

Yorkshire North York Moors Flood History - Esk, Rye, Pickering Beck, Derwent, Leven

Gauged records for the River Rye at Helmsley are not long enough to give a reliable indication of the risk of floods of 100 year return period or greater which are typically required for flood risk assessment. The longest record on the Rye above Helmsley is for Broadway Foot (NGR 44 560 883) with a record of 28 years, and downstream from Helmsley for Ness (NGR 44 696 791) with a record of 31 years.

Sources of Information

Historical flood information comes from a variety of sources but it has the general characteristic of being discontinuous. It comes to the attention of the observer(s) as a consequence of the rarity of occurrence which may be judged in different ways by different people and sources. The principal information comes from newspaper reports, which in Northern England starts with regional newspapers based on Newcastle in 1710 (Newcastle Courant) and the Leeds Mercury in 1731 whilst newspapers based in York commence early in the nineteenth century. Local newspapers start in the second half of the nineteenth century including the Malton Messenger in 1854. For this analysis the various newspapers were used for different periods depending on their availability as microfilm in local libraries. A preliminary review of potential flood dates was established from the BHS Chronology of British Hydrological Events.

A search was made of British Rainfall (annually from 1863 to 1968) for climatological information relating to floods. Information on early floods (1722 and 1754) was sought in the North Riding Quarter Sessions Order Papers which include orders and payments made for the repair and rebuilding of bridges consequent upon flood damage. In addition the Parish Record for Helmsley from 1576 was examined in relation to deaths in flood events. Some additional information was found in Helmsley Church Parish Records for the end of the nineteenth century, but these records are intermittent and were not found to be particularly helpful.

In the era before telegraphy, reports depended on access by reporters and reports by travellers; hence the absence of a flood report at a particular site does not necessarily imply that flooding did not occur.

A further difficulty in comparing flood magnitudes between historic and recent events is in the construction of new property at vulnerable locations, and sometimes the removal of old properties. However, such detailed analysis is outside the scope of this report.

Catchment potential for flood changing over historic period

Land use change and river regulation have the potential to change the flood generating properties of a river catchment thus creating inhomogeneities in the historic flood series.

The main change in land use in the Rye catchment has been with respect to recent afforestation. The main forest areas are on the steep valley sides but there is also limited development on moorland below 260 m AOD, notably at Helmsley Moor and Rievaulx Moor to the north of Helmsley and Wass Moor to the southeast of Helmsley. Afforestation and associated drainage has the potential for altering flood flows through changes in evaporation, interception, soil capacity and storage. That drainage and afforestation can significantly alter catchment yield and flood risk on small catchments has been demonstrated in a number of studies notably by Robinson (1998), Effects on flood risk on larger catchments have been much harder to demonstrate and O'Connell (2003) notes that no unequivocal demonstration of the hydrological effects of upland drainage and afforestation has been made on catchments greater than 10 km² in the UK. Studies by Archer (2003) confirm the limited impact of afforestation on river flashiness on a catchment 335 km² in area (River Irthing, a tributary of the Eden). The afforested area and percentage

of the Rye catchment are low and are unlikely to have had a significant influence on flood risk.

Changing climate

The purpose of assessing flood discharge of a given probability of occurrence is to provide a basis for determining the risk of occurrence of similar floods in the future. However the exercise is only valid insofar as present and past climate provides a reasonable representation of future climate. Modelling of global and regional climate suggests that global warming, driven by the rapid and continuing increase in emission of greenhouse gases to the atmosphere, will result in extremes of both floods and droughts becoming more frequent. Such climate changes present problems not only for the use of historical information but also for the standard methods of single site and pooled data analysis.

A particular effect of global warming, already observed in some parts of Britain, is the reduction in frequency and amount of snow and consequently a reduction in severity of snowmelt flooding. Whilst snowmelt flood runoff is uncommon in the Rye catchment, there is historical evidence of very heavy snow and associated flooding in 1867, 1878, 1882 and most recently in February 1991. The upward trend in winter temperatures is likely to lead to a reduced risk of snowmelt flooding, the occurrence of a larger proportion of precipitation as rain, a reduction in the duration and depth of snow cover and the more frequent interruption of accumulation by melt before there is sufficient depth to generate flooding. A reduction in snowmelt flooding might be offset in part by an increase in flooding from winter rainfall.

Apart from global warming, past and future climate may be affected on a decadal scale by changes in oceanic-atmospheric circulation patterns and in particular, with respect to Britain, the North Atlantic Oscillation. Such changes may be reflected in the occurrence of historical flood-rich and flood-poor periods. These variations may or may not be directly related to global warming and it could be argued that the inclusion of a wider range of such periods in historical data than is available from gauged records, even when pooled, is an advantage in assessing flood risk over a future long period during which such oscillations may recur.

Flood Chronology for North York Moors including River Esk, Rye Pickering Beck and Derwent

Date and sources	Rainfall	Description
Jun 1725		Quarter Sessions Bridge Accounts for 1725 note payments for the repair of Whitby bridge and for the rebuilding of the bridge at Sleights (River Esk) which was 'by the violent floods lately driven down.
NYQSBR Ralph Ward Diary		Ralph Ward's Diary notes that a flood occurred at Boulby on the coast near Staithes which was there 3 or 4 feet higher than the flood of 1754. No reference was found to flooding on the Rye or Derwent
9 Jun 1735 Newcastle Courant 21 Jun		Helmsley: We learn that the river was so prodigiously swelled by the rising of springs from the heavy rains that one part of the town lay in the utmost danger of being carried away and that a great many sheep and black cattle were swept away by the sudden floods.
12 Jun 1748 Gentleman's Magazine		Between Malton and Scarborough there was the greatest storm of thunder and lightning seen here in the memory of man. One man was reported killed. (Thunderstorms were also reported from Essex and Surrey (hail 7 inches in circumference), Warwick and Reading. 'The heat in Paris was so great as to confine people indoors. It was also very hot here')
28 Oct 1754		1. A very severe flood at Helmsley but also on other rivers in North Yorkshire.
Universal magazine		The Universal Magazine (1754) notes" A sudden inundation of the river Rye happened at Helmsley in Yorkshire, such as had never been known by the oldest people in those parts, probably occasioned by the late heavy rains. Two houses were entirely washed away , the one inhabited by James Holdforth, he and his whole family drowned, except his wife, who being sick in her bed, was carried down the stream half a mile, and at last washed off into a field, where she was found the next morning very little hurt. The other house belonged to John Sunley, was also drowned, and all his family. In the whole thirteen persons. Two other houses were greatly damaged, as was also the stone bridge at the entrance to the town; fourteen
James Pape's Diary		hay-stacks were driven down the river a mile, on one of which was a half year old calf, who kept its footing, and was taken off alive. The kitchen-garden walls, and part of those of the park, belonging to the fine seat of Thomas Duncombe Esq were washed away. Two large bridges, one of stone, the other of wood, at Rivaulx, were driven down, as were several more lying upon the river Rye, and others damaged.
Ralph Ward's diary		
Quarter		

Session Bridge
reports

Newcastle
Courant

Gentlemen's
Mag.

A malt-kiln, with a large quantity of malt and cinders at Rivaulx, belonging to Robert Berry, were utterly destroyed. The water formed a vent for itself, by forcing through the wall of his kitchen, which prevented the house from being driven down; the man and his family saved their lives by getting up into the chambers. There had also been terrible havock among the inhabitants at Rivaulx, as well as at Helmsley, by damaging of houses and drowning of cattle. One Simpson, a farmer at Rivaulx, had seven calves drowned; and Robert Sandwith's tanyard at Helmsley, were utterly destroyed, and leather washed out of the pits to a great value.

John Pape's Diary notes: "October the 28th, 1754:- A great and trable flud of water came by the rever Reye to Helmslay blakeymour, which came with such veamancy that it drove to the ground 8 houses, 5 dwelling houses. Thorten poure creators wear dround besides a great deal of catel, hey and corn staks. It drove down most part of Helmsla Bredg ... and Revolx bredg down to the ground, and part of Bow bredg and Shacan bredg and abundance of damage in the country besides... A while after a flood came by Borrow Beck, which filed William Ward and John Bentley's selars, and was very ney running down the market place, and water came on Bondgate as beg as Rey Bek..... in addition on p 174 it states "...at the time of the Rye Flood (1754), Robert Sandwith suffered severe loss when his [Helmsley] tanyard was swamped 'the leather being washed out of the pits to great value'.

Quarter Sessions Bridge Accounts 1754 to 1756 refer to payments for the rebuilding or repair of numerous bridges in North Yorkshire, including rebuilding of Shaking Bridge (upper Rye) and Helmsley, 2. The river Derwent was never known higher in the memory of man. Mr Creasor, of Ferby, near Malton, was drowned near Westow, in his return home from Pocklington fair". (Universal Magazine)

Ralph Ward's Diary refers to the flood at the end of October 1754 He lived in Guisborough. "Seldom a bigar has been known in these parts. In my way to Boulby went to Dale House Mill to view the bridge how it was after the great flood, all about it lookt well but that the flood there seemed not to have been so high by 3 or 4 feet as that of June 1725".

Newcastle Courant (Nov 2 1754) notes: "On Monday last a man was crossing the bridge at Heaton Rudby (Leven) in Yorkshire, it broke down and the man was drowned. Likewise at Stokesley the flood was so

violent that the damage was computed at £100 and that it likewise did considerable damage at a village near Allum-banks.

Thirsk bridge was entirely washed away, and the inhabitants suffered great damage, but no lives lost." (Universal Magazine).

Quarter Sessions Bridge Accounts 1754 to 1756 refer to payments for the rebuilding or repair of numerous bridges in North Yorkshire, including bridges at , Whitby, Sleights and Egton (Esk), Hutton Rudby and Leven Bridge (Leven), Masham,, South Ottrington, Thirsk, Willow, Wath, Thirsk, Exley, Granton, Yore, Kilgram, Howdon, Mill, Gilling, Scrawton, Howdon, Pickering,

Gentleman's Magazine summarises much of the material given above but notes also severe flooding in Glamorgan where a stone bridge over the Taff was washed away and Carmarthenshire.

8 Sep 1766

"Three dwelling houses at Eastrow, on the River Esk and two bridges, have been carried away, near Whitby, in Yorkshire, by a great land-flood."

Nothing specific about Rye or Derwent

7 Jul 1787

Newcastle Courant (July 7) notes that "on Wednesday last there was in York and neighbourhood a storm of thunder and lightning rain and hail as ever was remembered. The miller of Aklam was struck down".

Newcastle
Courant

Also very heavy rain generally over north of England in October and November.

Chronology of British Hydrological Events states, after coverage of the 1754 Rye flood, that Cooper (p12) describes 'another Borobek flood in 1787' [R. Rye]

CBHE

Nothing specific for Rye.

Cooper

YG describes a sultry summer day and a horseman having seen the severity of the storm as a waterspout on the hill galloped into Helmsley to warn the residents in the lower part of the town. He told them to get out or they would be drowned. An old woman was carried out into the street at Ryegate. In a house in High Street the water came in in a rush and was carrying off a cradle with a baby in it. She rushed to catch it as it was floating out of the door. An empty wagon 14 feet above the river level was carried off and blocked a wooden bridge downstream and all went down together. It was also blamed for the destruction of several other bridges. Pigs were drowned but there was no loss of human life. The water came down Bondgate; it would have come down the valley called Ashdale. At the place where the largest volume of water fell, it made an immense hole, uprooting trees, shale, rock and earth. But 100 years of rain and

Yorkshire Gaz.
14 May 1887

Derby Mercury
17 Jul 1787

frost have filled the hole so that it is not distinguishable from any other slope.

A further note in YG 1887 copies a letter of the time. 'We were in a very sudden manner alarmed by an uncommon large body of water coming down Church Street (High Street) with such rapidity as to bear all before it. It came down the Borough Beck and filled all the lower rooms of the houses, washing away furniture and making the houses uninhabitable. People were rescued by persons on horseback. After about an hour the water subsided.

Derby Mercury includes a letter from Helmsley with the same information as contained above. Also: A considerable portion of the water flowed through the Market Place (behind which on the west side the rivulet runs) covering nearly the whole of it and forcing its way with an incredible fury. A wagon was carried out of Church Street and stopped by the bridge. A malt kiln is washed away on the other side of the brook. Several bridges have their battlements entirely swept away and their foundations much injured. The arch at the lower end of the town through which the rivulet discharges into the River Rye is greatly broke down and the foundations shattered.

During a violent thunderstorm 8 sheep were killed at Yedingham (SE of Pickering).

[Storms with severe hail occurred widely in Britain and Europe.]

Stokesley::Tthe Leven overflowed and the streets of the town were completely overflowed. And many houses flooded. On the following day there was another heavy fall of rain giving an even higher flood in Stokesley. 'Such a flood has not been known for many years'.

The river Rye overflowed its banks to an extent not seen in the last 30 years causing much loss to farmers from Nunnington to Ness and Salton. The Holbeck at Gilling was not flooded.

The beck which runs through Gilling was more flooded than at any time since 31 May 1815. The thunderstorm was accompanied by violent hail.

Whitby: Rain commenced at 3 in the morning and continued till 9 at night. The flood came on very rapidly and in the harbour rose 3 perpendicular feet in half an hour at low water.

8 Jul 1816
Royal Cornwall

Gaz 3 Aug
12 Jul 1828
Yorkshire
courant 22 Jul

15/16 Jun
1830
Yorkshire Gaz
10 Jul

28 Jun 1830
Yorkshire Gaz
10 Jul

30/31 Jul 1839 Widespread and
York Herald persistent rainfall on
Tuesday night and all

<p>20 Sep 1839 Manchester Times 28 Sep</p>	<p>of Wednesday with strong NE wind</p>	<p>Whitby: The heavy rains caused the tributary becks to overflow the River Esk. Several herds of cattle were carried into the German ocean with wheat in sheaf and whole trees. The abutment of one of the railway bridges was destroyed and the bridge rendered impassable to the coaches. A farmer at Brigswath lost much wheat in stook. The river is at least a foot higher than 'the last we had to notice'.</p>
<p>21 Jul 1840 Yorkshire Gazette 25 Jul 1840 Archer (1992) Blakeborough (1901)</p>	<p>The accident is attributable to the heavy and sapping rains which have fallen in the neighbourhood and indeed throughout the country for some weeks.</p>	<p>Yorkshire Gazette (26 July) notes "The accident is probably attributable to the heavy and sapping rains which have fallen in the neighbourhood and indeed throughout the country for some weeks". Also noted that an awful thunderstorm occurred at Nun Monkton on 14 July and that the storm came from the southwest.</p> <p>Ayton Baptism Register reported in Blakeborough (1901) describes a severe flood on the neighbouring River Leven. "About midnight on Tuesday 21 July 1840 there was a most extraordinary and heavy rainfall on the whole neighbourhood but heaviest on the hills above Kildale, that is in Commondale etc. It filled the upper lake at Kildale near Westhouse, so that the wear (sic) of it could not contain the water, which ran over the full length of the embankment. About 3 am the embankment gave way and the water rushed over the adjacent fields with great fury carrying down two stone bridges between the upper and lower lakes. The lower lake endured the augmented torrent for another hour or more; then it burst and came down the narrow defile with great fury and rapidity. An old mill about an eighth of a mile below Kildale Church was completely swept away; a bleaching mill a quarter of a mile lower down was nearly all washed down"</p>
		<p>The Yorkshire Gazette notes: Livesay's bleach mill and premises were destroyed, some buildings at Great Ayton were undermined and at Stokesley, shops houses and warehouses were Inundated. "Providentially a little previous warning was given and some individuals were able to secure portions of their property". Further description of the effects of flooding at Great Ayton (Leven)" in Land of Singing Waters (Archer, 1992).</p> <p>"The River Esk was unusually swollen by the same rain. At Commondale it carried away the stone bridge, at Castleton Mill it was two feet deeper than had ever been known before and in some of the narrow passages near Glaisdale, five or six feet deeper than ever known. No life was lost at Ayton but a man was</p>

surrounded and drowned near Lealholm Bridge'

Newspaper reports in referring to Lealholm (River Esk) July 1930 show that this flood was 1 foot higher than the big flood of 1840-the water mark of which is recorded on the Wesleyan Chapel".

Nothing specific found for Rye or Derwent

At Whitby the hail has done damage to windows and hot houses. No reference to flooding.

12 Jul 1843
Newcastle
courant 14 Jul
? Apr 1846
CBHE
Yorkshire
Gazette

April started with a succession of cold rainy days 'and on three of these days the rain fell without intermission'.

Extensive flooding in Ryedale. The Derwent at Malton is reported to have risen 13 feet 6 inches at Malton (compared with 14 feet in Nov 1878 and 12 feet 7 inches in January 1867). The line of the York and Scarborough Railway was flooded by the overflowing of the Derwent.

The Yorkshire Gazette reports thousands of acres of lowland under water in the neighbourhood of York and also reports severe flooding of the Don at Doncaster and Rotherham.

6 Sep 1852
York Herald 11
Sep

Pickering: the storm deluged the streets and flooded houses in low quarters. At Middleton several houses were flooded and the streets were filled with sand and gravel. On the hilly land surface soil has been carried away. Several houses were flooded at Aislaby. The roads in many parts are washed up and nearly impassable.

