St Bees

Flood Investigation Report 37

Flood Event 30/8/2012

Version	Undertaken by	Reviewed by	Approved by	Date
Preliminary	Colin Parkes	Anthony Lane		6 Feb 2013
Draft	Colin Parkes	Doug Coyle		24th March 2013
Published	Andrew Harrison	Anthony Lane	Doug Coyle	25th Feb 2014

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Figures

Executive Summary

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

The report identifies the areas in St Bees that suffered from flooding on 30th August2012. 21 properties (9 internally and 12 externally were reported to have suffered flooding. Surface water runoff from agricultural land flowed down adjacent roads into low lying populated areas of the village.

17 actions have been identified in the report which would minimise the risk of future flooding. The recommendations range from cleaning drainage systems, installing property level protection, to longer term solutions that may require Flood Defence Grant in Aid partnership funding from Defra. Some of the actions have already been completed at the time of publication of this report.

Event background

Flooding Incidents

Figure 1. illustrates the locations affected during the heavy rain that occurred on the 30th August 2012. Two hills above the village had important roles in the flooding. They are not named on the mapping available and no local names were discovered during the investigations, so, for the purposes of this report, they have been named Scalebarrow Hill and Loughrigg Hill and are indicated on the map below.

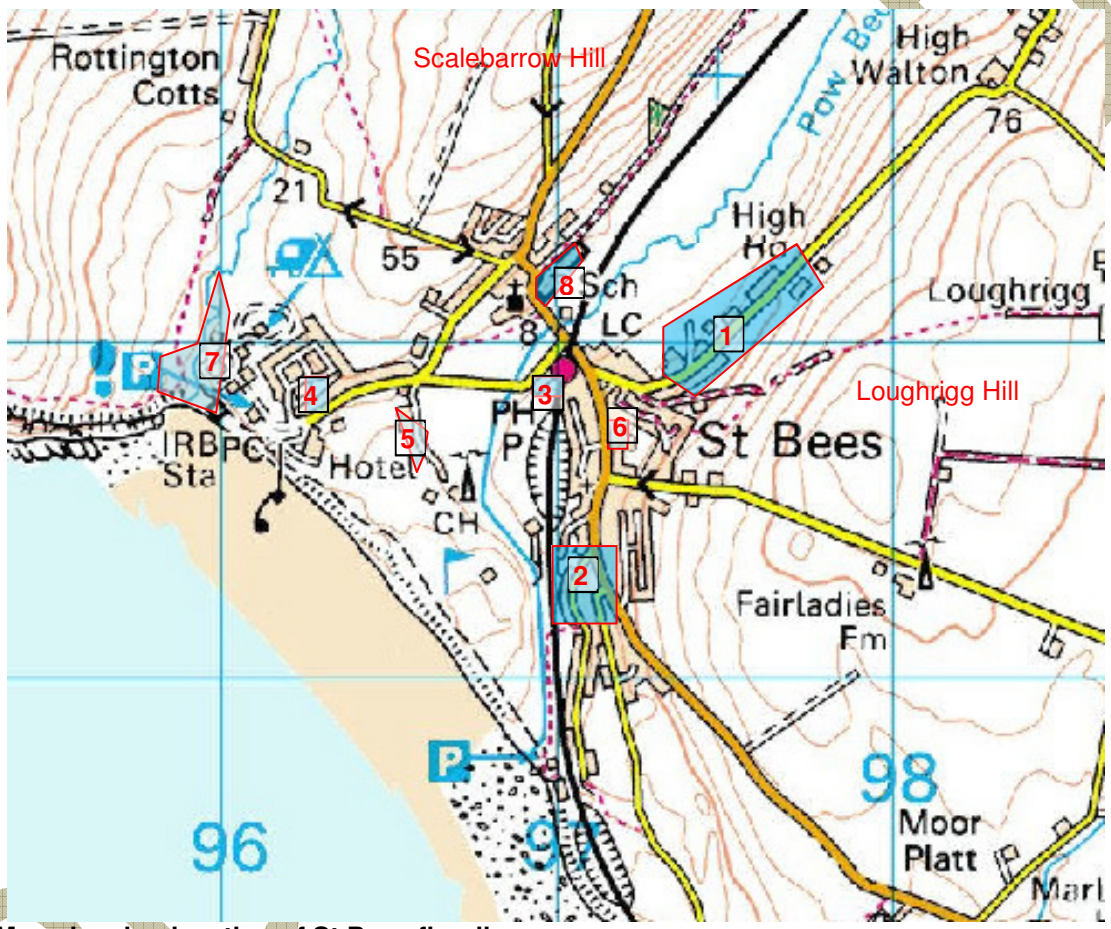


Figure 1. Map showing location of St Bees flooding areas.

1 High House Road,
2 Nethertown Road / Seamill Lane,
3 Station Road,
4 Tomlin House,
5 Peckmill,
6 Main Street,
7 Rottington Beck / St Bees Head flooding areas, and
8 St Bees School

Investigation

The ultimate cause of the flooding at all locations was extreme and sustained heavy rainfall. The summer had been the wettest in England since records began and so surrounding fields were unable to absorb any new rainfall. Both the 30th August event and a subsequent event on 17th October are shown below in graphical form to show the peak of intensity. Met Office data from a rain gauge at St. Bees Head recorded a total of 45mm over the duration of the storm, 29th – 30th August 2012. The average total rainfall for the whole of August is 92mm (1981-2010).

Rainfall Event

Radar data taken from weather records for the area over Loughrigg Hill show peak rainfall was 25mm/hr and occurred at about 00:20am. The rain started at 9:00pm and finished at 3:00am with 28.mm in those 6hrs.

