Sebergham, Bell Bridge, collapsed completely at the end of January 2016 as a result of damage caused during December 2015 and remained closed until December 2017.

Initial socio-economic assessment of Allerdale's bridges identified 11 bridges scoring 25 or more out of 30. One of these, Smithy Bridge on the A591, sustained significant damage during December's storms.

By mid-June 2016, six bridges within the district remained closed:

- Bell Bridge (Sebergham, U1140)
- Blennerhasset Bridge (Blennerhasset, U2077)
- Janet Bridge (Townhead, near Dearham, C2001)
- Mill Beck Bridge, Applethwaite (U2225)
- Priests Bridge (near Dovenby, U2172)
- Rumbling Bridge, near Abbeytown

Blennerhasset, Janet and Priests Bridge were opened in September 2016. Bell and Mill Beck Bridges were opened one year later in September 2017. The final structure, Rumbling Bridge, was opened in March 2018.

5.4.2 Barrow-in-Furness

Barrow-in-Furness escaped major or extensive damage to bridges as a result of December's flooding, and had the fewest number of bridges affected. Just one bridge, Manor Road on the U6016 in Askam in Furness was identified as affected, and required further detailed assessment.

5.4.3 Carlisle

Within Carlisle, damaged bridges affected 40 different routes in the district: three A-class roads, two B-class roads, 12 C-class roads and 23 unclassified routes (U-class roads).

Inspections to May 2016 indicated an estimated 51 bridges had been affected by December's storms and flooding:

- 28 bridges had minor damage;
- 20 had been affected by flood, and required further detailed assessment;
- 3 had signs of significant damage;

Six bridges scored 25 or more out of 30 in terms of socio-economic impact; one suffered minor damage, and the other five were deemed to require further assessment: Caldew, A595; Carleton, A6; Harraby, A6; Lanercost New, C1025; Nelson (river), C1043).

5.4.4 Copeland

After Barrow-in-Furness, Copeland had the least number of bridges damaged, with 20 assets affected by December's flooding:

- 5 bridges had minor damage;
- 15 had been affected by flood, and required further detailed assessment;

No bridges were assessed as having significant damage or being structurally or functionally impaired. Copeland's C-class and Unclassified were the routes mainly affected.

Initial socio-economic assessment of Copeland's damaged assets identified that seven structures (one bridge and six sections of culvert) scored 25 or more out of a possible total of 30. All seven were situated within the Whitehaven area.

5.4.5 Eden

Damaged bridges affected 146 different routes within the Eden district, including seven well used A-class roads: A5091, A592, A6, A683, A685, A686 and A689.

Eden district had the second highest number of damaged bridge structures after South Lakeland with 228 (28.8% of the county total) affected to some extent by December's flooding:

- 67 bridges had minor damage;
- 155 had been affected by flood, and required further detailed assessment;
- One had signs of significant damage;
- Five were structurally and functionally impaired.

An initial socio-economic assessment of Eden's damaged bridges identified seven scoring 25 or more out of a possible total of 30. Six required further assessment: Albert Street, U3521; Duke Street (Thaka Beck), A6; St Lawrence, Appleby, B6260; Friargate (Thaka Beck), U3536; Grisedale, A592; Old London Road (Thaka Beck), U3537. One, Pooley Bridge on the B5320 (a route which connects the A592 at Pooley Bridge to the A6 at Eamont Bridge) suffered significant damage, collapsing completely. A temporary bridge was in place by 20 March 2016 to aid connectivity until a permanent structure can be installed.

By mid-June 2016, one bridge remained closed in Eden: Brougham Old Bridge, at Brougham, east of Penrith. After extensive repairs, this bridge was finally reopened in December 2017.

5.4.6 South Lakeland

South Lakeland had the highest number of damaged bridge structures of all the districts. In total, 315 structures (39.8%) suffered some level of damage:

- 43 bridges had minor damage;
- 242 had been affected by flood, and required further detailed assessment;
- Six had signs of significant damage;
- 24 were structurally and functionally impaired.

Middleton Hall Bridge on the A683 near Kirkby Lonsdale was damaged beyond reasonable repair requiring a temporary bailey bridge to restore connectivity. This temporary solution was in place within two weeks of being damaged.

Initial socio-economic assessment of South Lakeland's bridges identified 28 bridges scoring 25 or more out of 30. Of these, 25 required further assessment. Three were structurally and functionally impaired: Baddley Clock, A5074; Stock bridge, B5287; Victoria Bridge, Kendal A6.

By mid-June 2016, six months after being affected by flood damage, five bridges remained closed in South Lakeland:

- Broad Head Bridge, Grayrigg
- Gowan Old Bridge, Staveley
- Hallbeck Bridge, Killington
- Sprint Bridge, east of Burneside
- Ford Bridge, Burneside

Hallbeck and Sprint Bridges reopened in the Autumn of 2016, whilst Gowan Old Bridge opened in the Spring of 2017. Broad Head and Ford Bridges remain closed at May 2018.

Middleton Hall Bridge and Pooley Bridge in May 2018 continue to have temporary solutions in place.

5.5 Footbridges

Around the county, 11 footbridges were closed initially as a precautionary measure pending structural inspections. Footbridges were closed in three districts:

Carlisle

- Rickerby Memorial Footbridge (Carlisle)

Allerdale

- Brewery Footbridge (Cockermouth)
- South Street Footbridge (Cockermouth)
- Forge Footbridge (Keswick)
- Stormwater Footbridge (Portinscale)

South Lakeland

- Barbon Footbridge
- Peasey Beck Footbridge (Millness)
- Ivy Footbridge (Kendal)
- Gooseholme Footbridge, Kendal
- Miller Bridge, Rothay Park, Ambleside
- Underloughrigg Footbridge (Ambleside)

A further footbridge (Dockray Hall Footbridge, Ambleside) was closed with immediate effect at the beginning of April 2016 after inspections identified scour damage. The footbridge was used by children to access school, and was repaired and reopened a couple of weeks later.

Most of the above footbridges closed initially were reopened relatively swiftly following inspection. The exceptions were two footbridges in South Lakeland, Miller Bridge and Gooseholme, which remained closed until mid-March and the beginning of April 2016 respectively (*Source: Cumbria County Council, 2016*).

5.6 Road closures

The storms forced road closures in 107 different locations across the county. Closures were the result of a number of reasons including: flooding; subsidence; landslip; damaged carriageway; bridge damage; bridge requiring safety inspection; culvert subsidence (*Source: Cumbria County Council, 2016*).

5.6.1 Allerdale

Roads were closed in 37 different locations in Allerdale following Storm Desmond. Seven A-class roads were affected, eight B-class, nine C-class and 13 Unclassified class (U-class roads) / other routes. Residents from a wide range of communities faced disruption and diversions. Road closures and communities affected can be seen in Table 10.

Table 10: Road closures in the Allerdale district following Storm Desmond

Road closure	Point(s) of closure
Cockermouth area	Cockermouth Main Street; Isel Bridge
Thirlmere area	West Road
A5086	Gote Bridge Cockermouth (from C2068 Low Road to a point 92m north)
A5271	Greta Bridge, Keswick (30m either side of the centre of the bridge)
A591	Castle Inn to A66 Keswick (from A595 (Bothel) to A66 Crosthwaite roundabout); Keswick to Bothel; From U7003, extending in a northerly and southerly direction for 6.8km (from St Johns in the Vale junction to Dunmail Raise)
A596	Lawson Street Aspatria; Hall Brow, Workington
B5271	Greta Bridge, Keswick
B5289	Borrowdale Valley; Low Lorton
B5291	Ouse Bridge (from a point 35m either side of the centre line of the bridge)
B5292	Braithwaite (from U2214, extending in a south-westerly direction, for 110 metres)
B5301	Arkleby Mill Bridge Aspatria
B5322	St Johns in the Vale (from A591 Legburthwaite Mill Bridge to A66 Threlkeld)
C2002	Westnewton to Asaptria
C2007	Broughton High Bridge
C2008	Dearham Bridge
C2016	Camerton to Great Broughton
C2027	Southwaite Mill Bridge, Lorton (from a point 50m either side of the centre line of the bridge)
C2027	Southwaite Mill Bridge
C2058	Portinscale to Grange (from U2218 near Portinscale, for a distance of 5km near Grange); Keskadale Culvert near to Keskadale Farm From a point 30m north of the property known as Keskadale Farm for a distance of 50m; Mill Dam Bridge
U1140	Bell Bridge, Sebergham (from junction with B5305 in north easterly direction for approximately 930m)
U2081	Blennerhasset/Baggrow
U2116	Park Wood, Bassenthwaite
U2216	Braithwaite High Bridge, near junction of B5292 (from a point 20m either side of the centre line of the bridge)
U2219	Stormwater Old, Portinscale; Scales, Lorton
U2229	Brundholme Woods, Keswick
U2960	Threlkeld Bridge
U4287	Brundholme Road, Keswick

(Source: Cumbria County Council, 2016)

5.6.2 Barrow

In Barrow-in-Furness District one road was closed

5.6.3 Carlisle

In the Carlisle district, roads were closed in 16 different locations: four closures on A-roads, one on B-roads, seven on C-roads, four on unclassified (U-class roads) / other routes. Road closures and communities affected can be seen in Table 11.

Table 11: Road closures in the Carlisle district following Storm Desmond

Road closure	Point(s) of closure
Carlisle city	Etterby Road (CDNR Route, part)
Carlisle city	Caldewgate/ Shaddongate
Carlisle city	St Ninians Road (from junction with Upperby Road and Holmacres Drive)
A689	Farlam Hall (from Farlam Hall Bridge)
A69	Warwick Bridge (from Warwick on Eden to Corby Hill)
A69 Carlisle	Warwick Road
A7	Eden bridges (from Hardwick Circus to Brampton Road)
B6263	Warwick Bridge to Wetheral (from Junction with the A69 to Steels Bank)
C1013	Newby east Bridge
C1014	From Dalston to M6 Junction 42
C1015	Rickerby park, Carlisle (from Rickerby to Linstock)
C1017	Petteril Crook, Wreay
C1027	Great Corby to Warwick Bridge
C1036	Durdar Road, around Racecourse, Carlisle
C1041	Upperby Road, 0.5 miles south of Carlisle to Brisco
U1181	Crosby on Eden (Eden Golf Club) to Newby East

(Source: Cumbria County Council, 2016)

5.6.4 Eden

Within Eden, roads were closed in 28 different locations: six on A-roads; nine on B-roads; nine on C-roads; and four on unclassified roads (U-class roads). The routes and communities affected are summarised in Table 12.

Table 12: Road closures in the Eden district following Storm Desmond

Road closure	Point(s) of closure
Appleby	Town centre (various); Station Road under M6 bridge
A592	Waterfoot Junction to Aira Force; various locations between Aira Force and the Kirkstone Pass
A6	Plumpton to Stoneybeck; Eamont Bridge (from A66 to Clifton)
A686	Approach to Langwathby bridge (from Langwathby to Great Salkeld)
B5305	Hutton Wall Pond (from Unthank to Hutton in the Forest)
B5320	Pooley Bridge (from Waterfoot Junction to Pooley Bridge)
B6259	Warcop Road to A685 Kirby Stephen
B6260	Appleby (St Lawrence Bridge); Old Tebay
B6261	Shap to Orton
B6412	Temple Sowerby
B6413	Plumpton from A6 Junction
C3042	Howtown (from Sharrow Bay Hotel to Howtown); also from Martindale to Dalehead
C3047	From A6 Junction through Cliburn and Bolton
C3048	Brougham

C3057	Ousenstand Bridge (from Temple Sowerby to Bolton to Cliburn Road)
C3064	Long Marton to Dufton
C3070	Warcop Little Bridge (Warcop)
Road closure (cont'd)	Point(s) of closure
C3079	Daleholme Lane, Kirkby Stephen
C3079	Kirkby Stephen, Low Mill Bridge
U3088	Barrock Mill
U3122	Mungrisdale to Scales
U3128	Guardhouse (A66 junction)

(Source: Cumbria County Council, 2016)

5.6.5 South Lakeland

Across the road network in South Lakeland, roads were closed in 26 separate locations. Four A-roads were affected, three B-roads, eight C-roads and 11 Unclassified (U-class roads) / other routes. The resulting road closures and communities affected are illustrated within Table 13.

