

Millom and Haverigg

Flood Investigation Report



30th September 2017

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	Helen Renyard / Gavin Murray	Making Space for Water Group	Doug Coyle	January 2018
Final	Helen Renyard / Gavin Murray	Making Space for Water Group	Doug Coyle	June 2018

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.

Millom and Haverigg are situated on the west Cumbrian coastline in the south of the county with Duddon estuary directly to the east. Many watercourses discharge into the estuary with Duddon River as the primary source.

On 30th September 2017 an intense rainfall event occurred over Millom and Haverigg. The rain soon overwhelmed the drainage systems and surface water began to rise, flooding an estimated 255 residential properties including commercial.

As part of the investigations the LLFA has gathered information from affected residents by means of site visits and a flood forum where members of the public provided information. Many surveys of various assets in the area have been carried out including highway drainage systems, public sewers including pumping stations and the performance of associated watercourses.

From the information gathered it was identified that the cause of the flooding was due to the intense rainfall event overwhelming the drainage assets, however, in some locations it may have been compounded by faults on some of the drainage systems. Work has already begun to repair identified faults.

The report also identifies recommended actions to reduce the risk of flooding for the future. These actions are categorised as Community Resilience, Upstream Management, Maintenance and Strengthening Defences.

Contents

Executive Summary	3
Introduction	5
Scope of this Report	5
Event Background	6
Flooding Incident	6
Number of properties affected in Millom	7
Number of properties affected in Haverigg.....	8
Investigation	9
Existing Flood Mapping	9
Rainfall Event.....	13
Tides	19
Asset Performance for Millom and Haverigg	20
King Street Pumping Station - Millom	22
Highway drainage and Cumbria County Council Assets	24
Millom – Flood Affected Areas	25
Haverigg – Flood Affected Areas	38
Likely Causes of Flooding.....	41
Flooding History	42
Recommended Actions	44
Next Steps – Community & Catchment Action Plan	47
Appendices	49
Appendix 1: Glossary.....	50
Appendix 2: Summary of Relevant Legislation and Flood Risk Management Authorities	51
Appendix 3: UU Historic Works/Routine Maintenance/ Pumping Station Operation.....	53
Desilting Programme.....	56
Pumping Stations and Treatment works	56
King Street Pumping Station Operation During Event	58
Appendix 4: LLFA Investigations	63
Crook Pool watercourse assessment	63
Damaged Highway Drainage Assets	69
Programme of Gully Emptying for Copeland	71
Surveyed Highway Drainage Assets, including piped watercourses	72
Appendix 5: Environment Agency.....	73
Appendix 6: Network Rail	76
Appendix 7: Feedback from Residents and draft report	77
Appendix 8: Useful contacts and links.....	79

Introduction

Under Section 19 of the Flood and Water Management Act (2010) Cumbria County Council, as Lead Local Flood Authority (LLFA), has a statutory duty to produce Flood Investigation Reports for areas affected by flooding. Section 19 of the Flood and Water Management Act states:

- (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.*

This section of the Act leaves the determination of the extent of flood investigation to the LLFA. It is not practical or realistic for Cumbria County Council to carry out a detailed investigation into every flood incident that occurs in the County, but every incident, together with basic details will be recorded by the LLFA.

Only those with 5 or more properties/businesses involved will have investigations published. An investigation will be carried out, and a report prepared and published by the LLFA when the flooding impacts meet the following criteria:

- where there is ambiguity surrounding the source or responsibility of flood incident,
- internal flooding of one property that has been experienced on more than one occasion,
- internal flooding of five properties has been experienced during one single flood incident and
- there is a risk to life as a result of flooding.

Scope of this Report

This Flood Investigation Report **is**:

- an investigation on the what, when, why, and how the flooding took place resulting from the 30th September 2017 flooding event and
- a means of identifying potential recommendations for actions to minimise the risk or impact of future flooding.

This Flood Investigation Report **does not**:

- interpret observations and measurements resulting from this flooding event. Interpretation will be undertaken as part of the subsequent appraisals,
- provide a complete description of what happens next.

The Flood Investigation Report outlines recommendations and actions that various organisations and authorities can do to minimise flood risk in affected areas. Once agreed, the reports can be used by communities and agencies as the basis for developing future plans to help make areas more resilient to flooding in the future.

For further information on the S19 process, including a timetable of Flood Forum events and associated documentation, please visit the County Council website at:

<http://www.cumbria.gov.uk/planning-environment/flooding/default.asp>

To provide feedback on the report please email LFRM@cumbria.gov.uk.

Event Background

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

Flooding Incident

Millom and Haverigg are located approximately 7 miles north of Barrow-in-Furness in the southwest part of Cumbria as indicated in **figure 1**.

The parish of Millom currently has a population of approximately 7800 people which is divided over three district council wards: Holborn Hill, Newton and Haverigg and two county divisional wards, Millom and Millom Without.

Millom is a town which is located on the north shore of the Duddon Estuary and began as a new town in the 1860s incorporating the existing Holborn Hill area. Holborn Hill originated as an important place for travellers crossing the Duddon Estuary to access the west Cumbrian coast with the railway station being opened in 1850.

Millom developed to support the local mining and ironworks in the area. However, these works were closed at the end of the 1960s but the infrastructure constructed to accommodate these works, such as the culverts remain and carry watercourses to this day.

Haverigg village is located along the Cumbrian coast southwest of Millom town. Areas of Haverigg were used during the Second World War as an airfield which later became the site of HM Prison Haverigg.

During 30th September 2017 Millom and Haverigg were affected by a band of torrential rainfall that overwhelmed drainage systems in the area of both Millom and Haverigg. There were no weather warnings in force at the time of the event.

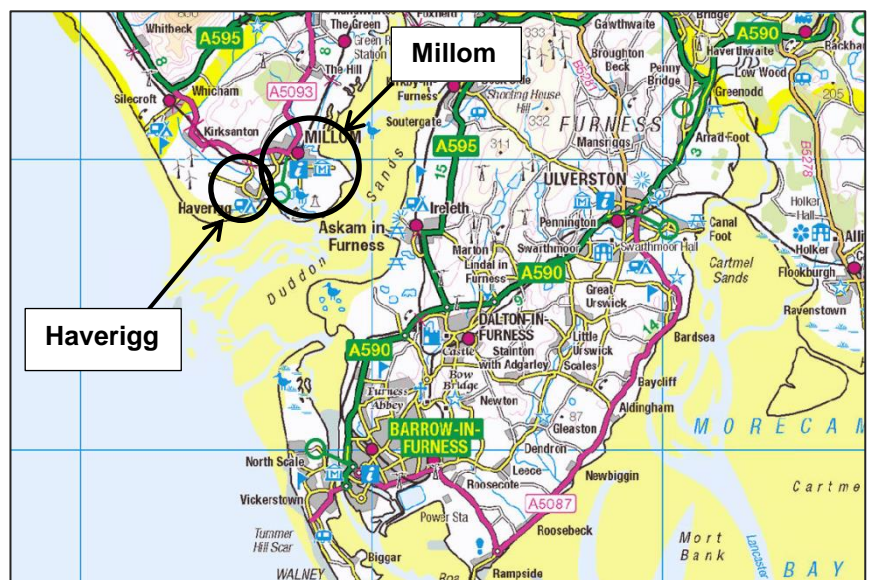


Figure 1: Location Plan

Street Name	External flooding	Internal flooding	Total
Albert Street	2	27	29
Bowness Road	5	9	14
Crown Street	1		1
Cumberland Close	6	1	7
Derwentwater Close	2	2	4
Devonshire Road	1		1
Egremont Street		2	2
Earl Street		1	1
Finch Street		5	5
Haverigg Road		3	3
Holborn Hill		8	8
Kingsland Road		1	1
King St Garage		1	1
Lapstone Road		3	3
Lonsdale Road	3	6	9
Lowther Road	7	2	9
Mainsgate Road	3	14	17
Market Street	4	36	40
Moor Park	8	2	10
Moor Road	6	1	7
Palmers Lane	1		1
Nelson Street	1	5	6
Newton Street	4	4	8
Old Hope Street	1		1
Oxford Street	1	11	12
Palmers Lane	1	1	2
Pannatt Hill	1	2	3
Richmond Street	2	1	3
Rottington Cottages		4	4
Salthouse Road		1	1
Settle Street		3	3
St Georges Road		1	1
Surrey Street	1	17	18
Victoria Street	1	1	2
Wasdale Road	15	1	16
Wellington St		1	1
Windermere Gardens	1		1
Grand Total	78	177	255

Number of properties affected in Millom

A total of 255 properties were affected by the flooding in Millom.

243 of these were residential and 12 were commercial properties.

176 experienced internal flooding and a further 79 experienced flooding to their gardens/external sheds/out buildings.

This list details the number of properties per street.

Table 1: Numbers of residential property flooding listed by street in Millom

Number of properties affected in Haverigg

Street name	External flooding	Internal flooding	Total
Bank End	-	2	2
Green Street	1	1	2
Castle Terrace	1	-	1
Moor Moss	-	1	1
Floyd Street	2	-	2
St Lukes Road	1	-	1
Wilson Avenue	1	-	1
Whiteriggs Close	2		2
Grand Total	8	4	12

In Haverigg 12 residential properties were affected by the flooding with 4 experiencing internal flooding and a further 8 experiencing external flooding.

In addition to this 7 commercial properties were affected by the flooding.

Table 2: Numbers of property flooding listed by street in Haverigg

Investigation

This section provides details of the authorities who have contributed to this investigation, details of the rainfall event, likely causes of flooding and any previous flood history of the area.

Information has been received from the United Utilities, Copeland Borough Council, Environment Agency and the Highway Authority in order to assist with the compilation of this report. In addition to this information provided by many of the residents at the first flood forum has also been summarised within the report.

Existing Flood Mapping

The following information demonstrates the areas considered to be at risk from flooding based on the flood risk maps produced by the Environment Agency. These maps are available to the public and can be viewed via <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>.

The following plan indicates the areas at risk of flooding from rivers or the sea. It can be seen that the north-eastern side of Millom, including Huddleston Road and Millom Road have a low risk of flooding from river or the sea.

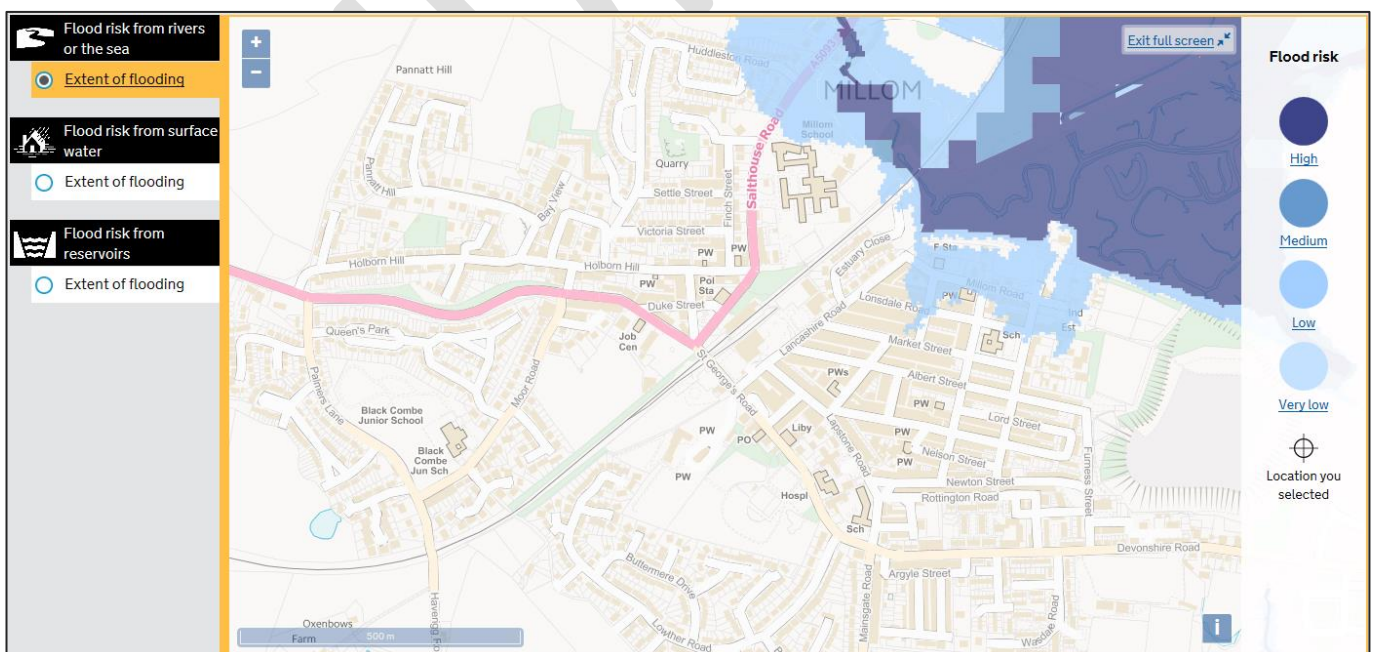


Figure 2: Plan indicating flood risk from rivers and sea for Millom

The following plan indicates the areas at risk of flooding from rivers or the sea for Haverigg and it can be seen that there are various areas within Haverigg that are at risk from rivers or the sea.

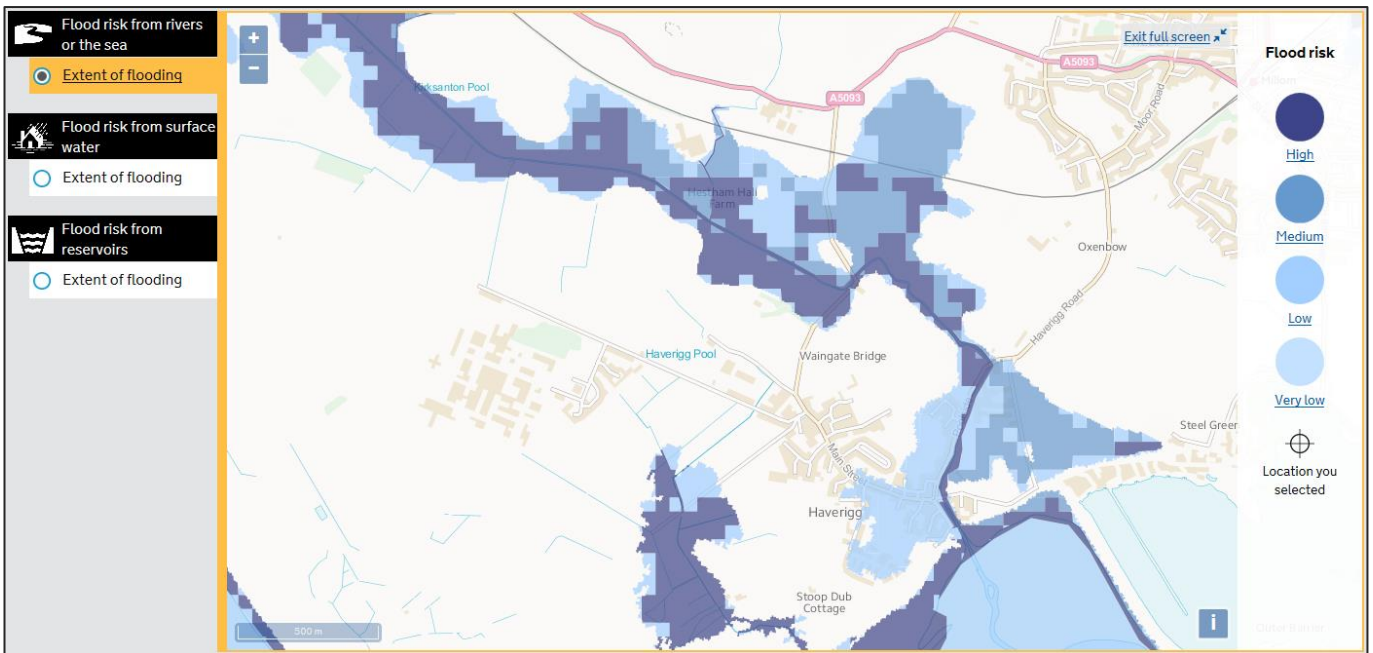


Figure 3: Plan indicating flood risk from rivers and sea for Haverigg

The Environment Agency also provide plans for surface water flooding and it is these that demonstrate the most significant flood risk for the majority of properties in Millom and Haverigg. Not all areas of Millom and Haverigg are covered by the following plans but the main areas that were affected by the flooding in September are.

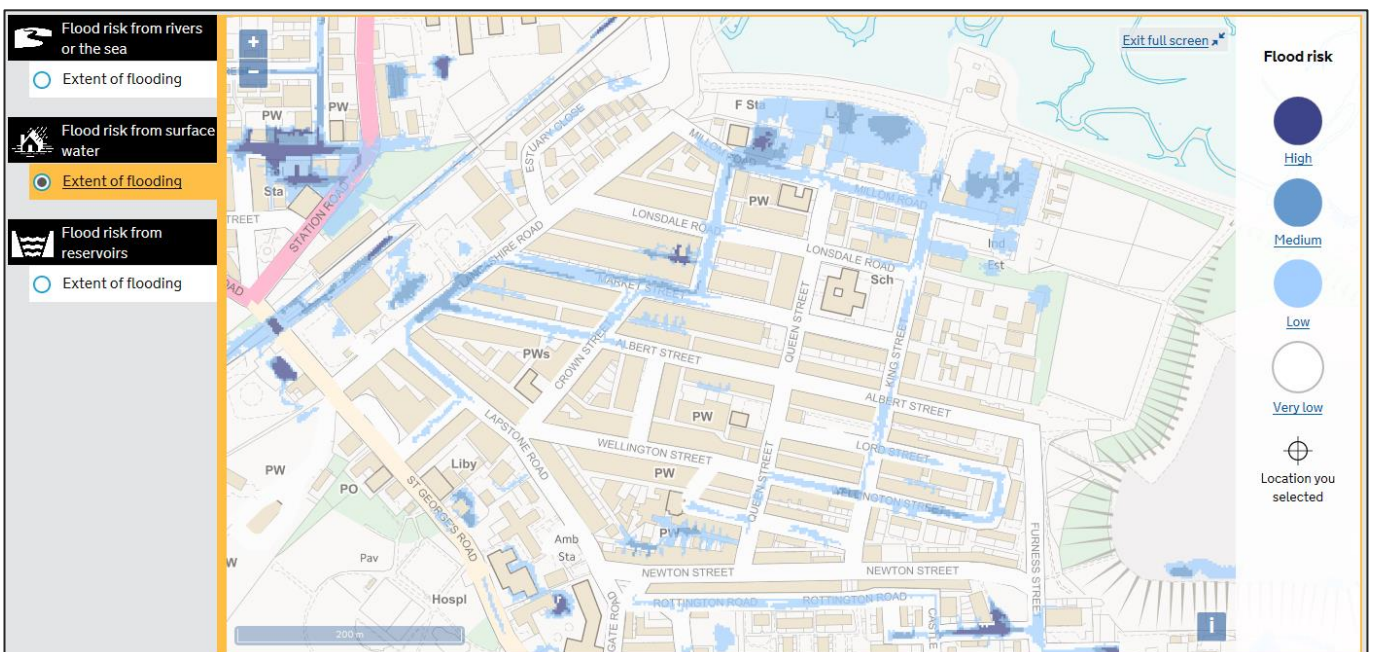


Figure 4: Plan indicating flood risk from surface water for North Millom (Millom Road / Albert Street etc.)

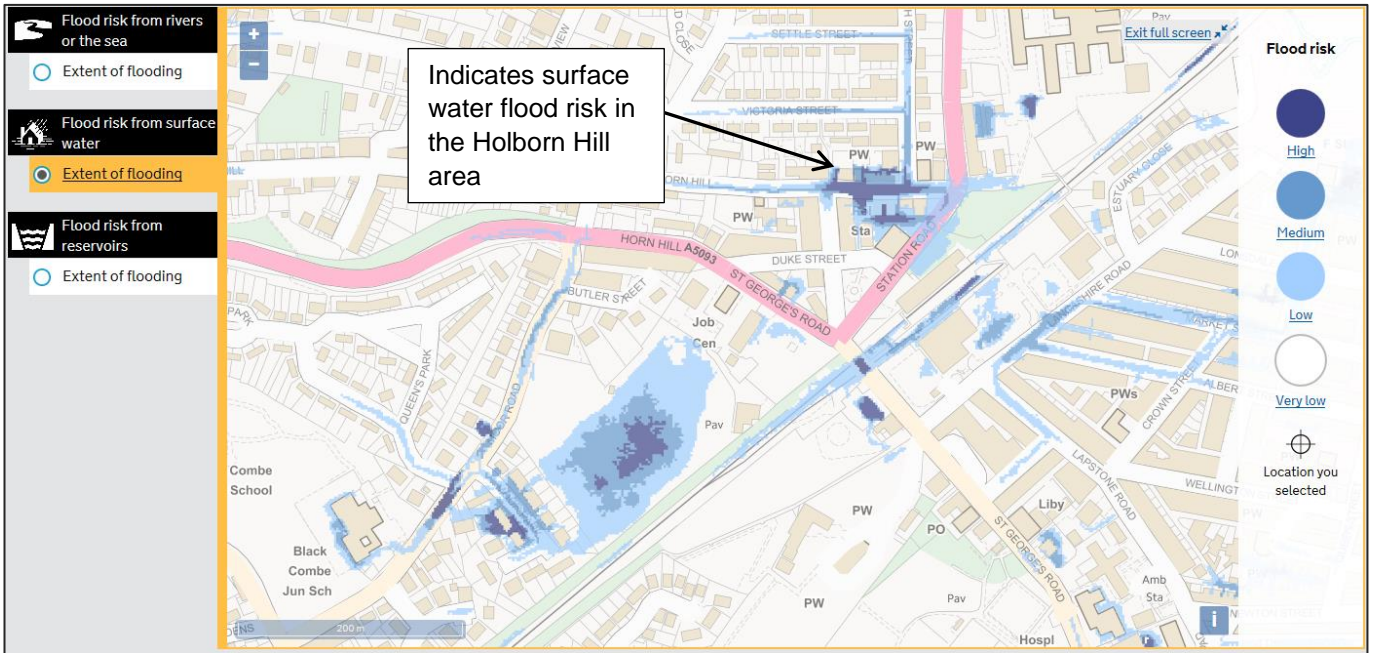


Figure 5: Plan indicating flood risk from surface water for North Millom (Holborn Hill etc.)