26 May 1854 Thunderstorm
York Herald 3
Jun

Pickering: Rain was accompanied by hail and all the streets were flooded and in the mountainous districts the roads were washed up. The road between Middleton and Pickering was converted to a beck, the water running out of the fields like a sea. The village Middleton was completely flooded.

19 Jul 1855
Yorkshire
Gazette 28 Jul
? 1857

Severe thunderstorm at Stonegrave and Nunnington [River Rye south of Helmsley] On the Stonegrave side upwards of 250 tons of soil was washed out of a field of turnips. A house in the neighbourhood was filled to a yard and a half high with water. The rain was accompanied by large hailstones.

6 Aug 1857
Newcastle
Guardian &
Tyne Mercury

Noted in the 1866 flood that a similar flood had occurred in 1857

Severe thunderstorm and flood at Scarborough sweeping the streets and gardens like a river, overthrowing walls and flooding houses, drowning several pigs and a horse in a stable. In New Queen Street a large number of houses being built there were washed down. The bridge crossing the road to Burniston was destroyed along with part of an adjoining mill. The bridge near the cemetery suffered the

15 Aug
Leeds
Intelligencer 8
Aug

same fate. At Scalby a house was completely washed away. The mill at Newby was washed down. LI reports heavy rain fell during the day but then in the evening a thunderstorm followed for 3 hours. Near the bottom of merchant's Row a main sewer burst under the Britannia Inn and tore up streets down to the Fish Market. Many drains burst elsewhere and houses were completely flooded. The garden walls beside The Plantation and down to Vernon Place were borne down. Some houses in process of erection in New Queen Street were demolished. Scaleby Mill on the side of a small stream which runs into North Bay was entirely washed down. Few families escaped some degree of inconvenience. A landslide occurred on the eastern face of Castle Hill leaving a precipitous face 200 feet high. A landslip also occurred on a railway embankment at Warmsworth in South Yorkshire.

18 Jul 1859
Westmorland
Gaz. 23 Jul
23/24 Jun
1861
Westmorland
Gaz.
Yorkshire Gaz
29 Jun

A thunderstorm in the Malton area continued from 6 in the evening to 3 or 4 the next morning. A few sheep died from lightning and some trees were struck but the main effect was from the floods. The drainage was unable to take the flow and numerous cellars and shops were flooded.

The Vale of Pickering was traversed by a severe thunderstorm with rain and showers of hail and ice. Cattle and horses killed by lightning at Scampston. The only reference to flooding is with respect to the York and Scarborough Railway which was flooded for some time.

Hail was reported to be between the size of nuts and walnuts. Many animals killed by lightning – horse, donkey, cattle sheep.

25 Sep 1861
Yorkshire Gaz
28 Sep
20 May 1864
BR

Severe thunderstorm in Ryedale and the base of the Moorlands. A new system of drainage in Malton was unable to take the flow and water was a foot deep on many streets; cellars and basements were flooded. Streets and houses were also flooded at Norton.

In Yorkshire, on the 20th, there were some tremendously heavy but very local falls of rain and hail, along the Vale of Pickering. The Rye and Derwent, which previously were lower than for years, were filled with flood-water on the 21st, and carrying down stones, trees, &c.

Carlisle Journal
27 May 1864
Yorkshire Gaz.
28 May

The storm broke out with most severity on the north side of the Vale of Pickering affecting the towns of Helmsley, Kirby, Sinnington and Pickering etc. Roads and fields were at once flooded and streams rose with unexampled rapidity carrying down trees and rocks. A man was killed by lightning near Kirkby.

Hailstones the size of nuts fell for some time with much glass broken at Allerston. Fruit and leaves are cut

off trees.

The Rye and Derwent which had initially been at their lowest for several years were filled to the top with flood water. The storm was accompanied by large hail in some places. Animals were killed by lightning. Yorkshire Gazette reports that heavy rain set in and continued the whole day on Wednesday and through Thursday (30 Aug) morning with a strong accompanying gale from the north. British Rainfall reports rainfall at neighbouring locations for 30 Aug. – Filey (1.92”), Ripon (1.91”), Yarm (1.70”), Scarborough (1.82”).

30 Aug 1866

Rain fell continuously during the whole of Wednesday (29th)

Yorkshire Gazette

Newcastle Chronicle

"Floods in the North Riding of Yorkshire: Destruction of a railway bridge: Malton, Thursday August 20th. The continuous rains of Wednesday have (for the second time this summer) caused great districts of the North Riding valleys to be inundated, causing a destruction of farm property, from which the county has not suffered since 1857, when a similar flood occurred. The late rainy season has so saturated the land that the whole of the last extraordinary rainfall ran rapidly off into the streams, and in that short period the North Riding rivers have risen from summer level to a state of flood. So heavy was the rain of Wednesday that the return railway journey from the Whitby Agricultural Show to Malton was made through an infinite array of cascades, every glen of the romantic Newton Dale being overcharged with water from countless contributory streamlets. In Ryedale the rivers have risen rapidly, and above Newsome Bridge have either burst or overflowed the banks. This morning large tracts of country under crop are flooded, and in some places so deeply that the heads of the growing crops are only just above water. Of course all the pastures will again be spoilt for a time by the mud left by the flood water. The old Derwent, with the rapid flow of the moor streams, has again overflowed, and a railway journey to Pickering shows the extensive grazing lands one sheet of water for miles. At noon, the waters were still rising and it was feared the country of the Derwent proper, from Malton downwards, would also become extensively flooded. "

1866 August 31 "Malton, Friday: It is thirty-five years since any approach to the scene of desolation witnessed to-day in the fertile vales of North Yorkshire has occurred. The constant rains of the last fortnight, culminating in the enormous rainfall of Wednesday, have carried destruction along the course of every river. Every valley has suffered from flood, more or less, but the greatest destruction has been in

Ryedale, and among the Rye tributaries. In the upper part of the wide vale, a great lake has been formed by the rivers Rye and Riccal, which met, completely overflowing the whole intermediate country, inundating houses, and rendering roads impassable. Nunnington suffered much from this disaster, whole crops of stooked corn being floated away. The Kirkdale beck (always impetuous) rose with unexampled rapidity, and the ford was no longer safe. A pony and cart, with two persons in it, were carried some distance, and rescued with difficulty..... The Farndale beck rose equally quickly, and at Yawdsworth Mill much timber was carried away, and a newly built house washed down. At Sinnington the Leven [sic, but means R. Seven, west of Pickering] flooded the village, and floated large timber about in great confusion. Mr Carter, of Kirbymoorside, with another gentleman, on horseback, were obliged to return to Pickering, and took refuge in the inn near the bridge. The house being full, they were compelled to sit by the fire till daylight, but the water entered during the night, and flooded the house, confining the inmates to the upper story, necessaries having to be given them from the street. The low part of the town of Pickering was much flooded. Between Kirbymoorside and Malton, miles of road were flooded, and the inhabitants were prisoners in their houses in various places. At Marton the water was believed to be five feet deep in the village. From Normanby corn has been floated out of the fields, as far as Barugh Hill, three miles. The damage in Ryedale cannot be estimated; whole farms are flooded. Not only corn-fields, but pastures, in splendid trim, are under water, and this morning stock were standing belly deep in the flooded lands. Near Malton the flood is increasing. By some accident the self-acting clough, in the Rye had been propped open, and in consequence the flood obtained access to Old Malton Moor, which, for the first time since the enclosure, half a century ago, is flooded. Farmers are busy fishing for their corn ricks in the flood waters. At Norton some pastures are overflowed, and much property has been destroyed in the brick-fields. Hundreds of acres are flooded by the bursting of the banks above Newsham.

On the eastern side of the moors the waters drain to the sea by the Esk , a meandering stream which the Malton and Whitby Railway crosses some dozen times in half-a-dozen miles. This stream receives the drainage of the Ellerbeck and the Gothland valleys, and rose to a state of flood in a few hours. The wooden bridge No 9 from Whitby, being old, was about to be restored or replaced, and the railway company had commenced operations for a permanent structure This bridge was watched with some anxiety all last night, the traffic of Wednesday (much of it excursion traffic) having all passed the bridge in

safety. During the night, however, the flood literally floated the bridge and had drawn the piles, so that the trains could no longer pass.

The bridge near Grosmont (Esk), which failed yesterday morning, has become a total wreck, and a stationary engine erected to pump the water from the coffer-dam of the intended new bridge has been washed away, and is not yet found.

1866 September 1 Malton correspondent wrote "The inundations in North Yorkshire were rapidly lessened on Saturday [1/9/1866], and on that day the North-Eastern Company had succeeded in throwing a temporary bridge across the Esk at Grosmont in place of that washed away on Wednesday night. During the floods it appears that, in addition to the damage to crops, many cattle and sheep were drowned, and some carcases were floating down the Derwent on Friday. Much land is still under water, and since the last report the banks above Ganton have burst and several farms are flooded, one farmer at Binnington having 100 acres of corn under water. The towns of Stokesley (Leven), Pickering, and Thirsk (Cod Beck) have suffered most."

The Yorkshire Gazette reports that Stokesley (Leven) was flooded in several places and the Agricultural Show was postponed for a day as the show field was flooded.

A number of small waterfalls were formed on the side of Rosebery Topping and adjacent Cleveland Hills. Between Middlesbrough, Stockton and Stokesley large tracts of land were inundated. Rye and Leven overflowed and flooded thousands of acres. Lower rooms in many Stokesley houses had upwards of 1 foot of water.

'One of the greatest floods within the memory of the oldest inhabitant' at Stokesley. Streets knee deep. Road between Stokesley and the rail station was flooded and water entered omnibuses.

Great damage was done to shipping and fishing boats in Whitby harbour due to the force of the flood coming down the Esk. A bridge at Grosmont was partially washed away

The Yorkshire Gazette of 26 January reports that the preceding period in January was very cold with deep snow on the North York Moors, that the Ouse at Selby was very high as a consequence of the break up of large quantities of ice and that ice was a problem on the river at York. There were no reports of heavy rainfall associated with this event.

A landslip was reported at Oswaldkirk south of Helmsley on 24 January, presumably due to the

26 Jan 1867

Yorkshire
Gazette

accumulation of snow rather than flooding.

Yorkshire Gazette notes "Floods on Thursday in the Old Derwent and Rye Valleys and about Ampleforth and Gilling. Up to Thursday night the waters were rising and threatened to overflow the county of the Derwent proper. Yesterday morning the flood at Malton was within 4 or 5 inches of that of the first week in the year and the waters were still rising." "The Rye and Derwent and all the North Ridings rivers are transferred again into immense lakes. It is worthy to note that this is the eighth flood in the low county of the Ridings since last July."

The London Illustrated News, February 1867 reported: 'GREAT FLOODS IN NORTH YORKSHIRE The sudden melting of snow on the wolds and moors in North Yorkshire in the latter days of January caused the most disastrous floods throughout the lower lands between Thirsk and Malton and especially in the district of Malton. Two streams, the Rye and Riccal, overflowed to such an extent that the water united and only the trees were visible. The villages and roads along the course of the Seven were also inundated. The roads were four or five feet deep in some hollows and all communication with Malton was cut off. At Newsome bridge over the Rye the river was about two miles wide. The old Derwent had expanded into an immense lake several miles in length. On both sides of the Pickering Railway the land was 3 feet deep in waster. The Malton and Scarborough Road for miles was impassable.

The town of Old Malton was flooded although since the great flood of 1846 streets have been raised nearly 3 feet. On Saturday night the 26th, the flood on the Malton and York and Malton and Scarborough railways and the other three lines meeting at Malton as far as Norton Junction was 12 inches above the rails. At the County Bridge, Malton, connecting the North with the East Riding the three large arches were nearly submerged with the boiling flood. Most of the flour mills, some of which have never been stopped for 20 years were flooded, one or two having 3 feet of water in their lower floors. The Biscuit Mills, Gasworks, Breweries, Tanneries and Merchant's Yards near the river were inundated. The water level at Malton Bridge was 12 feet 7 inches.

The natural springs rose so high that at the Crown and Anchor Hotel Malton, the spring rose 2 feet out of the ground and necessitated the removal of flags on the footpath. The water emerged from the Oolite

Range which runs southeast of Malton.

Yorkshire Gazette describes flooding on lowland catchments notably the Hull at Driffield

Whitby: Following a period with snow on the N York Moors, a thunderstorm was most severe 12 miles from Whitby. At Shaw End near Lealholm Bridge a cottage was struck and completely demolished, killing a man and his wife. The snow and thunderstorm with hail also occurred at Pickering, Scarborough and Driffield but there was no reference to flooding.

Whitby: At Castleton and neighbourhood the storm was intense for half an hour and the High Street and some of the houses were flooded to a great depth. At Danby Head a cow house and barn were destroyed by fire after lightning and a cow was killed. At Lealholm Bridge a number of windows were broken. Mulgrave Castle was struck and damaged.

Scarborough: No heavier rainfall has been known since the flood of 1857 but damage was trifling.
Malton: At Barugh Hill 40 sheep were killed by lightning.

Very heavy thunderstorms passed over East and north Yorkshire accompanied by heavy rains which have flooded lowland fields

Malton: thunderstorm for 2 hours converted the streets into rivers. Corn is knocked down and the Derwent is white with flood water from limestone roads.

Thunderstorms occurred in both North and East Ridings continuing for 3 hours. At one part of the Thirsk Railway trains ran through floods for more than a mile. At Osmotherby station the road had six inches of mud on it. From Hovingham to Gilling the land on either side of the track was covered with water. A river was running through Gilling station. And the whole town of Gilling was under water with one foot of water in the Inn. At Helmsley the storm was a perfect deluge and it was said that nothing like this was ever remembered. There are reports of stock drowned or killed by lightning.

In the vicinity of Malton a young man was killed by lightning at Low Mowthorpe. Effects seem to have been most severe between Malton and Driffield.

Pickering – thunderstorm with large hailstones – no reports of flooding or lightning damage.

Storms were also reported at Kirkbymoorside and Helmsley but no reports of flooding. Houses were

26 Mar 1869
York Herald 3
Apr

18 Jul 1869 thunderstorm
Whitby
Gazette 24 Jul

5 Sep 1869 Thunderstorm with
York Herald 11 hailstones of great
Sep size.

8 Jul 1871
Lancaster Gaz.
15 Jul

6 Sep 1871 Malton 2.33 inches
Western times
12 Sep

18 Jun 1872 Thunderstorms over
Shields Daily the north especially in
gazette 20 Jun Newcastle.

York Herald 22 Daily rainfall of 3.64”
Jun reported but location
 in N Yorks not noted.

12 Jul 1872 York Herald 13 Jul	A series of thunderstorms	flooded up to window level at Ampleforth. Malton: A man was killed by lightning. Railway lines were flooded in the Vale of Pickering. Some cellars were flooded at Malton.
4 Sep 1872 York Herald 7 Sep		Stamford Bridge: 40 minute storm, here the heaviest of the summer. No flooding was reported. Pickering: The storm lasted 2 hours and the roads were flooded and impassable in some places. Streets were inundated and the drains were insufficient to carry the water. Malton: Streams are greatly swollen and have overflowed including the Rye and Derwent. Water is over the rail line near Gilling and on the approach to Hovingham, Slingsby and Barton Stations. A woman was injured by lightning at Norton.
26 Aug 1873 Yorkshire Post 27 aug	Thunderstorm	Kirkbymoorside: The streams rose a yard in a few minutes carrying much debris. At Hutton le Hole several sheep were drowned and a wagon and two horses forced down the stream. Many houses were flooded at Sinnington. The water rose so quickly that it carried away a large quantity of timber. Helmsley: the fury of the storm appears to have been spent here with chaos of thunder lightning and rain
27 Jun 1874 Yorkshire Post 29 Jun	Thunderstorm with rain and hail	Malton: The streets were like rivers and numerous cellars were flooded. Crops have been flattened.
2 Sep 1874 Sheffield D Telegraph 5 Sep		Malton: Hail the size of marbles caused damage to glass and damage to fruit trees. There were no reports of flooding of property.
19 Jul 1875 Preston Chronicle 24 Jul	Thunderstorm	Scarborough: The streets were flooded but there was no reference to flooding of property.
23 Jun 1876	Hot dry weather was	Malton: Rain fell in torrents for nearly 2 hours. The streets were like small rivers and the drains were

Sheffield Independent 24 Jun	ended by a severe thunderstorm	unable to take the flow. Many of the Wold villages were flooded. Sheep were killed by lightning at several locations.
23 Jun 1878 York Herald 24/29 Jun	Thunderstorms	<p>Scarborough: Several properties were flooded by the overflow of drains. Several buildings were struck and damaged by lightning.</p> <p>Filey: Several of the Crescent houses were flooded and Mitford Street was much flooded and the drains blocked up. Lightning caused damage ot property and injuries to people, as well as a horse and sheep. At the foot of the Wolds the roads were nearly impassable and soil was washed from fields and one large field was made completely bare with nothing left but a stony surface.</p> <p>Scarborough: The sewers were utterly inadequate to carry off the downpour and even in the higher parts of town the cellars were flooded to a depth of several feet. At the bottom of Eastborough a manhole was forced up. The Ramshill sewer became a torrent and tore across the sands scouring a channel 5 feet deep. Roads downhill had deep gullies cut and lower roads were several inches deep in debris. The storm lasted about half an hour.</p>
7 Aug 1878 York Herald 8 aug		Malton: In the lower part of town the streets were flooded to several inches. The storm was als reported at Scarborough but without flood report.
30 Aug 1878 York herald 31 aug		Scarborough: the storm lasted three quarters of an hour. No flooding was reported.
17 Nov 1878		<p>Malton Messenger (Nov 23 1878) notes that the snow that fell in and near Malton was unusually heavy for the brief time it lasted and that which fell on the Moors must have been an enormous quantity as the rainfall, although heavy enough to cause a slight flood, cannot possibly account for what we have this week experienced. The rainfall recorded at Old Malton was 13th (.24"), 14th (.29"), 15th (.73"), 16th (.60") and 17th (.06"). The totals include snow melted in the gauge.</p> <p>No reports of flooding above Helmsley</p>
Malton Messenger		<p>The Malton Messenger (Nov 23 1878) reports: " The lower parts of North and East Ridings drained by the Derwent and its tributaries , the Rye, Costa, Seven, Dove, Seph and other smaller streams has this week been flooded to a greater extent than can be remembered by the proverbial' oldest inhabitant' and</p>

greater than ever been recorded. In the low-lying parts of the Rye district from near Helmsley and Kirby Moorside, right down to the junction of that stream with the Derwent the effects of the flood has been especially felt. Elsewhere, where there was little snow, the flood was only light. Malton has been visited by the highest and most destructive flood on record.

