

SHEFFIELD CITY COUNCIL FLOOD AND WATER MANAGEMENT ACT 2010

SECTION 19 STATUTORY REPORT:

Investigation into the Flooding Event in Sheffield on 20th October 2023

In its role as Lead Local Flood Authority Sheffield (LLFA) City Council has carried out this investigation to fulfil our responsibilities under Section 19 of the Flood & Water Management Act 2010.

1.1 Storm Babet – UK wide picture

Alongside record-breaking events in the east of Scotland heavy, persistent and widespread rain affected much of England, Wales and Northern Ireland from 18th to 20th October, with 100mm falling fairly widely. This was the third-wettest independent 3-day period for England and Wales in a series from 1891, while **the Midlands provisionally recorded its wettest 3-day period on record**. This rain came on top of very wet weather earlier in October with some central and eastern parts of England and Scotland recording more than twice the October whole-month average rainfall in the first three weeks of the month.

Provisionally, 19 October 2023 was, by a wide margin, the wettest day on record for this county in a series from 1891. These statistics in the observations are illustrative of the expected increases in rainfall extremes as the UK's climate continues to warm.

Over 1000 homes in England were affected by flooding across Yorkshire, the East Midlands and the Humber area.

1.2 Rainfall Event and Weather Warnings

Following earlier Yellow Rain warnings and alongside warnings across the UK including Red warnings for the east of Scotland (the first since 2020) we received an Amber Rain Warning covering a large area of Yorkshire & Humber and the Midlands on the morning of Thursday 19th October.

1.2.1 Rainfall – national picture

Atlantic storm systems affecting the UK in the autumn and winter months normally track west to east, driven by the jet stream, clearing eastwards fairly quickly. In contrast, this storm Babet was on an unusual track from south to north, enabling it to pick up additional moisture as it crossed the Bay of Biscay.

Many long running weather stations across England recorded their **wettest October day on record, including Sheffield, recording 61.4mm on 20th October, the wettest in a 139 year record**. Sheffield's total rainfall for the four-day period 0900UTC 19th to 0900UTC 22nd October 2023 was 117.4mm. Average monthly rainfall for October in Sheffield is 66mm.

Much of East Anglia, the Midlands, Lincolnshire and south Pennines, parts of Northumberland and much of eastern Scotland received over 150% of the whole-month

average rainfall over this period, with significant areas over 200% and locally the wettest areas (shaded in red) more than 225%.

1.2.2 Local picture (source EA Hydrology)

Most rain gauges in the Don & Rother catchment measured in excess of 100mm of rainfall in the 48-hour period. The Redmires rain gauge, which sits above the Rivelin catchments totalled up to well over a 200-year return period. Notable that Ringinglow (above the Porter) had a 134mm 48 total. As already mentioned, Sheffield's October average monthly total is around 66mm.

Storm Babet 19th - 22nd October 2023	Don & Rother										
	Wingerworth	Linacre	Dore	Ringinglow	Redmires	Woodhouse Mill	Langsett	Harley	Cannon Hall	Wombwell	South Elmsall
Peak Rainfall (mm)											
1 hour total	18.4	12	11.6	13	17.4	9.2	9.8	8.2	8	6.2	13.4
3 hour total	26.8	26.8	28.2	29.8	39	20	20.2	16	13.2	12.8	28.8
6 hour total	50.8	46.4	44.6	45.4	60.4	34.2	35.6	27.4	22.2	18.8	34.6
12 hour total	75.4	68	67.2	71	89.8	51.6	60.6	49	40.6	36.6	50.2
18 hour total	83.2	78.2	82.4	89.8	113.8	65.2	77.8	64.6	55.6	49.8	62.2
24 hour total	89	84.4	93.4	98	126.4	73	87.2	76.4	66.8	58.6	72.2
36 hour total	97.4	92.4	102.2	107.2	136.8	81	94	83.2	71.4	63.4	77.4
48 hour total	99.6	93.4	103.4	109	140.6	81	100.4	87.2	82.2	67.4	83.6
return period (years)											
1 hour	4	<1	<1	<1	3	<1	<1	<1	<1	<1	<1
3 hour	4	4	5	6	17	<1	<1	<1	<1	<1	6
6 hour	26	16	14	15	58	4	3	<1	<1	<1	6
12 hour	81	42	39	49	139	11	14	8	4	3	16
18 hour	82	49	57	81	231	21	24	18	9	7	30
24 hour	84	50	68	78	244	26	25	27	14	11	46
36 hour	88	48	58	65	188	27	18	25	11	10	42
48 hour	73	36	41	47	138	20	15	23	15	10	46
% LTA											
1 hour	22	14	13	16	16	14	9	14	11	11	22
3 hour	33	31	31	37	35	30	19	27	19	22	48
6 hour	62	54	50	56	55	51	33	47	31	32	57
12 hour	92	79	75	87	81	78	56	83	57	62	83
18 hour	101	91	92	111	103	98	72	110	78	85	103
24 hour	108	98	104	121	115	110	81	130	94	100	120
36 hour	119	107	114	132	124	122	87	142	101	108	128
48 hour	121	109	115	134	127	122	93	148	116	115	139

