



Advisory Visit

Shelf Brook, Glossop, Derbyshire

March 2019



1.0 Introduction

This report is the output of an advisory visit (AV) undertaken by Tim Jacklin of the Wild Trout Trust to the Shelf Brook, Glossop, Derbyshire on 13th March, 2019, at the request of a local resident. Comments in this report are based on observations on the day of the site visit and discussions with Geoff Hulmes, the AV recipient.

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream.

2.0 Catchment Overview

The Shelf Brook runs of the western side of the Pennines, joining the Glossop Brook, River Etherow, River Goyt and ultimately the River Mersey. Table 1 summarises the environmental information collected by the Environment Agency (EA) for this section of the Shelf Brook; this shows the brook is not meeting the target status of *good* because fish have been consistently recorded at *moderate* status or worse since 2009.

River	Shelf Brook
Waterbody Name	Glossop (Shelf) Brook (Source to Long Clough Brook)
Waterbody ID	GB112069060730
Management Catchment	Goyt Etherow Tame
River Basin District	North West
Current Ecological Quality	Overall status of moderate ecological status (driven by a moderate status for fish; fish status has been poor or moderate since 2009)
U/S Grid Ref inspected	SK0395094588
D/S Grid Ref inspected	SK0396494108
Length of river inspected	~550m in total

Table 1 Water Framework Directive assessment information from <https://environment.data.gov.uk/catchment-planning/WaterBody/GB112069060730>

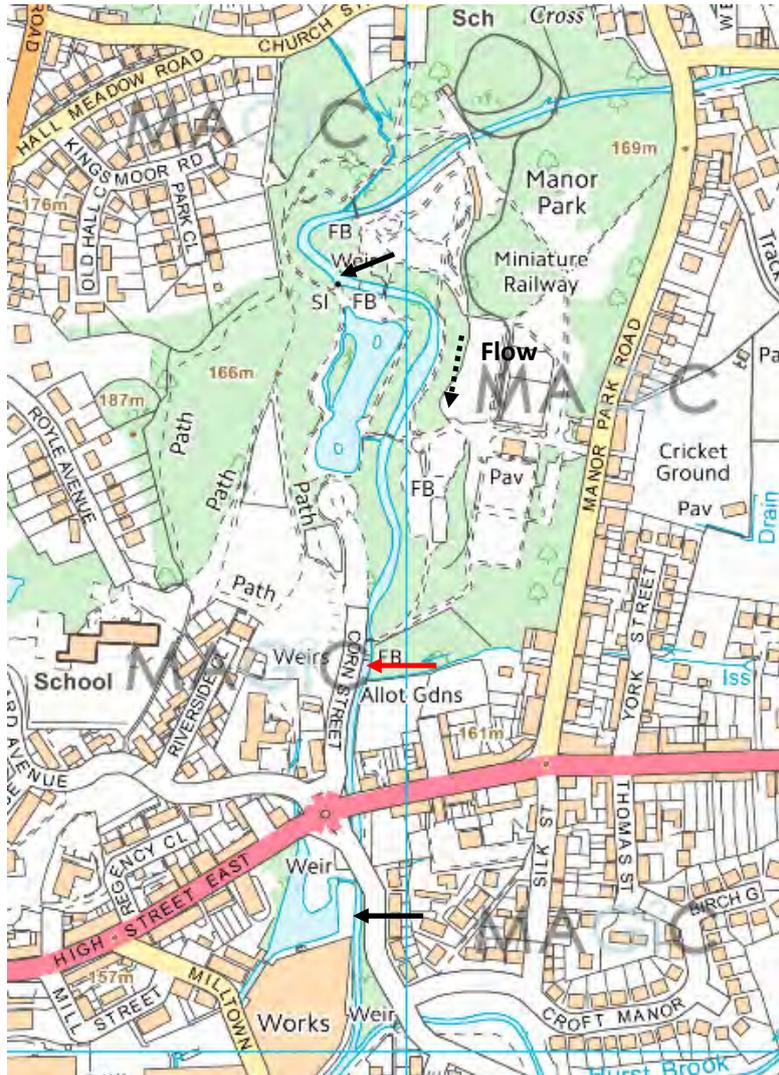


Figure 1 Site location, Manor Park, Glossop. Black arrows denote upstream and downstream extent of reach inspected, red arrow is the location of the weir and in-channel works.