Table 13: Road closures in the South Lakeland district following Storm Desmond

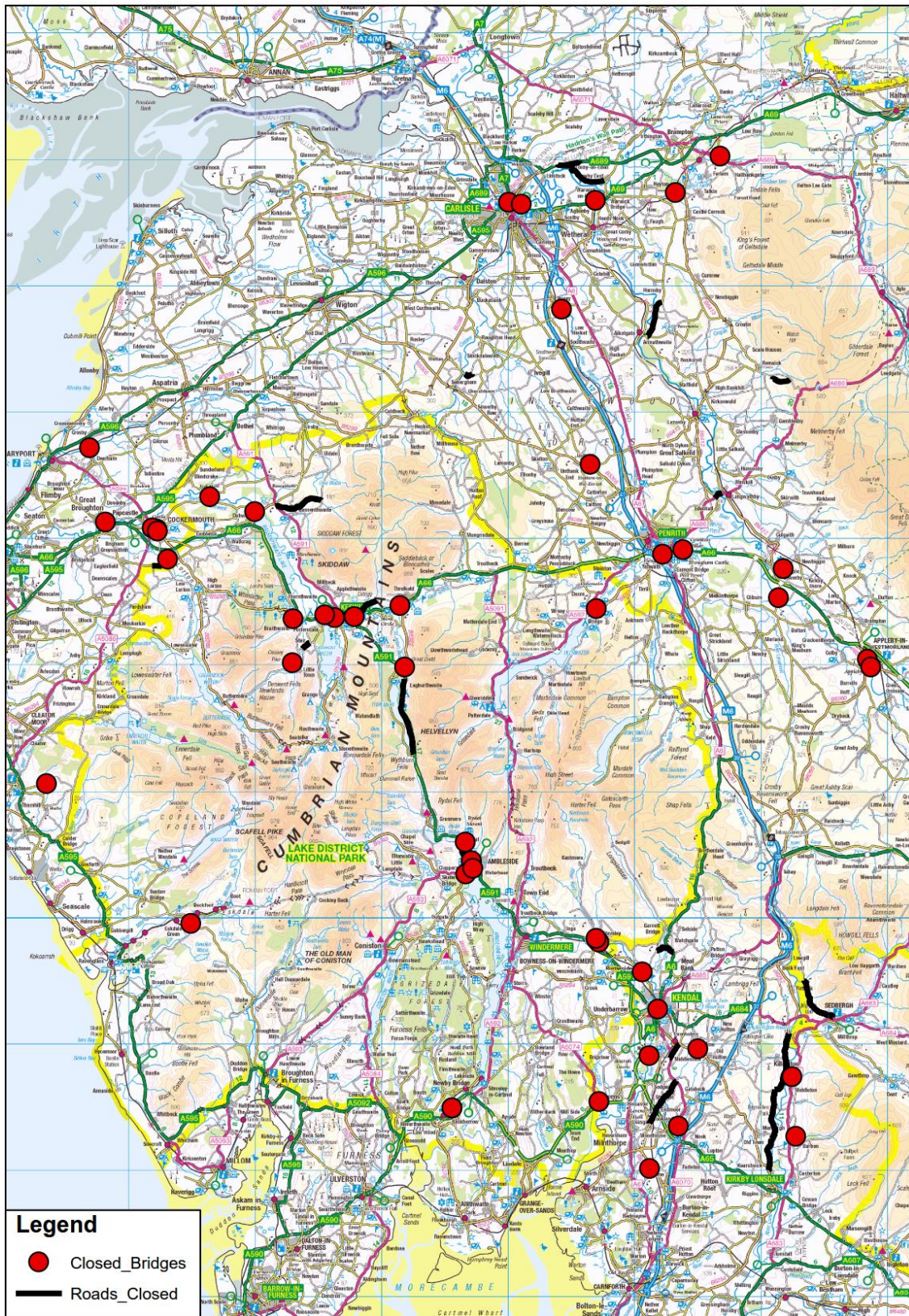
Road closure	Point(s) of closure
Ambleside area	Clappersgate (Brathay Bridge); Rothay Bridge
Kendal area	Sedgewick to Newlands
Levens area	Sampool Bridge
Natland area	Hawes Bridge
Rydal area	Pelter Bridge
Staveley area	Abbey Bridge
Whassett area	Hang Bridge
A592	South of Ferry Nab; Fell Foot caravan park (from A590 junction to Fell Foot junction)
A6070	Burton in Kendal at Sandycap Farm
A683	Middelton Hall Bridge
B5287	Stock Bridge (from Junction with A591 to Grasmere)
B6254	Millholme (St Sunday Bridge)
C5057	New Road Burneside, Ford Bridge
C5059	Backbarrow
C5070	Flodder Beck Bridge (Grayrigg)
C5079	Beck House junction (South of Killington); Hallbeck Bridge, Killington
C5100 / U5422	Howgill Lane (from Sedbergh)
C5101	Barth Bridge (from Dent to Sedbergh)
C5108	Staveley (Gowan Old Bridge)
U5272	Garth Row (Gurnal Bridge Lane, 60m length)
U5532	Ambleside (Under Loughrigg)
U5630	The Helm (from B6254 to A65)
U5647	Beckside Bridge

(Source: Cumbria County Council, 2016)

A number of routes were reopened relatively quickly, for example routes that became passable once flood waters receded, or routes crossing bridges that had been closed as a precautionary measure and subsequently reopened once safety inspections determined that the structure was safe to cross. Figure 9 provides a snapshot of the roads and bridges

across the county that remained closed at 16 December 2015, more than a week after the initial storm and flooding event.

Figure 9: Cumbria - roads and bridge closures at 16 December 2015



(Source: Cumbria County Council, 2016)

5.7 Excessive deviations arising from network infrastructure problems

Many minor diversions were in place following damage to carriageways and bridges on Cumbria's highways network. However, three damaged routes in the county required longer diversions.

Major structural failure of the A591 main north-south route through the Lake District left around 21 miles of the route completely impassable. A diversion route put in place almost doubled the travel distance to 41 miles. Although some level of connectivity had been restored by mid-February 2016, with the upgrading of a forestry track for use by shuttle buses and cyclists, car drivers were not able to use this route, and diversions continued until the A591 reopened in mid-May 2016.

Damage to the A592 at Ullswater made this route impassable. The diversion route was long, and time consuming, at 51 miles. By far the longest diversion route was in place around Langwathby, following structural failure of the A686. This diversion route was approximately 70 miles (*Source: Cumbria County Council, 2016*).

5.8 Drainage issues

Culverts allow water such as streams or open drains to flow under the highway. Damage has been recorded against nine of these important structures as a result of adverse weather in December 2015.

Four of the damaged culverts were situated in Allerdale: one alongside the reservoir at Thirlmere; Swan Inn Culvert; one at Cat Bells on the C2057, and the final culvert at Keskedale (Newlands Valley) on the U5113. Within Eden, major damage was discovered at Cardue Hall, Cumdivok; works were completed by early March 2016. In South Lakeland, damage was discovered to four culverts: Thatchmoor Head Culvert at Lambrigg (repaired and reopened by the end of February 2016), and a further culvert on the Appleby Road, north of Kendal. One on Kendal bypass and the final one on Sedbergh Road, Kendal. (*Source: Cumbria County Council, 2016*).

5.9 Accessibility

5.9.1 Accessibility of public services

Road and bridge closures affected communities across Allerdale, Carlisle, Eden and South Lakeland making it difficult for Cumbrian residents to access work, education and other public services. Those with access to a vehicle were generally able to access their destinations albeit with long diversions and delays. The settlement of Howtown was an exception as the road leading to the village (C3042) was impassable, and the community therefore found themselves isolated for a number of days.

Those without access to a vehicle found accessing services more difficult. In the first few days following Storm Desmond, bus and rail services were seriously disrupted (bus and rail services are covered in more detail within the [Impact on public transport](#) section). Within Carlisle, pedestrian access between the north and the south of the city was severed until 18 December as a result of the closure of Eden Bridge (A7) over the river Eden, and the Memorial Footbridge in Rickerby Park. The situation was similar within Eden, where bridge closures in Appleby divided the town, preventing those on foot from accessing services. The

closure of Greta Bridge in Keswick also caused similar problems for those on foot (*Source: Cumbria County Council, 2016*).

5.9.2 Additional school transport requirements due to impassable roads

Additional school transport requirements are covered within the [Impact on Learning and Schools](#) section of this flood impact assessment document.

5.10 Impact on public transport

5.10.1 Bus services

In the first few days following the flooding, bus services faced major problems in Carlisle, Kendal, Keswick, Cockermouth and Penrith areas as a result of road and bridge closures, but most services returned to an almost normal service relatively quickly.

The closure of Eden Bridge in Carlisle and resulting gridlock in the city, combined with the flooding of Stagecoach's Willowholme depot and relocation to Kingstown is likely to have had the largest impact in terms of the number of bus passengers affected despite the bridge closure lasting for just under a fortnight and alternatives coming into effect fairly quickly.

Other routes faced disruption over a longer time period. In Allerdale and South Lakeland, the closure of the A591 split the Keswick – Grasmere – Kendal route. The largest loss was for the small communities on the A591 between Keswick and Grasmere, which were still without a service in mid-January 2016. The number of bus users affected by the disruption to this route was likely to be relatively low. However, the A591 required major rebuilding works and was out of use for a number of months to car drivers as well as bus passengers. To provide some connectivity whilst repairs were carried out, a forestry track to the west of Thirlmere was upgraded to a temporary road to allow use by shuttle buses and cyclists from mid-February 2016. The temporary arrangement proved popular and was in place until the A591 reopened in mid-May 2016.

The closure of Ouse Bridge in Allerdale (near Dubwath) until mid-January 2016 meant there was no service between Dubwath and Castle Inn, and the service from Castle Inn to Keswick was reduced from every two hours to three trips per day. There was also a loss of the through bus to Cockermouth and Penrith from this area as a result of the Ouse Bridge closure. Thornthwaite, near Keswick, also had no service during part of January as a result of carriageway repairs.

Within Eden, the closure of Eamont and Pooley Bridges affected the 508 service Patterdale to Penrith route. The service was suspended during December, and when service was restored in early January 2016, it was with just one return trip a day, rather than the five evenly spaced journeys a day that had been provided previously.

Although bus services were disrupted initially, there were very few major impacts over the longer term, as bus operators acted quickly to restore services (*Source: Cumbria County Council, Integrated Transport Team, 2016*).

5.10.2 Rail services

Storms of early December caused flooding and landslips affecting First TransPennine 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-west-coast-main-line-to.html>*)

5.10.3 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*).

5.11 Public buildings

5.11.1 Temporary relocation of public services

5.11.1.1 Allerdale

Wigton Fire Station and Workington Police Station were both damaged as a result of flooding. Wigton Fire Station, although damaged, remained operational throughout. At Workington Police Station, extensive damage was caused to the ground floor including the custody complex, and although the station remained operational with officers working from the first and second floors, the custody function had to be relocated to Whitehaven police station until late January 2016 (*Source: Cumbria Constabulary; Cumbria Fire & Rescue Service, 2016*).

