Advisory Visit

Settrington Beck

04/11/2015

1.0 Introduction

This report is the output of a site visit to Settrington Beck, at the request of East Yorkshire Rivers Trust. The purpose of the visit was to assess habitat and make recommendations for habitat improvements that could be undertaken on the beck.

Normal convention is applied throughout this report with respect to bank identification, i.e. the banks are designated 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 Ordnance Survey National Grid Reference system is used for identifying locations.

Table 1. Overview of the WFD waterbody details for the sections of river visited

	Waterbody details
River Basin District	Humber
Management Catchment	Derwent Humber
River	Derwent
Waterbody Name	Settrington Beck catchment (trib of Derwent)
Waterbody ID	GB104027067750
Heavily Modified Waterbody (Y/N)	Y
Current Ecological Quality	Moderate
U/S Grid Ref of reach inspected	SE 84365 67651
D/S Grid Ref of reach inspected	SE 81941 73654
Length of river inspected (km)	7.4

(http://environment.data.gov.uk/catchment-planning/WaterBody/GB104027067750)

Under the current Water Framework Directive (WFD) classification (2014), this waterbody achieves a 'moderate' potential. It is classed as 'Moderate' for 'Invertebrates', 'Macrophytes and Phytobenthos' and 'Supporting Elements (Surface Water)', and it is a Heavily Modified Waterbody (HMWB), meaning that it is assessed for its ecological 'potential' rather than 'status'. Historic issues with straightening, dredging and weirs/barriers are likely to contribute to the HMWB status, with a corresponding, major impact on habitat degradation and fragmentation driving the 'Moderate' invertebrate populations.

Table 2. WFD supporting elements

	2009 Cycle 1	2014 Cycle 2	Objectives
Overall Water Body	Moderate	Moderate	(Cycle 2) good
Ecological	Moderate	Moderate	(Cycle 2) good
Biological quality elements	-	Moderate	(Cycle 2) not assessed
Invertebrates	-	Moderate	-
Macrophytes and Phytobenthos Combined	-	Moderate	-
Hydromorphological Supporting Elements	Not-high	Not-high	(Cycle 2) not high
Physico-chemical quality elements	-	Good	(Cycle 2) not assessed
Specific pollutants	-	High	(Cycle 2) good
Supporting elements (Surface Water)	Moderate	-	(Cycle 2) not assessed
Chemical	Does-not-require-assessment	Good	(Cycle 2) good
Other Pollutants	Does-not-require-assessment	Does-not-require-assessment	-
Priority hazardous substances	Does-not-require-assessment	Good	(Cycle 2) good
Priority substances	Does-not-require-assessment	Good	(Cycle 2) not assessed

(http://environment.data.gov.uk/catchment-planning/WaterBody/GB104027067750)

2.0 Catchment Overview

Settrington Beck rises from a chalk aquifer on the northern edge of the Yorkshire Wolds, near Wharram le Street, generally flowing in a northerly direction across the Vale of Pickering to the River Derwent.

"The site of a post-glacial lake, the Vale has a predominantly level topography covered by drift deposits, with some rolling ground on boulder clay and moraines in the far east. The underlying Jurassic sandstones and mudstones have little direct influence upon the landscape. The bed of the Beck is dominated by chalk originating from the Wolds which creates a productive, alkaline water chemistry.

Whilst rivers have long been a dominant influence in the landscape of the Vale Natural Area, large scale drainage and river engineering has been undertaken since the 18th century. Most of the river habitats within the Vale have been modified to some degree, varying from canalisation to more piecemeal deepening, straightening and embankment. Extensive river engineering has resulted in the widespread loss of natural features such as bends, pools and variations in depth as well as reducing the diversity of riparian habitats.

Despite the legacy of river engineering and land drainage, the rivers of the Vale of Pickering remain one of the most important wildlife features of the Natural Area"
(www.naturalareas.naturalengland.org.uk).

