WILD TROUT TRUST

Advisory Visit to River Beane at Frogmore Hall Park, Herts.

June 2026

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1.0 Introduction

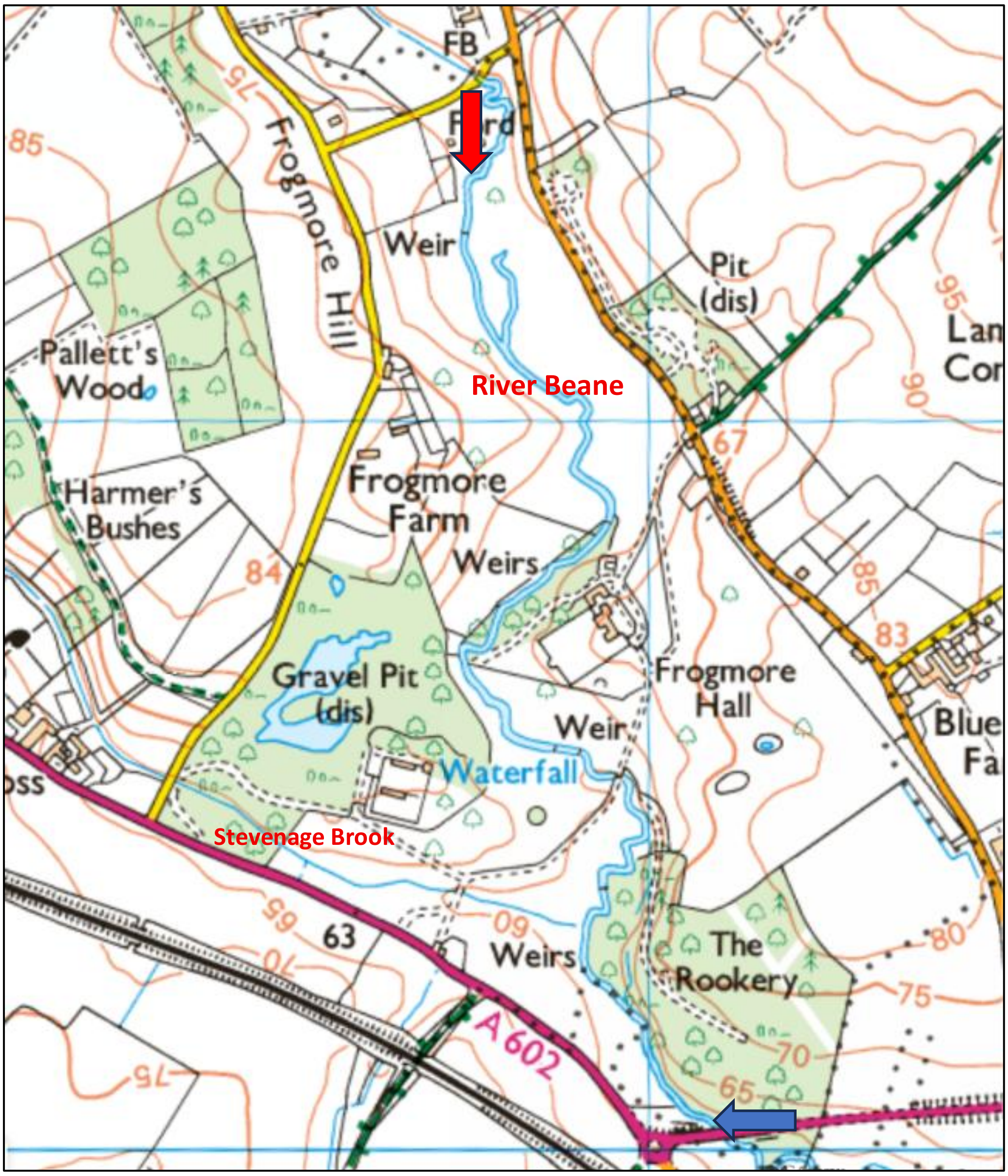
This report is the output of a site visit to the River Beane at Frogmore Hall Park, Hertfordshire. The visit was undertaken on the 11th June 2026 with a representative of Tarmac (site owners) present.

The report considers a reach of river that has been subject to habitat restoration at its downstream end in 2021. Additionally, there has been some very minor interventions (flow deflectors) in the upper part of the reach. The focus of the visit was primarily to highlight opportunities to further habitat enhancement and restoration. The report outlines some of the pressures upon the river and presents examples of habitat improvement measures that may be applicable to the site. No guide costings are provided as this will be affected by the scale of what is taken forward.