5.11.1.2 Eden

Within Eden, damage was caused to Appleby Fire Station, Appleby Police Station, Patterdale Fire Station and Police Headquarters in Penrith. Appleby Fire Station was out of action for 14 days following Storm Desmond requiring relocation of the fire appliance. Patterdale Fire Station, although damaged, managed to remain operational and maintain turnout systems.

Appleby Police station was out of action for one week; after this time business was conducted from the first floor until the building was fully restored in April 2016. Occupational health and sports facilities were affected at Police Headquarters in Penrith, and were operating from alternative premises until the completion of building work in April 2016 (*Source: Cumbria Constabulary; Cumbria Fire & Rescue Service, 2016*).

5.11.1.3 South Lakeland

Flooding affected Kendal Fire Station and Ambleside Police Station in South Lakeland. Kendal Fire Station, although damaged, remained operational throughout and Ambleside Police Station was open for business within one week (*Source: Cumbria Constabulary; Cumbria Fire & Rescue Service, 2016*).

5.11.2 Damage to public buildings and property (excluding schools)

Public buildings and property across four districts (Allerdale, Carlisle, Eden and South Lakeland) were damaged during December's storms and flooding. In total 32 assets were damaged, 9 in Allerdale, 12 in Carlisle, 7 in Eden and 4 in South Lakeland. By the end of 2015, almost one third of assets (31.3%; 10) had been repaired and were back in use. By the end of 2016, this had risen to 59.4% (19 assets) and by the end of 2017 78.1% (25) were back in use. Three premises had closed permanently. At April 2018, 1 asset remained completely closed (The Swifts Golf course and driving range). These damaged public buildings and property do not include school premises, which are included within the [Impact on Learning and Schools](#) section of this report (*Source: District Councils / Cumbria County Council, 2017*).

5.11.2.1 Allerdale

Water ingress and flood water caused damage to nine assets in Allerdale. Damaged assets included: libraries at Cockermouth and Keswick; public toilets at Braithwaite and Main Street, Cockermouth; Keswick Museum; sports facilities; and Cockermouth Town Hall.

With the exception of Keswick Museum, which although open was still undergoing repairs until 2017, all the other facilities reopened later in December 2015 (*Source: Allerdale District Council, 2017*).

5.11.2.2 Carlisle

Across Carlisle, 12 public buildings and property were damaged in December 2015, over one third (37.5%) of Cumbria's damaged local authority premises (excluding schools). A variety of assets were damaged including Carlisle's Civic Centre and The Sands Centre, a sport and entertainment venue.

Although the Civic Centre and the Sands Centre were reopened in early January 2016 whilst repairs were ongoing, over half 58.3% (7) of damaged assets remained closed at the end of 2016. These assets included recreational buildings, a community centre and a homeless hostel (*Source: Carlisle City Council, 2017*). At April 2018, 1 asset remained completely closed (The Swifts Golf course and driving range).

5.11.2.3 Eden

Across Eden, seven public building and property assets incurred damage as a result of flooding. Damage to Eden District Council's sporting facilities is covered in the [Impact on Environment](#) section of this report. Damage was mainly caused to assets in Appleby: the leisure centre, library, Broad Close public conveniences, Edenside Care Home.

Extensive damage to Edenside Care Home resulted in residents relocating to alternative accommodation in Penrith, and the Care Home was subsequently closed. This geographical relocation potentially makes it more difficult for residents to maintain their social contacts, with a possible detrimental effect on emotional wellbeing.

All remaining premises, with the exception of the sporting facilities, were reopened by the end of 2016 (*Source: Eden District Council, 2017*).

5.11.2.4 South Lakeland

Flooding affected four public building and property assets in South Lakeland, including three in Kendal (Mintsfeet highways depot, Whinfall Day Centre, Kendal Tutorial Centre) and one in Staveley (The Abbey Care Home).

Mintsfeet highways depot subsequently relocated to Millness Depot, a relatively short distance away, whilst Whinfall Day Centre did not reopen. The remaining properties reopened by the end of 2015 (*Source: Cumbria County Council, 2017*).

5.12 Emergency Assistance Centres

During Storm Desmond on 5-6 December, around 491 evacuees were sheltered across 13 Emergency Assistance Centres (EACs) in Cumbria. In total, 21 EACs were set up. However, not all were required in the event.

Nine EACs were opened in South Lakeland, of which seven were used by evacuees. Kendal Town Hall and Kendal Leisure Centre received the greatest numbers of evacuees, around 200 and 100 respectively, 61.1% of the total number of evacuees across the county. Two premises, the Hare and Hounds in Levens Village and The Villa, Brettagh Holt were set up unofficially in response to the plight of stranded motorists; exact numbers of evacuees in these establishments are unknown.

Seven EACs opened in Carlisle, although in the event only three were used. Richard Rose Morton Academy accommodated around 45 evacuees. Two unofficial EACs were also set up: Greystone Community Centre (30 evacuees) and Holy Trinity Church (12 evacuees).

In Allerdale, three EACs were set up in local schools (Cockermouth School, St Herbert's School and St Joseph's School). Two were used by evacuees: 30 people sought shelter in St Herbert's, and six in Cockermouth School.

Although two EACs were set up in the Eden district: Appleby Grammar School and Penrith Leisure Centre, numbers of evacuees using both centres were very low, around three people in each centre.

During Storms Eva and Frank later in December, no EACs were established (*Source: District Councils*).

5.13 Utilities – interruptions to power supplies and telecommunications

5.13.1 Telephones

Flooded power stations resulted in disruption to a number Digital Subscriber Line Access Multiplexer (DSLAM) fibre cabinets. As each DSLAM can service up to 800 connections, it is likely that initially a substantial number of customers would have been affected. Exact numbers are, however, unknown and DSLAMS affected by flooded power stations were quickly brought back into service once power was restored.

Flood water directly affected the following telecoms infrastructure: complete flooding of 37 copper cabinets and 57 DSLAM cabinets; water pressure caused 19 cables usually protected by air pressure to fail on the east side of the British Telecom network between the exchange and the cabinet. One of these cables in Carlisle alone feeds up to 1,200 customers. Although the full extent and exact geographical location of affected customers is unknown, figures provided by British Telecom show the status of telephone and broadband faults as 3,007 by 16 December 2015, 11 days after the initial flooding (*Source: British Telecom*).

5.13.2 Electricity

Although flood defences at Carlisle's and Kendal's main electricity substations protected power supplies to 110,000 properties, flooding to a number of smaller sub-stations and properties resulted in a substantial number of properties losing power.

At the peak of the flooding in early December 2015, there was an estimated 17,911 customers without electricity. The majority of these, around 13,000 (72.6%), were in the Carlisle district, 2,417 (13.5%) in Eden, 1,486 (8.3%) in Allerdale and 1,008 (5.6%) in South Lakeland. Nearly one in ten (9.8%) had power restored by 7pm on 5 December. By the end of Monday 7 December, 1,454 customers remained without power and six days after the initial flooding event, 750 customers were without power. The majority of customers had power restored eight days after the event, with the exception of a small number of properties still flooded, or those so badly damaged that electricity could not be safely restored.

Table 14 illustrates the main settlements with customers without power.

Table 14: Settlements and customers without power on 5 December 2015

District	Settlement	Customers without power at peak of flooding
Allerdale	Wigton	786
Allerdale	Cockermouth (Eaglesfield)	700
Allerdale sub-total = 1,486		
Carlisle	Carlisle	13,000
Carlisle sub-total = 13,000		
Eden	Kirkby Stephen	1,266
Eden	Appleby	1,011
Eden	Penrith	140
Eden sub-total = 2,417		
South Lakeland	Kendal	729
South Lakeland	Ambleside	135
South Lakeland	Broughton in Furness	100
South Lakeland	Grasmere	30
South Lakeland	Ulverston	14
South Lakeland sub-total = 1,008		
TOTAL		17,911

(Source: Electricity North West, 2016)

5.13.3 Gas

Disruption to gas supplies affected a small number of properties during December 2015. Water ingress affected six properties in Lingmoor Rise, Kendal in early December. Later in the month 70+ properties at Waterhead, Ambleside were cut off due to the failure of an underground regulator (Source: National Grid Gas plc).

Again, later in December, 170 residential properties were without gas at Hayton, near Carlisle, as a result of water in the gas main (Source: Northern Gas Networks).

Although gas supplies were an issue for a relatively small number of customers in Cumbria during December, it is difficult to determine whether disruption to supply was a direct result of flooding.

6 Impact on Learning and Schools

6.1 Schools and nurseries

Storms and flooding caused damage and disruption at varying levels to 44 schools in the county and one school in Lancashire attended by Cumbrian pupils. Schools were closed temporarily for a variety of reasons including: staffing shortages and accessibility problems; damage to property; lack of utilities and heating; flooding of part or all of the premises; and the use of three schools as Emergency Assistance Centres. The disruption affected an estimated 12,251 children in the short term.

Four schools in the Carlisle area were closed longer-term due to major flooding: Trinity School, Newman School, Richard Rose Central Academy and Crosby-on-Eden School, and by the end of the autumn term an estimated 3,034 children were not attending school.

Nursery schools also suffered disruption. Across the county, 17 nursery schools were affected with resulting disruption to an estimated 914 nursery school children and their parents. Disruption was also caused to six childminders: four suffered flooding; two were affected by loss of power and accessibility problems. Table 15 provides an outline of the number of premises and pupils affected at 11 December 2015, by district.

Table 15: School premises closed by storms and flooding at 11 December 2015

District	Nurseries (pupils affected)	Detail	Schools (pupils affected)	Detail
Allerdale	1 (6)	Greta pre-school flooded	11 (2,945)	Affected: Bassenthwaite; Borrowdale; Bowness on Solway; Braithwaite; Cockermouth School sixth form; Keswick; Kirkbride; Maryport Junior; Solway Community College; St Herbert's, Keswick; Workington Academy
Carlisle	7 (592)	5x flooded; 1x short staffed; 1x no power Affecting: Abbey; Ballyhoo Boutique; Crosby; Mother Goose; Kinder Park; St Aidan's	15 (6,456)	Affected: Austin Friars; Bishop Harvey Goodwin; Great Corby; Great Orton; Inglewood Infant; Inglewood Junior; Lanercost; Richard Rose Morton Academy; St Cuthbert's; Warwick Bridge; William Howard. 4x schools flooded and closed longer term: Newman School; Richard Rose Central Academy; Trinity School; Crosby-on-Eden Primary
Eden	2 (74)	Affecting: Biggins; Ullswater	7 (1,464)	Affected: Appleby Grammar; Appleby Primary; Beaconside; Bolton; Clifton; Patterdale; Yanwath
South Lakeland	7 (242)	2x no power; 4x no access; 1x other reason Affecting: Daisies; Safehands; Brewery; Meadow View; Stramongate; St Oswalds; Hawkshead	11 (1,386)	Affected: Allithwaite; Beetham; Castle Park; Crosscraze; Dean Gibson; Flookburgh; Goodly Dale; Hawkshead; Langdale; St Cuthbert's Windermere; Stramongate
TOTAL	17 (914)		44 (12,251)	

(Source: Cumbria County Council, 2016)

As of April 2018, all schools were open. Trinity school (Carlisle) was open with some temporary classrooms and a sports hall; and Newman school (Carlisle) was open but in temporary accommodation at Pennine Way, Harraby, Carlisle until the new school located on Scalegate Road (Carlisle) is operational (planned for 2020).

