



Crow Brook, Telford: Advisory Visit



Report and Proposal by Paul Gaskell of the Wild Trout Trust – Following a Site Visit on 13/11/2015

1. Introduction

A site visit and habitat appraisal was carried out at the request of Guy Pluckwell of the Environment Agency. The Crow Brook does not appear to be identified as an individual waterbody under the Water Framework Directive (WFD). The geographic location is, however, captured within the operational catchment of "Telford North". Specific data on the status of the Crow Beck are not currently measured or available (<http://environment.data.gov.uk/catchment-planning/OperationalCatchment/midops-west-24>). Comments in this report are based on observations made during the site visit along with information supplied by Guy Pluckwell.

Telford and the surrounding area contains a highly complex network of extensively managed water courses. Coal measures and groundwater upwelling feature prominently alongside this long history of modifications and control of surface water drainage. The divide between Telford North and Telford South catchments has a physical basis in the watershed caused by the ridge of land that runs in a roughly east-west orientation. Known issues associated with the Crow Brook and its tributaries include extensive physical modification and poor water quality in places. Throughout the reach visited for this report, the riverbed was coated with ochre (iron oxide deposition) from mine-water inputs upstream.

This report refers to a reach between an upstream limit at SJ 68200 13051 and a downstream limit at SJ 67852 13589; observations are reported sequentially from upstream to downstream.

Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated **Left Hand Bank (LHB)** or **Right Hand Bank (RHB)** whilst looking downstream.

2. Habitat Assessment Notes

The upstream limit of visited locations was at SJ 68214 12987 where the Crow Brook flows out of a culvert (Fig. 1). The ochre that coats the full width of the river bed is readily visible. Conversations on the day indicate that there is an upstream "serpentine" section that was designed to provide treatment for the ochreous water (via settling out of insoluble ochre and associated sediment). That facility is currently in need of maintenance and no longer providing protection against ochre inputs to the downstream watercourse.

The LHB is steep at this location (Fig. 2) but there is a relatively wide and level bank top on the RHB. This flat RHB is much lower (and closer to the normal water level) than the LHB. Consequently, it would be relatively easy to cut into that flat bank in order to produce a more meandering planform than the current, extremely straight path of the brook. The potential for suitable plant machinery to gain access appears relatively straightforward at this location. The road is close by and, if necessary, some felling of saplings should allow access for a small machine and bucket.



Figure 1: Ochre precipitate (Iron III oxide) coating the channel bed at the upstream limit of the visited reach at SJ 68214 12987.



Figure 2: Relatively steep LHB and low-lying/level RHB. Shot taken facing downstream from the culvert (Fig.1). There is scope for increasing the channel length of the brook via encouraging a more meandering planform.

At SJ 68200 13051, there is a typical example of the opportunities on this reach to establish some minor canopy management in order to stagger the age/height structure of the (established) surrounding woodland (Fig. 3). Increased variation in the light/shade regime would benefit some of the existing understory fern and sedge tussocks. However, for full benefit, some (volunteer group) management of the low-level Himalayan balsam infestation and some other dominant vegetation (principally brambles) is desirable.



Figure 3: Uniform canopy height and shade regime with little understory diversity (note ochre coating the soft/sandy stream-bed).

The ruler-straight planform is also evident in Figure 3 (as is the blanket coverage of ochre on the stream-bed). It may be possible to use a combination of excavation by mini-digger and installation of woody material to create a more meandering channel (see Section 3 “Recommendations”).

A naturally-occurring fallen tree (Fig. 4) provides an example of how woody material of suitable dimensions improves the ecological value of the channel structure. However, it must be stressed that the current status of this channel is best categorised as a severely degraded drainage channel. The combination of a perfectly linear planform, copious ochreous sludge and (even if the banks were allowed to engage in natural erosion processes) the available substrate is likely to be dominated by sand and silt. In combination, this yields very poor prospects for thriving and diverse aquatic communities.

In order to make morphological improvements meaningful, it would be necessary to tackle the upstream water quality issues. As a first priority, the reinstatement of functional treatment for mine-water is essential.

If this is possible to achieve, it could make some optional additional measures more viable (e.g. importing more varied substrate). However, there would need to be a significant reduction in the inputs of ochreous precipitate throughout the reach for this to be the case. See Section 3 “Recommendations” for potential options.