The flood began in the upper parts of the streams on Thursday (14th) and attained a great height in Ryedale and Pickering on 15th. At Sinnington, it covered the village green, an event only rarely recorded. The flood did not peak until Sunday 17th at Malton. At Norton Bridge the gauge top (at 13 feet) was covered and there was then about fourteen feet of water. The outer arches of the bridge were blocked up. The mills and breweries by the water side were all flooded. In some of the stables near the river, the horses were found standing belly deep in water. The road at the bottom of Low Street became completely flooded and the spring in the cellar of the Crown and Anchor burst out and water ran out the door. The house in the island in the middle of Norton Bridge was flooded. In Norton the water came up St Nicholas Street and over the Waltham Road, over which the Board of Health had spent £300 to raise it out of the way of floods. The police station and the courthouse became surrounded. Right up to Monday night the flood continued at such depth that conveyances were necessary for going back and forth from Marton to Norton. Railway traffic to Marton was completely suspended. The York and Scarborough Railway was submerged in several places. The town water supply was cut off for a time whilst water got into the retorts at the gas works and the gas supply for lighting was cut off for 3 weeks.

Extensive flooding occurred at Old Malton .where it attained a greater height by 6 inches than the previous highest flood in April 1846. At Messers Russell's Brewery where a mark was made in 1846, the present flood showed a foot more water On Sunday the dams near Espersykes burst and the country all around became flooded to a very great depth. Mr Marr at Acomb House had to rescue his family in a cab. At the Vicarage' the water was so deep (over 4 feet n the store room and 2 feet in the sitting room) and velocity so high that they feared for the integrity of the building and they escaped by boat in the morning.

Fatalities occurred at Yoadwath Bridge near Kirby Moorside where a man was swept off a flooded bridge whilst a boy of four was drowned at Ness. At Salton, Brawby the greater part of the villagers had to live

upstairs

15 sep 1880
Yorkshire Gaz.
18 Sep
30 Oct 1880

Downpour of rain accompanied at times by thunder and lightning. All the upper district of Ryedale is flooded. With corn and turnips under water serious losses have occurred. The county bridge at Malton registered 8 feet and still rising on 16th.

The main feature of the storm was the hurricane force winds which caused the shipwreck of dozens of ships all along the east coast and shipping difficulties as far afield as the Irish Sea and southwest England. Newspapers also refer to the 'heavy and continuous fall of rain'.

British Rainfall

Yorkshire
Gazette

British Rainfall observer at Middlesbrough refers to a dreadful storm of wind from SSE to NE whilst the Scarborough observer refers to an ENE gale with 1.82" rain. Monthly rainfall for 1880 at many localities in North Yorkshire was double the monthly average. Over Britain as a whole the maximum daily amount of rain for the year occurred on 27 October at 185 stations including Guisborough (2.90") and Richmond (2.70").

No reports of flooding above Helmsley

Yorkshire Gazette reports that "In the valleys of the Rye and Derwent and their tributaries and immense tracts of land in both the North and East Ridings are flooded to a great depth. In some parts of Ryedale the flood is actually worse than the great one 2 years ago. At Sinnington the land on which the railway station stands was converted into an island, access to which can only be gained by boats. At Rillington near Malton the railway station was also unapproachable. Marishes district was converted into a vast lake. The Malton and Whitby railway was flooded in many places and trains got through with difficulty".

At Malton the flood was within a foot and a half of the point reached in 1878 and reached the retorts of the gas works and into the waterworks making the town supply undrinkable. Access to the Railway station from the East Riding portion of the borough was cut off. The banks of the old Derwent above Old Malton have burst again. The mills and breweries in the town are stopped. Persons in St Nicholas Street are removing their families to upper rooms.

The Esk has risen and come down with such force as to drive vessels from their moorings in the harbour.

<p>5 Jul 1881 BR Yorkshire Gaz 9 Jul</p>	<p>Whitby 2.80" Ripon Mickley 2.53"</p>	<p>The railway near Glaisdale is much damaged and impassable". Numerous reports of shipwrecks then follow. A report in 1930 recalls a suspension bridge floating down the Esk during the 1880 flood. Widespread thunderstorms were reported round the country mainly with lightning damage but very little flooding reported. At Whitby hailstones did damage to crops and the lower parts of the town were flooded. The storm continued all night. [Very considerable damage is reported in Lancashire where over 50 mills are out of operation]. A great number of animals were killed on both sides of the Pennines.</p>
<p>Northern Echo 7 Jul</p>		<p>Whitby: The thunderstorm commenced at 9.30 and continued for 5 hours at Whitby. Hundreds of houses were flooded and much damage done. A large number of windows were broken by hailstones, two small houses were utterly destroyed, a flour mill was set alight at Ruswarp and several cattle were killed. Saltburn: Thunderstorm worst since August 1868 with rain and large hail. A horse was killed and a house struck.</p>
<p>29 Aug 1881 BR</p>	<p>Scarborough 2.47"</p>	<p>Storms were similarly reported at Guisborough, Loftus, Redcar Middlesbrough Stokesley and Brotton but there is no mention of flooding. Malton Thunderstorm reported but only 0.70" of rain. Malton etc: A heavy thunderstorm has wrought incalculable damage and was followed by long continued rain. The low country of Ryedale is flooded and the East Ridings are full of water. Mainly agricultural damage is reported.</p>
<p>Alnwick Gaz 3 Sep</p>		
<p>29 Apr 1882 BR 3 may 1882 Sheffield Daily tel. 4 May</p>	<p>Fylingdales 2.62"</p>	<p>Leeds Mercury reports that on 1 May low lying areas of Derwent and Rye catchments were under water due to the persistent rain on 29 and 30 Apr. No thunder was reported. Norton: A half hour storm with hail and rain caused flooding in Matilda Street near the Porter with cellar kitchens a foot deep in water. The storm rainfall was half an inch. A house was struck and seriously damaged.</p>
<p>24 Jul 1882 Leeds mercury 25 Jul</p>	<p>Thunderstorm</p>	<p>Malton: Rain with hail caused the flooding of lower parts of the town.</p>
<p>28 Sep 1882</p>	<p>Thunderstorm</p>	<p>Easby in Cleveland: Land and roads were quickly flooded in some places to 3 feet. The river Leven rose to</p>

York Herald 30
Sep
19 Dec 1882

Yorkshire
Gazette

30 Jun 1883
S shields Gaz 2
Jul

13 Jul 1884
Daily Gazette
Mbro 14 Jul
Leeds mercury
15 Jul

12 Aug 1884
Yorkshire Gaz
13 Aug.
Leeds Mercury
13 aug

Thunderstorm
Heavy hail at Brawith

Thunderstorms were
general on the Moors
and Wolds.
The weather had been
intensely hot – 77.5F
at S Shields and 93F at
Norwich

a great height and people stated that they had never seen it rise so quickly and fall in so short a time.

Rains on Saturday night quickened the removal of the melting snow from the moors and wolds. The Yorkshire Gazette (Dec 23) reports that "the flood reached its height on Tuesday evening, registering nearly 12 feet. It receded on Wednesday morning but not sufficient to allow work being resumed at yards and mills by the riverside. Ryedale is clearing fast of water but the lower reaches of the Derwent will be flooded for days to come"

"On Tuesday we had the highest flood of the year in this District. A vast volume of water was sent down the valleys of the Rye and Derwent. The Derwent rose to 11.5 foot by Tuesday evening."

Hailstones of extraordinary size fell in the Malton area and tore garden produce to pieces in one of the heaviest thunderstorms ever remembered. It occurred in the Rye and Derwent valleys and also on the Wolds. Turnips were washed out of the ground on hillsides. The streets were like miniature rivers and many houses in the lower part of the town were flooded.

Malton: The rain was accompanied by large hailstones, the drains became blocked flooding the streets and several houses in the lower part of town.

Scarborough: Buildings were damaged and a man seriously injured by lightning.

Various buildings were struck and damaged in the Thirsk area including the Vicarage at Osmotherley. Cellars were said to be flooded but the report does not specify where this occurred.

Cowlston: The becks overflowed and flooded houses 2 to 3 feet deep. Some hundreds of trees were uprooted. And at Snileswoth a wall was blown down and the chapel had its window forced out.

Helmsley: Serious damage was done by hail at Harden Hall vinery

Widespread thunderstorms occurred especially in Scotland and northern England. Near Pickering at Newton Dale hundreds of tons of stone were washed off the moors on to the railway line which was blocked. Stones were washed off the moor weighing up to one ton in weight. The water [presumably

Pickering Beck] has risen 6 feet in three hours. Hailstones were measured up to 2 inches in circumference including at Levisham N of Pickering. Horses and sheep were killed by lightning at Yedlingham SE of Pickering. One man killed by lightning at Ormesby nr Middlesbrough. Near Scarborough three horses were killed by lightning.

The Malton and Whitby railway line was blocked with soil washed on to the line. Hailstones were 1 ¼ to 1 ½ inches in circumference.

[Thunderstorms and flooding were also reported in the Glasgow area].

Thirsk: A thunderstorm flooded the market Square for a short time. Animals were killed by lightning and trees were struck and shattered.

In May 1886 British Rainfall reports thunderstorms in parts of 12 counties. Heaviest rainfall was centred on South Yorkshire where 3.9" occurred at Barnsley and 4.1" at Wakefield. Stations in the Helmsley area recorded daily totals of 2.7 and 1.6 inches.

"Rivers and their tributaries which were flooded and overflowed their banks: ... the Aire, Calder, Derwent (Yorks), Rye, Cod, Wiske..."

Very heavy rain fell at Lythe near Whitby. Within an hour East Row beck which runs through Mulgrave Woods rose more than 6 feet. It carried away three bridges and several hundred trees towards the sea. The storm was very localised.

Thirsk: The storm extended for a radius of about 4 miles around Thirsk. It did great damage to oats and barley

British Rainfall notes: This is one of the most exceptional rains that we have had to record. It occurred partly on 3 days 13, 14 and 15 October. A Frontispiece map shows the heavy rainfall generally over Yorkshire. The three day totals for the Malton area range from 2.9 to 3.8"; totals were highest over the Pennines and West Riding where 4-5" was widespread.

The Malton Messenger notes. 'The rain that started on Thursday week, 13th instant, continued on Friday and Saturday almost without intermission and the result has been the most disastrous flood we have had for many years. The rainfall on Friday and Saturday as registered at Old Malton was 2.93" and at Norton 2.87" .

21 Sep 1884
York Herald 27
Sep
? May 1886

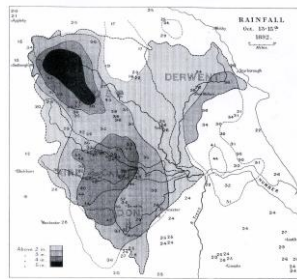
British Rainfall

13 Aug 1886
Sheffield
Independent
21 aug
24 Aug 1892
York Herald 27
Aug
22 Oct 1892

British Rainfall

Malton
Messenger

Thunderstorm



The Malton Messenger reports: The Derwent rose rapidly there being 12 feet of water at Norton Bridge in a few hours on Saturday. As the rain kept falling and the water rising, the millers and brewers of Malton made preparations for a big flood by removing all they could from their lower floors.

On Saturday morning the banks of the Rye burst in two places near Amotherby and Ryton, the consequence being that the water spread over a vast extent of the country and the flood did not attain so great a height at Malton as it otherwise would have done.

The water continued to rise at Malton all day on Sunday till early Monday morning when it attained a height of 12 feet 3 inches above summer level at the County bridge. The water was within a foot of flooding the railway on the east side of Malton Station but the line all along there has been raised after the great flood of 1878, it has now kept clear. The flood was the worst we have had since 30 October 1880 when the gauge showed 13 feet 6 inches, in December 1882 we had 11 feet 6 inches but the great flood of November 18 1878 was 14 feet caused by rain falling on snow. A similar case brought the water up to 12 feet 7 inches on 26 January 1867. Since 1882 we have occasionally had floods rising to about 10 feet. A flood is recorded as having occurred in April 1846 Welham Road was flooded to a depth of 2 or three feet in some parts when the river rose 13 feet 6 inches at Malton.

The road was flooded near the front of the Vicarage but not so badly as in 1878 when the boats were used in the streets.

Flooding was widespread. British Rainfall notes that the total number of houses flooded in Yorkshire was not less than 4000, 500 in York but also in Barnsley, Bingley, Boroughbridge, Castleford, Clackheaton, Dewsbury, Doncaster, Ferrybridge, Halifax. Kirkstall, Knottingley, Leeds, Pateley Bridge, Pickering, Selby and Wakefield.

Whitby. Two TSS were seen at once in the evening—one at sea and one on land. A cow-shed struck, and three cows killed. A horse killed at Newholm.

Widespread thunderstorms in Yorkshire with little flooding reported but lightning damage. At Ebbeerston near Pickering a man working in a field was killed by lightning.

2 Jul 1893

BR

9 Jul 1893

Yorkshire Gaz

15 Jul

27 Jun 1895
Yorkshire Post
27 Jun
27 Jul 1895
Daily Gaz of
Middlesbrough

Northern Echo
29 Jul
York Herald 28
Jun and 3 Aug
Whitby Herald
1 Aug

Malton: The rain choked the drains and gulleys and flooded the streets. Sheep were killed and buildings damaged by lightning. 1.67 inches of rain fell in 3 hours. The Derwent previously very low rose over a foot in a few hours.

Thunderstorms most severe in Rosedale where a tornado was observed; trees were uprooted and haystacks severed. Rivers were flooded and bridges swept away and crops washed out of the fields. The river through Helmsley was flooded and part of the town was under water and the High Street was impassable to foot passengers. Eight sheep were killed by lightning at Loftus. Two bridges between Greenhow and Staithes were completely washed away. The railway was damaged at Kettleless on the Whitby line. At Pillington the Blacksmith's Arms was struck by lightning and badly damaged. About the abbey water found its way into houses; both stone and wooden bridges were carried away; the Crown Hotel was flooded on the Whitby road.

Lastingham: Bridges were swept away at Losca. The whole village at Sinnington was flooded from the River Seven.

A boy was drowned at Malton having fallen in the river and carried into a culvert.

Whitby: The thunderstorm over Whitby lasted for two hours and was said to be the heaviest known in living memory. Alleys and yards and houses of the town have been flooded and people injured by lightning which has also damaged houses. A sewer at the bottom of Cliff Street burst and carried away a stone wall and burst up the pavement and flooded neighbouring houses. The rain swelled the stream running under Old Dale Bridge and carried away some of the coping stones. It swept away a bridge in Overdale Wood and damaged the rail line at Sandsend. A landslide on the Whitby to Loftus line near Kettleless blocked the line. The river Esk was filled to overflowing in a very short space of time. In the upper reaches it rose 10 to 15 feet and large quantities of hay were washed away. Many trees were uprooted. Carr Cottage at Ruswarp was flooded to a depth of 4 feet.

Two bridges between Staithes and Greenhow were completely demolished.

At Loftus 8 sheep were killed by lightning at Loftus Farm and houses were struck by lightning.

Ryedale District: Rivers were flooded and bridges carried away and beasts were drowned and carried away in the flood and carried more than 4 miles.

Malton: 4 inches of rain fell in the last 8 days. A nine year old boy was drowned.

Thirsk: The storm was the most disastrous since the great hailstorm of 25 Aug 1873. **Hailstones in Kilburn**

6 miles SE of Thirsk were an inch thick and 2 ½ inches long and weighed 2 ½ ozs making incisions in the ground 1 inch deep. Hundreds of panes of glass were smashed and crops badly damaged. The Kilburn

White Horse was nearly obliterated. In the village street in Kilburn the water was knee deep.

A man was killed by lightning at Great Ayton. A party of people on a wagon were also struck by lightning and the driver was seriously injured. A man was killed at Thirsk.

Loftus: The Bijou Theatre, a temporary structure on low ground near the Station Hotel was quickly flooded by the storm.

Scarborough: Heavy rainfall continued for nearly an hour and flooded the roads and streets. A hotel was struck and damaged. The thunderstorm was also experienced at Filey, Bridlington and Hunmanby.