This visit was made at the request of local resident Geoff Hulmes to look at a specific site in Manor Park, Glossop (Figure 1). Works have been carried out in the river channel downstream of a weir, apparently in response to flood damage to a retaining wall and subsequently, following the failure of the initial works. Mr. Hulmes's concerns centre on the detrimental impact of the works upon in-stream habitat quality within the brook, particularly for brown trout.

3.0 Habitat Assessment

The area of specific concern is downstream of a weir in Manor Park at National Grid Reference SK 03970 94298 (Photo 1)



Photo 1 Weir in Manor Park, Glossop.

The weir consists of a concrete step with two sluice gates on top. There is a man-hole cover in the pavement on the true right bank upstream of the weir which reportedly contains a flow control for a feed of water from upstream of the weir into the mill reservoir to the south of High Street East (Figure 1). The reservoir has been empty and disused for many years and the flow closed off; a small flow into and out of it was observed on the day of the visit, possibly surface water drainage due to the wet weather.

Appendix 1 shows a sketch supplied by Mr Hulmes indicating the situation prior to the works to the river channel downstream of the weir. The works involved:

- the re-building of the retaining wall on the true left bank which was washed out by floods

- the in-filling of deeper areas of the channel downstream of the weir with stone. It is not clear if this was imported stone, or accumulated river sediment which was removed from upstream of the weir
- following wash-out of the stone in-fill, the bed was lined with interlocking concrete blocks, creating an extended shallow apron downstream of the weir structure (Photo 2). Presumably the aim of this is to prevent bed scour and the undermining of the retaining walls. However, the high flows at the time of the visit demonstrated the concentration of energy below the weir and it was evident that the interlocking blocks were becoming dislodged by the current.



Photo 2 Concrete blockwork on the river bed (Photo: Geoff Hulmes).

There is no doubt that the works described above have had a detrimental impact on the in-stream habitat downstream of the weir and the present situation is a sterile environment for fish. The wider habitat on the Shelf Brook (from the limited reach inspected) is sub-optimal for trout; the channel is much-modified in this urban environment and lacks natural features like pools and riffles. In this context, the removal of the deeper water areas below the weir is likely to have had a more significant detrimental effect than would have been the case in a less modified river.

The weir is an impassable barrier to fish moving upstream; this was the case before the above works and remains so now. Trout run upstream in autumn to spawn and their offspring subsequently drop back downstream. Fragmentation of the habitat by weirs such as this limit the abundance and viability of trout populations.

The apparently recurring issue of the bed scour protection failure and the ongoing problem of zero fish migration past this site have a common cause: the presence of the weir and its concentration of flow energy. The erosion issues are further exacerbated by the interruption of sediment transport by the weir, and other weirs in the vicinity. Given the apparent redundancy of the weir for supplying water to the mill reservoir, the weir could be completely or partially removed to solve or lessen both problems.

Partial or total weir removal would cause the river bed upstream to re-grade, as sediment (cobbles, gravels and finer materials) which has accumulated above the impoundment is re-distributed (Photo 3). A 'knick point' would form which would gradually migrate upstream until the river bed stabilised at a new lower level; some bank slumping/erosion may initially occur as part of this process but could be stabilised if required. It is recommended that a survey by a fluvial geomorphologist is carried out to predict the extent of this effect and whether there would be any impact upon the upstream weir structure which provides a feed of water into the duck pond (Photo 4). The sluices could be opened as an initial trial.

Depending upon the extent of river bed re-grading predicted, various options for a scour reduction/fish passage project could be considered, including:

- Total removal of the weir structure, natural re-grading of the river bed and banks;
- Total weir removal, installation of fish-friendly bed check structures to control the grade of the river bed and bank stabilisation as required;
- Partial removal (e.g. removal of the sluice gates), construction of a 'rock ramp' downstream of the remaining weir that is specifically designed to also act as scour protection. Upstream of the weir: natural re-grading or bed checks/bank stabilisation as required.