From a public engagement perspective, there could be benefits in the re-meandering and vegetation management previously-mentioned. Additionally, it appears to be possible to instate a woodland footpath along the highest level of the RHB, set back from the channel. This is at the same height as the bank top on the steep LHB (and consequently well above both the water level and the low, flat RHB where it is directly adjacent to the channel). The creation of such a path would require some clearance of saplings – but it would already be necessary to

undertake some clearance of this nature in order to give a mini-digger access to the channel.



Figure 4: Tree spanning the brook above the normal bank level at SJ 68193 13087. Additional aquatic habitat benefits are associated with stable woody material that is partially (or wholly) below the waterline. Tree limbs like this can be partially cut and then hinged into the channel in the same manner as hedge-laying.

There was an example of bramble patch that could be reduced/controlled by volunteer groups to promote a more diverse understory just downstream (Fig. 5). Note that control over Himalayan balsam would be required in order to prevent the newly cleared patch being rapidly colonised by that invasive species.



Figure 5: Dense brambles on the RHB approximately 5 metres downstream from area pictured in Fig. 4

As well as creating a more varied tree canopy, the bramble control would make it possible to undertake some seeding with locally-appropriate species.

In this area, it was also noted that the bed of the brook was artificially armoured with cobbles, set into a solid matrix. It was unclear whether the entire upstream section of the brook also had the same reinforcement (due to the soft deposits of sand and silt that may have covered an artificial bed). The completely straight channel is, of course, entirely artificial – so it could well be that the bed (and bank toes) have been armoured to prevent any development of meanders.

The reinforced bed was visible at that point because of an increase in the gradient that acts to mobilise fine substrate. If the artificial channel had originally been constructed as a series of almost level sections, interspersed with steeper “steps” – this would encourage the deposition and retention of fine materials within the level sections. The deposition within level sections may be covering a continuous reinforced cobble bed that runs throughout the straightened section. Alternatively, the reinforcement may only be used in the steeper “step” sections due to the increased shear velocities experienced over those steep sections.

In order to compare dimensions and channel characteristics in this reach to a natural/non-armoured section of the brook, we examined the brook on the downstream side of the culverted section under the road at SJ 68058 13337 (which was the downstream limit (Fig. 6) of the reach where the investigation of the feasibility of initial works are requested by the E.A.).



Figure 6: Looking directly upstream from the road at the downstream limit of the straightened section at SJ 68058 13337

The next visited section runs adjacent to an Epson site and is a useful illustration of the Crow Brook with more natural dimensions and morphological characteristics. The upper sections of this reach as it runs along the perimeter of the industrial site is still fairly straight (even if not quite as rigidly engineered as the previous reach). However, the surrounding woodland is a little more structurally diverse and the stream bed appears to lack the formal cobble

armouring. Instead, the straight channel seems to be maintained largely by the increased bank resistance afforded by tree root systems that may have been planted to line the brook (Fig. 7).



Figure 7: Although still fairly straight, there is some more deviation from a totally linear path where the brook is less formally confined by heavy engineering of the channel. Habitat quality is, consequently a little better in this section pictured at SJ 68017 13447

If landowners were amenable, it may even be possible to increase the amount of meandering by modifying the LHB along this section (section 3 "Recommendations").

As an example of the natural propensities of the Brook, there is a naturally-occurring meander (Fig. 8) at SJ67852 13589.



Figure 8: Natural meander at SJ67852 13589 – note the sandy/silty nature of the watercourse.

Despite the sandy nature of the riverbank material, the watercourse does not display worrying levels of incision (cutting downwards) or lateral erosion in the absence of heavily armoured banks and channel bed. The presence of root structures of varying depths (including tree roots) tends to help to stabilise those processes of erosion and deposition.

Consequently, it appears that allowing a greater degree of natural erosion and deposition to produce a more meandering planform of the brook would be an appropriate and achievable goal. This could be coupled with actively digging out certain sections in order to kick-start this process. Further details are given in the next section.

3. Recommendations

It may be possible to improve the visibility and amenity value of the section of the Crow Brook between SJ68214 12987 and SJ68058 13337.

However, without significant improvements to water quality, such works would not achieve the desired benefits to the ecology of the stream. Therefore, in order to make a physical habitat scheme appropriate, there would need to be a demonstrable commitment to any required maintenance/improvement to the existing upstream ochre treatment measures.

