

Hallgarth, Kendal

Flood Incident Investigation Report



Works to repair drain Low Garth
Photograph provided by United Utilities

Flood Event 28th June 2012

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

Version	Undertaken by	Reviewed by	Approved by	Date
Preliminary	Helen Renyard	Anthony Lane		4 th February 2013
Draft	Helen Renyard	Anthony Lane		5 th March 2013
Final				

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Executive Summary

Cumbria County Council as Lead Local Flood Authority (LLFA) has prepared this report with the assistance of other Flood Risk Management Authorities under Section 19 of the Flood and Water Management Act 2010. Duties of the LLFA are undertaken by the Local Flood Risk Management team (LFRMT) within the counties Highways and Transport department.

The report identifies the area in Kendal that suffered from flooding on 28th June 2012. Eight properties suffered internal with three experiencing flooding of gardens. The flooding occurred due to a combination of excessive rainfall causing surface water flooding, surcharging of surface water and combined public sewers, and ground water creating infiltration issues into drainage systems.

Nine actions were recommended after initial investigations to minimise the risk of future flooding. The recommendations include cleaning drainage systems, installing property level protection and residents continuing to report issues. Some of the actions have already been completed at the time of publication of this report. The report also suggests further options that will be dependent on work programmes and capital money being available from the respective risk management authorities.

Event background

This section describes the location of the flood incident and identifies the properties that were flooded.

Flooding Incident

Hallgarth is a housing estate located on the northern edge of Kendal, approximately 1 mile north of the town centre. The area affected by the flooding is located in low spots along Low Garth Road and other low spots and flow routes from the hillsides to the west. The catchment area is predominantly rural in the upper reaches sloping relatively steeply from the edges of Kendal Hill to the suburbs of northern Kendal in its lower reaches. There are limited open watercourses in the Hallgarth Estate as many are now transferred via the surface water sewer systems. There are also Highways Authority and UU drainage networks.