The River Beane has been the subject of habitat improvement work since Affinity Water reduced ground water abstractions. The focus of that work was barrier removal and improvement of habitat connectivity. Areas of gravel placement, hazel faggot bank support and a rock ramp were observed.

This report also considers parts of the Stevenage Brook in the order seen during the visit.

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



Map 1 – The River Beane (and Stevenage Brook) at Frogmore Hall Park. Red arrow defines the upstream limit of visit, blue the downstream limit.

The River Beane and Stevenage Brook are both assessed under the Water Framework Directive (WFD) as a “fail”, having Poor Ecological Status. Therefore, work to improve the ecological potential of the rivers should contribute to their improvement under WFD.

Classification Item	2019	2022
Ecological	Poor	Poor
Biological quality elements	Poor	Poor
Invertebrates	Moderate	Moderate
Macrophytes and Phytobenthos Combined	Poor	Poor
Macrophytes Sub Element	Poor	Poor
Physico-chemical quality elements	Moderate	Moderate
Ammonia (Phys-Chem)	High	High
Dissolved oxygen	Good	Moderate
Phosphate	Moderate	Moderate
Temperature	High	High
pH	High	High
Hydromorphological Supporting Elements	Not high	Not high
Hydrological Regime	Supports good	Supports good
Morphology	Not high	Not high
Chemical	Fail	Does not require assessment
Priority hazardous substances	Fail	Does not require assessment

Table 1 Beane (Source to Stevenage Brook) | Catchment Data Explorer | Catchment Data Explorer

Classification Item	2019	2022
Ecological	Poor	Poor
Biological quality elements	Poor	Poor
Fish	Poor	Poor
Invertebrates	Good	Good
Macrophytes and Phytobenthos Combined	Poor	Poor
Macrophytes Sub Element	Poor	Poor
Physico-chemical quality elements	Moderate	Moderate
Ammonia (Phys-Chem)	Good	High
Dissolved oxygen	High	High
Phosphate	Moderate	Moderate
Temperature	High	High
pH	High	High
Hydromorphological Supporting Elements	Not high	Not high
Hydrological Regime	Does not support good	Does not support good
Morphology	Not high	Not high
Specific pollutants	High	High
Copper	High	High
Iron	High	High
Manganese	High	High
Triclosan	High	High
Zinc	High	High
Chemical	Fail	Does not require assessment
Priority hazardous substances	Fail	Does not require assessment

Table 2 Stevenage Brook | Catchment Data Explorer | Catchment Data Explorer

2.0 Habitat enhancement and restoration proposals for review by Tarmac

Pic 1 – The small multi-stemmed willow could have limbs hinge-cut to trail downstream to aid retention of woody material in the margins of the River Beane. It would also allow light to the margins to encourage vegetation growth. See example of tree-hinging and felling in Recommendations.

Pic 2 – Willow trees are growing from the river channel, that should not be seen as a problem. The main flow pathway is open (blue arrow), and when the river rises it takes additional flow pathways around some of the low growing trees resulting in water attenuation within the site and slowing of the flow.

Pic 3 – A previously placed gravel riffle is still functioning and requires no intervention. The stones had collected some fine sediment amongst them, but most flushed out as stones were dislodged. The gravel should support brown trout spawning.

Pic 4 – The gravel bed of the Stevenage Brook is considered natural. It has a greater diversity of particle sizes and had eroded to its clay base. Although the gravel may not be deep enough for trout to cut redds into, the gravel may support spawning by dace, minnow and other lithophilic fish species. Local scour of gravel exposing the clay bed is not a problem, it is the start of pool excavation and bedform variation. However, if the gravel appears too mobile then matters to address it (such a fixed wood) may be appropriate. The trailing vegetation is good for fish and could be enhanced further with pinned wood in the margins. See examples of brash and timber fixing in Recommendations

Pic 5 – Some installed faggot bundles in the brook have not entrained fine sediment, and now the wood has degraded a void is left. Where posts can be found, they could be used to hold more wood gathered from nearby shrubs. The silt was probably flushed out due to shading from tall vegetation above, with shade the root structure is weakened. See example of brash and timber fixing in Recommendations.

Pic 6 – Some faggot edging has retained fine sediment and provides a rooting substrate for marginal vegetation along the brook. Control of the invasive non-native species, Himalayan balsam, would aid the growth of native plants beneficial to marginal vegetation development. See example of invasive plant species control in Recommendations.