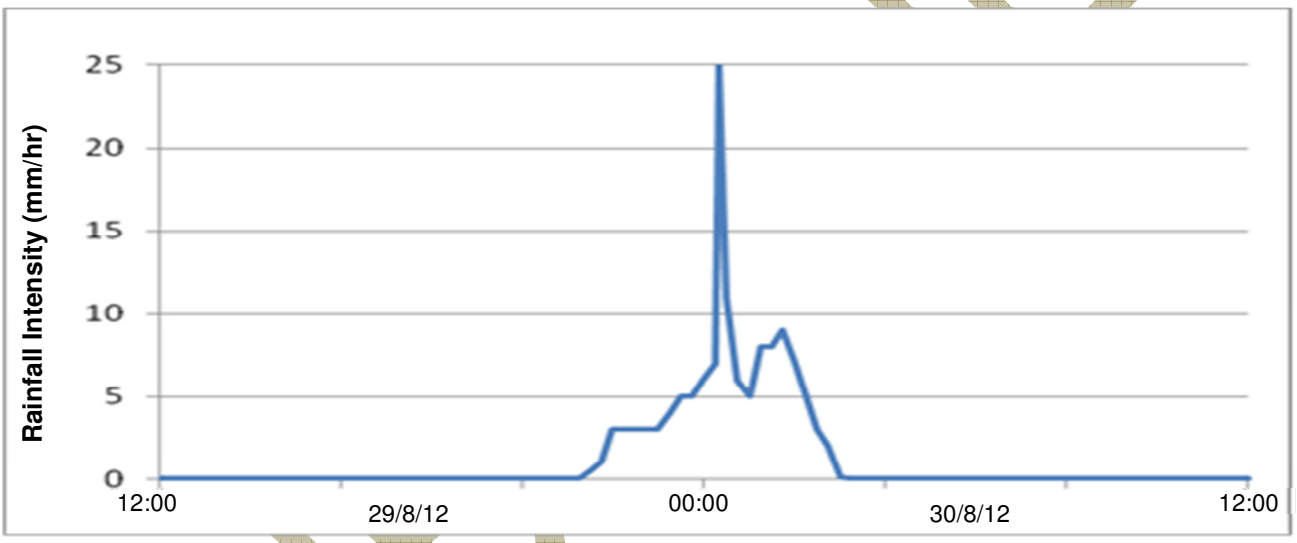


Figure 2. Rainfall data from 29-30th August 2012

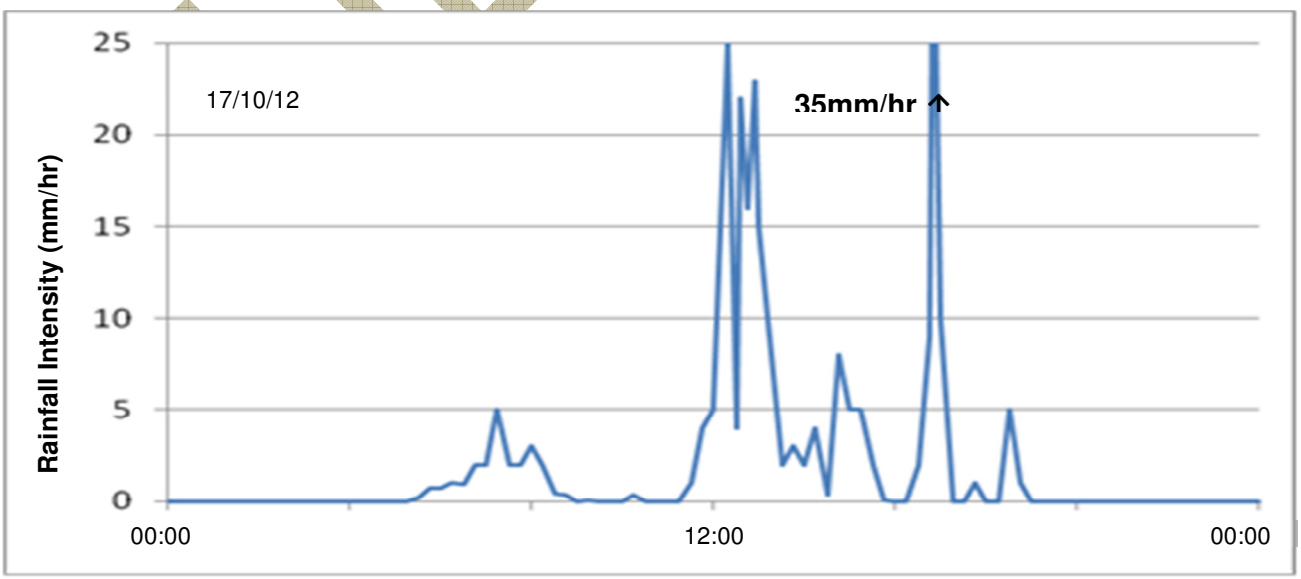


Figure 3. Rainfall data from 17th October 2012

The figures for the 17/10/12 storm at St Bees show that that it was even more severe, with 43.7mm over the day, 38.mm from 11:30 to 18:45, caused by the thunder storms that were moving across the area. These included three 20mm/hr plus bursts just after midday and 35mm/hr at 16:50.

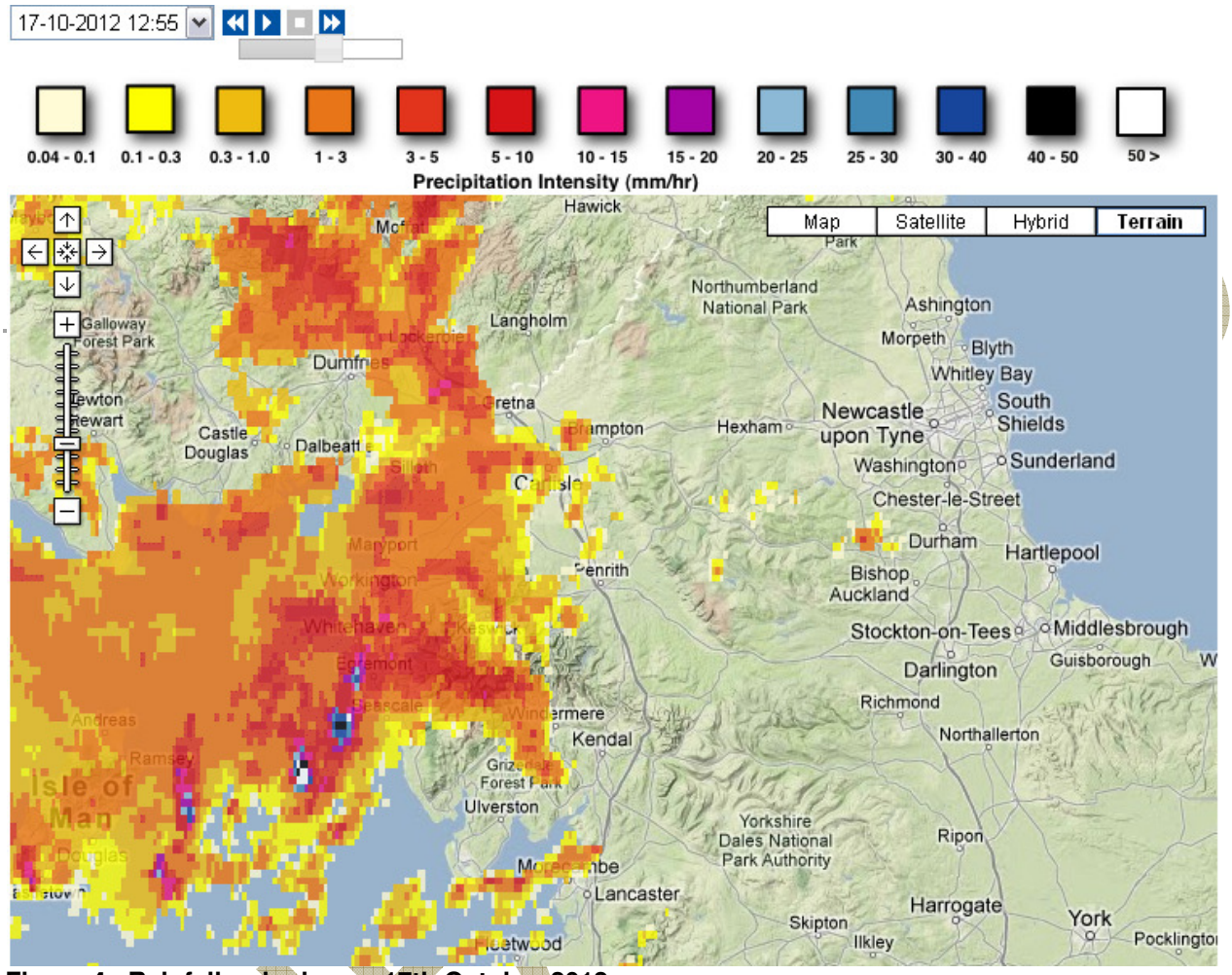


Figure 4. Rainfall radar image 17th October 2012

In comparison, annual maximum rainfall figures for the preceding 20 years from the St Bees Head rain gauge are as follows.