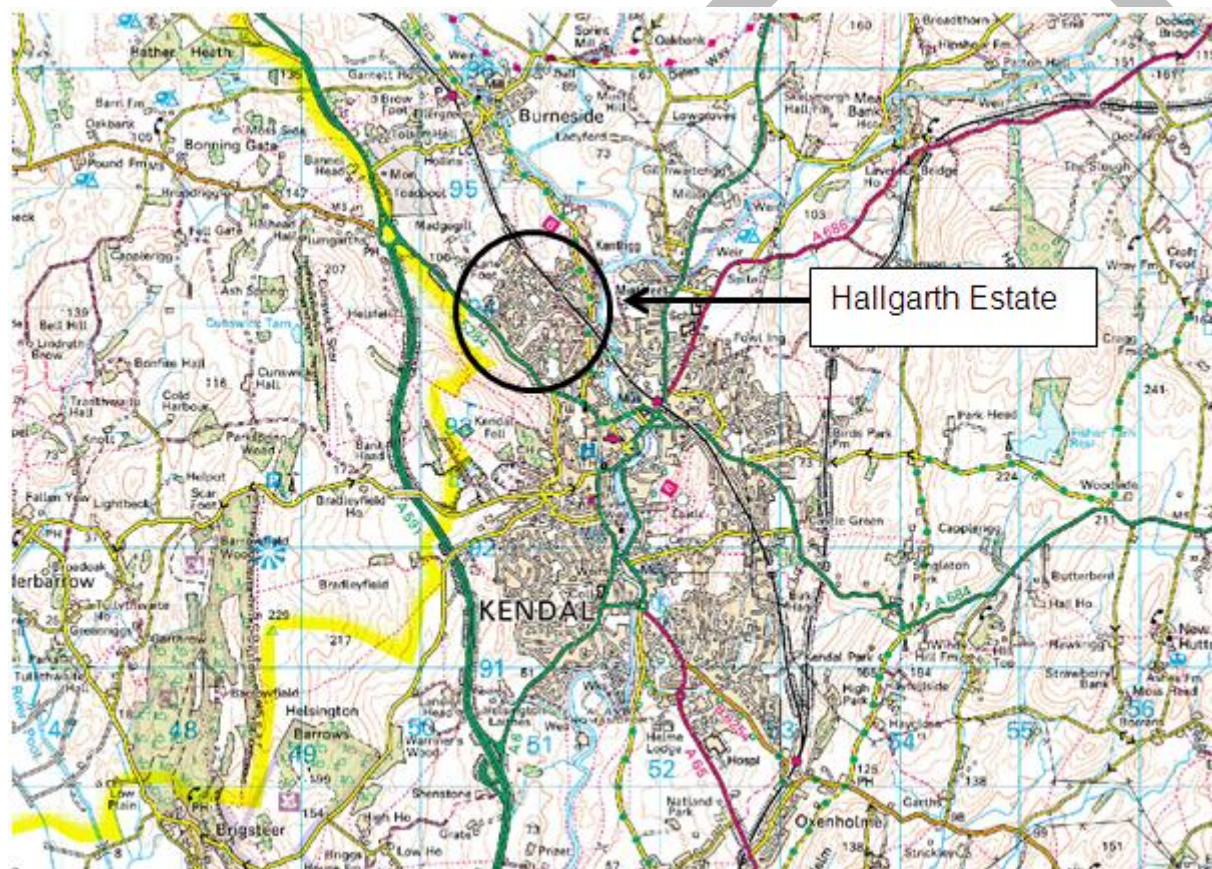


Figure 1 Location of Hallgarth Estate

Flooding occurred in the Hallgarth Estate area of Kendal on 28th June 2012. Several properties suffered internal flooding while others experienced flooding of gardens and footpaths. The properties affected are detailed in the following plan and table.

