

# Flood Investigation Report into the flooding in February 2022



Tadcaster Medical Centre – February 2022

## Acknowledgements

North Yorkshire County Council Development Management Team would like to thank the following for their cooperation and assistance in this investigation:

- The Environment Agency
- North Yorkshire County Council as Local Highway Authority
- Harrogate Borough Council
- Selby District Council
- Yorkshire Water
- Shires Area Internal Drainage Board
- Howard Ferguson (Senior Parliamentary Assistant to The Rt Hon Nigel Adams MP)

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## 1 Introduction and purpose of report

1.1 This is a review of circumstances to acknowledge the flood events of 20 and 21 February 2022 in the River's Nidd, Wharfe and Aire catchments. The majority of flooding occurred in Tadcaster with a small number of properties across the other catchments. This report will include a review of actions taken by risk management authorities within Tadcaster since the previous flood investigation report.

## 2 Event background

2.1 Flooding incidents were recorded in over nine separate communities across North Yorkshire on the 20 and 21 of February 2022. A high level map is provided in Figure 1 illustrating how the incidents reported are spread geographically across the County.

2.2 The majority of the flooding occurred in Tadcaster where 63 properties were recorded as being internally flooded. In addition, 6 properties were internally flooded in Ulleskelf, and therefore meet the criteria for a Section 19 report in.

2.3 Three storms swept across the UK from the south west between February 16 and 21 2022. Storm Franklin (20 February) affected communities in North Yorkshire. The February 2022 storms were not characterised by the type of high-intensity, short duration rainfall likely to overwhelm surface water systems or cause flash flooding. Rather, there was a series of low pressure systems which equated to the long term average rainfall for February, giving rise to widespread and prolonged rainfall saturating the catchment which in turn led to very high river levels, particularly in the River Wharfe (second highest in 30 years of record at Tadcaster<sup>1</sup>).

2.4 There were an additional 15 internally flooded properties spread across the Nidd, Wharfe and Aire catchments. All affected areas have been noted and recorded in Section 4 of the report as an accurate and historical record of the event, however the investigation for these areas do not warrant formal publication.

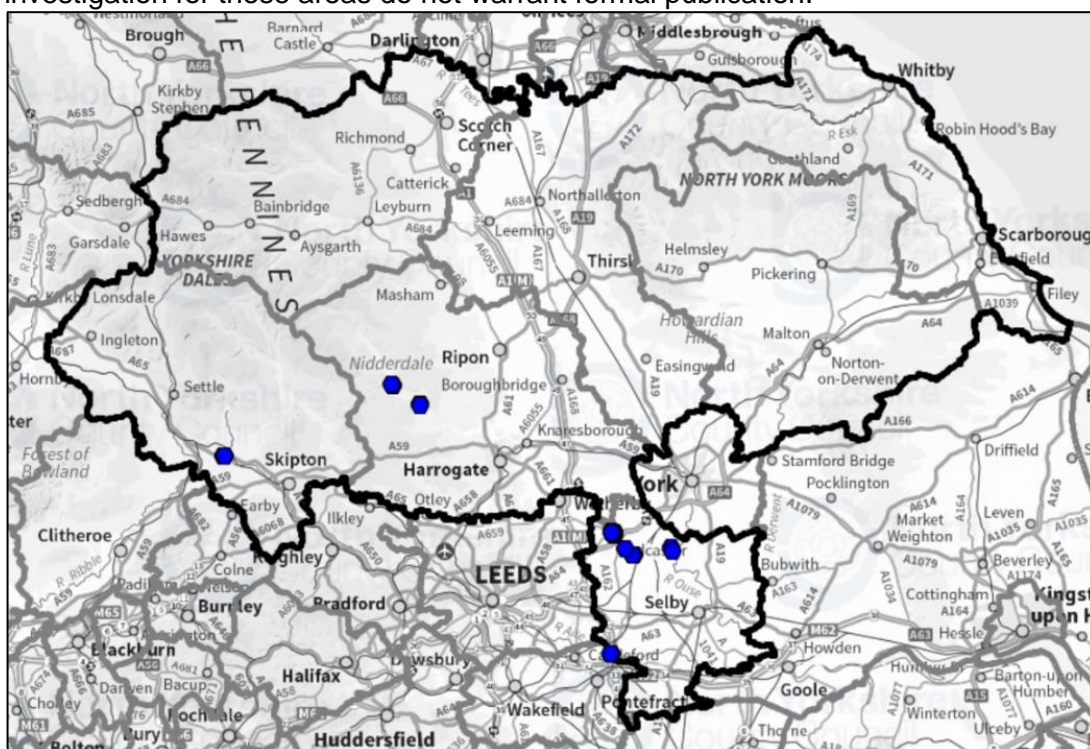


Figure 1: Map of internally flooded properties

<sup>1</sup> It is known that the River Wharfe at Tadcaster is subject to tidal influence, which can increase the risk when the tide is incoming, although in this event this did not occur.