YEAR	ANNUAL TOTAL (mm)	MAX 24hr Rainfall (mm)	ON	YEAR	ANNUAL TOTAL (mm)	MAX 24hr Rainfall (mm)	ON
1993	913	32.4	16/5	2003	861.6	21.8	7/9
1994	1139.5	30.8	10/7	2004	1080.6	52.4	3/10
1995	847.6	23.6	11/7	2005	962.4	52.6	11/10
1996	929.2	44.8	14/10	2006	1181.3	49.8	18/8
1997	874	30	2/9	2007	902.2	50	23/9
1998	865.2	26.6	2/6	2008	1252.6	43.8	18/6
1999	773.8	22	26/6	2009	1195.9	41.8	19/8
2000	1367.6	34.8	27/9	2010	1035.4	37.2	25/10
2001	903.5	25.8	7/10	2011	1161	26.4	24/11
2002	1254.8	41.4	21/10	2012	1293.2	42.6	29/8

Figure 5. 20 year rainfall comparison

There have been years with greater rainfall in a 24 hour period but most of these have occurred in drier years overall and there is no data for the intensity of the rain within these 24 hour periods.

Likely Causes of Flooding

2.1 High House Road (August and October events)

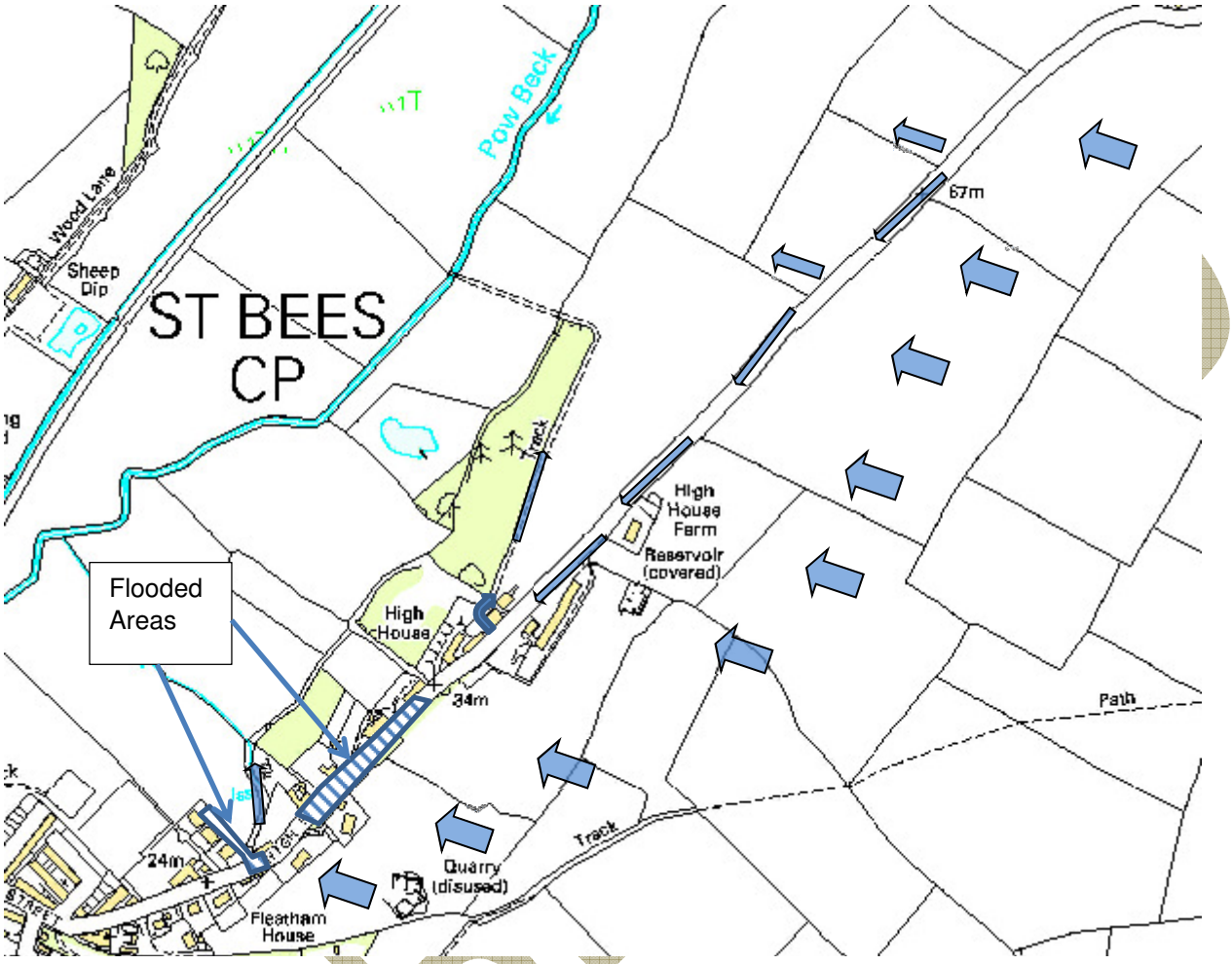


Figure 6. High House Road

High House Road cuts across the slope, descending gradually towards the village. It is easier for the water to follow the road rather than continue on its natural course straight down the slope. This is because the verge on the lower side of the road is raised above the road surface along most of the length. This has the effect of concentrating the water on the road surface. If the road was not there then the water would travel straight down the slope to Pow Beck.

A significant amount of water was discharged through a field access from the road at 'The Barn' where the driveway is lower and a lane leads downhill towards Pow Beck. The water appears to have done little damage on the driveway and did not enter the properties but it caused damage to land below. It is clear from the agricultural damage that the flows must have been significant. It has been reported that there was a 225-300mm diameter pipe system connecting road gullies in this area to Pow Beck. It is now abandoned and performs no drainage function.

Highway drainage starts at the St Bees road sign, opposite High House Farm, (2 gullies connected to a small soakaway in the field on the lower side of the road). It recommences at 'The Barn' with gullies on both sides of the road to a dip outside 'The Stables'. See Appendix 4. Two outlets from the drains then flow left and right of 'The Stables' buildings. A combination of leaves, debris and quantity of water overwhelmed the highway drains causing the dip to fill.

Water spilled down ‘The Stables’ driveway and overtopped front door flood boards, leaving the property uninhabitable; the flood depth exceeded 600mm. Floodwater continued down the road flooding ‘The Retreat’ internally and flowing into to the access track behind the property. Flood waters crossed the access track into the garden of ‘Seathwaite’, surrounding the property, flooding the garage, but the majority of the flows passed between the house and the garage.

Figure 7. High House Road during the 17/10/12 flood event

Figure 8. Devastation in the garden of Orchard House after the 30/8/12 flood knocked over walls

Flows descended into the back gardens of the ‘Orchard House’ and ‘Brocklebank’. On route the force of the waters demolished walls and fences. ‘Orchard House’ was surrounded by water and ‘Brocklebank’ suffered internal flooding.

'Croft House' and 'Fleetholme' are above High House and suffered from runoff from the fields behind the properties although no internal flooding was reported.

As well as the damage to homes, significant damage was also caused to the agricultural land down slope of the road. A large flow of water was able to escape from the road through the field entrances at 'The Barn'. This flowed down the track, causing scour and carrying large amounts of debris, with extensive damage to the farmland and woodlands below.

Another factor contributing to the ineffectiveness of the road gullies was the leaves that collect on the gratings of the gullies and prevent water getting in to the system. Residents often go out into the road to sweep leaves away when heavy rain occurs, which was attempted on this occasion, but the excessive flood waters prevented them from doing this.