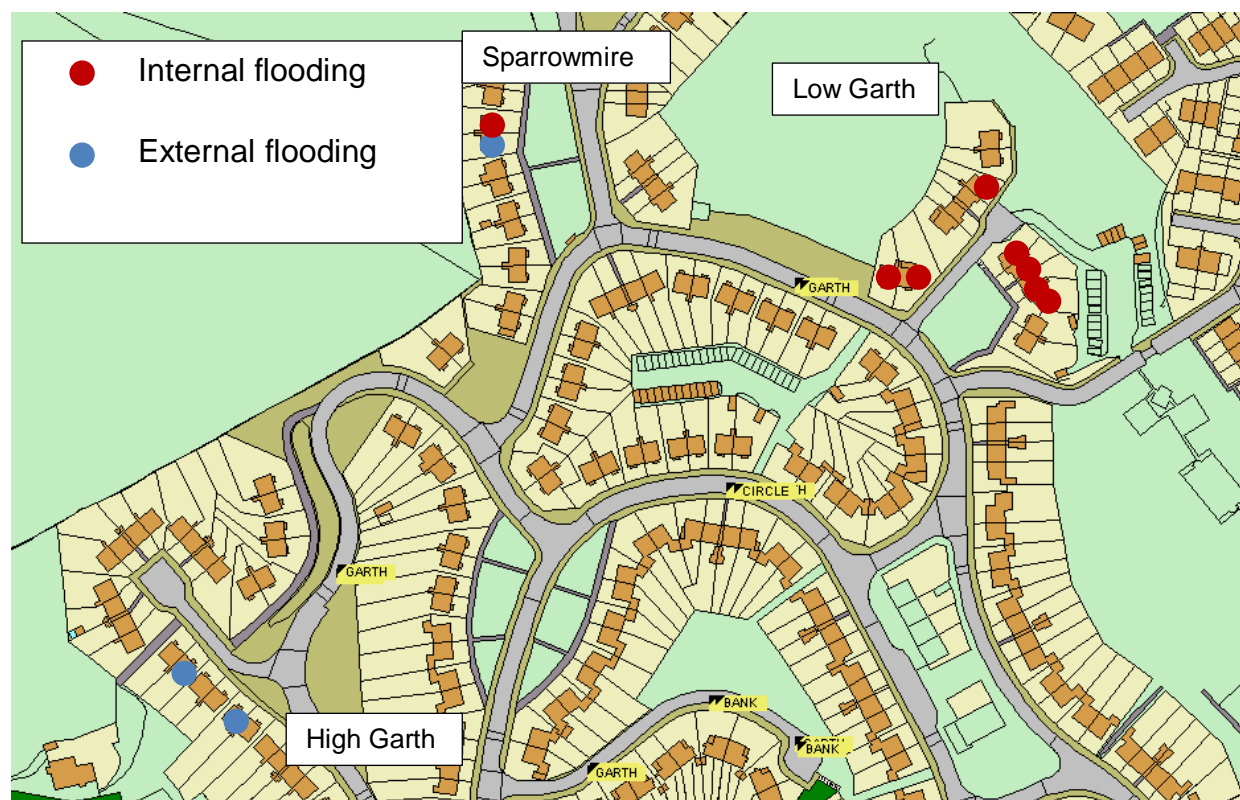


Figure 2 Location of properties affected by flooding

Address	Extent of flooding
13 High Sparrowmire	external flooding
15 High Sparrowmire	internal flooding
82 Low Garth	Internal flooding
84 Low Garth	
86 Low Garth	
88 Low Garth	
94 Low Garth	
102 Low Garth	
104 Low Garth	
35 High Garth	external flooding
41 HighGarth	external flooding

Table 1 Details of extent of flooding

Investigation

This section provides details of the authorities who have contributed to this investigation, an analysis of flow routes and details of the likely causes of flooding. Also included are details of the rainfall event and any previous flooding history in the area.

The investigation has been carried out jointly by SLDC, UU, and the Highways Authority. All are members of the Making Space for Water Group (MSfWG) through which the LLFA engages when carrying out investigations into flooding. LLFA have compiled this report as a result of each members investigations.