Pic 7 – The Stevenage Brook has good marginal cover where light reaches the channel. The desirable species of yellow flag iris, great willow herb, water mint and lesser pond sedge are present. Less desirable species included Himalayan balsam (should be pulled up to remove it), hemlock (grows tall and dominates) and nettle (can dominate margins but is hard to control when soil enrichment is present).

Pic 8 – The Stevenage Brook is too straight as it shown by its course on Map 1. To get the brook functioning better it should be re-meandered across the grassland. Introducing meanders would enable better sediment transport and deposition, facilitating greater depth variation and an increase in biodiversity. Although tree planting has taken place in the grassland, they are of a size that could be dug up and replanted, and should not be viewed as reason to hold back significant habitat restoration. See example of channel realignment in Recommendations.

Pic 9 – A rock ramp has been installed to raise the bed level of the Stevenage Brook, allowing fish to swim up and through the bridge. The rock ramp was constructed with stone held by wire mesh, which is now exposed making it vulnerable to damage and possibly hazardous to animals. The original design for the rock ramp should be revisited, if it was meant to be capped with gravel then it should be topped up. If not, then presently there is little cover for fish moving through this reach and the original designer should be asked about measures to improve the approach. Caution should be had at any measure that could potentially damage the mesh holding the stone.

Pic 10 – If fish reach the bridge in low flow, they have very shallow water to swim through because the easement was not finished to the crest height of the obstruction. In high flows the water velocity and smooth bed will make it challenging for most species to traverse. Passage through the bridge could be enhanced by the installation of stones fixed to the base of the bridge to increase its roughness whilst creating small pockets of calmer water to aid resting. Similarly, flow baffles could be attached. See example of fish passage easements in Recommendations.

Pic 11 – The invasive non-native species giant hogweed is present on the brook. Friends of the River Beane have been undertaking control using herbicide. That work should continue with full support by Tarmac. If the plant is allowed to dominate it presents a serious threat to health due to its phototoxic sap, in addition to degrading riparian habitat/species diversity. See example of invasive plant species control in Recommendations.

Pic 12 – Approximately 80m upstream from the rock ramp easement another bridge was encountered. The drop from bridge base to water was ~0.15m. It may have been may have been accentuated by the low flow conditions, but it still presents an obstruction to the movement of fish and river substrates. Access through the bridge should be enhanced by the addition of stones set into the base of the bridge, but that does not address the problem that the bridge poses to the river corridor.

Pic 13 – The same bridge as Pic 12. Given that this bridge is a short distance from the last, and that it had not been accessed for recent meadow management (suggesting concern for its strength), the best option in terms of river restoration would be to remove the bridge. The bridge is causing an impoundment, and with its removal, flow diversity would be restored to the upstream channel, with the potential to mobilise important bed substrates that will aid natural channel processes downstream (such as riffle formation). The upstream channel may even start to naturally meander. The best outcome would be to package the bridge's removal with channel realignment. The bridge impoundment presents similar problems that weirs cause to rivers, see bridge removal in Recommendations.

Pic 14 – Recent rainfall led to rising water levels in the brook. This log jam has been partially removed to allow water to move through. Whilst local site conditions are not fully known, it would be better to retain the accumulated material as it focusses the force of water to create scour either upon the bank or bed, resulting in either meandering or pool development. See creating undershot flows and bed scour in Recommendations.

Pic 15 – Only a few metres upstream of the partially cleared log jam, the brook has small willows growing from it. These trees should be retained for their habitat and ability to push high flows out of bank.

Pic 16 – Recent bank clearance (probably to allow viewing of the brook) has exposed extensive stands of bur reed. Bur reed typically grows in channels dominated by fine sediment with little bed scour, such as dredged channels. Note the pile of deposited material (with evidence of hogweed control by herbicide, white oval). This part of the brook has been over-deepened and will not restore itself unless it is supplied with suitable substate material and is allowed to meander. Rubbish appears to be transported down the brook and should be collected (if not already being done).

Pic 17 – The base of a former weir has been retained after its partial removal. The effort to remove the barrier is commended but the issue is not resolved until the concrete base of the structure is removed. With ~4m of concrete base in place, downstream sediment transport is interrupted, an impoundment is created and fish passage in low water is not as good as it should be.

