River Kennet – Marlborough College

An Advisory Visit by the Wild Trout Trust December 2015

1. Introduction

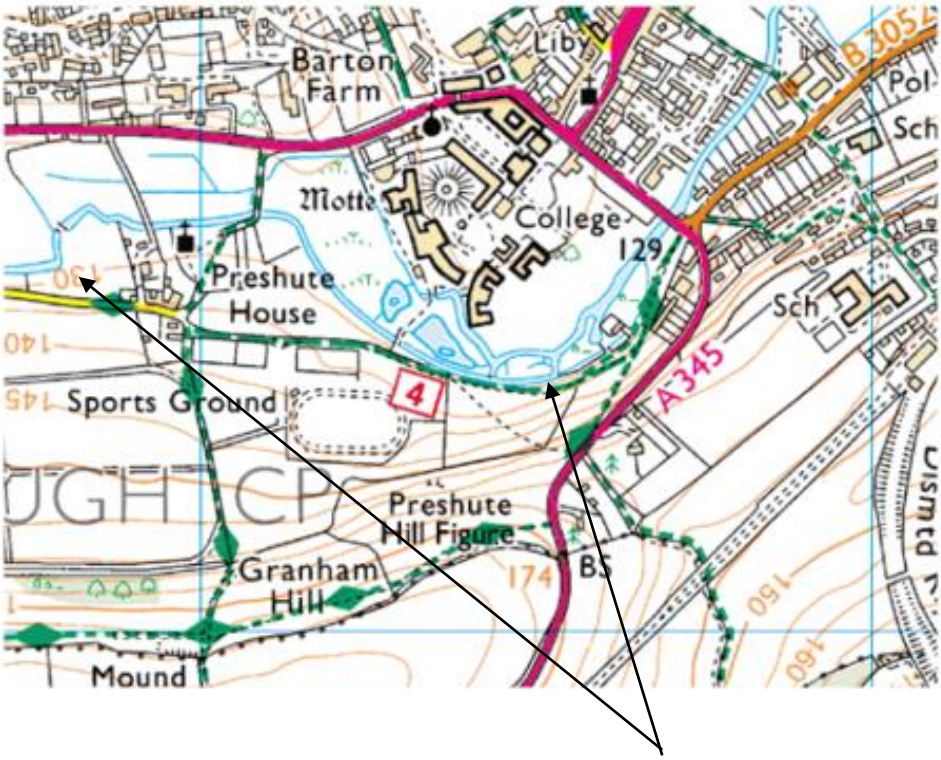
This report is the output of a site meeting and walk-over survey of a 1km stretch of the River Kennet at Marlborough College running from the upstream boundary at National Grid Ref SU 177685 downstream to SU 185683.

The request for the visit came Charlotte Hitchmough from the Action for the River Kennet group ARK.

ARK volunteers have been working alongside Marlborough College students undertaking basic riverbank maintenance as part of Wednesday afternoon school activities. The boys, led by ARK volunteers Don Harris and Rodney Owen Jones have made great progress but are seeking to undertake significant bank and river restoration works. The group's objective is to create a self-sustaining trout fishery, at a low cost, using techniques which require minimal imported materials or machinery. The college has a modest budget to maintain the fishery, plus free labour from the boys and our volunteers, as well as support from the grounds team.

Comments in this report are based on observations on the day of the site visit and discussions with Charlotte, Don and Rodney from the ARK group.

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.



Map 1 Kennet at Marlborough College – reach inspected

2. Catchment and fishery overview

The River Kennet is a lowland chalk stream which rises from the Berkshire Downs above Marlborough and flows east for approximately 70 km to join the Thames in Reading. The river drains a mainly rural catchment of approximately 1200km^2.

The Kennet is renowned for once supporting a high diversity of aquatic plants and invertebrates including nationally-scarce species. A number of internationally, nationally and locally-rare/protected invertebrates, mammals and birds are still present within the river corridor. This has resulted in the river between Marlborough and Woolhampton Bridge being designated a Site of Special Scientific Interest (SSSI).

The river is largely managed as a stocked 'put and take' trout fishery upstream of Newbury, with the lower reaches running down to Reading mainly used as a coarse fishery. Good numbers of wild trout are present where there is habitat to support them.

