

WILD TROUT TRUST

Project Proposal

Malham Beck & Goredale Beck, R Aire

([GB104027063110](#) & [GB104027063130](#), respectively)

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1.0 Introduction

The following is a brief report based upon observations during a short walkover of Malham & Goredale Becks near to their confluence, and from desk-based studies. It was carried out by Prof J Grey at the request of the landowner / tenant with the rationale to assess potential for renaturalisation of the beck via better connection with the floodplain and surrounding wet meadows. Further consultation was provided by Chris Nash (Environment Agency geomorphologist).

Throughout the report, normal convention is applied with respect to bank identification, i.e. left bank (LB) or right bank (RB) whilst looking downstream. Upstream and downstream references are often abbreviated to u/s and d/s, respectively, for convenience.

The EA data for Malham Beck give an overall classification of 'Moderate' ecological status in 2019 driven by the failing for Fish. Reasons for Not Achieving Good status (RNAGs) are listed as riparian/in-river activities and farm infrastructure leading to diffuse source pollution, and physical modifications for flood protection.

The situation is similar for Goredale Beck.

2.0 Habitat Assessment

A series of images are used to exemplify ideas generated during the walkover. Some detail is given in the legend for each figure, and more can be found in the summary following on.

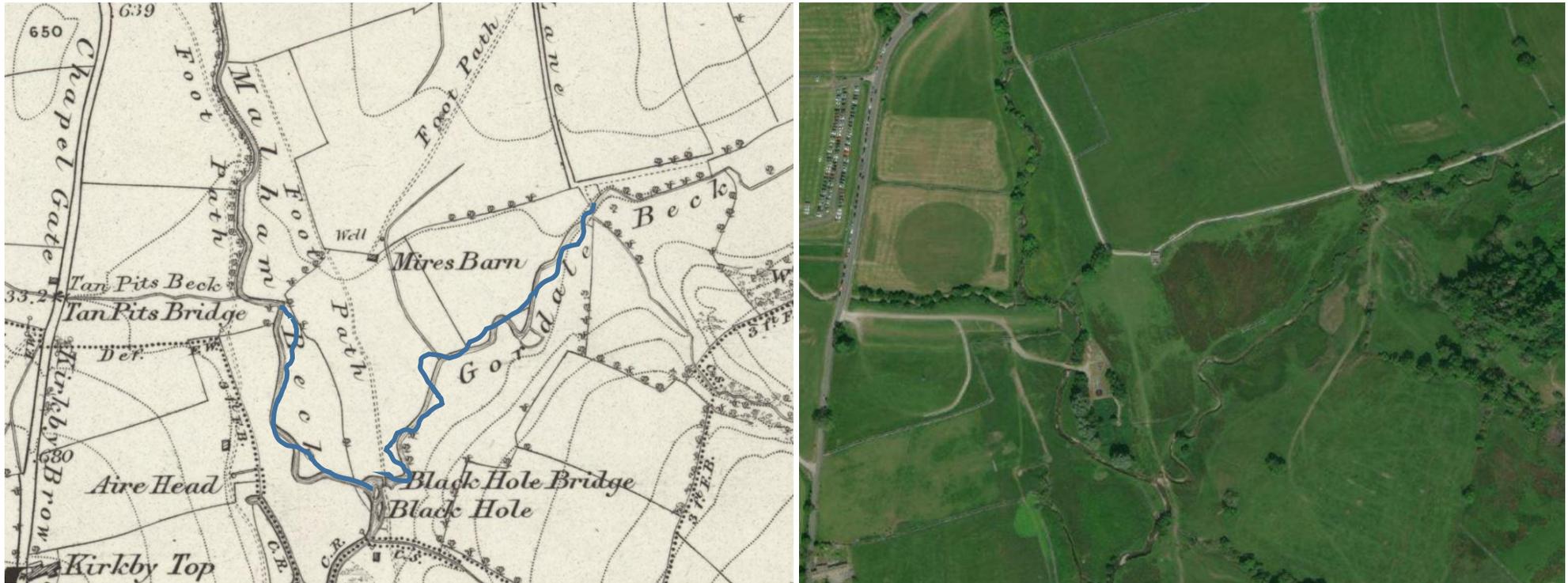


Fig 1. Comparison of the Ordnance Survey map from 1854 to current satellite imagery, and an overlay of the extant course of both Malham & Gordale Becks in blue to highlight change over time. Even 170y ago, Malham Beck had been realigned and pinned against a boundary wall in the upper reaches (of this map extract) with an occasional abrupt turn and long, straightened reaches.