### 3 Investigation

#### 3.1 Rainfall Gauges

- 3.1.1 North Yorkshire County Council has sought to use data from rain gauges where incidents of flooding are located within a 2.5km radius of the instrumentation. This distance meets the requirements of British Standards and aims to capture localised rainfall patterns. Where rain gauges are outside of the 2.5km radius they may not accurately reflect localised rainfall conditions but provide an indication of the rainfall patterns in the general area. The following information has been provided by the Environment Agency in relation to the affected communities.

**Tadcaster** - There were no rain gauges within 2.5km of the incidents of flooding within this catchment. However, the closest rain gauge is 4.2km away at Bramham. SE449416 and this recorded 10.2mm in 4 hours, 14.8mm in 8 hours, 28mm in 18 hours, for example. The highest return period was one in three years with 55mm in 72 hours.

**Ulleskelf** - There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

**Brotherton** - There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

**Pateley Bridge** - There were no rain gauges within 2.5km of the incidents of flooding within this catchment. The nearest gauge with regular rainfall readings is at Lumley Moor reservoir, SE226707, about 8.2km from Pateley Bridge. This recorded 19.6mm in 6 hours, but the highest return period was one in four years with 73mm in 72 hours.

**Acaster Selby** - There were no rain gauges within 2.5km of the incidents of flooding within this catchment.

- 3.1.2 More generally rainfall with the highest return periods occurred over localised areas of upper Wharfedale, the upper Nidd catchment, and at the Aire-Calder boundary around Halifax with rainfall durations of between 18 and 36 hours. Rainfall with return periods of 1 in 10 to 1 in 13 years was recorded at Grimwith and Scar House Reservoirs, increasing to 1 in 18 years at Littondale.
- 3.1.3 In summary rainfall intensities and rainfall return periods were not particularly high in the immediate 24/48hrs leading up to the events. At locations which had the largest totals, such as Thornton Moor and Littondale, the rainfall over the whole period from the 15th to the 21st reached between 140% and 180% of the February Long Term Average (LTA). Whilst these are large totals, they are not exceptional when compared to the 300% to 400% of February LTA reached over a similar duration in February 2020. This shows the influence of antecedent conditions within the upstream catchment in relation to conversion of rainfall into river flows and saturation of the upstream catchment.

#### 3.2 River Levels

- 3.2.1 Three storms swept across the UK from the south west between 15 and 21 February 2022. Storm Franklin (20 February) affected communities in North Yorkshire. The February 2022 storms were not characterised by the type of high-intensity, short duration rainfall likely to overwhelm surface water systems or cause flash flooding. Rather, there was a series of low pressure systems, including Storm

Franklin on 20-21 February, giving rise to widespread and prolonged rainfall saturating the catchment.

- 3.2.2 In February 2022, whilst the prolonged rainfall was not in of itself intense or significant, the antecedent catchment conditions resulted in high river levels on the lower Wharfe (second highest in 30 years of record at Tadcaster), and on the Aire at Castleford near Brotherton (second highest in 27 years of record). Flood levels on the Nidd at Pateley Bridge were high but not extreme, about 0.3 to 0.45m below the February and November 2020 peaks.

### **3.3 Forecasts and flood warnings**

- 3.3.1 Based on the Environment Agency assessment the events recorded from the 15 to 21 February produced some of the highest ranking river levels on record at many locations throughout Yorkshire despite the contributing rainfall being markedly lower than that of previous high ranking events such as December 2015 or November 2019. This event, therefore, will require further investigation including the potential role played by snowmelt.
- 3.3.2 The Upper River Wharfe and the Upper Nidd received flood alerts on the 19 February and on the 20 February and all locations considered within this report were on flood warnings.

## **4 Flooding Consequences**

- 4.1 Communities within two district/borough council boundaries, namely Selby and Harrogate, reported flooding to properties. For the purpose of this report, the most significant events will be highlighted at a district level.

### **4.1 Selby District Council Area**

- 4.1.1 The main area of flooding was Tadcaster (63 reported properties internally flooded) with the majority located around Bridge Street and Commercial Street. A significant number of these flooded properties were businesses, and it is estimated that there was £400k of damages. In addition to the flooded properties within Tadcaster a total of twelve (12) internally flooded properties were reported within Selby District Council in Ulleskelf (six properties internally flooded at the location of West End), Brotherton (three internally flooded properties at Marsh Croft), Acaster Selby (two internally flooded properties in Back Lane) and one internally flooded property in Kirkby Wharfe. They were affected by flooding from the River Wharfe, River Ouse (Acaster Selby) and Aire.