Figure 1: Peak rainfall accumulation in Rother and Don catchments Storm Babet: 19th to 22nd October 2023

1.2.3 River Levels (source EA Hydrology)

Following heavy rain from early morning river levels across the region began to rise from late morning on Friday 20th October. Levels on the River Sheaf and Porter Brook reached levels around or higher than those experienced in 2007, not all recorders go back to the severe event of 1991 but at Highfield's on the lower Sheaf levels were second only to this event which had severely flooded Sheffield Station and around.

Don									
Sheffield Hadfields		Rotherham Forge Island		Doncaster		Kirk Bramwith*		Fishlake*	
55		18		57		26		11	
Stage	Date	Stage	Date	Stage	Date	Stage	Date	Stage	Date
4.675	25/06/2007	3.322	08/11/2019	6.308	08/11/2019	7.583	21/02/2022	6.952	21/02/2022
4.497	07/11/2019	3.271	26/06/2007	6.303	26/06/2007	7.577	08/11/2019	6.895	21/10/2023
3.766	20/02/2022	2.454	20/02/2022	5.977	21/10/2023	7.577	21/10/2023	6.867	09/11/2019
3.182	20/10/2023	2.343	20/10/2023	5.678	21/02/2022	7.55	26/06/2007	6.83	27/10/2019
3.005	15/06/2007	2.103	16/02/2020	5.648	08/11/2000	7.47	16/06/2007	6.812	21/01/2021
2.892	06/11/2000	2.023	15/06/2007	5.563	16/06/2007	7.464	21/01/2021	6.805	17/02/2020
2.814	16/07/1973	1.814	21/01/2021	5.495	21/01/2021	7.462	27/10/2019	6.468	07/07/2012
2.773	22/06/1982	1.812	09/02/2020	5.436	16/02/2020	7.449	17/02/2020	6.298	03/04/2018
2.708	13/04/1970	1.784	06/07/2012	5.39	27/10/2019	7.153	07/07/2012	6.263	10/02/2020
2.628	06/07/2012	1.611	26/10/2019	5.175	07/07/2012	6.93	03/04/2018	6.242	02/10/2019
2.52	16/02/2020	1.596	24/02/2020	4.928	27/04/2012	6.908	27/04/2012	6.133	27/04/2012
2.454	21/01/2021	1.591	27/04/2012	4.9	23/06/1982	6.908	02/10/2019	6.12	21/12/2012
2.294	02/11/1968	1.534	25/11/2012	4.861	25/11/2012	6.852	10/02/2020	6.118	27/11/2012
2.082	25/03/1979	1.509	21/11/2016	4.842	03/04/2018	6.84	25/11/2012	6.057	25/02/2020
1.967	09/02/2020	1.471	18/01/2007	4.821	29/01/1995	6.82	21/12/2012	5.991	07/02/2021

Figure 2: Rank Order river level peaks River Don during Storm Babet, 19th to 22nd October 2023

Levels on the Loxley and Don were below record but notably above levels that would have caused flooding before the installation of our major flood schemes. Levels at Sheffield Hadfield's (Meadowhall) were the 4th highest on record, statistically significant given the length of record, 55 years. Flood Defences completed since 2007 prevented flooding to homes and businesses in Hillsborough and through the Lower Don Valley.

