

Seascale

Flood Investigation Report 31



Flood Event 30/8/2012

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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 Seascale that suffered from flooding on 30th August 2012. 23 properties were reported to have suffered internal flooding in four areas of the village. Very intense rainfall was the ultimate cause and the performance of culverts within drainage systems has contributed to the flooding impacts.

16 actions have been identified in the report which would reduce 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.



Figure 1. Map showing the location of the flood areas.

1. The Fairways
2. Railway Terrace
3. Santon Way
4. Swang Farm

Investigation

The ultimate cause of the flooding at all locations was the 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.

Rainfall Event

According to radar data taken from a weather records provider, peak rainfall was 29mm/hr and occurred at about 1:15am. The rain started at 9:00pm and finished at 3:30am with a total of 37mm in 6hrs 30mins.

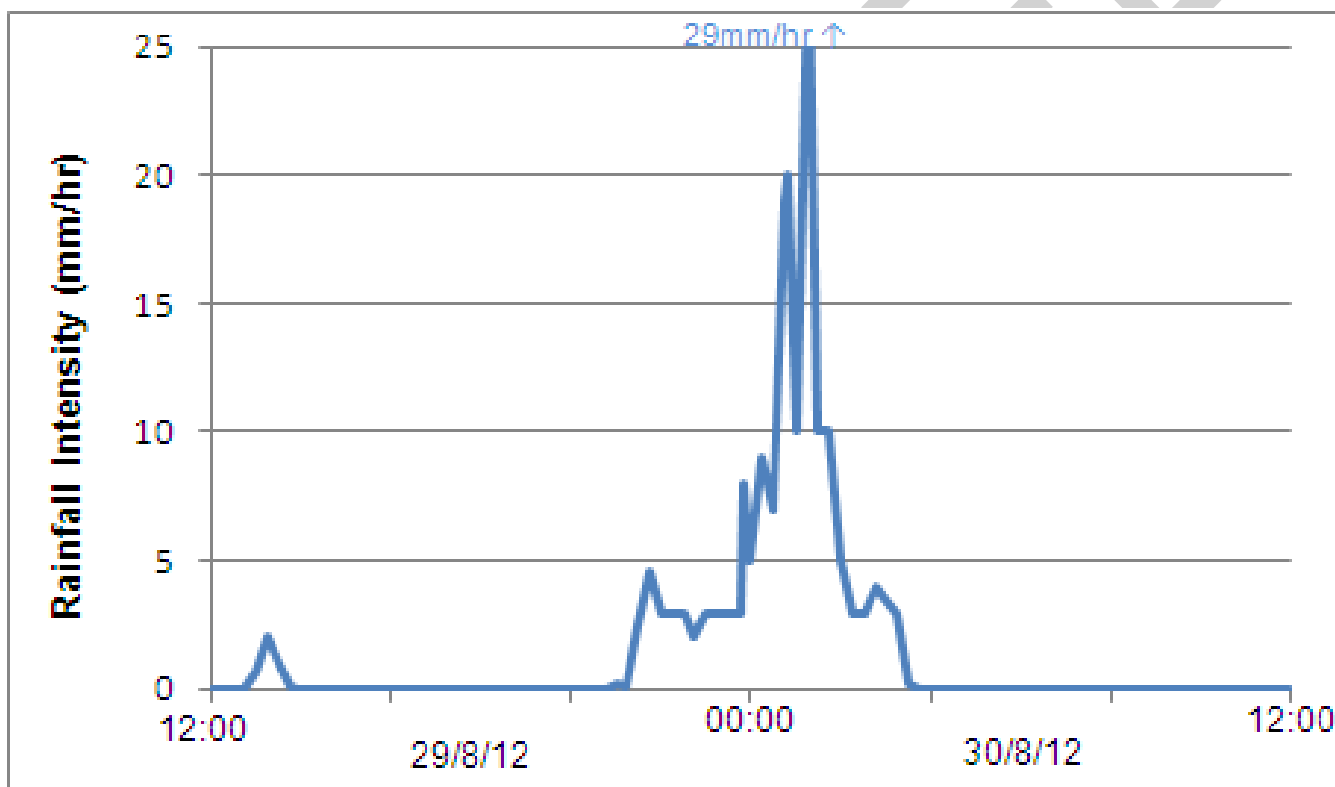


Figure 2. Radar rainfall data from 29-30 August 2012

The average total rainfall for the whole of August is 92mm (1981-2010) at St Bees Head which is the closest climate monitoring station.

