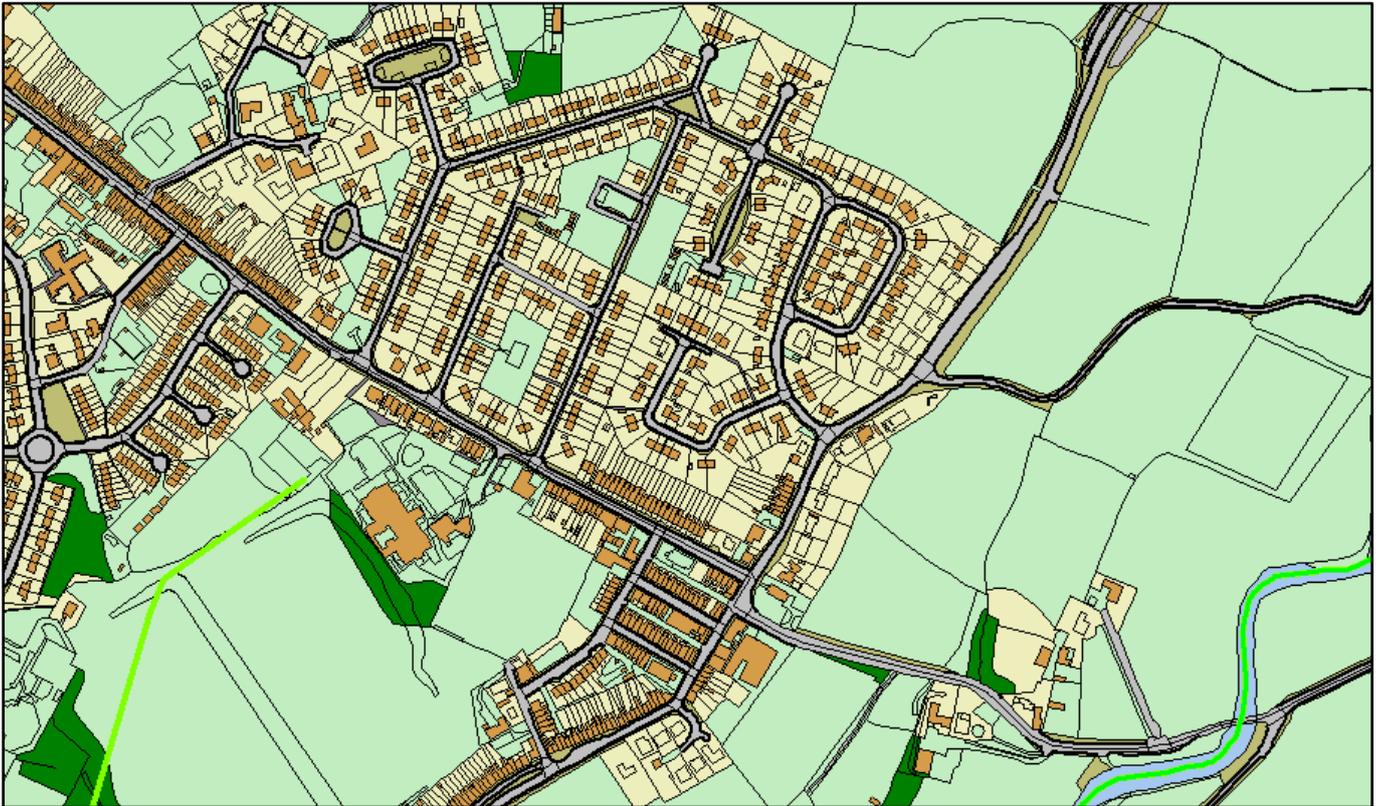


Red Beck Park

Flood Investigation Report



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
Draft	Peter Allan	Helen Renyard	Doug Coyle	August 2017

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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 as it considers necessary to do so under Section 19 of the Flood and Water Management Act 2010.

This Report examines the ground water flooding within the Red Beck Park vicinity, detailing the reported affected properties. The probable main cause of the flooding is from the sub surface groundwater infiltrating house foundations.

Five actions have been identified in the report which could reduce the risk of future flooding. The recommendations range from establishing maintenance regimes for drainage systems, installing property level protection, to longer term solutions that may require Flood Defence Grant in Aid partnership funding from Defra. Most of the actions will require a spirit of working together from the Red Beck Park community with clear guidance and support from LLFA working with Making Space for Water officers.

Cumbria County Council Local Flood Risk Management team has used information from a wide range of sources to compile this report. This includes details from individuals, other authorities, the Red Beck Park community and on-site observations. Whilst best endeavours have been made to be factual, to understand the full scope of the flooding that occurred and the mechanisms influencing it, some information has been used from secondary sources. If this has resulted in incorrect reporting, please inform the Local Flood Risk Management Team. Tel. 01228 221330.or e-mail us on LFRM@cumbria.gov.uk

Event Background

Flooding Incident

This report considers under floor void flooding to a number of properties in Cleator Moor. Cleator Moor is a small town incorporating two electoral wards (north and south). The town's skyline is dominated by Dent Fell and the town is located approximately 6.6km south-east of Whitehaven along the B5295; see *Figure 1* below. The main areas being investigated are in Red Beck Park and Frizington Road.