2.2 Nethertown Road/Seamill Lane area (August and October Events)

Flooding mechanisms at this location were the same as those at High House Road. Intense rainfall caused runoff from the saturated fields on Loughrigg Hill, onto the roads. The highway

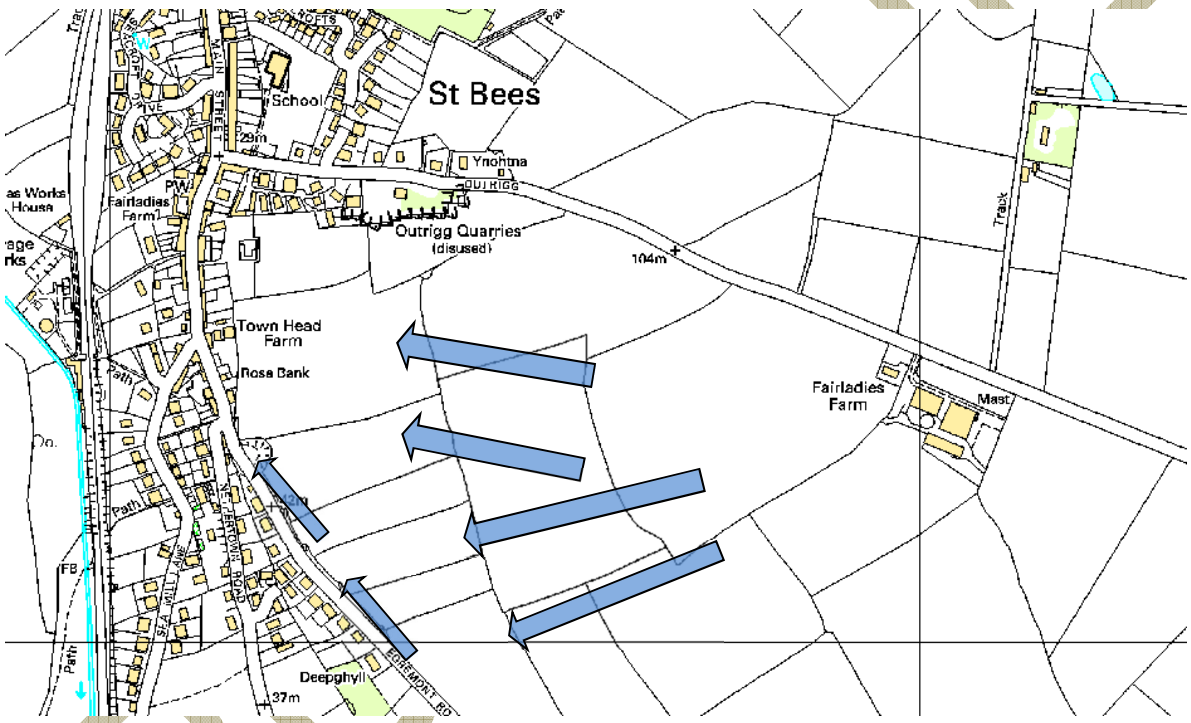


Figure 9. Surface water runoff from above Egremont Road

drainage system was unable to cope with the volume of water and debris. Another source of water at this junction was a manhole, the cover of which was lifted by the force of the water.

Surface water runoff deposited significant amounts of silt on the Fairladies roundabout. The roads run across the slope in this area and the water was channelled along them but escaped down the slope where there were gaps at road junctions, footpaths, hedges and garden gates.

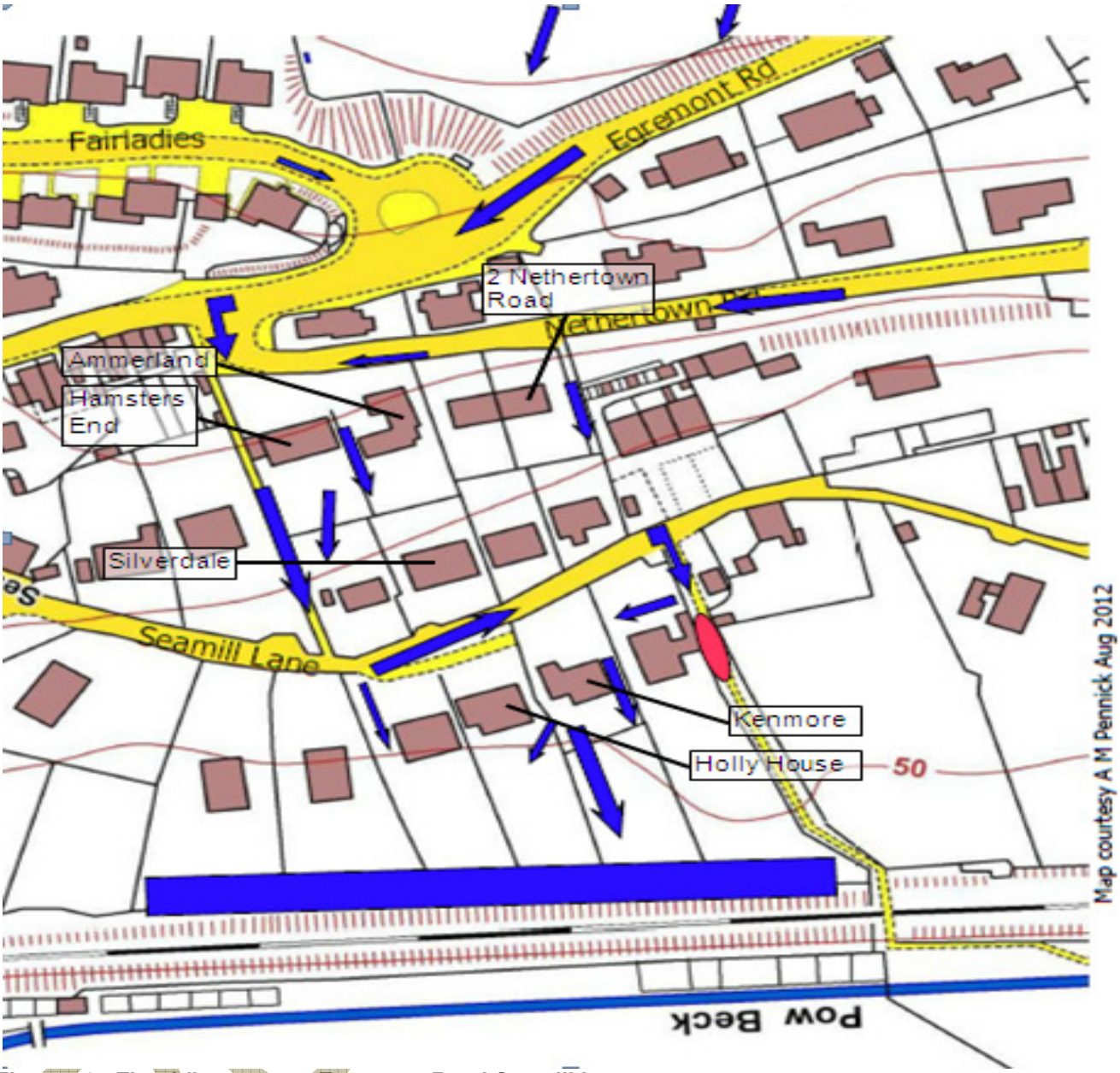


Figure 10. Flood flow routes, Egremont Road/Seamill Lane

Flow routes through gardens caused extensive damage demolishing walls at ‘Silverdale’ and ‘Holly House’, flooding garages moving soil and paths away from gardens at ‘Ammerland’, ‘Hamster’s End’, ‘Silverdale’, and ‘Kenmore’, and depositing debris in others. Water entered ‘Silverdale’. The water flooded the bottom of the gardens on Seamill Lane and could not discharge into Pow Beck as the railway embankment acted as a dam.

2.3 Station Road

The source of the water that flooded these properties is unclear. Reports say that the water rose out of the skirting boards in numbers 1 and 2 indicating groundwater flooding associated with a rising Pow Beck. If the floor is suspended, it could have been surface water flooding that collected under the floor.