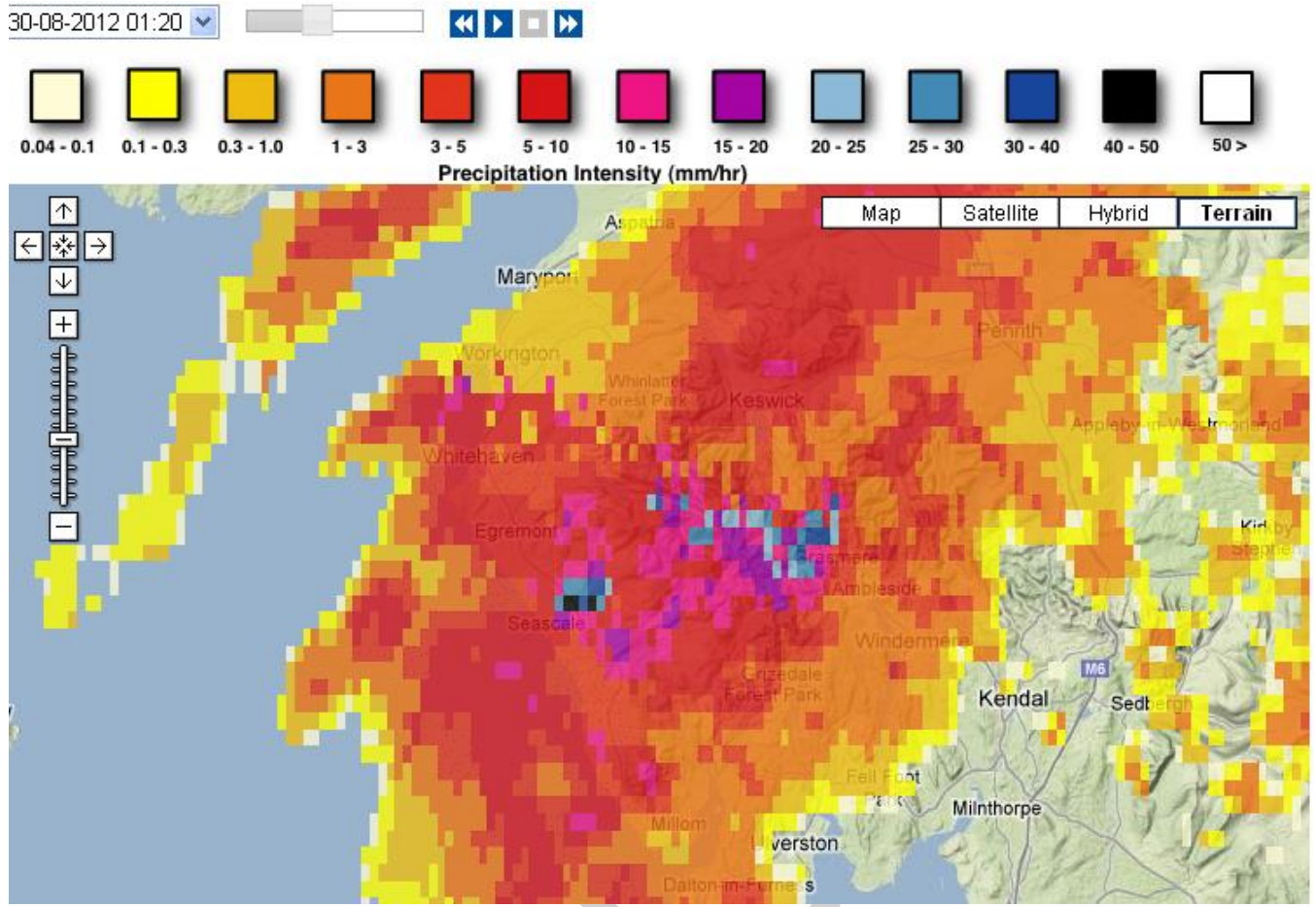


Figure 3. Rainfall radar image 1:20am 30th August 2012

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Likely Causes of Flooding

The Fairways

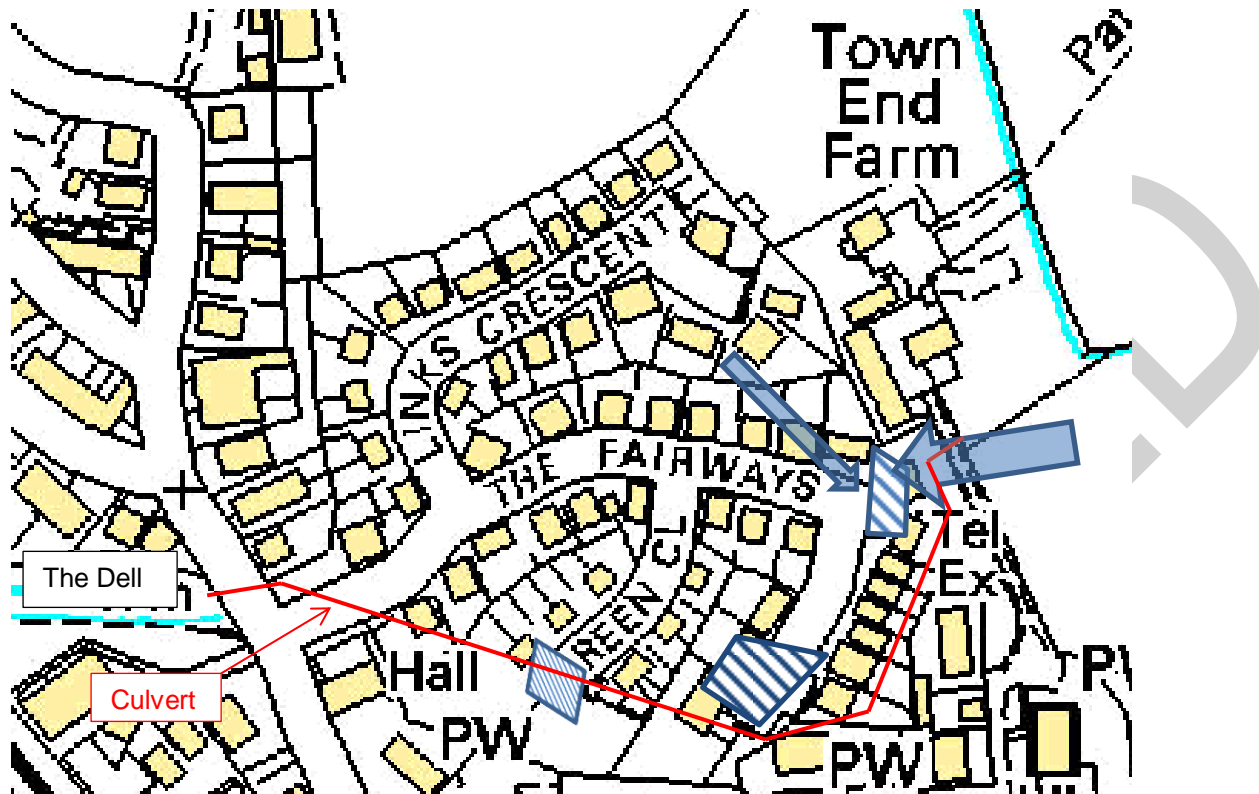


Figure 4 Plan of The Fairways and Green Close showing the location of the culvert, the main surface water flow routes and the areas that flooded.

An un-named natural watercourse flows through a culvert under the estate and outfalls at a piece of open land known as ‘The Dell’. The source of this culvert is unknown but it is likely that it takes water from the How Farm area 1km to the north. The ground levels have been altered in the building of the development. There are significant dips at the end of the roads and the flood waters gathered in these low areas flooding adjacent properties. 21, 23, 29, 33 & 35 The Fairways were flooded internally and no. 25 suffered external flooding.

UU attended the flood incident and found that the flood water was flowing through no. 21 The Fairways from pooled flood water in the field behind the property. UU advised that the sewers were operating satisfactorily, but the culvert, which is not in UU ownership, required investigation. Surface water was also reported to have been flowing from the direction of Links Crescent.

The outfall of the culvert is in ‘The Dell’, a small area of open space on the west side of The Banks (a road) at the entrance to The Fairways. ‘The Dell’ is surrounded on all four sides by steep slopes with another culvert taking the beck under the railway to the sea and regularly holds flood water because of restrictions within the railway culvert.