- 4.1.2 Anecdotal evidence of flooding in Selby can be found via the following links.  
<https://www.theguardian.com/environment/2022/feb/21/were-devastated-yorkshire-town-hit-by-floods-for-third-time-in-decade>

### **4.2 Harrogate Borough Council Area**

- 4.2.1 The communities affected by flooding were within Pateley Bridge, Summerbridge, Knaresborough and Ramsgill with a total of 12 internally flooded.
- 4.2.2 In Pateley Bridge there were four internally flooded properties with the cause attributed to surface water. In Summerbridge three properties were internally flooded from the nearby watercourse.

4.2.3 In Knaresborough there were two report of internal flooding, however, a number of properties were advised to evacuate but were not affected by internal flooding. The flooding was from the River Nidd.

4.2.4 In Ramsgill there were also three properties internally flooded from a combination of the River Nidd, backing up of the reservoir and surface water.

## **5 Flood Risk Management Functions undertaken**

5.1 The requirement of the section 19 report is to reflect on the responsibilities of each Risk Management Authority and assesses whether each authority has undertaken the statutory duties leading up to the event, during and after in accordance with the Flood and Water Management Act 2010 (see Appendix 6.1). In accordance with Section 19 of the FMWA, the LLFA has identified the following as Risk Management Authorities with actions and responsibilities in relation to the flooding during February 2020:

- The Environment Agency
- North Yorkshire County Council as Lead Local Flood Authority and Local Highway Authority
- Harrogate Borough Council
- Selby District Council
- Yorkshire Water
- Internal Drainage Board
- Riparian Land Owners

Further information on the role of the respective Risk Management Authority can be found here ([link no longer exists](#)).

## **6 Investigation and findings**

### **Flooding within the Selby District Council Area**

6.1 **In Tadcaster** the flooding of the locations occurred initially due to ingress water from the River Wharfe at low points within the embankment/flood defences (second highest in 30 years of record at Tadcaster) followed by overtopping of the embankment/flood defences. Whilst the rainfall event in the 2015 was very significant, the mechanism that caused the flooding in 2022, the river breaching the flood wall, was similar.

6.2 The Environment Agency reported that the initial low points that the river breached were in the following places (this does not take into the account the areas that then overtopped):

