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Witchampton Mill (River Allen) – Advisory Visit

An advisory visit by Nick Lawrence of the Wild Trout Trust

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Introduction

This report is the output of a visit undertaken by Nick Lawrence and Andy Thomas of the Wild Trout Trust (WTT) on approximately 200 metres of the River Allen at Witchampton Mill, near Witchampton, Dorset (national grid reference (NGR) ST 99800 06796 to ST 99985 06984). The site of the old paper mill is now a residential development of both conversions and new property built adjacent to the main Mill and Garden Carrier channels (map 1). The site is owned and managed by the Witchampton Mill Residents Association (WMRA) and the site visit was requested by Mr. Ross Jordon, who lives on site and is an active member of the WMRA.

The WMRA would particularly like to explore options for managing the structures sustainably and if possible improving fish passage through the site, which was subject to an earlier WTT visit and report in 2013, where recommendations were made for enhancing local habitat quality in the reach downstream of the access bridge. At the time, no additional recommendations were made for improving fish passage. A further WTT report was commissioned by the Critchel Estate in 2016 to provide advice on habitat management for the reach running upstream above the Mill. The latter report identifies opportunities for running water levels lower and faster through the Mill to help improve sediment transport and ultimately promote enhanced habitat quality on the reach above.

Comments in this report are based on observations on the day of the site visit. Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left Bank (LB) or Right Bank (RB) whilst looking downstream.