The reputation of the River Kennet as a top class fishery has been tarnished somewhat over the last few decades. Several factors have been identified as having a big impact on water quality and quantity. The restoration of the Kennet and Avon Canal, significant water abstraction pressures and the arrival of non-native signal crayfish *Pacifastacus leniusculus* have all put additional pressure on the river.

Recently Thames Water have announced a reduction in the amount of water to be abstracted from the Axford pumping station, where water was previously pumped out of the Kennet catchment to augment water supply for the Swindon area. This decision followed a long campaign of lobbying by local land owners and the ARK group.

Other problems include a very recent and extremely serious pesticide pollution entering the river via Marlborough WWTW and continued diffuse pollution issues emanating mainly from local arable farmland. The Water Framework Directive should, in theory, be the mechanism for seeking enhanced protection and improvement for this heavily pressured river system.

The Kennet above Marlborough is particularly vulnerable to the impacts of drought and low flows. Managing the shape of the river channel to provide some resilience against the impacts of low flow is a key objective for the Marlborough College reach.

The Water Framework Directive status for the upper Kennet (water body ID no 106039032171) suggests that the river is in good ecological status. This classification implies that the low flow issues on the river upstream of Marlborough are natural and not due to groundwater abstraction pressures.

Upper Kennet to Marlborough			
		View data	
Waterbody ID	GB106039023171		
Waterbody Name	Upper Kennet to Marlborough		
Management Catchment	Kennet and Pang		
River Basin District	Thames		
Typology Description	Low, Medium, Calcareous		
Hydromorphological Status	Not Designated A/HMWB		
Current Ecological Quality	Good Status		
Current Chemical Quality	Does Not Require Assessment		
2015 Predicted Ecological Quality	Good Status		
2015 Predicted Chemical Quality	Does Not Require Assessment		
Overall Risk	At Risk		
Protected Area	Yes		
Number of Measures Listed (waterbody level only)	-		

3. Habitat assessment

The walk over assessment took in a section of river owned by the upstream neighbours to the college owned waters. The college has access to this water and will be helping with future maintenance.

This top section of channel mainly consists of shallow glide habitat flowing through a comparatively shaded channel. The channel appears to be very wide for the likely average discharge and is slightly impounded by an old hatch structure (photo 4) which is located approximately 100m downstream of the top boundary. Although much of the bed above the structure has re-graded over the years, with the river bed having risen as a direct result of the downstream impoundment.

At some stage the outside of a sweeping left hand bend has been reveted with large imported stone (photo 1 & photo 2). This work was probably undertaken in response to some slight bank erosion following an exceptionally wet winter. This treatment, sometimes referred to as 'riprap' is not considered to be an appropriate bank protection measure for a low energy chalkstream and more importantly is often not as effective as a well planted 'soft' margin containing energy absorbing emergent plants. The impacts of the stone revetment could be softened by pushing in the high RB down to form a low, wetter margin which could then be planted with a mixture of native aquatic emergent plants (procured from other sections of kennet flood plain) such as sedge, iris, reed sweet grass, burr reed or reed canary grass. The outside of the bend did not appear to be heavily shaded so the development of a planted soft margin should be perfectly possible.

Ideally some of the stones could be redistributed and liberally scattered within the channel to create individual lies for adult trout in deeper runs and for parr on shallow riffles (photo 5). Again this will look slightly odd in a lowland chalkstream channel but large stones are effective for creating holding lies for trout by providing a refuge. The upwelling water promotes a safe refuge for any fish which will be reluctant to sit out in a smooth open glide where they will vulnerable to predation.

A short distance downstream there are some good examples of where stones have been used to create some short stub groynes (photo 3) to promote flow diversification and some bed scour. These have undoubtedly provided some improved habitat but groynes and flow deflectors constructed from large pieces of woody debris would be more appropriate in the chalkstream environment and has the added advantage of providing food and habitat for aquatic invertebrates.

The bankside maintenance regime appears to be very sympathetic with shallow, well covered margins, ideal for post hatching trout fry.

Photo 1. Imported stone used to revet the bank.