At the upstream end of the culvert, the first manhole is in the back garden of number 21. It has two inlets, one of which takes surface water from the field south of Town End Farm. The other inlet carries base flow even in dry conditions but the source could not be found. This is thought to be the stream which starts 1km away at How Farm.

Surface water collecting in the field behind 21 'The Fairways' discharges into the culvert via an old stone culvert located under an access track leading to Town End Farm. There is no formalised headwall to the culvert on the edge of the field.

Near no. 24 The Fairways the 900mm diameter culvert splits, with a 400mm diameter pipe taking normal flows, and a high level 600mm diameter pipe for overflows. If the 900mm diameter pipe was running at full bore (which is very likely) the water would be forced to back up and flood out of the system at any openings, such as manhole covers. Residents reported that the culvert manhole outside 24 The Fairways surcharged during the flood event.

The two branches of the culvert recombine close to no.2 in a 700mm x 1080mm box culvert with a section of disused pipe running inside this section, reducing the cross section by approximately 15%. The culvert discharges as an open watercourse in 'The Dell'.

From a CCTV survey, the 900mm diameter section of the culvert proved to be in very good condition with some large debris. This is not unexpected as a culvert carries the bed load of the watercourse as well as the water. During the surveying, stones were taken out of the manhole near no.35 but they had built up again after rain on the weekend of 21/10/12.