Sites were visited in August 2016 and again in April and May 2017 by the Flood and Development Management Team of Cumbria County Council. A letter drop took place on 19th May 2017 to appeal for any anecdotal evidence from residents in the area to ascertain a greater picture of the surface water, and ground water history within the area. Nine responses were received from the letter drop.

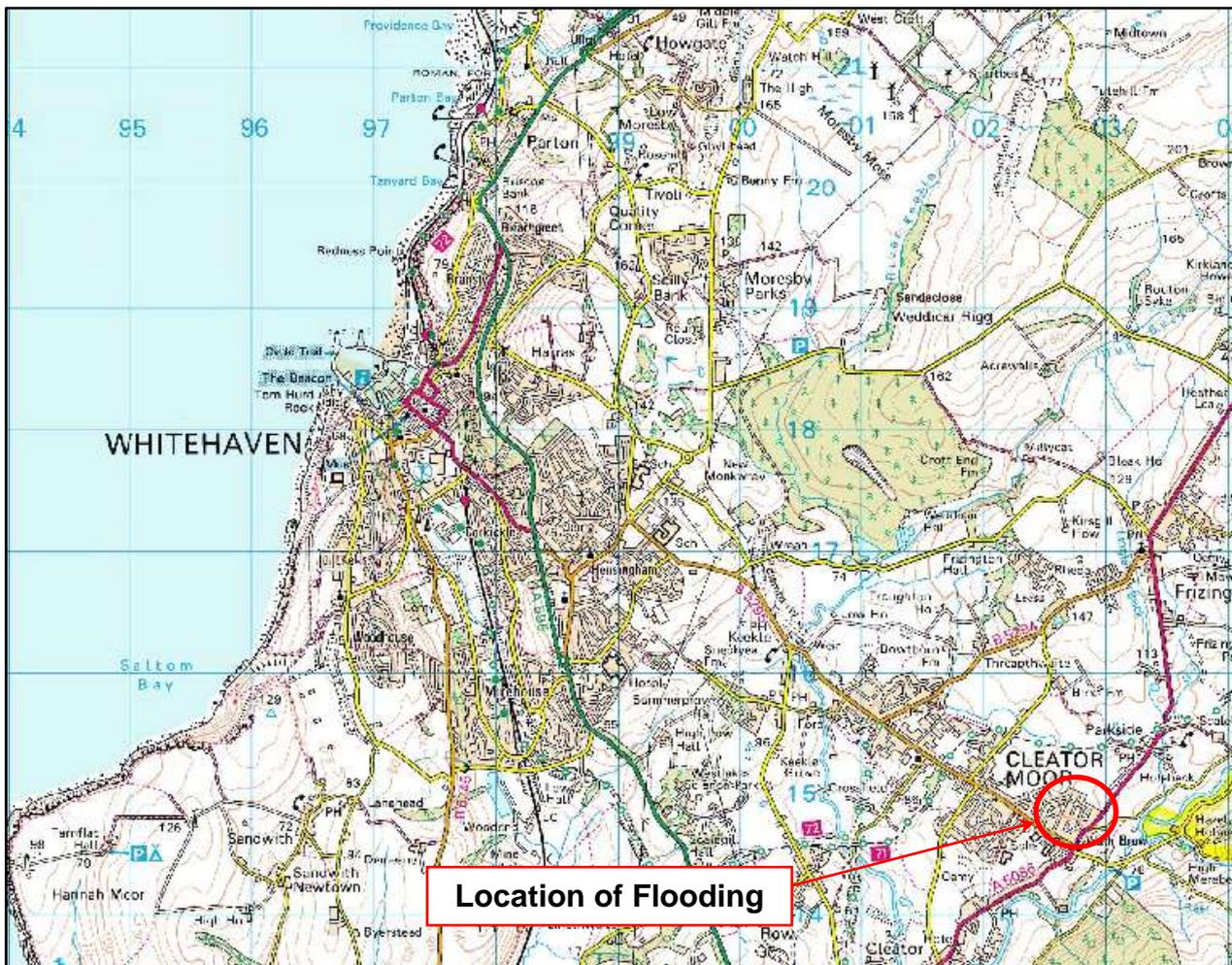


Figure 1: Location Plan.

Figure 2 indicates the area of Cleator Moor that is affected by suspected water flooding and the location of watercourses in relation to the affected area. It can be seen that the River Ehen flows in a south-westerly direction towards the Irish Sea. There are no ordinary watercourses within the area.

As no watercourse or obvious surface water flooding was reported in the vicinity of Red Beck Park it has been decided that the most likely cause of flooding is from a perched ground water table during high rainfall events.