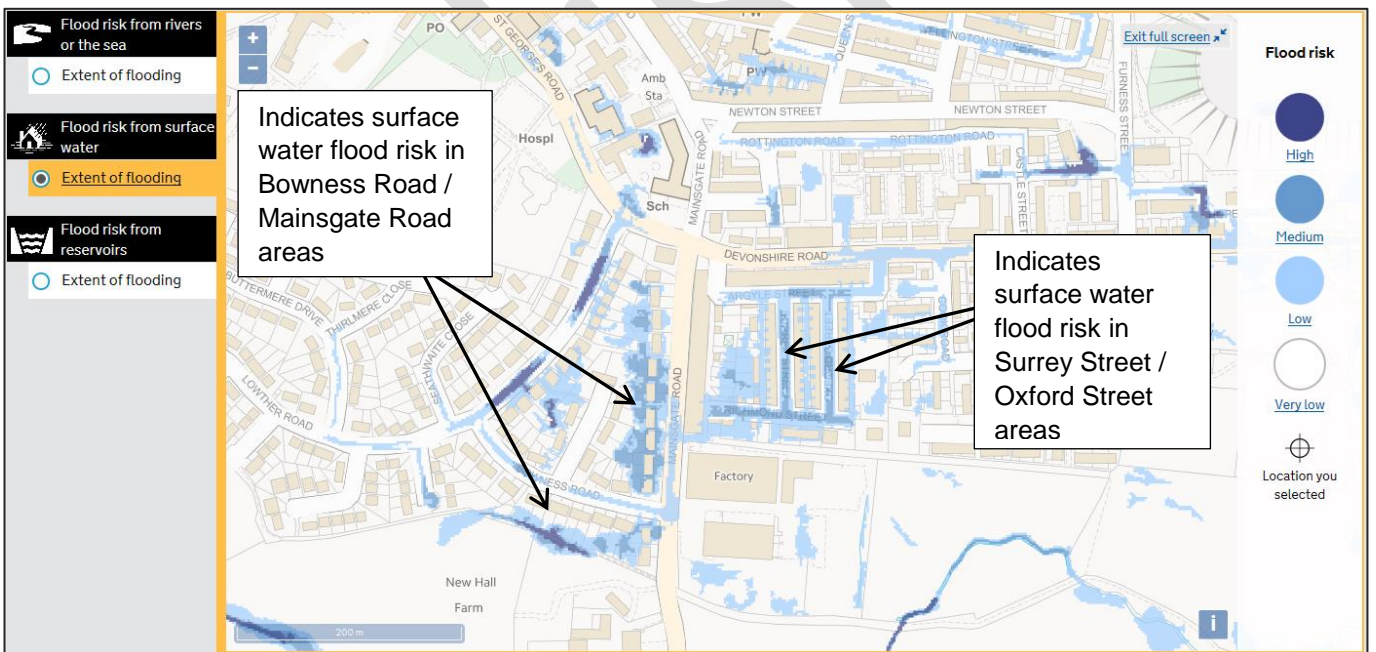


Figure 6: Plan indicating flood risk from surface water for North Millom (Mainsgate Road / Richmond Street etc.)

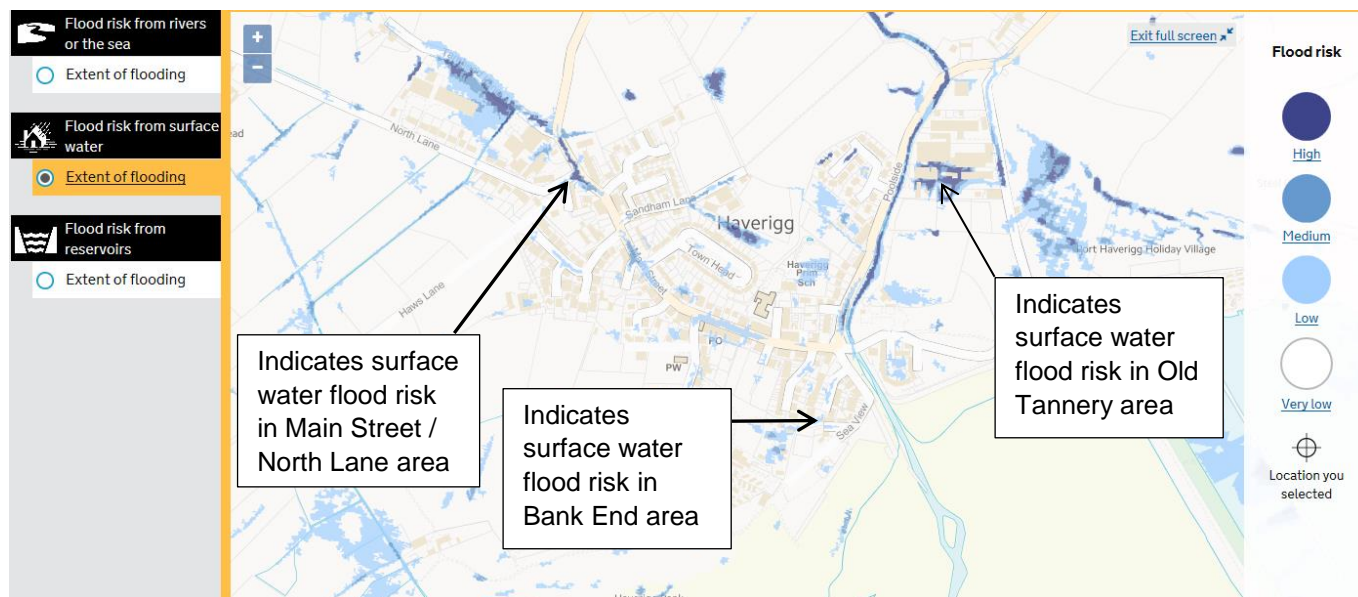


Figure 7: Plan indicating flood risk from surface water for Haverigg

The following four diagrams indicate the 6hr precipitation rates and it can be seen than the rainfall volumes during the 06:00 to 12:00 period was high as indicated by the red colouring.

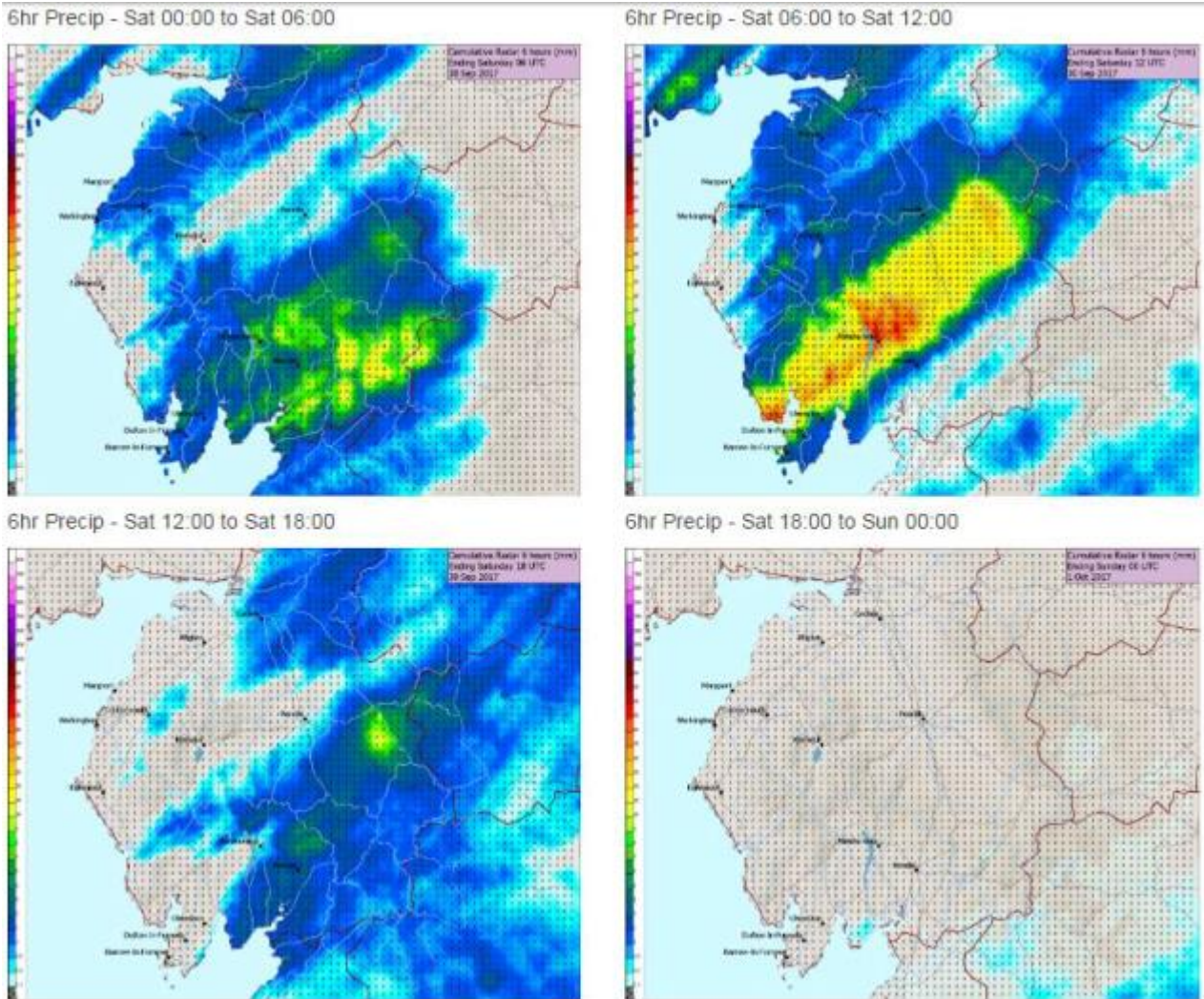


Figure 9a: 6hr precipitation totals

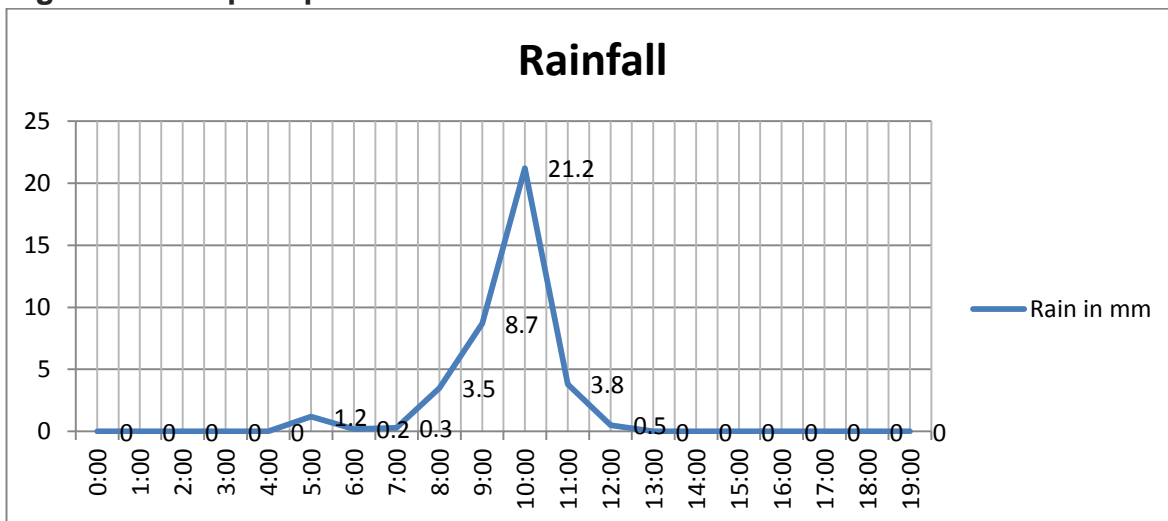


Figure 9b: Rainfall over 9hrs

The following information in figure 10 is also provided to give an indication of the intensity of the rainfall during the 30th September 2017 event in comparison to the daily rainfall average.

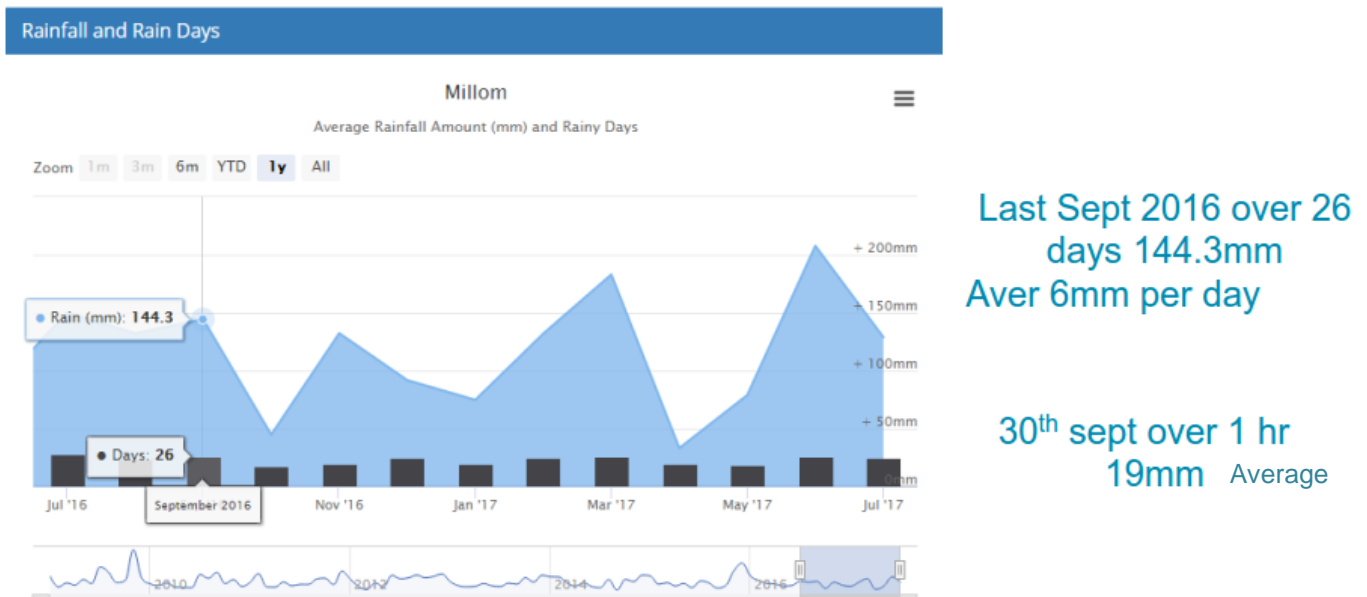


Figure 10: Comparison of average daily rainfall in September 2016 and hourly rate on 30th September 2017 (Web site for data)

<https://www.worldweatheronline.com/millom-weather-averages/cumbria/gb.aspx>

Again the following information provides an indication of the average daily rainfall for December 2015 when Storm Desmond occurred.

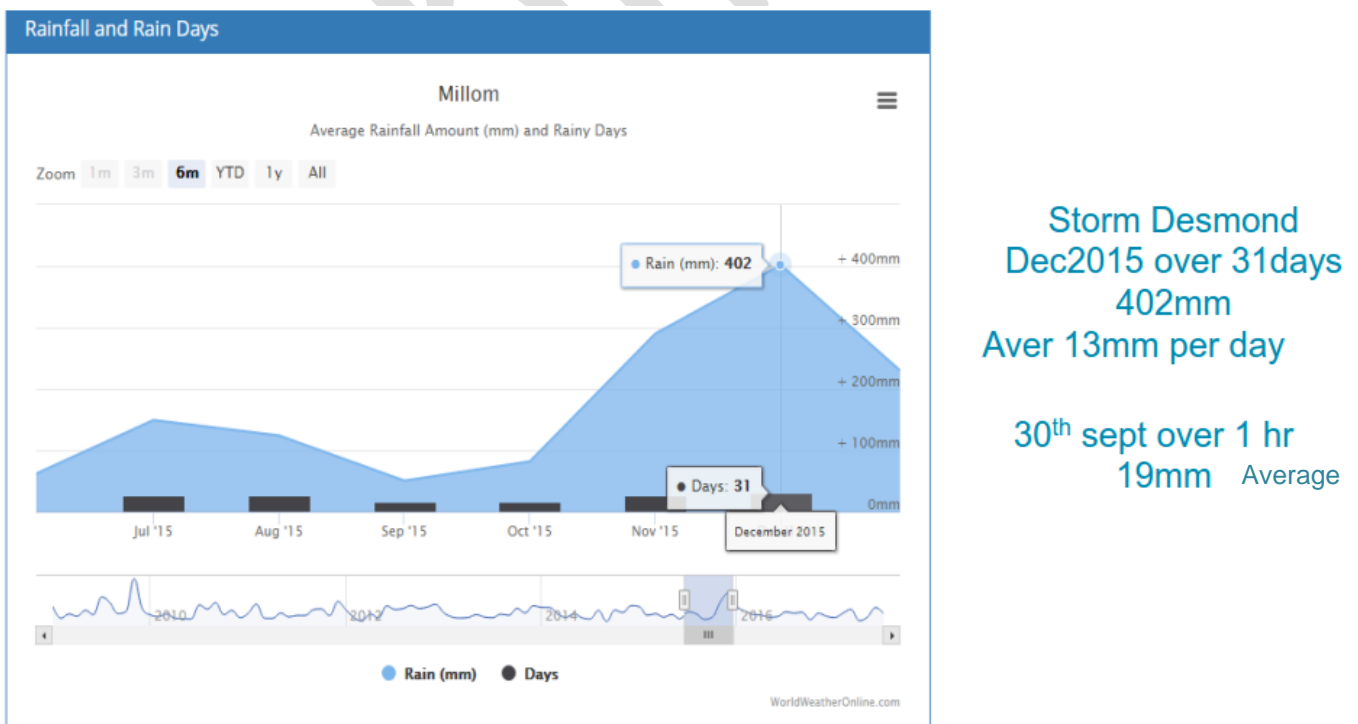


Figure 11: Comparison of average daily rainfall in December 2015 and hourly rate on 30th September 2017

The following information has also been obtained from the MetDesk’s Radar Analysis Tool which is available to Cumbria County Council and indicates that on Mainsgate Road the hourly rainfall total at 10am on 30th September 2017 was 21mm.

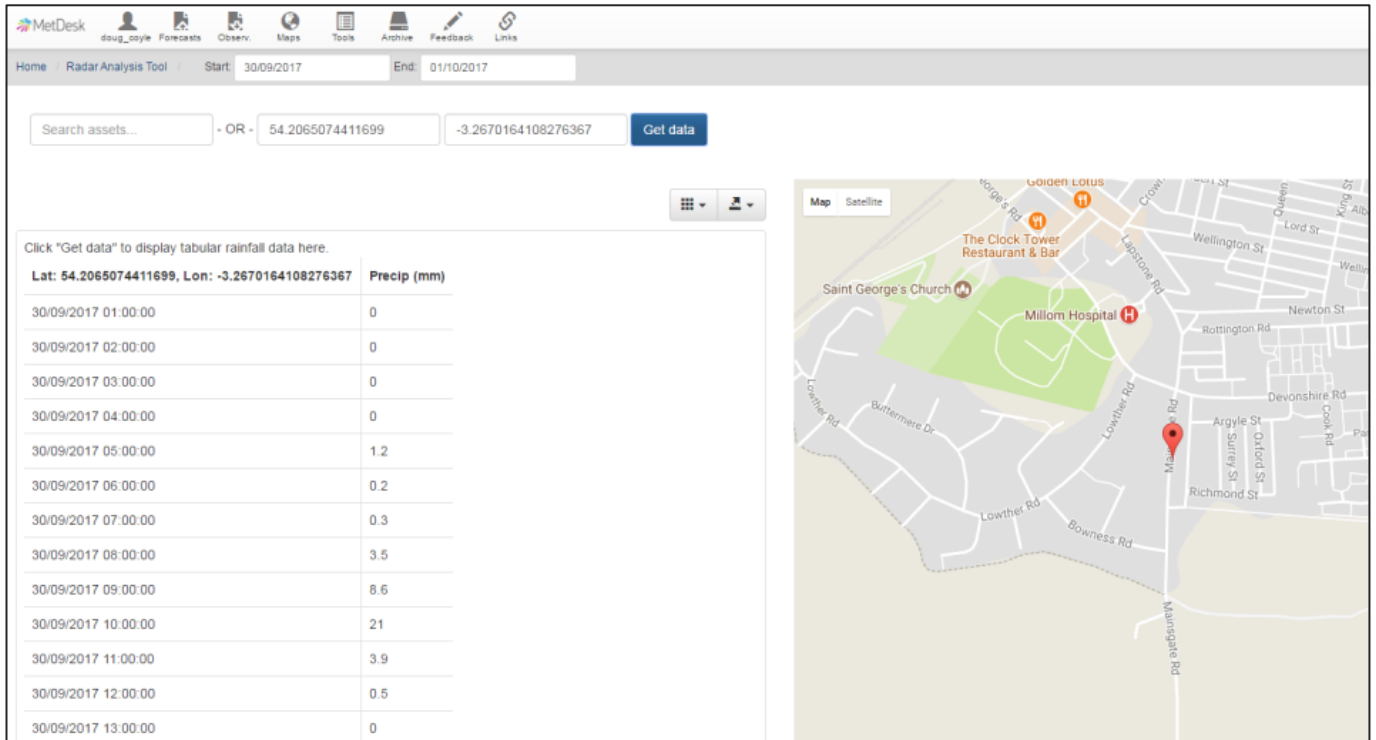


Figure 12: Information from MetDesk – hourly rainfall totals

With a peak rainfall of 19-21mm of rainfall within an hour it can be concluded that this was a significant rainfall event.

Wunderground website (<https://www.wunderground.com>)

This website provides access to private rain gauges and there are 2 within the Millom and Haverigg area that have provided a useful indication of rainfall during the event on the 30th September 2017.

The first station is located on Lowther Road in Millom and the rainfall details are shown in the graph below.

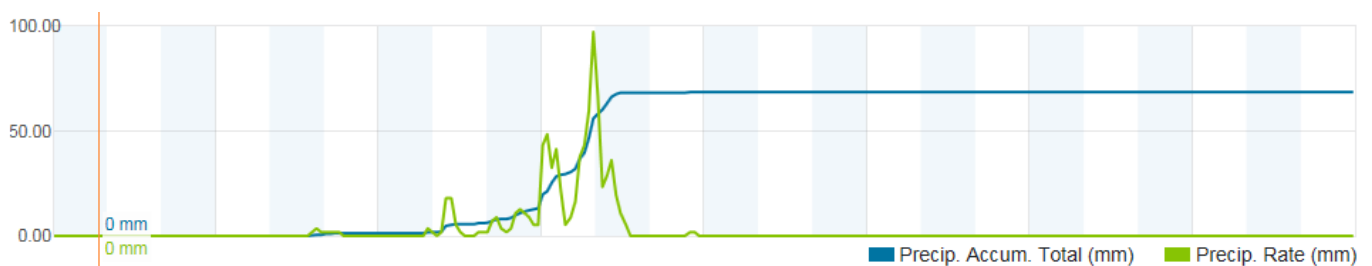


Figure 13: Wunderground rain gauge Lowther Road, Millom

The rain gauge information from this site indicates that approximately 67mm of rainfall fell between 7am and 10.30am with peak intensity of 97.3mm.

The rain gauge in Haverigg is located near to Richmond Gardens and the detail of this station is below.

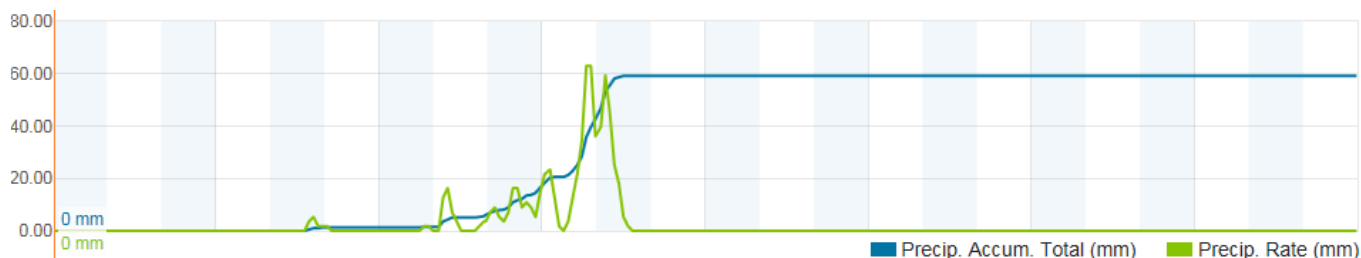


Figure 14: Wunderground rain gauge Richmond Gardens, Haverigg

The raingauge information from this site indicates that approximately 58mm of rainfall fell between 7am and 10.30am with peak intensity of 63mm.

There is no information to determine if the data provided is calibrated on the Wunderground website but the information is useful to demonstrate that this was a significant event.

Environment Agency rainfall data

The nearest EA rain gauge is located approximately 5km from Millom at Lanthwaite. The information from the EA is detailed below for 30th September 2017.