It appears that within the intervening years, parts of both becks have been further straightened by cutting off meanders. However, there has also been some natural re-meandering occurring resulting in increased sinuosity, especially on Gordale Beck just above the confluence.

2.1 Malham Beck



Fig 2. The uppermost reach (u/s boundary at the watergate) where Malham Beck has been straightened and pinned between a wall boundary and the Pennine Way. Wooden stakes can be seen at the erosion point where the LB has been formalised (and recently 'repaired' with wired branch bundles d/s, just out of shot).

Note continual shallow riffle habitat, a function of straightening into a trapezoidal channel of fixed width. The erosion point was likely to have arisen from livestock or dogs accessing the beck and subsequently exacerbated as a desire line developed. It is difficult to prevent such deterioration with the proximity of the Pennine Way and the amount of footfall.



Fig 3. Where the Pennine Way departs from adjacent to the channel, there is more scope for renaturalising the channel. The land to the LB is relatively low lying but has been disconnected from the channel by boulder revetment (each of the 'hummocks' along the LB).

Opportunity to use some of the diseased ash or stems from previously coppiced alder and sycamore on the RB by felling and laying them into the channel to accentuate the inside of the bend in conjunction with removing the boulders to the LB and rewet the meadow.

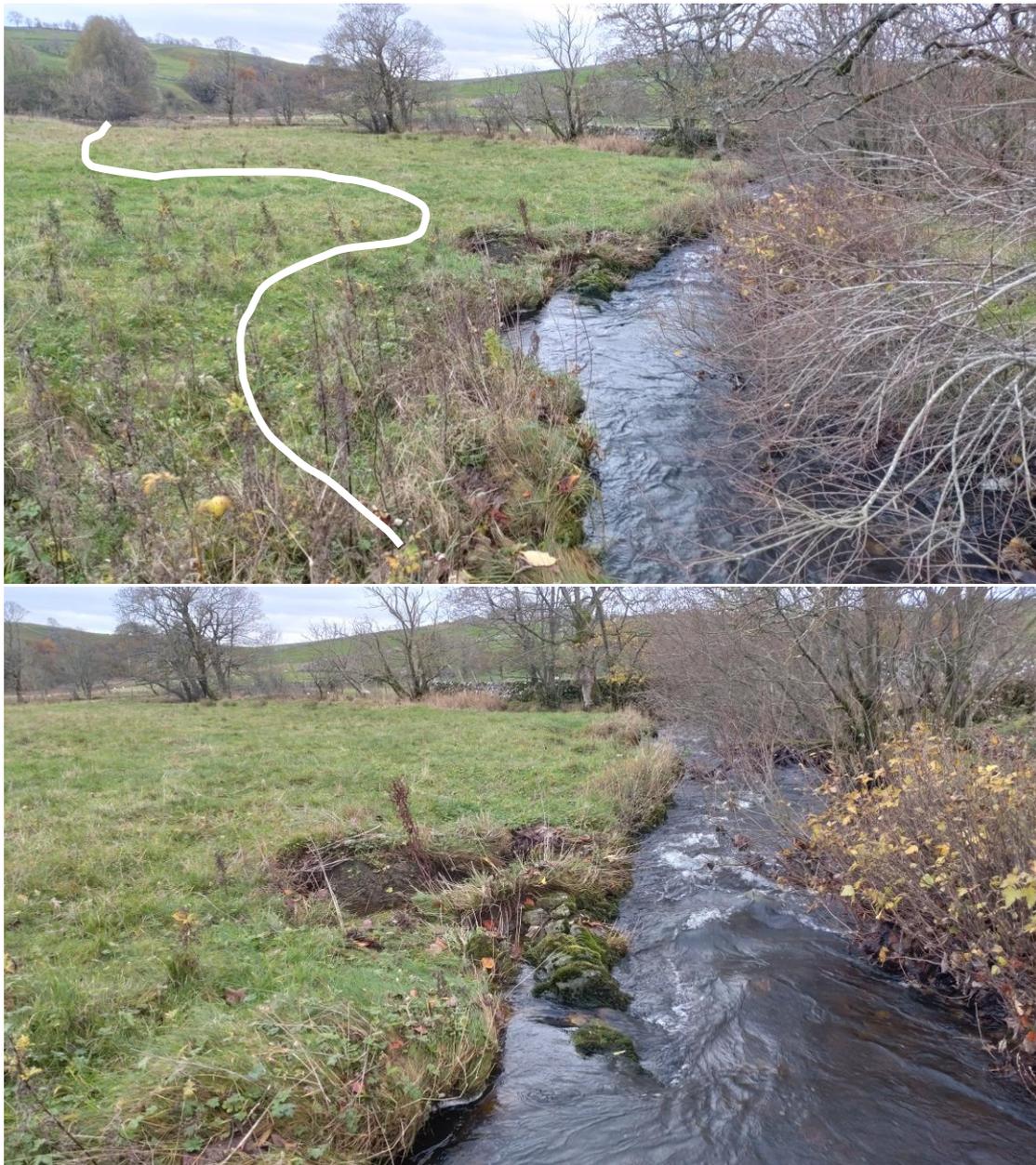


Fig 4. Upper panel, by eye, there appeared to be a palaeochannel evident across the field to the LB (highlighted by the white line) but the beck had been forced right to stay parallel to the boundary by walling.

Lower panel – a close up of the LB walling which the beck has started to erode behind to return to a more natural position within the floodplain and develop a more naturally variable width. Retained by walling, flow energy cannot dissipate laterally onto the floodplain, so it scours downward creating a more incised chute-like channel even further disconnected from the floodplain and stripping out the finer substrate (exemplified by turbulent accelerated flow in this image).

Opportunity to break out the LB walling to reinstate a more natural channel width and use the material *in situ* to raise the eroded section of bed, thus reconnecting the floodplain and rewetting the meadow.



Fig 5. Looking u/s at another section of LB walling that has partially failed. Originally there would have been walling the length of the white trapezoid; there remains a spur at the d/s end. Unshackled from walling, the channel has widened by eroding into the LB, slowly returning to a more natural position within the floodplain. Where it is wider, there has been deposition of gravel, creating a shallow riffle and further diversifying the physical characteristics of the channel. The remaining walling forces flow to be constrained again and creates a chute of much steeper gradient

Opportunity to break out the remaining walling and encourage more sinuous flow, reinstate a more natural gradient, again in conjunction with laying of woody material from the RB.



Fig 6. Another example of formalised LB walling (forcing the channel through almost 180°) which could be broken out with material used to raise the bed and reconnect the floodplain.