6.2 School transport

Many Cumbrian children are entitled to free transport to school provided by Cumbria County Council. Children who are eligible include children who live further away from their catchment or nearest qualifying school than the statutory walking distance (two miles for children aged under eight, and three miles for children aged eight or over), children within a specified low income group and some children with special educational needs. In the aftermath of December's storms, a number of roads and bridges were impassable, with the result that normal journeys to and from 35 schools were severely disrupted. Four of these schools are situated in Allerdale, 5 in Carlisle, 11 in Eden, 14 in South Lakeland, and 1 special school attended by Cumbrian pupils in Bentham, Lancashire. Costs to Cumbria County Council to the end of May for providing alternative free school transport to eligible pupils are estimated to be in the region of £99k (*Source: Cumbria County Council, Integrated Transport Team*).

6.2.1 Allerdale – school transport

Within Allerdale, routine routes to and from four schools were disrupted in December 2015 by storms and flooding. The closure of Ouse Bridge resulted in a 10 mile diversion to Bassenthwaite School for pupils in the High Bewaldeth to Bassenthwaite area which was in place until the end of the autumn term 2015. In the Cockermouth area, road and bridge closures resulted in a variety of route diversions via Papcastle or Embleton to ensure pupils from multiple settlements were able to attend Cockermouth School. The majority of these diversion routes were back to normal by mid-January 2016. However, around 46 children eligible for free school transport originating from the Blindcrake, Sunderland, Mosser and Brandlingill areas were subject to route diversions via Embleton until late March 2016.

Alternative transport arrangements were put in place for children eligible for free school transport to Fairfield Primary school in Cockermouth who were relocated following flooding to the family home. Within Keswick, road closures resulted in alternative arrangements being made for pupils to access Keswick School until the end of February 2016.

6.2.2 Carlisle – school transport

December's bad weather affected travel to a number of schools in the Carlisle and Brampton areas. The closure of Eden Bridge to vehicles and pedestrians, pending safety inspections, caused disruption to pupils attending many of Carlisle's schools, a situation that continued until the bridge reopened on 18 December 2015.

Newman School, in the centre of Carlisle, suffered damage to the extent that required the school to be relocated to the old Pennine Way Primary School site in Harraby, affecting just over 600 pupils. As the majority of pupils were not entitled to free school transport before December's flooding event, there was no obligation for the local authority to provide

transport. Newman School therefore made their own alternative transport arrangements to the new site for all pupils, with associated costs to be reclaimed from insurance.

Alternative transport arrangements were required until mid-December 2015 for around 188 pupils attending William Howard School in Brampton and a small number of pupils from Wigton attending Kirby Moor School in Brampton. The pupils originated from a wide area around Brampton, and disruption was caused by the closure of Beck Bridge at Farlam, and disruption within Warwick Bridge.

6.2.3 Eden – school transport

Travel to school in Appleby (Appleby Grammar School and Appleby Primary School) was severely disrupted until mid-December by the closure of St Lawrence Bridge to vehicles and pedestrians, effectively cutting Appleby in two, and by the closure of Langwathby Bridge and by road closures and issues in Colby and Great Asby. The Appleby Bridge closure also affected children around the Great Asby area travelling to Asby Endowed School, adding an additional 30 miles per day for some.

Pupils travelling from the Ousby, Melmberby, Hunsonby and Winskill areas to Langwathby School were inconvenienced by the closure of the A686 Langwathby Bridge, adding 16 miles to the daily journey for some 43 children until the end of the autumn term 2015. The bridge closure also affected around 27 children travelling from the Unthank area to Langwathby School.

Clifton School children and those attending the Lowther Endowed School at Hackthorpe and Yanwath School found their travel disrupted until late March 2016 by the closure of Eamont Bridge, on the A6 near Penrith. Travel to Kirkoswald School for children based in Renwick, Gamblesby and Glassonby was disrupted until the end of the autumn term by the closure of Lazonby bridge, resulting in diversions via Armathwaite.

Ullswater Community College, North Lakes School and Queen Elizabeth Grammar School in Penrith have large catchment areas and therefore closure of Eamont Bridge on the A6, Langwathby Bridge and the closure of the Patterdale Road affected pupils from a large number of areas. Pupils whose route included Langwathby Bridge found their travel disrupted until the end of the autumn term 2015. However, for others from areas such as Dalemmain, Lowther, Howtown and Great Strickland whose usual route included Eamont Bridge, travel to school was disrupted until late March 2016.

6.2.4 South Lakeland – school transport

Many pupils entitled to free school transport to attend schools in Kendal faced disruption following December's storms and floods. Transport to 14 schools in South Lakeland was disrupted: eight in Kendal (Cambian Whinfall; Castle Park; Kendal College; Kirkbie Kendal; Queen Katherine; Sandgate; Selside; and Stramongate); three in Kirkby Lonsdale (Queen Elizabeth; St Mary's Church of England Primary; and Underley Garden School); Dallam School in Milnthorpe; Settlebeck and Sedbergh Primary School in Sedbergh; and The Lakes School in Windermere.

Children attending Cambian Whinfall, Kendal College, Queen Katherine School and Stramongate School were affected until mid-February 2016 by the closure of Victoria Bridge in Kendal. Transport for a number of children attending Castle Park School was altered after

families were displaced by flooding. Other regular journeys were affected by damage to minor roads, damage to or loss of minor bridges, and loss of school vehicles. In total, an estimated 312 children required alternative arrangements to be put in place.

6.2.5 Lancashire – school transport

Travel was disrupted for four children attending a special school, Cedar House, in Bentham, Lancaster. Closure of the A590 combined with flooded roads around Bentham resulted in a 20 mile diversion each way for those based in the Barrow-in-Furness area. Those living in the Windermere / Kendal and Eden Hall areas faced longer journeys as a result of the closure of Victoria Bridge, Kendal until mid-February 2016 and Langwathby Bridge until the end of the autumn term 2015.

7 Impact on Environment

7.1 Waste

As a result of flooding to residential properties and businesses, the volume of municipal waste increased significantly. In the initial aftermath of the flooding, the nature of the waste was primarily household goods and furniture. Soon afterwards, damaged building materials began to appear on the kerbside, raising the concern that the public sector would be expected to pick up costs that were covered by insurance. To allow householders to dispose of waste quickly and easily in the immediate aftermath, permit requirements at Household Waste Recycling Centres (HWRCs) across the county were suspended for several weeks, and opening hours were extended, allowing householders to dispose of waste quickly and easily. Thereafter, opening hours reverted to normal from 06 January 2016, and permits were reinstated from 11 January 2016, with insurance companies expected to pick up the ongoing costs of flood waste removal.

Large volumes of flood waste were placed on pavements for collection and demand for skip hire increased threefold, with skip-lined streets becoming a familiar sight. Keeping up with demand was challenging, with district councils working around the clock for several weeks collecting and disposing of flood waste. Overnight road closures and collections were carried out to minimise disruption to traffic. Waste, including mud deposits, also needed to be collected from amenities and parks to allow communities to return to some sort of normality.

By early January 2016, the majority of waste was cleared from urban streets, although smaller quantities of waste continued to be collected for several weeks afterwards. Total tonnages of municipal waste directly attributable to flooding are illustrated in Table 16.

Table 16: Tonnages of flood-related waste received

District	Tonnes
Allerdale Borough Council	640
Carlisle City Council	2,457
Copeland Borough Council	8
Eden District Council	418
South Lakeland District Council	557
HWRCs (<i>breakdown below</i>)	
Allerdale	111
Carlisle	205
Eden	105
South Lakeland	357
TOTAL	4,858

(Source: Cumbria County Council, Waste Services, 2016)

The table shows tonnages of flood waste handled through the contract with Shanks, including tonnages delivered via SITA UK Ltd at Kendal Fell.

Over half of the flood waste (55%) arose from the Carlisle area, with 19% arising from South Lakeland, 15% from Allerdale, and 11% from Eden. This reflects the impact of the flooding throughout the county. In the South Lakeland area nearly half the waste was delivered to HWRCs, whereas in other areas most was collected by the district council from the kerbside.

As well as waste specifically described as flood waste, an additional 1,200 tonnes of other waste was delivered to HWRCs compared to the equivalent period for the previous year.

Flood waste was sent to landfill due to high levels of contamination, having a negative impact on landfill performance and recycling rates. During the previous year, total household waste was around 240,000 tonnes, of which 36,000 tonnes was sent to landfill. Flood waste tonnages equate to 13.5% of the total landfill waste in the previous year.

Costs to the County Council from Shanks, SITA UK Ltd and Cumbria Waste Management relating to the disposal of flood damaged waste are estimated to be in the region of £844k (*Source: Cumbria County Council Waste Services*).

7.2 Water supplies and wastewater assets

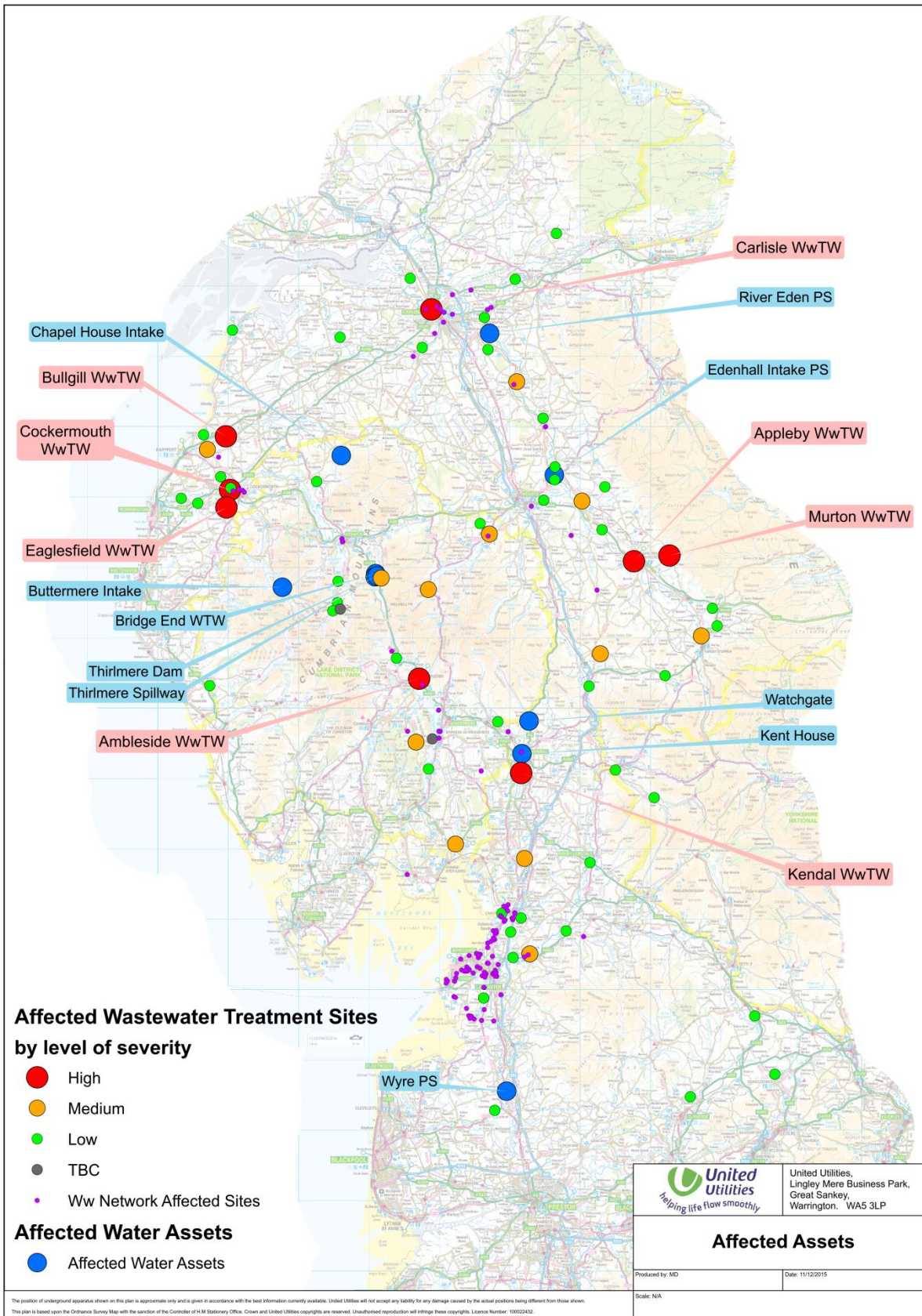
December flooding caused damage and disruption to wastewater treatment works and pumping stations around the county. Many sites were completely flooded or experienced high-through flows which damaged electrical and mechanical equipment and biological processes, some onsite sludge processing assets and welfare buildings.