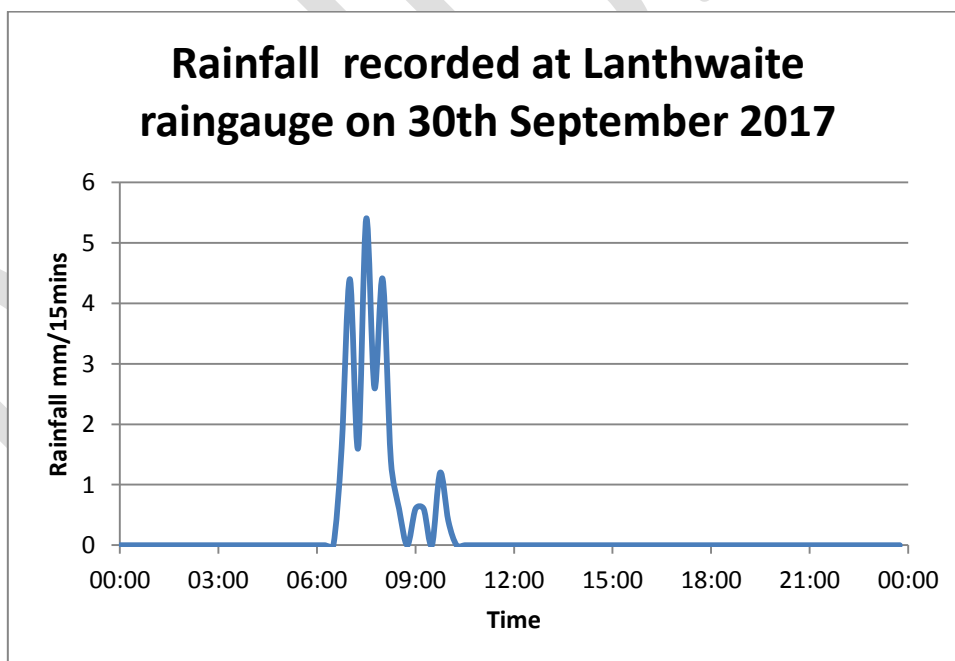


Figure 15: Rainfall recorded at Lanthwaite rain gauge on 30th September 2017

This information shows significantly lower rainfall than appears to have been experienced in Millom and Haverigg. The following diagram helps to demonstrate why there was a significant difference between the EA raingauge and the other information gathered during this investigation.

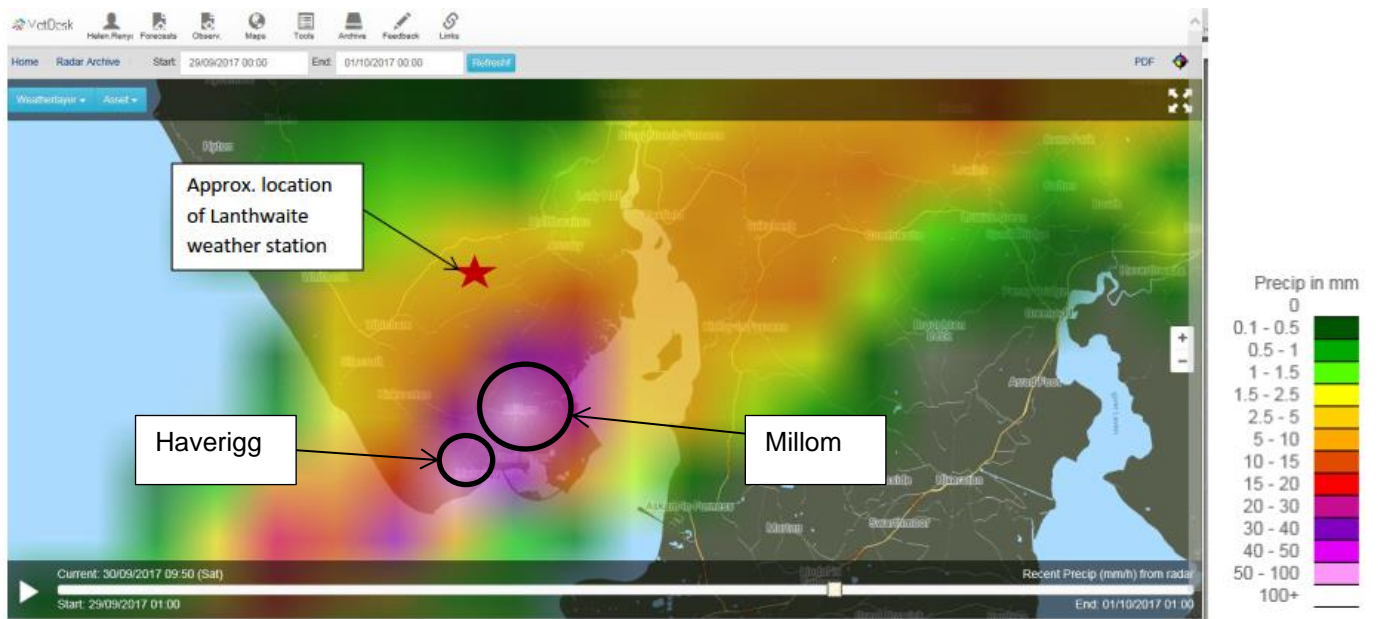


Figure 16: Location of Lanthwaite raingauge and rainfall radar data at 09:50 30/09/2017

The above radar information from Metdesk helps to show how there can be a significant difference in a short distance with regard to rainfall.

Tides

The information on tides has also been considered during the preparation of this report in order to determine if there was also any unusual high tide at the time of the event which may have impacted on the discharge of watercourses through the tidal flaps.

There is a tide monitoring station at Duddon Bar at the following location.

Saturday 30th September, 2017

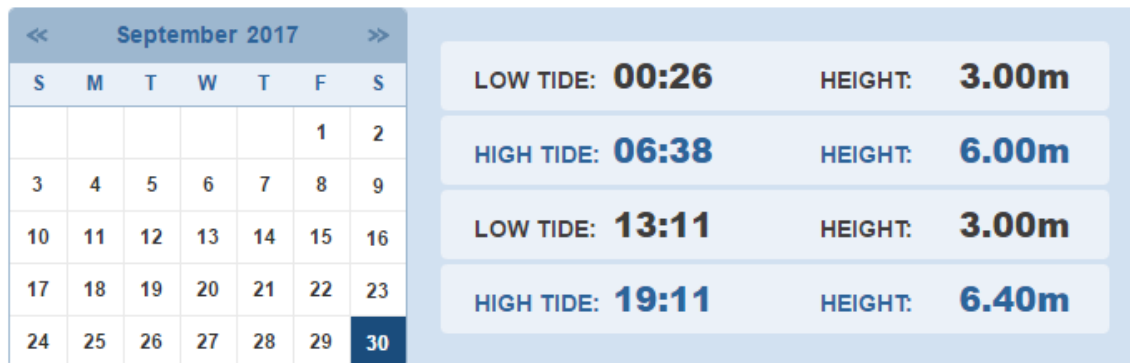


Figure 17: Duddon Bar information for day of event

Information on tides can be located from the following website -

<https://www.tidetimes.org.uk/duddon-bar-tide-times>.

From this it was determined that high tide occurred at 06:38 on the day of the event with low tide at 13:11. There was no indication that there was any unusual high tide during this event and it could be seen that the high tide on the 30th September was approximately 2.5m less in height to those on 4th and 5th of October 2017 and therefore it was concluded that the tides did not have an impact on the flooding during 30th September 2017.

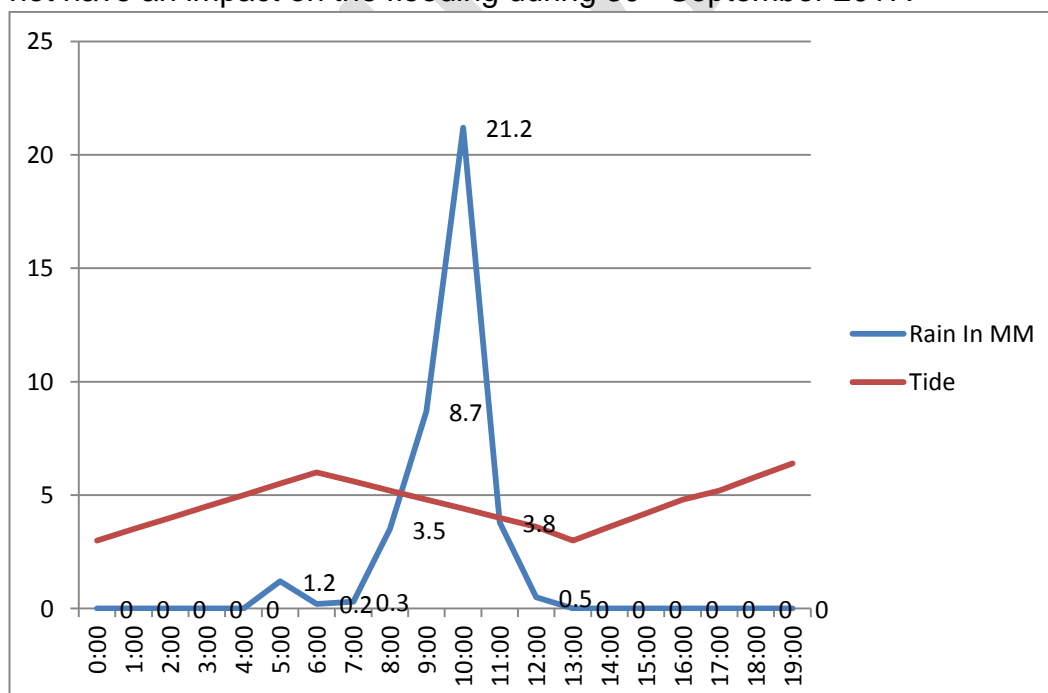


Figure 18: Tide heights verses rainfall

Asset Performance for Millom and Haverigg

Public Sewers and United Utilities Assets

Public sewers are the statutory responsibility of United Utilities in both Millom and Haverigg.

Millom and Haverigg are served by a public sewerage system that carries both foul and surface water from properties, known as a combined system. This makes up approximately two thirds of the network at Millom and Haverigg. The later housing developments in the areas are served by a separate sewer and surface water system, such as those on Lowther Road, Millom.

A common trait of older properties is for foul water and surface water, including highway drainage to flow in a one piped system beneath the street. The properties built after the 1970s have their foul water and surface water draining to separate systems and where possible surface water is discharged direct to a nearby watercourse.

The main area that incorporates separate sewers is the development that incorporates Bowness Road, Cumberland Close, Lowther Road etc., in this location much of the surface water is discharged direct to a watercourse known as Crook Pool however this type of separate system is uncommon in Millom.

New public sewers are built to a minimum national standard to accommodate a 1 in 30 year design storm and any network improvements would also be designed to ensure the same standard is met.

Two pumping stations make up part of the overall sewer system and assist with the transfer of sewage to the wastewater treatment works. These pumping stations are located King Street, Millom and to the east of Haverigg pool, Haverigg. See figure 18 on the following page.

It should be noted that the Millom and Haverigg systems work independently to one another, however during periods of prolonged, heavy rain the station at Millom assists with additional flows from Haverigg.

The following diagram summarises the UU operational systems within Millom and Haverigg. More detailed plans of the sewerage networks can be located within Appendix 3.

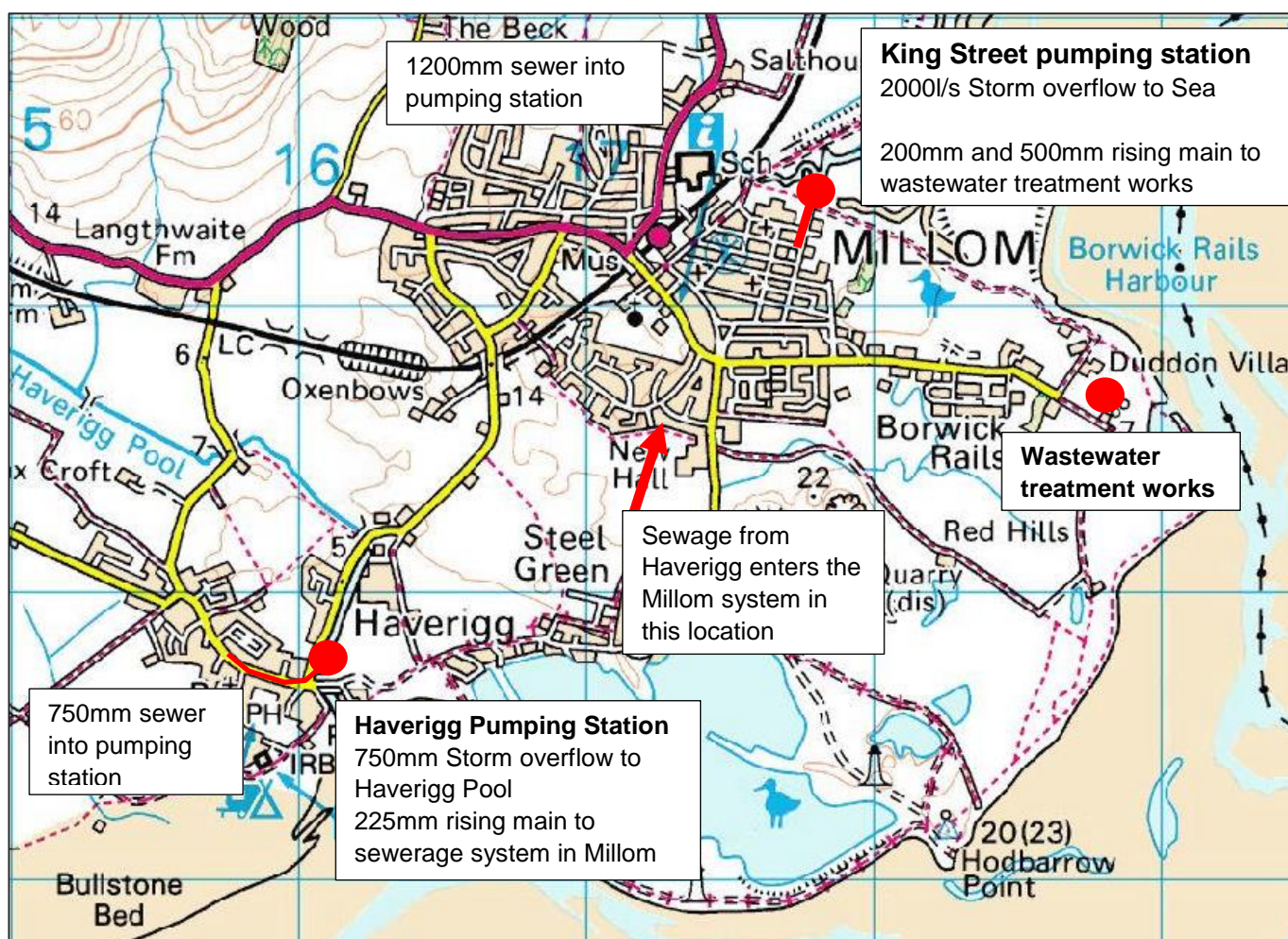


Figure 19: Summary of the main public sewer assets

The pumping station at King Street has been in existence for some considerable time but major refurbishment of the station took place during 2013 to improve the quality of any discharge direct to the Duddon Channel and forward treatment of greater capacity to the Waste Water Treatment Works. Further UU detail is provided in at Appendix 3.

During the investigation and discussions with many of the residents it is often commented that the pumps at the pumping station in King Street may not have been working during the event. However, UU have provided information that demonstrates that the pumps were working to their full capacity during the event. The following information provides details on the King Street pumping station –

King Street Pumping Station - Millom

UU have provided the following summary of the operation of the pumping station at King Street as follows –

- The Pumping Station is configured with 3 wells with different sets of pumps:
 - The low level pumps (2no) are configured as duty/standby and pump up to 200 litres a second in normal weather to Millom Waste water Treatment Works
 - Once flow rates into the pumping station are greater than 200 litres a second the high level pumps (2no) configured as duty/standby kick in and pass an additional circa 500 litres a second to Millom Waste water Treatment Works. At this point a total of circa 700 litres a second combined flow is passed to the works for treatment. Flow is measured via 2no flowmeters installed on the rising main from each set of pumps.
 - Any flow rates, usually during intense storm periods that are above this level flow are screened into the storm well. The storm well has (3 no.) pumps configured as duty, assist, and standby operation and pass approximately 1000 litres a second each out to estuary by a tidal valve. Max two running at a time (circa 2000 l/s)

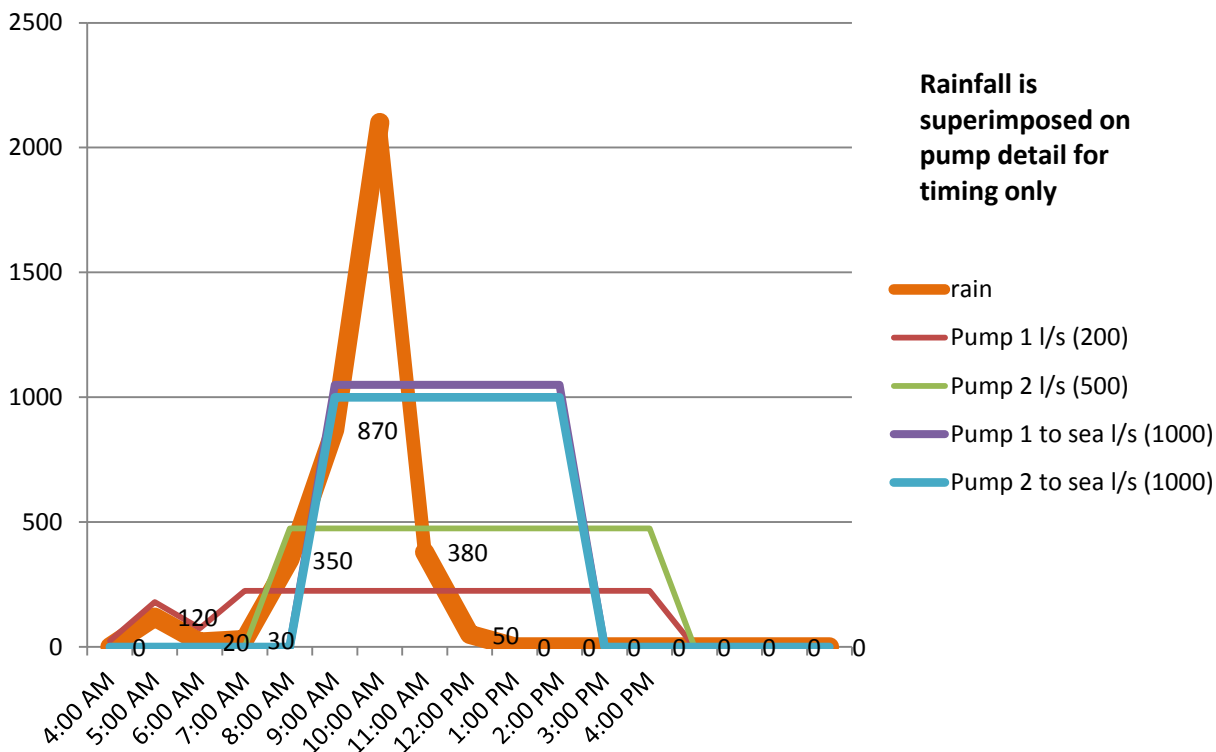


Figure 20: Rainfall totals against King Street Pumping Station operations

The following photograph shows the tidal valve at the discharge point from the King Street Pumping Station. This is known as a duckbill check valve and allows water to flow in one direction only. This does not restrict the volume of water that can escape from the pumping station but serves to protect the pumping station from tidal flows.

Several residents refer to this valve as a tidal gate and were concerned that it was not open during the event. The graph under figure 20, demonstrates this was not the case.



Photograph 1: Duckbill valve at King Street Pumping Station

As previously mentioned, any new systems are designed to accommodate up to 1 in 30 year flood events. The historic combined sewer system throughout Millom may even be designed for less. The event experienced on 30th September 2017 is believed to be beyond a 1 in 30 year event and overwhelmed the system.

This is true for Cumbria County Council Assets; they too mostly rely on the historic combined sewer system for drainage.

Highway drainage and Cumbria County Council Assets

Cumbria County Council are responsible for public highway drainage and maintenance of gullies within the Millom and Haverigg areas.

Historically the majority of the highway gullies within Millom and Haverigg discharge direct to the combined public sewerage system. More recent developments, such as Bowness Road discharge highway runoff into a separate surface water system in addition to water from roofs and other impervious areas such as driveways and patios. These then discharge directly to a watercourse if possible, in this instance directly to Crook Pool.

Gullies are cleaned by CCC on an annual basis and the last cleaning of the gullies in Millom and Haverigg prior to the event took place during July 2017. See schedule for 2017 at Appendix 4

During the event many gullies were overwhelmed by the volume of rainfall experienced and were not able to drain the surface water runoff away from the area as quickly as required as the rainfall intensity was above the design capacity of gullies.

Following the event gullies in the flooded areas were checked and cleaned by CCC. An extensive CCTV survey of drainage systems where it was considered there were issues has taken place. These areas included the Bowness Road / Mainsgate Road area, and in Haverigg, the Tannery Industrial Estate area, the Bank End / Sea View area and Main Street / North Lane area. In these areas faults were found on some of the systems. These faults have been identified in the section on flow routes and other relevant information.

Millom – Flood Affected Areas

As the flooding covered such a large area the details of the flooded areas have been broken down into smaller areas so that adequate detail can be provided for each area of flooding.