Photo 3 River upstream of the weir. The river bed here would re-grade to a lower level following removal of the weir downstream. Note the existing bank reinforcement provided by rock rolls; these could be repositioned at a lower level if required following weir removal.



Photo 4 Upstream weir (at NGR SK 03952 94591), providing head of water to the duck pond.

Some examples of the above options are given below:

- Complete weir removal example:
<https://westcumbriariverstrust.org/projects/ennerdale-mill-weir-removal>
- Details of cross-vanes which can be used to provide grade control on river beds, whilst providing fish passage and habitat. This design may be suitable if natural river bed re-grading is likely to be problematic following total or partial weir removal.
http://www.hydrology.bee.cornell.edu/BEE4730Handouts/Rosgen_Vanes.pdf
- A rock ramp constructed downstream of the weir following removal of the sluices would provide a dissipation of flow energy over a longer length of channel and maintain sufficient depth of water over the remaining concrete step structure to provide fish passage.



Photo 5 Rock ramp during construction.



Photo 6 Completed rock ramp, spreading out the head loss and flow energy, reducing scour and facilitating fish passage

4.0 Recommendations

Aim to remove the weir. If removal is not feasible, reduce its height as much as possible. Use the above techniques to dissipate flow energy and improve fish passage. Those same techniques could also be employed to make the upstream weir passable while retaining the feed to the duck pond, should it be required. This is not a foregone conclusion as many ponds can function quite adequately as enclosed systems, without the requirement for an inflow and outflow, which often discharges elevated nutrient water to a potentially sensitive watercourse. If it can be ascertained that the feed to the pond is not required, the weir upstream and feed to the duck pond could also be fully removed.

5.0 Making it Happen

Use this report as the basis for discussion with stakeholders. These are likely to include High Peak Borough Council, the owners of the weir structure

(and/or any water abstraction rights associated with it) and the Environment Agency (EA). Points of contact at the latter include Kevin Nash and Oliver Southgate (in the Fisheries department). A partnership approach may be possible if there are multiple benefits from the project, such as reduced scour/erosion, improved fish passage and flood risk reduction. Appendix 2 lists some useful points that need to be considered for a project such as this.

6.0 Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programme in England, through a partnership funded using rod licence income.

7.0 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.