In total, 731 assets belonging to United Utilities were impacted, including 110 wastewater pumping stations (WwPS) and around 70 waste water treatment works (WwTW). Significant damage was caused to WwTWs in Carlisle, Eden (Appleby; Murton); South Lakeland (Kendal; Ambleside) and Allerdale (Eaglesfield, Cockermouth and Bullgill). Biology essential for processing was washed away; pumps and motors damaged by flood water had to be sent away for specialist repair and drying. Back-up generators were in use at a significant number of WwTWs and WwPS; by 18 December only three sites were not on full mains power. However, as some access roads had been washed away or damaged, gaining access to assess damage and carry out repairs was a challenging process for engineers.

Water supply to households was interrupted as a result of Storm Desmond at the beginning of December. In total, 667 properties in the county initially lost their clean water supply, mainly across Allerdale (Keswick; Borrowdale) and Eden (Glenridding; Patterdale; Scalehouses near Penrith). Landslips around and into Thirlmere reservoir caused turbidity in the reservoir, and a precautionary “boil water” message was issued to 373 properties; by 19 December only two properties, both in Staveley, remained on notice. Storms Eva and Frank, later in December, had some slight impact on sites, but no further customers were without clean water as a result. By the end of December 2015, no properties were without clean water or on a boil water notice. Work to fully restore the WwTWs did not have a negative impact on services to individual properties and customers. Damage to water assets is estimated to be in excess of £50m (*Source: United Utilities*).

Figure 10 shows affected water assets across the county, and affected wastewater treatment sites by level of severity.

Figure 10: Affected wastewater treatment sites and affected water assets



(Source: United Utilities, 2016)

7.3 Private water supplies

It is possible that damage may also have occurred to private water supplies, septic tanks and treatment plants as a result of flooding or landslips. There was concern that damage may have occurred to individual water supplies that are not required to be monitored by Private Water Supply Regulations. The condition and whereabouts of these private water supplies is unknown. No concerns were known to have been raised by owners; although this could be because they were unaware that damage had occurred and issues may have arisen at a later date. However, it is not anticipated that there would be a large number of cases (*Source: Carlisle City Council; Eden District Council*).

7.4 Forestry assets

Storms and flooding resulted in very limited damage to woodlands and forestry apart from a very few localised pockets of damage. Across the county storms and flooding caused an estimated £185k of damage to forestry assets within Allerdale and South Lakeland. Riverside woodlands, forest paths, tracks, bridges, forest drainage infrastructure and culverts were affected across a wide area, with some infrastructure washed away. Recreational infrastructure and visitor facilities were also affected, which could have a medium to long term impact on tourism and tourism businesses.

Within Allerdale, a landslide occurred from a section of Latrigg on the Greta Gorge near Keswick, requiring rerouting of the path. Debris, gravel and stones were deposited from River Greta and Bassenthwaite Lake flooding. Mature parkland trees were lost the Hutton in the Forest Estate, near Cockermouth. South Lakeland also experienced landslides and river erosion at Kirkby Lonsdale, and trees blown over at Hawkshead and Mansergh. Windblown trees can be normal during December, but can result in some trail closures and diversions until trees are cleared and routes made safe (*Source: Forestry Commission*).

7.5 Rural landscape

Landscapes across a wide area were altered by landslips; 12 landslips occurred around mine treatment works in the valley above Braithwaite, raising concerns regarding contamination and the management of mining sites. Further landslips occurred around the Ullswater catchments, resulting in boulders, debris and sediments being deposited onto roads and paths and into river courses. The financial cost of damage to the rural landscape was estimated to be in the region of £2m. However, the full extent of landscape changes is not known. For example, although it is estimated that costs to restore rivers could be in the region of £7m, the potential impact on changes to river courses and geography is not yet known. Future modelling work is planned by the Environment Agency to establish the standard of the environment before the flooding incident to use as a benchmark in determining changes (*Source: National Trust; Environment Agency*).

7.6 Nature and habitats

Across the flood areas there was scouring damage adjacent to rivers, damage to peat bunds, loss of bog areas and upland planting removed on the commons. Debris was washed onto meadows, potentially damaging fragile habitats. Overall reinstatement and repair costs were estimated at around £7m. This damage to the natural environment will

have an impact on the plants and animals that inhabit these specialised areas, as well as a potential impact on tourism and tourism businesses (*Source: Natural England*).

7.7 Contamination issues

In addition to debris, there were some contamination issues. Leaking fuel tanks, mainly heating oil, were reported in the Eden district, and an oil spillage at Mintsfeet, Kendal hampered the cleaning up process (*Source: Eden District Council; Cumbria County Council*).

7.8 Farming assets / businesses

Hardship was caused to farming businesses. Around 600 farming businesses across Allerdale, Carlisle, Eden and South Lakeland experienced some degree of impact, either directly from flooding or from water run-off. Impacts were wide ranging, and included damage to boundaries, stock proof fencing, dry stone walls, access tracks and bridges. Large areas of land, up to 10 hectares in some instances, were damaged by debris deposits of gravel and silt from rivers. Removal of these deposits was challenging for farmers; Environment Agency consent was required, and there were concerns that the removal process could cause further damage to fragile habitats as land was already saturated. Livestock health and welfare was affected: around 702 cattle and sheep are known to have drowned as a result of flooding; forage was lost where silage and straw was washed away.

It is estimated that up to 2,000 parcels of farmland were flooded. 40 farms (6.7%) had 50% or more of their fields flooded; 346 farms (57.7%) had up to 10% of their fields flooded. By the beginning of March, 193 applications valued at £2.2m had been made to the Farming Recovery Fund by Cumbrian farmers, and claims may well rise. A survey carried out by the Farmer Network, Westmorland Agricultural Society and the National Farmers Union between 18 December 2015 and 26 January 2016 indicated that 67% of affected farmers would apply to the Flood Recovery Fund. Given the estimate that 600 farms have been affected it is likely that the number of applications from Cumbria could more than double to 402 applications. It is possible that the final claim for Cumbria could be in excess of £5m (*Source: National Farmers Union; Rural Payments Agency*).

Further results from the survey illustrating the impact to farming businesses can be viewed in the [Farm Survey Key Findings](#) section.

7.9 Damage to non-agricultural land

Non-agricultural land and recreational facilities were impacted by deposits of gravel, sediment, silt and debris. The impact across the districts is captured in the following sections.

7.9.1 Allerdale

A number of local communities within Allerdale temporarily lost the use of leisure facilities as a result of flood damage. In Fitz Park, Keswick, damage occurred to lawns and shrub borders, fencing, car parking facilities along with the bowling green and tennis court. Restoration work was also required at the Memorial Gardens, Cockermouth, where paths and planting were washed away. There were reports of land impacted by deposits of gravel, sediment, silt and debris at Greta Bridge in Keswick, property adjacent to the River Greta, and at Low Lorton. Several parish councils also reported sludge and gravel deposits across

their areas still having an impact at the end of March: Threlkeld; Seaton; Broughton; Keswick Town and Above Derwent Parish Councils (Source: *Allerdale Borough Council; Environment Agency; Parish Councils, 2016*).

7.9.2 Carlisle

Damage was caused to leisure facilities within Carlisle by deposits of gravel, sediment, silt and debris, including Bitts Park play areas and Sheepmount Sports Centre. Sheepmount Sports Centre remained closed at June 2016. Wetheral Parish Council also reported damage to Downagate playing fields at Warwick Bridge (Source: *Carlisle City Council; Parish Councils, 2016*).

7.9.3 Eden

A number of leisure facilities owned by Eden District Council were damaged: King George V playing field and play area, (Appleby); Frenchfield Sports Fields (Penrith); and Jenkins Field (Glenridding). River debris and scouring had caused damage to sports pitches, running and cycle tracks and play areas, all requiring significant reinstatement work (Source: *Eden District Council, 2016*).

Crosby Ravensworth along with Yanwath and Eamont Bridge Parish Councils also reported sludge and gravel damage (Source: *Parish Councils*).

7.9.4 South Lakeland

Significant damage was caused to play facilities at Rothay Park, Ambleside when a river retaining wall was damaged. Other damage to non-agricultural land caused by deposits of gravel, sediment, silt and debris was reported by Milnthorpe Parish Council and Burneside Parish Council. Leighton Beck, the River Kent in Kendal and Smithy Beck at Howgill were also affected (Source: *South Lakeland District Council, 2016*).

7.10 Public Rights of Way within the Lake District National Park

Enjoyment of natural, outdoor leisure facilities was disrupted as a result of extensive damage caused to the Public Rights of Way (PRoW) network within the Lake District National Park. The network, managed by the Lake District National Park Authority (LDNPA) contains 3,122 km of PROW and 1,428 bridges.

Storm Desmond left 562 km of the network compromised, almost one fifth (18.0%) including damage to 165 public paths, 257 missing or damaged bridges and 108 damaged items of access furniture (gates and stiles) across 64 parishes (16 of which are within Allerdale, 13 in Copeland, 17 in Eden and 28 in South Lakeland).

The areas most severely affected were:

- The Coast to Coast route between Grisedale and Mardale
- Glenridding and the Parish of Patterdale
- Grasmere
- Mungrisdale
- Along the Rivers Greta and Middle Derwent
- General damage across north lakes valleys: Buttermere, Bassenthwaite, Newlands and Borrowdale
- General damage across south lakes valleys: Ambleside, Windermere and Langdale

The overall cost of flood damage to the PRoW network was £5,790,381 (LDNPA, 2016). The Routes to Resilience project (R2R) was established to address this damage and restore a more resilient PRoW network. R2R is a £3m project, 100% funded with European Agricultural Development Fund money through the Rural Payments Agency. Funding was awarded in November 2016 and the programme is scheduled to close in November 2018. The additional £2,790,381 is being sought through alternative sources of funding.

To the end of March 2018, R2R had delivered completed 127 jobs, incurring expenditure of £1,455,273. This has replaced, restored and added resilience to 72 bridges, 47 public paths and 28 items of access furniture.

Extensive damage was also caused to the Keswick Railway path, resulting in sections of the path, which is widely used by walkers and cyclists, being closed off. Damage included the collapse of two major bridge structures and approximately 200+ metres of track bed washed away, as well as severe damage to the abutment of one of the remaining railway bridges across the River Greta (Rawsome Bridge) leaving it in imminent risk of collapse. In addition to the impact on tourism and tourism businesses, there was an impact to the local community in the loss of a well-used recreational route, and debris in the water from collapsed bridges posing a safety threat to canoeists. Repair plans were established and fundraising efforts are ongoing. The route remains disconnected at April 2018 (*Source: Lake District National Park Authority, 2018*).