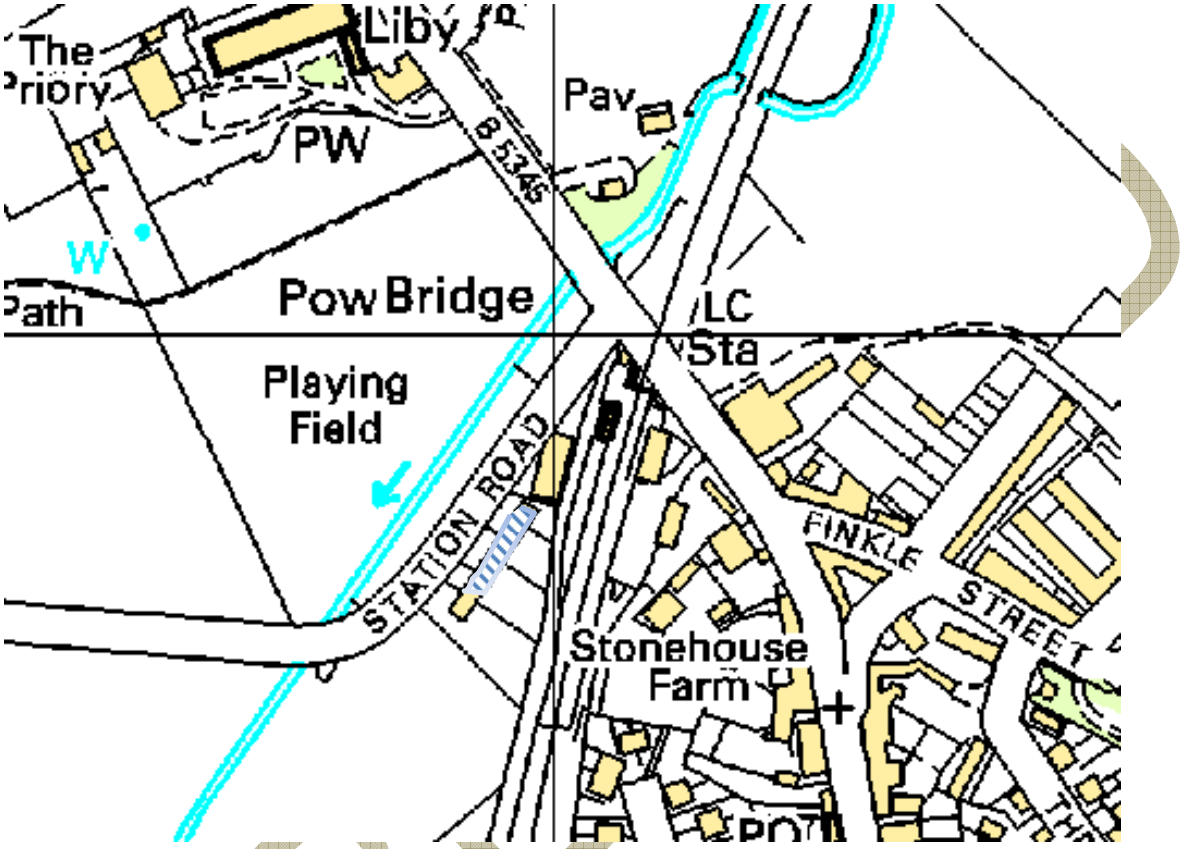


Figure 11. Flooded properties in Station Road

There are also claims that an underground stream passes under the properties. There is no record of a culvert in this area. Surface water would follow the topography but higher ground is cut off from Station Road by the railway embankment. Anecdotal evidence suggests there was an old well in the garden of number 2 and this has been filled in.

Number 6 also reported flooding and this appears to have been surface water from an adjacent field.

2.4 Tomlin House

Flood water ran down the driveways and paths from Priory Road which is above the property and followed the fall of Beach Road towards 'Tomlin House'. Road gullies along Beach Road were found to be blocked. The pipe which takes water from the gullies outside 1 Abbotts Cottages appeared to have collapsed. The garden of 'Tomlin House' is lower than the road and

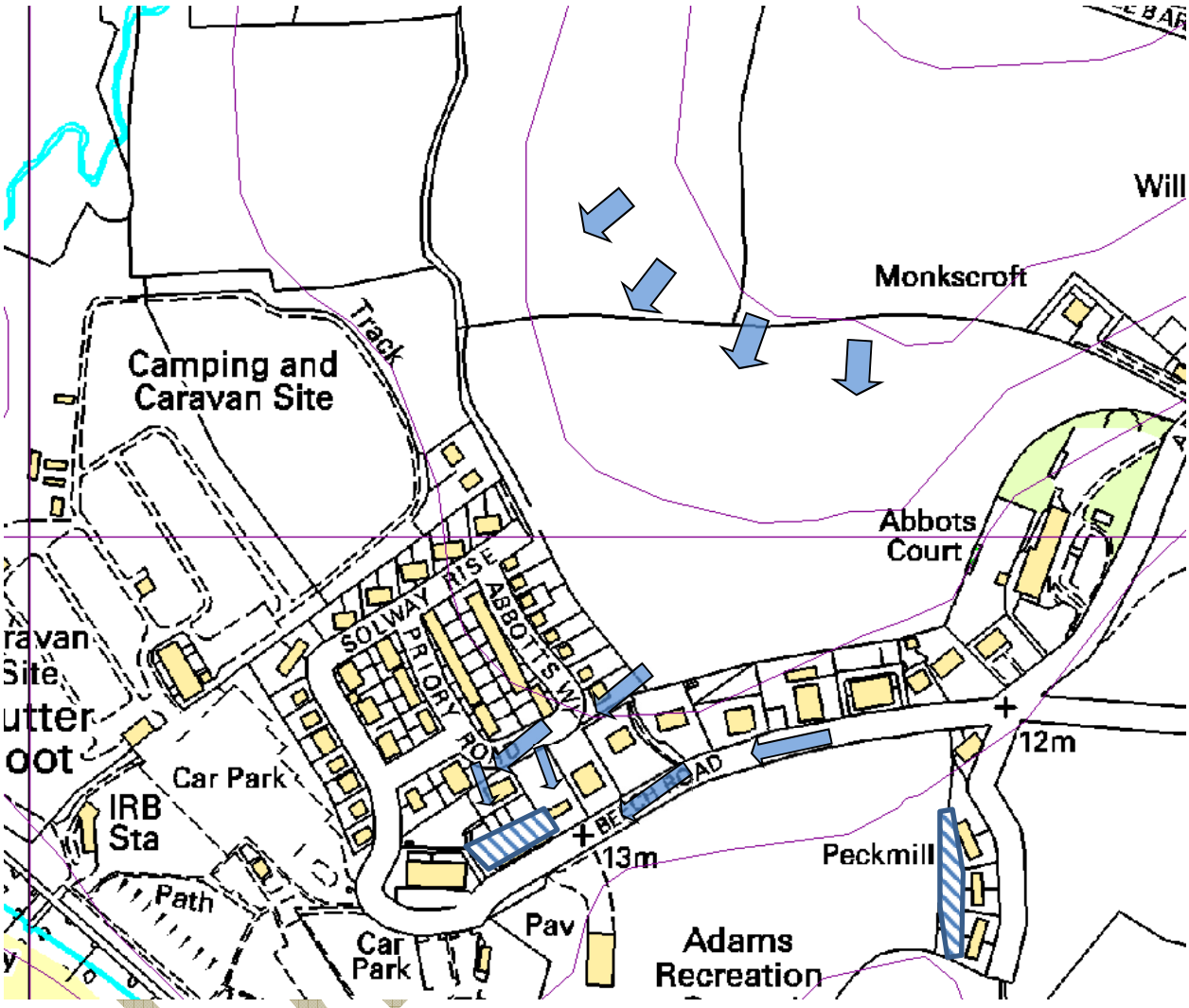


Figure 12. Flow routes and flooded properties, Tomlin House and Peckmill

water flooded the lower floor causing extensive damage. Ground water may also have been a factor as it has been an issue in the past resulting in the resident installing a pump, permanently in the cellar. There were no issues found with the sewers.