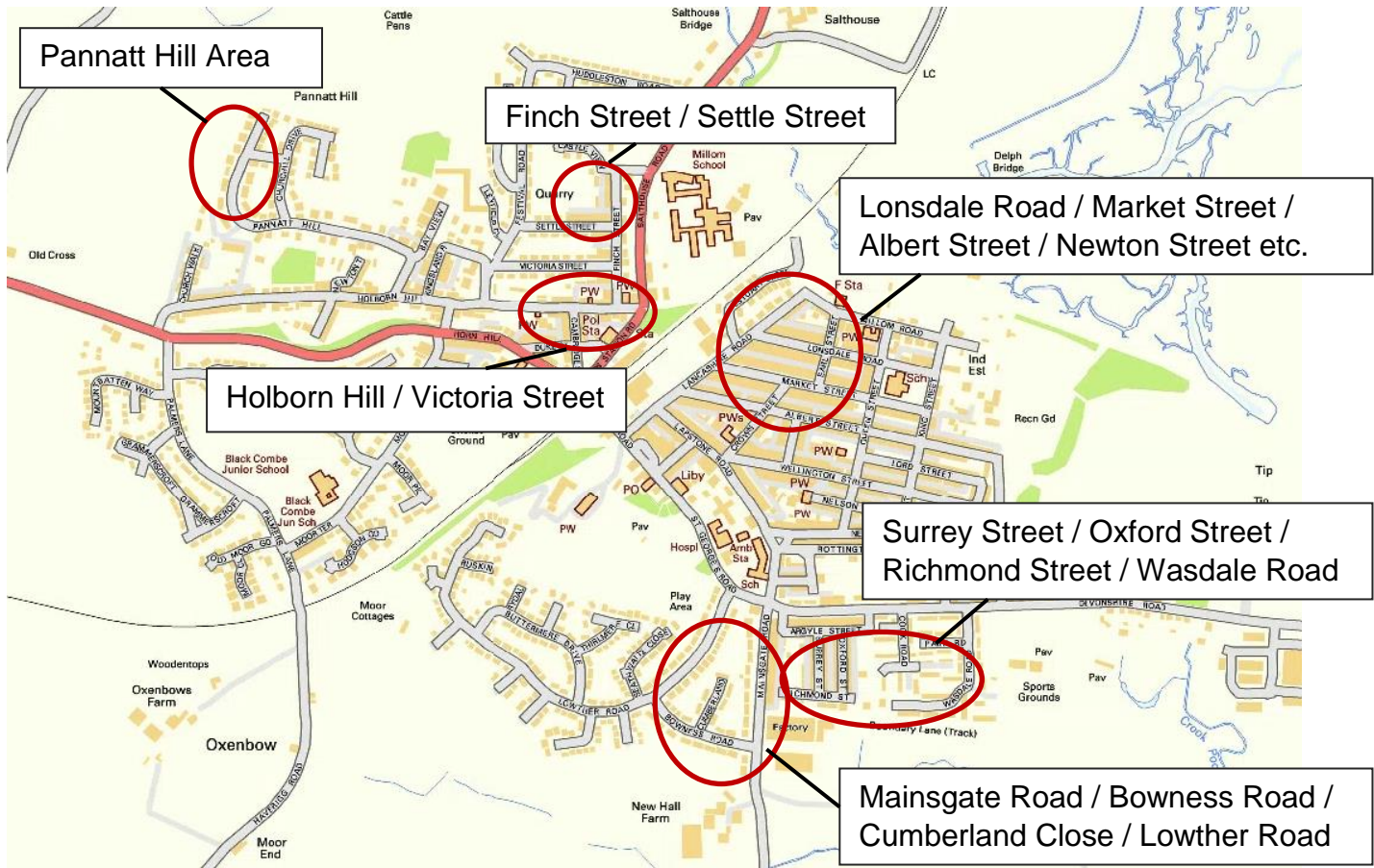


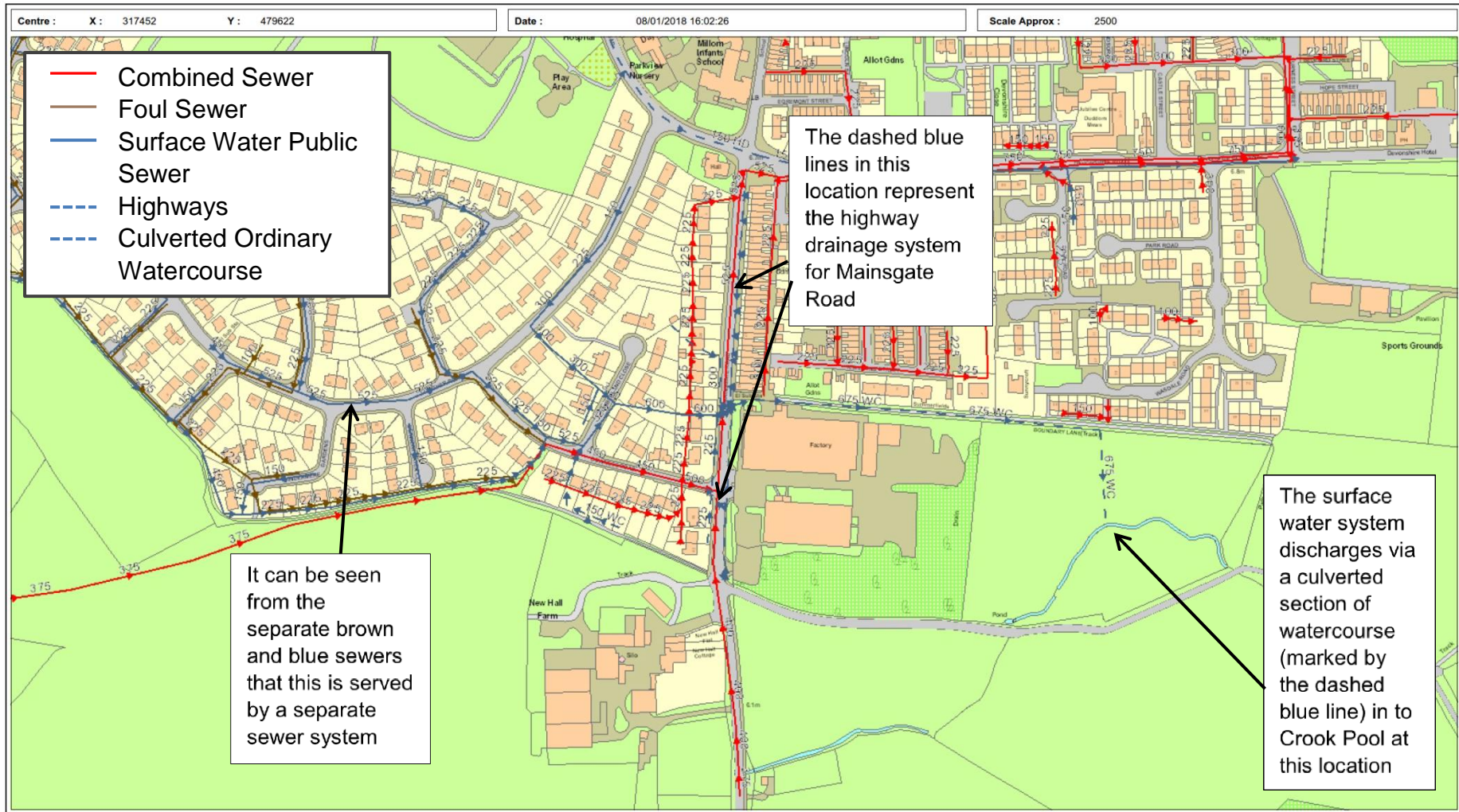
Figure 21: Flood Affected Areas - Millom

Mainsgate Road / Bowness Road / Cumberland Close / Lowther Road

This area was significantly affected with 26 properties being affected with internal flooding and 20 properties affected by external flooding.

The following figures show details of the Networks recorded on United Utilities database

United Utilities Maps for SafeDig



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.

Crown copyright and database rights 2017. Ordnance Survey 100022432 This plan is based on the Ordnance Survey Map with the sanction of the Controller of H.M. Stationary Office. Crown and United Utilities Water copyrights are reserved. Unauthorised reproduction will infringe these copyrights.



Figure 22: Plan of public sewer records

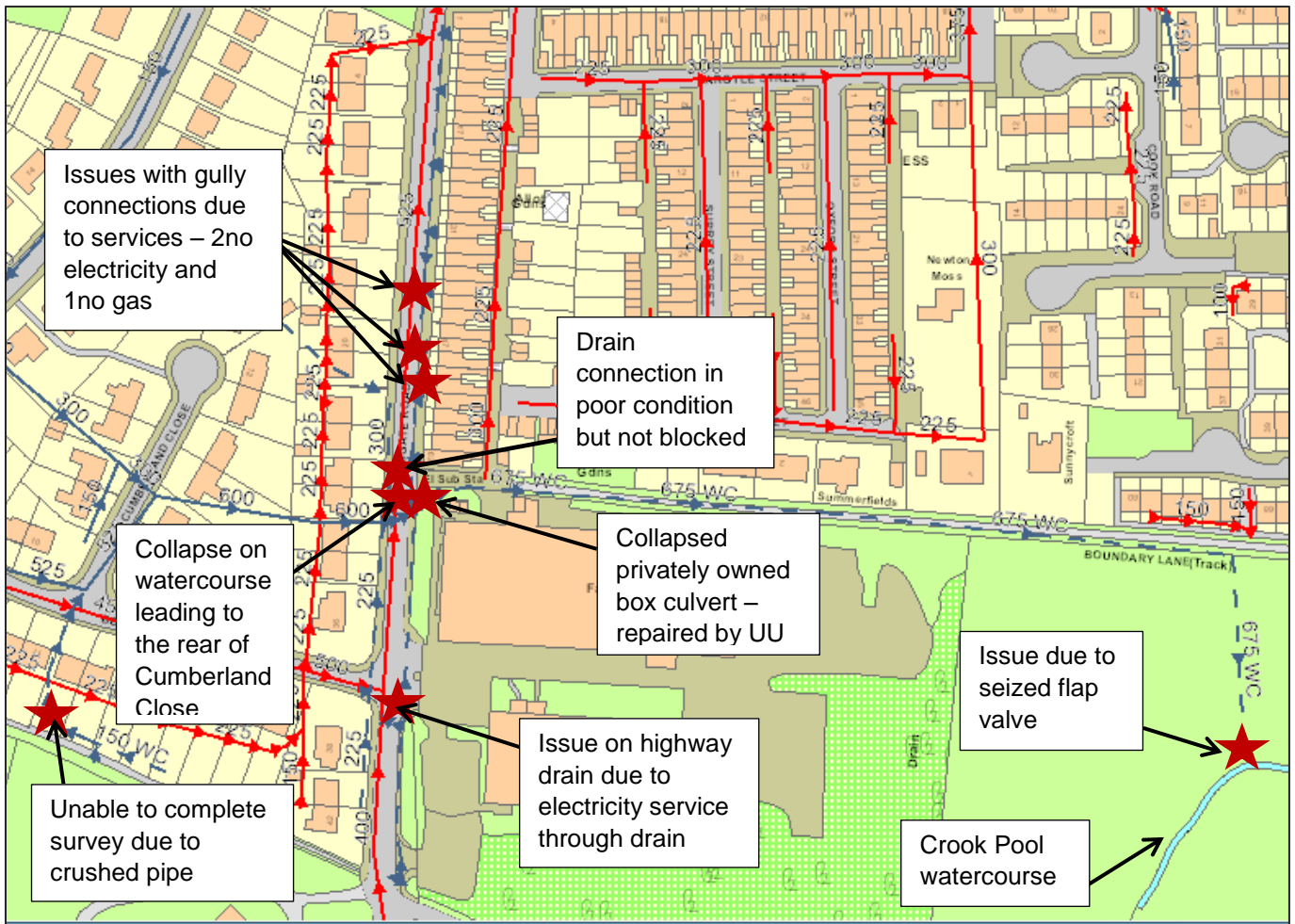


Figure 23: Location of issues on the surface water drainage systems in Mainsgate Road and Bowness Road

During the investigations as detailed in Figure 23 several issues were found on the drainage systems which are summarised as follows –

- Seized flap valve – now removed
- Collapse on the watercourse from Cumberland Close – to be programmed for repair in the near future
- Collapse on the culvert through the grounds of the factory – now repaired by United Utilities
- Badly damaged highway drain connection – now repaired by Cumbria County Council
- 4no damaged drains due to service installation – 1no gas and 3no electricity have now been repaired, see **photograph 2**.
- Crushed pipe rear of Bowness Road – the pipe is still operating but camera is unable to progress – it has been established that this transfers surface water from fields to the rear, to the public surface water system.

As part of the investigations it was also noted that water levels in Crook Pool were at a high level against the outfall from the surface water system from Mainsgate Road and as such the LLFA also carried out a survey of the watercourse downstream to identify levels of the various downstream watercourse crossings and culverts. The information from this survey is included in this report as Appendix 4. Some issues were identified following this survey such as some of the invert levels of the watercourse crossings are set at a high level which may impede flow from the area. A minor collapse was also found on one of the crossings. The LLFA will be working to address these issues with the relevant landowners. It is worth noting that these crossings have been in existence for a considerable length of time.

Several of the properties on Mainsgate Road / Bowness Road have finished floor levels approximately 250mm below the highway level. As a result surface water has no positive discharge point and pools. It is understood the fire service pumped flood water out of gardens to ease the flooding, confirming these findings.

To summarise there are several factors that were likely to have influenced the flooding within the Mainsgate Road and Bowness Road area including; the topography of the ground, the issues identified on the drainage systems and the surface water runoff from surrounding areas particularly from the footpath / New Hall Farm area. However the fundamental cause is believed to be the overwhelming amount of rain experienced over a short period of time.

Photograph 2: Highway drainage reinstated on Mainsgate Road. Photo courtesy of Electricity North West



Photographs of the flooding in this area are included on the following page.



Photographs 3: Photographs of the flooding in the Bowness Road area



Photographs 4: Photographs of the flooding in the Mainsgate Road area

Surrey Street / Oxford Street / Richmond Street / Wasdale Road

This area was significantly affected with 29 properties being affected with internal flooding and 19 properties affected by external flooding.

This area can be divided into distinct areas of drainage with parts of the area, Surrey Street, Oxford Street and Richmond Street being of older construction (pre -1900) and, therefore, the surface water from this area discharges direct to the combined public sewer system. These are the streets in this area that were most affected by internal flooding. The properties consist of terraced housing with threshold levels very close to the level of the highway.

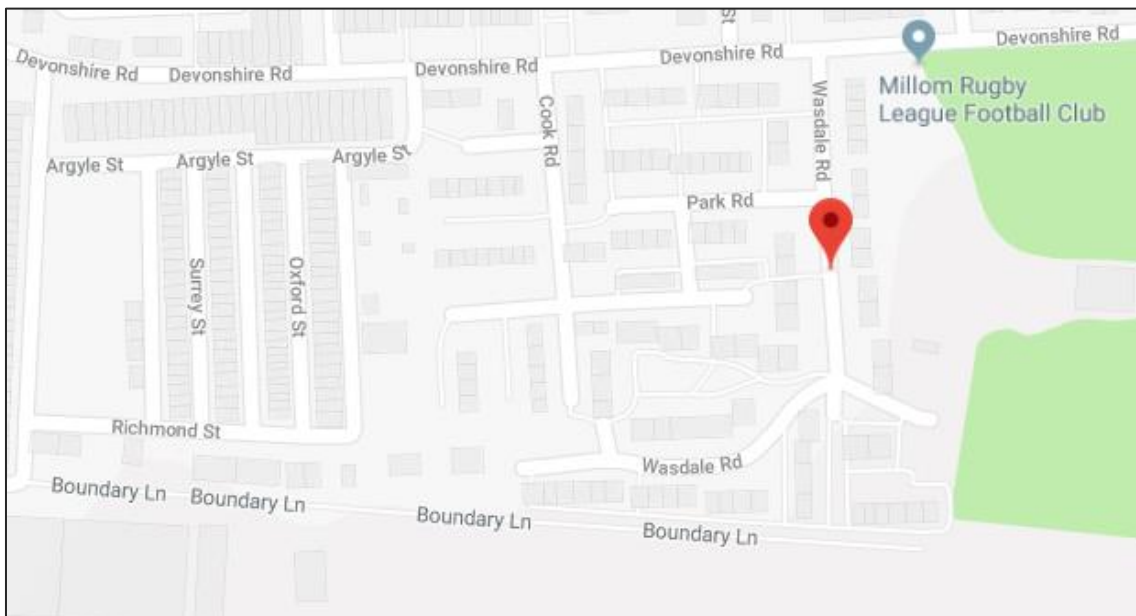
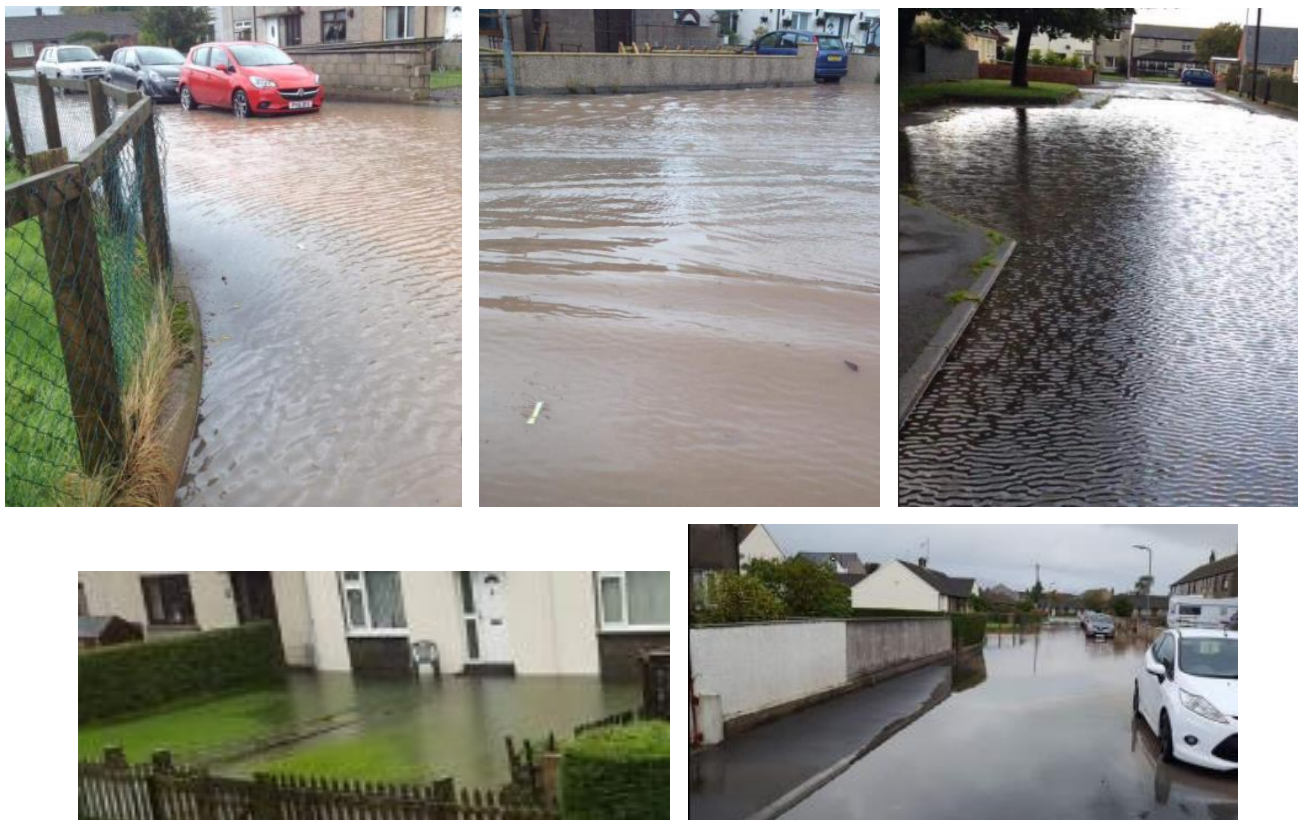


Figure 24: Surrey Street / Oxford Street / Richmond Street / Wasdale Road

It is also noted that downspouts from the roofs of these properties discharge direct to the footway and into the highway drainage system. Due to the age of the properties it is unclear what design standards the gully system will have been designed to and it is unlikely that it would have been designed to accommodate a rainfall event such as this. It can also be noted that the surface water that did drain through the gully system also overloaded the combined public sewer system contributing to the capacity issues and surcharging from the public combined sewer.

From information gathered regarding this area it is concluded that the likely cause of the flooding is the extreme rainfall event exceeding the design capacity of the drainage systems available.



Photographs 5: Photographs of flooding in Wasdale Road, Cook Road and Park Road

Lonsdale Road / Market Street / Albert Street / Newton Street etc. area

This area was the worst affected area of the flooding within Millom with in excess of 79 properties affected by internal flooding and 14 properties affected by external flooding.

The housing in this area is of older construction (pre 1900) and, therefore, the surface water from this area discharges direct to the combined public sewer system.

The properties consist of terraced housing with threshold levels very close to or below the level of the highway. It is also noted that downspouts from the roofs of these properties discharge direct to the footway and then to the highway drainage system. Due to the age of the properties it is unclear what design standards the gully system and public sewer system will have been designed to and it is unlikely that it would have been designed to accommodate a rainfall event such as this.

The feedback information from the residents do not suggest that there were problems with the flushing of toilets during this event and information from UU suggested that there appeared to be limited sewage within the flood water which suggested that the flooding was likely to be caused by inability of the heavy rainfall to enter the highway and combined sewer system.

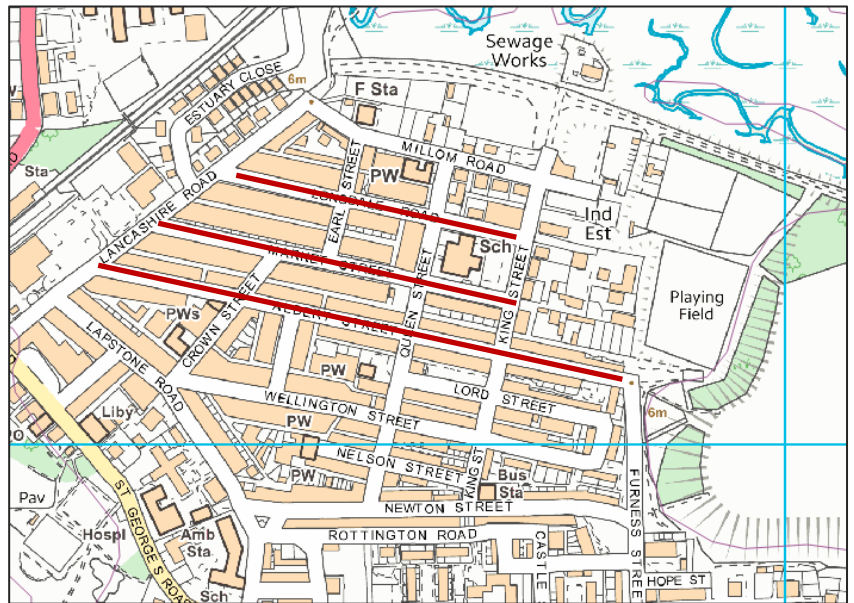
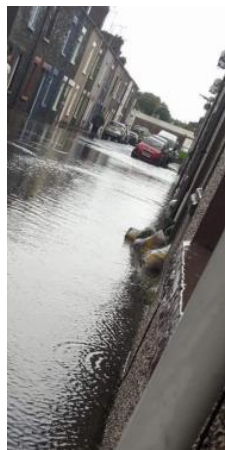


Figure 25: Lonsdale Road/ Market St / Albert St etc.



Photographs 6: Photographs of flooding in Albert Street



Photographs 7: Photographs of flooding in Lancashire Street



Photographs 8: Photographs of flooding at Market Street

Holborn Hill / Victoria Street / Pannatt Hill

This area was significantly affected with 32 internally flooding and 19 externally.

The combined sewer has been visually inspected, surveyed by CCTV and dye tested where necessary. The system runs effectively during downpours however there was one area of damage which blocked a single highway gully on the corner of

Finch St/Holborn Hill, see below for more detail. The cause of flooding in this area was due to vast quantities of surface water, once the drainage system was at capacity any precipitation ran from the surrounding high ground and pooled at the low point of Holborn Hill. Once the drainage system 'caught up' the surface water cleared.

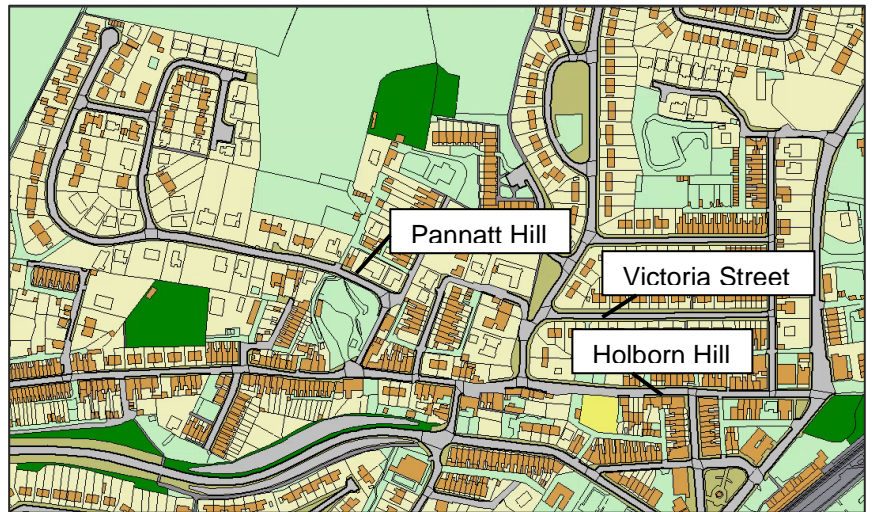


Figure 26: Holborn Hill / Victoria St / Pannatt Hill

The photograph below shows a block of concrete restricting the size of the pipe. It should be noted that this is a single arm connecting only to a gully; however this does cause an area of the highway to flood during downpours.