Levels on the River Rivelin were exceptionally high but unfortunately severe damage to the Environment Agency's river gauge means readings are unreliable.

Although flood alerts and warnings were received in the Blackburn Brook catchment and highway flooding was experienced levels did not reach thresholds for property flooding.

Following severe flooding in Chesterfield earlier on 20th October exceptional levels made their way down the River Rother reaching 160mm higher than the previous (2007) record level at Catcliffe and overtopping the flood defences.

1.3 Flood Alerts & Warnings

Flood Alerts for Upper Don, Middle Don, Sheaf, Porter & Upper Rother were issued in the evening of Thursday 19th October.

The Lower Rother Flood Alert was received on the morning of Friday 20th October.

FA flood warning for Meersbrook followed at 10:15 on Friday morning with warnings for the Rivers Sheaf, Porter and Loxley following in the early afternoon.

Flood warnings on the Rother were received at 11:23 for Woodhouse Mill and at 15:14 for Beighton. Flooding to homes on Woodhouse Lane occurred at approximately 08:00 on the morning of Saturday 21st October.

A full list of warnings issued is shown in Table 1.

123FWF569	River Sheaf at Dore Station *
123FWF571	River Sheaf at Coniston Road, Norton Hammer *
123FWF573	River Sheaf from Woodseats Road, Norton Hammer to Charlotte Road, Lowfield *
123FWF576	River Sheaf at Broadfield Road and London Road South *
123FWF578	River Sheaf at the Nether Edge end of Broadfield Road *
123FWF580	River Sheaf at Priestley Street, Duchess Street and Sheaf Gardens *
123FWF591	River Sheaf and Porter Brook from Granville Square to Commercial Street *
123FWF624	River Don at Saville Street, Sheffield *
123FWF628	River Don at Blackburn Meadows*
123FWF629	River Don at Meadowhall and Carbrook*
123FWF690	Blackburn Brook and Charlton Brook from Chapeltown to North Ecclesfield *
123FWF691	Ecclesfield Brook at Ecclesfield *
123FWF692	Blackburn Brook from Ecclesfield to Wincobank *
123WF039	Meers Brook at Heeley *
123FWF709	River Rother at Beighton *
123FWF711	River Rother at Woodhouse Mill *
Table 1: Flood Warnings issued, Sheffield, Storm Babet	

1.4 Risk Management Authorities

The risk management authorities (RMAs) with statutory duties in relation to the flooding event are:

- Sheffield City Council in its capacity as LLFA and as Highway Authority with Amey LG acting as the Council's emergency first response contractor
- The Environment Agency as the authority for main rivers
- Yorkshire Water as sewerage undertaker

1.5 Emergency Response

Following the issue of an Amber Flood Guidance Statement on the morning of Thursday 19th October covering Friday 20th and Saturday 21st and a confirmation email from the Flood & Water team the Lower Don Valley flood gates were closed on the afternoon of Thursday 19th (confirmation email received at 15:20).

A flood preparedness meeting was held at 17:00 on Teams of key Sheffield officers hosted by the Duty Chief Officer to review readiness across the Council.

Following Flood Response meeting multi agency Adverse Weather meetings called at 11:30 and 16:00, wash up meeting 10:00 Saturday 21st.

Major incident declared for South Yorkshire at SCG afternoon of 20th October due to impacts on the River Rother, principally at Catcliffe.

Amey Streetsahead OCR received 135 calls of reports of flooding on 20th October through into the morning of Saturday 21st. Emergency protocols at Clough Dike, Wood Royd Road in Deepcar were activated and flooding to homes was prevented by our actions.