3.0 Habitat Assessment

3.1 U/s of Settrington Village

The beck was inspected from an u/s limit at North Grimston, at which point fine sediment loading within the water column and on the bed indicated potential issues with diffuse pollution further u/s (Fig. 1). While the visit was following rain, a chalk aquifer system should not naturally experience such issues. Observations made for the area u/s (Google Maps) suggest that the beck is subject to significant habitat degradation from straightening (evident by the current course and adjacent paleo-channel), and erosion resulting from livestock grazing/access to the banks. D/s of the village, the beck is better protected by a wooded area but a tributary joining it there is still providing sediment input resulting from livestock poaching (Fig. 2).

Figure 1. Cloudy water and fine sediment deposition on the beck bed.

Figure 2. Livestock access to a tributary provides a good demonstration of the source of fine sediment inputs impacting upon the beck.

Within the wooded area, the channel is relatively natural and geomorphologically active with erosional and depositional features providing a range of habitats. Fine sediment deposition in slower flow areas again highlight issues u/s (Fig.3). Whitestone Beck enters Settrington Beck and provides another potential sediment source that is worth further investigation.

Figure 3. Areas of scour and deposition provide some important habitat features but excessive fine sediment deposition (red ovals) identifies issues u/s.

D/s of the wooded area, the beck meanders across grazing land and exhibits a natural planform, as it should be without the impact of straightening (Fig. 4). Natural erosion is a beneficial source of coarse sediment that provides important substrate for invertebrates and salmonid spawning (Fig. 5). However, grazing is accelerating the rate of bank erosion in many areas, beyond that which would naturally occur. This is resulting in further fine sediment input as evident by agitating the bed (Fig. 6), and deposits within and upon the marginal vegetation (Fig. 7).

Figure 4. A good example of the natural, meandering planform the beck should conform to.

Figure 5. Some beneficial coarse sediment input to the beck (red circle)

Figure 6. Agitating the bed liberates a volume of fine sediment.

Figure 7. Fine sediment trapped between and coating (deposited as flows subside) the marginal vegetation.

Around Bellmanear Farm, the exclusion of livestock has allowed a greater diversity of bankside vegetation to establish and, correspondingly, the banks are more stable. However, where the grass has been mowed, the reduction in vegetation diversity and root structure within the bank has resulted in increased erosion, replicating the conditions and issues commonly associated with grazing (Fig. 8).

Figure 8. Where diverse vegetation has established (protected from grazing pressure) the banks become much more stable; however, where mowing of the grass occurs, it replicates the conditions created by grazing and similar erosion occurs.

D/s of Bellmanear Farm (SE 84339 68447), two fording points create major sediment inputs to the beck and act as conduits for surface flows carrying polluting materials to the beck from further away (Figs. 9 & 10). Attempts have been made to create a harder base to the upper of the two fords but it is insufficient to counteract the poaching by cattle (Fig. 9), particularly on the banks at either side of the track. Fencing off of the beck and railings to guide livestock through the centre of the ford would help mitigate the problem.

Within the same field, the impact of dredging, creating an over-capacity (Fig. 11) and straightened (Fig. 12) channel, and erosion associated with grazing and cattle poaching severely impact upon the watercourse (Fig. 13). Obvious signs of the paleo-channel remain at either side of the current, straightened channel offering some potential for restoration of the beck's natural course (Fig. 14).

Figure 9. Attempts have been made to protect the bed and banks of the ford immediately adjacent to Bellmanear Farm but it remains a major source of fine sediment input and pollution to the watercourse. Restricting livestock to the hard-standing area of the crossing would be beneficial.

Figure 10. The second fording point d/s of Bellmanear Farm represents an even greater source of fine sediment input to the beck.

Figure 11. Straightened, over-capacity section between the two fords. Note the fine sediment composition of the substrate.

Figure 12. Straightened and over-capacity channel that has begun to narrow through encroachment of emergent vegetation.