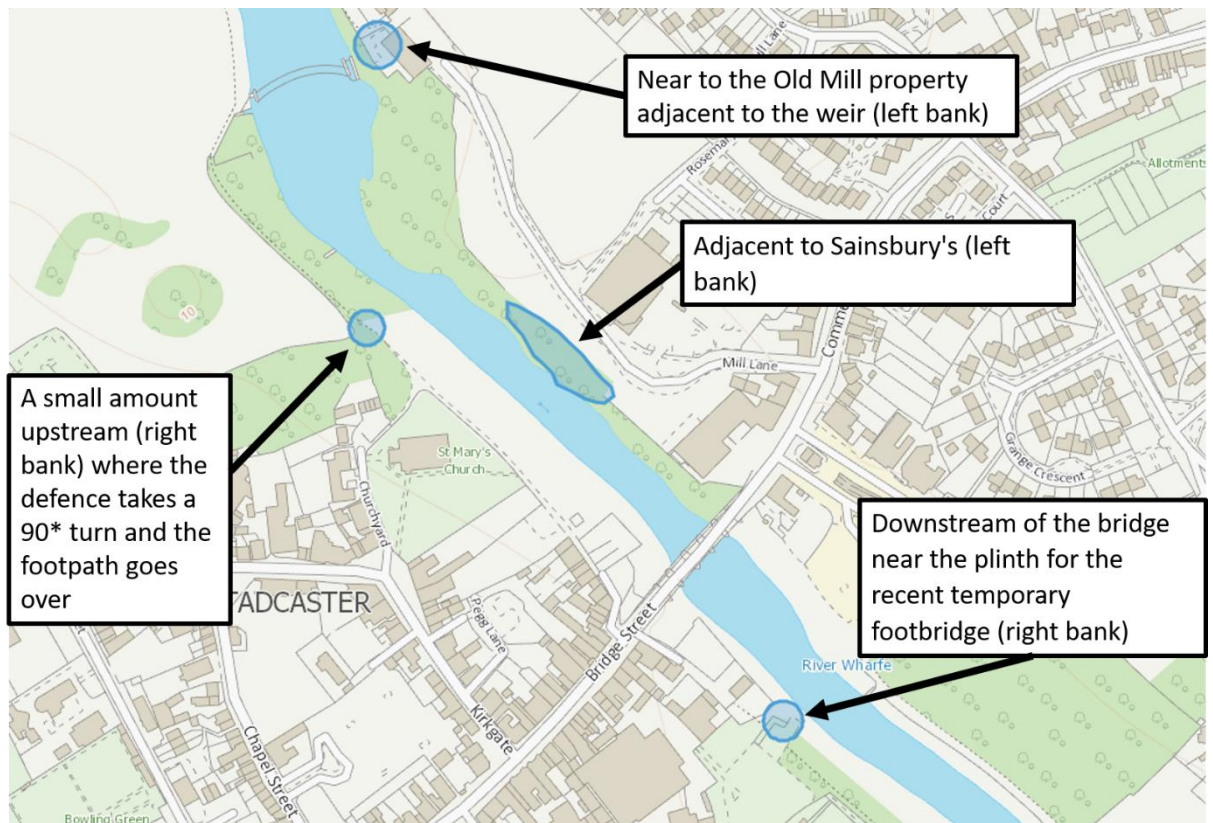


Figure 2: Locations where the River Wharfe overtopped/breached

- 6.3 The Environment Agency (EA) in response to the floods carried out re profiling of the design height of the <sup>2</sup>low spots within the flood plain to reduce the likelihood of flood water overtopping/breaching the defences.
- 6.4 The EA Flood Resilience Team carry out a post review of the flood alert/warning system as part of the business as usual post flood work and includes the following process:
1. **Post incident data is collected.** This includes site visits, data sharing with our partners, social media searches and conversations with EA flood wardens and local communities.
  2. **Identifying any missed flood warnings.** A check of flood warning triggers against river levels recorded to identify if any warnings where flooding occurred were not issued.
  3. **Validation of flood warnings.** A check of whether or not a flood warning was required and an assessment of the warning quality (for example, was it issued in a timely manner).
  4. **Warnings and alerts reviewed.** Following the validation of warnings, improvements (if required) are made to both the triggers and the area covered by the flood warnings.

<sup>2</sup> Following the February 2022 flood event the Environment Agency undertook additional surveys along the Rivers Wharfe, Ouse, Nidd, Swale and Derwent. These inspections allow the EA to re-assess the condition of the assets, which indicates if they are meeting their performance requirements and the results are used to populate the recovery programme which can include the need for further detailed investigations rather than repair. It is noted that this survey is a visual survey and only considers localised low spots in level and does not assess the asset against the overall flood protection level.



- 6.5 In relation to a post review of the warnings/alerts for the River Wharfe at Tadcaster the following response was provided by the EA:

**River Wharfe at Tadcaster**

The trigger for the flood alert (122WAF943 Lower River Wharfe) at the Tadcaster river level gauge has been lowered to ensure a longer lead in time for the community. The trigger for the flood warning has also been lowered to provide a longer lead-time for the community. Additional contextual information has been added to EA procedures to aid the flood warning duty officer's decision-making process, such as the level at which Crane Cottages access and Mill House are expected to flood. These changes were shared with the flood group ahead of being implemented.

- 6.6 It has been noted that a large number of properties on Bridge Street, for example, were provided with some form of property flood resilience measures e.g., flood barriers, following the events of 2015. The success of these measures was mixed. A small number of businesses stopped or reduced the amount of floodwater entering their property and were able to open soon after the event passed. However, in most cases the PFR, were not effective/able to protect properties from internal flooding. Notwithstanding this, it is noted that a number of residents/businesses within Tadcaster have taken preventative measures to reduce the impact of flooding since the flood event in 2015 and were, following the EA flood warnings, able to remove or move furniture/equipment and thereby reduce the losses/impacts of the flooding. As a result, a number of businesses were able to 'bounce back' and continue to operate only a few days after the flood event.
- 6.7 In **Brotherton** the properties were affected by the surcharging of the sewer system from the water storage area known as Brotherton Marsh via the ordinary watercourse (Marsh Drain). A total of three properties were internally flooded. A site visit was carried out by risk management authorities following the flood event. It was identified that the mechanism for this flood event was different to the previous flood event covered in the Flood Investigation report into flooding in Brotherton in 2015, in that the watercourse surcharged backed up into the sewer system serving the properties. Surface water flooding also caused the foul sewer to surcharge. As an immediate response to the lack of toilet facilities due to the flooding of the foul sewer, North Yorkshire County Council brought in a large pump and Selby District Council (SDC) brought in portaloos to support the 18 properties left without toilet facilities. SDC also provided a 24 hour guard to ensure it continued to run and was safe. Following the previous flood event NYCC (via the Internal Drainage Board) have cleared the main watercourse into which the surface water system from March Court discharges into.
- 6.8 Following a CCTV survey and cleansing of the surface and foul water sewers serving the properties it was identified that changes needed to be made to reduce the risk of the watercourse (Marsh Drain) surcharging into the sewer system. This would be through the installation of non-return valves at 2 locations; one in the surface water sewer system and the other at the outfall point within the watercourse (Marsh Drain) to stop the back flow of water into the surface water system. These actions relate to Yorkshire Water and North Yorkshire County Council assets respectively.
- 6.9 In **Ulleskelf** (West End), being downstream of Tadcaster, and following reports from local residents, the flood defence embankment to the rear of the properties in the West End, Ulleskelf was breached/circumvented by the high water levels of the River Wharfe. West End is both within Flood Zone 2 and Flood Zone 3 and the Ulleskelf Ings (see figure 3 overleaf), immediately to the rear of the properties within West End are an Environment Agency managed asset and are described as Water Storage Areas where *'An area of land that is deliberately engineered to hold water where it wouldn't naturally accumulate'*. The flood extents, as shown on photos supplied to the LLFA, mirror approximately, the extent of flood zone 2. On Main Street the water from