2.5 Peckmill

'Peckmill' was flooded by surface water which gathered in the Adams Recreation Ground. Anecdotal evidence suggested that the land drainage in the recreation ground is blocked. The floodwater overflowed into the neighbouring gardens on 'Peckmill' where the surface water drainage was unable to cope with the volume of water. These drains are reported to run to Pow Beck although there is a watercourse closer than this and a combined sewer runs under 'Peckmill' as well. There were no issues found in the combined sewer or the lateral surface

water system that runs into it. There are concerns that outfalls into Pow Beck may not be working as it is holds significant gravel and silt deposits.

2.6 Main Street

A culvert runs in front of 21 and 22 Main Street and water rose up through the ground and the flagged stone paving above it, to a depth of 75mm. The properties were flooded internally as the water rose through the floors.

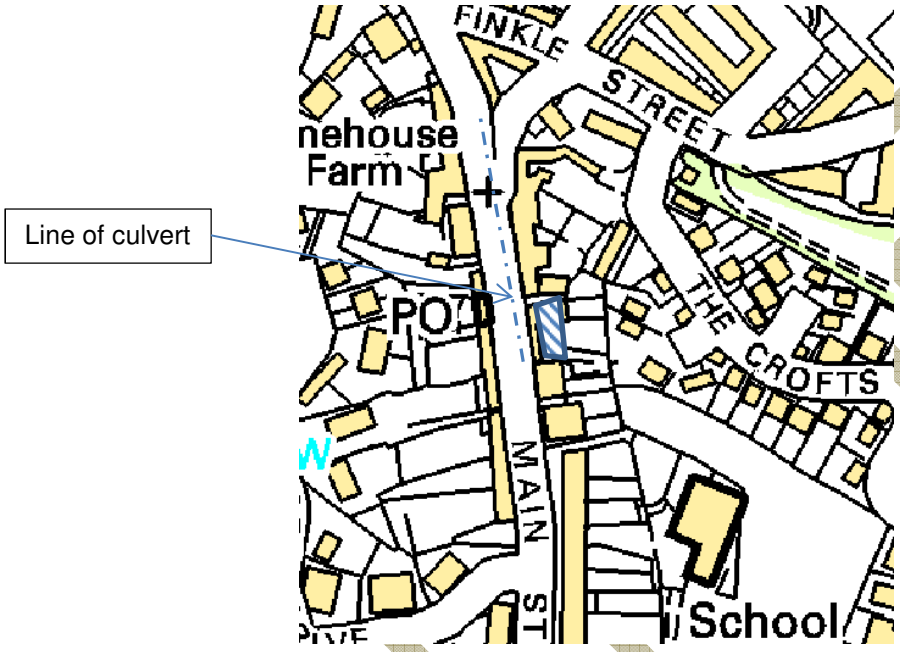


Figure 13. Location of 21 & 22 Main Street

Also on Main Street, although not reported after 30/8/12, the properties at the bottom of Outrigg regularly experience flooding as the road from Egremont provides another flow route for runoff from Loughrigg Hill.

2.7 Rottington Beck/St Bees Head

This was fluvial flooding and flood waters would have carried significant power along with rock and other debris causing scour. Damage occurred to the footbridge abutments and new channel

Figure 14. Embankment damage within the caravan park

works on the promenade as well as threatening caravans within the park. On 17th October 2012 when there was further torrential rain, combined with high tides, a further landslip took place on cliffs opposite the promenade. Water was reported to be running off the land on either side of Rottington Beck and the whole basin area was under water covering the promenade.

2.8 St Bees School

Intense rainfall caused runoff from the saturated fields on Scalebarrow Hill onto the roads. The highway drainage system was unable to cope with the volume of water. A drain on the B5345 above the school takes highway drainage in normal rainfall conditions but during the flooding water was discharged from the drain into Wood Lane.

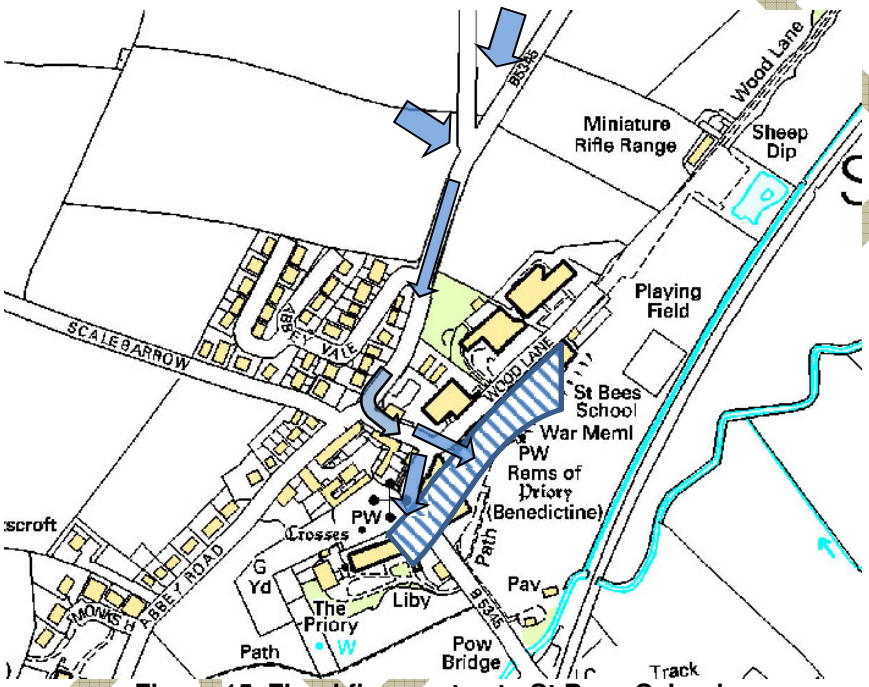


Figure 15. Flood flow routes to St Bees School.

Flooding History

3.1 High House Road

High House Road has appeared on the Making Space for Water Group (MSfWG) Hotspot list for a number of years. But immediately prior to August 2012 it was recorded as resolved as there had been no reported problems (by the members of the MSfWG) there for five years.

Flooding does appear to be a fairly regular occurrence with the previous large event occurring on 25/11/2011, which was less than one year earlier. Following the flooding on 30/8/12, the next event occurred on 17/10/2012, only seven weeks later. Indeed the culvert which takes road drainage under 'The Stables' towards Pow Beck was replaced by Cumbria County Council, as Highway Authority, in response to a similar event in 2000.

3.2 Nethertown Road / Seamill Lane area

The event of 30/8/12 was said to be the third such event in 12 years and concerns have been raised by residents that such events were no longer unusual and that their impact was getting worse. Another such event did occur only seven weeks later on 17/10/12.

3.3 Station Road

Residents said that these properties have flooded four times in seven years. One of these flood events was caused by Pow Beck bursting from its banks which have since been raised.

3.4 Tomlin House

This was the fifth flooding event in 20 years. Two of these had been to a depth of 200mm (8 inches) or more. It is unclear if these events include the groundwater problems that have caused the resident to install a pump, or are in addition to the ground water issues.

3.5 Peckmill

Flooding occurs here regularly, gardens have flooded on five or six occasions since 2009. Before this, flooding was infrequent.