Figure 13. Where the more sinuous channel remains, the impact of grazing and associated erosion is evident (red ovals).

Figure 14. One of the many paleo-channels which lies alongside the beck's current straightened course.

Where the channel has a more natural morphology and vegetation has narrowed the channel to a more natural width, areas of sorted (relatively silt-free) gravels suitable for salmonid spawning are present. These areas, combined with the water crowfoot (*Ranunculus* spp.) and other aquatic and marginal vegetation, also represent greatly improved habitat for invertebrates. However, where the channel is of greater capacity and flows are correspondingly slower, fine sediment deposition threatens the health of the aquatic vegetation and habitat quality.

Figure 15. Where the channel has a more natural morphology and aquatic vegetation has established, some higher quality substrate habitat is present.

Where the beck enters a small woodland at the d/s end of the field, flood debris on the field boundary fence offers an indication of the high-water mark (Fig. 16). While some floods will inevitably reach higher than this, it offers an indication that most high flow events would be unlikely to jeopardise a buffer fence if it were set back from the bank top.

Within the wood, shading prevents vegetation growth and the channel, being subject to historic maintenance and over-capacity, has become smothered by fine sediment, thereby degrading habitat quality (Fig. 17). This serves to highlight the considerable volume of fine sediment entering the beck u/s.

Figure 16. Flood debris on the field boundary fence provides an indication of the high-water level (red).

Figure 17. Excessive fine sediment on the bed.

The field d/s of the wood appears to be used primarily for sheep grazing which, although resulting in less physical poaching damage than cattle grazing, can lead to equal habitat degradation through the close cropping of bankside vegetation and the associated impact upon root structures within the bank (Fig. 18). Consequently, bank erosion remains a major issue.

Figure 18. Sheep grazed field d/s of the wood - less poaching issues than cattle grazing but similar impact upon bank stability and erosion rates.

The cumulative effect of fine sediment input to the beck is evident within deeper pool areas where the poor water clarity is more apparent and the slower flows allow deposition upon the aquatic vegetation (Fig. 19). Where in-channel features pinch the channel width, the accelerated flows achieve some substrate sorting; however, the channel has to be pinched to an unnaturally narrow width for the size of the beck to mitigate against the impact (Fig. 20).

Small bridges already present within the field offer the potential for installing buffer fencing along the beck without restricting grazing access to the fields (Fig. 21). Excluding sheep from the undercut, unstable banks would reduce the risk of sheep being injured or lost into the beck, as well as reducing the rate of future erosion. The addition of hard-standing to protect the ground in the area of access to the bridge would be beneficial.

Figure 19. Poor water clarity within deeper pools and fine sediment deposition amongst the aquatic vegetation highlight the cumulative impact of high sediment input.

Figure 20. It is not until the channel is significantly narrowed that flows reach a velocity capable of beginning to clean and sort the gravel. Even then, the fine sediment impact is notable.

Figure 21. Small bridges already present would allow access even if both banks of the beck were buffer fenced.

Moving d/s, habitats with potential for salmonid spawning, as well as for invertebrates and smaller fish species, become increasingly impacted by the fine sediment and are severely degraded. In many cases these habitats are unlikely to support those natural functions (Fig. 22).

Figure 22. Heavily silted gravels that would otherwise provide high quality spawning and invertebrate habitat.

Stone turning revealed some of the expected invertebrate assemblages, but at severely impoverished densities. (Fig. 23a & b). Tufa (calcium carbonate precipitate) was also noted on some of the substrate in this area, indicating high calcium carbonate within the water; however, the tufa appeared to be inactive. This is another symptom of the sedimentation and eutrophication of the beck as they can both inhibit growth of the biofilms which produce tufa.

Figure 23a. Only one ephemerid was found through turning of numerous stones.

Figure 23b. A few cased caddis were observed.