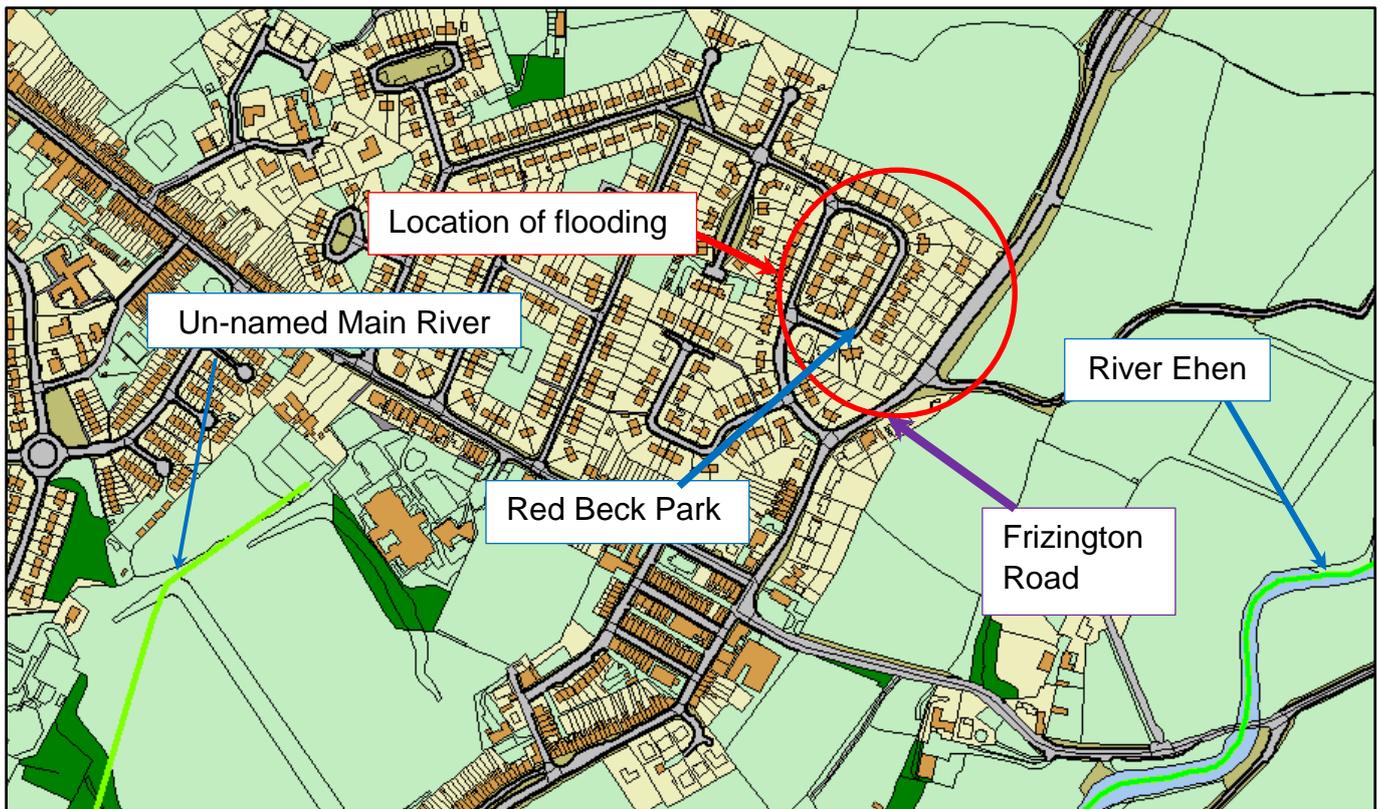


Figure 2: Cleator Moor Layout

The flooding events occur in the vicinity of Red Beck Park/Frizington Road and usually occur during heavy periods of rainfall which appear to raise the ground water table.

The following plans indicate the flood risk in the Red Beck Park / Frizington Road area for River flooding and Surface Water as indicated on the Environment Agency flood risk mapping.