Railway Terrace

Whitriggs Beck drains a large area of agricultural land before flowing past the waste water treatment works on the north-east side of the Cumbria Coast Railway. It runs

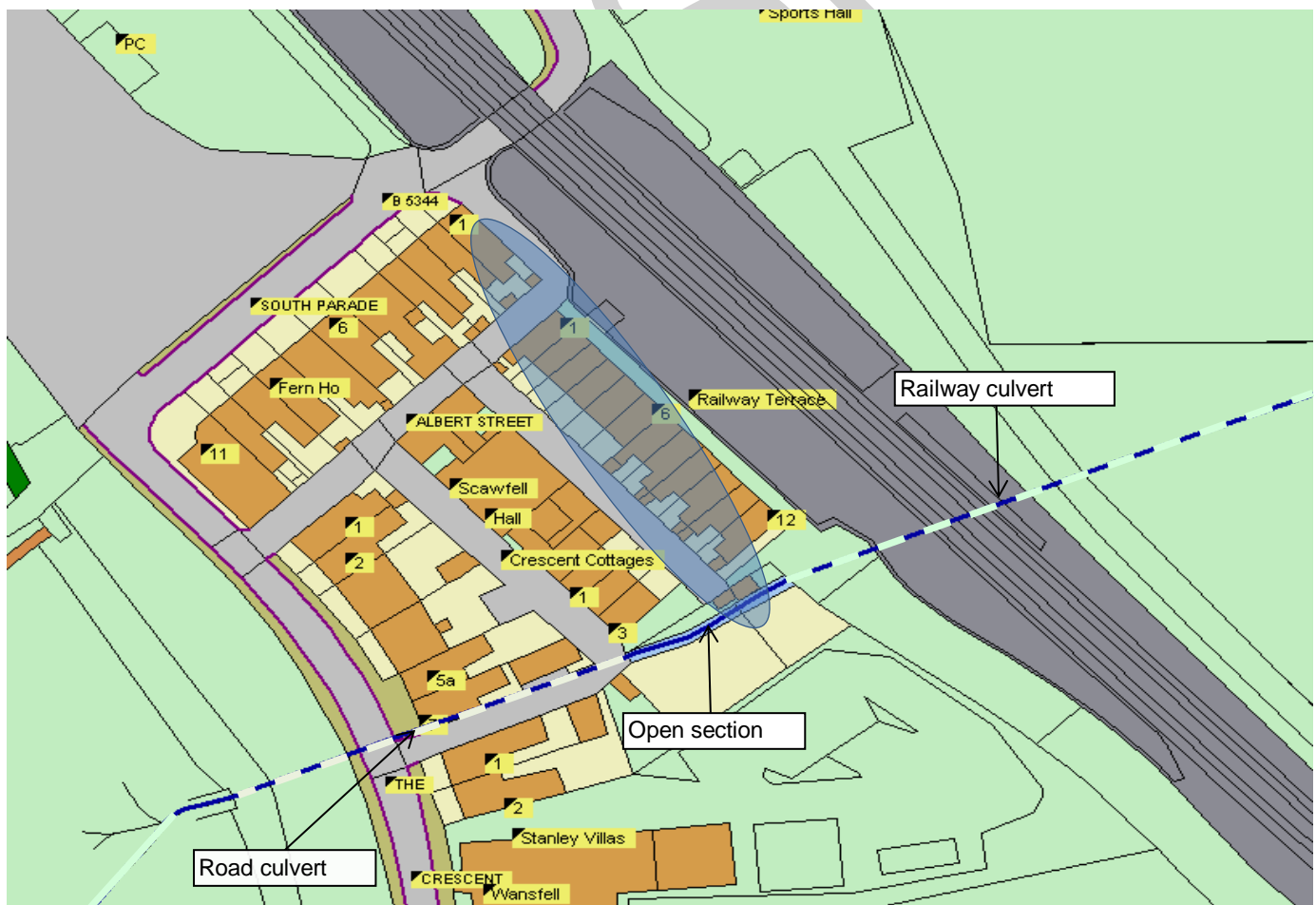


Figure 5 Plan of the Railway Terrace and Albert Street area showing the line of the culverts and the location of the flooding.

through an extended culvert under a BMX track and under the railway embankment. In the yard of 12 Railway Terrace, the beck is partly in culvert but also in open channel bounded by a wall. The wall has drainage holes made by residents to drain highway areas in normal rainfall conditions. This arrangement was reversed during the flood event. The beck surcharged and water came through holes, over the small wall and flooded adjacent properties. Whittriggs Beck then runs through a further culvert under Drigg Road and outfalling into the sea 80m downstream.