Where a fallen hawthorn (*Crataegus monogyna*) shrub impounds the flow, foam has collected on the water surface (Fig. 24). While some foam can occur on watercourses naturally as a result of decaying matter, in this instance it is likely another sign of enrichment.

Figure 24. Foam on the water surface is another potential sign of nutrient enrichment.

At the inlet to Settrington mill pond, a board weir poses a major obstruction to fish passage and impounds the channel u/s (Fig. 25). It is suspected that the weir is used to counteract the partial blocking of the pond inlet screen, as the beds of each appear to be the same height. It may now be possible to remove the screen and the weir, allowing a simple overspill that favours flow to the beck.

Looking at the surrounding land and the straightened, steep gradient channel d/s on the beck, it is suspected that the original channel course lies somewhere beneath the pond, with the current channel being a bypass cut through the base of the valley side on the LB (Fig. 26). Although the channel is eroding and slumping quite significantly here, it is recommended that these processes are allowed to progress and develop as they will ultimately lead to improved in-channel habitat. At some point in the future, it would then be beneficial to install fencing to allow the bank to stabilise and slow the currently accelerated sediment input to the channel.

As well as degrading the channel quality, this also maintains the beck elevation above the valley bottom. D/s of the pond, the beck returns to the natural valley bottom via a steep, artificial channel section that includes a weir (Fig. 27) and road culvert (Fig. 28), both which provide poor passability for fish, and armouring d/s of the culvert (Fig. 29) which assists fish passage somewhat.

Figure 25. Weir/water feed to Settrington mill pond – a major barrier to fish passage and impoundment to beck flows.

Figure 26. The straightened and, correspondingly, steeper low habitat quality bypass channel alongside the mill pond.

Figure 27. An ornamental weir located near the d/s end of the mill pond; an obstacle to fish passage.

Figure 28. Poor passage for fish created by the straight, steep channel flowing down into the concrete-lined road culvert.

Figure 29. Rock armouring on the d/s side of the road culvert. This was likely installed as scour protection for the bed but does provide some improvement to fish passage, rather than a sheer drop or concrete lined channel.

3.2 Settrington Village

Through the centre of the village, the channel appears to have been straightened and lacks deeper pool areas but, in the absence of grazing, has naturalised and supports some beneficial features. Although the land adjacent is mowed, a reasonable buffer strip of unmown land is provided along the beck which has allowed some herbaceous vegetation to establish (Fig. 30). It is suspected, however, that mowing/cutting closer to the beck has been undertaken relatively recently as a greater diversity of herbaceous vegetation and shrubs would be expected. The bed of the beck remains heavily impacted by sediment (Fig. 31).

Several fords cross the beck within the village; these areas are over-wide and likely to accumulate substrate supplied from u/s (Fig. 32). It is suspected these are dredged and the material removed. While this might maintain access, it denudes the channel of important gravel substrate and may explain the coarse, armoured nature of the bed d/s that lacks gravel (Fig. 31). At one of the fords, a water vole may have been spotted, supported by the presence of numerous suspected burrows (Fig. 34); however, no latrines were observed.

Figure 30. Straightened channel though Settrington Village.

Figure 31. Poor habitat quality - armoured substrate resulting from excess sediment input u/s and potentially impacted by and interruption of gravel supply.

Figure 33. Massively over-capacity ford area where it is suspected that dredging/gravel removal is undertaken, as evident by the trail of gravel leading out of the ford at either side (likely to be washout from the removal vessel as it ascends the slope).

Figure 34. Suspected water vole burrows within the bank around the ford.

Several outfalls were observed to be discharging into the beck around the village (Figs. 35a, b & c). Inspection of these revealed no signs of any malodorous or obviously polluting substances and it is therefore assumed that these are surface water outfalls.