3.6 Main Street

A storm on 3/7/06 caused flash flooding on Main Street as surface water flowed down Outrigg (road to Egremont) carrying mud and boulders. 20mm of rain fell in one hour ('News and Star' newspaper). The Outrigg flooding also occurred in 2001. The flooding from the culvert on 30/8/12 was specific to 21 and 22 Main Street but it could be related to the 2006 event.

3.7 Rottington Beck/St Bees Head

The event that caused the flooding from Rottington Beck should be expected to occur statistically between once every 100 to 1000 years (Environment Agency flood zone mapping). The footbridge had previously suffered flood damage in November 2009 where there had been damage to the abutments which was repaired. Prior to this it had been replaced in 2001 due to deterioration over time rather than any specific flood damage.

St Bees Head has an erosion problem, rather than flooding, as severe landslides have occurred, threatening the 'Coast to Coast' footpath. It is associated with the same severe weather but falls outside of the scope of this report. Erosion here typically occurs during winter storms.

3.8 St Bees School

Flooding is reported as a frequent occurrence and the school deals with it without reporting it. County Highways have attempted to address the problem by repairing the drain on the B5345 but this has not resolved the matter.

Recommended Actions

The following recommendations are a list of the next steps that should be taken towards reducing flood risk in the areas identified in St Bees. These are not statutory obligations but are steps that could be taken and will be pursued as resources allow.

Action by	Recommended Action	How
County Highways	Identify any defects in highway drainage so that system can be repaired and work at full capacity.	CCTV survey, jetting, gully cleaning. COMPLETED.
County Highways	Identify any defects in highway drainage so that system can be repaired and work at full capacity.	Repair any defects found. PARTLY COMPLETED.
County Highways / Land Owners	Restore natural drainage pattern along High House Road as closely as possible.	Install grips and soakaways as a trial to convey water off the road above the village.
County Highways / Land Owners	Restore natural drainage pattern along High House Road as closely as possible	Apply for funding to install a permanent solution of grips and soakaways above the village if trial soakaways work
MSfWG/ Land Owners	Restore natural drainage pattern along High House Road as closely as possible	Investigate unknown culverts that cross High House Road in village and study how these could be used to convey water over the road.
Land Owner	Reduce the volume of run off that reaches High House Road Nethertown Road and from Scalebarrow Hill.	Trial soil improvement measures. Rural SuDs A linear cut off drain or swale could be installed in the fields above High House Road. A suitable outfall would need to be found first.
MSfWG / Land Owner	Convey water across High House Road / Reduce water on road surface.	A cattle grid style grille could be placed across the full width of the road to convey drainage across road and to intercept water from the road surface.
CBC/ Residents	Keep gullies free of falling leaves.	Increase frequency of road sweeping/ residents self resilience

Action by	Recommended Action	How
MSfWG / Land Owners	Restore natural drainage pattern along Egremont Road and Fairladies as closely as possible.	Look for similar opportunities as the proposed High House Road scheme. Highway drainage investigations on-going along Egremont Road.
Land owners	Identify flow routes through gardens	Adopting a series of coordinated sustainable drainage measures
MSfWG	Investigate manhole and culvert at Egremont Road / Nethertown Road junction.	Drain dye / CCTV.
MSfWG/Housing Association	Determine the source of flooding at Station Road.	Further investigations.
County Highways	Ensure road drainage at Tomlin House can cope with maximum possible volume.	Investigate and repair the damaged gully pipe.
Land Owners	Determine if drainage can discharge at Peckmill.	Investigate the drainage layout and the condition of the outfall.
County Highways	Determine if there are any maintenance issues in the culvert under Main Street.	As part of culvert investigations across the village.
MSfWG / Land Owners	Restore natural drainage pattern along B5345 as closely as possible.	Look for similar opportunities as the proposed High House Road scheme.
Residents	Ensure any future flooding, in all areas, causes minimal damage.	Resilience measures.

Next Steps

Cumbria County Council (CCC) as the LLFA will continue to ensure that any actions identified within the actions table of this report are appropriately taken forward by each Risk Management Authority identified. Actions are likely to be prioritised through the Making Space for Water process and monitored through regular meetings of the group. Details of the MSfWG members and a summary of related processes are detailed in Appendix 3.

Appendices

Appendix 1: Summary of residents feedback to draft report

From the Flood Forum held at the Adams Recreation Ground, Beach Road, St. Bees, 7pm, 25th March 2013.

- There is an abandoned culvert/pipe which connected a road gully above 'Meadow House' on High House Road to Pow Beck. It was 225-300mm.
- Work done by County Highways near 'The Retreat' appears to have reduced the risk of flooding to the property as there were no problems in the storms on 22/11/12 or near Christmas.
- Information provided by the resident of 'The Retreat' on the drainage layout shown in Appendix 4.
- Concerns were raised about the new housing development on the old petrol station at Station Road. The drains can cope now but will they be able to after the development? The field opposite is the source of the flood water.
- 21 and 22 Main Street did flood internally and the route of the flooding was up through the floors.
- Properties on Main Street at the bottom of Outrigg also flood regularly. Main Street has suffered serious flooding previously in 2006 and 2001. After the 2006 events, County Highways found a restriction in the drain at Main Street/Finkle Street which has not been removed.
- It has cost £40k to replace the culvert at the caravan park; land management is needed further up catchment to reduce flows. The biggest landowner in the catchment was devastated by Foot & Mouth and switched from a dairy farming to cereals. Ploughing down the slope has increased flows and erosion into Rottington Beck. The bed of the river has risen by a metre or so over the last few years *(implying that this is due to increased sediment).*
- St Bees School was also flooded on 30th August 2012 but this was not recorded in the Draft report as the school regularly suffers flooding without reporting it. The flooding mechanism is similar to that on High House Road and at Nethertown Road / Sea Mill Lane where the road intercepts water that would normally flow directly down the slope. A highway drain from the B5345, above the school has been repaired but this has been ineffective.
- It was asked if the report could cover additional flood events which have occurred in St Bees. Prior to the 30/8/12 event there were serious flood incidents in summer 2006, autumn 2005, and in 2000. Rainfall extreme data was asked for covering the last 20 years. A diagram of the structure of responsibilities as shown in the presentation was also asked for.

Appendix 2: Glossary

CCC	Cumbria County Council
CBC	Copeland Borough Council
Defra	Department for Environment Food & Rural Affairs
EA	Environment Agency
LLFA	Lead Local Flood Authority
LFRM	Local Flood Risk Management
MSfWG	Making Space for Water Group
RMA	Risk Management Authority

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

The Flood Risk Regulations 1999 and the Flood and Water Management Act 2010 (the Act) have established CCC as the Lead Local Flood Authority for Cumbria. This has placed various responsibilities on CCC including Section 19 of the Act which states:

Section 19

(1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate—

(a) which risk management authorities have relevant flood risk management functions, and

(b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.

(2) Where an authority carries out an investigation under subsection (1) it must—

(a) publish the results of its investigation, and

(b) notify any relevant risk management authorities.

A '*Risk Management Authority' (RMA)* means:

(a) the Environment Agency,

(b) a lead local flood authority,

(c) a district council for an area for which there is no unitary authority,

(d) an internal drainage board,

(e) a water company, and

(f) a highway authority.

The table below summarises the relevant Risk Management Authority and details the various local source of flooding that they will take a lead on.

Flood Source	Environment Agency	Lead Local Flood Authority	District Council	Water Company	Highway Authority
RIVERS					
Main river					
Ordinary watercourse					
SURFACE RUNOFF					
Surface water					
Surface water on the highway					
OTHER					
Sewer flooding					
The sea					
Groundwater					
Reservoirs					

The following information provides a summary of each RMA's roles and responsibilities in relation to flood reporting and investigation.