The road culvert is an arch 1.59m high x 1.28m wide while the railway culvert is a 1m high x 1.16m wide box (at the other side of the embankment it is a 1.2m diameter pipe so it is smaller at the outlet than at the inlet). Residents have concerns that it is not cleared on a regular basis. A CCTV survey was carried out to check the condition of the road culvert. While there is some rock in the culvert, it must carry bedload as well as water.

Some observations made by residents suggest that the water rose out of drainage holes in the yard and at the downstream portal of the railway culvert. There are a number of scenarios which describe how water flows through a culvert with an open channel at both ends. These behaviours are affected by the channel and culvert gradients, cross-section and resulting flow depth. Such factors would have an impact on the nature of the flood water flow at both ends of the culvert. Observations made by residents are consistent with a number of these scenarios as the flood flows altered over time covered by the event.

The flood water is said to have flashed up and down. This is consistent with a pulse of water coming through caused by a short but intense burst of heavy rain but it is more likely to be explained by the changing behaviour of the flow through the culvert as the volume of water changed with time.

The culvert below the roads was surveyed and no restrictions to the flow were found. Cobbles and small boulders within the channel are to be expected as the culvert must carry the stream's bedload as well as the water. The MSfWG partners have no authority to survey the culvert owned by Network Rail who make a full internal inspection of the culvert every six years. This was unavailable at the time of publication of this report. Network Rail's most recent external inspection, in May 2012, revealed no indications of failure.

As well as the flood water being delivered by the culvert, some of the flooding was caused by the rain falling directly on the area, especially during the 29mm/hr peak rainfall. All of the road gullies have been cleaned and the pipes between them jetted clear following the flooding. Most of the road gullies drop into the combined sewer system. The combined sewers in the area are 250mm diameter and it was reported that when the manhole cover outside no.12 was lifted, flood water was able to get away. This indicates that the combined sewers had spare capacity in them. Possibly this occurred after the peak flows had passed but the surface flood water remained. There have never been any reports of flooding from the combined sewers in this area but UU surveyed and jetted them after the flooding as a precautionary measure.

There is one road gully that flows into the open section of Whittriggs Beck rather than the combined sewer. This is located outside no.12 and could be a key mechanism to reduce flood water. It is not effective during flooding because the outfall is below the stream level in normal flow conditions. It should be noted that if the stream level is higher than the gully it will not work and will only be effective in reducing flood water levels after the stream level has subsided. Nevertheless, if the fall allows, it would be more efficient with a higher outfall, and with a flap valve on the outfall. On 22/11/2012 there was heavy rainfall and, again, this drain appeared unable to operate, resulting in surface water in the street, although there was no report of flooded properties from this event. This is a new problem that has not previously occurred.

Residents have stated concerns that the flooding may have been caused by water overflowing from the WWTW, resulting in a significant increase in the levels of Whitriggs Beck.

UU have provided details about the WWTW and records of operation available from the night of 29 - 30 August 2012. There is a consented emergency overflow from the works into Whitriggs Beck but this would only operate in times of severe storm.

On the evening of the 29th August there were no alarms from the site. At 0100hrs on 30th August alarms recorded overflow from the works into Whitriggs Beck. At 0215hrs numerous alarms from site indicated equipment failure suggesting water was entering the site from Whitriggs Beck. As flood waters rose, there was a gradual shut down of the site.

Since the site was commissioned in 1996 it is only in recent years that there has been evidence of Whitriggs Beck flowing in to the works.

In normal operation the WWTW pumps treated and storm flows out to sea via the long sea outfall. On 18th November 2012 the pumping main from the WWTW did break and cause a 3m deep hole in the village car park. This was due to operational failure at a weak point caused by a 90° bend.

Santon Way

The fields behind 50 Santon Way are very wet, even in dry weather. Land falls towards the houses and these properties are the only route for flood water and it appears that the houses were flooded because of this topography. The water passed through the rear garden of 50 Santon Way and flooded the properties at 46 and 48 Santon Way.