Figures 35a, b & c. Suspected surface water outfalls

3.3 D/s of Settrington Village

Owing to time restrictions (restricted daylight hours) and the adjacent land use and general nature of the beck d/s of Settrington village, the section of beck was assessed in two areas. A spot-check was undertaken in the area around the sewage works where access could be easily attained and there was an obvious point of interest to the report. The other area assessed was from the A64 d/s to the River Derwent as this section is known to contain weirs and significant channel alteration.

A brief inspection of Google and Bing Maps undertaken in researching this report revealed that, as expected, a reasonably sized buffer strip of trees appears to be present along most of the beck between Settrington and the A64, excluding possibly a few fields (SE 83373 70988 - SE 82932 71211), where the adjacent land use appears to be livestock grazing. A possible weir was also identified at SE 82928 71243, along with a significant widening of the channel at SE 82764 72089, which may be associated with a weir.

3.3.1 Sewage Works area

As described, the land use adjacent to the beck is arable farming with a reasonable buffer in most areas. This has allowed the proliferation of trees/shrubs and herbaceous vegetation. For much of this length u/s and d/s of the sewage works, the signs of historic maintenance are slight as the beck has more recently been allowed to meander within its wooded buffer strip. This has created some higher quality, naturalised habitat with ample features for a healthy aquatic ecosystem (Fig. 36), aside from the fine sediment issues which remain a major impact upon the quality of substrate habitats (Figs. 37 & 38). Natural woody material and trailing branches provide some sorting of the substrate (Fig. 39).

However, the channel immediately adjacent to the sewage works has been more recently straightened, presumably in response to the erosion of the RB (alongside the works) which was threatening to undermine the boundary fence. As in other areas, the straightening and re-sectioning has left the channel over-capacity and with poor quality habitat (Fig. 40). The only outlet observed for the sewage works appeared to be discharging relatively clean water, with no significant odour or signs of sewage fungus (Fig. 41).

Figure 36. Good quality, naturalised habitat within the wooded buffer.

Figure 37. The substrate habitat quality remains severely compromised by fine sediment.

Figure 38. Agitation of the bed displaces large plumes of fine sediment.

Figure 39. Where woody material constricts the flow and scours the bed, some higher quality gravels are present.

Figure 40. The straightened channel alongside the sewage works.

Figure 41. The only outfall observed for the sewage works.

3.3.2 A64 to the River Derwent

A brief look u/s of the A64 road bridge revealed that the flow was greatly impounded and the habitat resembled that of a stillwater (Fig. 42). These conditions continue for >200m d/s, to a 3-m weir at SE 82640 72742 that impounds water as a feed for the disused fish farm and adjacent carp lakes (Carpvale).

The weir poses a complete barrier to u/s fish migration (Fig. 43). Paleo-channels within the wood provide an indication of the natural, more sinuous course (Fig. 44) and may provide some potential for a river restoration project or, at least, creating a bypass channel around the weir if it cannot be removed; this could be the case if it is still required to maintain water levels within the carp fishery. Habitat within the straightened sections is of very low quality (Fig. 45).

Figure 42. The beck is impounded for several hundred metres, with the influence of the d/s weir extending well upstream of the A64.

Figure 43. >3m high weir that impounds several hundred metres of the beck and poses a completely impassable barrier to the u/s migration of fish.

Figure 44. One of the redundant paleo-channels alongside the carp fishery.

Figure 45. Very low habitat quality within the straightened channel.

The past dredging and realignment remains a significant impact for the remainder of the watercourse d/s to the Derwent, with further sections of paleo-channel evident. Around Marr House (SE 82406 73448) maintenance of bankside vegetation has been undertaken. It is not clear as to the purpose but it may be an attempt to adopt it as garden or simply to reduce perceived flood risk (Fig. 46). The result is a further negative impact upon the already poor quality habitat.

D/s of the house, the beck flows through a perched, cobble-lined railway culvert that poses another obstacle for fish (Figs. 47 & 48). Stone rip rap employed to reduce the impact of scour on the d/s side of the structure aids fish passage somewhat but it remains a major barrier, exacerbated by the fluming effect of the culvert. Fish passage between the culvert and the Derwent is inhibited.