Note elsewhere Swale and Tees in flood

Thunderstorms generally in NE A cyclonic rain of considerable intensity reinforced in some parts by local thunderstorms gave the maximum annual rainfall at 160 stations in the east and north of England, with falls greater than any previously recorded at several stations in Yorkshire. Between 8am of 3 Aug and 8 am of 4th the centre of a small well marked cyclone passed from east to west across England between Cardigan Bay and the Wash, with easterly or NE gales in Yorkshire and the Northeast.

Danby Dale: Streamlets became roaring torrents and many trees have been torn up by the roots.
Thunderstorm

Rosedale: Rain and hail were accompanied by a high wind. Gutters and drains overflowed and houses were flooded. Crown Hotel was flooded. Crops were damaged by large hailstones and some windows were broken. Crops were washed out by the flood.

4 Jun 1896 Shields Daily Gaz 5 Jun York Herald 6 Jun	Thunderstorm
7 Jul 1896 BR	Guisborough Hutton Hall 3.07" in 1.25 hr
12 Jul 1899 Yorkshire Post	Thunderstorm
13 Jul	
1 Oct 1899 BR	Great Ayton (Easby) 2.30" Guisborough Hutton 2.17"
3 Aug 1900 BR	Middlesbrough Ormesby 2.28" Middlesbrough
Mbro Daily Gaz 4 Aug	Albert Pk 3.24 Lockwood Beck 2.54 Great Ayton Easby 2.68
22 Jul 1901 BR	Whitby 2.47"
10 Aug 1901 Whitby gazette 15 aug	Thunderstorm

26 Oct 1900 BR	No rainfalls shown in BR for N York Moors	A very severe storm of snow sleet and rain with a N to NW gale affecting Northumberland Durham and North Riding of Yorkshire. There were serious floods on northern rivers (Note Met Mag Nov 1900 p145). The storm started as snow but turned to rain starting pm 26 th and ending on the forenoon of 27 th (most on the rainfall day)
11/12 Nov 1901 BR	Amounts for 11 th and 12 th Pickering Rec 0.20 1.75 Great Ayton Easby 0.57 2.47 Guisborough 2.40	Widespread heavy rainfall from a deep depression moving across Ireland and northern England extending over 2 days. Rainfall on 11 th exceeded 1 inch over the whole of Ireland except the extreme NW and SW, and parts of Lancs and W Riding of Yorkshire. On 12 th the heavy rain continued in NW England and extended to Northumberland as well as southern Scotland and south to Derbyshire. (Complete BR rainfall list scanned)
20 Aug 1902 Yorkshire Evg. Post 20 Aug 6 Oct 1903 British Rainfall		Scarborough: Thunderstorm with rain and hail of a considerable size caused flooding of streets and some damage to crops. Bridlington suffered from a similar storm. British Rainfall notes heavy rainfall generally over northeast England from 6 to 8 October with the map showing heaviest rainfall centred on Newcastle and the Northumberland coast. Rainfall was > 2" in some parts of the North York Moors but only around 1" in most of the Rye catchment, Noted in 1930 that a comparable flood occurred on the Esk in October 1903 the level of which is marked on the walls of Lealholm Mill at a level of 16 feet above normal summer level (compared with 21 feet in July 1930).
18 Jun 1905 Leeds Mercury 20 Jun	Thunderstorm	Whitby: The storm mainly affected outlying districts including Fryup and Gaisdale. At Lealholm, the culverts were blocked and the street flooded. Much soil was washed out of ploughed fields. The new church was struck by lightning and the roof damaged
19 May 1906 BR	Ingleby Greenhow 2.52 Skelton Castle 1.96 Whitby 1.77 & 2.53	
4 Jun 1908	Thunderstorm for	Whitby: It was said to be the heaviest thunderstorm in Whitby for many years. The water coursed down

Whitby Gazette 5 Jun	about an hour	the streets like streams flooding many low-lying houses and shops. The street grates were insufficient to carry the flow. At the bottom of Hunter Street and Clarakson Street the water was knee deep. Church Street was covered. The Coop Store was struck and damaged by lightning. Large hailstones fell at Whitby as at Ruswarp.
1 Aug 1909 BR	Thornton le Dale 2.16	
20 May 1910 BR	Pickering 0.75" in <30 mins (causing a flood) Malton 0.96" in 25 mins Whitby 1.05" in 2 hrs Thornton le Dale 1.71" in < 1 hr	Whitby observer notes 'wooden footbridges and East Row stone bridge wrecked. Thornton le dale observer notes that a cloudburst occurred up the neighbouring N York Moors valley. Driffield observer notes that a thunderstorm lasting 1 hour with hail and rain had destroyed several bridges, driving inhabitants from their houses with water 6 feet deep. One child was drowned. The substrata of the fields is chalk soil and this has been laid bare. All the houses in the lower part of Langtoft were flooded
Sheffield Daily Telegraph 21 May		At Thorntondale near Scarborough the brook rose 10 feet and water was feet deep in the main street. Furniture including pianos were floating around in houses. Thousands of fowls were drowned. At Staintondale there was a cloudburst; some hailstones were an inch in diameter. Great masses of water rushed into the valleys of the Yorkshire Wolds. At Elmswell Wold and Heslerton Wold large boulders were carried down the hills on to the road, blocking it. At Weaverthorpe and Driffield 400 were washed out of their houses. The valleys of the Rye and the Derwent became like a lake.
21 May 1910 Sheffield Daily Telegraph 23 May		In the Whitby district the Eastnow beck became an impetuous torrent and the stone bridge at Sandsend was washed away. Foss Mill near Lythe has been severely damaged. At Grosmont low lying houses were flooded
Yorkshire post 23 May		A second cloudburst affected the northern portion of Yorkshire. At Thorntondale near Scarborough the water was 6 feet deep in the main street. At Brompton and Snainton the water rushed down the hills, leaving behind a scene of desolation. Never since the great flood of 1878 has such destruction occurred in the Malton area. Malton was flooded in its lower areas and two houses were struck by lightning, a cottage set on fire animals killed both by lightning and washed away in the flood. Weaverthorpe was submerged in mud which entered every house with the exception of three. Horses on

the wold top were carried by the flood into the valley but rescued. One shop had its counter washed away.

Helperthorpe: Houses were flooded to 3 feet deep. Hens and pigs were washed away.

Thorntondale: The storm burst on the hillside above the village and the waster swept down with the force of a torrent. In less than 10 minutes there was 6 feet of water on the High Street and the beck was 12 feet deep. The muddy water rushed through houses and completed the havoc to furniture from the previous day. Timber from the Thorntondale Mill was carried away. Mud was everywhere a foot thick and boulders brought down caused much damage.

Heslerton: A great hole was washed on the hillside 13 feet deep and 8 yards wide and 150 yards long.

Ebberston nearer Scarborough: Solid rock was washed out of the Wold on to the road blocking traffic for hours. There was also damage at Brompton, Sherburn and Allerston.

Thunderstorm

17 Jun 1911 Pickering 1.03" in 30
BR mins

19 Jun 1911
Yorkshire post
20 Jun

Malton: A man was struck and killed by lightning at Welburn, others were injured and a house damaged. The storm was also observed with lightning effects in the Driffield area and in the Vale of Mowbray where a horse and other animals were killed.

20 Aug 1911 Malton the Leat Ho
BR 1.61 in 30 mins
Malton 1.51 in 29 mins
Daily 1.92

Thunderstorm with hail

23 Jun 1912
Leeds Mercury
24 Jun

Malton: The rains flooded the streets which resembled rivers and some low lying property was inundated. A house was struck and damaged by lightning.

2 Jul 1912 No thunder was
Whitby reported.

Lealholm: The heavy northerly gale caused the River Esk to overflow its banks and flood many acres. It is nine years since the river was in so heavy a flood.

Gazette 12 Jul
4 Aug 1912 Thunder not reported
Yorkshire Post here

Ryedale: With a renewal of heavy rainfall Derwent and Rye have overflowed their banks and hay is floating and rotting in the fields.

5 Aug

30 May 1913
Sheffield Evg
telegraph 31
May

4-8 Oct 1913
BR

4 Oct
Driffield 1.63
Bedale (Leeming
Garth) 1.96
Whitby Mulgrave Cas
2.37

18 Jun 1914
BR
20/21 Jun
1914 Yorkshire
Post 22 Jun

1 2 Jul 1914
Sheffield
independent 3
Jul

23 Jul 1914

British Rainfall

Thirsk 2.07
Glaisdale (Gables Gdns) 3.21
Sleights (Brook Park) 3.00
Whitby (Aislaby) 3.37
Whitby (Ocean road) 2.53
Whitby (Musgrave Castle) 3.03
Lockwood Beck Resvr 2.80
Skelton in Cleveland 2.26
Kildale hall 3.17
Middlesbrough Linthorpe 2.00
Middlesbrough Albert Pk 2.13
Bridlington 0.99" in 15 mins

7 Jul 1916

Scarborough: Three storms occurred during the week and the one on 30 May was accompanied with large hailstones.

Northallerton: a man was killed by lightning.

BR notes that many stations in north Yorkshire had their heaviest daily rainfall in the year from 6 to 8 Oct – but figures are not quoted.

A severe thunderstorm was reported from the Cleveland District in North Yorkshire, and at Lockwood Beck Reservoir, near Guisborough, 2.67 in. of rain was measured. (Severe thunderstorm near Blanchland) Coxwold (SW Helmsley): Many cottages were flooded as hail swept over the foot of the Hambleton Hills. Scarborough: Streets on the lower level were flooded. Holy Trinity Church was struck by lightning.

Malton: Hailstones considerably larger than peas fell with rain and great damage was done to fruit trees, cereals and root crops. The streets of Malton and newton were flooded.

British Rainfall notes that on 15 and 16 July rainfall > 3" occurred over parts of the North York Moors over an area of 250 square miles; for example Whitby (3.37), Kildale (3.17) and Thirsk (2.07). In all 150 stations in Britain recorded their highest annual daily fall on 16 October. The source was a depression which tracked southeast across Scotland, then over the North Sea, circling Southwest towards Dover – presumably generating rain in a northerly airstream over the North York Moors.

Noted in 1930 that a comparable but lower flood occurred on the Esk in July 1914.

BR 16 Aug 1916 Yorkshire Post	Thirsk 2.06 Newby Wiske 1.98	A thunderstorm of exceptional severity occurred in northeast Yorkshire. The torrential downpour of rain occasioned much damage to crops. In Malton the rain flooded the streets, the drains being unable to cope. It was also very severe at Scarborough and lasted about one hour.
17 Aug 8 Aug 1917 BR		
15 Aug 1917 Hull Daily Mail 17 Aug		Whitby: The village of Snainton was flooded and on Whitby Moor hailstones and jagged pieces of ice fell. Scarborough: Tourists to Langdale End from Scarborough had their return cut off by an overflowing stream.
12 Jan 1920 Yorkshire Post 13 Jan		In northeast Yorkshire heavy rain was accompanied by thunder and lightning. The rivers Rye and Derwent overflowed their banks and hundreds of acres of land were under water. The Derwent at Malton registered nine feet of fresh and the Rye at Howe Bridge was 10 feet above summer level. The whole district has suffered from recurring floods for the whole winter.
2/3 Jul 1920 BR Yorkshire Post	Whitby 2.46 Kildale Hall 2.84 West Hartlepool 1.80	Heavy rainfall at Whitby and Pickering Districts. Potatoes and turnips were washed out of the fields. A horse was killed by lightning at Egton and a house was struck at Sleights.
5 Jul 21 May 1922 Yorkshire Post		Thunderstorm at Whitby and low lying parts of the town were flooded. Hailstones the size of marbles fell as well as large pieces of ice over an inch square. A woman was killed at Scarborough – perhaps lightning.
23 May 27 Jul 1927 Sheffield independent		Redcar: Rain was followed by huge hailstones and the back streets of the town were flooded to a depth of one foot or more. Bridlington: A farm worker was killed by lightning.
28 Jul 15 Aug 1927 Yorkshire post 15/16 Aug		The heaviest thunderstorm for many years occurred in the Staithes and Runswick Bay area and for a time isolated the inhabitants. Shale was brought down from the cliffs and prevented the water from flowing away. Houses in the narrow streets were flooded to several inches depth. At Hinderwell further down the coast part of the railway bank was washed away. At Runswick Bay boulders carried by the torrent

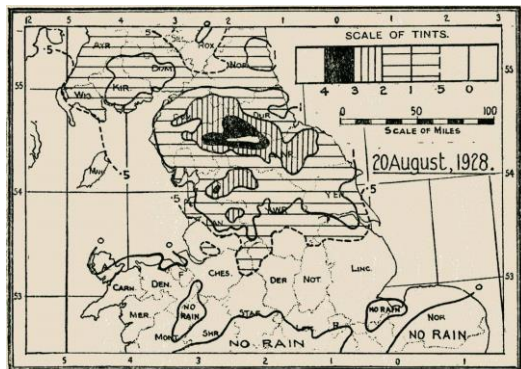
damaged buildings. On the road to Whitby the Dalehouse culvert was torn up and at Dalehouse many houses were flooded.

Flooding occurred at Pickering

25 Aug 1927
Longfield 1998

20 Aug 1928
BR

Coxwold (The Old Hall) 2.5
Thirsk (Brynkellow) 2.98
Felixkirk (Mt. St. John) 2.59
Boltby (Ravensthorpe Manor) 2.91
Maunby Hall 2.48
Northallerton (Brompton) 2.63
East Harlsey (Harlsey Hall) 2.54
Guisborough (Lockwood Res.) 2.5
Kildale Hall 2.82
Barningham Park 4.31
Nunthorpe (The Box) 1.96



6 Aug 1929
Yorkshire Post
7 Aug

Whitby: Torrential rain fell and in a very short time the streets were flooded. Water came rushing down from the higher parts of the town, many manholes were lifted and pavement stones displaced. At the junction of Baxtergate and Bogdale water gathered to a depth of more than 12 inches and houses were flooded with much damage to furniture. Serious damage was done in Cliff Street and on St Ann's Staiths basements of several shops were flooded.

22/23 Jul 1930

22nd
Egton Bridge (Bridgeholme) 2.63
Danby Lodge 2.72
Greenfield (Chew Mount) 3.35
Penistone (Broadstone Reservoir) 2.73
Holmfirth (Thongsbridge) 2.84
Masham Moor (Somerside) 2.8
East Harsley (Harsley Hall) 2.95
Rounton Grange 2.59
Egton Bridge (Bridgeholme)

British Rainfall

Malton
Messenger

Northern Echo
26 Jul

North Yorkshire Moors, July 20 - 23: At ten rainfall stations "...the rainfall of these four days exceeded 8 inches; the wettest site at Castleton recorded successively 2.70 ins, 2.32 ins, 5.70 ins and 1.25 ins, making 11.97 inches in all. In the Sleights to Castleton area the rain appears to have started about 15 h. on the 20th and continued with but few breaks until noon on the 23rd....The observers comment on the steadiness of the rain. An isohyetal map and synoptic map of the storm is shown below. Note the significant block over the North York Moors with >10" whilst the area from Marton to Helmsley has less than 2 inches. The heavy rainfall was due to a depression which persisted off the east coast of Lincolnshire from 21 to 24th and maintained a strong northerly airstream over the Moors. The rainfall distribution was controlled by the configuration of the land, the largest amounts over the more elevated

Northeastern
Daily Gazette
24 Jul

4.07	
Sleights (The Hall)	3.01
Danby (The School House)	5.2
Castleton	5.7
Danby Lodge	5.2
Whitby (Park Hall, Aislaby)	
3.11	
Whitby (Mulgrave Castle)	2.5
Guisborough (Lockwood Reservoir)	4.46
Ingleby Manor	4.15
Kildale Hall	4.55
23rd	
Glaisdale (The Gables Gardens)	3.68
Saltburn (Skelton Castle)	2.61

parts of the moors and less immediately to the south.

Malton Messenger (July 26) notes that “Malton has not suffered as severely as other districts but there are significant agricultural losses”. At Pickering the floods were the worst on record; also at Keldholme

Serious flooding occurred in the Valley of the River Esk and also in the Leven Valley. There were terrible losses from Sleights to Ruswarp and a woman lost her life. The Egton and Sleights bridges gave way about 5h. on the 23rd. Subsequently the level of the river fell rapidly. The most serious flooding naturally occurred in the lower Esk Valley, notably between Sleights and Whitby. ... Mr R.H.Tunstall, of Turnerdale Hall, Whitby, reported “ At one point on my land, about 2 miles below Grosmont, the river rose 30 feet, but I think that was largely due to the blocking of the railway bridge by floating trees...”

At Stokesley on the River Leven the water level (221.36 at the town Hall) was the highest since the beginning of the century. The whole of the riverside area was under water. The workhouse was flooded and the water was 3 feet deep in many houses. Northeastern Daily Gazette provides photographs of street scenes in Stokesley, at Hutton, Seamer. A footbridge at Stokesley was washed away. Great Ayton Squire Bridge was washed away and a three arch railway bridge at Egton was wrecked. Sleights bridge was destroyed and also Sandsend bridge. The whole of the low Leven valley and North Cleveland flooded. Early on 23rd residents of Leven Bridge saw huts and furniture being washed away. The road was impassable and only the hump back bridge was visible. Northern Echo has a photograph of Leven bridge village.