Map of Flow Routes



Figure 3 Details of flow routes through Hallgarth Estate

Likely Causes of Flooding

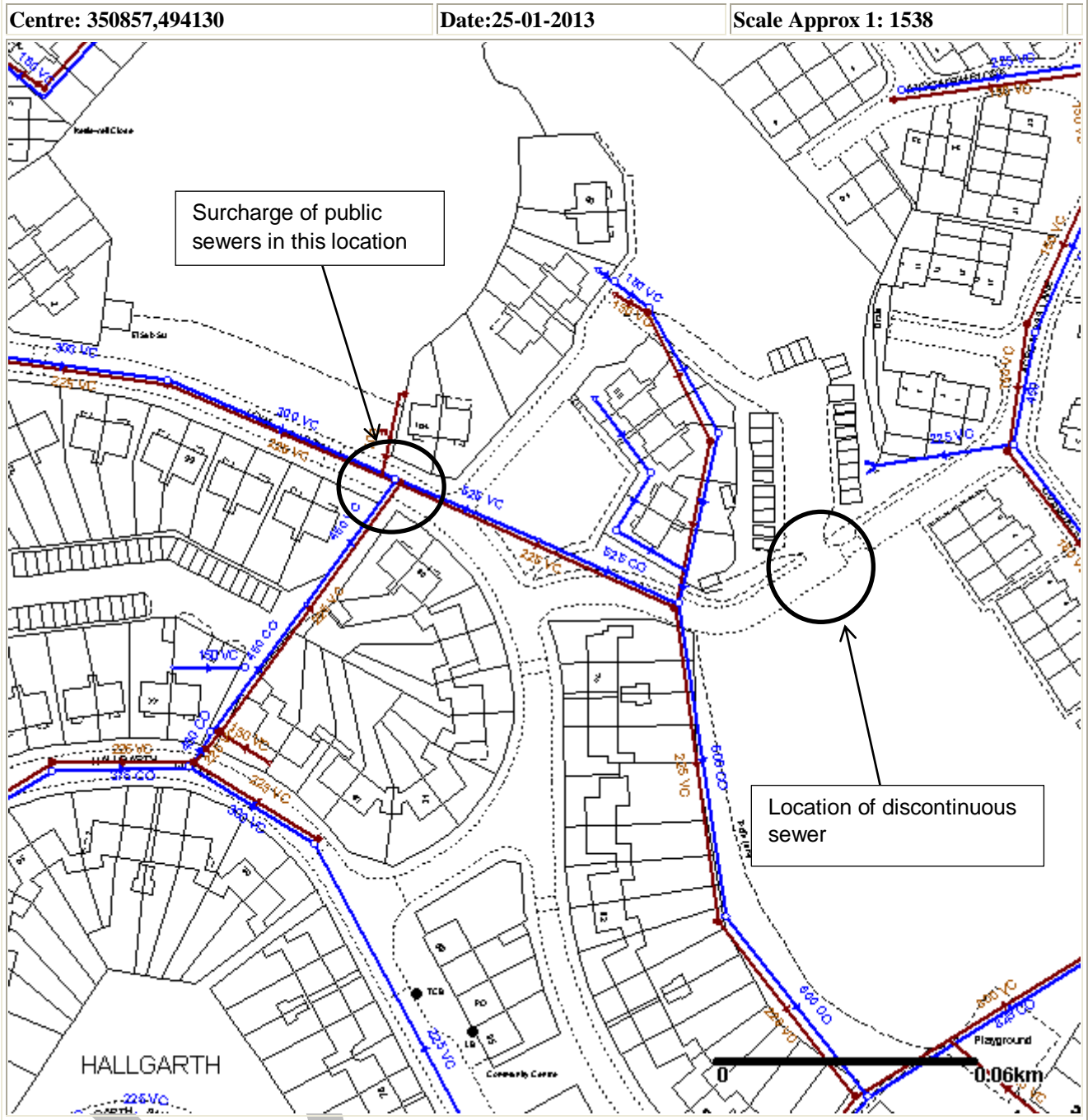
The main cause of the flooding in the Hallgarth estate was very heavy rainfall which fell over a short period of time. This resulted in flash flooding which in certain locations exceeded the capacity of drainage systems resulting in surcharging from both UU's combined and surface water sewers. Therefore, foul sewage was part of the flood water in the Low Garth area. Surface water runoff from agricultural land to the west and north also contributed to flood flows which followed roads, public open space and gardens and flooded properties en route to the low spot at the old garage site off Acre Moss Lane. The topography of the ground with steep gradients also contributed to the velocity of flows. Ground water seeping into drainage systems is also a contributing factor to the flooding.

At some locations water collected behind the boundary walls of properties that back on to the farm land. In some instances water flowed through these walls before flooding houses and flowing into the estate. Once on the estate, flood water quickly became funnelled towards the low points in the estate where the drainage systems were unable to deal with the volumes of water they were receiving from the wider catchment over such a short period of time, water began to surcharge from the drainage system contributing to the overland flow which began to pond and collect in low spots.

Reports have been made that surface water flowed from Windermere Road down the entrances to Hallgarth Cottage and Lane Foot Farm contributing to the surface water runoff over the fields behind High Garth and High Sparrowmire. Possible blocked highway drains or pipework partly responsible for runoff.

UU have carried out extensive investigations of the sewer systems in the Low Garth area. Their CCTV investigations revealed canker at pipe joints suggesting there is significant infiltration from ground water. Canker is the deposit of material around joints caused by ground water seeping into sewers. UU's excavations in the area also confirmed a high water table and suggested that there may be springs in the area that is contributing to the infiltration. Infiltration can result in a reduction of hydraulic capacity in sewers, leading to increased risk of frequency of surcharging and flooding.

The plan on the following page shows United Utilities sewers and indicates the locations where surcharging occurred. Also where there is a surface water sewer which was discontinuous and has been reconnected by UU.



Extract from Map of Public Sewers

Do not Scale

Red or Brown - Foul Sewers
Blue - Surface Water Sewers

- Public Sewer
- Highway Drain
- Private Sewer
- Pumping Main

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities will not accept any liability for any damage caused by the actual positions being different from those shown

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Figure 4 Public Sewer records

Rainfall Event

A number of Heavy Rainfall Alerts were issued by the Met Office over the days preceding the flooding on the afternoon of the 28th June 2012. These were issued with medium confidence and suggested that some locally high rainfall totals could be observed over Cumbria, although there was uncertainty as to exactly where this rain would fall.