With an achievable plan for such improvements in place, it may be possible to increase the ecological value of the river corridor habitat in the following ways:

- Coppicing of a small proportion of the trees (~10 - 20%) that currently form a uniform canopy.
- Control of Himalayan balsam (http://www.wildtrout.org/sites/default/files/library/Invasive_Plants_Apr2012_WEB.pdf). For this project I recommend that it is pulled by hand and composted on site – well away from the high-water line)
- Cutting back dense patches of brambles.
- Potential supportive seeding/planting of native river corridor woodland plants.
- Fixing logs/tree trunks to the stream bed (including laying of suitable bankside species e.g. willow, hazel, elm and hawthorn) so as to actively promote bank erosion and generate meandering planform of the brook (Fig. 9).
- Using “dig and dump” techniques to pull back the bank toe on the RHB – and repositioning the excavated material on the opposite bank to produce a berm and instant re-meandering (Fig. 9).
- Berms could be stabilised using brush arising from coppicing work with material secured using stakes (Figs. 9 and 10).

In order to generate a meandering planform, it is likely to be necessary to break up and dig out any stone-work reinforcements of the existing bank toe. Removing the cobbles within lined sections is likely to kick-start natural channel adjustment immediately. Cobble arising from that work could be redistributed within the channel as valuable habitat. As and when the level of ochre precipitation could be substantially reduced, it may be appropriate to consider importing coarse and fine gravel to further diversify the available aquatic niches.

However, this may need to be held back for future phases of works on the Crow Brook – when the scale of improvements to water quality can be assessed.

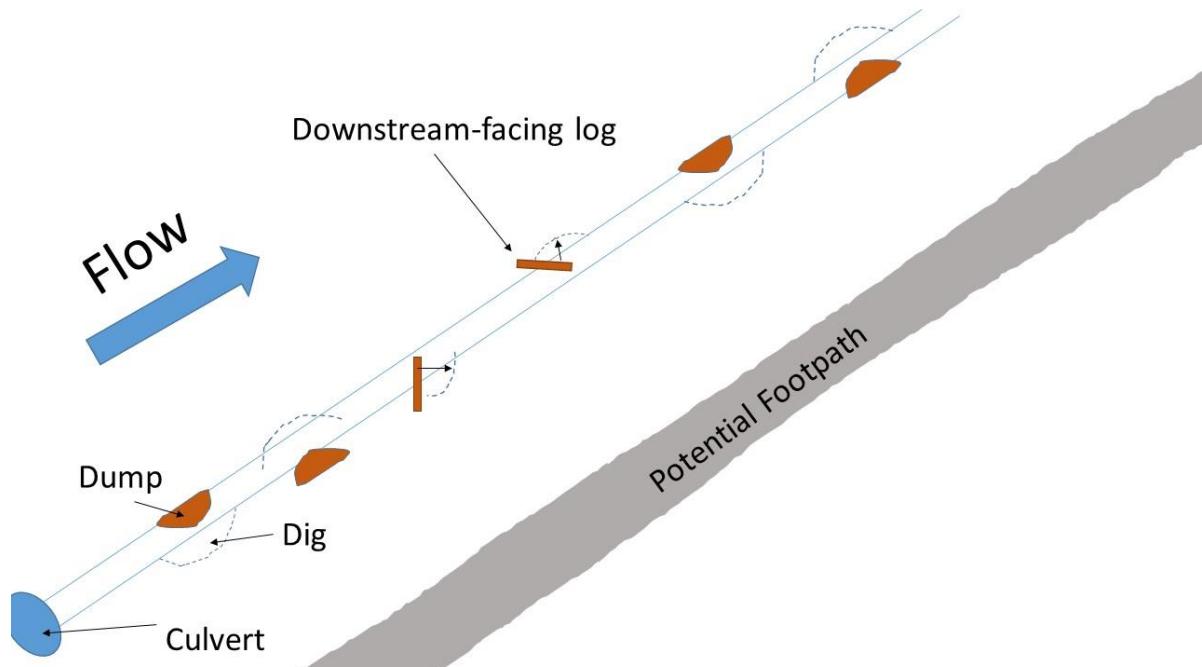


Figure 9: Re-meandering measures - "Dig and Dump" and using log deflectors positioned so as to erode the bank adjacent to the downstream face of each log



Figure 10: Berms created from back-fill from dig and dump can be stabilised by brash, stakes and fencing wire.

4. Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programmes (through which a proportion of this work has been funded) in part through rod-licence funding.

5. Disclaimer

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