7.10.1 Allerdale

Data provided by the LDNPA in 2016 showed that just over a third (35.7%) of all damaged LDNPA PROW infrastructure items occurred in the Allerdale District. Damage to 84 bridges will cost an estimated £694k to repair, and £901k for damage to 112 paths and other associated items. Damage occurred across 16 parishes. Above Derwent was the most seriously affected parish having 78 damaged items, with repair costs expected to be in the region of £613k (*Source: LDNPA, 2016*).

7.10.2 Copeland

In 2016, data provided by the LDNP showed that damage was caused to 19 items in Copeland across 8 parishes as a result of flooding; 13 bridges; 6 paths and associated items. Total damage costs are estimated in the region of £63k. Ennerdale and Kinniside parish was the worst affected in Copeland, with 5 bridges damaged, an estimated repair cost of £26k (*Source: LDNPA, 2016*).

7.10.3 Eden

In 2016, LDNP data illustrated that whilst the Eden district suffered damage to similar numbers of network structures and paths as Allerdale district (194 and 196 respectively), each accounting for around a third of the total damaged items, almost half of the damage costs (£2.64m; 45.5%) occurred in the Eden district. Damage occurred to 96 bridges and 98 structures across 12 parishes. Patterdale parish saw the most damage with 82 items affected and resulting repairs estimated as £1.26m, the highest on both counts of any parish within the National Park (*Source: LDNPA, 2016*).

7.10.4 South Lakeland

A quarter (25.5%) of damage to the PROW network within the National Park occurred in South Lakeland according to data provided by the LDNP in 2016, with 140 items damaged. In total, 71 bridges and 69 paths and associated structures were affected across 28 parishes, costing an estimated £1.50m to repair. Lakes (Grasmere) parish was the worst affected of South Lakeland's parishes, with 20 damaged PROW items and repair costs estimated to be in the region of £283k (*Source: LDNPA, 2016*).

7.11 Public Rights of Way (CCC)

Outside the national park, the Public Rights of Way Network is managed by Cumbria County Council and the Lake District National Park Authority in partnership with other agents including the Yorkshire Dales National Park Authority. The network comprises: 2,431 bridges / structures; 5,450km of public footpaths; 1,885km of public bridleways; 106km of public byways; and 390km of unsurfaced minor roads providing valuable links.

Network damage occurred across all districts, with the exception of Barrow-in-Furness. In total, there were 102 instances of path erosion and 172 instances of damage to bridges and structures, across 97 parishes. The total cost of repairing damage across the network was estimated to be in the region of £2.117m (£577k for network bridges and £1.540m for path erosion).

Funding of £500,000 was received from the Cumbria Countryside Access Fund (via the Rural Payments Agency) and is expected to be fully committed by October 2018. It is expected that there will be a shortfall of around £900,000. Although no additional funding has been identified, some schemes have been addressed by working in partnership with Yorkshire Dales National Park using their staff and volunteers to ensure bridges can be replaced. This approach has ensured that all the damaged bridges covered by the Yorkshire Dales National Park Authority in Cumbria have now been replaced or repaired.

Data at April 2018 show that 76 paths covering 13.8km and 105 bridges across the county are still affected by flood damage (*Source: Cumbria County Council, 2018*).

7.11.1 Allerdale

In Allerdale 20 parishes were affected (Blennerhasset and Torpenhow; Borrowdale; Broughton; Camerton; Cockermouth; Crosscanonby; Dean; Dearham; Dundraw; Embleton; Gilcrux; Holme Abbey; Keswick; Maryport; Papcastle; Plumbland; Seaton; Sebergham; Wigton; Workington). Damage occurred to 47 bridges and 25 paths resulting in estimated repair costs of £97k and £235k respectively. Maryport saw the most overall damage in Allerdale with 15 assets affected, costing an estimated £52k to repair.

Storm Desmond caused damage to 2.9km of paths within Allerdale, one quarter (24.5%) of all damaged paths on Cumbria County Council's network. The worst damage was seen within Maryport where 707 metres of paths were damaged (Source: Cumbria County Council, 2018).

Data at April 2018 indicated that 41 bridges and 24 paths covering 2.6km in Allerdale continued to be affected by flood damage (Source: Cumbria County Council, 2018).

7.11.2 Carlisle

In Carlisle, 58 PROW network items were recorded as damaged: 20 bridges and 38 paths. Total repair costs were estimated at £801k, comprising £35k for bridges and £766k for paths. Estimated repair costs for paths make up almost half (49.7%) of the total flood path repair costs across Cumbria County Council's network. It is known that around 10.0km of paths were damaged, 48.6% of all the damaged paths managed by the County Council. Three parishes in Carlisle district had more than 1km of path lengths damaged.

Table 18: Greatest damage to path lengths, Carlisle district

Parish	Estimated length damaged (metres)	% of district damage total
Carlisle City	3,457	34.5%
Beaumont	1,510	15.1%
St Cuthbert Without	1,454	14.5%

(Source: Cumbria County Council, 2018)

In total, 13 parishes were affected: Beaumont; Brampton; Burgh by Sands; Carlisle City; Dalston; Hayton; Irthington; Kingmoor; Rockcliffe; St Cuthbert Without; Stanwix Rural; Stapleton; Wetheral. One third of Carlisle district's damaged occurred in Carlisle Parish with 19 network items damaged, with costs estimated at £514k.

Data at April 2018 indicate that 9 PROW bridges and 26 paths covering 6.6km were still affected by flood damage (Source: Cumbria County Council, 2018).

7.11.3 Copeland

Four parishes were affected in Copeland: Drigg and Carleton; Lowside Quarter; Parton; St Bees. Eight infrastructure items were damaged, comprising 6 bridges and 2 paths (157 metres of damage) with costs estimated at £19k and £8k respectively. Drigg and Carleton Parish suffered the majority of the damage, with 5 damaged items totalling an estimated £6.5k to repair (Source: Cumbria County Council, 2018).

Data at April 2018 showed that 2 PROW bridges and 1 footpath covering 100m continue to be affected by flood damage in Copeland (Source: Cumbria County Council, 2018).

7.11.4 Eden

As within the national park, Eden and Allerdale districts saw a similar number of instances of damage to network bridges and paths, 79 (28.8%) and 72 (26.3%) respectively. Within Eden district, damage occurred to 55 bridges and 24 paths. Over 5.4km of paths were damaged, almost one quarter (23.5%) of all damage to the county council's paths network. Glassonby Parish was the worst affected, with 2km of paths damaged.

Repair costs are estimated to be in the region of £469k, comprising £157k for bridges and £312k for paths. In total, 35 parishes were affected: Ainstable; Alston Moor; Appleby-in-Westmorland; Asby; Bolton; Castle Sowerby; Crosby Ravensworth; Culgaith; Dufton; Glassonby; Hartley; Hesket; Hoff; Hunsonby; Kirkby Stephen; Kirkoswald; Langwathby; Lazonby; Long Marton; Lowther; Mallerstang; Morland; Musgrave; Nateby; Newby; Orton; Patterdale; Ravenstonedale; Shap; Skelton; Sockbridge and Tirril; Soulby; Tebay; Temple Sowerby; Warcop. In terms of repair costs, Alston Moor suffered the greatest amount of overall damage in Eden, with estimated repair costs in the region of £93.8k for five damaged network items (one bridge and four paths) (*Source: Cumbria County Council, 2018*).

At April 2018, data indicated that 34 bridges and 14 paths covering 2.6km were still affected by flood damage in Eden (*Source: Cumbria County Council, 2018*).

7.11.5 South Lakeland

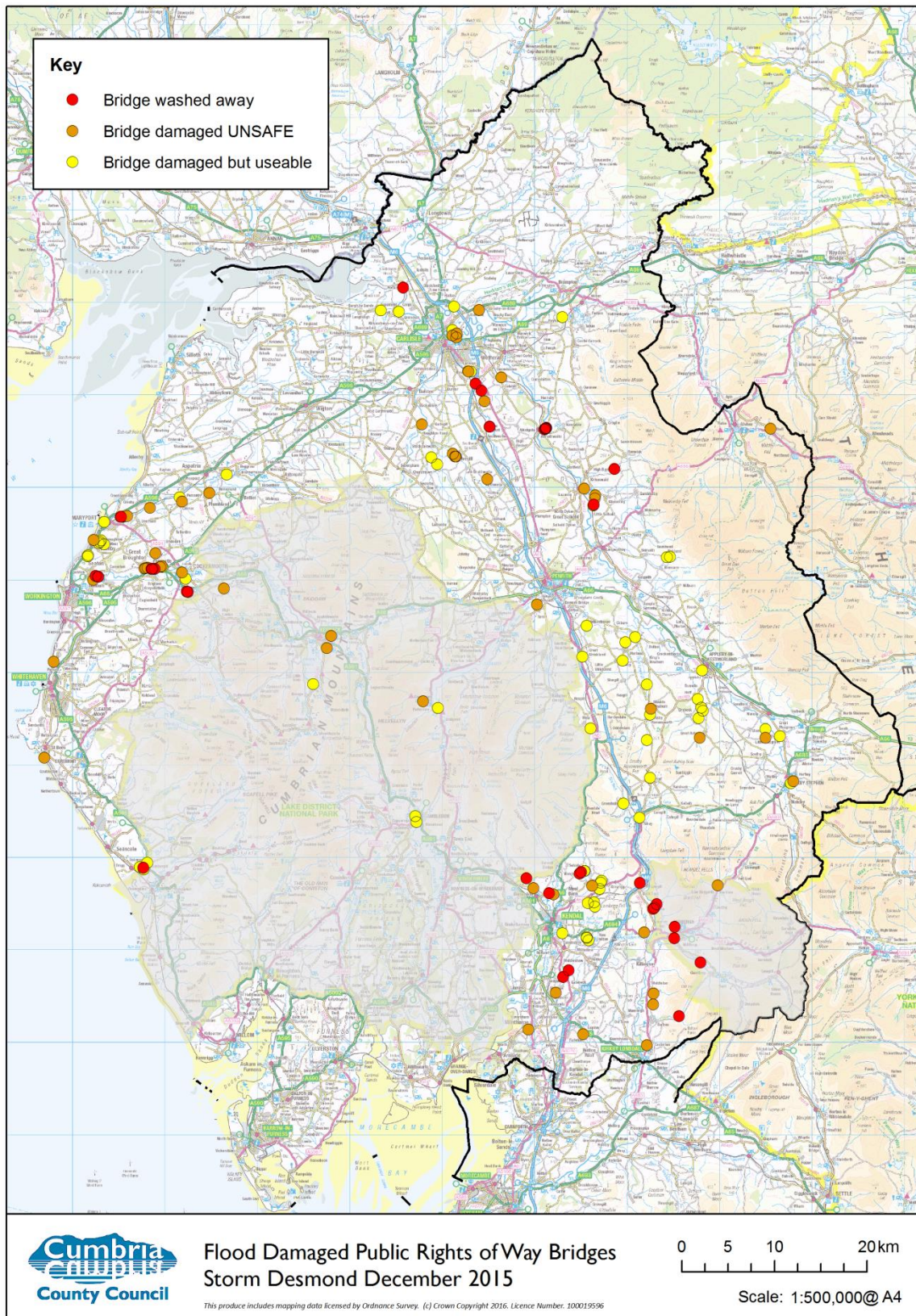
In South Lakeland, damage occurred to 44 bridges and 13 paths covering 2.1km. Stainton Parish had the highest number of damaged assets in the district affecting 4 bridges and 2 paths with estimated repair costs in the region of £171.5k, one third (35.2%) of all repair costs for the district. Five bridges were also damaged in Sedbergh, with estimated repair costs in the region of £74k.