Figure 27: Standing water in damaged highway gully



Photographs 10: Photographs of flooding in Holborn Hill area

Finch Street / Settle Street

- Flooding has occurred 4 times since 2006
- Flooding from manhole cover in back yard
- Surface water from waste ground behind houses
- Surface water runs like a river when there is heavy rainfall

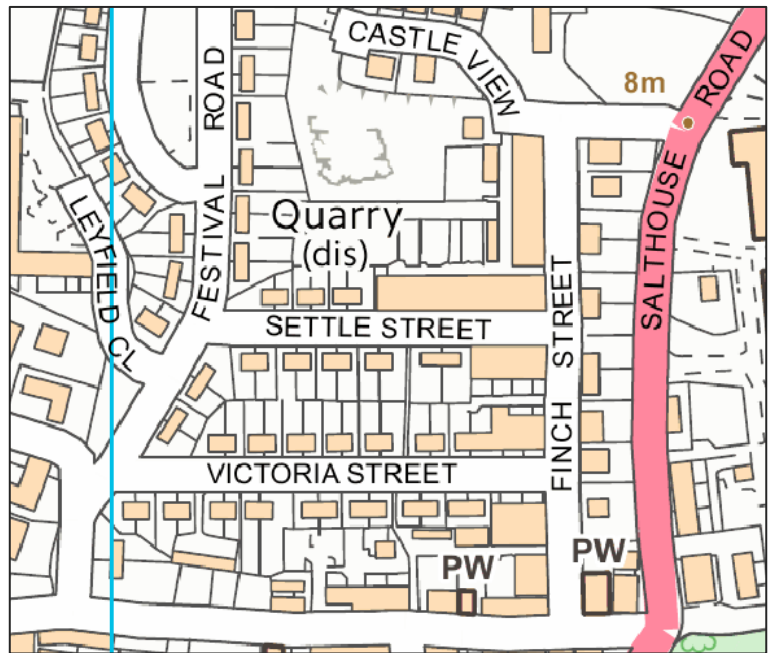


Figure 28: Finch Street / Settle Street

Investigations suggest that the cause of the flooding in this location was due to the extreme rainfall event causing extensive runoff from the Quarry which flowed into Settle Street and Finch Street.

Haverigg – Flood Affected Areas

The Old Tannery Industrial Estate Area

Closed in June 1979, the old Tannery at Haverigg once provided work for hundreds of local men and women. It has now found a use as an industrial estate.

Flooding occurred to a reported 8 properties at this location.

- Flooding caused by flash flooding
- Surface water ran over adjacent fields and onto the highway
- Surface water did not drain for days at some points
- 50mm of water recorded in one property
- Flooding is historic

Cumbria County Council and United Utilities have since conducted surveys on the majority of the active drainage system.

The only drains found for surface water in this area were highway gullies. These all link into a combined sewer beneath the highway that runs toward the sea, falling west half way down the field to the pumping station.

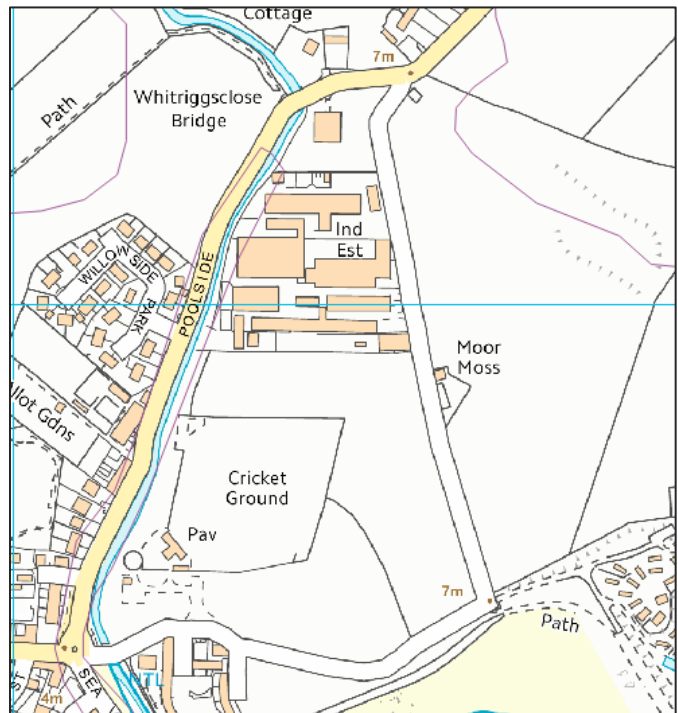


Figure 29: The Old Tannery / Moor Moss

Three of these highway drains were found to be defective (see **figure 30** for reference):-

- Number 1 was heavily silted. This has since been cleared and is now in full working order.
- Number 2 was covered by a sheet, presumably to protect the drain from gravel (see **photograph 11**). The sheet has been removed and the gully is fully functional.
- Number 3 has partially collapsed, severing the link between the gully and the combined sewer. This has now been repaired and reconnected.

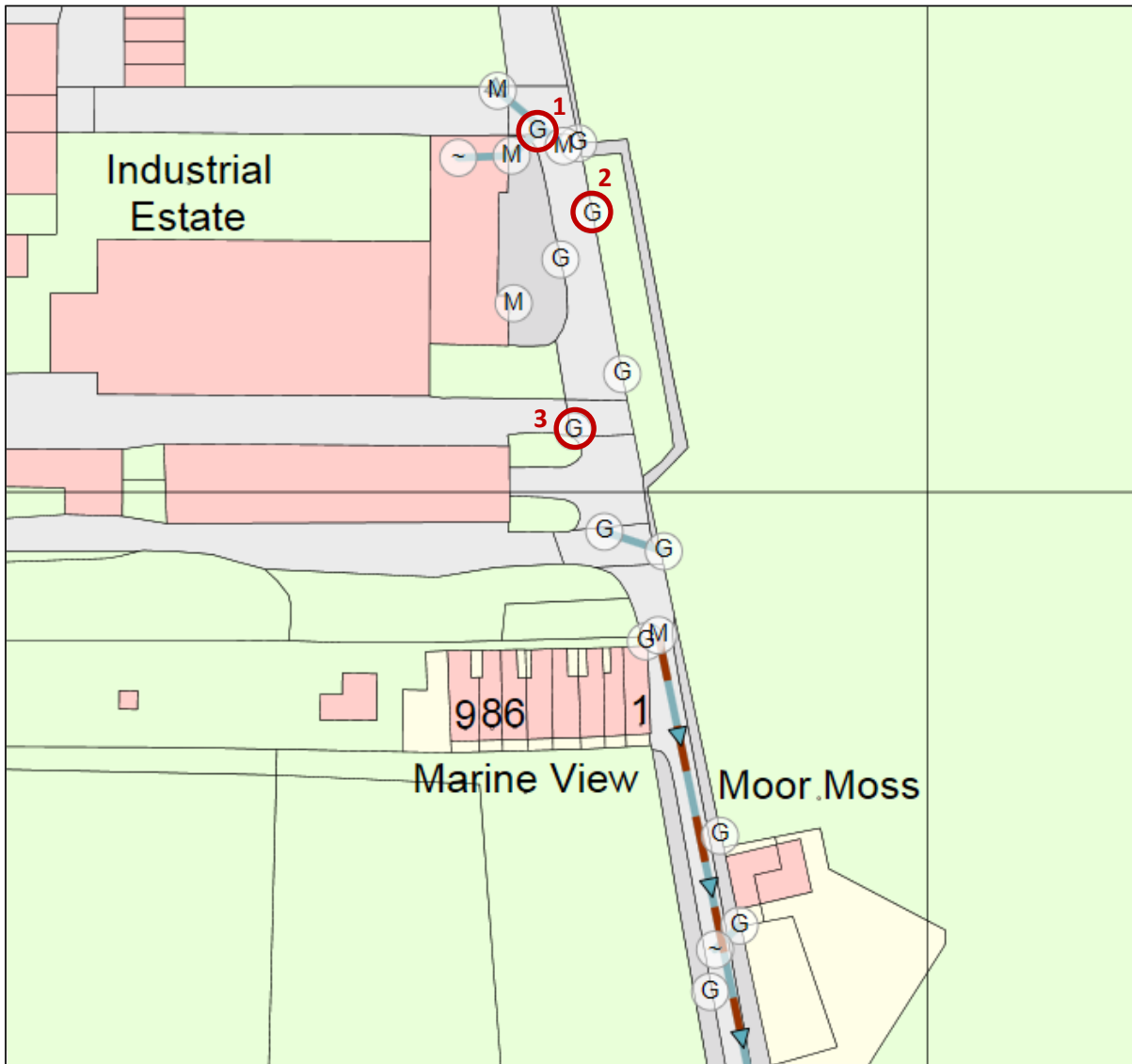


Figure 30: Obstructed Highway Gullies



Photograph 11 (left): Standing water on collapsed chamber



Photograph 12 (right): Metal sheet over highway gully

Bank End / Sea View

One property was reported as flooded at Bank End with an approximate depth of 60mm, this was caused by flow from surrounding properties and the highway.

The flooding is historic, having flooded previously in 2012 and 2014.

It is believed that the flooding is caused due to the properties location at low point in the land. The only drainage we were able to locate was the combined system, however during the event this exceeded its design capacity and ultimately caused flooding at the low point.

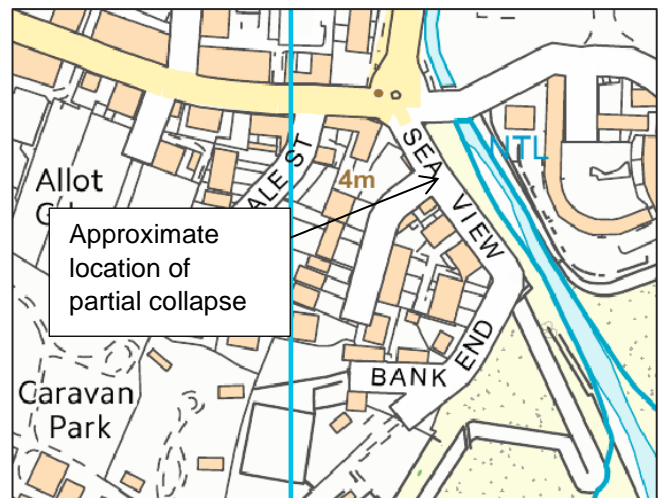


Figure 31: Bank End area

Cumbria County Council has since surveyed the highway gully systems and confirmed by dye testing that many gullies discharge direct to the public sewer system. However, on Sea View the highway system discharges direct to Haverigg Pool where a partial collapse had been located and repaired.

Main Street / North Lane

Five properties were reported as internally flooded at this point. Since the event Cumbria county Council has conducted surveys in and around the area in an attempt to determine the cause. Similar to Millom the surface water around this area all falls into highway drains which are subsequently linked to the combined sewer system.

It was discovered that the highway system is in full working order, as is the combined sewer. It is therefore believed that the design capacity for the system reached its limit due to the event.

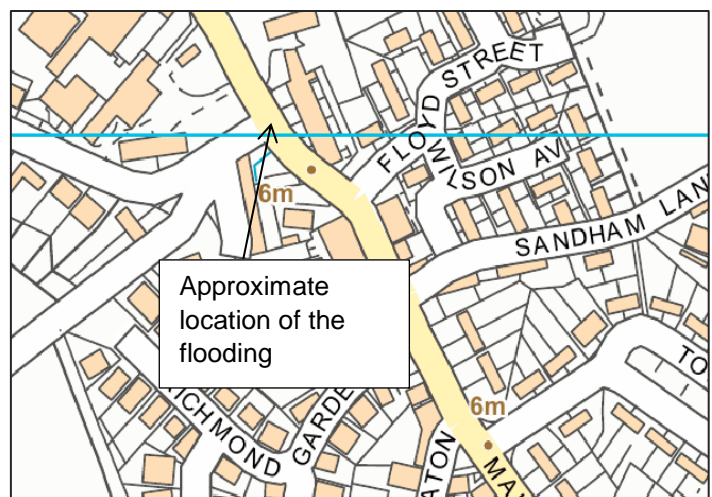


Figure 32: Main Street / North Lane

Likely Causes of Flooding

From the evidence gathered the most significant cause of the flooding was the extreme rainfall event that occurred on the 30th September 2017. The rainfall was very intense over a very short timescale with a peak rainfall of approximately 19-21mm. This is above any design capacities of both highway drainage systems and the combined public sewer in both locations. The anecdotal evidence from residents that the flood waters in most locations quickly dissipated once the rainfall ceased would also suggest that systems were on the whole working at an adequate capacity for their design.

However, investigations and surveys of drainage systems have identified some faults on the drainage systems which have been detailed earlier within the report and these may also have had some impact on the flooding severity.

Flooding History

Millom

CCC is aware of previous flooding (from the residents) as follows:–

Settle Street / Finch Street – October 2012 – internal flooding of 1 property caused by surface water runoff from fields at the rear of the property

Mainsgate Road / Bowness Road – 4th October 2012 – several properties affected with both internal and external flooding – surface water runoff appears to have been the cause and some clearing of the downstream watercourse was carried out following the flooding.

Haverigg

Bank End / Sea View - Reports of previous flooding in 2012 and 2014 – Cause unknown.

The Old Tannery - There have been several instances of flooding recorded on a recurring basis however the information of these events is limited.

In addition to the above United Utilities has also provided a plan detailing flooding incident density within Millom and Haverigg (Figure 29).

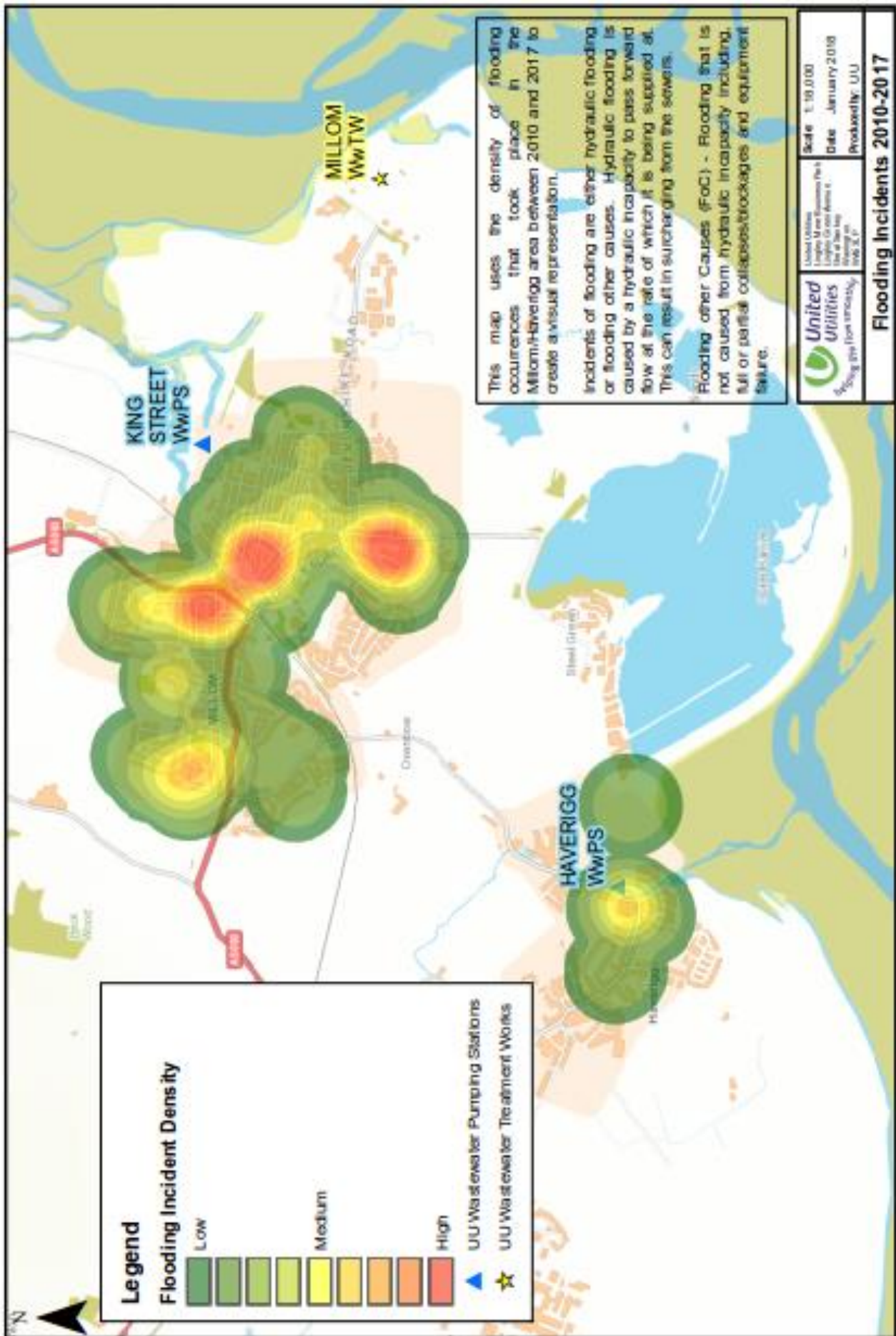


Figure 33: Flooding Incident Density in Millom and Haverigg

Recommended Actions

The following table details recommended actions for various organisations and members of the public to consider using the Cumbria Strategic Floods Partnerships 5 Themes: Community Resilience, Upstream Management, Strengthening Defences, Maintenance and Internal Drainage Boards (IDB's). Some of these recommendations may have already been carried out or are ongoing.

Cumbria Flood Partnership Theme	Action by	Recommended Action	Timescale
Community Resilience	Cumbria Local Resilience Forum*	Review and update community plans to enable homes and businesses to be better prepared for flooding and reduce the impacts of any flooding	Ongoing
	Residents and businesses	To ensure where possible reinstatement works to properties following the flooding allow for resilience for any further extreme flooding events.	Ongoing
	Cumbria Planning Group, Copeland Borough Council, Cumbria County Council and Environment Agency	Continue to review Local Development Plans and Strategic Flood risk Assessment to reflect current understanding of flooding	Currently ongoing update with JBA consultants
Upstream Management	Cumbria County Council	To investigate any opportunities to reduce the runoff from the disused Quarry between Settle Street and Castle View	To be carried out as part of the Millom study works when funding has been secured via a funding bids to the Regional Flood and Coastal Committee
	Cumbria County Council / United Utilities	To investigate opportunities to reduce the runoff from the footpath / New Hall Farm into Bowness Road	As above

Maintenance	United Utilities	Continue with annual sewer cleaning regime	On-going
	Cumbria County Council / Copeland Borough Council	Work to collaborate gully cleaning and street sweeping to coordinate with United Utilities sewer cleaning regime.	Ongoing
	Cumbria County Council (Electric North West) (Network Gas)	Liaise with services to remove cables and pipes that have obstructed highway drainage systems in Mainsgate Road	Completed
	Cumbria County Council	Excavate on blockage on watercourse on Mainsgate Road from rear of 1970s properties to determine extent and condition of watercourse to the properties behind Mainsgate Road	Ongoing
	Cumbria County Council	Repair highway drainage system at the following locations – Completed <ul style="list-style-type: none"> • Sea View, Haverigg • Mainsgate Road, Millom Ongoing <ul style="list-style-type: none"> • Salthouse Road, Millom • Holborn Hill 	Completed / Ongoing as indicated
	Cumbria County Council	Remove flap valve at the end of the culverted water course into Crook Pool	Completed
	Copeland Borough Council	Inspect flap valves at Crook Pool exit / old ironworks	Ongoing
	Cumbria County Council/United Utilities	Investigate replacement drain system at Bank End Haverigg	Completed

Strengthening Defences	United Utilities / Cumbria County Council	Review network capacity of drainage systems and consider where improvements can be made.	Some review of public sewer system has been carried out. Further review to be carried out as part of the Millom study works when funding has been secured via a funding bids to the Regional Flood and Coastal Committee
	Cumbria County Council	Review effect of the Crook Pool watercourse access crossings on the drainage outfall from Mainsgate Road	Level survey completed. Further review to be carried out as part of the Millom study works when funding has been secured via a funding bids to the Regional Flood and Coastal Committee
	Cumbria County Council/United Utilities	Review highway drainage system at Old Tannery, Haverigg	Initial investigations complete. Further review to be carried out as part of the Millom study works when funding has been secured via a funding bids to the Regional Flood and Coastal Committee
	Cumbria County Council/United Utilities	Investigate areas where surface water can be drained separately from the current combined system e.g. Holborn Hill, Market St, Albert St etc.	Further review to be carried out as part of the Millom study works when funding has been secured via a funding bids to the Regional Flood and Coastal Committee

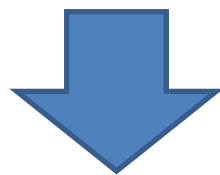
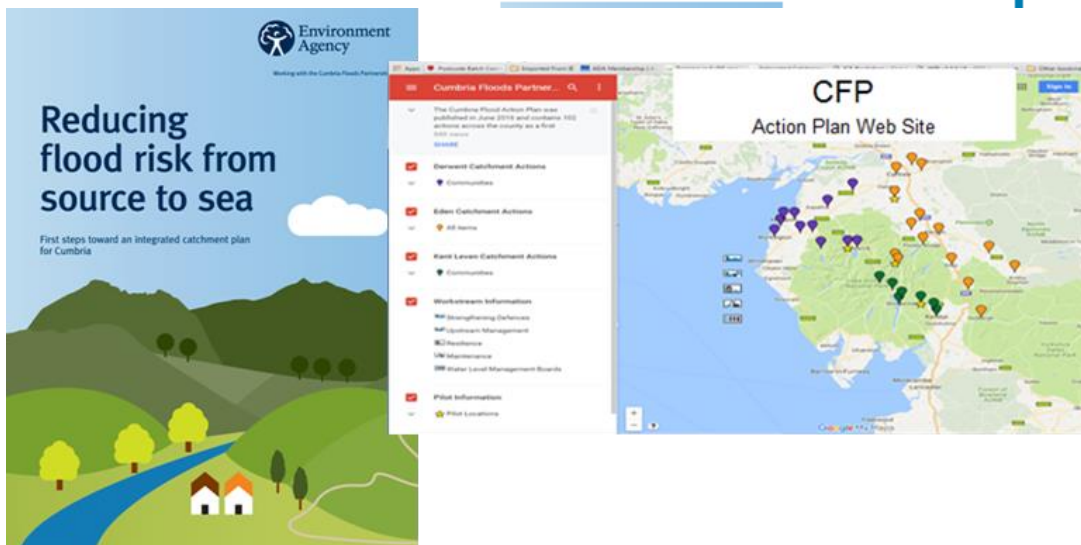
* The Cumbria Local Resilience Forum includes emergency services, local authorities, Cumbria County Council, Environment Agency, Maritime Coastguard Agency and health agencies along with voluntary and private agencies. Under the Civil Contingencies Act (2004) every part of the United Kingdom is required to establish a resilience forum.

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 is now a reality working across Cumbria.

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



Communities working together across Cumbria

Appendices

Appendix 1 Glossary

Appendix 2 Summary of Relevant Legislation and Flood Risk Management Authorities

**Appendix 3 UU Historic Works/Routine Maintenance/
Pumping Station Operation**

Appendix 4 LLFA Investigations

Appendix 5 Environment Agency

Appendix 6 Network Rail

Appendix 7 Feedback from Residents and draft report

Appendix 8 Useful contacts and links

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—
- (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 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.