Signal crayfish (*Pacifastacus leniusculus*) remains were also found at the culvert (Fig. 49). These invasive crayfish are the legacy of an historic grant programme for their cultivation available from the then Ministry of Agriculture Fisheries and Farming (MAFF) in the 1980s.

The buffer strip in the field where the beck meets the Derwent is much smaller than in other sections. This creates an issue where the bank is eroding towards the field and could lead to more serious erosion if it reaches the unconsolidated ground (Fig. 50).

Figure 46. Maintenance of bankside vegetation around Marr House.

Figure 47. Railway culvert – rip rap at the d/s entrance improves fish passage somewhat, but it remains a major obstacle.

Figure 48. The swift flow over the relatively smooth and flat bed further impedes the passage of any fish making it into the culvert.

Figure 49. Remains of a signal crayfish.

Figure 50. One of the few areas of the arable land use adjacent to the beck where the buffer strip is not large enough.

4.0 Recommendations

4.1 Bank erosion

As one of the major impacts upon Settrington Beck is fine sediments, it is recommended that wherever livestock have access to the watercourse, buffer fencing is installed to exclude them. Negotiations regarding the fencing will have to be undertaken with the tenant farmers, but if the benefits to their land livestock management are promoted, and they are helped to understand the major impact that grazing is having upon the watercourse, they should be supportive. Incentives may also be required through Countryside Stewardship to mitigate the loss of grazing land.

Table 3. Bank erosion

Description	Fig. #	Solution	Location
Any grazed bank sections without buffer fencing. Particularly prevalent on Bellmanear Farm and the fields d/s		Install buffer fencing as far back from the watercourse as can be agreed with the landowner/tenant.	Particularly (SE 84292 68088 - SE 84067 69629)
Eroding garden at Bellmanear Farm.	8	Leave a larger buffer of unmown grass and allow the bank to regrade naturally.	SE 84317 68314
Erosion and cattle poaching at Bellmanear Farm Fords.	9 & 10	1. Ideally the ford should be replaced with a clear-span bridge or oversized, sunken culvert (possibly in a slightly different location). It should also be ensured that the farm tracks have drainage points that discharge to soak-away areas in rough vegetation, rather than directly down the track to the watercourse.	SE 84339 68447
Cultivation too close to the beck	50	Increase size of the buffer strip	SE 82160 73738

4.2 River restoration

Settrington Beck is subject to channel straightening and realignment in many areas. This is severely impacting upon habitat quality within those sections. If funding were available, it would be greatly beneficial to look at re-meandering the channel. Tree planting and buffer fencing to protect the banks of any restored channel is likely to be required.

Table 4. Re-meandering			
Straightened beck channel d/s Bellmanear Farm	Fig. 14	With sufficient funding it may be possible to undertake a river restoration project to reinstate the beck's paleo-channel.	SE 84403 68658
Straightened sections d/s of A64 d/s (Nr. Carpvale)	Figs. 42 & 44	With sufficient funding it may be possible to undertake a river restoration projects to reinstate the beck's paleo-channel.	Around SE 82640 72742

4.3 Barriers to fish movement

Several significant barriers to fish movement are present on the beck. These severely fragment fish populations along the watercourse and pose a threat to sustainable wild fish stocks. Without the ability to move freely u/s and d/s in a watercourse fish are deprived of the ability to move between the various habitat types required to fulfil their lifecycle and to achieve optimal utilisation of habitats through natural dispersal. This section will demonstrate some examples techniques that could be employed to address them.