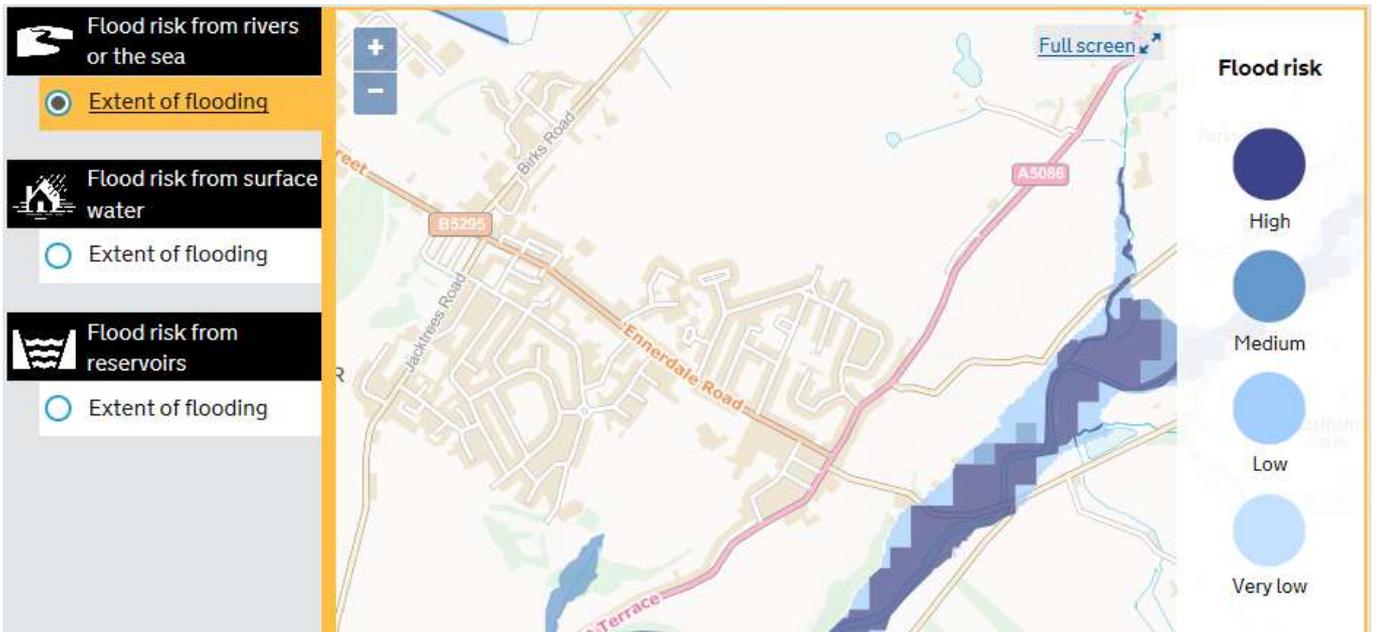


Figure 3: Flood Risk from rivers or the sea

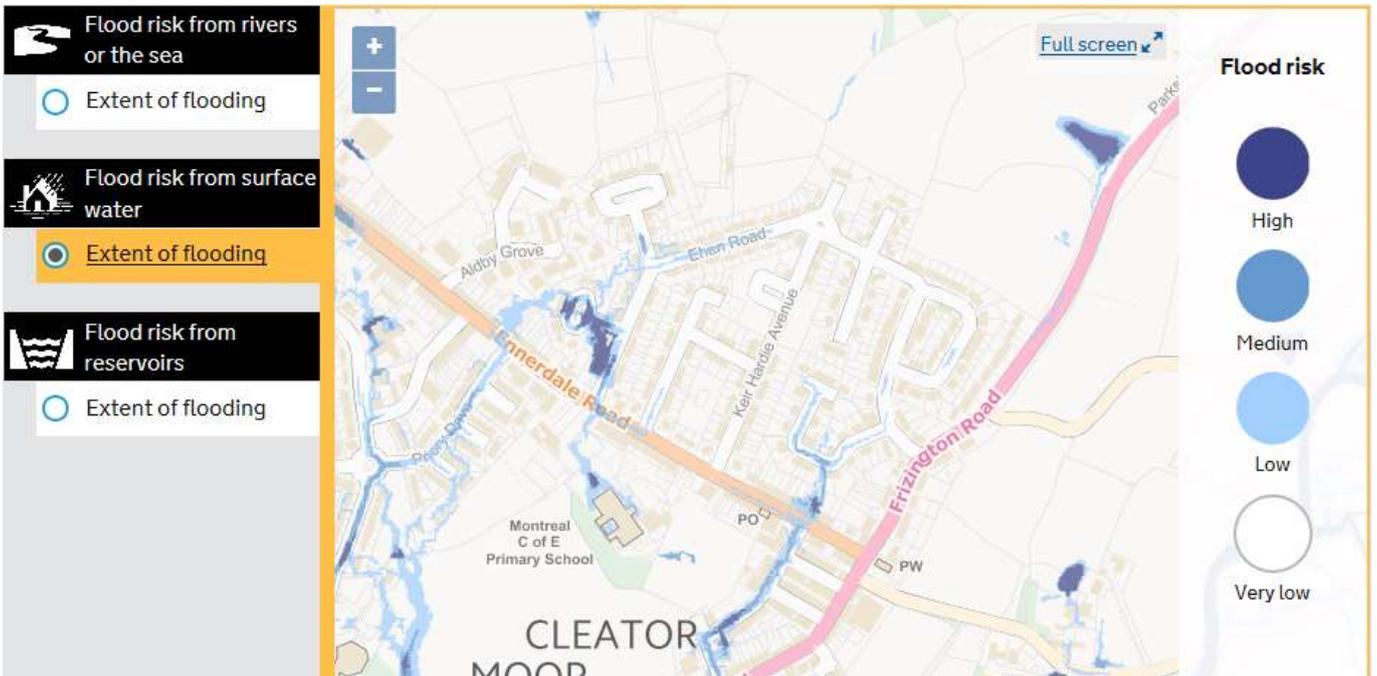


Figure 4: Flood risk from surface water

Investigation

This section provides details of an analysis of flow routes and details of likely causes of flooding. Also included are details of the a large rainfall event in 2016 and any previous flooding history in the area.

Rainfall Event

On 22nd August 2016 there was an event that resulted in perched ground water / surface water entering the sub floor of a number of dwellings at Red Beck Park / Frizington Road. The graph in figure 5 illustrates the extent of this rainfall.

Prior to the ground water flooding which occurred at Red Beck Park on 22nd August 2016, a heavy rainfall event took place on 20th August 2016 where 45mm of rainfall fell between 04:00am and 21:15pm. This is likely to have saturated soils and increased the height of the water table in the area.