Government – Defra develop national policies to form the basis of the EA's and CCC's work relating to flood risk.

Environment Agency has a strategic overview of all sources of flooding and coastal erosion as defined in the Act. As part of its role concerning flood investigations this requires providing evidence and advice to support other risk management authorities. The EA also collates and reviews assessments, maps and plans for local flood risk management (normally undertaken by LLFA).

Lead Local Flood Authorities (LLFAs) – Cumbria County Council is the LLFA for Cumbria. Part of their role requires them to investigate significant local flooding incidents and publish the results of such investigations. LLFAs have a duty to determine which risk management authority has relevant powers to investigate flood incidents to help understand how they happened, and whether those authorities have or intend to exercise their powers. LLFAs work in partnership with communities and flood risk management authorities to maximise knowledge of flood risk to all involved. This function is carried out at CCC by the Local Flood Risk Management Team.

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

Water and Sewerage Companies manage the risk of flooding to water supply and sewerage facilities and the risk to others from the failure of their infrastructure. They make sure their systems have the appropriate level of resilience to flooding and where frequent and severe flooding occurs they are required to address this through their capital investment plans. It should also be noted that following the Transfer of Private Sewers Regulations 2011 water and sewerage companies are responsible for a larger number of sewers than prior to the regulation.

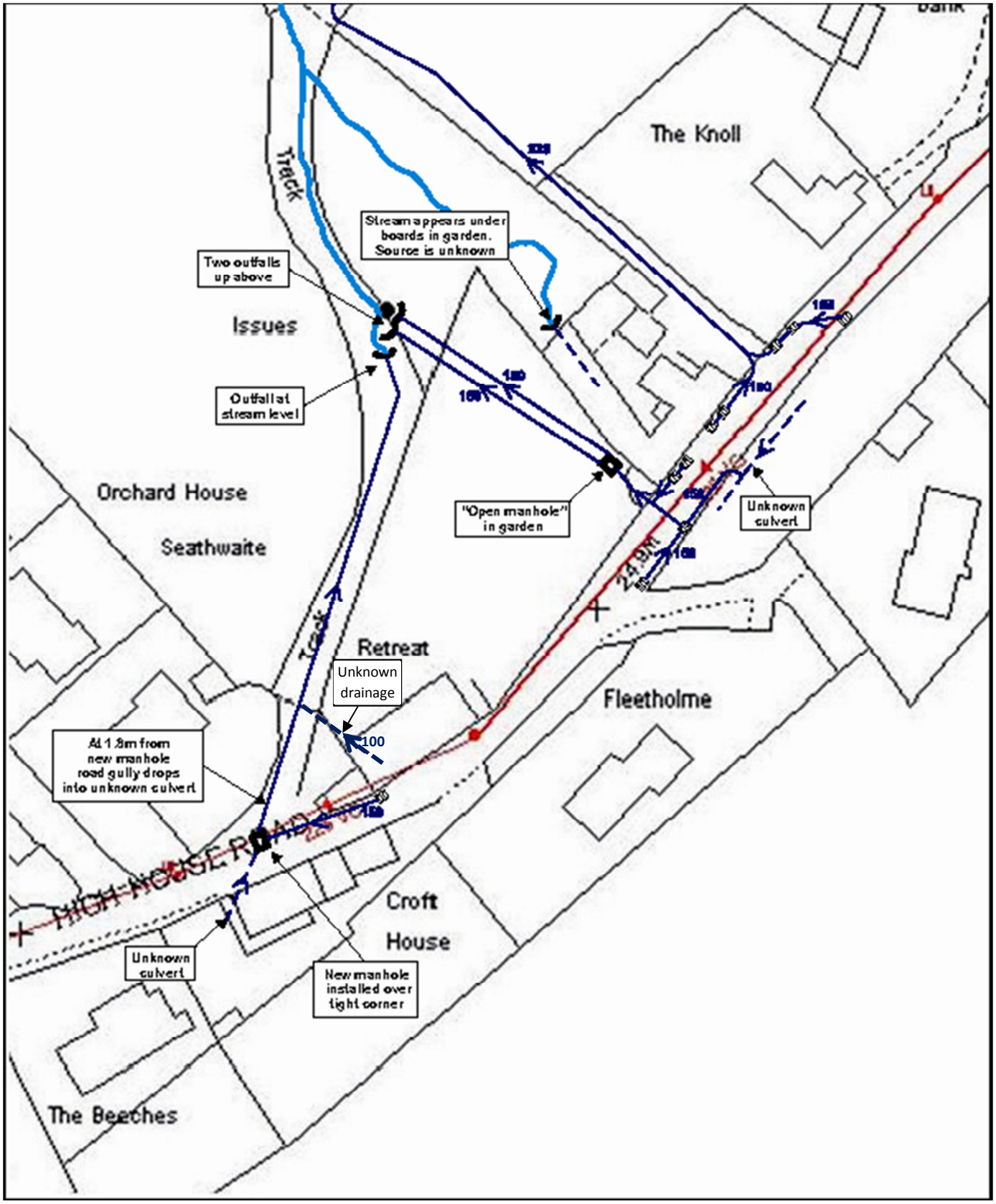
Highway Authorities have the lead responsibility for providing and managing highway drainage and certain roadside ditches that they have created under the Highways Act 1980. The owners of land adjoining a highway also have a common-law duty to maintain ditches to prevent them causing a nuisance to road users.

Flood risk in Cumbria is managed through the Making Space for Water process which involves the cooperation and regular meeting of the Environment Agency, United Utilities, District/Borough Councils and CCC's Highway and LFRM Teams to develop processes and schemes to minimise flood risk. The MSfWGs meet approximately 4 times per year to cooperate and work together to improve the flood risk in the vulnerable areas identified in this report by completing the recommended actions. CCC as LLFA has a responsibility to oversee the delivery of these actions.

Where minor works or quick win schemes can be identified, these will be prioritised and subject to available funding and resources will be carried out as soon as possible. Any major works requiring capital investment will be considered through the Environment Agency's Medium Term Plan process or a partner's own capital investment process.

Flood Action Groups (FAGs) are usually formed by local residents who wish to work together to resolve flooding in their area. The FAGs are often supported by either CCC or the EA and provide a useful mechanism for residents to forward information to the MSfWG.

Appendix 4: Detailed Plan – drainage in High House Road



Appendix 5: Useful contacts and links

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

Cumbria County Council (Highways):
highways@cumbria.gov.uk, www.cumbria.gov.uk, tel: 0845 609 6609

Cumbria County Council Neighbourhood Forum: tel: 01946 505022
cumbria.gov.uk/sayit

United Utilities: tel: 0845 746 2200

Copeland Borough Council
info@copeland.gov.uk, www.copeland.gov.uk, tel: 0845 054 8600

Flood and Water Management Act 2010:
http://www.legislation.gov.uk/ukpga/2010/29/contents

Water Resources Act 1991:
http://www.legislation.gov.uk/all?title=water%20resources%20act

Land Drainage Act:
http://www.legislation.gov.uk/all?title=land%20drainage%20act

Highways Act 1980:
http://www.legislation.gov.uk/all?title=highways%20act

EA – 'Living on the Edge' a guide to the rights and responsibilities of riverside occupation:
http://www.environment-agency.gov.uk/homeandleisure/floods/31626.aspx

EA – 'Prepare your property for flooding' how to reduce flood damage including flood protection products and services:
http://www.environment-agency.gov.uk/homeandleisure/floods/31644.aspx

Translation services

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

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