1.6 Flooding Impacts

Sheffield experienced a combination of surface water, localised water course flooding and main river flooding, mainly to the west and south west of the city and along the course of the River Rother in the south east.

A summary of properties flooded is included in table 2.

1.6.1 River (fluvial) flooding

Property flooding from rivers was limited to those affected by the River Rother flooding at Beighton and a single residential property from Totley Brook in Totley. This was in no small part due to the flood defences installed in the Lower Don Valley and Loxley areas by the Sheffield Flood Programme.

Highway flooding occurred from the River Sheaf around Little London Road and at Weedon Street and Meadowhall Road in the Lower Don Valley as a result of high levels in the River Don and the lower reaches of Blackburn Brook.

Extensive overtopping was experienced in the Rivelin and Porter Valleys. There was extensive damage to paths and ponds in Rivelin Valley and wider damage to the rights of way network to the west of the city. No property flooding occurred from main river.

Flooding occurred from the River Sheaf in Millhouses Park and overtopping onto Highways around Little London Road but no property flooding resulted and only limited asset damage with riverside wall collapses at the following locations:

- Moscar Cottages, River Sheaf
- Near Broadfield Mowers, River Sheaf
- Endcliffe Park, Porter Brook

1.6.2 Highway flooding and transport disruption

Amey's operational staff received and responded to 135 urgent calls reporting drainage related incidents. The breakdown of calls was:

- Flooding on Highway - 107 total jobs of which 22 were duplicates
- Flooding to Property - 11 total jobs of which 2 were duplicates
- Blocked Gullies (non-urgent) - 11
- Sandbag request - 6 total jobs of which 1 was a duplicate

Sandbags were deployed to 8 locations.

The following roads were flooded across the city:

1.6.3 Due to surface water (earlier in the day):

- Upwell Street (Brightside)
- Penny Lane (near The Crown Inn, Totley)

- Fife Street (Wincobank)
- London Road, A61, Heeley Bridge
- Beaver Hill Road (Handsworth. Woodhouse)
- Mosborough Parkway

1.6.4 Related to high River Don/Blackburn Brook levels (afternoon of 20th):

- Meadowhall Road
- Weedon Street

1.6.5 Other reports of flooding to Highways through the day:

- Loxley Road, numerous locations between Loxley and Damflask
- Ringinglow Road from Castle Dyke Pond (also flowed down Common Lane onto Ivy Cottage Lane)
- A625 Ecclesall Road South (jct. Whinfell Court), damage to embankment down towards Limb Brook

Although South Yorkshire Fire & Rescue had to assist with several cars stranded in flood water there were no reported injuries or fatalities.

1.6.6 Other flooding impacts:

Our waste management partner Veolia suffered flooding at their Blackstock Road Household Waste Recycling Centre (HWRC). The site lies alongside the Meers Brook and flooding was due to blockage and high flows in the brook. The site was not registered on the Environment Agency's flood warning system due to being upstream of main river limit.

On Topley Brook Road significant cellar flooding to 11 homes resulted in loss of power and gas supply and limited temporary evacuation over the afternoon and evening of Friday 20th October. South Yorkshire Fire & Rescue Service carried out emergency pumping and Yorkshire Water and Amey were in attendance. Power loss was reported to a wider area with approximately 30 homes being without power for several hours.

Extensive emergency pumping and sandbagging was required at Wood Royd Road in Deepcar on Clough Dike which successfully prevented a repeat of the property flooding seen here in 2019.

1.7 Success of Flood Defence investments

Although levels in the Rivers Loxley and Don were not at record levels they exceeded those that would have led to flooding of business and surrounding areas before the Lower Don Valley and Upper Don Valley phase 1 (Loxley) schemes were constructed. This investment alongside improved river maintenance prevented flooding to hundreds of businesses and several homes.

We also saw significant volumes of water held back in our Natural Flood Management features, notably in the Limb Brook above the River Sheaf, which will have also reduced downstream impacts.