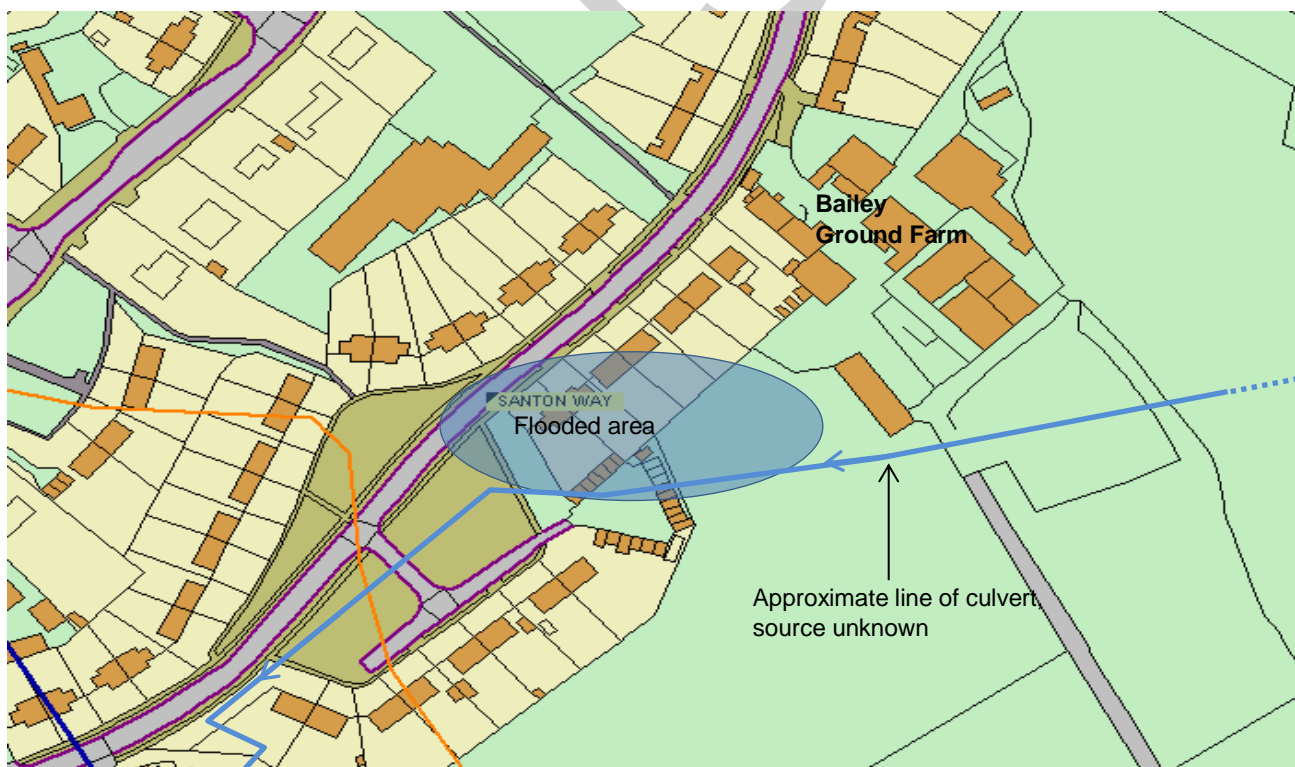


Figure 6 Plan of the Santon Way area showing the location of the flooding and the approximate line of the culvert

There is a culvert carrying a natural watercourse which runs around the edge of the area. It comes from the direction of Black How, crossing the agricultural land surrounding Bailey Ground Farm, but its source is unknown.

The culvert runs behind 46 and 48 Santon Way and continues through the open space in front of the houses where a depression has formed in the grass indicating that the culvert has collapsed. There is also subsidence above the culvert on the site of the garages. It appears to be flowing satisfactorily in normal conditions. Owners of these areas of land are responsible for maintaining the culvert as riparian landowners; it is very deep at 2-4m. The source of the culvert is unknown. Copeland Borough Council attempted to carry out a CCTV survey after the flooding in June 2012 but could only get 26m upstream from the furthest known manhole on the upstream end of the culvert.

Swang Farm, Fircroft



Figure 7 Location of the two properties reported to have suffered flooding in the Swang Farm area

Two properties at the northern end of the village were reported to have suffered from flooding. There are no mapped watercourses in this area, although there is a suspected culvert near ‘Fircroft’. The general slope direction, and therefore the route surface water, is from the fields to the northwest of Gosforth Road towards the southeast.

‘The Barn’, was surrounded by water but did not flood internally. ‘Fircroft’ also had surface water flooding as water ran off the highway causing damage to the garage but not flooding inside the house. The drive of ‘Fircroft’ slopes downwards from Gosforth Road.

The problems in this area became known to the LLFA too late to be fully investigated in this report. United Utilities continue to carry out extensive investigations in this area and believe

some of the flooding is related to problems with road drainage. Separate reports have been prepared by the LLFA for flooding in this area.

Flooding History

The Environment Agency (EA) Historic Flood map shows outlines of all flooding known to the EA. This does not show flooding in the Seascale area (the nearest shown is at Holmrook) but it is not a comprehensive record. Seascale is not known for flooding and the only flooding Hotspot recorded by the Making Space for Water Group is the Seascale Park area. The Flood Map for Surface Water, also produced by the EA (see Appendix 4) shows that the houses that flooded at The Fairways and at Santon Way are both at risk of flooding in a 1 in 100 year rainfall event.