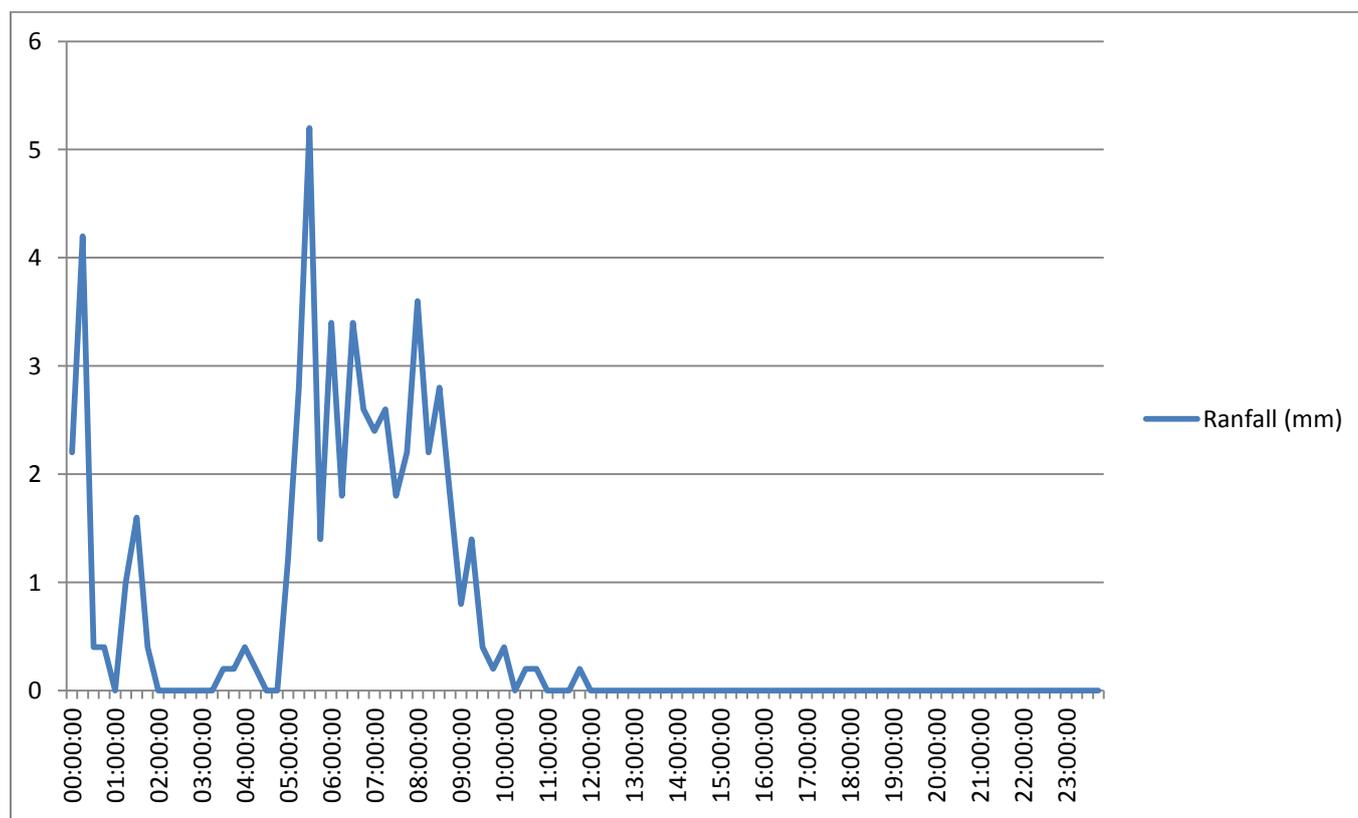


Figure 5: Rainfall Data from 22 August 2016

Environment Agency data showed that for the 22 August 2016 57mm of precipitation fell. The highest hourly recorded rainfall rate was between 05:00am and 06:00am at 14mm. The peak of this event was at 05:15am where 5.2mm of rainfall fell in 15 minutes.

To place these figures into perspective, the average total rainfall for the whole of August was 92mm (based on 1981-2010 dataset) at St Bees Head which is the closest rainfall monitoring station.

Likely Causes of Flooding

The extreme rainfall event of 22nd August 2016 caused approximately 10 properties within the Red Beck Park / Frizington Road vicinity to experience flooding beneath their floor boards. There were no obvious signs of surface water flooding on to the site from surrounding ground and no watercourses are known to have burst their banks and caused flooding.

A desktop study carried out by the Lead Local Flood Authority indicated that the residential properties are located within an area where there are poor soils which are known to be slowly permeable and seasonally wet clay soils with impeded drainage. This creates a situation during a heavy rainfall event where any surface water falling within the area is unable to drain away through the soil structure and is retained near the surface of the soils. This can create a situation where water is at a higher risk of percolating into floor voids and other areas. Once located in these areas due to the poor percolation rates the water tends to remain trapped.

This situation with a perched water table can sometimes be identified by water sitting on ground surfaces or appearing to run from the ground during heavy rainfall events as shown in the following photographs:





Photographs 1, 2 & 3: Examples of ground water flowing above the ground surface in the Rad Beck Park / Frizington Road area.

A perched water table is generally defined as a reservoir of water within the ground maintained temporarily or permanently above the standing water level within the ground below it and is usually caused by the presence of a stratum which is of low permeability or is impervious. It is understood from the desktop study that this is likely to be the case in this area.