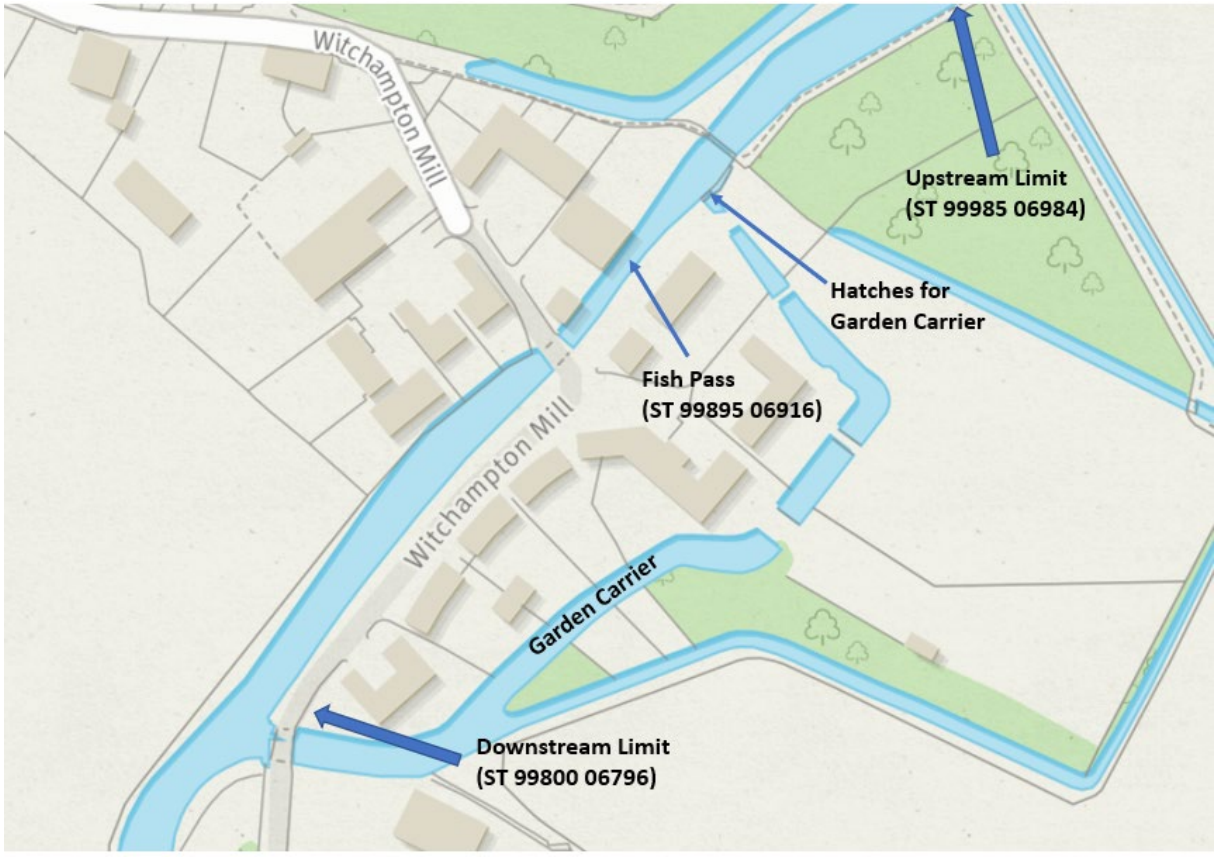

Figure 1: Map showing the location of the water visited

Catchment and Fishery Overview

The River Allen is a relatively short chalk stream with a total length of approximately 21 km. The river rises from springs at Monkton Up Wimborne and flows through Wimborne St Giles, Witchampton, Stanbridge, and Walford to its confluence with the River Stour at Wimborne Minster. In turn, the Stour meets the Hampshire Avon just as both rivers discharge into the English Channel at Christchurch Harbour.

Almost the entire length of the Allen flows over chalk and through largely undeveloped land. Some intensive agriculture is practised within the catchment but much of the riparian land consists of lightly grazed water meadow. As a result, the Allen enjoys good quality water and was until recently an important refuge for the endangered white-clawed crayfish. Unfortunately, crayfish plague has been identified in the river, resulting in a dramatic decline in native crayfish. Crayfish plague is a waterborne mould carried by alien invasive signal crayfish and often transferred by a variety of factors including on wet fishing tackle, boots, waders and Otters. Despite the impact of the disease to crayfish, other invertebrate and fish populations are not affected (other than by the loss of a prey species) and the Allen continues to support healthy populations of brown trout and grayling as well as a range of other coarse fish species; the river is also an important spawning habitat and nursery for the now rare Stour salmon. Throughout, the river supports a diverse range of freshwater plants.

The Allen has a classification of 'Good Status' under the Water Framework Directive (WFD). However, this is an overall classification and does not necessarily represent the river at a local reach level. As with most English rivers, the Allen has suffered from the impacts of unsympathetic land drainage and river management practices: straightened, widened and deepened in many places, inhibiting natural geomorphological processes and reducing habitat diversity. Water meadow creation, milling, land drainage for agriculture and flood defences have all had an impact on habitat quality.

Habitat and Fish Passage Assessment

The overall ecological condition of the river at Witchampton Mill is heavily impacted by the water level impoundments in a number of ways:

1. By acting as a challenging barrier for upstream fish migration, despite the construction of the pool and traverse fish pass on the main Mill Channel.
2. By acting as a barrier for effective downstream transport of bed sediments, resulting in upstream deposition and ultimately a step in the relative bed levels above and below the Mill.
3. By facilitating low energy flow velocities, thus restricting the development of diverse and valuable river-bed features on the impounded section above, with a resultant negative impact on river ecology.
4. Via the hard, vertical bank revetments required to defend the built environment adjacent to and immediately below existing impoundments.
5. The likelihood of increased water temperatures and reduced dissolved oxygen levels in the impounded reach, although partially mitigated by the turbulent nature of the weir and hatch flumes downstream.

As well as the ecological impacts, the structures also pose a significant flood risk and with changes to rainfall patterns predicted as being highly likely, it is possible the weirs and hatches will need to convey more water in the future than they were ever designed for, with current flow capacity designed to a standard based on historical data.

Recommendations relating to river habitat management are set out in the two WTT reports attached in appendix 1 and 2.

A current dilemma regarding effective fish passage is making sure that fish on spawning migrations will make the right choice in which channel to choose to ascend.