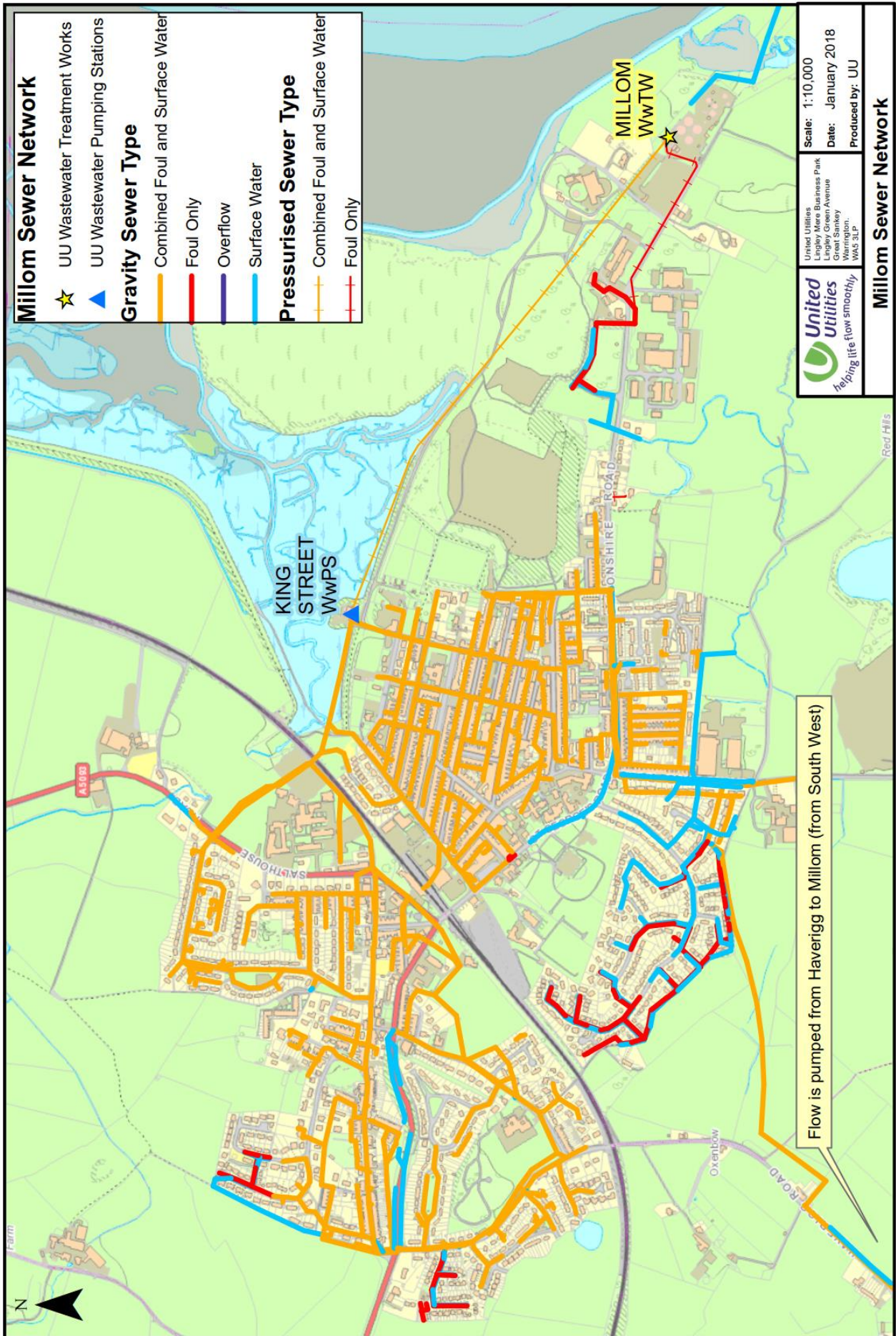
Flood risk in Cumbria is managed through the Making Space for Water process which involves the cooperation and regular meeting of the Environment Agency, United Utilities, District/Borough Councils and CCC's Highway and LFRM Teams to develop processes and schemes to minimise flood risk.

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.

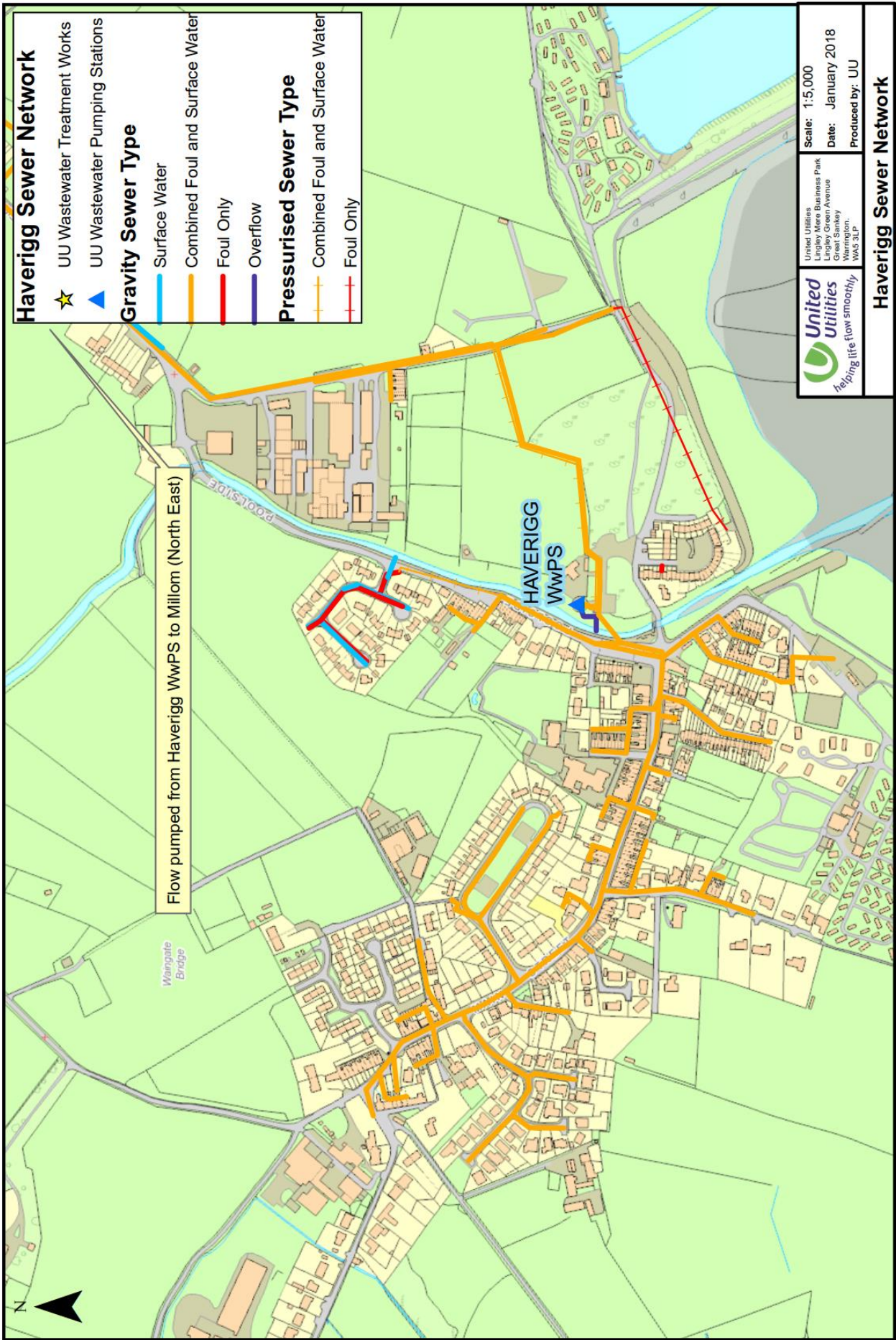
Flood Action Groups are usually formed by local residents who wish to work together to resolve flooding in their area. The FAGs are often supported by either CCC or the EA and provide a useful mechanism for residents to forward information to the MSfWG.

Appendix 3: UU Historic Works/Routine Maintenance/ Pumping Station Operation

The following plans detail the sewer network within Millom and Haverigg.



The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown. Crown copyright and database rights 2017 Ordnance Survey 100022452.

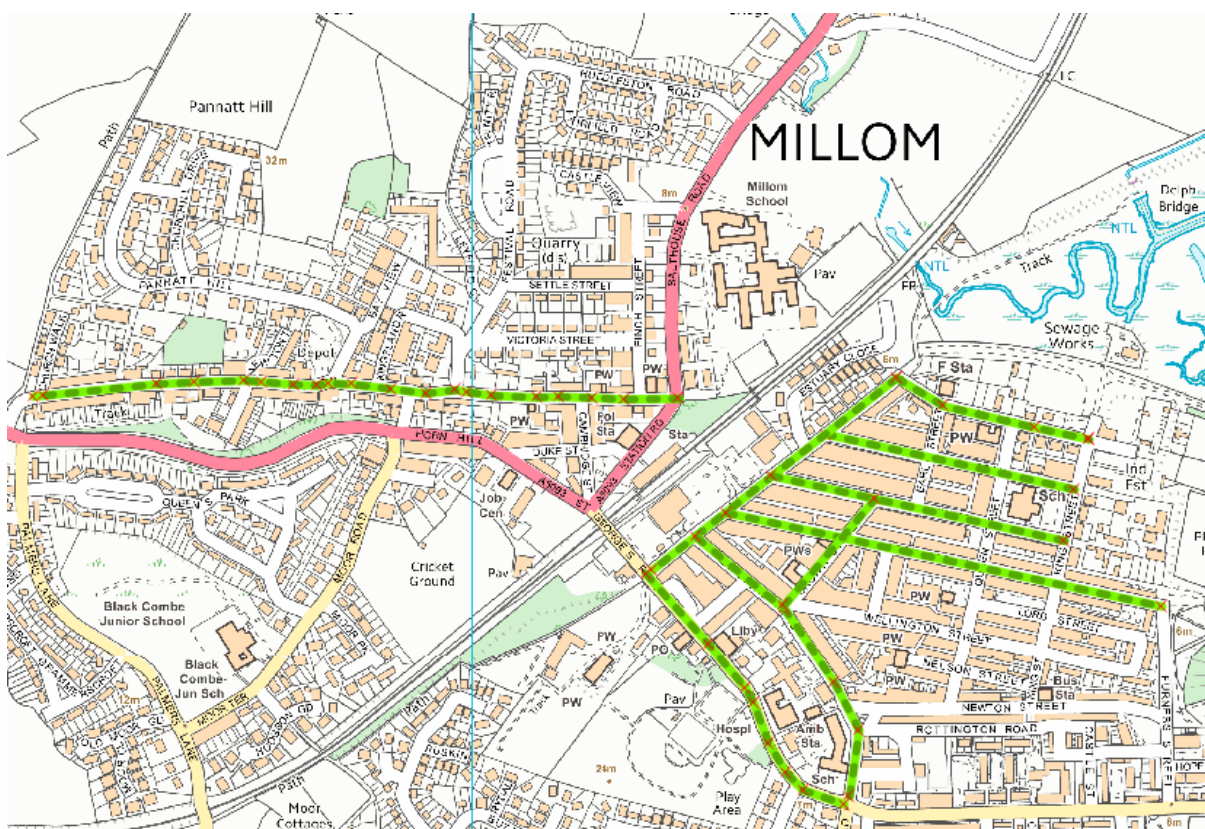


The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.
Crown copyright and database rights 2017 Ordnance Survey 100022432.

Desilting Programme

United Utilities have provided the following information on their planned desilting works:

- The planned cleaning programme covers the areas of Millom where we have issues with silt in the sewer due to poor gradient.
- The sites/manholes included are mostly in and around the town centre.
- This programme is carried out annually prior to the start of winter.
- The programme is reviewed following its conclusion to identify if there is a need to increase the frequency of cleaning. This is done through our liaison with a UU representative known as the area Strategic work planner (SWP) who plans the work and to ensure it's carried out.
- The programme ensures the sewers are at maximum capacity before winter commences (with typically more persistent rainfall periods).



Pumping Stations and Treatment works

Millom WwTW Storm Overflow/King Street Pumping Station (COP0049) AMP5 Unsatisfactory Intermittent Discharge (UID) Project

In AMP3 (2000-2005) storm discharges from two overflows within the Millom catchment, WwTW storm tanks overflow and King Street Pumping Station storm overflow, were designated as unsatisfactory, impacting on the Duddon Channel, as a result of bathing water/shellfish and aesthetic criteria.

A project was to meet the design criteria of 3 spills per bathing season for bathing waters and 10 spills per annum or equivalent for shellfish requirements. The aesthetic criteria was met by designing screens to 6mm in two directions to screen flows up to a 1 in 5 year event.

The purpose for this project was not related to flood protection. However it had to demonstrate 'no detriment' to the existing levels of service in the network upstream.

King Street Pumping Station

The proposed solution for King Street pumping station was based on upgrading and reconfiguring the existing pumping station and laying an additional rising main to Millom WwTW.

The scheme involved the delivery of:

Up-grade to existing pumps to increase the pass forward flows up to a peak of 700 l/s to the WwTW.

A new 500mm dia. rising main laid parallel to the existing rising main.

New storm overflow screen to ensure all spills up to a 1 in 5 year design event are screened to 6mm in two directions.

The existing high level overflow was retained to protect the station from tidal ingress while affording a relief in the event of an emergency.

The operation of the pumping station with the four interconnecting wet wells and the three storm pumps, operating in duty/assist/standby mode remain the same.

Millom WwTW Storm Tanks

The proposed solution for Millom WwTW storm tanks was based on increasing the Flow to Full Treatment (FTFT) from 61 l/s to 100 l/s and providing Ultra-Violet treatment to all storm spills discharged when the existing storm tanks are full. Storm Tank no.1 acts as blind tank capturing the first flush of the storm, which is returned for treatment. There is no overflow to the Duddon Channel from this tank. When the blind tank is full (Storm Tank no.1), storm flows back-up in Storm Tank no.2, then weir over and spill to the Storm UV plant for treatment. The Storm UV treatment achieves a 2 log reduction in bacteria across the overflow. This treatment is equivalent to a reduction in spill frequency to less than 10x per annum.

The scheme was to provide the delivery of:

Refurbishment of the existing inlet screens and increasing screening capacity from 305 l/s to 700 l/s; providing 6mm screening in two directions.

Modification to storm tank overflow to feed the new Storm UV plant; existing Storm Storage 1,850m³.

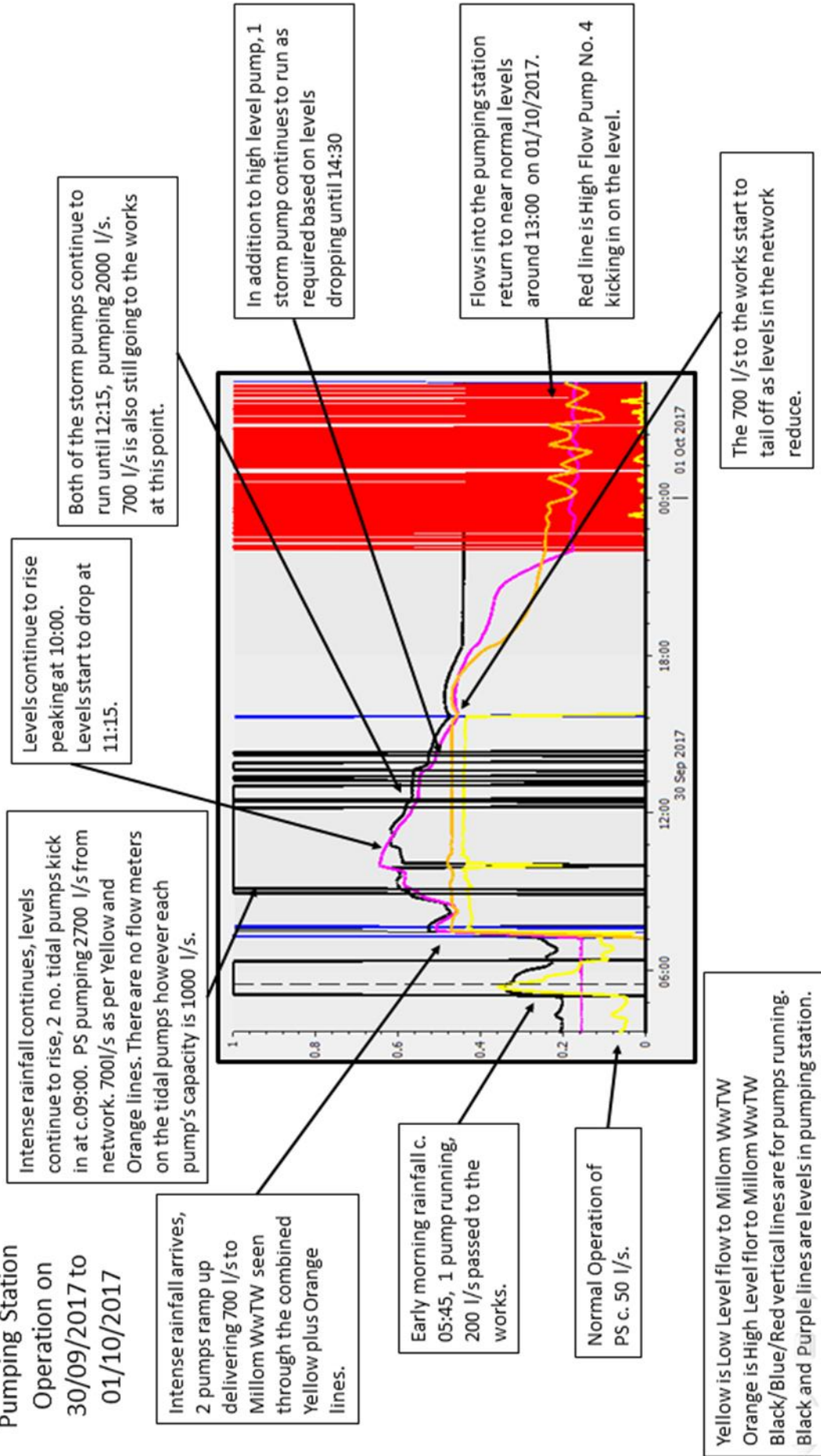
New Storm UV plant to accommodate for flows over 100 l/s when the existing storm tanks are full, up to a maximum 600 l/s.

Refurbishment work and new process units was provided to accommodate the increase in FTFT from 61 l/s to 100 l/s. This included:

- Refurbishment of Primary Settlement Tank
- New secondary SAF plant
- New Final Humus tank
- New Final effluent UV plant
- New Tidal pumping station for storm outfall
- New WwTW and Storm Outfall pipeline at a new location

King Street Pumping Station Operation During Event

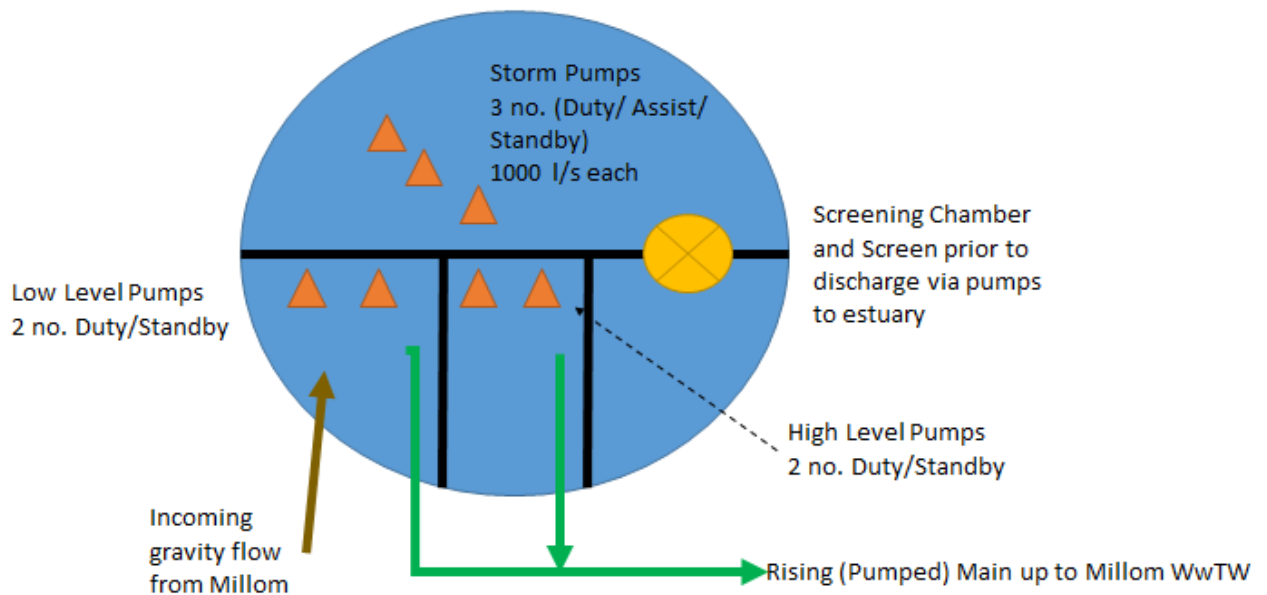
Pumping Station Operation on 30/09/2017 to 01/10/2017