High intensity rainfall was forecast as an active frontal system moved in quickly from the south west and traversed Cumbria leaving the north east corner late in the afternoon. High rainfall totals were expected at those locations within a very short period. It was acknowledged by forecasters that this was a complex meteorological situation. The unique alert reference of the Heavy Rainfall Alert issued by the joint Met Office and Environment Agency Flood Forecasting centre was 633. Heavy Rainfall Alerts are issued to the Environment Agency staff in the area offices.

The Environment Agency operates a network of rain gauges across Cumbria. The rain gauge station with the highest rainfall total for the 28th June was at Levens Bridge End, just south east of Kendal. This is about 10km from Kendal. This rain gauge recorded a total of 52.2 mm in a 24 hour period. Within this total was one fifteen minute spell where 20 mm fell. This is very intense rainfall and although it was reflected in the forecast by the Met office it is believed to be the highest 15 minute total recorded by the Environment Agency in recent times.

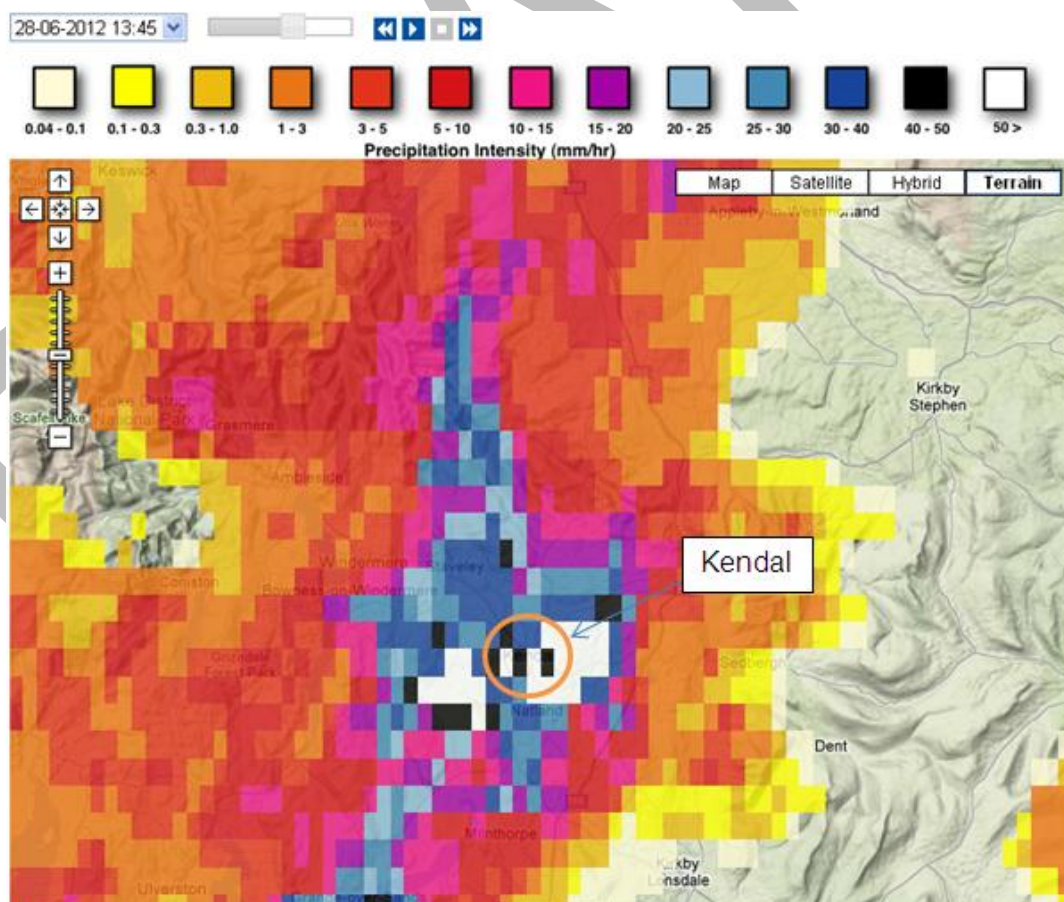


Figure 5 Rainfall intensity 28th June 2012 over Kendal

Flooding History

The Hallgarth estate does have a history of flooding. Anecdotal evidence from residents suggests that there has been flooding of property from surface water over a number of years but more regularly over the last 10 years. Since the flooding that occurred in June 2012 there have been incidents where the foul sewer system has surcharged in Hallgarth