4.3.1 Settrington mill pond sluice

Investigate ways to maintain a sufficient feed of water to the pond, without the use of weir boards, to maintain free fish passage in that area. It may be possible to remove the weir and operate a simple screened overspill to feed the pond when the beck has sufficient flow. This would completely remove the weir board barrier leaving only the raised rock armoured bed that protects the weir base for fish to ascend. Removal of the boards would also greatly reduce the length of beck that is impounded u/s.

4.3.2 Artificial channel section

The issue of fluming flows through the uniform, artificial channel section could be reduced through the installation of flow baffles. This technique is often undertaken within culverts using concrete baffles (often kerb stones). However, in this case it may be more in-keeping with the garden and more acceptable to the owner to use rock/boulder clusters within the channel to create resting areas for fish in a more aesthetically pleasing manner (see Fig. 51 below). The rock clusters could be employed to meander the flows within the channel and create areas of slower water where fish can rest as they attempt to ascend the channel.

Figure 51. Boulders placed in channel to assist fish passage. The blue arrows indicate the direction of flow.

4.3.3 Road culvert and railway culvert

Within the actual road and railway culverts, a simple concrete baffle array could be employed using kerb stones or similar, as shown in Fig. 52a & b. This would create increased deposition within the channel, slow the flow making it easier to ascend, and create slack water where fish can rest as they pass through.

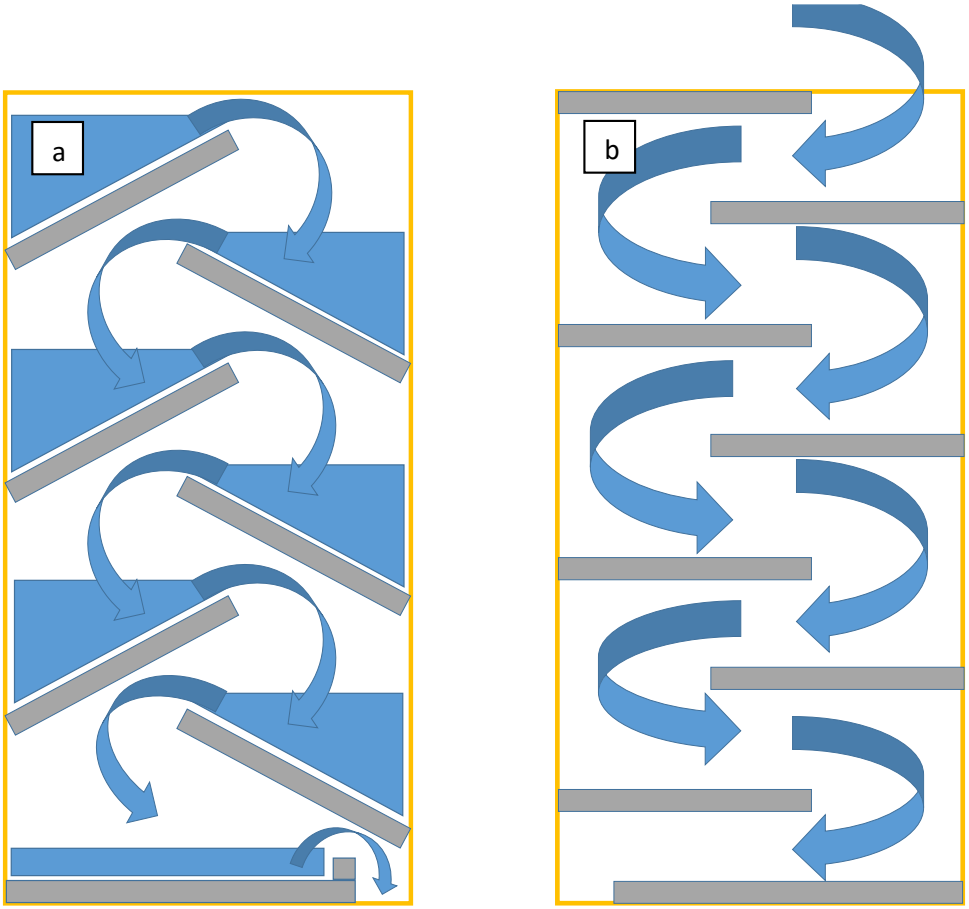

Figure 52a & b. Possible designs for the concrete baffles within the culvert.