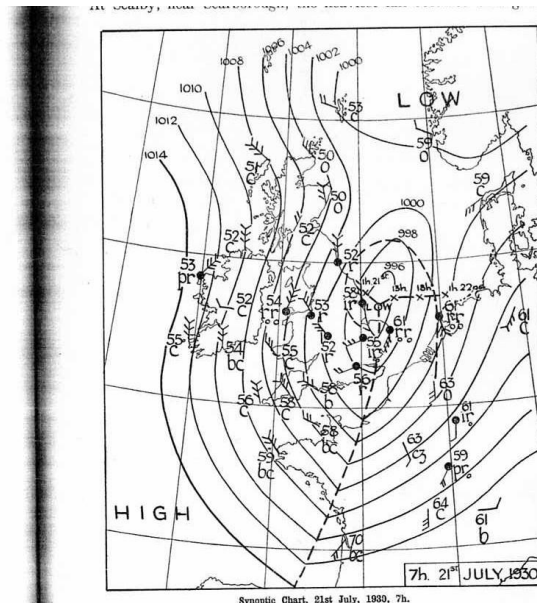
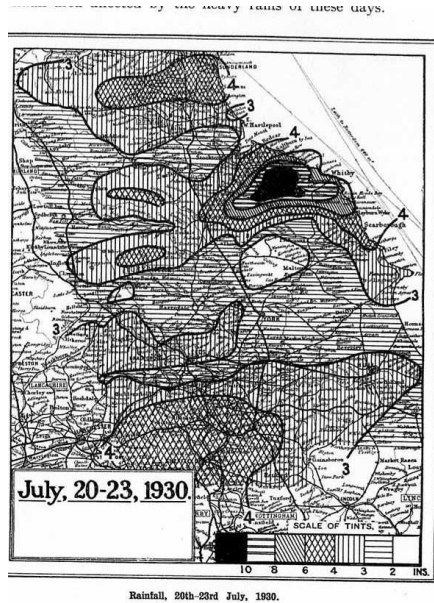
Sleights: The flood crashed down on the village with such amazing rapidity that it was impossible to warn some people before they were entirely cut off in their homes. In some cases they were marooned on their roofs. The valley railway is under water and Sleights bridge is washed away. Sleights was the first place to experience the rising flood; by dusk it was flooding the gardens on the river bank. Early in the morning it reached the walls of one house near the river and shortly afterwards the bridge toppled into the river. ‘The bridge had been acting as a dam and as soon as it gave way the water swept along the

valley in a great wave surrounding houses on the river bank and sweeping away cattle trees and furniture' One family spent 6 hours on their roof. Few homes have not suffered.

A cloudburst happened somewhere in the higher Esk valley and the water poured down the valley and extending a quarter of a mile on either side of the river bed. The water rose at several inches a minute [Esk at Whitby]. The railway station was flooded and the railway was under water so that rail communication was impossible. The Ruswarp garage was under water up to the waist. The main road through Ruswarp to York had become a raging torrent. Workers in Ruswarp flour mill were trapped. Waterloo cottages were badly flooded. A man in High School House was awakened when his bed began to float. One family were rescued from their roof. Bridge Inn residents were trapped in upper rooms. A woman was drowned in trying to escape from the flood. In Whitby harbour many boats were set adrift. Landslides occurred at Kildale and Lealholm affecting rail traffic.

The three arched rail viaduct between Egton and Glaisdale has been damaged and two girder bridges between Grosmont and sleights are also out of action. Trains were disrupted everywhere in the area.

At Kirby Moorside buses cannot get out because there is 4 feet of water on the road. All roads leading to Northallerton are under water.



Scarborough: Forge Valley is impassable with the road several feet under water. Houses were flooded in Ayton. At Scalby the water is up to the parapet of the bridge and a horse in the area was drowned. Elsewhere sheep were drowned and cattle rescued with difficulty.

15 Jun 1931 Westow vic. 1.16 in 30 mins
BR
17 Jun 1931
Hull daily Mail
19 Jun
19 Jun 1931
Yorkshire Evg
post 19 Jun
12 Jul 1931

Scarborough: Houses at 1 to 14 Vine Street were flooded.

Carlton in Cleveland: The stream running through the village became a raging torrent and several small bridges were swept away, a house was inundated and several calves drowned.

Two inches of rain fell in about an hour at Middlesbrough. Premises at Grange Road and Marsh Road

Yorks Post &
Leeds Intell.

4 Sep 1931

British Rainfall

Yorkshire
Gazette

Northern Echo
5 Sep

Northeastern
Gazette

East Harlsey (Harlsey Hall) 2.56
 Pickering (Hungate Hall) 3.11
 East Ayton (Derwent House) 2.61
 Egton Bridge (Bridgeholme) 3.34
 Glaisdale (The Gables) 3.81
 Danby (School House) 4.43
 Castleton 5.01
 Danby Lodge 4.43
 Whitby (Park Hall, Aislaby) 2.58
 Guisborough (Lockwood Res.) 4.38
 Ingleby Manor 4.23
 Thornton Dale (High Dalby Ho.) 2.95
 Whitby (Mulgrave Castle) 2.51
 Terrington (The Cliff) 2.84
 Kildale Hall 4.97
 Crathorne Hall Gardens 2.50
 Nunthorpe (The Box) 2.65
 Marton-in-Cleveland Southleigh) 2.24
 Marton-in-Cleveland Gartheen) 2.46
 Holmfirth (Thongsbridge) 2.98
 Middlesborough (Albert Park) 2.33
 Hurworth Burn (Crookfoot Res.) 1.98
 Shotton (New Winning P.S.) 2.44
 Easington (Mill Hill Res.) 2.42

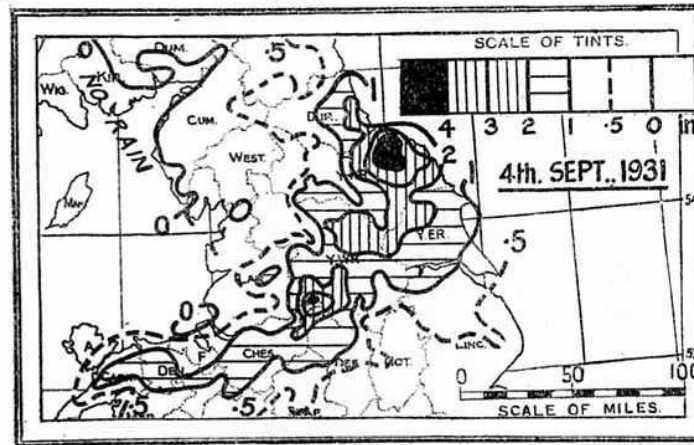
suffered the most. At Marsh Road a rowing boat was brought into use.

A thunderstorm was reported over the Driffield Wolds with three quarters of an inch of rain in 20 minutes. Streets were flooded to a depth of a foot in places.

Bridlington: Drainage pipes were burst and a manhole cover was forced up.

British Rainfall reports: "One of the outstanding features of the weather of September was the abnormally heavy falls during the first four days which gave rise to widespread and severe floods in the Midlands and North of England. The rainfall was associated with a deep and complex depression which, situated off the southwest of Ireland on the 1st, moved slowly eastward and by the morning of the 4th was centred over the southern North Sea.

'At Pickering Wednesday rainfall was 0.94", Thursday 0.64", Friday 3.11– a total of 4.69 in 3 days". Local records since 1866 suggest only 2 occasions previously when 2 inches in a day have been reached – 1 Aug 1900 (2.18") and 16 July 1914 (2.00"). At Malton, on Wednesday the rainfall measured 0.74 inches, on Thursday, 1.13 inches fell and on Friday 2.24 inches making a 3 day total of 4.11 inches.



Rainfall, 4th September, 1931.

The following comments from Mr. R. H. Rastall of Turner Dale Hall, Whitby, are of special interest in connexion with his comments on the heavy rainfall in that area during July 20th to 23rd, 1930, as given on

page 66 of British Rainfall, 1930 :

“On September 4th, 1931, there occurred an almost precisely similar flood to that of July 20th to 23rd, 1930. On the earlier occasion the Press reported incorrectly that a lifeboat was used, but on the latter occasion a lifeboat really was used to rescue the same two old women! However, the employment of the lifeboat was not very successful; it ran into a telephone pole, when one of the crew fell overboard and was considerably injured. After knocking down a long length of wooden fencing it was found that the lifeboat could not be got to the flooded cottage and the people were finally rescued in a small boat, in which they could have got away hours before without any difficulty.

There were some remarkable features about this flood. It began to rain about 17h. on September 3rd and by 13h. 30m. on September 4th the river had risen at Grosmont Priory to 21 feet above its level on the day before. The real point is that this year 20 hours of rain produced a rise of the river only 9 inches lower than that due to nearly 4 days rain in 1930. The damage this time was on the whole rather worse than that of last year, but owing to the much more widespread character of the floods it attracted much less notice.”

1. No reports of flooding at or above Helmsley but it was noted that all traffic from Pickering to Helmsley was held up and that “few farmers got through to the Helmsley market on account of the bad conditions”.
2. Yorkshire Gazette reports ‘The worst flood ever experienced at Malton occurred over the weekend when the record of 1878 was broken. Railway communication was broken off with York and Scarborough, Norton was cut off from Malton and many houses in Old Malton and Norton were invaded by water. The gas supply was cut off and in some parts of the town there was no electricity. The floods followed the exceptionally heavy rain of Wed, Thur and Fri of last week when over 4 inches of rain fell.’
On Friday the small streams of the River Rye were unable to cope with the deluge of water, miles of countryside were speedily inundated. Villages and farm houses were isolated. Sinnington caught the full force of the visitation and many of the houses were invaded, the occupants having to seek refuge upstairs whilst all road communication was stopped. The railway near Sinnington station was washed away over a cattle arch and no trains have since run on the line.

At Marton floodwater was 10 feet deep and in some cases reached bedroom windows. A similar state of affairs prevailed at Pickering and Thornton Dale. On Friday most of the houses in Thornton Dale were cut off and floods were over the counter of the village Post Office and telephonic communication was broken off.

At Malton the Derwent was registering only 7 feet above summer level on Friday but continued to rise rapidly until Monday morning. By Sunday morning the water was over the lower part of Welham Street, Norton and threatening part of Church Street – later all inundated with St Nicholas Street. Old Malton had 2 to 3 feet in the main street. The Malton Messenger of 12 September 1931 contains a page of photographs including “Flooding at Westgate, Old Malton”, “Old Malton School”, “Main Street, Old Malton”, “Black boards Road Malton” and “Malton Railway Station”.

On Monday morning rail communication was cut off with water rushing between the platforms like a mill race. The flood did not reach its height until Monday afternoon. The water supply was affected. The Gasworks and electricity works were threatened and the gas supply failed. Water was in many houses in Old Malton and the Vicar had to be rowed to church in a boat to conduct evensong. Right down the village streets across Ryedale and from Pickering to Malton the country was inundated. Nearly all the houses in Ryton were reported flooded.

Pickering. All the shops in Park St and the street to 4 feet, and at the bottom of the Market Place and Hungate were flooded the water reaching the top of counters in some places; also the Co-Op Stores in Southgate and Bridge Street.

Hovingham: Scenes not witnessed in living memory. The road approaching the station was covered to 3 feet; the houses on the other side were flooded to a depth of 2 to 3 feet. Park road was impassable; the cricket ground was covered.

Sinnington: All records of flooding on the river Seven were broken. The river overflowed its banks and flooded the whole village from the station to beyond the Post office. Sinnington has suffered bad floods before but they have never extended so far. Extensive damage was done to stores.

Marion and Normanby Floods reached as far as bedroom windows. The Malton to Kirbymoorside Road was under water between Malton and Normanby to a depth of 4 feet.

Salton Butterwick and Brawby. Hundreds of acres under water Houses flooded to kitchen windows.

Widespread flooding was also described for many parts of East and North Yorkshire including Scarborough and Stamford Bridge. The river Esk overflowed its banks at Ruswarp and Sleights. Houses were isolated and a lifeboat was used to rescue the occupants of a cottage at Carrs near Ruswarp. A torrential downpour was reported in the Littlebeck valley and the river overflowed at Grosmont and the temporary bridge erected at Egton Bridge in place of the stone structure carried away last year, was submerged.

Flooding on the River Leven especially at Stokesley is described in Land of Singing Waters. At 8 am the river level was normal but within 2 hours the footbridge was under water to 3 to 4 feet and spread over the main road in Stokesley. The peak level was lower than in 1930, 1903 and 1976

Serious floods also occurred in Middlesbrough. In North Ormesby district shops and houses in a large number of streets were flooded. Over 2 miles of streets were flooded altogether with 511 houses affected. The flooding was mainly from the Marston beck where a flood protection scheme had started but not sufficiently advanced to reduce flooding. Water in Deepdale Avenue, Marston Grove was not as great as formerly. The beck overflowed at the junction of Eastbourne Road and Valley Road. The Palladium Cinema was flooded. Greatham Creek washed away the side of a reservoir at haverton Hill and flooded part of the Salt Union Works into Ash Street and Oak Street where 8 houses were flooded waist deep.

Whitby: Houses on Car Hill were flooded. In some places the water rose 5 feet and the basements of houses were flooded. Many roads throughout the area were flooded including between Yarm and Thirsk. Heavy falls across the Midlands and Yorkshire and BR notes that considerable flooding ensued including Birmingham, Warwickshire, Derby and the Don valley at Rotherham.

Skinningrove: Much damage was done and the Gas Works were flooded.

Pickering: Flooding was reported

21 May 1932	Haxby (Moorlands)	2.25
BR	Holme-on-Spalding Moor	3.58
	Welburn	2.67
Longfield 1998	Egton Bridge (Bridgeholme)	2.65
	Glaisdale (The Gables)	2.96
	Sleights (The Hall)	3.08
	Castleton	2.6

	Whitby (Park Hall, Aislaby) 2.86	
	Whitby (Westthorpe) 2.32	
	Whitby (Mulgrave Castle) 2.55	
	Rossington Main Colliery 3.14	
	Cloughton (Cober Hill) 3.12	
11 Jul 1932	Pickering Hungate Hall 1.50 in 1 hr Tot=2.72	Thunderstorms at various locations from the North York Moors south to Lincoln where daily totals of 5.33 and 5.14 were reached with 2.93" in 1 hour at Cranwell.
BR	Kildale Hall 1.45 in 1 hr Felixkirk 0.75 in 30 mins Tot=3.11	
Yorkshire Post	Boltby 2.16	Pickering: All motor traffic through the town was suspended for an hour. Shops and houses at the bottom of Market Place and Hungate were flooded and ran through scores of houses in different parts of the town. Heavy damage was done to root crops and in some fields to the north of the town whole fields of turnips were washed away.
12 Jul		Whitby: Several parts of the low lying portion of the town were flooded. The parish church was struck by lightning.
		One of several isolated thunderstorms around the country.
24 Jul 1932	Helmsley Boys School 2.36	
BR		
13 Jul 1934	Felixkirk 1.22 in 50 mins	
BR	Maunby Hall 2.14	
	Helmsley Boys School 2.64	
18 Jul 1934	Castleton 2.15 in 1 hr	
BR		
21 Jun 1936	Ganton 2.00 in 75 mins	
BR		
3 Jun 1936		Whitby: The heavy rainfall caused a rapid rise in the River Esk at Ruswarp and Briggswath. The river threatened to overflow but then receded.
Yorkshire Post		
4 Jun		
15 Aug 1936	Pickering Hungate Hall 0.70 in 20 mins	Whilst most of the country had good warm sunshine local storms occurred in Yorkshire. At Pickering the rain was so heavy that in less than 15 minutes shops were flooded to over one foot in depth. In the shops (Sat at 6.30) customers took refuge on boxes and cases. Many houses were also flooded. The storm also affected the Thirsk district where lightning damage was reported.
BR	Thunderstorm	
Yorks Post &		

Leeds Intel 17
Aug
3 Sep 1936
Yorkshire post
4 Sep
14 Sep 1936
Yorks Post
15 Sep

21 May 1937
Yorkshire
Evening post
21 May

16 Jul 1937
Yorkshire Evg
Post 16 Jul

5 Aug 1938
Yorkshire Evg
post 5 Aug
Hull Daily Mail
5 Aug
12 Aug 1938
Yorkshire Evg
Post 12 Aug
Yorkshire Post
13 Aug

Thunderstorms
Bridlington 1.25 ins in less
than 3 hours.

Thunderstorm with strong
winds.
Bridlington – nearly 2 inches of
rain

Bridlington 0.75 ins in 1 hr

Bridlington: the drains were unable to cope with the heavy rain and Station Road and other roads were flooded

Filey: Rain streamed down the streets and on to the promenade.

Derwent Valley had one of the worst storms for several years. The main street in Stamford Bridge was flooded to several inches. The storm was accompanied by large hail. The flood also caused damage in Driffield.

[Storms were also reported in upper Wensleydale and SW Durham].

Bridlington: It was the worst flooding for years. Roads and two bungalows were flooded. The floods were most serious in Queensgate Extension but also occurred on Marine Drive and Brooklands Road. Fog continued although there was half a gale blowing. A cliff subsidence occurred below houses on south Cliff. Scarborough: Over an inch of rain occurred and the private road to the new hospital was flooded for 200 yards. Several houses were struck by lightning.