In total, 25 South Lakeland parishes were affected: Ambleside; Barbon; Beetham; Burton in Kendal; Casterton; Dent; Docker; Firbank; Grayrigg; Kendal; Killington; Kirkby Lonsdale; Langdales; Lupton; Middleton; Milnthorpe; New Hutton; Preston Richard; Sedbergh; Skelsmergh; Stainton; Strickland Ketel; Strickland Roger; Whinfell; Whitwell and Selside.

Data at April 2018 indicated that 19 bridges and 11 paths covering 1.9km in South Lakeland were still suffering from the effects of flood damage (*Source: Cumbria County Council, 2018*).

The location of damaged bridges across the county that are managed by Cumbria County Council can be seen in Figure 11. With a few exceptions, the majority of the bridges are located outside the national parks.

Figure 11: Damage to PROW bridges managed by Cumbria County Council



(Source: Cumbria County Council Countryside Access Team, 2016)

7.12 Historic environment

Across Cumbria 228 listed buildings or structures fell within flooded areas. Of these 22 were listed in Grade I or II* (defined as being of exceptional national interest), the remainder being Grade II. In all, 21 designated Conservation Areas were partly or totally flooded, affecting a further 1,019 historic buildings and structures. Three Registered Parks and Gardens and 17 Scheduled Ancient Monuments were also flooded in the county. Areas with most significant heritage damage were found in Kendal, where 427 historic assets were affected; 345 in Cockermouth; 121 in Appleby; 106 in Carlisle with Rickerby; 60 in Keswick and 49 in Grasmere.

The town of Appleby suffered significant heritage damage due to the concentration of listed buildings and other heritage assets falling within the flood zone. As with many other historic places in Cumbria that suffered flooding, this has greatly harmed Appleby's visitor economy. Historic England have continued to provide technical support and advice to the owners of historic buildings in Appleby including the Grade I church of St Lawrence where past flood resilience measures have failed to protect the church, also the Grade II* Moot Hall occupied by the Town Council and Tourist Information Centre. The Appleby Conservation Area was added to the national *Heritage at Risk* register in 2016 partly resulting from the impact of Storm Desmond. A subsequent bid for Appleby to become the North West's first *Heritage Action Zone* (HAZ) has been successful and a 5 year funding allocation agreed. Funding will enable joint working with Cumbria Action for Sustainability (CAfS) to deliver a Flood Resilience Project including: filming, promoting and project managing the story of a traditional terraced property retrofit with findings accessible to the public; home energy audits; training; public events; development of an online interactive Flood Resilience tool; and best practice dissemination.

Three highly graded listed buildings suffered flood damage in Kendal estimated at £400k: Abbot Hall, Castle Dairy and Levens Hall and gardens. Flooding also caused damage estimated at £200k to two Grade II* buildings in Warwick Bridge (near Carlisle): Holme Eden Abbey and Warwick Bridge Corn Mill. Scheduled Monuments were also affected, including Cockermouth Castle and Brough Castle where substantial damage was caused at both sites by landslips undermining curtain walls, causing damage estimated between £500,000-£1m. Historic England has been working with Cumbria County Council to advise on flood damage to several designated bridges. Substantial collapse occurred at Bell Bridge (Sebergham) and Pooley Bridge whilst Eamont Bridge, Forge Bridge (Keswick) and Gaisgill Packhorse Bridge were closed due to their instability. In total, damage to historically important and listed buildings, designated structures, landscapes and Scheduled Monuments in Cumbria was estimated (at April 2016) to be in the region of £52m.

There is a risk that the impact of flood damage can be made worse during remediation if people do not understand how historic buildings and structures perform before, during and after flooding, potentially damaging their integrity and significance. Historic fabric can, for example, be permanently damaged by the unauthorised removal and disposal of wet timber panelling or floors, or the removal of lime plaster from the walls or ceilings of listed buildings. Historic England are working with partner agencies across the North of England to gather evidence, experience and knowledge from the latest floods to update national flood guidance for the historic environment (*Source: Historic England*).

Table 18 shows a summary of damage to high graded historic assets: Grade I and II* inside / outside Conservation Areas; Grade II outside Conservation Areas; Scheduled Ancient Monuments (SAM); Registered Parks and Gardens (RGP).

Table 18: Summary of damage to highly graded assets

District	Historic Asset	Damage	Estimated cost
Allerdale	Cockermouth Castle (SAM)	Landslip undermining curtain wall	£0.5m (under review)
Allerdale	Ennerdale Cairnfield (SAM)	Erosion of monument, loss of one cairn	£0.005m
Carlisle	Wetheral Gatehouse	See note ¹	See note ¹
Carlisle	Holme Eden Abbey, Warwick Bridge (Grade II*)	Ground floor flooded	£0.1m
Carlisle	Warwick Bridge Cornmill (Grade II*)	Loss of outbuildings / flooding	£0.1m
Eden	Church of St Lawrence, Appleby (Grade I)	Flooding	£0.1m
Eden	Brough Castle (SAM – English Heritage)	Landslips on the banks	£0.005m (under review)
Eden	Shap Abbey (SAM)	See note ¹	See note ¹
Eden	Greenside Mine (SAM)	Extensive damage to walls, water channels	£0.02m
Eden	Myers Head Mine (SAM)	Diversion of river channel threatening historic fabric	£0.005m
South Lakeland	Abbot Hall, Kendal (Grade I)	Basement flooded	£0.05m
South Lakeland	Ambleside Roman Fort (SAM)	See note ¹	See note ¹
South Lakeland	Stott Park Bobbin Mill (SAM)	See note ¹	See note ¹
South Lakeland	Castle Dairy, Kendal (Grade I)	Severe flooding	£0.1m
South Lakeland	Levens Hall (Grade I) and Gardens (RGP I)	Flooding of house and gardens	£0.25m
South Lakeland	New Sedgwick Gunpowder Works	Walls fallen, capping stones removed	£0.05m
South Lakeland	Watercrock Roman Fort, Natland (SAM)	Erosion of 100m length of river bank adjacent to fort	n/a

(Source: *Historic England, 2016*)

Notes:

¹English Heritage properties, damage to walls, carparks, river banks plus clean-up costs, combined estimated cost of £0.02m.

Table 19 shows listed or scheduled bridges that suffered serious damage through flooding.

Table 19: Serious damage to listed or scheduled bridges

District	Historic asset	Damage	Estimated cost
Allerdale	Forge Bridge, Keswick (Grade II)	Closed due to instability	£1.0m
Allerdale	Sosgill Bridge, St John's in the Vale (Grade II)	Flood damage	£0.05m
Allerdale	Bell Bridge, Sebergham (Grade II)	Substantial collapse	£1.0m
Eden	Eamont Bridge (SAM)	Now reopened following repairs	£1.0m
Eden	Brougham Old Bridge (Grade II)	Extensive damage to cutwater	£0.75m
Eden	Gaisgill Packhorse Bridge (SM)	Closed due to instability	£3,100
Eden	Pooley Bridge (Grade II)	Collapse	£5.0m
South Lakeland	Stainton Aqueduct (Grade II)	Damage to wing walls, dislocation of arch	£1.2m

(Source: Historic England, 2016)

8 Impact on Economy and Business

8.1 Key findings

- It is estimated that 2,923 active businesses were located in Environment Agency (EA) designated flood extent areas (not including public corporations, central / local government);
- Businesses in EA flood areas accounted for 25,112 employees and £871m of Cumbria's economic output, representing 10.3% of all businesses in Cumbria, 13.0% of all employment and 13.2% of all economic output in Cumbria;
- 36% of businesses (1,067) within EA flood extent areas were in South Lakeland, 27% (777) were in Allerdale, 20% (575) were in Eden and 17% (504) were in South Lakeland;
- 1,029 businesses were reported by the district authorities as having been flooded by the storms;
- 36% of flooded businesses (366) were in Allerdale, 34% (350) in South Lakeland, 19.9% (205) in Carlisle and 10.5% (108) in Eden;
- 65% of businesses throughout Cumbria responding to the Cumbria Business Survey reported being negatively impacted by the floods;
- 11% of businesses throughout Cumbria reported an increase in trade as a result of the floods (these were mostly construction or business services companies);
- 60% of affected businesses reported financial losses as a result of the floods, 72% of those in flood extent areas did so, 57% of those outside these areas;
- The average cost of impact per affected business was expected to be £54,600 but was much higher for businesses in a flood extent area, £99,500, compared to those not in a flood extent, £33,100;
- Fewer than a third (27%) of businesses that suffered financial losses expected to recover these from insurance, although this was higher among those located in an EA flood extent (48%) compared to those outside these areas (19%);
- Four months after the floods, 12% of affected businesses were only trading at limited capacity (16% of those within an EA flood extent, 11% of those outside);
- Customer downturn (77%), negative image of Cumbria (61%), infrastructure issues (54%) and ongoing building/repair work (36% overall, 53% in a flood extent area) were the key reasons given by businesses that were still trading fully;
- Business that got back to full trading quickly cited quick action to protect property stock (51%); support from local community (22%) and previous flood resilience measures (18%) as the main reasons;
- 80% of businesses throughout Cumbria said that it was essential/very important for there to be a positive PR/marketing campaign for Cumbria;
- 73% of businesses in an EA flood extent area are very/quite concerned about the risk of further storms and flooding in the near future;
- 68% of businesses in an EA flood extent area are worried about the future cost of insurance (44% of those outside a flood extent) and 65% are concerned about the terms/conditions/excesses of future insurance policies;
- 648 businesses were awarded grants from the SME Business Recovery Scheme totalling £3,534,772;

Table 20: Summary of impacts

	Allerdale	Barrow-in-Furness	Carlisle	Copeland	Eden	South Lakeland	Cumbria
Flooded businesses	366		205		108	350	1,029
Business located in EA flood extent areas	777		504		575	1,067	2,923
Employment in EA flood extent areas	4,745		6,409		2,900	11,058	25,112
Gross Value Added generated in EA flood extent areas	£170.3m		£203.2m		£84.1m	£413.5m	£871m
% business base reporting negative effects	75%	45%	62%	42%	72%	73%	65%
SMEs receiving recovery grants	192		127		103	226	648
Value of SME recovery grants	£895,716		£575,254		£466,166	£1,262,243	£3,203,379
Farm businesses awarded farm recovery grants	156		46	5	195	154	546
Value of farm business grants	£1,631,489		£369,705	£56,722	£1,755,227	£1,319,545	£5,132,689
Tourism related activity	£172,007		£120,218		£110,000	£156,735	£558,960
Countryside Access Fund							£3.5m

(Sources: DCLG Portal, Environment Agency, ONS IDBR, Experian Local Economy Model, Cumbria Growth Hub, DEFRA, District Councils, 2016)

8.2 Measuring the impact – methodology

In the immediate aftermath of the December flooding, based on local knowledge it was estimated that approximately 2,000 businesses were affected to some extent by virtue of being located in one of the areas where most of the flooding occurred. In order to verify this figure and to profile the businesses involved, an extract from the Office for National Statistics Inter-Departmental Business Register (IDBR) comprising all active local units located in Cumbria was purchased. This contained data on the trading name and full address of the business, number of employees, main sector of operation and legal status.