Under high flow conditions, as those observed on the day of the site visit, it is highly likely that fish on an upstream migration would be attracted into the Garden Carrier, as opposed to the main Mill Channel due to attraction flow. This would result in at best a delay in migration but possibly also in fish being forced to use spawning habitat within the Garden Carrier. Although good quality spawning habitat is available in this stream, it is limited in extent and has poor connectivity to any nearby nursery habitat (shallow, well covered margins). It is highly likely that all available spawning sites within the Garden Carrier will be fully utilised and any delay or block for upstream migrants may well result in overcutting of favourable spawning sites and an overall loss of natural production within the system. Overcutting in fish species like salmon and trout happens when suitable areas for spawning are limited and females inadvertently disturb nests dug by other females, killing the first-laid, incubating eggs.

On the day of the site visit it was not possible to assess whether or not fish would be able to ascend via the under-shot hatches at the head of the reach but it is assumed that a combination of excessive flow velocities, the anti-erosion apron/hatch invert and lack of available water depth immediately below the hatch gates would make this route impassable under virtually all flow conditions. It is essential therefore that downstream, where the two channels meet, fish are encouraged to keep to the RB and make progress via the main Mill Channel.

Measures to manipulate the water velocities and hence provide an attractant flow into the Mill Channel are discussed in the recommendations section of this report.

Those fish that migrate into the Mill Channel should find navigating through the series of notched weirs and pools relatively straightforward although turbulence within the second chamber down was considered to be excessive. Flows at the time of the visit are likely to be considerably greater than those which might be expected to lift an autumn run of salmonids on spawning migration, so the turbulence may not be such an issue under lower flow conditions. At some stage, if and when future maintenance is required, it would help if size of the second chamber could be extended by moving the retaining impoundment downstream of its current location. This would reduce the amount of upwelling within the chamber and provide improved migration opportunities. An alternative and much more desirable outcome would be to reduce the overall head-loss at each structure by reducing the height of all the impoundments.

It was noted that the top impounding wall incorporated a cable-operated tilting gate adjacent to the LB. It might be possible to use the gate under high flow

conditions without compromising fish passage through the adjacent notch, increasing the amount of attractant flow down the main Mill Channel. Conveying a greater proportion of the available flow through the main Mill Channel would also take some pressure off the Garden Carrier, which was flowing near to full capacity, despite the side hatches not being fully drawn.

The initial report commissioned by the site developers suggested that even when all the side channel hatches are fully drawn, flooding into the downstream gardens would not occur due to backing up from elevated water levels at the confluence. This may well be the case but observations on the day of the site visit suggested there was very little capacity left in the Carrier to take any additional water via this route.

None of the structures currently look to be suitable for effective eel migration.

Photo 2: Impounded reach above the Mill with fantastic low cover on the RB, ideal habitat for both fish and invertebrates

Photo 2: The side hatches that feed the Garden Carrier. Upstream water levels are controlled using these hatches and under high flow conditions fish are likely to be attracted into the carrier where upstream progress is impossible

Photo 3: The Garden Carrier downstream of the hatches, fast flowing, very turbulent and with hostile, hard vertical revetment

Photo 4: The fish pass is a series of notched pools and weirs; note the pools are different lengths, with the first two pools being quite short and as a result, very turbulent, potentially impacting on pass efficiency

Photo 5: Close up of the first 3 weirs on the fish pass; note the steel gantry above the top weir supporting the tilting gate. The second pool down is extremely turbulent which may well reduce the efficiency of the notched pass and result in excessive scour to the adjacent wall haunch.