Photo 2. The same section of sweeping bend looking down stream

Photo 3. Stone stub groynes and clusters of individual stones provide some upwelling and local river bed scour.

Photo 4. Hatch pool

Photo 5. An individual stone providing good quality holding opportunities for a small trout.

Downstream of the bridge adjacent to Preshute House, the river channel is reveted on both banks with vertical stone walls (photo 6). A dense stand of yew trees on the RB casts significant shade over the channel and the lack of any significant in-channel cover makes this a comparatively hostile section for holding trout. These yew trees are very old and significant and the chances of introducing more light here to promote in-channel weed growth is remote. This might be a very good section to consider using some of the large stones found upstream to provide much needed cover and local river diversity.

Where shafts of light are able to hit the river margins then it is possible to locally install a new toe to the bank with either faggot bundles (as already very successfully tackled by the group) back filled with a brash/soil mixture and planted with appropriate emergent plants. Sedge species are particularly useful for planting into the toe of the bank, or if shallow enough, yellow flag iris as a plant that is particularly sturdy where there are large numbers of water fowl present.

In one or two locations the odd hazel faggot flow deflector has been installed (photo 7). For these to promote in-channel bed scour they really need to squeeze the channel width. Currently they are too short and too high. Flow deflectors can be constructed from faggot bundles but whole sections of tree trunk tend to be more robust and ultimately more effective. In such a low energy environment, it is recommended to install the deflector and then to loosen the bed substrate with a fencing spike or mattock, or even slightly dig out the area where the water eddies off the end of the structure. In low energy chalk streams the elevated flow velocity promoted by the deflector does not always have enough flow power to scour the bed, especially if the bed is concreted with

calcium carbonate deposit. Digging a little pot and using the flow deflector to keep it swept clean of fine bed deposit is very effective for creating trout lies.

Photo 6. This shaded reach could benefit from some of the large stones found in the reach above.

Photo 7. Flow deflectors need to pinch the channel to be effective and should be below the height of the bank

The section of channel running downstream from adjacent to the church is heavily impacted by the impounding weir installed to provide an inlet to the College lakes. With little gradient available, the river here is flat, uniform and a comparatively poor environment for trout (photo 8).

Some in-channel diversity could be promoted by hinging or laying in some of the bankside alder trees. This might not be an appropriate job for the volunteers and specialist help would be required but hinging and laying whole trees into the river margins is a very effective way of providing cover. An alternative for the group is to install brushwood parallel to the bank toe to provide complex and biologically valuable habitat.

Photo 8. Some of the alders adjacent to the LB lend themselves to dropping into the channel margins where they can either be hinged or tethered to their own trunks.

Further downstream the group have undertaken some excellent revetment work (photo 9) where the bank breached during the heavy winter floods in 2014. The LB is particularly vulnerable here due to the impoundment and perched nature of the channel. To ensure that the work is sustainable it will be important to undertake some planting this spring, ideally with plants such as sedge. The sedge *Carex pendulus* is usually associated with woodland environments but works well in comparatively dry areas for reveting banks that have to be set up well above the water levels. It is also shade tolerant to some extent but more light penetration to this margin is recommended. A section of revetment just upstream of the structure (photo 10) requires a dense brash matrix infill, planting and improved light penetration.

Photo 9. High quality bank revetment work will need to be planted up with resilient emergent plants this spring.

Photo 10. The sturdy revetment now requires packing with lots of brushwood and emergent plant plugs. It is also recommended to keep all trees coppiced to the ground that are currently growing on top of the side sluice wing walls.

Some in-channel upstream 'V' deflectors have been installed (photo 11). These were helping to sort river bed sediments. Lightly chiselling out the bed where the water eddies off the outside edges will make these structures to be even more effective.

Photo 11 Upstream V deflectors can be very effective at promoting an uneven and more diverse river bed topography.

At the bottom of this reach there is a weir (photo 12) which provides a head of water to feed into the college lakes. A notch has been cut into the centre of the structure which will undoubtedly help fish to be able to migrate up and over the structure. Unfortunately the structure is still impounding a substantial reach of river. The impoundment is not helping to provide any useful water depth upstream because over the years since the structure was installed, the river bed upstream has gradually risen. It is understood that this weir fulfils a requirement to push water through the lakes but it is very important to keep the weir as low as possible and try and create up-stream water depth by locally driving the river bed down and not through holding up the levels with additional boards.