Appendix 1

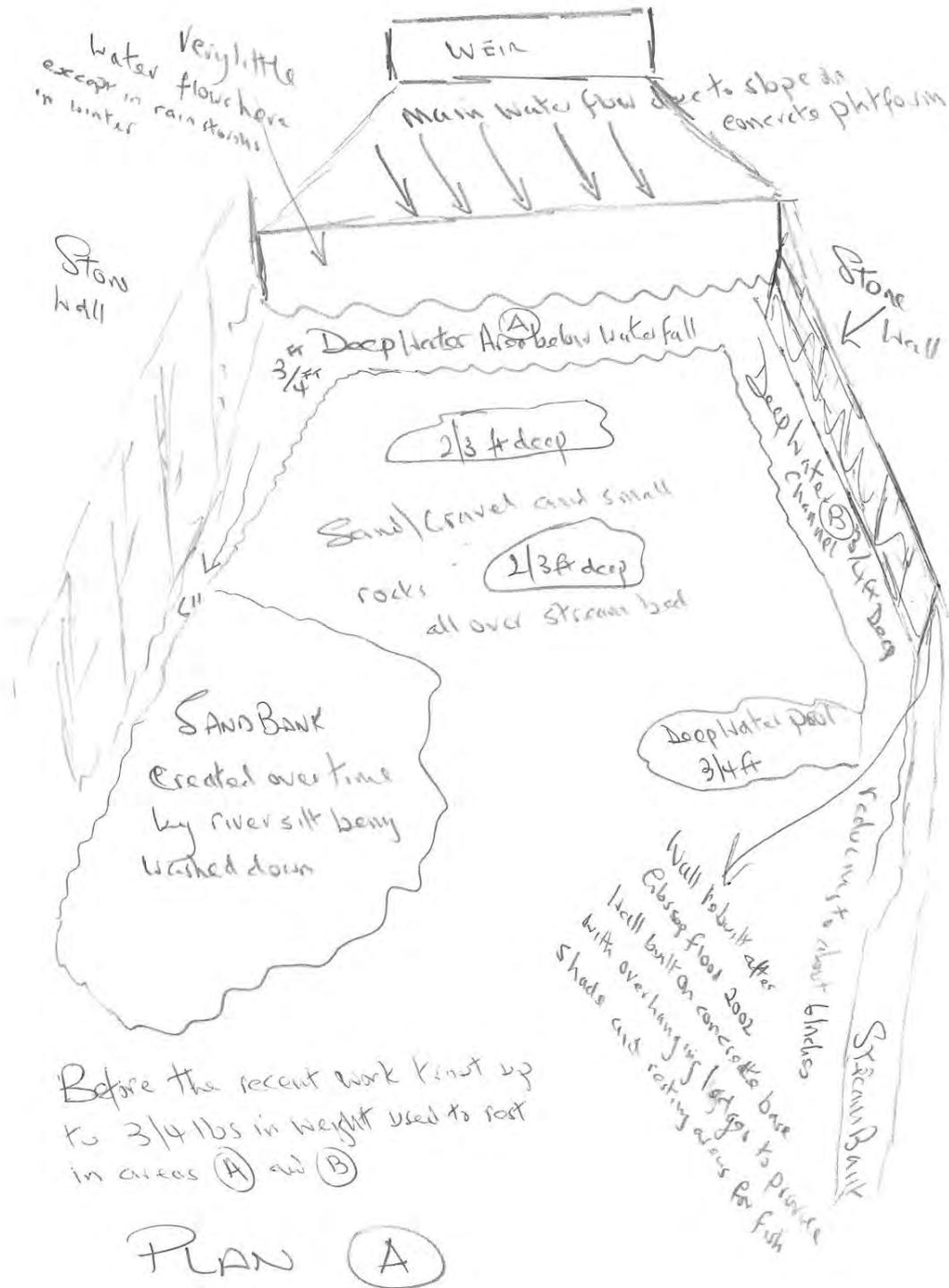


Figure 2 Sketch of pre-works situation downstream of the weir, Manor Park, Glossop (by Geoff Hulmes).

Appendix 2

Considerations in taking forward a weir removal project:

1. Service searches – are there any showstoppers like gas mains/sewers enclosed in the weir structure?
2. Identification of ownership of the structure and/or water abstraction rights. There may need to be some process to try and identify the owner or formally advertise intention to remove it if they can't be found. Environment Agency can advise on abstraction licensees.
3. Landowner consultation and formal permission for removal and access for works.
4. Flood risk assessment. Early consultation with the Environment Agency and modelling of options if required; could be incorporated in 6 below. There may be existing flood models available that could be re-run to demonstrate the effects of changes to the weir.
5. Is an impoundment licence required or just a low risk impoundment checklist (Environment Agency can advise)? The low risk checklist is useful for what needs to be considered, e.g. any existing abstractions reliant on current water levels.
6. Topographic survey and geomorphological assessment. Expert input from a suitable consultancy to advise on the response of the river to weir removal, if this needs to be mitigated and how.
7. Feasibility, options, detailed design.
8. EPR permit application to the Environment Agency
9. Tendering, appointing contractor, project management.

Appendix 3 – Additional Photographs



Photo 7 Allotments on LH bank downstream of the weir; some bank erosion is occurring here.



Photo 8 Small stream or drain entering on the left bank just downstream of the weir.



Photo 9 Weir and sluice structure. Note land drain (arrow).



Photo 10 Man-hole containing water offtake control.



Photo 11 Sluice gate structure



Photo 12 Downstream view from the weir



Photo 13 Footbridge a short distance upstream of the weir



Photo 14 View from left bank. Note drainage outlets at the base of the wall (arrows)



Photo 15 View of weir from LH bank



Photo 16 Outlet from duck pond into brook upstream of the weir



Photo 17 View of brook looking downstream towards the weir from alongside the children's play area.