

Study into the Correlation Between Levels of the River Wharfe Recorded at Ilkley and the Safe Availability of Passage Across The Stepping Stones at Burley in Wharfedale

Inputs:

- 1) Height data from the Government check-for-flooding service at <https://check-for-flooding.service.gov.uk/station/8106>:
- 2) Real time river level data from Government check-for-flooding service at <https://check-for-flooding.service.gov.uk/station/8106>
- 3) National rainfall figures from <https://www.metoffice.gov.uk/> for 5 years 2018 to 2022:
- 4) Ordnance Survey (OS) Map 1:25000 Lower Wharfe and Washburn Valley No. 297:
- 5) Observations and photos at site.

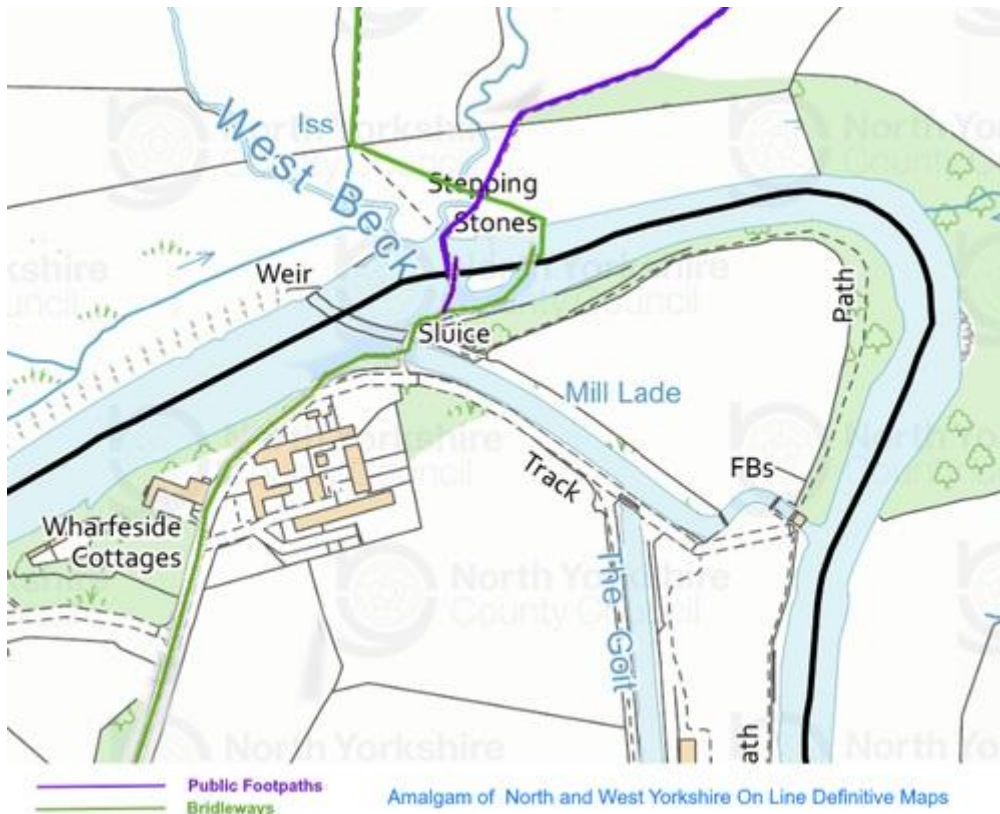
Outputs:

Excel spreadsheet

Site Description

The site is half a mile from the main street of Burley in-Wharfedale accessed by a public footpath and private lane (Leatherbank), which is a public bridleway.

A large weir built in Victorian times provided water power, via a goit, to Greenholme Mill. This is now converted to private apartments and the goit has been diverted to provide power to a hydroelectricity station. A series of 'water control' stones was installed across the river to direct the water away from the north bank and a Right of Way (ROW) has been established across these stones, in effect stepping stones, by habitual usage. A second right of way is by way of a bridleway. See amalgam of Bradford MDC and North Yorkshire Rights of Way Definitive Maps below.



Over time, a substantial amount of shingle has washed down the river. This has formed an ‘island’ with sufficient permanence to have been recorded on the Definitive Map. The bridleway ROW diverts round it. The area between the ‘island’ and the south bank has also been largely in-filled with shingle and rocks, washed down by the river. This and the island are submerged at high water levels but at lower levels they form a barrier which forces the water flow towards the north bank and impedes water flow. The north bank has a stone area of ‘reinforcement’ by the stepping stones but this is overwhelmed at high water levels. Behind this, the north bank is heavily eroded. There is no obvious evidence of any form of maintenance in respect of the north bank or the river bed.

Methodology

A desktop study of the OS map was carried out to establish whether there were any significant tributaries to the Wharfe between the Ilkley measuring station and the Burley stepping stones. Only minor streams were identified, the largest being Bow Beck which joins the Wharfe at Carters Lane. No volume figures could be ascertained for this stream but given the speed at which the river level of the Wharfe rises (see diagram below), it is considered most unlikely that this stream or indeed the others would receive sufficient rainfall in isolation, to materially affect the conclusion of this study, particularly as the prevailing weather is from the West and North West – i.e. the Wharfe would have already been swollen by any rains.