Pic 18 – Upstream of the retained concrete bed, the channel is dominated by reed sweet grass. This may be indicative of the slight impoundment which reduces the river's ability to scour the plant from the channel come winter. It is noted that the low flow conditions may be contributing to the plant's current dominance. Although dominant it should not be viewed as a problem as water is passing through and it provides important habitat, it just lacks open water at present.

P19 – Fallen trees within the river should not be seen as a problem. The fallen material provides low shade which suppresses emergent vegetation dominance, and the various flow pathways created by the partial blockage aid local scour, sediment sorting and transport. The fallen wood also provides important habitat for a wide range of invertebrates which in turn may feed fish. See example of brash and timber fixing in Recommendations.

Pic 20 – Beneath the shade of an oak tree a pool receives a defined flow path into it. Flow into the pool could be enhanced by the placement of a large tree trunk flow deflector (~0.5m diameter timber extending to 50% of channel width, note illustration). The pool could be partially excavated to increase its depth and initiate bed scour. The pool was almost completed degraded by the excessive fine sediment load. See example of flow deflectors in Recommendations.

Pic 21 – Water vole latrine with fresh dropping (white oval) and food piles along with runways are present amongst the dense stands of reed sweet grass. The site was not known to support water vole.

Pic 22 – Whilst searching for bullhead fish, stone turning revealed a good diversity of aquatic invertebrates. Caseless caddis (white arrow) are encouraging to see given the high sediment load. Also present are cased caddis, freshwater shrimp, flatworms and mayfly larvae.

Pic 23 – Access for fish through the bridge is possible at all water levels. The bridges shown in pics 10 & 12 should be like this and could be so with appropriately installed rock ramps, which actually drown the invert of the structure. Note the high fine sediment load disturbed as soon as the pool was entered. It is degrading the habitat. If it were not for the excessive fine sediment this pool would offer good trout holding potential given its low trailing cover. The positioning of a flow deflector (note illustration) could enhance the main flow pathway to the trailing cover.

Pic 24 – The bank slope should not be cut, especially where water voles are present. The cutting is to facilitate an electric fence. All grazing animals should be kept back from the top-of-bank to reduce trampling by livestock and retain bank integrity.

Pic 25 – Another deep pool found beneath the shade of a horse chestnut tree. The depth results from an historic weir now partially removed (pic 26). The ideal situation would be to fully remove the remains of the weir to allow natural sediment transport from upstream. If that cannot be achieved, then the placement of large stones (or the redundant concrete weir-base blocks) or a log flow deflector would create some cleansing flow into the pool to prevent the build-up of excessive volumes of fine sediment.

Pic 26 – The remnant weir structure now partially removed. Flow into the pool should be enhanced by flow deflection using the concrete blocks or a large log (note illustration).

Pic 27 – In the parkland landscape there was little riparian tree cover to suppress the dominance of reed sweet grass. To compound matters, the river here has been widened to create a broadwater in front of Frogmore Hall resulting in a river that has little energy to scour sediment or plants from the bed (inset), and so swamp habitat has developed. See example of tree planting to create shade in Recommendations.

Pic 28 – At the upstream end of the former broadwater (now a swamp of reed sweetgrass) there was evidence of flow entering. This pathway could be enhanced through the installation of large woody material to create bed scouring flow. Large hardwood timbers should be used to ensure their impact is maximised in the long-term. See example of brash and timber fixing in Recommendations.

Pic 29 – Fresh otter spraint present on a removed weir structure.

Pic 30 – Only one fallen tree is present in the river. It is small but still useful in terms of flow diversity. It doesn't appear to have held back any significant flood flows, but it is interesting that the channel was clear of reed in its proximity (which may be a consequence of riparian trees casting shade). The riverbed consisted of gravel with a layer of degrading silt (inset).

Pic 31 – The cause of the high fine sediment load was apparent as soon as cattle grazing was encountered. The animals have unrestricted access to the river. Fencing and alternative watering is required to prevent the animals from accessing the river and breaking its banks. This reach of river had signs of embankment, presumably to drive a nearby hydraulic ram pump which once supplied water to the Hall. If there is potential for floodplain connection, then the embankment should be removed. See example of riparian fencing in Recommendations.

Pic 32 – Cattle cause serious damage to rivers and their banks, especially small low-flow ones. In this case cattle have destroyed water vole habitat by grazing the marginal fringe, that has also removed cover that may have been used by juvenile fish. As the animals cross the river multiple times a day they send large volumes of fine sediment downstream. That fine sediment clogs potential spawning gravels and reduces habitat diversity for aquatic invertebrates. Cattle watering should be provided away from the river using mains fed troughs, pasture or solar pumps. The last resort could be a construct a fenced crossing point, but that would not eliminate the problem of animals defecating in the river as they watered. See examples of cattle watering in Recommendations.