The Fairways

No information about historic incidents of flooding here.

Railway Terrace

A resident reported that he had lived there for 23 years and had never witnessed flooding.

Santon Way

Santon Way had also flooded two months prior to the 30/8/2012 event in June and on an unknown date in the past when the properties were owned by BNFL.

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 Seascale. 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	Ensure highway drainage is running effectively.	Gully cleaning and jetting connections. COMPLETED.
United Utilities	Ensure sewers are flowing effectively.	CCTV surveys / Jetting. COMPLETED.
MSfWG	Ensure culverts are flowing effectively.	Look at removing section of disused sewer from within culvert at 'The Fairways' CCTV surveys. COMPLETED.
LLFA	Look at options to reduce flow.	Attenuation feasibility studies. Developing candidate schemes for Defra funding bids.
Land Owner / MSfWG	Divert flows from The Fairways.	Look at moving access to the Town End Farm field to a higher level/location.
Land Owner / MSfWG	Improve performance of culvert under lane behind 'The Fairways'	Clarify source and flow route(s) of the water entering the culvert behind 'The Fairways'
Network Rail	Dell restrictions	Discuss with Asset Manager for Network Rail culvert concerns.
LLFA/UU	Fairways culvert obstruction	Discuss with UU removal of service from within culvert
CBC Development Control / LLFA	Reduce flood flows.	Ensure a condition of any future development around 'The Fairways' is to improve the culvert or reduce flows. Discussions with Persimmon Homes
LLFA	Prevent flood waters rising from Whitriggs Beck and flooding properties in the Railway Terrace area.	Studies and associated funding bids to Defra for: - <ul style="list-style-type: none"> • a continuous culvert; • raising the wall on the open section of beck.

Action by	Recommended Action	How
LLFA/County Highways	Improve drainage capability of gully outside no. 12 Railway Terrace.	Investigate options for improving discharge.
CBC Development Control / LLFA	Repair Santon Way culvert.	Ensure a condition of any development around Santon Way is to improve the culvert. Residents are in the process of obtaining the land.
LLFA / Riparian Owner	Repair Santon Way culvert.	Determine who owns the Santon Way culvert and make them aware of their riparian responsibilities. EA and Natural England are looking to carry out a scheme to improve water quality. Residents are liaising with the LLFA regarding a minor drainage route to alleviate flooding at this location.
LLFA	Ensure EA Detailed River Network is correct.	Prove route of How Farm stream by dye testing. Investigate source of 'The Fairways' culvert. Inform EA of results. Completed.
United Utilities / County Highways	Improve the sewer system in the village.	Look for opportunities to reduce surface water in the combined sewer.
Residents	Reduce impact of flooding.	Anybody who is aware that their property is at risk of flooding should consider installing resilience measures .

Next Steps

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 will continue to be prioritised through the Making Space for Water process and monitored through regular meetings of the group. Details of the MSfWG members and summary of related processes are detailed in Appendix 3.

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Appendices

Appendix 1: Summary of residents feedback to draft report

From the Flood Forum held in the Methodist Church Hall, Seascale, 7pm 27th March 2013.

- Details of land ownership of the fields behind The Fairways were given.
- Surface water flow routes at The Fairways were discussed in detail.
- The field behind The Fairways is known as 'The Sinks'. There is a depression in this field which forms the flow route to The Fairways. This depression didn't exist 15 years ago although the field has always flooded.
- The stream that flows to the north of 'The Sinks' should be maintained regularly.
- It was asked that details of surveys of the Network Rail culvert and details of the consent to discharge from the WWTW are included in the Railway Terrace section of the report.
- Completely enclose culvert past Railway Terrace is the preferred solution.
- 3-6 months timescale for rail culvert survey and assessment of options.
- Discussions on the potential contribution to Beck flows from WWTW compared with whole of catchment.
- Explore using land in front of WWTW for attenuation – WWTW already protected by bund.
- Extra information was supplied about the history and route of the Santon Way culvert.

Appendix 2: Glossary

Acronyms

CBC	Copeland Borough Council
CCC	Cumbria County Council
Defra	Department for Environment Food & Rural Affairs
EA	Environment Agency
FAG	Flood Action Group
LLFA	Lead Local Flood Authority
LFRM	Local Flood Risk Management
MSfWG	Making Space for Water Group
RMA	Risk Management Authority
WWTW	Waste Water Treatment Works
UU	United Utilities

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

The Flood Risk Regulations 2009 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' 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 RMA 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 – CCC 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 RMA has relevant powers to investigate flood incidents to help understand how they happened, and whether those authorities have or intend to exercise their powers. LLFAs work in partnership with communities and flood 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.