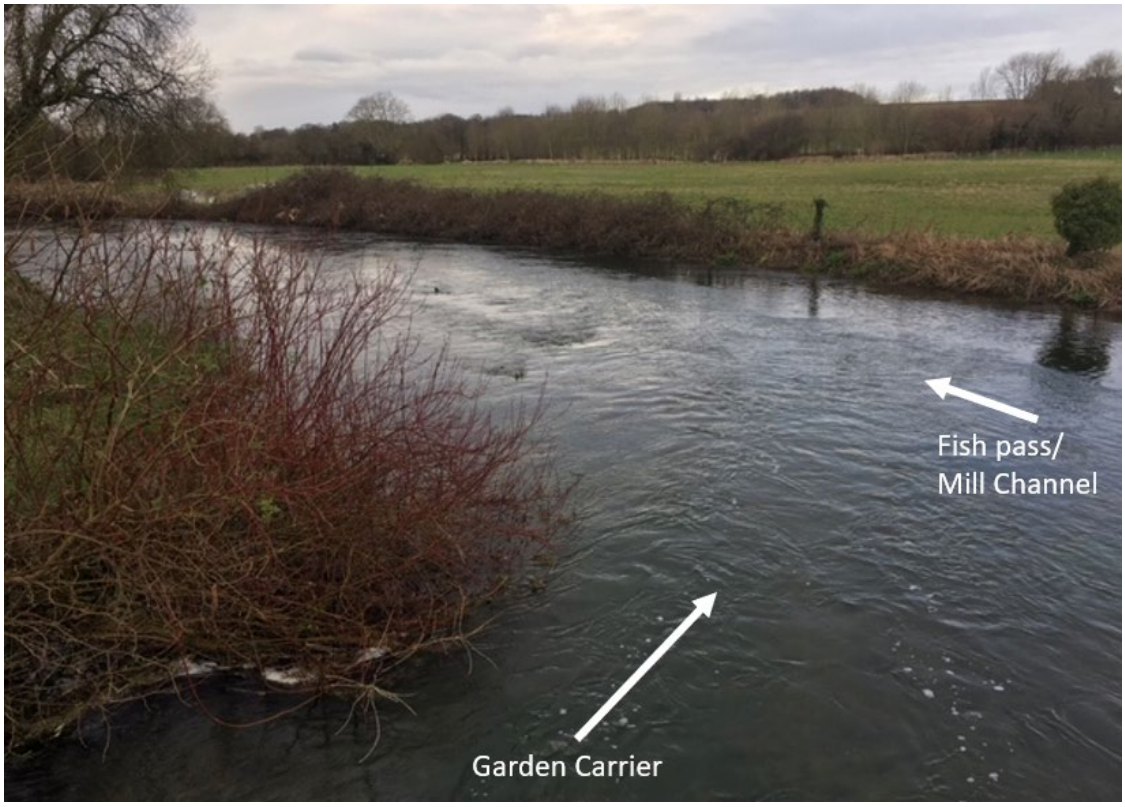

Photo 6: Confluence of both channels with the main attractant flow velocities appearing to be in favour of the Garden Carrier

Photo 7: Looking upstream on the Garden Carrier, fantastic gradient and gravels but hugely lacking in bankside diversity. The strimmed/ mown margin is a monoculture of grass and vulnerable to erosion

Photo 8: Looking downstream on the Garden Carrier: again, fantastic gradient and gravels but note vertical revetments on both banks, impeding the development of any marginal fringes

Photo 9: Looking upstream from bottom boundary on the Garden Carrier, another example of both banks being vertically revetted and lacking cover that would provide habitat for small fish

Recommendations

In order to investigate the possibilities of improved fish passage and enhanced riverine habitat, the following actions are recommended:

Review the whole flow dynamics of the site. Are the existing impoundments a critically important feature of the site? If not, a total removal of the impoundments would be the best option and a major environmental enhancement for the River Allen, locally enhancing upstream habitat quality as well as drastically reducing local flood risk. A total removal of the main channel impoundments would require re-engineering of the side sluices to maintain a low-level flow into the existing Garden Carrier. Maintaining the existing upstream levels may well be subject to legal covenants and it is recommended to include the Critchel Estate in any early discussions about possible alterations that potentially could benefit all parties.