UU have records of flooding incidents in the area from May 1991 to February 2013 although not all incidents involved internal flooding. The most significant incidents causing internal flooding occurred on 31st August 2009, 19th November 2009, and 4th November 2010.

Surcharging of the foul and surface water drains outside of 102/104 Low Garth has also occurred over and above the above dates but has not caused internal flooding. The most significant of these occurrences has been on the 22nd January 2012 when the public sewer surcharged to such an extent that the manhole outside 104 required rebuilding.

Recommended Actions

The following table details recommended actions for various organisations and members of the public to consider. Many recommendations have already been completed.

	Action by	Recommended Action	How
1	United Utilities	Re-connection of the severed sections of surface water sewer from 102/104 Low Garth Details provided in more detail in figure 6	Excavation to reconnect the sections of sewer COMPLETED
2	United Utilities	Clean entire public sewer network less than 300mm diameter in Hallgarth estate	Jetting and CCTV survey including removal of debris and fat COMPLETED – survey revealed canker at pipe joints suggesting infiltration
3	South Lakes Housing	Works ensure adequate flow routes through gardens to prevent internal flooding to the properties at 13 and 15 High Sparrowmire	Alterations to garden and footpath levels COMPLETED
4	CCC Highways	Cleaning and survey investigation where appropriate to ensure gullies function at full capacity in the Hallgarth Estate	Cleaning of gullies and jetting of gully connections COMPLETED
5	United Utilities / Residents	Provide property level protection measures to prevent internal flooding to 102 and 104 Low Garth	Provision of property level protection including non-return valves, impenetrable garden wall and gate, and bund. COMPLETED
6	South Lakes Housing / SLDC	Establish a management plan for the open section of watercourse off Acre Moss Lane	Prepare a regular cleaning routine for the grid and ensure watercourse is clear of debris. COMPLETED
7	Residents and affected parties	Continue to report any future flooding incident to the appropriate RMAs	Residents contact RMAs. Contact details provided in Appendix 3
8	CCC Highways	Investigate gullies on Windermere Road to confirm they are working adequately and determine their discharge point.	Jetting, dye testing and possibly CCTV survey investigation.

9	CCC LFRMT	Submit request to SLDC to remove the development site on the old garages site, Acre Moss Lane from SLDC Local Development Framework to minimise future flooding.	CCC LFRMT has had initial discussions with SLDC Planning to consider removal. CCC LFRMT to submit response to SLDC during public consultation between 8 th April 2013 and 5 th May 2013. http://www.southlakeland.gov.uk/planning/local-development-framework/land-allocation-dpd/examination-hearings-1.aspx
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Uncharted Surface Water Drain