Filey: Campers were flooded out and waterfalls were formed in Filey Ravine.

Bridlington: Flooding occurred on Marine Drive, Cemetery Road, Kingsgate, Queensgate Trinity Road Victoria Road and other places. Houses were flooded at the harbour side. A hundred tents of the territorial army were blown down.

Filey: Throughout the Filey district and along the Wolds slight flooding of roads is reported.

Bridlington: Fields roads and gardens were flooded; buildings were struck by lightning. Photo in HDM shows water knee deep in Lawson road.

Scarborough: Many streets were flooded from rainfall which at its worst lasted 20 minutes. Water ran down the foreshore to a depth of 4 inches. Manhole covers were lifted in various parts of the town. The subway outside the central station was flooded.

Bridlington, Wold Newton: **Two feet of hail and snow fell to a depth of 2 feet so that cars had to be dug out.** The Anvil Arms was flooded. The Bridlington to Malton and the Driffield to Forden roads and others were blocked. Motorists took shelter in the village inn which was cut off by floods. **Windows were broken by heavy hailstones, poultry and geese were drowned and hedges were swept away.** The storm lasted about 2 and a half hours. The village pond overflowed and the signpost at the centre of the village was

completely covered. Crops were ruined by heavy hail and potatoes were washed out of fields. Several houses were flooded and water rushed through the village a foot deep. Mr Shaw of Pasture Farm said 'Water rushed down from the fields and through the paddock bringing debris and turnips washed from a field 200 yards away. Hen coops were carried 40 yards. Poultry and geese were drowned. Through the farmyard it was 2 feet deep. After the storm the temperature dropped 20 degrees.

Staithe, Loftus: Half a mile of railway track between Loftus and Staithe was made unsafe by the deluge. The roadway across Kilton ravine between Loftus and Carlin How was washed away. Two low lying streets in Loftus were flooded to a depth of one foot.

Several more stations with rainfall between 1.56 and 2.49 in Yorkshire have been omitted from the BR table.

Hodge Beck at Bransdale 1936-78 AMS Rank 2 AM 2

BR notes 'many of the heavy falls in August 1944 were associated with severe local thunderstorms'.

Hodge Beck at Bransdale 1936-1948 AMS Rank 1 AM 1

Isolated storms occurred over the Wolds and North York Moors whilst holiday makers on the coast enjoyed sunshine. The rainfall affected Wetwang in the Wolds. At Kirkby Moorside water two feet deep ran down the main street and traffic on the Pickering Road at Keldholme was held up with water between 3 and 4 feet deep. Banks shops and private houses were damaged by flooding. [Picture of a flooded road at Kirkby Moorside] At Bridlington

5 Aug 1939
Yorkshire Post
7 Aug

17 Jul 1940
BR
Hiflows UK

Coxwold (The Old Hall)	2.8
Felixkirk (Mount St. John)	2.83
Boltby (Ravensthorpe M.)	2.62
East Harlsey (Harlsey House)	2.89
Ampleforth College	2.89
Castleton	2.83
Guisborough (Lockwood Res.)	3.24
Guisborough (Waterworks)	2.6
Redcar	3.54
Ingleby Manor	2.98
Kildale Hall	3.43
Nunthorpe (The Box)	2.96
Marton-in-Cleveland	2.88

20 Aug 1944
BR

Guisborough (Lockwood Reservoir)	2.76
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24 Oct 1945
BR

Hawes Junction (Moorland Cottage)	2.95
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23 Jun 1946
BR

Farndale Vic	1.28 in 15 mins
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Hiflows UK
Yorks Post
24 Jun

it was the hottest day of the year with 77 F with no rain.

13 Jul 1946

East Harlsey 1.10 in 30 mins

BR

2 Jun 1948

Weaverthorpe (The School House) 2.45

BR

Hiflows UK

Coxwold (The Old Hall) 2.36

Felixkirk (Mount St. John) 2.06

East Harlsey (Harsley Hall)

1.94

Welburn 2.13

Hovingham Hall 2.1

Ampleforth Abbey 3.22

Oswaldkirk (Leysthorpe Hall)

3.05

Nunnington Hall Gardens 2.4

West Ayton (Derwent House)

2.21

Farndale (Vicarage) 3.82

Bransdale (Hull Waterworks)

3.8

Danby (Botton Hall) 2.79

Whitby (Park Hall, Aislaby)

2.31

Whitby (Pannett Park) 1.91

Guisborough (Lockwood

Reservoir) 2.45

Kildale Hall 2.55

Crathorne Hall Gardens 1.94

Egglescliff 2.32

Heavy rain fell in the northern counties north of a line from the Mersey to the Humber.

Hodge Beck at Bransdale 1926-78 AMS Rank 3 AM 5

14 Jun 1948

No high daily totals were noted

BR

Hull Daily Mail

Whitby 1.19 in 3 hrs

14 Jun

10 Jul 1950

Hull Daily Mail

Flooding occurred at many places in the south of England and as far north as Whitby.

Streets and gardens were flooded in Whitby and houses were struck by lightning.

It was the most severe thunderstorm at Whitby for 20 years

Scarborough: A number of manhole covers were forced up and there was flooding of a shop on the Foreshore.

Withernsea: Heavy rain and hail flooded the streets; the hailstones were almost as big as marbles.

10 Jul

2 Aug 1950
Yorkshire
Evening Post 2
Aug

26 May 1951
BR
Silpho Moor 2.64
Sleights (The Hall) 2.74

5 Nov 1951
BR
Danby (Bolton Hall) 3.04

1 Aug 1952
Yorkshire Post
2 Aug

7 Aug 1954
BR

Sunday Sun

19 Aug 1954
LSW
Persistent rainfall over the
summer giving a wet initial
catchment

15-19 Aug 105 mm

20th 33 mm

23rd 51 mm

27 Jul 1956
BR
Pickering Porters Headland
0.99 in 1 hr

26 Jul 1959

Bridlington: A girl was killed and 6 other injured by a lightning strike on the beach. A hotel was flooded and guests were sent to another hotel. There was severe flooding at Flamborough Road Bridlington.

Stormy periods alternated with drier spells during May. A wet period culminated in heavy falls on the 26th-27th after which fairer weather prevailed. At Whitby 1.75 inches fell in the 12 hours ending at 9 a.m. on the 27th and considerably greater falls were reported from other parts of the North Riding. Flooding occurred in the valleys of the Esk and the Ure and the Whitby Gazette of June 1 reported "Newholm Beck...rose at an amazing rate and reached the highest level since 1931."

Widespread southwesterly gales and heavy rain occurred on 4th and 5th and rivers began to rise rapidly. The basins of the Yorkshire Ouse and Severn were the most seriously affected the flood at York being the highest since 1931 with the exception of March 1947. A notable feature of these floods was that they occurred suddenly after a very dry period when most rivers were at a remarkably low level for the time of year. It might have been expected that the ground would have been able to absorb very considerable amounts of rain and delay the rising of the rivers but the falls were sufficient to saturate the surface layers and cause heavy runoff in a short time. Most of the Pennines, the Lake District had their heaviest falls on 4th whilst the Yorkshire Wolds and Cleveland Hills had theirs on 5th. For the two days more than 3 inches occurred over the North York Moors and in the Lake district.

Bridlington: Queensgate and other roads were flooded. More than an inch of rain fell in less than 24 hours.

Sunday Sun reported that the road near Whitby was strewn with hailstones and slush to a depth of 6 to 8 inches. Some of the hailstones were as big as golfballs.

Double peaked flood on 21st and 24th. The event though serious was from persistent rather than intense rainfall.

BR			
9 Oct 1960	Westerdale	2.67	
BR	Danby Lodge	3.42	
	Kildale Hall	2.7	
19 Oct 1961	Kildale Hall	2.50	
BR			
20 Apr 1965			Rye at Little Habton 1958-71 AMS Rank 2 AM 17 (no more summer AM floods)
Hiflows UK			
14 May 1967	Filey	51.6	Depression, frontal, thundery.
BR	Silpho Moor	56.1	Sea cut at Scarborough 1967-09 AMS Rank 2 AM 2
	Staxton Wold	54.6	
Hiflows UK			
4 Nov 1967	Danby Lodge	51.1	Frontal depression moving slowly north over southeast England.
BR			
5 Nov 1967	Hawnby	67.8	Depression, orographic, thundery; depression east of Yorkshire coast
BR			
16 Jul 1973			Rye at Little Habton 1958-71 AMS Rank 1 AM 14
Hiflows UK			
15 Sep 1973			Leven at Easby 1971-09 AMS Rank 3 AM 3
Hiflows UK			
23 Sep 1973			Leven at Leven bridge 1959-08 AMS Rank 3 AM 8
Hiflows UK			
2 Oct 1975	Pickering	25 mm in 50 mins	
COL			
11 Sep 1976			Leven at Easby 1971-09 (closed 1997-04) AMS Rank 1 AM 1
Hiflows UK			Leven at Leven Bridge 1959-08 AMS Rank 1 AM 5
20 May 1979	Pickering	33.8	A small depression moved N from France (no mention of thunder)
COL	Redcar	32.8	
14 Aug 1980	Pickering	54.0	A day with widespread thunderstorms over SE and E England extended to North Yorkshire though the heaviest totals were in Northants and Lincoln and Nottingham.
COL			
Hiflows UK			Esk at Sleights 1952-98 AMS Rank 2 AM 6

23 Jun 1982

Hiflows UK

17 Apr 1986

Hiflows UK

30 Jun 1988

COL

24 Feb 1991

Carlton in Cleveland 48.9
Coxwold Stores 68.8

Sea Cut at Scarborough 1967-09 AMS Rank 3 AM 9

Leven at Leven Bridge 1959-08 AMS Rank 2 AM 7

On 30 June a deep depression developed near Ireland and associated fronts affected all areas of the UK

Rainfall on snow resulted in flooding mainly in the Pennine tributaries of the Ouse, along the Swale, Ure, Nidd Ouse but also on Derwent Rye and tributaries. . In early February the whole of the NYM was blanketed in snow, depth not certain. The rain during the period 20-23 Feb was not great at Church houses 0.5 mm (20th) 8.0 mm (21) 9.5 mm (22) and 5.0 mm (23). The snowmelt was therefore the main source of the flood.

Floodwater overtopped the floodbank at Butterwick Bridge and flooded the road which was closed. No property was flooded. The floodplain north of Old Malton was extensively flooded. However the embanked sections of the River Rye contained the floodwaters. No flooding occurred in Malton/Norton where the level at the bridge was 18.06 m (compared with 18.56 in 1960. Higher levels were also reported at Ness and Howe Bridge in 1960.

During the flood of Feb 1991 there were no significantly high flows down the upper reaches of the Derwent upstream from the Rye mouth.

Esk at Sleights 1952-98 AMS Rank 3 AM 7

26 Jun 1993

Hiflows UK

4 Aug 1993

COL

13/14 Sep

1993

COL

Hiflows UK

Carlton in Cleveland 62.1
Redcar 1 50.8
Redcar 2 37.0
13th
Fylingdales 75.2
Carlton in Cleveland 29,5
14th
Fylingdales 44.8
Low Etherley 34.9

A small secondary low east of Whitby gave heavy rain and cold weather in Northeast England.

The remnants of Tropical Storm Floyd affected UK over the following few days.

A low near the Netherlands gave a northeasterly wind. No reference to thunderstorms.

15th

Costa Beck at Gatehouses 1969-09 AMS Rank 3 AM 4

Esk at Sleights 1952-98 AMS Rank 1 AM 5

Pickering at Ings bridge AMS Rank 2 AM 2

Esk at Briggswath 1992-09 AMS Rank 3 AM 5

Observer at Redcar notes the occurrence of thunder at his station but little rainfall. However at Skelton Loftus and Brotton there was a severe storm raising manholes at Loftus and causing street flooding at Skelton from an overloaded drainage system.

Thunderstorms

12 Jul 1994

COL

24 Jul 1994

Redcar 17.8 mm in 3 hours

COL	Marton 34.3 of which most fell in 3 hours		
30 Jul 1994	Marton 34.3 of which most fell in 3 hours		
COL			
26/27 Aug 1996	26 th Redcar 38.3		Heavy showers were widespread with occasional thunderstorms. Localised flooding in Stockton.
COL	27 th Carlton in Cleveland 27.2		
30 Jun 1997	Marton 34.7		No thunder reported
COL	Carlton in Cleveland 28.1		
	Redcar 27.0		
13 Jul 1997	Whitby 15 mm in 30 mins		Thunderstorm
COL			
31 Aug 1997	Redcar 45.2		Cold front came east and brought heavy rain and thunderstorms. Severe thunderstorm reported in Darlington area.
COL			
11 Apr 1998			
Hiflows UK			
2 Jun 1998	Redcar 45.7		<p>Marton, Middlesbrough: 3rd: 51.1mm was the greatest 24-hour June fall since records began (1971). It was the third wettest day in any month, after 71.4mm (11.9.1976) and 51.3mm (14.7.1975). 30.7C on the 19th was the hottest June day on record.</p>
COL	Marton 31.8		
7 Jun 1999	Carlton in Cleveland 61.6		
COL	Marton 26.7		
3 Jun 2000	Marton 51.1		
COL	Redcar 39.5		
1 Jul 2000	Redcar 46.6		
COL	Normanby 27.9 mm in 5 hours		
7 Aug 2001			
COL			
19 Aug 2001			There were reports of local flooding in the Scarborough area in thundery showers.
COL			There was much thundery activity in the Whitby area with heaviest rain in Goathland where much flooding occurred.

1 Aug 2002
COL
Hiflows UK

Fylingdales	114.6
Whitby West Cliff	78.8
Marton	73.8
Whitby	72.5
Loftus	69.4
Redcar	59.6
Carlton in Cleveland	58.5
Pickering	56.1

Floods affected large areas of Yorkshire. No thunder reported
Whitby observer notes: The River Esk was left in spate with some flooding on roads and the Middlesbrough-Whitby railway line was closed for a day due to flooding in the Danby area. I don't think the flooding was as bad as November 2000 because the land soaked up some of the rain due to dry weather beforehand. Another heavy burst of rain occurred during night of the 9th/10th when I recorded 29.9mm. On this occasion we missed the worst and the heaviest rain was centred on Filey some 30 miles south of here, where much flooding with evacuation of people occurred.

Rye at Broadway Foot 1976-09 AMS Rank 2 AM 4
Pickering at Ings bridge 1976-09 AMS Rank 1 AM 1

10 Aug 2003
COL

Carlton-in-Cleveland	51.8
Normanby	29.5
Leeming	28.4
Marton	26.0
(24.0 mm in 20 mins)	

10th: During the morning, thunderstorms broke out over W England and W Wales, spreading northeast to affect the Midlands and much of N England. Some of the storms were very active, and there were reports of injuries from lightning. Thunderstorms continued through the afternoon and evening, but became less widespread and intense than earlier, and chiefly affected the Midlands and E England, and East Anglia later. The storms were heaviest across parts of Yorkshire – see letters columns for further details. At Carlton-in-Coverdale there was a shortlived but severe thunderstorm in the morning. The temperature fell from 24.0C to 19.0C in a few minutes, while the rainfall totalled 7.1mm. There were strong gusts of wind, and in nearby Jervaulx Abbey grounds it was possible to see a distinct area of broken branches and some large boughs ripped from trees. The area involved was about 100 years wide and about half a mile long. There was much heavier rain to the E of this site.
At Redcar an exceptional thunderstorm was observed from 1045h to 1130h. It was almost dark at 1100h then the wind gusted to 50mph. 15.8mm rain fell, the bulk of it between 1100h and 1115h. There was a small amount of hail but no exceptional thunder. Much flooding occurred locally and a fishing boat sank in Tees Bay. There was severe wind damage at around 0900GMT, during a thunderstorm, in the village of Lofthouse, 10km NW of Pateley Bridge. Local eyewitnesses claim to have observed a tornado.

1980 The North Yorkshire - Teesside Storm of 10 August 2003

A cloudburst dropped an incredible 49mm of rain, approaching our monthly average of about 63mm, in a quarter of an hour on Sunday, 10 August 2003, here at Carlton-in-Cleveland. Not only was this easily in the "very rare fall" category, with a return period of more than 160 years, as defined by Bilham, but rates as one of the most intense downpours ever to be recorded in the British Isles. The storm was accompanied by a severe squall, hail up to 20mm in diameter and was apparently travelling at high speed. I estimate that most, 47.2mm, poured down in twelve minutes, i.e. at about 235mm/hour, and 45.3mm tumbled down in ten minutes, i.e. at about 270mm/hour. These figures are derived from the fall collected in my "official", well exposed, 5-inch, Meteorological Office Mark II raingauge and the chart from my tilting siphon, recording raingauge (TSR) for the timing of the event. I sent my

chart and data to Stephen Burt (Stratfield Mortimer) for a second, independent, expert opinion on my analysis. Stephen once spent three years in the Heavy Rainfalls Section of the Meteorological Office. At the time of writing this note, although he wanted to do a few more measurements on the chart, he saw 'nothing that would challenge my assessment of the depth-duration estimates'. Others, with whom I've corresponded, think my arguments are reasonable, too. There are only three other known, short period, point-falls that compete with this. At the top of the list is the 31.7mm in five minutes at Preston, Lancashire on 10 August 1893, i.e. at 380 mm/hour. This is highly questionable as it was before the existence of recording raingauges. The widely accepted record is that of 50.8mm in twelve minutes, i.e. 254mm/hour, at Wisbech, Cambridgeshire, on 27 June 1970. The drenching at Carlton would seem to be slightly behind this, at least over twelve minutes, but is definitely ahead of Leeming's 35.7mm in nine minutes, i.e. 238mm/hour, on 2 July 1968.