the Ings surcharged up through the drains and did not breach the defences. Pumps were deployed to stop water internally flooding properties.

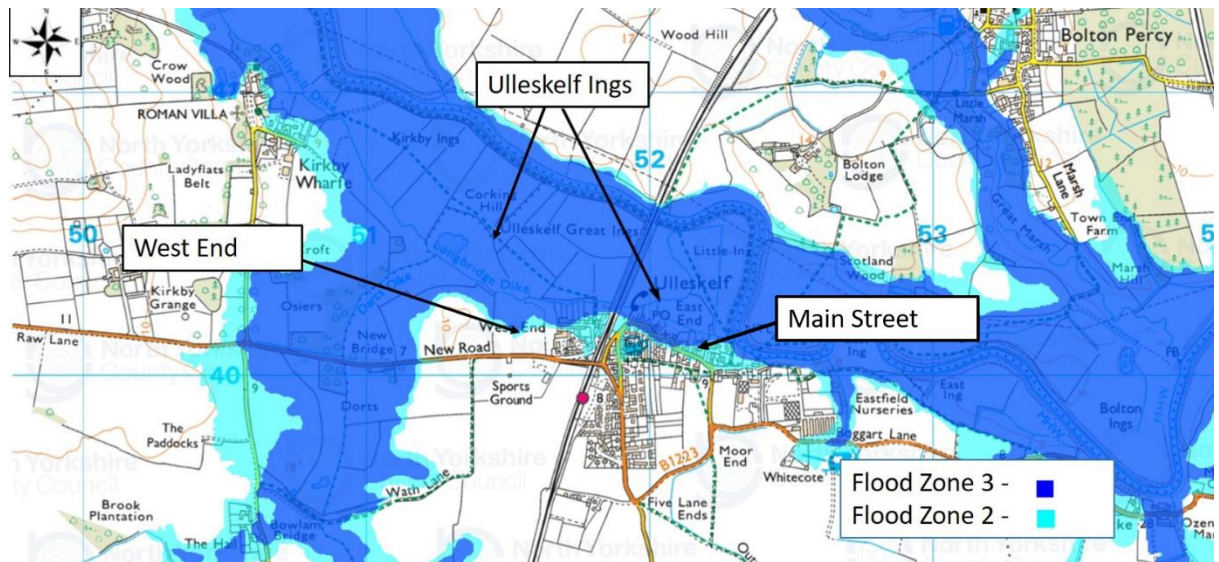


Figure 3: Map of Ulleskelf

- 6.10 Residents mentioned that the flood warnings for Ulleskelf were not given early enough to enable the community to better prepare. In response to the event, the EA carried out a post review of the flood alert/warning system and have provided the following response:

**River Wharfe at Ulleskelf and Ryther (Ref: River Gauge 122FWF586)**

*'The triggers have been reviewed and have remained the same. The short lead time reported by residents was not due to the triggers being too high. This flood incident saw a river level response in catchments right across Yorkshire and a large volume of warnings were triggered at a similar time. It was incredibly busy for the duty officers and unfortunately some warnings were not issued with the lead time we aim for. We are already working on solutions to try and reduce the workload of our duty officers in an incident and therefore reduce the risk of warnings being issued late in the future. This flood warning has also been identified as one we need to split. As there was property flooding in Ulleskelf and not Ryther, we shouldn't be warning residents in Ryther when no flooding is expected so we need to split out Ryther. We do not yet have a timescale for when this work will be completed but prior to this change being made partners will be informed.'*

- 6.11 In response to the flooding the local flood action group deployed pumps and were aided by additional pumps from Yorkshire Water. Whilst the pumps can remove significant amounts of fluvial water, once the Ings reach a critical level the pumps will only be re circulating water and not removing it.
- 6.12 Kirkby Wharfe suffered from one internally flooded property (which has been flooded multiple times in the last 10 years) and in addition, both approach roads were cut off by flooding. The village put into action their emergency plan and erected a flood barrier adjacent to the river. The following information was provided by Howard Ferguson:
- 'The incident showed that bank stabilisation work done by the community using HESCO bags filled with clay was an effective defence and the pilot project is being extended to a second phase. The HESCO bank held back the flood water with slow percolation that was dealt with by the pumps owned and operated by the community. It was only when the HESCO bags were overtopped and the second line of defence comprising the Aquadam came into play that water levels rose, and one property was*

flooded. The pumps, including fire brigade pumps were unable to match the rate at which water percolated beneath the Aquadam. The Environment Agency have secured local levy funding which is being provided to the community group who will be doing the work.'