Pic 33 – A defunct sluice off-take from the river was found. It was later stated that it once directed flow to fish rearing ponds when levels in the channel were kept higher. It serves no purpose now but is an interesting reminder of how this chalkstream once had enough water to push flow in multiple directions for a range of purposes. It should be retained for its historical interest.

Pic 34 – A flow deflector in the cattle poached reach. It had no effect, mainly due to the constant disturbance caused by cattle and secondly due to the limited gradient of the reach reducing the river's capacity to drive flow against the bed to create scour. It would be more effective to install large tree trunks across the river at differing heights to make use of high flows. If needed gentle excavation of the bed beneath such structures could be done to initiate bed scour.

Pic 35 – Upstream of the main cattle activity area the river retained more vegetation but grazing is still apparent (and the animals may have now moved onto this area). Potentially, with cleaner bed substrates, there is more potential for the river to support trout once again. But they would be very vulnerable without the river being fenced.

Pic 36 – Further stone turning still did not find any bullhead fish, but it did reveal high number of freshwater shrimp feeding on the accumulated organic matter (a positive). If this reach of river has dried it may be possible that bullhead have not yet been able to re-colonise as they cannot traverse obstructions (like the bridge footings) very well and are considered rather sedentary.

Pic 37 – Where the river has more gradient it flows more swiftly and is able to clean some fine sediment from the bed. Note that cattle have (currently) retained less palatable plants of great willow herb, teasel, rushes and thistles. Grazing of in-channel brooklime has taken place and fine sediment covers what should be clean gravel. Cattle damage is apparent and reduces the reach's potential to support trout.

Pic 38 – Once again a weir removal has removed most standing blocks to lower the upstream impoundment of water, but by unnecessarily retaining the foundation a shallow weiring effect is still present. Unless there is a need to retain the upstream pond habitat, the weir's complete removal should be sought as in low flow conditions it still presents a barrier to fish (such as bullhead).

P39 – The ponded river upstream of the partially retained weir is subject to cattle intrusion which significantly degrades the chalkstream habitat. Also note the fine sediment deposition that the impounded, de-energised flow is unable to transport.

P40 – A tributary channel with a meandering planform is present. Careful observations were made in case it was a defunct river channel (a paleochannel). That is not the case as cool water near its start indicates notable spring flow providing the tributary with its own source (independent from the river). The channel is being degraded by cattle, and it should be fenced. It would be best to fence it with a 5m to 10m buffer to allow dense marginal cover to evolve with tree and scrub cover over the spring head to aid natural cooling.

P41 – The tributary rises from a springline in the pasture. The area is currently subject to intense cattle trampling. The area should be fenced to protect it and to allow a vegetated buffer zone to grow.

P42 – The upper extent of the site was marked by a barbed wire fence and a single flow deflector. The adjacent site receives only occasional cattle grazing and consequently it is not subject to the same degrading pressures that the survey reach is. The banks are better vegetated with less bare soil and the river is cleaner.

3.0 Recommendations

3.1 Tree hinging and felling

Hinging (also called laying, folding or pleaching) trees into a watercourse is an excellent way of adding flow diversity and roughness to a channel. Hinging replicates the natural process of trees falling into the channel, with the added benefit that the hinged section of tree should continue to grow, developing even more habitat complexity over time.

Willows are usually the best type of trees for hinging directly into the channel and can still thrive with up to 50% of their canopy submerged. Many other species hinge well but into shallower areas or along the river margin, to ensure that the majority of their canopy remains in the dry.

Small, pliable species like, willow, hazel, elm, hawthorn and even alder (with a bit of practice) can easily be hinged. The more brittle species such as sycamore, ash should generally be avoided as they tend to break off rather than bend.

Pic 43 - Tree hinging, a simple and effective technique for increasing cover.

An alternative to tree hinging is simply controlled felling of larger trees into or across a river to make use of flood flows which can significantly increase the extent of bed scour. The trees can be secured in optimum position using stakes and wire.