When I first looked at my TSR chart, I was initially puzzled and disappointed. It shows a fall of just 31.4mm from 0935GMT, when the deluge commenced, until 1000GMT, including 30.0mm between 0935GMT and 0947GMT. However, there are several explanations for the deficit compared to the catch in my official gauge. The main one is that my TSR is in a sheltered position, especially from the west, the direction from where most of the precipitation came. I would have expected a loss of about 20% with a similar, accompanying, strong wind in winter and probably more in summer, with the leaves on the surrounding trees and shrubs. My "check" gauge, a standard 5-inch Snowdon Pattern, Mark 1A, similarly exposed two metres away, confirmed this with 40.8mm between 0900GMT and 1000GMT, compared to the official gauge's 49.4mm in this time.

Also, the TSR is an old Meteorological Office Mark 1, which, at the rate of fall experienced, would have lost the equivalent of about 6mm whilst siphoning six times during the event. I did a series of controlled experiments on my TSR the following weekend to check that it was functioning properly, which it was, and to verify these losses. These increased with rainfall rate, as to be expected (the more that flows into the siphon chamber, the longer it takes to empty), until becoming infinite at about 600mm/hour (when inflow into the chamber equals the outflow). It is possible that this rate might have been reached very briefly once or twice due to the gusty winds and other factors causing marked fluctuations in the intensity of the precipitation - and, perhaps also due to me "opening the plug". I ventured out, both in the middle of the tempest and swiftly again when it eased off, to check the hail was not blocking up the TSR's funnel. Surprisingly, no doubt thanks to the earlier high temperatures, it didn't seem to be, but I did scrape out a little the first time, equivalent to 0.7mm of rain, but there was none the second time. Other reasons for discrepancies are likely to include out-splash from the large-diameter of the TSR (one can imagine, in particular, the larger hailstones bouncing out) and rainfall gradients within the storm; the distance between my "official" gauge and TSR is 60 metres.

I run a Meteorological Office Climatological Station (Ref. DCNN 2256, Rainfall Ref: 031 971, National Grid Ref: NZ 508039) at Carlton, about 5 km south-south-west of Stokesley and 20 km south of Middlesbrough. The Cleveland Hills run east-north-east to west-south-west just to the south, on the northern edge of the North York Moors. From my station at 103m amsl, the ground slopes gently up for about 1km, then climbs steeply, with Carlton Bank

at 408m, i.e. some 300m above us, 1.8km to the southeast. The Pennines start rising to the southwest some 40km away.

The previous day had seen the temperature reach 31.5C, the second highest in my 20 years of records here. This equalled that on the 2 August 1990 and has only been exceeded by the 33.3C on the 3 August 1990. Sunday began sunny and cloudless, with a very gentle breeze, mainly from the north. The mercury at 0900 was already up to 24.5C. This was several degrees higher than at the same time on the Saturday, so was well on course to reach a new high. Admittedly, this would have been somewhat short of the UK record that was threatened, and indeed achieved later, in southeast England. However, at 0900GMT, towering anvils of cumulonimbus loomed out of the haze to the far southwest accompanied by the ominous rumblings of very distant thunder. The clouds swept towards us amazingly quickly, and at 0935, a wall of precipitation suddenly hit us, propelled by a strong, gusty southwest wind that soon turned westerly. Mixed in with the rain was much hail, up to 2.0cm in diameter, mainly ovate in cross-section or "pear-drop" in shape. This continued until 0950GMT when the wind died down, the hail ceased and the rain became slight. In this time, the temperature had dropped over 9C, from the 24-hour maximum of 24.9C to the 24-hour minimum of 15.7C, and atmospheric pressure had jumped up by 3mb. Strangely, only the odd flash of lightning and a few rolls of thunder were observed in this period, though the noise of the rain and hail clattering on the roofs and windows, especially in our conservatory, was tumultuous and would have drowned out all but the nearest of thunderclaps. Further showers until mid afternoon and overnight drizzle (0.1mm) brought the 24-hour total up to 51.8mm.

Hail covered the ground giving a weird, wintry feel; small drifts survived for seven hours. When it had melted, with leaves and other debris lying everywhere, the scene looked more autumnal - except the leaves were green. They had been stripped from some trees, particularly the broad-leafed ones, with many shredded into pieces. Around the village, a few large branches had also been torn off the trees. My lawns looked as though they had been raked in one direction, from the west, then rolled. The many mossy patches in them, which I have to admit to, were covered with indentations made by the hail. Tall grass was simply flattened. Combined with the wind, the hail had "sandblasted" white paint from the rendered, west-facing walls of the houses opposite. A near-by greenhouse lost a couple of panes of glass. Flash flooding occurred in the surrounding area - including in my garage. Water also poured into our conservatory through the roof, which had previously never leaked. I can only presume it was driven up the slanting roof and under the flashing that normally deflects it away from the main wall of the house. There was the inevitable chaos across the region during and following this episode, from the North Yorkshire Dales across to Teesside. Trees were blown down, roads flooded, homes and business inundated; there were power cuts and many boats offshore, adjacent to Teesmouth, needed assistance. All the local lifeboats were called out. Tragically, two men in a fishing boat lost their lives. Reports of tornadoes were mentioned in the media. A trail of destruction was left through the villages of Stean (National Grid Ref: SE 0973), Middlesmoor (SE 0974) and Lofthouse (SE 1073), all about 10km northwest of Pateley Bridge (SE 1666) between 0830 and 0900 GMT. Considerable damage was caused to trees, buildings and cars (mostly due to falling branches?) according to The Nidderdale Herald and The Yorkshire Post (report sent to me by Bill Wade). Rather than any tornadoes, I imagine

that the violent, "down-draft" or squall that heralded the storm probably caused the damage. Its sudden onset was, more than likely, responsible for the problems at sea, too. My rainfall catch is by far the largest of which I'm aware. Around 25mm seems to have fallen in a swathe between Leeming (25km to the south-west of Carlton) to Middlesbrough (about 15-20 km to the north). There was only a few millimetres further north and little to the south, e.g. 1.2mm at Dishforth, 30km to the south-south-west and a trace at Pickering (Paul Hignett), 35km to the south-east on the other side of the North York Moors.

John Goulding at Normanby (14km to the north-north-east) made similar observations to me but not so extreme and delayed by a quarter of an hour. He determined that 25.4mm fell in 13 minutes, with a peak intensity of 200 mm/hour from his natural siphon recorder; hail was limited to 5mm in diameter. Bill Wade at Pateley Bridge (50km to the south-west) had a thunderstorm at 0850-0930GMT with a 7mm-rainfall. He noted that from "almost calm conditions, a brief squall at 0855GMT provided gusts of up to force 7". From their and my observations, assuming we noted the same squall line, the storm seems to have been moving at about 40 - 45mph. If this is true, when weather systems generally were only 'ambling' about, then there was certainly something very special about this storm. What was its cause? I don't have the knowledge to give a full explanation but I'd be very interested to hear of one. In my simple terms, as far as I'm aware, a weak front was moving slowly southeast into western Britain and, presumably, had pushed a cold pool of air ahead of it at high levels. This was the trigger for the development of a large area of thunderstorms over the southern Pennines. This moved north-north-east and was vividly evident on the radar pictures on the "Farmers Forecast" on BBC1 shown just after the storm. On these images, a brightly coloured 'finger' indicating torrential rain, seemed to form on the southeast flank of the storm area as it skirted the northwestern edge of the North York Moors. This finger continued (more?) rapidly in a northeasterly direction along the northern edge of the Moors and on its way out to sea. I guess, therefore, that the increased severity of the storm locally was partly due to orographic enhancement, perhaps combined with it coming up against the gentle northerly that was blowing beforehand. This northerly was either caused by a rotor in the lee of the hills (quite common here), by the strong heating of the hills in the early sunshine, the beginnings of a sea-breeze front or the suction towards the storm itself?

I intend to send a "Letter to the Editor" or a short article to one of the meteorological journals. If anyone can offer any further information to include in this, or assistance with it, I'd be very grateful. Home address: 10 The Crescent, Carltonin- Cleveland, Middlesbrough, TS9 7BH, tel: 01 642 712 093, e-mail: (office) mike.cinderey@epigem.co.uk.

Acknowledgements: my thanks to Jonathan Webb, Philip Eden, Roger Brugge and Stephen Burt for their help and advice; also to Roger to for providing some of the rainfall data and to everyone else mentioned above for their observations. Special thanks go to Stephen for his correspondence with me, his opinion on my TSR chart and electronically scanning it for reproduction here.

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Mike Cinderey

Carlton-in-Cleveland, North Yorkshire

Another view of the storm of 10 August 2003

This was a major storm with very strong winds and torrential rain. Also, very large hailstones fell doing much damage and of course adding to rainfall totals. At my Marton 2 station 20.7mm of rain fell in the first hour whereas a few miles south of this station the rate of fall was in the order twice as much. Large hail fell to the north and south and the rate of fall was greater; at one location the pressure of water in the main drains was such that they burst and "unzipped" the road surface above. The Accident and Emergency unit at Middlesbrough General Hospital was flooded and they lost power. For the time being this unit is running on emergency power provided by a transportable unit. At North Tees Hospital the Children's ward, a scanning unit and X-Ray suit were put out of commission. A major supermarket was flooded and had to be evacuated, while nearby Yarm high street became flooded and there were other problems at Hartlepool.

Ships anchored awaiting entry into rivers together with small fishing craft put out mayday calls. At least two people died as direct and indirect casualties.

As far as I can tell Marton got off lightly, which illustrates a fickle side to this unexpected storm, which for the Northeast and points west marked the end of a very sunny and hot spell. Here I recorded a 29C maximum on the 9th, the highest of the year here so far this year. Altogether a very interesting first ten days for this August. David Ledger Marton 2

10 August 2003 in the Middlesbrough area

Whilst the South East was sweltering with record temperatures yesterday, the Middlesbrough area suffered torrential rain as thunderstorms moved northeast. From a sunny start the temperature rose rapidly to 25.9C by 0935GMT; the cloud was increasing before this and was overcast and very dark by 0935GMT with background thunder from about 0900GMT. At 0950GMT there was a sudden series of strong gusts - up to a maximum of 27mph accompanied by torrential rain that relented to heavy and just about stopped by 1004GMT.

A total of 25.5mm fell in this period (final total 29.5mm) with a peak intensity of 200mm/h taken from the natural siphon recorder! There was some small hail at 1000GMT; the temperature by 1030GMT had dropped to 20.0C. The ground was flooded locally for a short time and visibility was down to about 50 metres during the downpour. Local reports stated there was flooding in the Cleveland Shopping centre and water was at car door level in Acklam 33.2mm was said to be recorded at Longlands close to the centre of Middlesbrough. Sunny spells returned in the afternoon and the temperature rose to 24.0C.

John Goulding Normanby

19 Sep 2003 COL	Leeming Carlton-in-Cleveland Marton, Middlesbrough Normanby Redcar	38.2 35.6 35.0 34.8 33.6	Normanby: 32.2mm fell over period 1830-0220h. No reports of thunder
19 Apr 2004 Hiflows UK			Rye at Broadway Foot 1976-09 AMS Rank 1 AM 3
25/26 Apr 2004 COL			25th: Thunderstorms were reported from parts of N and E Yorkshire and the Cleveland area. 26th: A band of rain developed thunderstorms in NE England. Roads were flooded in Tyne and Wear and County Durham.
9 Aug 2004 COL	Whitby Carlton in Cleveland Marton Normanby	38.0 50.8 34.0 28.7	A deep low to the W of Ireland pushed frontal rain slowly E across W Britain during the day. This was heavy and thundery in places. Reports of thunder came from Hull to Northumberland, much of East Anglia, Lancashire, Gloucestershire and counties in SE England.
16 Apr 2005 Hiflows UK			Leven at Easby 1971-09 AMS Rank 2 AM 2
19 Jun 2005 COL	Carlton-in-Cleveland	37.1	Severe Thunderstorms, North York Moors, 19 June 2005 Severe storms hit parts of the North York Moors during the afternoon of Sunday, 19 June 2005. The resulting catastrophe was widely reported on national television and in the press. The heaviest rain affected the southwest quarter of the Moors and seems to have coincided with the catchment area for the River Rye, which runs through Hawnby (SE 5489) and on to Helmsley (SE 6183), about 8km to the southeast. As far as I'm aware, the highest rainfall was recorded at Hawnby1 where 70mm of rain tumbled down in three hours - most in just 30 minutes. Parts of Helmsley and neighbouring villages, particularly Hawnby, were devastated by flash floods. Many houses were flooded, some being structurally damaged by the rushing water. Many cars, tents and caravans were swept away by the swollen streams, one car being found 8km from where it had been parked. Fortunately, nobody lost

their lives but hundreds of pets, sheep, cattle and wild animals were drowned. There were widespread power cuts across the region and the Bilsdale TV mast (SE 5596) was put out of action. Here at Carlton-in-Cleveland (NZ 508039) just below the northern edge of the Moors and about 25km north-northwest of Helmsley, we appear to have been on the northern edge of these storms. However, they were impressive even here, but were obviously much worse over the Moors. I could hear thunder continuously from about 1330GMT until 1715GMT and it was overhead at times between 1500GMT and 1630GMT. I observed the first lightning at 1445GMT and, between about 1545GMT and 1715GMT, it flickered away at in the order of ten flashes per minute - and this during daylight. Had it been at night the storms would have been truly spectacular. The thunder and lightning finally died away by about 1800GMT, though there was more distant lightning late evening, again to the south. It started raining here at 1430GMT - just 'spots' initially, but huge ones, making 50mm-diameter splashes on concrete paving. It became almost continuous, of 'slight to moderate shower' intensity, between 1450GMT and 1700GMT, with further very slight rain until 1815GMT. Within this period, there was just a little hail, up to 7mm in diameter, briefly around 1450GMT, but also some torrential bursts of rain. 1 However, see also a subsequent report from Whitley Bay in the thunder report section. June 2005 27 The downpour was particularly notable between 1505GMT and 1535GMT when 28.5mm fell, with half of this in seven minutes from 1521GMT. The accumulation for the afternoon (and the 24 hours from 0900GMT) was 37mm, well short of the record daily total for June here of 62mm on the 7th in 1999. The temperature fell from the day's maximum of 28.1C at about 1340GMT to the 12-hour minimum of 18.3C around 1610GMT. The seven-minute fall here, almost 15mm, i.e. at a rate of about 125mm/h, was still less than half that which occurred here in the UK-record breaking storm on 10 August 2003 over a similar time [ref 1]. This intensity of rain continued for as long as 30 minutes at Hawaby, producing 60mm of their total, but again, even this was well short of the UK record over 30 minutes, i.e. 80mm at Eskdalemuir, Dumfries and Galloway, 26 June 1953 [ref 2]. Amounts of rain dwindled rapidly going away from the badly affected area of the Moors, e.g. to the south and east:

Pickering (SE 7984, Paul Hignett) had 16mm, Whitby Climatological Station (SE 8910, Peter Wallace) 5mm and Whitby West Cliff (Trevor Goodall) 3mm. To the north, Normanby, Middlesbrough (NZ 5518, John Goulding) received 11mm and Copley, near Barnard Castle (NZ 0825, Ken Cook) a mere trace. Thanks to the above-mentioned COL colleagues for allowing me to mention their figures.

Mike Cinderey Carlton-in-Cleveland

References:

[1] Cinderey, M B. (2005), The North Yorkshire – Teesside Storm of 10 August 2003, *Weather*, 60, pp 60-65, (doi: 10.1256/wea.117.04).

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Thirsk to Helmsley area: "Sunday 4 p.m: thunderstorms hit North Yorkshire.... 6 p.m: 68 mm of rainfall recorded in approximately two hours.... 8 p.m. reports reach [North Yorkshire County] council of river flooding 10-11 p.m: River Rye, Cod Beck and Sutton Beck burst banks.... Midnight: water levels thought to be at a maximum, in some places 3m higher than previous levels...'Even in the storms of 2000 (NCE 9 November 2000) , I never saw [bridge and road surface] damage like this' said [acting divisional engineer] Pimperton, referring to 2 km of road between Thirley and Sutton-under-Whitestonecliff' "

Sutton-under-Whitestonecliff A tidal wave swept up from the beck that runs by the property of pensioner Thomas Lowey. "I looked out of my window and saw the workshops sailing away - just like Noah's Ark," he said. "Then the flood waters started to fill the house. A gush of water came up through the toilet and the whole place filled with sewage so I had to get upstairs until it started to die down. A car washed downstream by the flood also landed in Mr Lowey's garden as the raging waters surged through. My workshops were never found. "The flood water reached ten feet in the house and all my furniture, floors and walls are ruined".