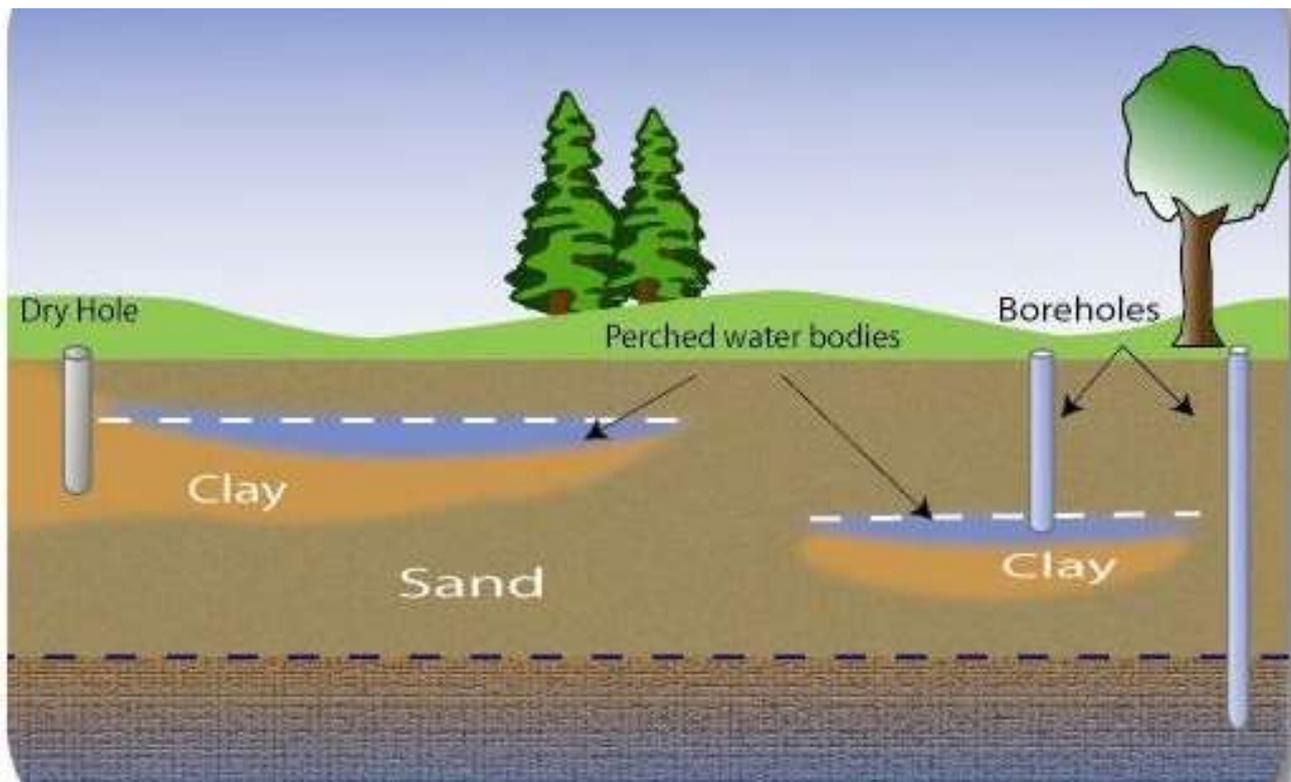


Figure 5: Diagram indicating perched water bodies

As detailed earlier in the report it is considered from information from various websites including Soilscales, Geoindex Onshore and UK Sustainable Drainage that the soils in the area around Red Park Close and Frizington are of a poor permeable nature. It is therefore considered that the cause of the standing water below the floorboards in these properties is due to a perched water table which is usually more visible during periods of heavy rainfall.

Flooding History

Anecdotal evidence secured as part of this investigation indicates that as many as 10 properties within the Red Beck Park / Frizington Road vicinity have suffered from rising damp over the past 15 / 20 years. None of these properties have experienced surface water flooding but periodically the sub floor void becomes saturated and fills with water during heavy rainfall events.

Flooding in other areas of Cleator Moor

Other flooding known to occur within Cleator Moor is external flooding to properties on William Morris Avenue, Orchard Place, Aldby Place and Hopedene in October 2012. All the properties investigated after reporting flooding were found not to have suffered any internal flooding as a result of the rainfall event across 17th and 18th October 2012.

It became apparent that the properties on William Morris Avenue, Orchard Place and Aldby Place had suffered some degree of external flooding. There was no immediate evidence for the reasons for this however it is concluded that these localised issues were caused by exceedance of infrastructure coupled with some general defects within the property boundary and high groundwater conditions limiting natural infiltration.

The problems experienced at Hopedene were similar to those described above. However there are a number of other contributory factors worthy of a separate note. The properties adjacent to a reasonable sized impermeable area consisting of adopted highway and hardstanding. Anecdotal evidence suggests that flows from this hardstanding area contributed to the surface water draining towards the properties in Hopedene.