Within a few days of the flooding, an online survey was opened allowing businesses to report the type of impact experienced and early estimates of cost. This online survey remained open for 8 weeks and yielded 673 responses. The sample was self-selecting and therefore biased towards affected businesses but nevertheless the survey yielded valuable data on the immediate impacts of the flooding and was able to help shape the recovery response. A similar online survey was conducted at the same time by Cumbria Tourism targeted at tourism-related businesses. The Cumbria Farm Flood Action Group also conducted a telephone survey among farm businesses.

Four months after the floods, in order to capture statistically reliable medium-term impact data, the regular biennial Cumbria LEP Business Survey (which had been underway when the floods occurred and halted as a result) was re-started with the questionnaire substantially altered to enable capture of flood impact data. BMG Research carried out the survey and interviewing took place throughout the county across all sectors and size-bands with 1,458 businesses interviewed in the post-flood phase (368 of which were located in an Environment Agency flood extent area).

Reports from all the surveys are available from the Cumbria Intelligence Observatory website (www.cumbriaobservatory.org.uk).

8.3 Businesses located in flood extent areas

In order to assess the profile of businesses in flood extent areas, data was obtained from the Office for National Statistics. This data was drawn from the Inter-Departmental Business Register (IDBR) and covers local units within enterprises registered for VAT and/or PAYE. Whilst this excludes the very smallest non-employing organisations, it does include the majority of wealth creating businesses. For the purposes of this analysis, local units classified as public corporations, central or local government were excluded. The IDBR data was combined with flood extent data from the Environment Agency to produce a profile of local units located within one of the 85 flood extent areas, as a proxy for affected businesses.

8.3.1 Profile of businesses within EA Flood Extents - key findings

- There were 2,923 local units located within one of the 85 flood extent areas;
- 10.3% of all businesses in Cumbria were located in a flood affected area;
- 14.3% of all businesses in South Lakeland were in a flood affected area, compared to 14.2% in Allerdale, 13.2% in Eden and 9.3% in Carlisle;
- 16.0% of all wholesale businesses in Cumbria were located in a flood extent, whilst 15.6% of motor businesses, 14.9% of property businesses and 14.4% of accommodation & food businesses were;
- 36.4% of flood extent businesses were in South Lakeland, 26.6% in Allerdale, 19.7% in Eden and 17.2% in Carlisle;
- The individual flood extents containing the most businesses were Kendal (675), Carlisle (474), Cockermouth (320), Windermere (208) and Keswick (122) – between them accounting for 61.5% of all businesses in a flood extent;
- 68.2% of flood extent businesses employed fewer than 5 people;
- 14% of flood extent businesses were in the agriculture sector, 12.1% in accommodation & food services, 10.2% in construction and 10.2% in retail;
- 25,112 people worked in flood extent businesses, 13.0% of employment in Cumbria;
- 4,513 manufacturing employees were based in flood extent businesses, together with 4,264 accommodation & food employees and 3,539 retail employees;
- Employees in flood extent businesses generated £871m a year in economic value, 13.2% of all Cumbria's total economic value.

Table 21: Businesses within EA flood extent areas

	Allerdale	Carlisle	Eden	South Lakeland	Cumbria
Businesses in flood extents	777	504	575	1,067	2,923
% total business base in flood extents	14.2%	9.3%	13.2%	14.3%	10.3%
Employment in flood extents	4,745	6,409	2,900	11,058	25,112
% total employment in flood extents	13.7%	13.8%	11.7%	23.7%	13.0%
Economic value in flood extents	£170m	£203m	£84m	£414m	£871m
% total economic value in flood extents	14.4%	12.4%	11.2%	26.0%	13.2%

(Source: EA, ONS IDBR, Experian Local Economy Model, 2016)

A report profiling businesses located in the EA flood extent areas is available from the Cumbria Intelligence Observatory website.

8.4 Impact on businesses

Several surveys were conducted in the immediate aftermath of the flooding when the impact was most acute and when it was important to gain a quick understanding of the nature of the impacts in order to inform recovery interventions. The Business & Economy Recovery Group and Cumbria Tourism both opened online surveys within a few days of the incident. The samples were self-selecting and therefore biased towards affected businesses but nevertheless the surveys yielded valuable data on the immediate impacts of the flooding. Alongside the online surveys, a telephone survey of affected farms was undertaken by the Farmer Network, Westmorland Agricultural Society and NFU (funded by the Prince's Countryside Trust).

Reports from these short term surveys are available on the Cumbria Intelligence Observatory website.

8.4.1 Cumbria Business Survey – key findings

The regular biennial Cumbria LEP Business Survey presented an opportunity to ask businesses throughout the county about the nature, scale, duration and cost of the impact 4-6 months after the incident. Telephone interviews were conducted by BMG Research with 1,486 businesses located both inside and outside the Environment Agency flood extent areas. (Please note that the A591 had not re-opened at the time of the interviews). Key findings included:

- Two-thirds of businesses (65%) suffered a negative impact of the storm and floods that were experienced in December 2015. Three in ten (30%) reported restricted access to their business premises, with slightly fewer (27%) reporting a reduction in passing trade and fewer customers.
- Actual flooding of business premises was less common but still experienced by one in eight businesses across Cumbria (13%) but this increased to two in five (41%) in the EA flood extent areas. Within the EA flood extent areas, more than four-fifths of businesses (86%) experienced a negative impact of some description.

- A positive effect, such as an increase in new orders and sales, was experienced by one in eight businesses (11%; 12% in the EA flood extent areas) with construction businesses most likely to benefit from this impact (30%).
- Where businesses reported structural damage to their premises, half (50%) reported the problems as on-going when interviewed between 4 and 6 months after the event.
- Of the 65% of businesses suffering a negative impact of the storms and flooding; three in five (60%) reported a financial loss or additional costs as a result. This equates to around two in five of all businesses in Cumbria and increases to nearly two in three of all businesses in the EA flood extent areas.
- The mean financial loss/cost incurred to date (at the time of the interview) was £35,759, rising to £84,455 across the EA flood extent areas.
- Additional costs were expected by around one in four businesses that experienced a negative impact and their projected further costs increases the mean financial loss/cost that is likely to be incurred to £54,608, rising to £99,496 in the EA flood extent areas.
- Financial loss due to a reduction in trade was most prevalent, with 74% of those able to provide an estimate attributing their loss to this.
- Just over half of those suffering financially from the impact of the storms and flooding (54%) incurred some costs as a result of physical damage.
- Just over a quarter of businesses suffering financially (27%) were able to recover at least some of their costs/losses from insurance or other sources, rising to nearly half of businesses in the EA flood extent areas (48%).
- There were financial gains as a result of increases in orders/sales, with more than half of those reporting some gains (and able to provide an estimate) (55%) reporting gains of up to £5,000. The mean amount was £35,571.
- More than two in five businesses that experienced a problem as a result of the storm and floods (45%) had taken one or more actions as a result. They were most likely to increase promotion/marketing activity (20%) and/or apply for a grant (15%).
- One in eight businesses that experienced a negative impact of the storm and flooding (13%) sought business advice, rising to 23% of those in the EA flood extent areas.
- One in eight businesses (12%) continued to be trading on a limited basis at the time of interview. This proportion was higher amongst those in the EA flood extent areas (16%) and amongst those whose premises had flooded (25%).
- Most expected to be fully trading again in the next six months, but one in eight anticipated limited trading for at least a further year and one business expected to close.
- A third of affected businesses (36%) were able to avoid a period of limited trading because they were able to take action quickly to protect property and stock, while a fifth of those that remained fully trading (21%) had taken previous preventative/resilience measures. Most businesses that were able to get back to full trading after a period of limited trading were able to do so, they said, because the impact was limited anyway (81%), while around half (51%) took action quickly to protect property/stock and just over a fifth (22%) were helped by the local community.
- More than a quarter of all businesses anticipate longer term impacts on the local economy as a result of fewer visitors to the area (28%).

- Four in five businesses (80%) considers a positive PR and advertising campaign to represent Cumbria favourably going forward as essential/very important and most of the remainder (12% of all) considers it quite important.
- Half were very concerned about the risk of storms and flooding in the future (three quarters of those in a flood extent area); with slightly lower proportions concerned about the level of future insurance premiums; and revisions to insurance policy terms and conditions.

The full report from the Cumbria Business Survey is available from the Cumbria Intelligence Observatory website.

8.4.2 Cumbria Tourism Survey - key findings

Cumbria Tourism conducted its regular survey of tourism businesses in March 2016 and included questions about the ongoing nature and level of impact post floods, building on the initial online survey. A total of 282 businesses completed the March survey. Key findings included:

- After more than two years of strong performance, and positive upward trends in profits and visitor numbers, this situation is now reversed. Three quarters (76%) of tourism businesses report profits down and the same proportion report visitor numbers down.
- All visitor markets have been affected by the downturn, in particular domestic visitors (74% of businesses report decreases), and new visitor groups (61% report decreases). Even overseas markets have been affected, with more than half of Cumbria's tourism businesses (57%) reporting reduced numbers of international visitors.
- Four months on, businesses continue to be badly affected by the floods. More than three quarters (77%) are suffering from reduced bookings and enquiries.
- Four months on 59% are still being affected by road or bridge closures, and 52% specifically affected by the ongoing closure of the A591 north of Grasmere. Almost half have had cancellations from pre-booked visitors.
- 45% of tourism businesses have had to reduce staff hours, and are suffering from recruitment problems. 27% find lack of staff accommodation a problem, a fifth are having trouble retaining staff, and 17% have actually lost jobs.
- Businesses were asked to estimate the cost of loss of business since the floods. On average, each enterprise has lost £25,000.
- 56% have had to undertake additional marketing activity as a result of the floods, and this has cost an additional £3,000 per business on average.
- 82% of tourism businesses in Cumbria say they need positive PR and marketing to build consumer confidence.
- Repeat business in the form of returning customers is a critical factor in the success of many tourism businesses. However, even repeat business has been affected. 82% cited this as a positive factor six months ago, and 78% did so this time last year – this has now fallen to 52%.
- Weather can have a mixed impact depending on business type, but 82% report a negative impact over the last six months. Weather aside, problems for visitors accessing Cumbria, and getting around once here, are significantly impacting trade, and 57% of businesses are having to offer price reductions.

- When asked about business performance expectations in 2016 overall compared to 2015, just over half (52%) of businesses are pessimistic. A third think it will be about the same. Just 15% believe 2016 will be better than 2015. This is a complete reversal of expectations six months ago.
- Forward bookings do not necessarily make for good forecasts, bearing in mind the ongoing trend towards last minute bookings from consumers seeking the best deals and keeping an eye on the weather. The picture for the next six months is that approximately 10% are up on advance bookings compared to last year, 30% are level, and 60% are down.

The full report is available from the Cumbria Intelligence Observatory website.

8.4.3 Cumbria Farm Business Survey

The Farmer Network, Westmorland Agricultural Society and the NFU conducted a telephone survey between 18 Dec 2015 and 26 Jan 2016. They interviewed 219 of the 600 farms estimated to have been affected. 73% of respondents had seen damage to fencing, 63% had lost sections of watercourse bank sides, 55% had experienced damage to tracks or access roads, 37% had lost walls, 27% had lost trees and 14% had lost hedgerows. In addition, 53% reported river stone / gravel deposits, 22% had had land slips and 21% reported land contamination. Overall, 63% had land that was affected by one or more types of debris contamination. 20% of respondents reported either sheep deaths or missing sheep, averaging 21 sheep lost per respondent.

Average losses reported at the time of the survey were £22,200 for residential buildings & contents, £9,200 for non-residential farm buildings, £5,200 for machinery, £6,900 for fence & boundary damage and £3,600 for losses to diversified businesses (eg Bed & Breakfast businesses).

A short report on this survey is available from the Cumbria Intelligence Observatory website.