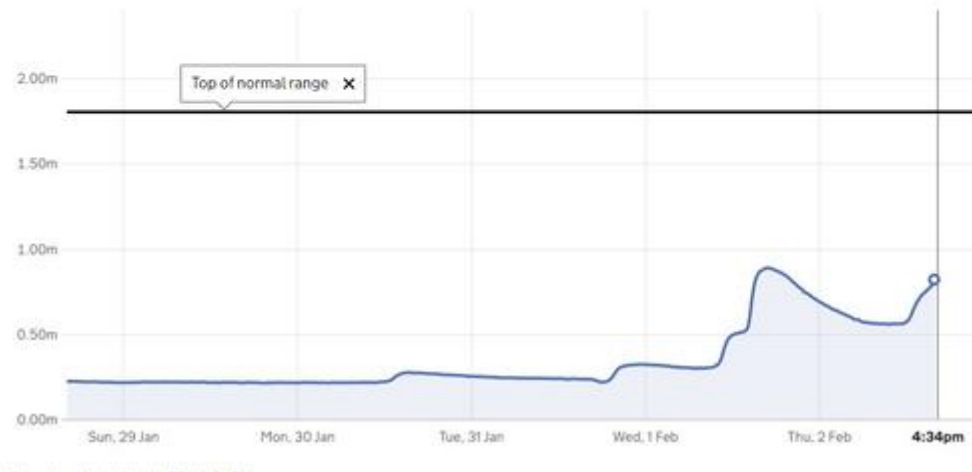
River Wharfe level at Ilkley

[View map](#) [↑ Upstream](#) [↓ Downstream](#) [Nearby levels](#)

State
Normal
0.09m to 1.80m

Height
0.81m
at 4:00pm today

Height over the last 5 days



Nine observations at site were carried out as levels fluctuated, between 19 January 2023 and 14 February 2023 and photos taken. On each occasion, the level recorded at the Ilkley measuring station was recorded. The object was to establish at what level recorded at Ilkley the stepping stones could be regarded as safely passable, with care. 'Safely' is taken to mean the surfaces of the stones were not below water level. On all occasions, water was flowing into the goit.



Photo taken 19 January 2023. Recorded river level 0.32m

It was not considered that the stepping stones were safely passable on 19 January 2023 at this level. The central stones were under several inches of water.

Intervening observations also indicated crossing the stones would not have been safe.



Photo taken 11 February 2023. Recorded river level 0.20m

The central stones are still covered.



Photo taken 13 February 2023. Recorded river level 0.19m

Disclaimer: It is up to the individual to be responsible for their own safety in crossing these stepping stones and no liability is accepted for acting or failing to act on the information in this report.



Close up of central stones 13 February 2023

Although the central stones are becoming visible, there is still a shallow covering which could lead to them being slippery.



Photo taken 14 February 2023. Recorded river level 0.17m

The surface of the central stones is just above the water. In fact there is a person crossing the stones who also returned without difficulty.



Close up of the central stones 14 February 2023

Conclusion

It is considered that a safe level for crossing the stepping stones cannot occur until the river level at Ilkley is recorded at 0.17m or less. Even at this level, the surface of a couple of stones is level with the surface of the water. A breeze can blow water across the surface of the stones so great care needs to be taken to avoid slipping.

Assumptions/Mitigation

Closure of the sluice feeding the goit could affect levels.

The amount of gravel between the island and the south bank could change. Any reduction would be likely to ease the flow of water and increase the availability of the stepping stones. The reverse is also possible.

Wind blowing along the river could increase the flow over the weir and over the stepping stones so increasing coverage of the stones.

Safe crossing presupposes that Bradford MDC comply with their obligations to maintain the stepping stones. It was noted that a stone close to the north bank had been swept away and replaced with a boulder.

Percentage of time the Stepping Stones are available

Met. Office annual rainfall figures for the country were obtained to establish a typical year's national rainfall. These were as follows:

2018 - 713mm
2019 - 925.4mm
2020 - 833.8mm
2021 - 799.8mm
2022 - 662mm

2022 is discounted (extreme drought) and 2019 was similarly discounted as unrepresentative. Of the remaining 3 years, the average is 782.5mm so it was considered that using the figures from the Ilkley measuring station for 2021 was a reasonably representative, recent figure.

Height data for the Wharfe, from the Government check-for-flooding service at <https://check-for-flooding.service.gov.uk/station/8106> is available, year by year on a daily basis at low, average and high levels. Given that this river can rise very quickly (see diagram on page 3), it is considered that only the higher of the daily figures should be used, in the interests of safety.

The figures show that using the 2021 figures and on the basis of 0.17m at the Ilkley measuring station being the yardstick for a safe crossing, the stepping stones were unavailable on 253 days or 70% of the time. See attached spreadsheet. Indeed for very long periods of time, walkers would have been unable to safely cross the river, such as between 1 January 2021 and 7 April 2021, between 3 May 2021 and 3 June 2023 and from 18 October to 31 December 2023 (apart from 3 days). There were also a number of days even in the summer months when safe crossing would not have been possible.

It is hoped the information in this report will enable walkers to advance plan for crossing the stepping stones. Until now, one could never be sure of the water level at the stones without walking the half mile to the river to observe.