Recommended Actions

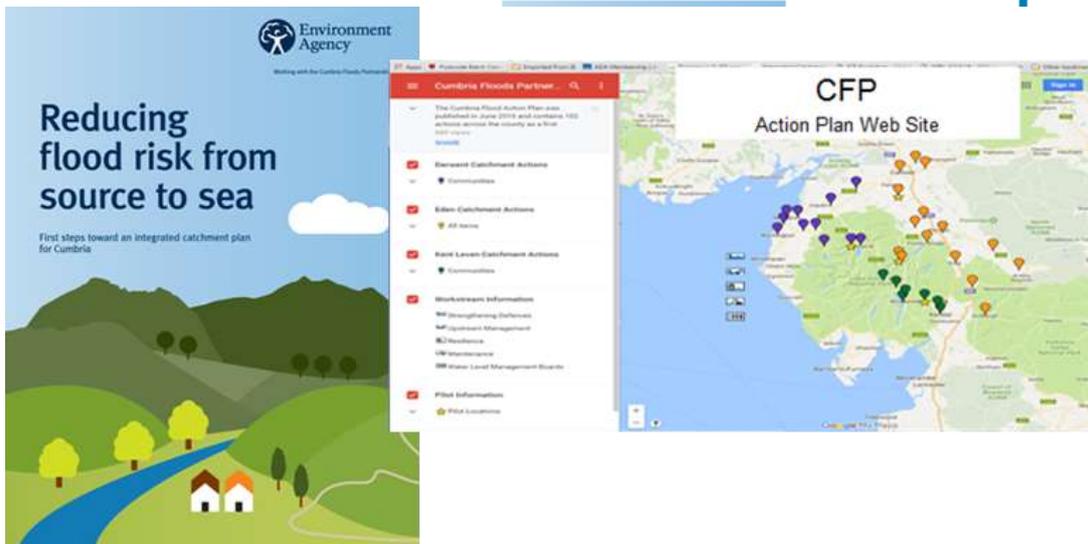
Cumbria Flood Partnership Theme	Action by	Recommended Action	Timescale
Maintenance	LLFA / Highways	Ongoing annual cleaning of gullies etc. Including tracing highway pipework in the area	Ongoing cleaning and CCTV Autumn 2017
Community Resilience	LLFA	Trace all Watercourses leading to tributary of river Ehen next to primary school	CCTV Autumn 2017
Community Resilience	Residents	Take action for flood protection to property	As and when resident thinks it is appropriate
Upstream Management	Copeland Catchment Management Group	Investigate options for reducing ground water flows from fields to the north east with runoff attenuation features, such as cut-off ditches, bunds and upland storage ponds.	Winter 2017

Next Steps – Community & Catchment Action Plan

The Cumbria Floods Partnership has brought together a wide range of community representatives and stakeholders from a variety of sectors to plan and take action to reduce flood risk. The Cumbria Floods Partnership, led by the Environment Agency, is producing a 25 year flood action plan for the Cumbrian catchments worst affected by the December 2015 flooding, including Carlisle. The plan will consider options to reduce flood risk across the whole length of a river catchment including upstream land management, strengthening flood defences, reviewing maintenance of banks and channels, considering water level management boards and increasing property resilience. The Cumbria Floods Partnership structure below details how these 5 themes are being delivered in the Flood Action plans which will be completed in July.

The diagrams below helps demonstrate how the two partnerships have now come together:

Cumbria Flood Partnership



NEW Cumbria Strategic Flood Partnership



Defra 25 Year Environment Plan Cumbria Flood Action Plan Local Flood Risk Management Strategy

<p>2016 – Cumbria Pioneer</p> <p>DEFRA 25 Year Environment Plan and vision New and innovative ways of working Making best use of resources Working at Catchment scale through engagement and commitment Place based decision making within DEFRA vision Lead – Jez Westgarth, Environment Agency</p>	<p>January 2016 - Cumbria Flood Partnership</p> <p>Created following December 2015 floods Local knowledge and expertise Integrated catchment management Community focus 25 year Cumbria Flood Action Plan Lead– Rory Stewart MP, Environment Agency and 3 Catchment Directors</p>	<p>2013 – LLFA Cumbria Strategic Partnership</p> <p>Flood and Water Management Act (2010) Professional partnership providing strategic leadership for flood risk management Reporting to RFCC Coordination and cooperation between Risk Management Authorities (RMA's) Lead – CCC as LLFA</p>
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Communities



Communities working together across Cumbria

Appendices

Appendix 1: Glossary

Acronyms

EA	Environment Agency
CCC	Cumbria County Council
UU	United Utilities
LLFA	Lead Local Flood Authority
LFRM	Local Flood Risk Management
MSfWG	Making Space for Water Group
FAG	Flood Action Group
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 Risk 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—
- which risk management authorities have relevant flood risk management functions, and
 - 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—
- publish the results of its investigation, and
 - notify any relevant risk management authorities.