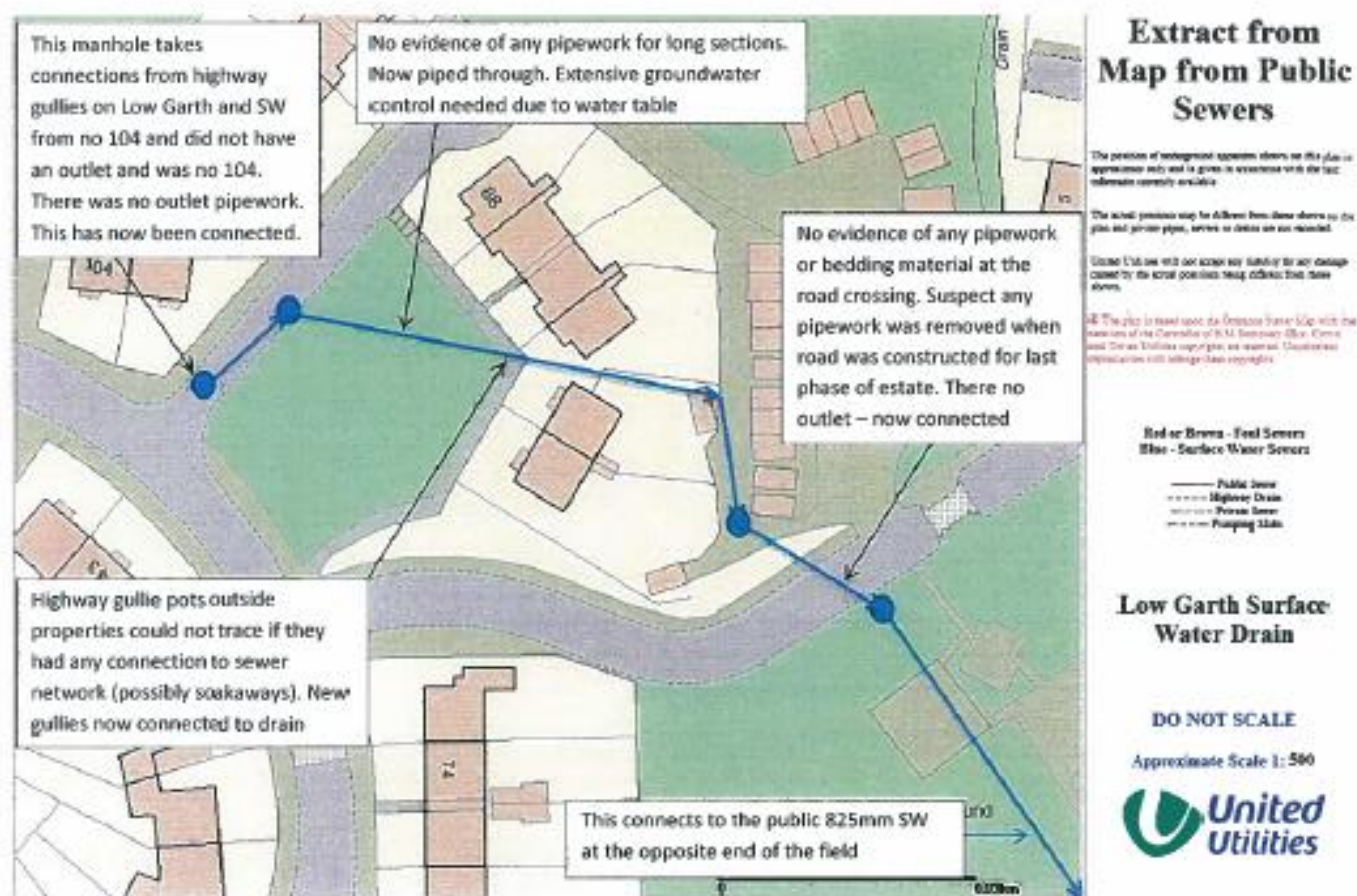


Figure 6 Action 1- Plan provided by United Utilities to show works they have carried out to reinstate surface water drain from 102/104 Low Garth

Possible Future Options

The following table details possible options that may be considered further but may ultimately not be feasible for technical or financial reasons.

	Option to be considered by	Option	Comments
1	United Utilities / CCC Highways / SLDC / South Lakes Housing	Investigation into the development of a community / wet woodland area in the location of the old garages that could be used as an escape route for surface water during a flooding event. This option would also consider the development of a flood route from the area outside 102/104 Low Garth to the watercourse. Location shown in figure 7 below	This option involves several parties and may require various funding from different sources so may take considerable time to consider.
2	United Utilities	Review of sewers and possible upsizing of sewer(s) following hydraulic modelling or possible relining to reduce infiltration.	This is likely to be a long term aim and has the potential to require significant funding.