Harrogate District Council Area

- 6.14 Following flood warnings on the 19, 20 and 21 February a number of properties within Harrogate District were put on standby for evacuation. Meetings between category one responders took place to prepare those at risk.
- 6.15 In Pateley Bridge the flooding was attributed to surface water. In Summerbridge the properties were internally flooded from the nearby watercourse.

7 Conclusions and Recommendations

- 7.1 Flooding incidents were recorded in over nine separate communities across North Yorkshire on the 20 and 21 February 2022. The majority of the flooding occurred in Tadcaster where 63 properties were recorded as being internally alongside six within Ulleskelf. In addition, there were also 15 internally flooded properties spread across the Nidd and Wharfe catchments.
- 7.2 There was a series of low-pressure systems, including Storm Franklin on 20-21 February, giving rise to widespread and prolonged rainfall in the upstream catchments which led to very high river levels which breached the rivers in the flooded locations within Tadcaster and Ulleskelf.
- 7.3 In Tadcaster the river levels in the 2015 event were 4.508 and 0.7m above the flood defences. In the February 2022 event the river level was 3.951 and therefore was approximately 0.15m above the flood defences (on the west bank). The estimated return period of the peak flow was in the range one in 15 years to one in 25 years. This is based on an overview of the results at both Tadcaster and Wetherby Flint Mill upstream.