Table 5. Barriers to fish movement			
Water feed to Settrington mill pond	Fig. 25	Investigate whether the weir can be removed and flow allowed to simply overspill into the pond.	SE 84051 69825
Ornamental weir at the d/s end of Settrington mill pond	Fig. 27	Remove if possible – if not, a poor second best would be to install rock ramp type fish passage easement.	SE 83836 69990
Artificial channel section d/s of ornamental bridge through road culvert.	Figs. 28 & 51	Install 'ornamental' rock baffles to create resting areas for fish migrating through the section. Possibly concrete baffles in culvert.	SE 83836 69990 - SE 83818 70046

Access to road culvert access at d/s end of Settrington mill pond	Fig. 29	Additional rip rap to create an enhanced rock ramp.	SE 83818 70046
>3m high weir that impounds water to feed the now disused fish farm and carp lakes	Fig. 43	Identify whether the feed to the lakes is still required. 1. If not - **Remove weir** 2. If so – Investigate options for a bypass channel, possibly using a paleo-channel	SE 82640 72742
Railway culvert that impedes fish passage	Figs. 47 & 48	1. Install baffles on culvert base to slow flows and increase water depth. 2. Improve rock ramp access to culvert	

4.4 Tree planting

Planting of native, deciduous tree species would be beneficial in any areas where increased bank stability is required or there is a lack of cover. Planting within any existing or newly installed buffer strips would also help to kick-start the regeneration of a healthy riparian zone.

Table 6. Tree planting			
Lack of riparian trees		Planting deciduous species within any buffer trips created would provide greatly enhanced riparian habitat	
Lack of trees/shrubs in Settrington Village	Fig. 30	Planting a few small bankside shrubs would provide habitat and enhance the aesthetics of the village	

4.5 Further investigation

The walkover of Settrington Beck was limited by the extent of daylight hours on the day of the visit, limiting the areas that could be covered. In addition, the walkover itself and further investigation during the write-up process has identified additional aspects that are worthy of further investigation, as described in table 7.

Table 7. Further investigation			
Assess the impact of land use u/s of North Grimston.		Walkover of the area	
Assess the potential for re-meandering the beck u/s of North Grimston.		Walkover of the area	
Whitestone Beck – potential fine sediment source		Further walkover investigation.	Tributary u/s of SE 84342 68013
Gravel removal at Settrington Village ford(s)	Fig. 33	Find out who is undertaking the removal and ascertain whether at least some of the material can be left within/returned to the channel d/s	
Possible weirs		Undertake site inspection to assess whether there is an impediment to fish passage	SE 82928 71243 and SE 82764 72089
Bankside mowing around Marr House	Fig. 46	Liaise with landowner/tenant to leave a buffer strip along the beck.	SE 82406 73448

5.0 Making it Happen

WTT may be able to offer further assistance such as:

- WTT Project Proposal
  - Further to this report, the WTT can devise a more detailed project proposal report. This would usually detail the next steps to take and highlighting specific areas for work, and more detailed explanation of the how it can be done, with the report forming part of a land drainage consent application.
- WTT Practical Visit
  - Where clubs are in need of assistance to carry out the kind of improvements highlighted in an advisory visit report, there is the possibility of WTT staff conducting a practical visit. This would consist of 1-3 days work, with a WTT Conservation Officer teaming up with interested parties to demonstrate the habitat enhancement methods described above. The recipient would be asked to contribute only to reasonable travel and subsistence costs of the WTT Officer. This service is in high demand and so may not always be possible.
- 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

The WTT officer responsible for fundraising advice is Denise Ashton: dashton@wildtrout.org

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.

6.0 Disclaimer

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