A 'Risk Management Authority' (RMA) means:

- the Environment Agency,
- a lead local flood authority,
- a district council for an area for which there is no unitary authority,
- an internal drainage board,
- a water company, and
- 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 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 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 3: Known drainage details in the area

UU Maps for Safe Dig



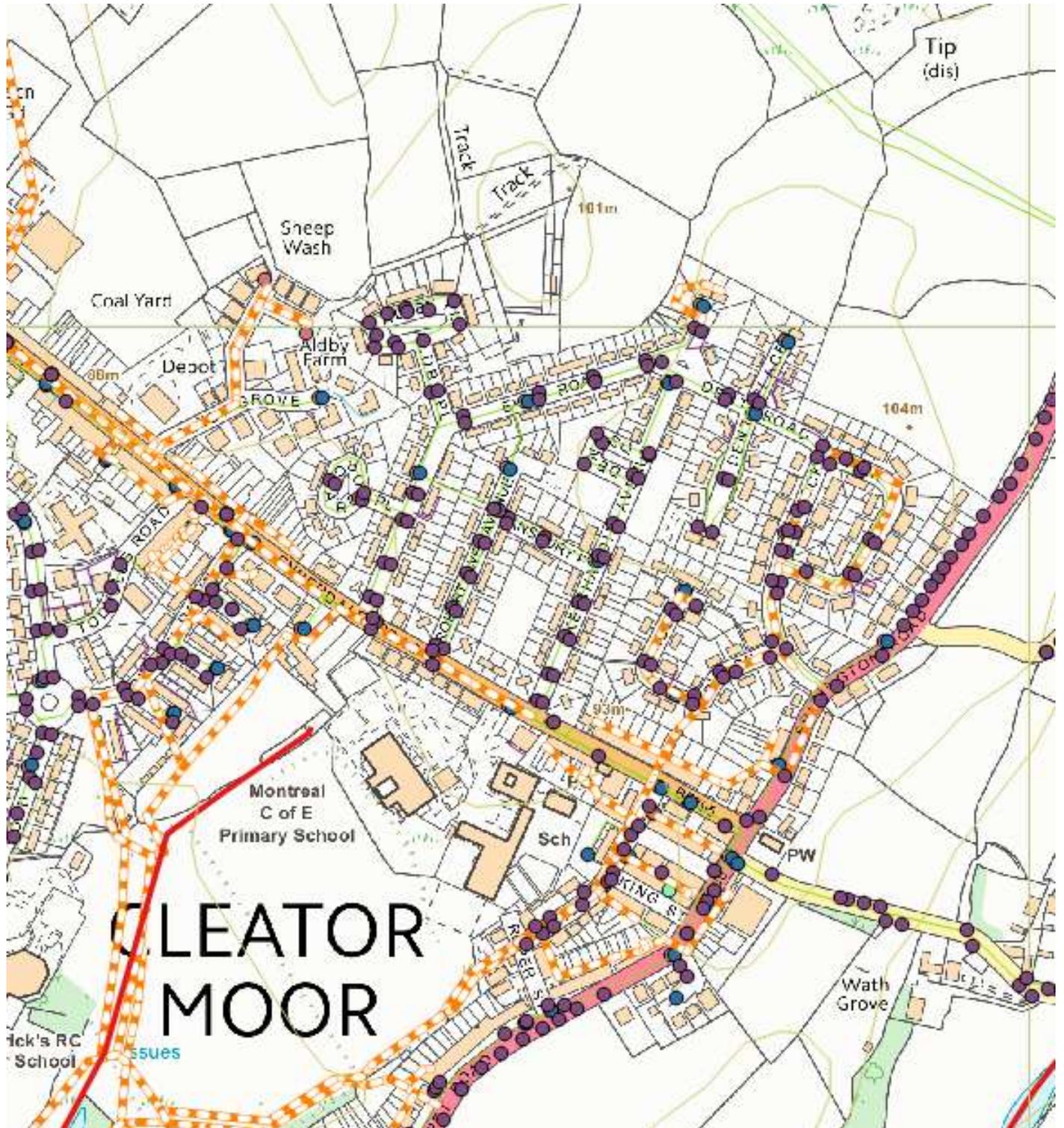
Extract from maps of United Utilities' Underground Assets

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 service pipes may be shown by a blue broken line. United Utilities Water will not accept liability for any damage caused by the actual position being different from those shown.

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- HighwayGullyCombined
- ▬ United Utilities Sewers any
- United Utilities FireHydrants any



Appendix 4: Feedback from the letter drop

A letter drop took place on 19th May 2017 to appeal for any anecdotal evidence from residents within the Red Beck Park vicinity to ascertain a greater picture of the surface water, and ground water history within the area. Nine responses were received from the letter drop.

The general consensus from the Red Beck Park community is that ground water flooding is a common event within the vicinity of the development since construction. No internal flooding has occurred within any dwellings that Cumbria County Council were made aware of, flooding above floor board level; however in the void beneath the floor boards ground water flooding is common place. This flooding has caused extensive damp issues for a number of properties and also manifests itself in surface water flooding within gardens and around properties in the southern part of Red Beck Park.

It was also established that multiple properties within Red Beck Park have undertaken their own property level protection measures to protect their dwellings from groundwater flooding. Measures that have been taken include the concreting of floors and the installation of pumps within the voids between floor boards and the ground to remove any flooding that may occur. The installation of concrete floors has fully protected the dwellings from future groundwater flooding and helped to ease damp issue. However properties which have installed pumps have not been as successful and have not eased groundwater flooding issues, and in some instances, have resulted in stagnant water beneath floor boards.

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

Out of hours emergencies should be reported via the Police on 101

United Utilities: www.unitedutilities.com, tel: 0845 746 2200

Eden District Council

Customer.services@eden.gov.uk, www.eden.gov.uk, tel: 01768 817817

Copeland Borough Council

info@copeland.gov.uk, www.copeland.gov.uk, , tel: 01946 598300

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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