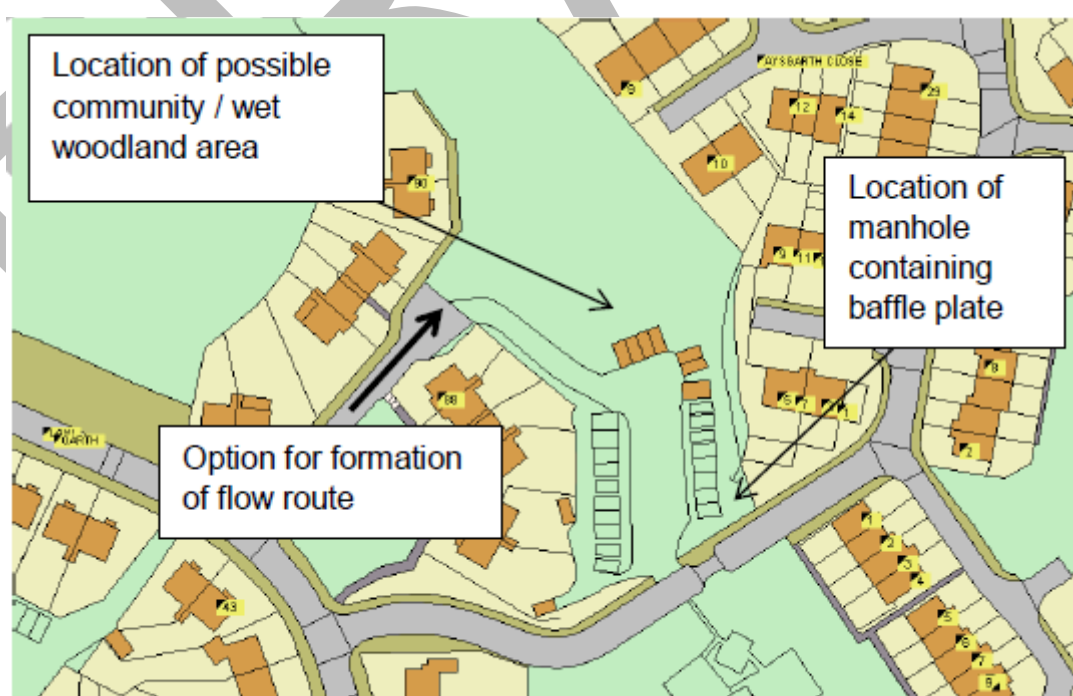


Figure 7 - Option 1 and 2 location plan

Next Steps

LFRMT 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 2.

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Appendices

Appendix 1: Glossary

Acronyms

EA	Environment Agency
CCC	Cumbria County Council
UU	United Utilities
SLDC	South Lakeland District Council
LLFA	Lead Local Flood Authority
MSfWG	Making Space for Water Group
FAG	Flood Action Group
LFRMT	Local Flood Risk Management Team
FWMA	Flood and Water Management Act 2010
LDA	Land Drainage Act 1991
WRA	Water Resources Act 1991

Appendix 2: Summary of Relevant Legislation and Flood Risk Management Authorities

The Flood Regulations 1999 and the Flood and Water Management Act 2010 (the Act) have established Cumbria County Council (CCC) as the Lead Local Flood Authority (LLFA) 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 Risk Management Authority's roles and responsibilities in relation to flood reporting and investigation.

Government – Defra develop national policies to form the basis of the Environment Agency's and Cumbria County Council'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 are the LLFA for Cumbria. Part of their role requires them to investigate significant local flooding incidents and publish the results of such investigations. LLFAs have a duty to determine which 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 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.

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Appendix 3: Useful contacts and links

Cumbria County Council (Local Flood Risk Management):

lfrm@cumbria.gov.uk, www.cumbria.gov.uk, tel: 01228 211300

Cumbria County Council (Highways):

highways@cumbria.gov.uk, www.cumbria.gov.uk, tel: 0845 609 6609

Cumbria County Council (Neighbourhood Forum):

Carol.Last@cumbria.gov.uk, www.cumbria.gov.uk, tel: 01539 713180

United Utilities: tel: 0845 746 2200

South Lakeland District Council:

info@southlakeland.gov.uk, tel: 0845 050 4434

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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