King Street – Backup Control
Operation due to High Levels in PS



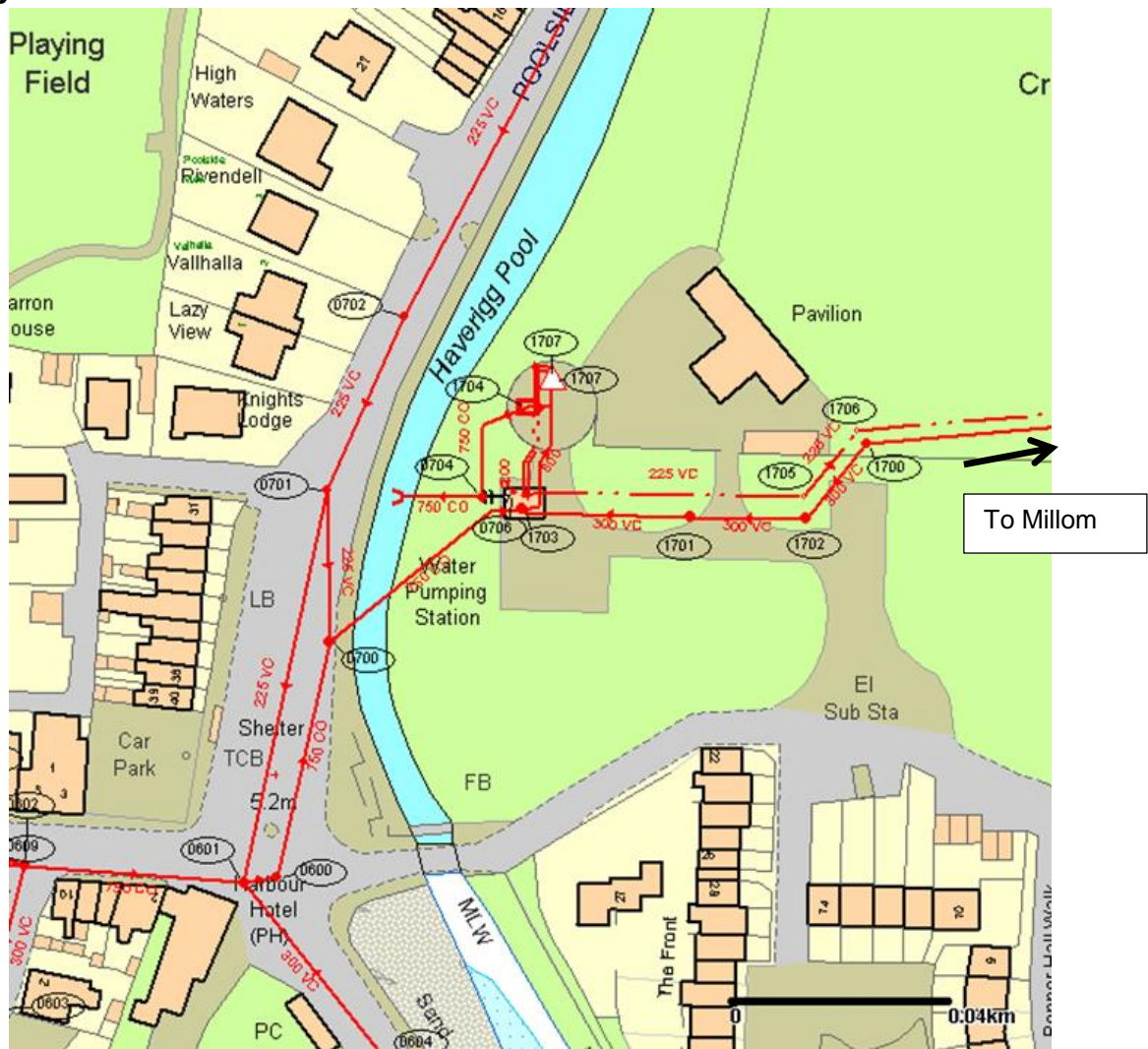
Diagram of King Street PS



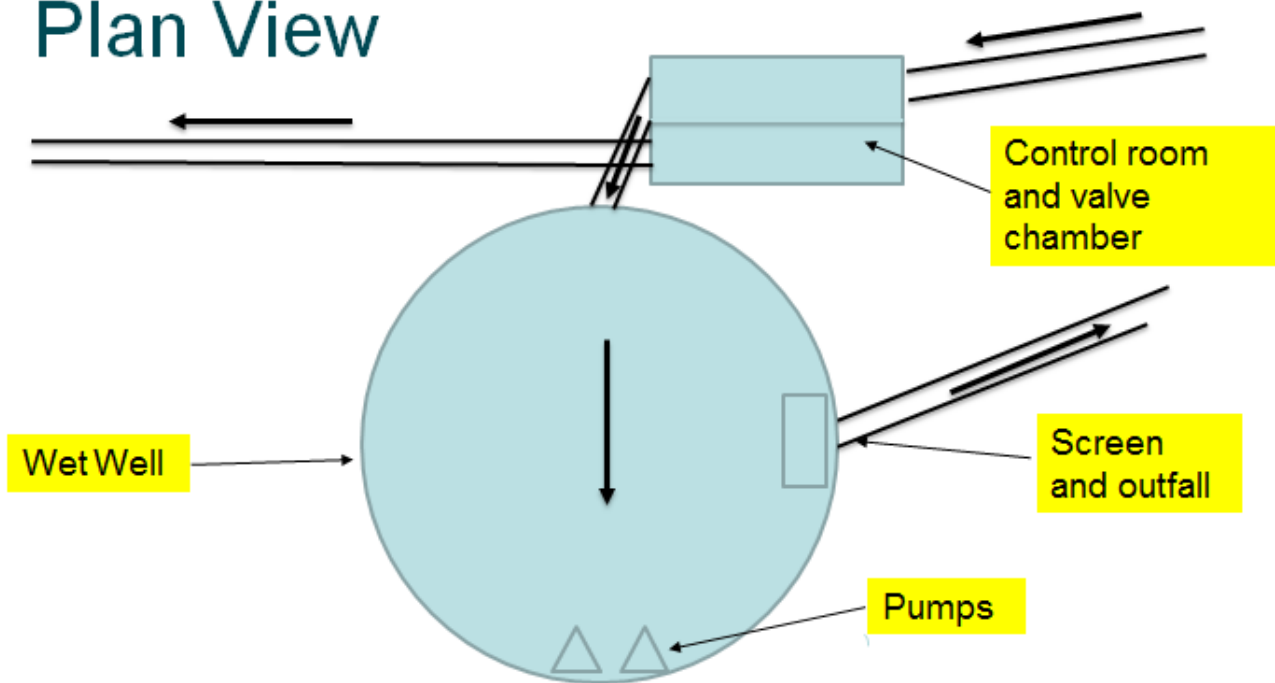
Haverigg Pumping Station

- Haverigg Waste water pumping station is a combined sewer waste water network pumping station that directs all flows to the Millom wastewater network system
- Site has a pass forward flow in the permit of 43.5 L/S
- The tank has 950 cubic meters of storage
- Permitted discharges are via a 750mm pipe to Haverigg pool, NATIONAL GRID REFERENCE SD 1608 7876 spill through a 6mm static Copa wave screen
- Site is a wet well submersible site with a Duty/ Standby auto rotation

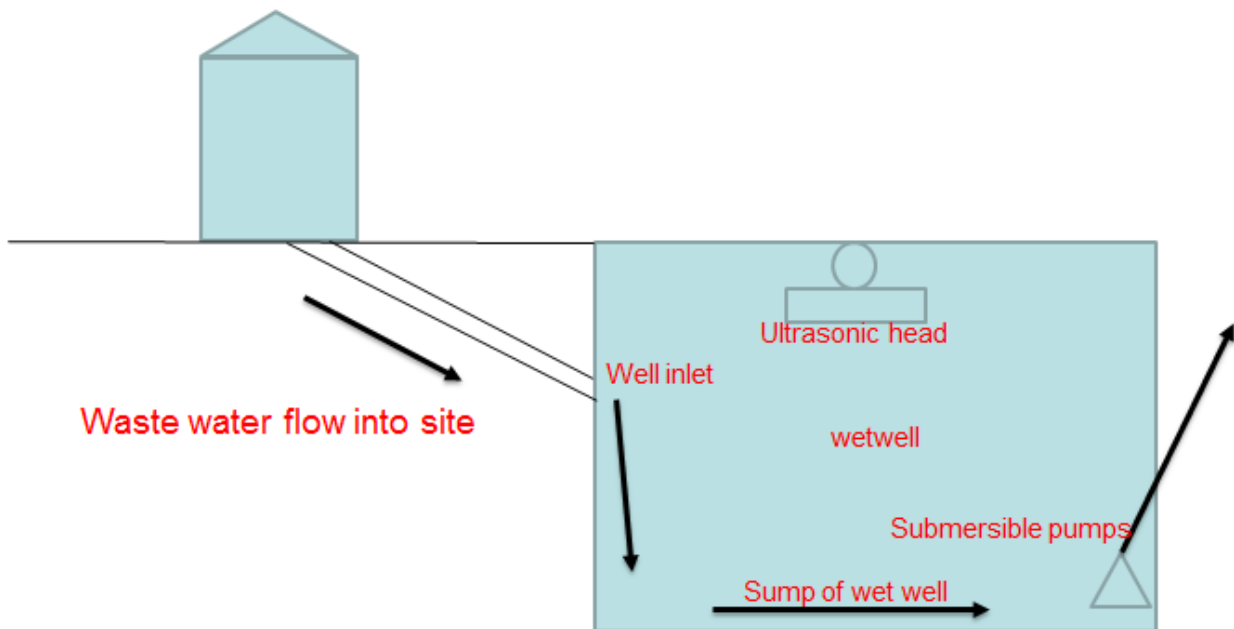
Sewer layout



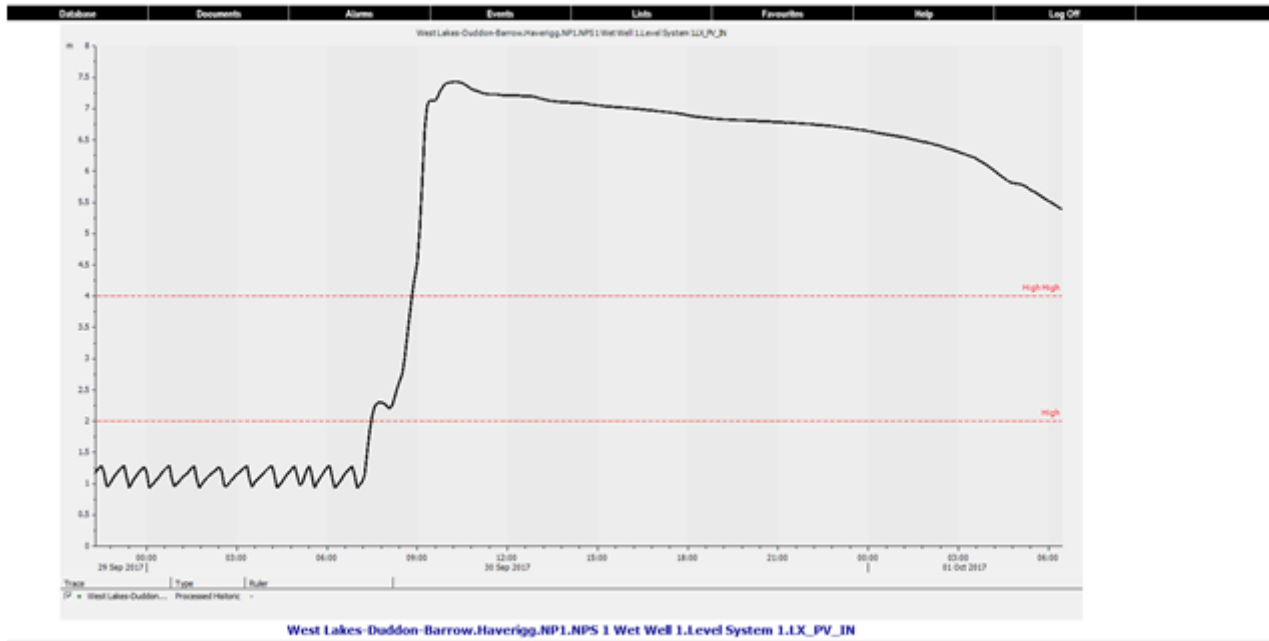
Plan View



Side View



Haverigg pumping station wet well level 30th September 2017



Summary of Telemetry Data 30th September 2017

- 07:16 Pump no 2 starts running
- 07:32 Wet well from normal to high
- 08:54 Wet well goes from high to high high
- 09:04 Wet well reaches back up pump control so pump 2 stops and pump 1 starts
- 09:10 CSO Starts to spill into watercourse
- 10:33 Pump no 1 trips and Pump no 2 starts running right away
- 14:16 Pump no 1 is reset by controller and starts running right away and Pump no 2 stops

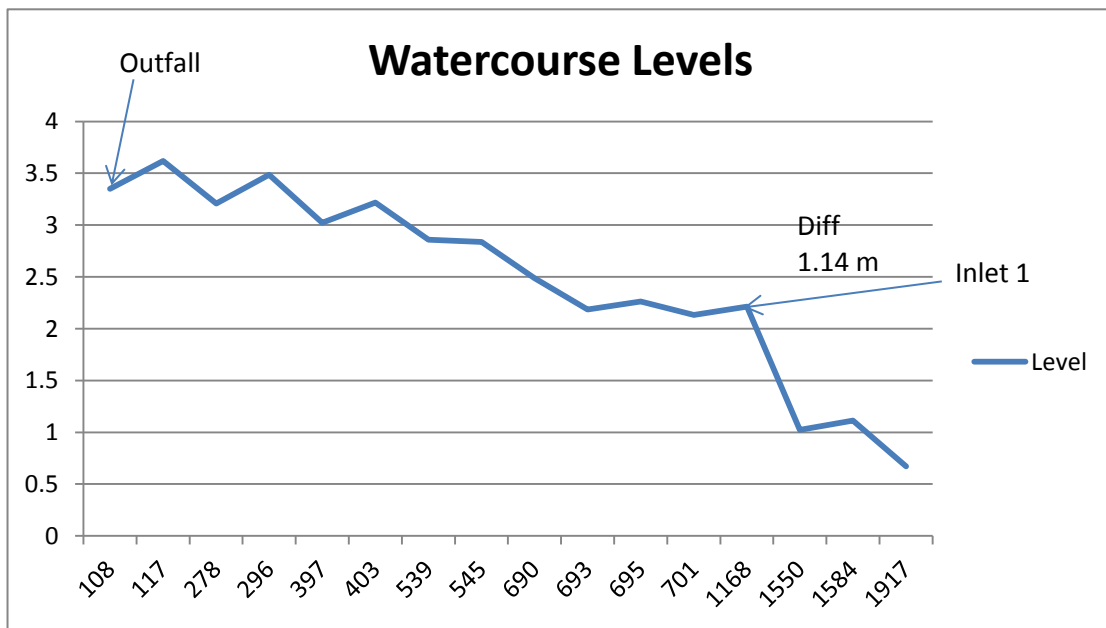
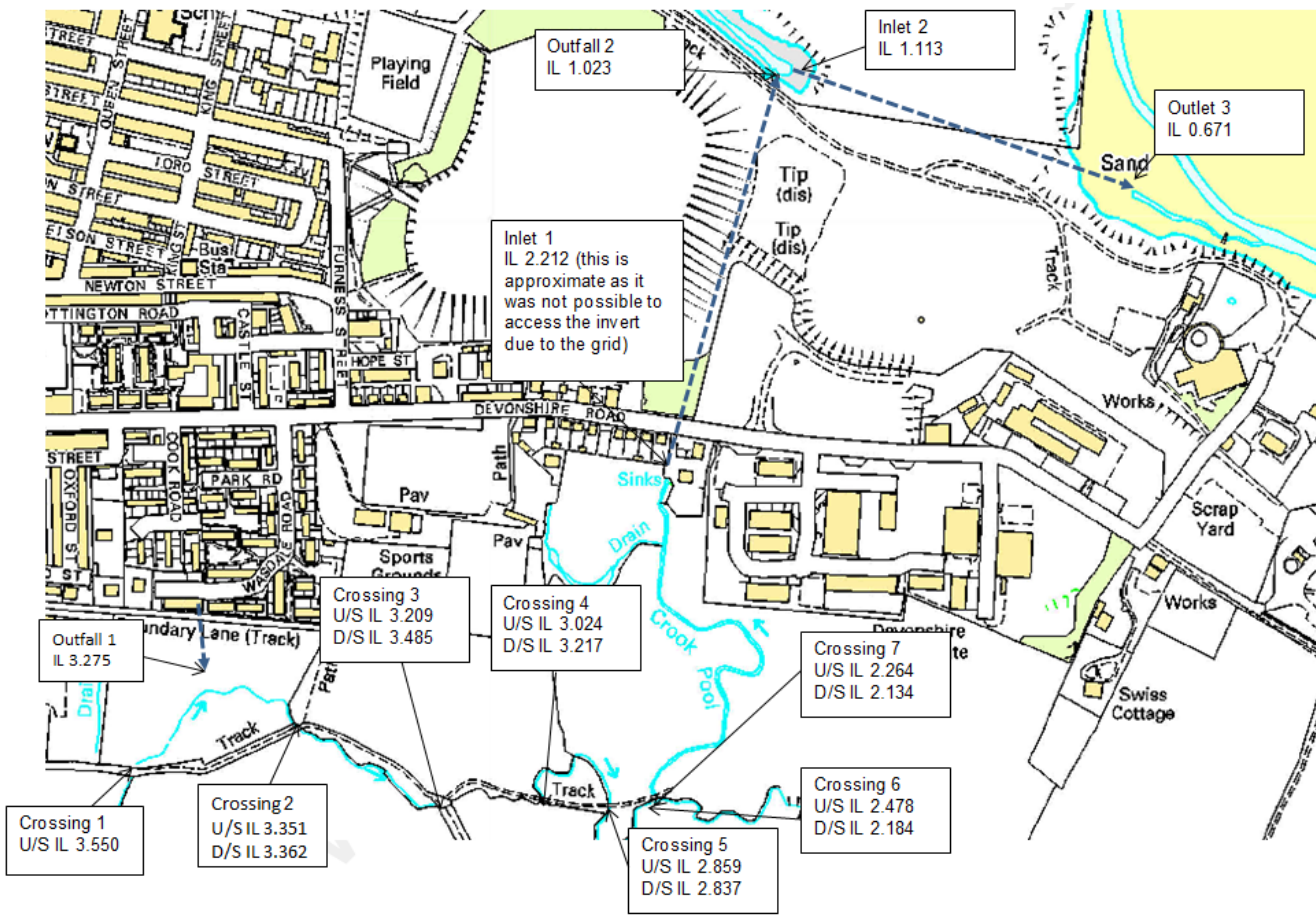
On the 30th of September 2017 the catchment received a large amount of rainfall causing high flows into the site wet well. During the day the well level rose dramatically causing pumps on site to run continually for over 40 hours. The site was spilling as permitted to do so for 30 hours stopping the local network from flooding. The site was monitored for any issues by the ICC that were passed within the correct timeframes and managed.

Other Works of Note




LLFA records mentions a UU scheme to upsize the sewers in Finch Street to reduce the risk of flooding to properties in the Finch St / Settle St area that was completed around 2012/13.





Appendix 4: LLFA Investigations




Crook Pool watercourse assessment

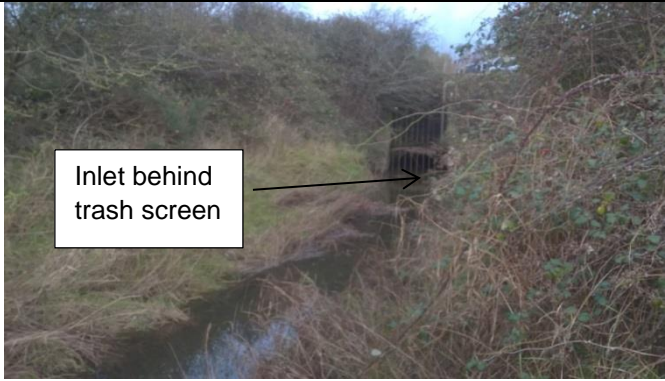




Graph of Crook Pool Levels from Outfall of surface water systems to sea

Asset Name	Levels	Constriction and Dimensions	Comments	Photographs
Crossing 1	U/S IL 3.550			 <p data-bbox="874 725 1123 786">Upstream inlet</p>  <p data-bbox="847 1173 1123 1234">Downstream outlet</p>
Outfall 1	IL 3.275	Concrete pipe 675mm dia.	Flap valve corroded and fixed in one position – needs attention	 <p data-bbox="1369 1464 1549 1525">Flap valve</p>

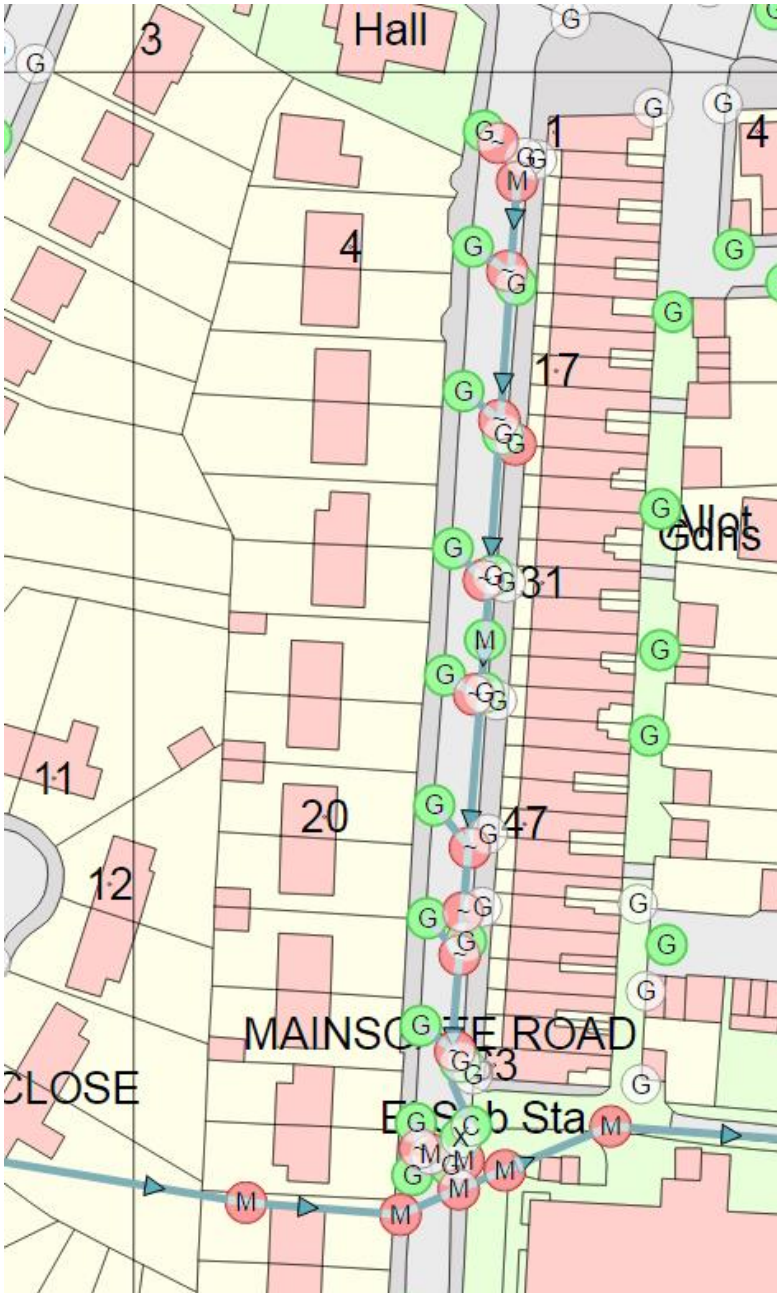
				 <p>Reeds in watercourse next to outfall</p>
Crossing 2	U/S IL 3.351 D/S IL 3.362	Concrete pipe 1100mm dia.		 <p>Upstream inlet</p>  <p>Downstream outlet</p>
Crossing 3	U/S IL 3.209 D/S IL 3.485	U/S Stone culvert 950mm high x 850mm wide D/S concrete pipe 1000mm dia.	Position of change of construction unknown	 <p>Upstream inlet</p>

<p>Crossing 4</p>	<p>U/S IL 3.024 D/S IL 3.217</p>	<p>Stone culvert U/S 800mm high x 800mm wide D/S 800mm high x 550mm wide</p>		 <p>Downstream outlet</p>
<p>Crossing 5</p>	<p>U/S IL 2.859 D/S IL 2.837</p>	<p>Stone culvert U/S 600mm high x 950mm wide D/S 650mm high x 550mm wide</p>	<p>Minor collapse at side of culvert – preliminary discussion with landowner regarding repair during inspection</p>	 <p>Upstream inlet</p>
<p>Crossing 6</p>	<p>U/S IL 2.478 D/S IL 2.184</p>	<p>Stone culvert U/S 850mm high x 850mm wide D/S 900mm high x 800mm wide</p>		 <p>Upstream inlet</p>
<p>Crossing 7</p>	<p>U/S IL 2.264 D/S IL 2.134</p>	<p>Stone culvert U/S 1100mm high x 1000mm wide D/S 1200mm high x 900mm wide</p>		