1.8 Flood Warning removal

The majority of Flood Warnings across Sheffield were removed on Saturday 21st with the exception of those issued on the River Rother which remained in place until the afternoon of Saturday 21st. The River Rother Flood Alerts remained in place through Tuesday 24th for the

Upper Rother and Wednesday 25th for the Lower Rother which was the last alert to be removed at 13:23 on Wednesday 25th October.

1.9 Recovery Actions

Lower Don Valley gates were reopened on Monday 23rd October and cleaning operations commenced of riverside walkways. Clean up and checking of gullies and drains across our highway network was instigated.

Wall collapses were securely fenced off as was the highway embankment damage off Ecclesall Road South. Damaged footpaths and bridleways were inspected and dangerous sections secured. Repairs to affected assets will be considered by the relevant departments.

Investigations into the flooding at Trolley Brook Road are being led by Yorkshire Water working with SCC Highways and SCC Flood & Water as there are a number of factors involved. Mitigation will be taken forward by the appropriate authorities.

The Environment Agency informed us that they will be carrying out a review into the River Rother flooding which will include properties affected in Sheffield.

As is routine following issue, the Environment Agency Flood Warnings are validated and reviewed, we supplied on the ground information for this review. No significant concerns were raised over accuracy.

Veolia's Blackstock Road HWRC was not on the EA's flood warning system as it sits upstream of the main river limit. We have now addressed this omission by having the site contacts added directly to the system, they will receive the Meersbrook Flood Warning for future events.

1.10 Longer Term Investment

High levels on the River Sheaf and flooding to highway around Little London Road and in Millhouses Park demonstrated the importance of the Sheaf & Porter Scheme that is currently in development.

Without the instigation of our emergency procedures at Clough Dike in Deepcar it is highly likely we would have seen a repeat of the flooded experienced in November 2019 where 9 homes flooded. The need for the capital scheme in development is clearly demonstrated.

Although less severely affected in this event development for future capital investment in the Upper Don and Blackbrun Brook catchment continues.

Alongside our capital programmes we continue our catchment wide work as part of Connected by Water.

Connected by Water (CBW) is an alliance of the four South Yorkshire Councils, the South Yorkshire Mayoral Combined Authority, the Environment Agency and Yorkshire Water with the core focus of improving flood resilience across the region.

Partners have been working together collaboratively since 2019 to deliver flood risk management schemes and to plan catchment wide measure for the future to help meet the challenges of climate change.

CbW partners are currently exploring the benefits of adopting a Strategic Place Partnership model to provide further efficiencies in future funding, greater alignment of resources and promote a more collaborative approach to national and local decision making.

Location	Residential Properties (number)	Commercial Properties (number)	Source of Flooding
Woodhouse Lane, Beighton	2	0	River Rother
Back Lane, Totley	1	0	Totley Brook
The Pines, Lodge Moor	1	0	Redmires Conduit and field run off
Abbeydale Road South, Dore	0	2	Surface Water
Blackstock Road, Gleadless	0	1	Meersbrook
Horner Close, Stocksbridge	1	0	Surface Water
Summerfield Street, Ecclesall Road	1	0	Surface Water
Totals:	6	3	

Table 2 Flooded Properties, Sheffield, Storm Babet

Date of Publication: 19 March 2024

Flood & Water Management

**Sheffield City Council
Howden House
1 Union Street Sheffield
S1 2SH**

Tel: 0114-2735847

E-mail: floodmanagement@sheffield.gov.uk

Information warning

1. Contains Environment Agency information © Environment Agency and database right.
2. Any information contained in this report is provided by Sheffield City Council in the exercise of its statutory duty under the Flood and Water Management Act 2010 only and is intended to provide only general information to the public. Although we try to ensure that the information is accurate and up to date, we cannot and do not guarantee that the information is either. You must not, under any circumstances, rely on the information as professional advice. If you do rely on this information, you do so at your own risk as we do not accept any liability to you or any other person for loss or damage from, connected with or relating to the use of our information or the reliance on the information.