River Rye, England – transformation of lag in flash floods (Archer)

Analysis for the River Rye in North Yorkshire in England provides an example. The River Rye drains the plateau moorlands of the Cleveland Hills in North Yorkshire and has a catchment area of 132 km². A catastrophic flood in June 2005 was extreme both in its peak discharge (400 m³s⁻¹ - 11 times QMED the median annual flood) and in rate of rise in level (an increase in water level of 1.43m over 15 minutes). The lag time was only one third of the average for other floods (Figure 5) (Wass et al., 2008).

This observed reduction in lag in flash floods is critical for the reliability of flood forecasting and rainfall-runoff methods of flood risk estimation using the unit hydrograph procedure which assumes invariant lag. For example, the Flood Estimation Handbook (FEH) method widely used in Britain applies a fixed time-to-peak parameter (proportional to lag) which controls the speed of response (IH, 1999). In the case of the Rye, using the average lag based on 'normal' floods was found to seriously underestimate the peak flow in the 2005 event (Wass et al., 2008). In a similar flash flood at Boscastle in southwest England in 2004, HR Wallingford (2005) had to reduce the time to peak of the unit hydrograph by a half and still underestimated the peak flow calculated from hydraulic considerations. Previous attempts to identify sources of variation in lag have focused on the relationship between lag and flood peak magnitude but found no statistical evidence for a shortening of response time (Kjeldsen et al., 2005). Wass et al.,(2008) proposed a land phase mechanism for reduced response time where overland flow is

concentrated into gullies, extending the channel network to make delivery to the river more efficient. However, Archer and Fowler (2018) suggested that channel travel time is also reduced where such transitory waves occur. Reduced lag in flash floods remains a serious operational and accuracy issue for flood forecasting and flood risk estimation for design.

6 Jul 2005
COL
Redcar 45.5
Skelton Green 45.6
Marton 28.5

Low pressure close to the coast of E Britain into the 6th meant a rather cloudy start to the day, with rain in the E; there was heavy rain in E Scotland that later spread S into NE England and East Anglia.

No thunder reported

28 Jul 2005
COL
Marton, Middlesbrough 49.0
Carlton-on-Cleveland 45.7
Redcar 39.8
Normanby 39.1
Skelton Green 32.3
Pickering 27.8

Most places had a cloudy start to the 28th, There was some early rain in many places. As the day progressed a band of rain from SW England to Norfolk pushed N into N England and parts of S Scotland, with a low pressure centre moving NE to mid- Wales by 2400GMT. Heavy showers turned thundery to the S of the main rain band, and tornadoes occurred in Birmingham, Peterborough and Lincolnshire; the one in Birmingham did considerable damage and at least 20 people were reported injured by flying debris. Winds were estimated at over 130mph, according to press reports. Heavy rain led to localised flooding in parts of the Midlands. At Carlton-in-Cleveland the day was the wettest July day in a 22-year record with 45.7mm falling; 37.5mm fell in the six hours commencing 1700GMT. One station in Scarborough reported 57.8mm and other similar falls were reported in Wales.

Marton, Middlesbrough: 31st - Hottest day (27,4C) resulting in a severe thunderstorm around 1730GMT in which most of the 17.6mm of rain recorded for the day fell in 30 minutes.

Normanby: 31st - Hottest day of month (26.8C). Cloud thickened and lowered with heavy rain 1710h to 1745h which produced 9.1mm at a maximum intensity of 50mm/h. Thunder 1710-1830h. Lightning was particularly intense between York and Thirsk around 1645h, accompanied by heavy rain.

31 Aug 2005
COL

13- 20 Jun
2007
COL
Hiflows UK
14th
Whitby 32.1
19th
Pickering 31.6
25th
Pickering 36.6

Four people died in the floods which inundated parts of the Midlands and Yorkshire, with more than 30,000 homes and 7,000 businesses affected. UK insurers are facing a bill of about £1.5bn after June's floods.

Dozens of shops and pubs closed in Pocklington and Pickering, while the water rose to two feet deep in parts of Elvington.

25th

Esk at Briggswath 1992 09 AMS Rank 1 AM 1

26th

Costa Beck at Gatehouses 1969-09 AMS Rank 2 AM3

Pickering at Ings bridge 1976-09 AMS Rank 3 AM 3

3 Jul 2007
COL
Carlton in Cleveland 41.1

The low pressure centre extended E across Scotland during the 3rd. There was some heavy rain in Yorkshire around dawn (thunder reported) with showers elsewhere across the British Isles. During the afternoon and evening thunderstorms became widespread SE of a line Hull-Exeter.

19/20 Jul 2007
N Yorks county
pubs 19/20 Jul

Carlton observer reports: 39mm tumbled down in less than three hours from 1300GMT with rainfall rates of up to 75mm/h. Roads were awash and the village was cut-off by car for a few hours after about 1500GMT. I've only known this happen once before in the 24 years we've lived here and that was in early November 2000. (Note Normanby: 4th - Wettest day with 21.1mm all within 75 minutes from 1800h.)
Filey: Dozens of people had to be evacuated following flash floods. A lifeboat crew rescued people from homes and businesses after a torrential downpour flooded Filey yesterday. Firefighters dealt with more than 80 call-outs in an hour and as floodwater reached waist depth. Filey's town centre was flooded and residents of Rutland Street had to be evacuated while Murray Street was also under water. Around 30 elderly residents were evacuated from flats in Chapel Court after a roof collapsed. Filey RNLI had to rescue eight adults from a swimming pool building that flooded at Filey School; a woman and four dogs from the Wharfedale Estate; and eight people from homes in Seadale Terrace. Two hours after the cloudburst, police said Muston Road remained closed and 10 houses in the area had been evacuated. Scarborough Road was passable with care.

31 Jul 2008
COL
Pickering 43.3
Redcar 42.1
Normanby 25.1

The persistent squally rain leaves those living in communities such as Pocklington and Pickering, which were recently devastated by floods, anxiously watching the skies and checking water levels in becks and streams. In Elvington, villagers are getting used to having the main road open again, after it was closed for two weeks. But water levels in the beck are still high.

Low pressure remained close to Ireland during the 31st and pushed a sequence of fronts and troughs E across W and Cent parts of the British Isles.

Whitby: The wettest day (31st) was due entirely to a thunderstorm which occurred on 1 August between 0130h and 0200h.

Ripley: 31st - Torrential rain in afternoon and evening followed by severe thunderstorm in night.

Normanby: 31st Heavy rain, mainly in the early hours of the 1st produced 25.1mm which was the wettest July day since 39.1mm on 28.7.2005.

See northeast Flood History

5/6 Sep 2008
COL
Hiflows UK
Ripley 61.2
Whitby, West Cliff 40.1
Carlton-in-Cleveland 38.6
Pickering 35.8
Normanby 32.0
Marton, Middlesbrough 27.6

Sea Cut at Scarborough 1967-09 AMS Rank 1 AM 1

Costa beck at Gatehouses 1969-09 AMS Rank 1 AM 1

Esk at Briggswath 1992-09 AMS Rank 2 AM 4

16/17 Jul 2009
COL
49.9 Redcar
48.8 Normanby
43.0 Marton, Middlesbrough

Whitby: The 16th, with 41.8mm, was the wettest day since 2.8.2002 (72.5mm) and the wettest July day since 6.7.1973 (55.1mm).

Carlton-in-Cleveland: 16th/17th - 63.8mm in two days (33.7mm and 30.1mm) including 54mm in 19 hours.

Normanby 16th - An afternoon shower followed by steady rain from evening onwards with some heavier bursts in the early hours gave 36.3mm by 0900h on the 17th. 17th - Rain continued from 0900h including a heavy fall of 31.0mm between 1030h and 1220h. The total of 48.8mm was the heaviest single day's fall since 82.3 mm on 1.8.2002. The two-day total of 85.1mm was slightly less than the previous high of 88.1mm on 1-2.8.2002. Marton, Middlesbrough: 16th and 17th - a total of 63.2mm rainfall, 54.2mm of which fell in the 24h from 2200h on the 16th.

20 Jul 2010
COL

Thunderstorms affected parts of northern England in the persistent cold frontal zone in the late afternoon and Evening.

Normanby: 20th – Around 1630h there was very heavy rainfall about 7km to the west which produced flooded roads in the Stockton and Billingham areas. (A local station in Billingham reported 41.8mm.)

Whitby (West Cliff): 20th - 9.9mm rain in a 20-minute downpour with thunder.

23 Sep 2010
COL

Carlton-in-Cleveland 35.7
Whitby 29.5

During the 23rd a small area of low pressure was slow-moving over N Britain and, with several fronts over the British

Isles, it was a rather wet day in many places. Parts of S England had some heavy rain during the early morning. Much of N Scotland and W areas of Ireland Scotland had a mainly dry day - elsewhere, there were falls of heavy rain during the day, often showery and thundery in nature.

Behind the cold front, thunderstorms developed over many parts of England, away from the more southern and south-eastern regions, during the afternoon. Intense rainfall in various districts caused localised flooding – notably in

Newcastle-upon-Tyne. 24th: The last of the previous day's thundery showers affected Whitby very early in the day.

Normanby: 23rd - Thunder 1600-1630h with sharp shower 1608–1625h which produced 8.8mm: 24.1mm in the rainfall day.

3 Oct 2010
COL

Redcar 28.0
Normanby 27.2
Carlton-in-Cleveland 26.2

Overnight into the 3rd rainfall was widespread across England and Wales. Much of E Scotland remained dry, as did parts of NE England. During the day the rain moved E'wards and produced some heavy falls across the Midlands and N England. It turned brighter following the rain with a few showers in the W; however, E and Central parts of Britain remained cloudy. North Yorkshire Fire crews rescued 13 people in floods which swept the county; the fire service said it had attended 31 flood-related incidents, mainly around Kirkbymoorside, Danby and the North York Moors. Flood victims included a farmer at Lanburn Bank, Castleton, who became cut off by flood water from the River Esk. A total of 12 flood warnings were issued across Yorkshire.

7 Aug 2012
COL

Carlton in Cleveland 11.5 in 20
m (24.3 in 3 h)

Osmotherley (SE4697), 10 km to SW of Carlton, received 55.2 mm, with 51.8 mm during 1500-1700 h. The beck though Swainby, 5 km to WSW, over-flowed, flooding about 12 houses along the main street.

6 Sep 2013
COL

Redcar 63.5
Normanby 59.2
Marton Middlesbrough 34.4
Carlton in Cleveland 47.0
Whitby 18.4

In terms of rainfall intensity at most sites this was hardly a flash flood but the effects of rapid rise in level reported were consistent with flash floods.

A once in 250-year+ deluge in north-east North Yorkshire on Friday, 6 September 2013

A deluge brought extensive flooding along the coast on the north-east side of the North York Moors and in East Cleveland, see, for example, reports in The Darlington & Stockton Times, <http://www.darlingtonandstocktontimes.co.uk/news/10661052>

Cars were swept away and 60 homes evacuated after torrential rain hit NE England. Two cars were swept away by floodwater in Saltburn, and the RNLI and Cleveland Police helicopters were scrambled over fears drivers had been swept away. Everyone was accounted for. Cleveland Fire Brigade said 60 homes had to be evacuated in Redcar. This affected a stretch from Sandsend, just north of Whitby, to Hartlepool, and as far inland as Guisborough. As much as 82 mm poured down at Sandsend and also Scaling, half way between Guisborough and Whitby. This is as much as six weeks of "normal" rain. Even more incredibly, it fell in less than six hours. Statistics suggest that such an intense cloudburst happens would happen here just once in over 250 years! No wonder some becks in this area reached their highest levels since at least 2000. My thanks to the Environmental Agency for providing these figures. Redcar (Nicholas Bentley) and Normanby (John Goulding) also reported huge totals - see their Daily Station Notes and

figures in the Main Data Table. At Carlton, near Stokesley, we caught 47mm - see my Daily Station Notes. Not far to the south-west, there was little rain. Pickering (Paul Hignett), just to the south of the Moors, had scarcely 2 mm. I wasn't surprised that much higher accumulations poured down towards the coast. I had a lot of trouble getting home

from Redcar that evening around 9pm, as half the roads in the locality were inundated. I haven't seen anything quite like it since early November 2000!

Mike Cinderey Carlton-in-Cleveland

Carlton-in-Cleveland: We missed the worst of the torrential rain that caused extensive flooding in the north-east corner of the North York Moors and East Cleveland. Here it rained from 0320 GMT until 2000 GMT, very heavy at times with rates up to 15 mm/h. 46 mm fell in 10½ hours from 0700 h and 23 mm in 4 hours from 0945 h. As it fell over 2 official days, the 34.2 mm on 6th made it the fifth wettest September day in my 30-year record.

<Normanby>: Rain commenced at 0500 GMT and continued uniformly at about 2.5 mm/h until 1000 and then intensified to 17.5 mm/h to 1130, followed by an average of about 6 mm/h until it ceased at 1800. The total fall amounted to 68.8 mm, of which 9.7 mm was attributed to the 5th and 59.2 mm to the 6th.

<Normanby> (E of Middlesbrough): At 1.48 pm rain started from overcast cumulonimbus and quickly became torrential with small hail 2.13 pm to 2.42 pm and close-range thunder between 2.20 pm and 2.47 pm. The fall reached 25 mm after 52 minutes and finally ceased at 3.50 pm, with a total of 40.1 mm. Before the storm, the ground was relatively dry, but was soon awash with standing water and swathes of hail. Local drainage could not

1 Apr 2017
COL

cope with the downpour and roads were flooded and manhole covers lifted. The rainfall total was the greatest one day fall in April records (1986), and certainly the most intense. Rainfall totals at nearby COL stations were only slight. Adrian Smithies at Marton, 4 km to the SW, reported 0.6 mm in slight rain from 1.30 pm, with thunder heard at around 2.30 pm. Nicholas Bentley at Redcar, 8.5 km to the NE recorded 3.9 mm in showers during the afternoon from 3.00 pm to 7.00 pm, with thunder heard 2.20 pm to 3.00 pm. Mike Cinderey at Carlton-in-Cleveland, 15 km to SSW observed 1.8 mm in slight showers between 3.55 pm and 5.00 pm in very light winds with thunder heard 2.29 pm to 2.47 pm. No hail was reported from these stations.

6 Jul 2017 COL

<Carlton-in-Cleveland>: A remarkable thunderstorm, the liveliest for several years here, with almost continuous thunder for about 1¼ hours from 1515h. Torrential rain started with a sudden brief squall, too, with gusts to force 5-6, but there was only a little hail; 31.5 mm fell in 48 minutes at up to about 160 mm per hour. There was local flash flooding - our garage was inundated! It was the wettest July day since 16.07.2009, which had 33.7 mm, although

the one with the most rain was 28.07.2005, with 45.7 mm.

23 Aug 2017
COL

<Ganton> (SW of Scarborough): A very heavy thunderstorm produced 39.2 mm rain in 75 minutes, with virtually continuous thunder and lightning. By 1030 GMT the first large spots of rain fell, accompanied by continual lightning and thunder. The lightning appeared to be mainly inter-cloud. By 1145 GMT the rain had stopped and the event was over. The total rainfall, as recorded by my manual 5 inch Munro raingauge, for the 75-minutes amounted to 39.2 mm The storm moved on over <Scarborough> and caused severe flooding in parts of the town, as seen on news reports.



16 Jul 2018
COL

<Carlton-in-Cleveland>: Thunderstorm gave 33 mm rain, with 22 mm 2110-2210 h, so was the wettest day since 06.07.2017, with 33 mm, yet, by 09h on 19th the ground was bone dry!

< Normanby>: Slight thunder 1915GMT and 2050-2200 with heavy showers, the first rain since 16th June. The total of 23.4 mm made it the wettest day, the most in July since 48.8 mm on 17.07.2009.

Conclusions from the historical review of flooding

The study of the River Rye has commenced with a review of floods at Malton and the surrounding area. Several floods which have damaged property in Malton are recorded through the nineteenth and twentieth century and comparative levels are available at Malton Bridge from 1846 to 1931. With further study it may be possible to tie these levels in to more recent gauged flows. However it is noted that the flood series at Malton is likely to show inhomogeneity arising from the effects of flood embankments in the upstream reaches of the Derwent and Rye in the Vale of Pickering and from the diversion of part of the Derwent headwaters by the Sea Cut in 1804.

It is clear from this analysis that floods at Malton arise from a variety of sources but generally require a large volume (high rainfall or snowmelt) over an extended period to fill the floodplain storage in the Vale of Pickering. The Rye at Malton behaves quite differently from the Rye at Helmsley where floods appear to be generated only by short duration rainfall of very high intensity such as occurred in June 2005. The survey of climatic conditions during the floods at Malton (when really exceptional daily and longer duration rainfall has occurred) indicates how severe the rainfall must be for flooding to occur at Helmsley.

However, the flood in 1754 was not an isolated event like the 2005 flood but affected the whole of North Yorkshire. It must therefore have had both high volume and an embedded period of very high intensity, so that it affected and destroyed bridges on small tributaries as well as on the main river.

It is very likely that the flood of October 1754 was the only flood since the early eighteenth century (when published records became more common) to equal or exceed the flood in June 2005 at Helmsley. Given the absence of any reference in the Helmsley Parish Record starting in 1576 to other floods which caused death by drowning, it is probable that there was no further occurrence of such a flood from 1576 to the present (430 years). Such information hardly provides sufficient information to construct a robust statistical analysis, but is broadly indicative of a risk of a damaging flood at Helmsley of the order of one in 200 years.

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