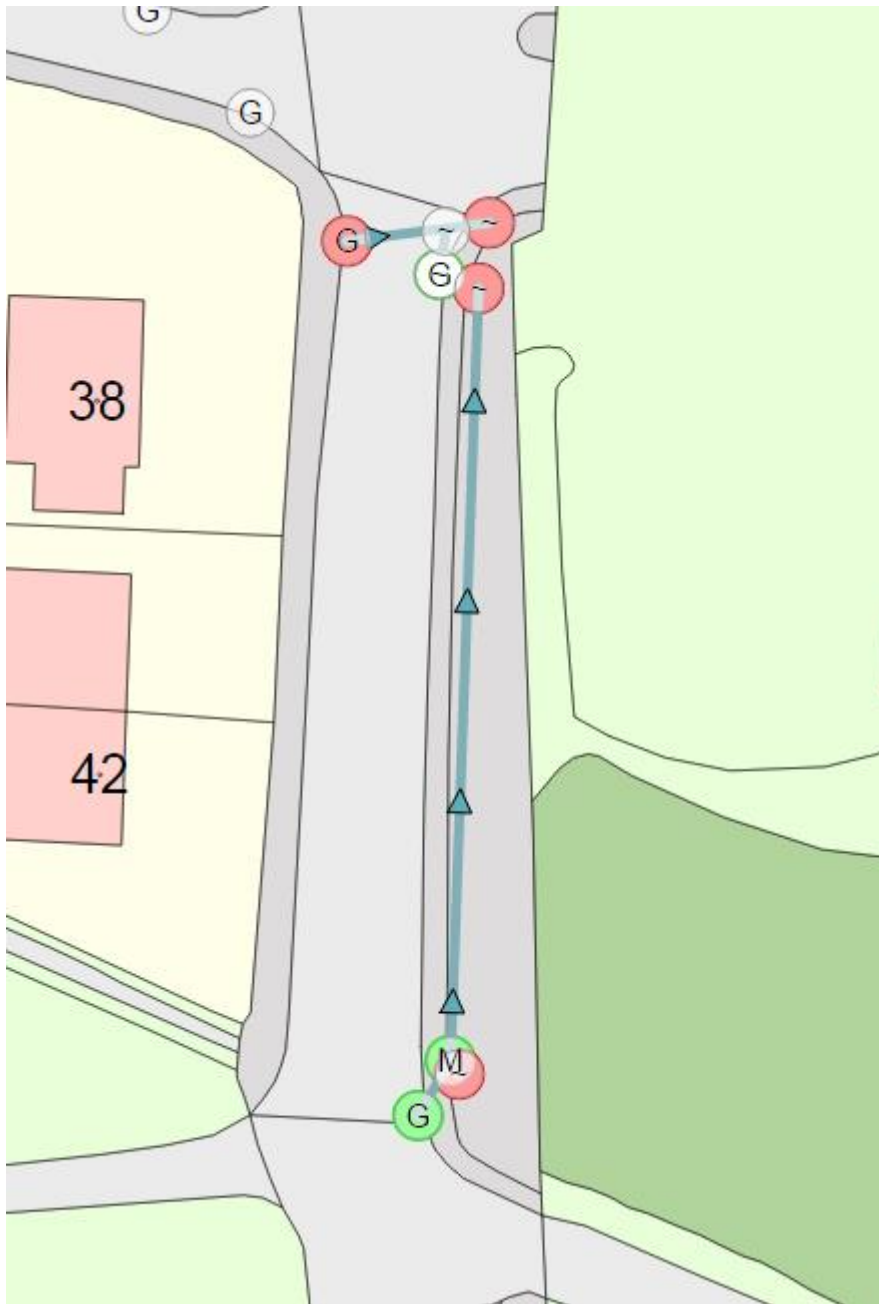
Inlet 1	IL 2.212 (this is approximate as it was not possible to access the invert due to the grid)	Concrete pipe with sluice gate and grid Inlet approach 2000mm wide culvert approx. 1300mm dia but unable to measure accurately		
Outfall 2	IL 1.023	Concrete pipe 1500mm		
Inlet 2	IL 1.113	Concrete pipe 1700mm dia	Some stones at entrance – would benefit from removal	

Outfall 3	IL 0.671	Concrete pipe 1550mm dia.		
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Damaged Highway Drainage Assets



Damaged Highway Drainage in Mainsgate Road by ENW cabling work from no 1 to 63

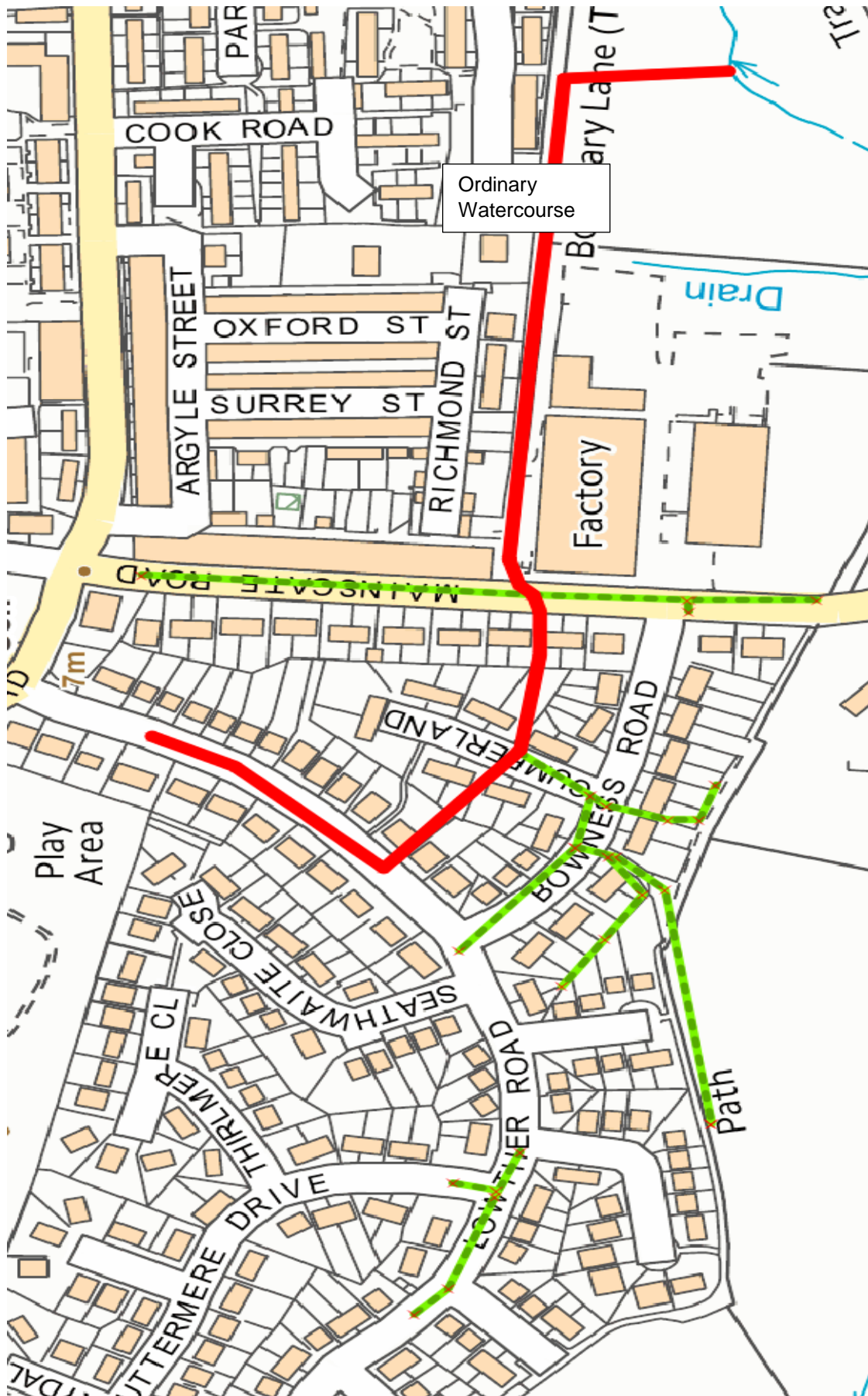


**Damaged Highway Drainage
in Mainsgate Road by ENW
cabling work next to CPG
Factory**

Programme of Gully Emptying for Copeland

Annual Copeland Gully Clean April 2017 - March 2018									
Month	Area	Gullies	Days	Est Start	Est Finish	Start	Finish		Remarks
Pre KaarbonTec asset collection									
Apr-17	Egremont East	B3K4	476			06/04/2017	11/04/2017		
	Cleator Moor North	B3A4	322			03/04/2017	06/04/2017		
	Egremont West	B3C1	564			11/04/2017	18/04/2017		
	Arlecton Ennerdale	B3A2	568			12/03/2017	28/03/2017		
May-17	Keekle Arlecton	B3A1	556			19/04/2017	30/05/2017		
	Whitehaven	B5K2	592			28/04/2017	18/06/2017		
	Kells	B5C1	259						
Jun-17	Ravenglass	B3A6	146			08/05/2017	09/05/2017		
	Millom	B3C6	1169			10/05/2017	21/06/2017		
KaarbonTec software asset collection									
Jul-17	Thwaites Duddon	B3C5	266	3.3	12/07/2017	17/07/2017	12/07/2017	17/07/2017	0.00
	Wasdale	B3K5	313	3.9	17/07/2017	20/07/2017	17/07/2017	28/07/2017	8.00
	Gosforth Seascale Drigg	B3A5	849	10.6	21/07/2017	04/08/2017	31/07/2017	11/08/2017	7.00
Aug-17	S.E Egremont	B3C4	427	5.3	07/08/2017	14/08/2017	14/08/2017	25/08/2017	11.00
	Middletown	B3C2	606	7.6	15/08/2017	23/08/2017	29/08/2017	06/09/2017	14
	Bigrigg StBees	B3K1	560	7.0	24/08/2017	04/09/2017			
Sep-17	A5093	TM	514	6.4	05/09/2017	14/09/2017	06/09/2017	18/09/2017	4.00
	A595	TM	1325	16.6	14/09/2017	06/10/2017	19/09/2017	23/10/2017	17.00
Oct-17	A5086	TM	435	5.4	09/10/2017	16/10/2017	24/10/2017	02/11/2017	T.M.
	Moor Row / Cleator	B3K2	348	4.4	17/10/2017	23/10/2017			
	Woodhouse Greenbank	B5C2	258	3.2	24/10/2017	27/10/2017			
	Mirehouse West	B5C3	237	3.0	29/10/2017	01/11/2017			
Nov-17	Highfields / Hillcrest	B5K3	535	6.7	02/11/2017	10/11/2017			
	Cleator Moor	B3K3	479	6.0	13/11/2017	20/11/2017			
	Frizington	B3A3	397	5.0	21/11/2017	27/11/2017			
	Morasby Parks	B5A3	333	4.2	28/11/2017	01/12/2017			
Dec-17	Lowca / Parton	B5A2	414	5.2	04/012/17	08/12/2017			
	Pica / Moresby	B5A4	343	4.3	11/12/2017	15/12/2017			
	Distington / Gillgaran	B5A1	496	6.2	16/12/2017	22/12/2017			

Surveyed Highway Drainage Assets, including piped watercourses



Appendix 5: Environment Agency

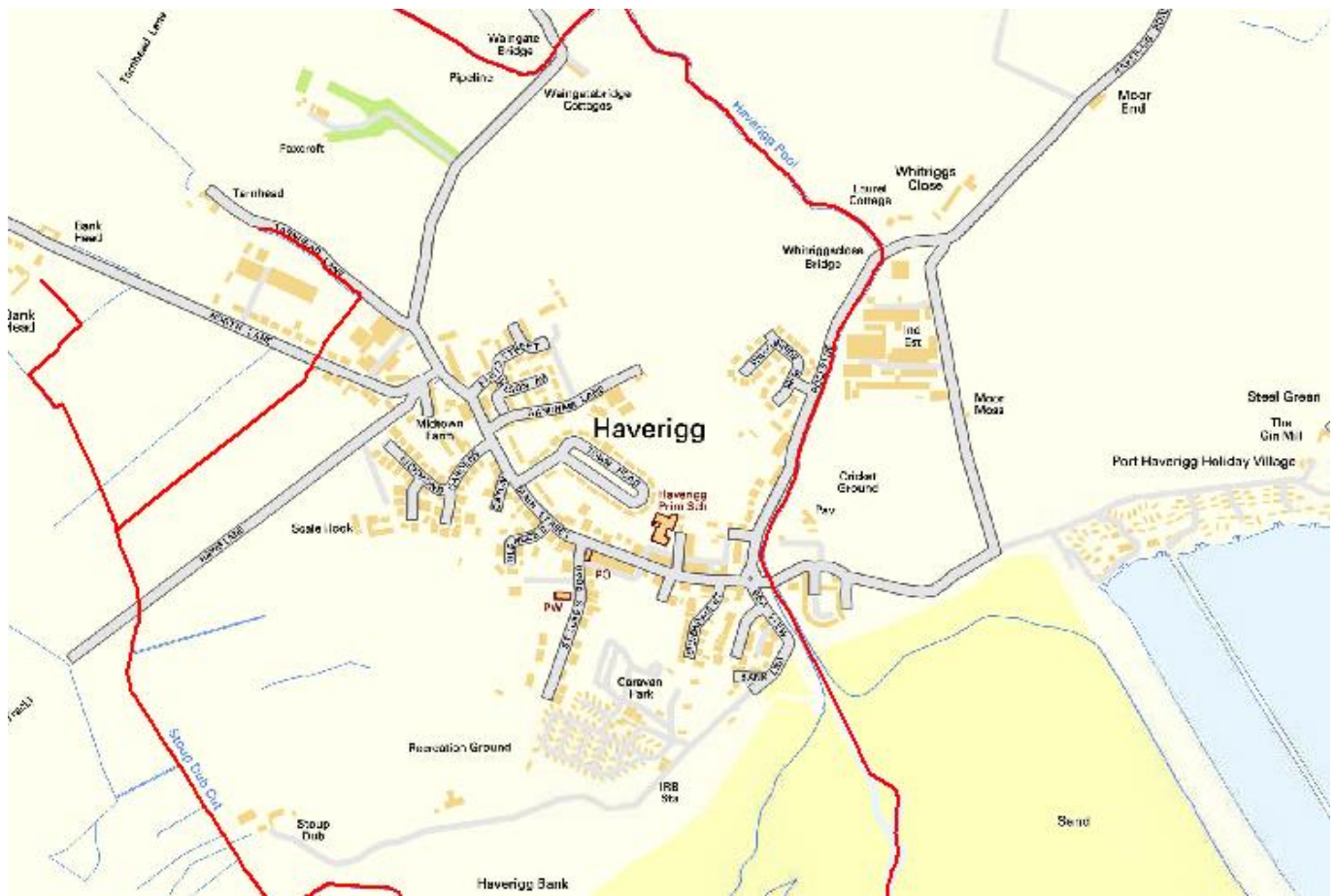


Figure 18: Main rivers within Haverigg

Maintenance Plans for the EA can be viewed at the following website address <https://www.gov.uk/government/publications/river-and-coastal-maintenance-programme>.

This includes details for the EA assets in both Millom and Haverigg.

The following information summarises the regular maintenance carried out by the EA in the Millom area –

- Salthouse Pool, Screen clearance on regular grid runs and ahead of forecast heavy rainfall (NGR: 317417, 480667)
- Salthouse Pool, Culvert outfall – flapped (NGR: 317503, 480585)
- There are also tidal embankments and flaps that are EA maintained to the north-east

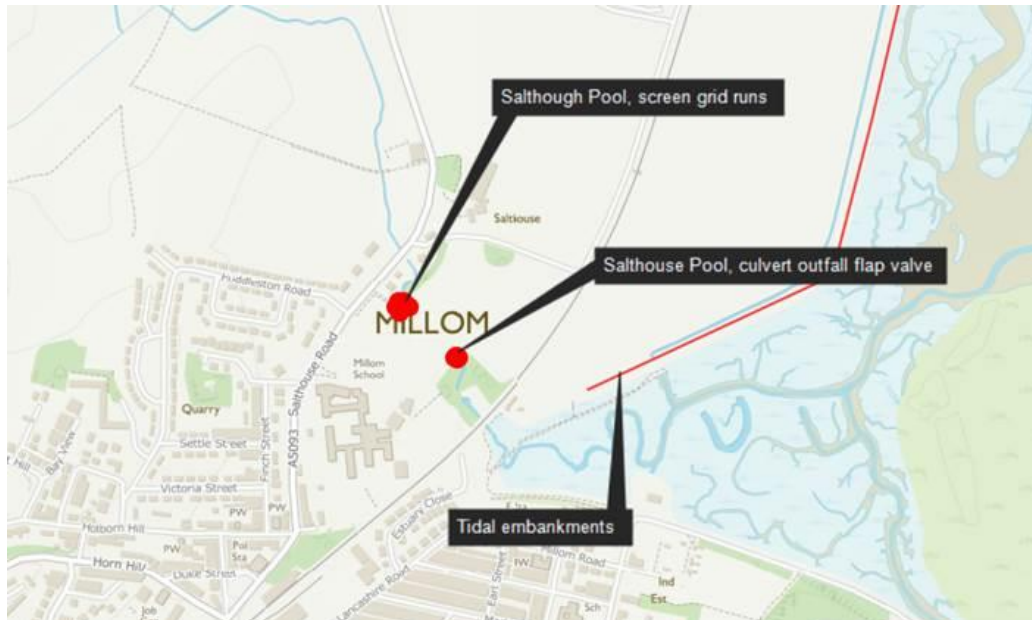


Figure 19: Assets maintained by EA in Millom

In Haverigg the EA maintain the following assets –

- Stoup Dub Cut, Haverigg Bank, screen clearance on regular grid runs and ahead of forecast heavy rainfall (NGR: 315548, 478204)
- Haverigg Pool, right bank upstream of Whitriggsclose Bridge, raised embankment (NGR: 316194, 479226)
- Haverigg Pool, Raised Floodwalls both banks and tidal flap valves, from Whitriggsclose Bridge to Harbour Hotel Bridge
- Haverigg Pool, Raised Floodwalls right bank and tidal flap valves, along Sea View



Figure 20: Assets maintained by EA in Haverigg

It is considered that the EA assets performed well during the event and there have not been any reports of any back flow from the sea side of the defences during the event. It is therefore considered that the main rivers within both the Millom and Haverigg catchments did not have an impact on the flood event.

Appendix 6: Network Rail

Network Rail Assets

The Cumbrian Coast Railway Line runs from Barrow-in-Furness to Carlisle passing through Millom. As it passes through Millom it crosses the main river known as Salthouse Pool. In this location there is a river crossing with a tidal flap as indicated in the following photograph.



Photograph 2: Cumbrian Coast Railway Line river crossing

There is no evidence that any drainage systems close to flooded properties interact with the Salthouse Pool watercourse and, therefore, it is considered that the Network Rail asset has not had any impact on the flooding that occurred on the 30th September 2017.

Appendix 7: Feedback from Residents and draft report

The following comments were received from residents after the information gathering flood forum on 12th October 2017:-

Mainsgate Road / Bowness Road / Cumberland Close / Lowther Road

- Surface water often collects on the highway in front of 1 & 3 Bowness Road and this build-up of water was one of the sources of the flooding. This is often an issue during heavy rainfall.
- How often is the drainage system maintained and cleaned
- How has an electricity cable been allowed to run through a surface water drain
- When was the road last swept
- Were the pumps working and can details of this be included in the report
- Footway at the rear of Bowness Road used to be a watercourse but has become filled up over the years
- Water started to recede about 13:30 with manhole Bowness Road / Mainsgate Road was draining and making loud noises
- Surface water was running off from the field behind Bowness Road
- Drains surcharging including toilet backing up
- Mainsgate Road – toilet slow to flush at 08:45 with surcharging from manhole in the garden about 09:30

Surrey Street / Oxford Street / Richmond Street / Wasdale Road

- Heavy downpour approximately 09:50
- Back street flooded about 09:30 with water gone by 12:30
- Water went down really fast in approx. 1 hour
- Water entered both back and front for some with surcharging from combined manhole
- Rainfall exceeded drain capacity and surcharging from toilet

Lonsdale Road / Market Street / Albert Street / Newton Street etc. area

- Some flooding from surcharged drain in back lane of Lonsdale Road
- Flooding began about 10:00 and started to abate between 11:30 – 13:00
- Water was to front step on one property but flooding in from the back
- Gully in back lane covered with soil and weeds

- Who is responsible for cleaning back lanes
- Heavy rainfall from 06:00
- Rainwater on roof looked like a river
- Flooding from back and front in Market Street
- Some of the back lanes appear to be sinking – could this cause a problem
- Earl Street drainage also seemed to impact on the flooding in Market Street
- Were the pumps working
- Flooding also increased by cars driving through the flood water
- Problem with parked cars when gully cleaning
- Leaves and general debris blocking gullies
- How are watercourses managed – never seen any clearing or dredging

Pannatt Hill

- Drains backed up and house flooded at approx. 09:50 then disappeared 13:00
- Drains on the footpath to the rear of no's 43-45 etc. are blocked

Holborn Hill / Victoria Street

- Flooding caused by flash flooding
- Previous flooding in October 2006 and October 2010
- Surface water noticed running down Festival Road
- Surface water runs past drains
- Often bus company park over drains so notification required before cleaning of gullies
- Surface water rushed down footway between Victoria Street and Holborn Hill

The following table details comments received by Cumbria County Council

Comments	Cumbria County Council response
Appears to be lack of gully maintenance	At the draft report meeting Doug Coyle of Cumbria County Council accepted that Cumbria County Council could do more to ensure the gullies were more consistently cleaned and explained that new systems (Kaarbontech) were being introduced to enable to carry out maintenance in a more efficient way. Also in future there would be better collaboration between United Utilities and Cumbria County Council to ensure a more consistent cleaning approach to both gullies and sewers.
Concerns were raised regarding the rainfall recorded at Lanthwaite rain gauge and the flooding that occurred	Further investigations have been carried out and additional information has been obtained regarding the rainfall event – this has been updated within the report.

Appendix 8: 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):

www.cumbria.gov.uk/highways-pavements/reporting-problem-on-a-highway/

or contact the Highways Hotline on 0300 303 2992

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

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

Copeland Borough Council's Building Control team can offer assistance to Millom residents affected by flooding that are concerned about the condition of their property. Assistance can be sought by uninsured residents who believe their property may have been damaged as a result of flood water entering or laying underneath properties (in basements etc.). If you are a home owner, don't have buildings insurance and would like expert advice around the structural condition of your property, contact the Building Control team on buildingcontrolmailgroup@copeland.gov.uk

Flood Re

We're also aware that some people are finding it difficult to get insurance that covers flooding, or are facing large increases in premiums when their policies come up for renewal. It's worth taking a look at Flood Re, a national scheme established in the last couple of years to ensure people living in flood risk areas have access to affordable home insurance:

<https://www.floodre.co.uk/Recycled furniture> – information can be found here

<http://www.recycleforcumbria.org/recycling/reuseorganisations.asp>

Lancaster University have resources on **flooding and children**, that do a good job of explaining what the impacts are on children although this is more aimed at staff/professionals than families:

<http://wp.lancs.ac.uk/cyp-floodrecovery/>

And page of reports/resources:

<http://wp.lancs.ac.uk/cyp-floodrecovery/what-weve-produced/>

The Flood Advisory Service provide a step by step guide for homeowners to help them to understand their flood risk and advise how to make homes more resilient. There will be copies available in Millom library from Monday or those people who don't have access to the internet. This is the link to the webpage [Managing your Flood Risk](#)

Grant support available for flood affected households:

Individuals and families affected by the recent flooding in Millom and South Cumbria are eligible to apply for financial support from Cumbria Community Foundation's Cumbria Disaster Fund; priority will be given to uninsured households with low income. More details are available on the CCF website: <https://www.cumbriafoundation.org/fund/cumbria-disaster-relief-fund/>

Advice Re: Cleaning & Salvaging Flood Damaged Items:

'Protecting Precious Memories Toolkit'- developed by York Archaeological Trust it give advice on cleaning & salvaging objects. It is available here

<http://www.cumbria.gov.uk/emergencyplanning/supportingpages/floodingadvice.asp>

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.

আপনি যদি এই তথ্য আপনার নিজের ভাষায় পেতে চান তাহলে অনুগ্রহ করে 01228 606060 নম্বরে টেলিফোন করুন।

如果您希望通过母语了解此信息，
请致电 01228 606060

Jeigu norėtumėte gauti šią informaciją savo kalba,
skambinkite telefonu 01228 606060

W celu uzyskania informacji w Państwa języku proszę
zatelefonować pod numer 01228 606060

Se quiser aceder a esta informação na sua língua,
telefone para o 01228 606060

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