Photo 12. Level control weir has been successfully modified by the group to facilitate improved fish passage. Additional boards should not be installed, even under low flow conditions.

Downstream of the weir the river enjoys a comparatively steep gradient and is dominated by long sections of shallow riffle habitat (photo 13). This is potentially a very good trout spawning and nursery area. Habitat could be improved through the provision of some modest sized holding pools for pre and post spawning adult trout.

This habitat can be promoted by pinning in some large woody debris flow deflectors to radically squeeze the channel width. Fluming the water through some narrow gaps and chiselling and loosening the bed material will help to sort river bed gravels into valuable 'up ramps' where the water flows through the gravel, rather than just skimming over the top. These classic tails to small pools will be the places that trout will seek out for productive spawning opportunities.

Currently this section of channel is quite heavily shaded. Regular coppicing of hazel and alder will help to promote improved in-channel weed growth and thus provide improved cover for both adult trout and parr. Maintaining low shade over the deeper pool habitats and opening up the canopy above the riffles is generally accepted as the best management regime to provide safe, cool lies for trout but to also promote primary production for plants and bugs.

Photo 13. Long shallow riffle would benefit from bed scour promoted by LWD flow deflectors.

Photo 14. Regular coppicing of hazel will provide excellent revetment material and ensure some summer weed growth on what should be very productive shallows.

4. Conclusions

The ARK volunteers and pupils have delivered some excellent work. The soft bank protection measures that have been installed are of a very high standard but ensuring there is dense backfill, lots of planting and access to plenty of light will ensure longevity.

The measures taken to reduce the height of the weir and provide improved access for fish migration are to be praised. Keeping the structure as low as possible will be important.

There are lots of opportunities to locally improve holding lies for trout. The installation of large woody debris flow deflectors should continue but with efforts made to loosen the bed material with hand tools so the bed is driven down and swept clean. Only a modest increase in depth is required and any micro pools need only be a metre or so long and half a metre wide to hold a good sized trout. The blown out bed material will naturally form into gravel ramps and should help to improve spawning opportunities.

Replacing inappropriate bank defence work with soft energy absorbing margins will enhance biodiversity and individual stones could be usefully deployed to create individual micro habitat in areas where weed cannot grow due to shading.

In seeking Flood Defence Consent from the EA, it is recommended to seek consent for a set number of LWD flow deflectors between designated grid reference points rather than try and gain consent for individual structures. The channel must not be littered with contrived structures and flow deflectors should not be recognised as 'built structures'. Bent and gnarly trees with branches attached make the very best deflectors. Scour can be achieved with water flowing both above and underneath the woody structures. Individual flow deflectors should seek to narrow the channel width by at least one third.

It is perfectly reasonable that a section of river should have a piece of large 'fallen woody material' roughly every 50m of channel length. Where the channel has gradient and therefore some flow power, the flow deflectors will be more effective. In impounded reaches concentrate on installing brashy cover via hinged trees or brushwood bundles pinned into the margins rather than flow deflectors which will be ineffective. Whole hawthorns are wonderful but not much fun to peg in place!

5. Recommendations

- **Set all of you project objectives in one single application for Flood Defence Consent.**
- **Consider removing the inappropriate stone revetment and replace with a low, soft planted margin.**
- **Use some of the stones to create some individual lies but do not littler the channel with too many.**

- **Backfill your revetments with brash and high bank soils and plant with locally procured emergent plants.**

- **Ensure there is plenty of direct sunlight on vulnerable banks.**

- **Peg in large chunks of woody debris on shallow gravel riffle sections to create bed pots and sort river bed gravels. Chisel the bed to loosen bed material to a depth of at least 300mm.**

- **Coppice and pollard to promote a 50:50 dappled light and shade regime.**

- **Keep any trees that are growing on top of structures or vertical revetment coppiced to the ground.**

Note: All work within 8m of the top of the bank will require a consultation with the EA and may require a formal written Flood Defence Consent prior to any work being carried out.

Acknowledgement

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Disclaimer