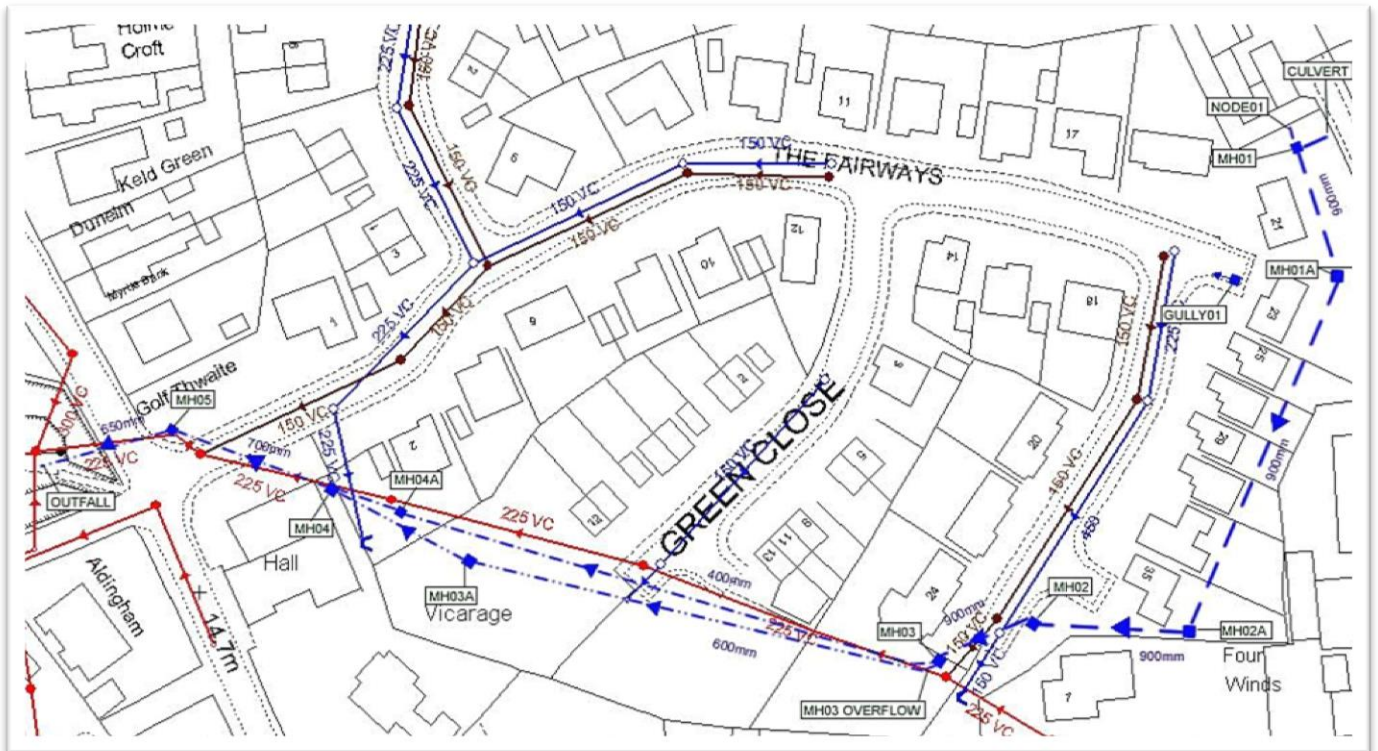
Flood risk in Cumbria is managed through the Making Space for Water process which involves the cooperation and regular meeting of the Environment Agency, United Utilities, District/Borough Councils and CCC’s Highway and LFRM Teams to develop processes and schemes to minimise flood risk. The MSfWGs meet 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 EA’s Medium Term Plan or a partners own capital investment process.

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

Appendix 4: Plans

Drainage layout plan for 'The Fairways'



The dashed blue line is the culvert which splits in two outside no.24 and recombines outside no.2. Blue lines are surface water sewers. Brown lines are foul sewers. Red lines are combined, foul and surface water sewers. The numbers indicate the diameter of the pipes in millimetres.

Environment Agency flood mapping: Zone 3 and surface water flooding from a 1 in 100 year rainfall event.



Pink hatching shows Flood Zone 3 where rivers have a greater than 1% chance of flooding in any one year. The dark blue zone indicates susceptibility to surface water flooding from a 1:100 year rainfall event. Parts of The Fairways, Santon Way and Railway Terrace all fall within the more severe and frequent surface water flooding zones.

Appendix 5: Useful contacts and links

To report flooding: Incident hotline tel: 0800 80 70 60 (24hrs)

Floodline: tel. 0845 988 1188

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

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