Table 1: River Levels

Years of record	Ure		Nidd			Wharfe			Ouse											
	Boroughbridge		Westwick	Pateley Bridge	Birstwith	Hunsingore	Addingham	Otley	Tadcaster	Skelton	York Viking									
	26	56	21	45	55	48	30	30	53	26										
Rank	Stage	Date	Stage	Date	Stage	Date	Stage	Date	Stage	Date	Stage	Date								
1	15.791	26/09/2012	3.497	26/09/2012	3.931	09/02/2020	3.664	31/10/2000	3.059	26/12/2015	2.631	02/11/2020	2.462	31/01/1995	4.508	27/12/2015	6.787	04/11/2000	5.400	04/11/2000
2	15.676	07/12/2015	3.348	01/02/1999	3.76	02/11/2020	3.561	09/02/2020	2.918	31/10/2000	2.541	03/01/1982	2.016	26/12/2015	3.951	21/02/2022	6.634	28/12/2015	5.189	27/12/2015
3	15.618	27/12/2015	3.340	24/02/1991	3.727	31/10/2000	3.445	26/12/2015	2.868	03/11/2000	2.493	31/01/1995	1.968	09/02/2020	3.723	31/10/2000	6.555	27/09/2012	5.072	27/09/2012
4	15.591	10/02/2020	3.328	06/12/2015	3.521	25/09/2012	3.388	20/02/2022	2.964	21/02/2022	2.478	23/02/1991	1.918	20/02/2022	3.703	26/09/2012	6.414	06/01/1982	4.638	22/01/2021
5	15.586	08/01/2005	3.309	10/02/2020	3.504	11/02/2002	3.309	11/02/2002	2.832	26/09/2012	2.467	09/02/2020	1.883	22/02/2020	3.583	12/02/2002	6.289	25/02/1991	4.589	22/02/2022
6	15.461	16/02/2020	3.292	26/12/2015	3.472	26/02/2022	3.302	15/11/2015	2.729	10/02/2020	2.463	11/02/2002	1.856	02/11/2020	3.535	22/01/2008	6.131	02/02/1995	4.569	28/11/2012
7	15.432	03/11/2020	3.177	08/01/2005	3.351	15/11/2015	3.286	02/11/2020	2.717	26/06/2007	2.463	26/12/2015	1.790	31/10/2000	3.453	16/11/2015	6.121	21/02/2022	4.478	24/02/2020
8	15.371	22/02/2020	3.070	04/01/1982	3.300	22/02/2020	3.277	02/11/2000	2.670	30/11/2009	2.457	22/02/2020	1.790	11/09/2002	3.441	01/02/1995	6.116	22/01/2021	4.473	23/01/2008
9	15.368	08/02/2001	3.047	02/11/2020	3.279	02/08/2002	3.258	25/09/2012	2.666	06/09/2008	2.441	31/10/2000	1.779	15/11/2015	3.435	07/11/2000	6.104	29/12/1978	4.470	01/01/2013
10	15.348	21/02/2022	3.029	16/02/2020	3.245	06/11/2000	3.25	06/11/2000	2.657	15/11/2015	2.438	02/01/2000	1.764	16/03/2019	3.428	30/11/2009	6.073	01/12/2009	4.455	01/12/2009
11	15.34	30/11/2009	2.915	22/02/2020	3.158	11/01/2007	3.216	30/11/2009	2.607	06/11/2000	2.428	08/01/2005	1.754	08/01/2005	3.420	10/02/2020	6.061	27/11/2012	4.425	17/02/2020
12	15.185	07/09/2008	2.855	21/02/2022	3.142	08/12/2011	3.193	23/02/1991	2.583	22/02/2020	2.418	04/08/2003	1.744	04/08/2003	3.385	02/11/2020	6.051	17/02/2020	4.402	08/09/2008
13	15.176	04/06/2000	2.833	30/11/2009	3.114	26/12/2015	3.147	22/02/2020	2.535	02/11/2000	2.405	05/11/2010	1.734	05/11/2010	3.369	22/02/2020	6.039	24/02/2020	4.386	12/01/2007
14	15.142	17/03/2019	2.741	03/11/2009	3.092	16/03/2019	3.101	16/03/2019	2.516	16/03/2019	2.395	21/12/1991	1.724	21/12/1991	3.340	08/01/2005	6.002	01/01/2013	4.335	11/02/2015
15	15.127	06/11/2000	2.725	17/03/2019	3.032	29/11/2009	3.081	16/02/2020	2.459	16/02/2020	2.384	04/06/2000	1.714	04/06/2000	3.328	17/03/2019	5.988	07/09/2008	4.303	07/12/2015
16	15.106	03/11/2000	2.687	04/06/2000	2.999	03/01/2012	3.072	27/10/1998	2.403	22/02/2020	2.373	21/01/2008	1.704	21/01/2008	3.248	20/01/2021	5.982	23/01/2008	4.243	04/11/2020
17	15.100	12/01/2007	2.682	03/08/2002	2.896	07/01/2005	3.047	11/01/2007	2.251	11/02/2002	2.227	25/09/2012	1.694	25/09/2012	3.203	23/06/2012	5.980	12/01/2007	4.238	08/02/2001
18	15.089	01/01/2013	2.609	07/09/2008	2.889	16/02/2020	3.035	04/06/2000	2.234	17/08/2008	2.313	02/01/1976	1.613	05/01/1992	3.181	03/08/2002	5.918	11/02/2020	4.207	09/01/2005
19	15.081	22/01/2008	2.582	31/10/2000	2.848	21/01/2008	3.028	21/01/2008	2.234	21/01/2021	2.274	21/01/2008	1.597	30/11/2009	3.181	06/09/2008	5.879	09/01/2005	4.186	22/02/1997
20	15.064	16/11/2015	2.581	16/11/2015	2.759	02/11/2000	3.027	02/08/2002	2.223	02/08/2002	2.266	22/01/1975	1.519	13/09/1993	3.175	04/06/2000	5.877	07/12/2015	4.173	12/02/2002
21	15.018	27/11/2012	2.537	01/01/2013	2.757	05/09/2008	2.996	31/01/1995	2.200	17/03/2019	2.242	20/02/2022	1.480	20/01/2021	3.173	05/11/2010	5.822	03/11/2020	4.138	05/06/2000
22	14.968	12/02/2002	2.532	12/01/2007	2.714	31/12/2012	2.932	10/05/2012	2.192	20/08/2004	2.227	25/09/2012	1.440	06/11/2000	3.130	14/09/1993	5.816	21/02/1997	4.118	31/01/2013
23	14.932	21/01/2021	2.521	22/01/2008	2.549	04/11/2010	2.894	05/09/2008	2.173	12/09/1968	2.185	06/12/1999	1.430	02/08/2002	3.126	26/06/2007	5.812	08/02/2001	4.081	23/12/2012
24	14.889	04/12/1999	2.473	12/02/2002	2.490	10/01/2008	2.883	08/12/2011	2.173	15/09/1993	2.168	30/11/2009	1.430	16/02/2020	3.126	16/02/2020	5.785	03/12/1992	4.080	17/11/2015
25	14.889	02/08/2002	2.461	08/02/2001	2.374	09/01/2007	2.836	03/01/2012	2.116	21/12/2012	2.134	31/12/2012	1.410	18/01/2008	3.056	01/01/2013	5.719	12/02/2002	4.078	07/12/2008

Tadcaster river level:

Table 3: Highest 25 ranked peak river level (m stage) at selected sites in Yorkshire. 15<sup>th</sup> to 21<sup>st</sup> February 2020 event highlighted in blue. (for the tidal Don the table is limited to the top 10 ranked events)

- 7.4 A number of other properties within the catchment were affected by surface water and pluvial (from a watercourse) flooding e.g., Pateley Bridge and Summerbridge

## 8 Recommendations

Table 2: Recommendations for Tadcaster and Ulleskelf

<b>Recommendations for Tadcaster</b>		
<b>Recommendations following the 2015 flood event</b>	<b>Actions taken since 2015</b>	<b>Recommendations following the flooding in February 2022</b>
<p><b>Improved defences</b> – Environment Agency to prepare a funding bid for improved flood defence within Tadcaster.</p>	<p>Since the flooding of Tadcaster in 2015, £11.5 million of funding has been received for the Tadcaster Flood Alleviation Scheme. The Environment Agency is continuing to develop a model and has stated that a scheme will be delivered by 2026.</p>	<p>YW, NYCC and other partners/community should work with the EA to ensure that the model and FAS recognises the risk from all sources of risk. The EA are carrying out a catchment scale review to seek opportunities to reduce flooding in at risk communities, including Tadcaster.</p>
<p><b>Resilience - NYCC, YWSL, the EA and TFAG should work together to review the current level of resilience and identify opportunities for improvement within Tadcaster</b></p> <p><i>All risk management authorities to work with the communities to encourage and promote improved property level resilience. With the impacts of climate change becoming ever more clear, it is critical that communities play an active role in helping themselves to be resilient to the increasingly prevalent risk of flooding.</i></p>	<p>A number of properties have installed property flood resilience measures.</p> <p>The EA have re profiled a number of Low spots within the River Wharfe to reduce the risk of the river breaching.</p> <p>The EA have reported that the number of people signed up to flood alerts &amp; flood warnings /emergency plans has increased.</p>	<ul style="list-style-type: none"> <li>• An assessment of the existing PFR measures and their effectiveness should be carried out as part of a wider modelling exercise to determine what is the most cost benefit scheme to protect properties for a given standard of protection.</li> <li>• EA should communicate with property owners as to timescales of any flood defence measures</li> <li>•The Environment Agency and the Tadcaster Flood Action Group should work with businesses owners and residents to review existing and potential PFR measures to ensure they are appropriate and flood resilient.</li> <li>•Following a review of existing PFR measures the EA and partners should discuss sources of funding for PFR measures, both for existing and new properties.</li> <li>•If businesses and residents are unwilling to wait for a review of the existing PFR measures and/or funding then the EA will provide guidance as to PFR measures that can be taken in the interim prior to a capital scheme coming forwards.</li> </ul>

<p><b>Drainage</b></p>		<ul style="list-style-type: none"> <li>•Yorkshire Water/NYCC Highways should review the level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding locations in line with the risk identified for the affected locations. YW and NYCC should provide a maintenance timetable for the systems serving the flooding locations.</li>   <li>• The EA should continue to involve Yorkshire Water/NYCC Highways in scheme development to ensure that surface water systems can continue to function to a reasonable standard.</li>   <li>• EA to carry out a post review of the flood alert/warning system to ensure that these are issued in a timely manner.</li> </ul>
<p><b>Recommendations for Ulleskelf</b></p>		
<p><b>Recommendation 1:</b> Environment Agency to review the current flood risk assets their integrity and current standard of protection.  <b>Recommendation 2:</b> Environment Agency to review their current flood model to better understand flood risk in Ulleskelf to assist in an initial assessment to explore options to manage the flood risk, working with the community and partners.  <b>Recommendation 3:</b> Environment Agency will communicate with local residents of properties known to have flooded internally to investigate options for managing flood risk e.g. This may need to be dependent on those property owners affected contributing towards a solution.  <b>Recommendation 4:</b> Property owners could carry out their own property flood resilience measures where funding is not forthcoming or residents are unwilling to wait.  <b>Recommendation 5:</b> EA to carry out a post review of the flood alert/warning system to ensure that these are issued in a timely manner.  <b>Recommendation 6:</b> Yorkshire Water/NYCC Highways should review the level of maintenance required to sustain the design efficiency of their drainage systems that serve the flooding location in line with the risk identified for the affected locations.</p>		
<p><b>Recommendation for Kirkby Wharfe</b></p>		
<p><b>Recommendation:</b> Complete Phase 2 of the village flood defences as funded by the Environment Agency.</p>		
<p><b>Recommendation for Brotherton</b></p>		
<p><b>Recommendation:</b> NYCC and Yorkshire Water to install non-return valves within the surface water system to reduce the risk of surcharging.</p>		