2.2 Goredale Beck

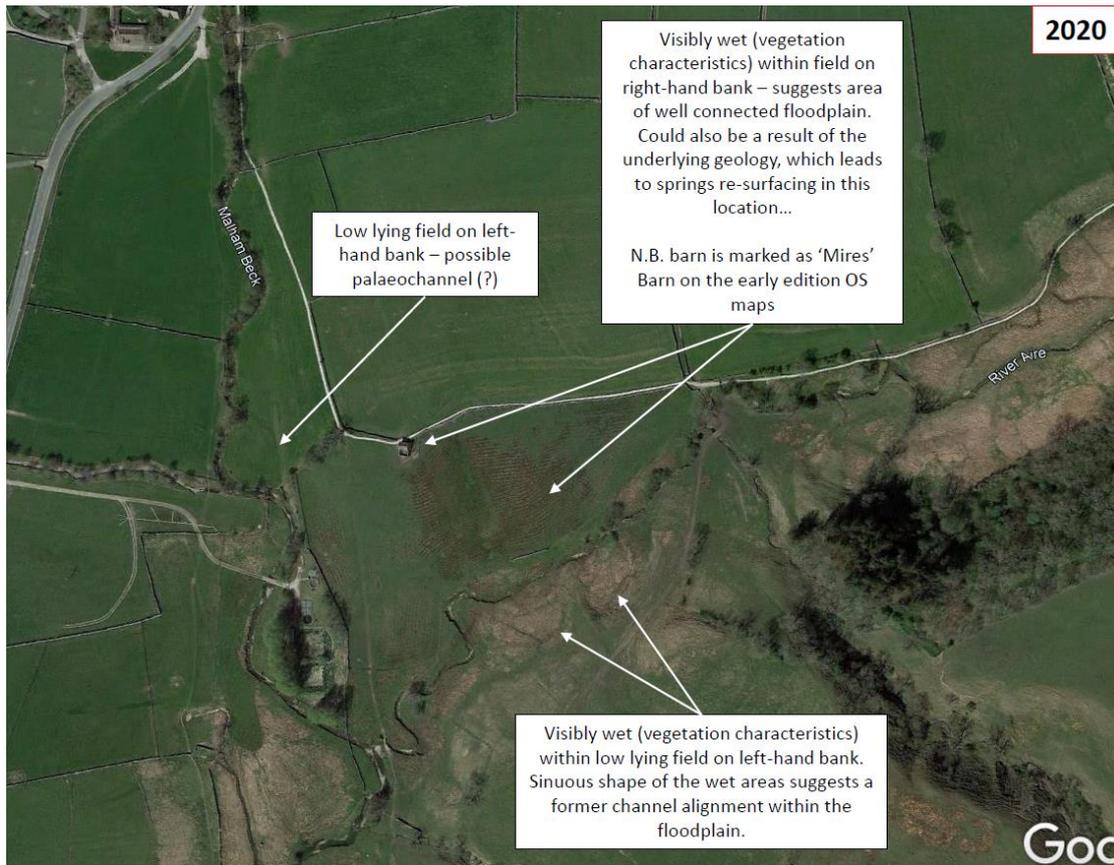


Fig 7. Satellite image from 2020, with accompanying notes provided by Chris Nash (Environment Agency). Lidar coverage is poor for Malham & Goredale Becks, but the wet nature of the floodplain and evidence of palaeochannels are visible to the naked eye in places.

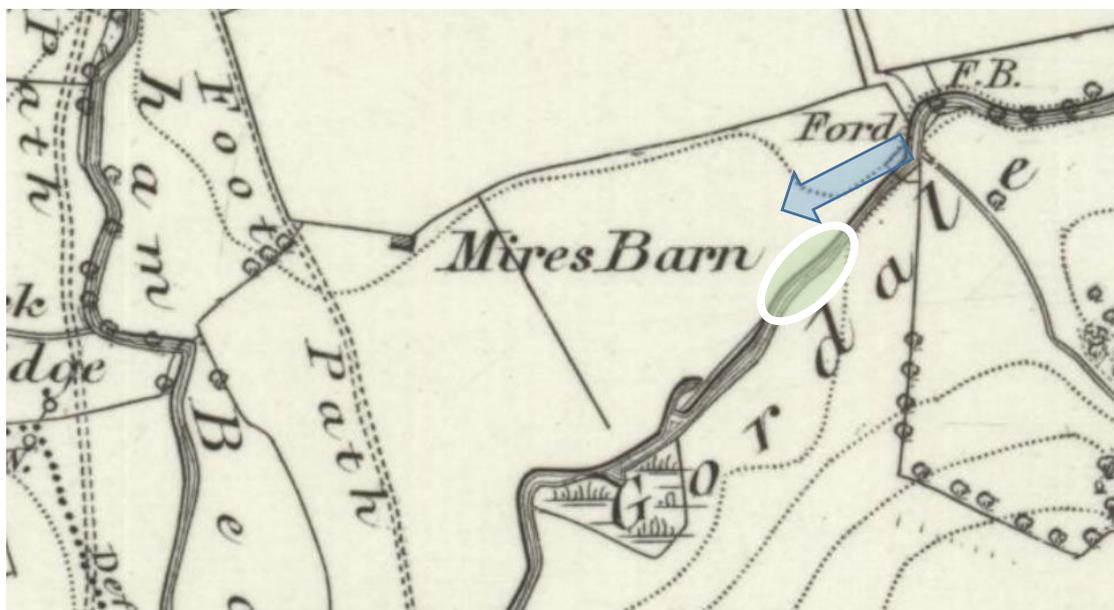


Fig 8. Extract from the 1896 Ordnance Survey map highlighting a formalised ford crossing of the beck (now bridged) and revetment of the RB preventing the most likely route of former channel (highlighted by blue arrow).

Opportunity to remove revetment and hinge / lay scrubby goat willow into the channel within the white oval.

3.0 Recommendations

3.1 Malham Beck

Gold standard channel restoration would involve the removal of any artificial bank revetment on either side to allow for natural dynamism across the floodplain. The co-location and formalisation with hardcore of the extremely busy Pennine Way immediately adjacent to the channel does not help. From the 1854 OS map, the path (as far as it was marked) was set further back from the beck, and it would be beneficial to liaise with Yorkshire Dales National Park Authority and the local Public Rights of Way officer regarding its position.