If total removal of the Mill Channel impoundment is deemed to be a step too far then reducing the height of the impoundments, particularly of the top two weirs, is the next best option. A corresponding widening of the notches would also help with improving conveyance in the upstream reach but it will be important that the fish pass is still deemed operational during low-flow conditions. Removal or lowering of the impounding weirs would provide additional channel capacity. This could enable the creation of naturalistic margins in the toe of each retaining wall without increasing local flood risk. A fringe of vegetation could be planted to help absorb flow energy and prolong the life of the wall, as well as providing a soft, biologically valuable margin to support local river ecology.

If the height of the upstream water level is maintained, then consider the following as minimum actions:

- Inspect the flow split, especially in low flow conditions to give priority to the Mill Channel. This will ensure fish are directed towards the passable route during autumn migrations, when flows are just beginning to build.
- To encourage fish to find the main Mill Channel, it is possible to build a naturalistic woody flow deflector out from the LB of the Milling Channel to flume elevate flow velocities down the RB at the very confluence of the two streams. The deflector must be located either at right angles to the Mill Channel bank or laid in at a slight angle pointing upstream to avoid any elevated risk of bank erosion. The deflector should be keyed into the bank and firmly secured to the river bed and should be high enough to kiss the surface during high flow conditions and squeeze the existing channel width by at least a third of the existing channel width to be effective. An existing willow sits on the LB and this could be hinged into the channel for a similar effect.
- If the water levels are retained at their current height then consider extending the length of the chambers to reduce the amount of flow energy and upwelling, particularly in the second chamber.
- Experiment with the tilting gate on the main channel to see if it can be used to prioritise flow into the Main Channel without compromising fish pass efficiency. Lowering the gate will increase the attractant flow and could be used in conjunction with throttling the Garden Carrier.

- During low-flow conditions priority flow must always be given to the main Mill Channel.
- Invite the Environment Agency for a meeting to assess the options for modifying/ removing the existing fish pass; WTT are happy to act as a broker to make this meeting happen.
- In line with recommendations made in the previous WTT report, vertical revetments should be softened to improve the marginal interface between the river and the riverbank. These can be replaced with faggot bundles which will improve the connectivity between the bank, margin and river, and act as a medium for plants to colonise or be planted.
- In the previous WTT project proposal, many opportunities for woody berms were highlighted, some in places where the vertical revetments are. This would improve the marginal interface between the river and the bank, see example below (previous habitat works at Witchampton). An example of an unmanicured chalkstream margin can be seen in the appendix; the scope for improving the habitat within the gardens remains a good opportunity.

Photo 10: a woody berm, created during previous habitat works at Witchampton

- Installation of eel bristle-brush passes should be made adjacent to the margins of all structures.
- Due to traditional garden maintenance, the banks are not rich in plant growth which can be 'reservoirs' for biodiversity and can offer excellent complex habitat for many species of aquatic invertebrates and even fish. It is essential to recognise that however 'messy' unmanicured banks may appear at first glance, this 'messiness' provides many more habitat niches for different species, and is far more beneficial for birds, fish and insects, than hard banksides or tightly mown lawn turf extending right to the water's edge. Supplementary planting of attractive and iconic native plants such as marsh marigold, purple loosestrife, water forget-me-not, water mint, flowering rush, meadowsweet, hemp agrimony and gypsywort, if these are not already present, could also add extra visual appeal for the gardens at Witchampton.

- Explore opportunities with the RB owner downstream of the Mill to reconnect the floodplain to improve connectivity between the land and the river to reduce local and downstream flood risk via improved flood water storage. Simply lowering a section of the existing bank bund with a tracked excavator, ideally at both the upstream and downstream end of the meadow, would be a major enhancement and would be very easy to achieve.

Making It Happen

The creation of any structures within most rivers or within 8m either side normally requires a formal Environmental Permit from the Environment Agency.

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

www.wildtrout.org/content/wtt-publications

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 material, enhancing fish populations 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.

Acknowledgement

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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 & 2

Witchampton Mill
Project Proposal.pdf

Click here for previous project proposal (habitat structures on garden carrier remain good enhancement options)

Allen Crichel House
Advisory Visit 2016.pc

Click here for previous advisory visit to Crichel Estate