With an ownership boundary effectively forming the (walled) RB of Malham Beck throughout the field at present, reinstatement of an entirely natural RB is unlikely to occur in the foreseeable future. However, it appears that the beck has been mostly realigned to the west and pinned against that boundary by walling the LB. Hence, by breaking out the artificial LB, the channel will naturally begin to reconnect and rewet the floodplain meadows to the east, which is the aspiration.

So, the majority of the recommendation for Malham Beck is simply to remove any LB walling. As noted in Fig 4, down-scour caused by the walling has lowered the bed of the beck and increased the gradient. The most cost-effective solution is to use the limestone walling (local) material to infill the scoured sections and lessen the gradient, thereby raising the bed slightly and allowing better reconnection to the floodplain.

Currently, there is some cover from riparian trees but many of the mature specimens are ash with advanced *Chalara* (dieback) infection. Judicious felling of leaning ash or limbs, leaving as much standing dead wood as possible for habitat, and hinging or felling some of the formerly coppiced alder to provide large woody material would also help to slow the flow (by increasing sinuosity) and reconnect the floodplain better. This has been successful u/s on Malham Beck, just above the village on National Trust land. Coppicing will encourage low and vigorous regrowth, reinstating low cover and important shade. To replace failing ash, and diversify the fringe, some other native tree saplings could be introduced.

The recommendations are summarised overleaf.



Fig 7. Options for Malham Beck:

- **Planting ~50 native saplings (hazel, hawthorn, blackthorn, rowan, alder, sessile oak) on the RB wherever space to counteract loss of ash and increase diversity**
- **Break down any remaining stone walling to LB and redistribute to channel**
- **Break out stone walling to LB and infill scoured bed with material**
- **Fell / hinge large woody material to channel**
- **Remove LB walling and infill channel**
- **Aspiration of rewetted meadow via floodplain reconnection (shaded blue)**

3.2 *Goredale Beck*

Many high-profile upland river restorations use highly engineered solutions to create a 'rewiggled' channel, often using the line of a former palaeochannel as a guide. The same effect can be achieved with less invasive techniques, by removing the shackles on the original channel, ie the revetment on the RB at the head of the field, and allowing the beck the freedom to access the floodplain and find its own path over time. The fact that the beck is becoming more sinuous under its own steam down towards the confluence (as evidenced in Fig 1) is encouraging.

Allowing better floodplain connection at the u/s boundary (the ford area in Fig 8) will reduce spate flow energy within the extant channel and encourage more deposition, especially if the scrubby willow beside the channel can be hinged in to form a permeable matrix. Hence, the solution to channel restoration on the Goredale Beck reach is to encourage more out of bank flow, and let the beck do the work. Whips cut from the stand of goat willow could be pushed into the toe of the bank on the inside of any nascent bends to encourage flow in a more sinuous path, and provide further low cover and shade in a currently exposed reach.

4.0 Making it happen

Both becks are designated as ordinary watercourse and hence permission for works related to this proposal must be sought from North Yorkshire County Council. Note that WTT has permitted work from NYCC for environmental improvements/habitat works u/s on Malham Beck at Town Head Farm, as well as numerous projects on similar sized channels such as Lothersdale Beck, Haw Beck and Flasby Beck. All the recommendations could be taken forward as a WTT contribution to the [Upper Aire Project](#).

Further information

WTT Fundraising advice - Help and advice on how to raise funds for habitat improvement work can be found on the WTT website - www.wildtrout.org/content/project-funding and should be discussed with your local Conservation Officer.

In addition, the WTT website library has a wide range of free materials in video and PDF format on habitat management and improvement:

<http://www.wildtrout.org/content/index>

We have also produced a 70-minute DVD called 'Rivers: Working for Wild Trout' which graphically illustrates the challenges of managing river habitat for wild trout, with examples of good and poor habitat and practical demonstrations of habitat improvement. Additional sections of film cover key topics in greater depth, such as woody debris, enhancing fish stocks and managing invasive species.

The DVD is available to buy for £10.00 from our website shop <http://www.wildtrout.org/product/rivers-working-wild-trout-dvd-0> or by calling the WTT office on 02392 570985.

5.0 Acknowledgement

The WTT would like to thank the Environment Agency for supporting the Advisory Visit programme.

6.0 Disclaimer

This report is produced for guidance; no liability or responsibility for any loss or damage can be accepted by the Wild Trout Trust as a result of any other person, company or organisation acting, or refraining from acting, upon guidance made in this report.