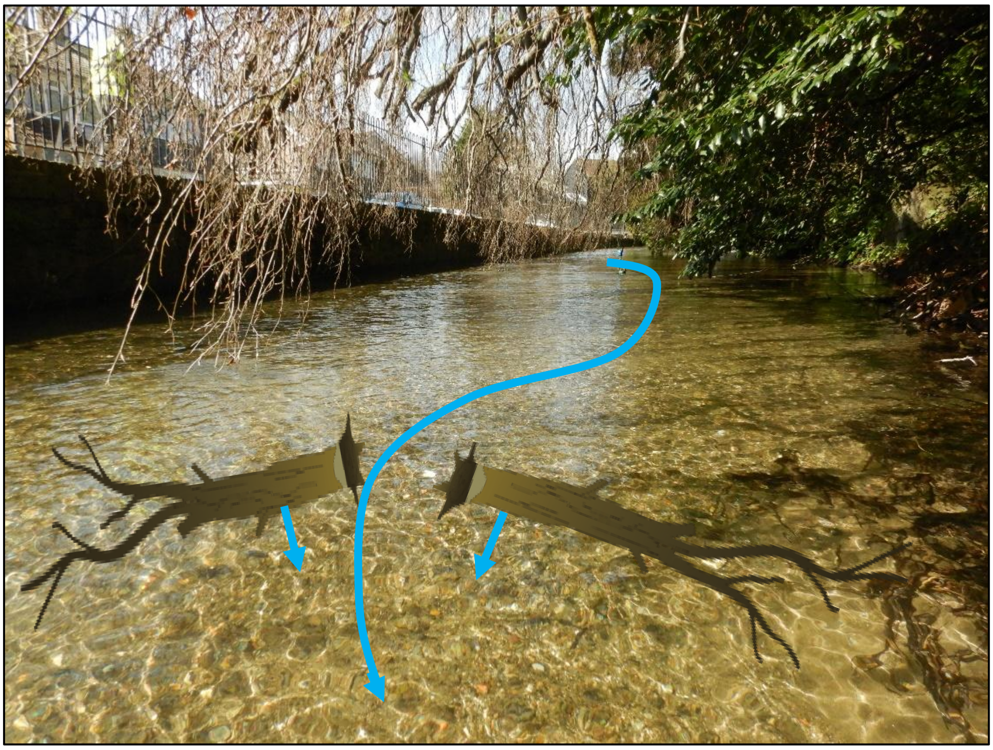
Pic 44 – Controlled tree-felling both into and across a river can replicate natural tree fall, and in turn create beneficial habitat. Note the growth of water crowfoot downstream of the area of turbulence.

3.2 Brash and timber fixing

Some of the most beneficial in-channel habitat structure results from fallen trees and branches, often referred to as brash or large woody material (LWM). Where trees are present, this occurs naturally and creates features that may be stable for many years but eventually disintegrate. Naturally occurring woody material therefore relies on a dynamic supply to replenish that material.

Where lacking, wood can be installed as a habitat improvement. In its most effective form, this mimics natural fall of wood into a river.

Pic 45 – Pining of LWM in margins for cover, sediment accretion and flow deflection. The complex cover provides excellent protection for trout fry.


Pic 46 – Large pieces of timber can be fixed to the riverbed to produce areas of bed scour and flow diversity.


Pic 47 – A less prescriptive approach is simply “chop and drop” which sees tree timbers cut and allowed to find their own position. To reduce the risk of timbers moving they should be >1.5 times the channel width to enable them to wedge against banksides. The complex cover provides excellent protection for trout fry.

Pic 48 – A more structured (and secured) approach sees the construction of a brash ledge. This has brash and timbers layered to hold the smallest pieces below water. Chestnut posts and steel wire is used to secure the material. This type of feature is good for sediment entrainment in depositional areas of rivers.

3.3 Flow deflectors

These features can be used to increase flow diversity and bed scour. They can be simple log deflectors or tethered tree stems. The complex flow that arises results in depth cover and sediment sorting and transport.

Pic 49 - A flow deflector used to focus flow and scour beneath a trailing tree.

3.4 Creating undershot flow

A variation on flow deflectors can see timbers set above the bed level, often nearer the surface. This causes water to be pushed down against the bed, maximising the potential for bed scour. This approach can be particularly valuable in low energy chalkstreams.

Pic 50 – Timber positioned above the bed can enhance bed scour, a useful approach in low energy chalkstreams.

3.5 Tree planting to create shade

Pic 51 – Note how the single tree suppresses the growth of reed sweet grass, and maintains an area of open water.

3.6 Invasive plant species control

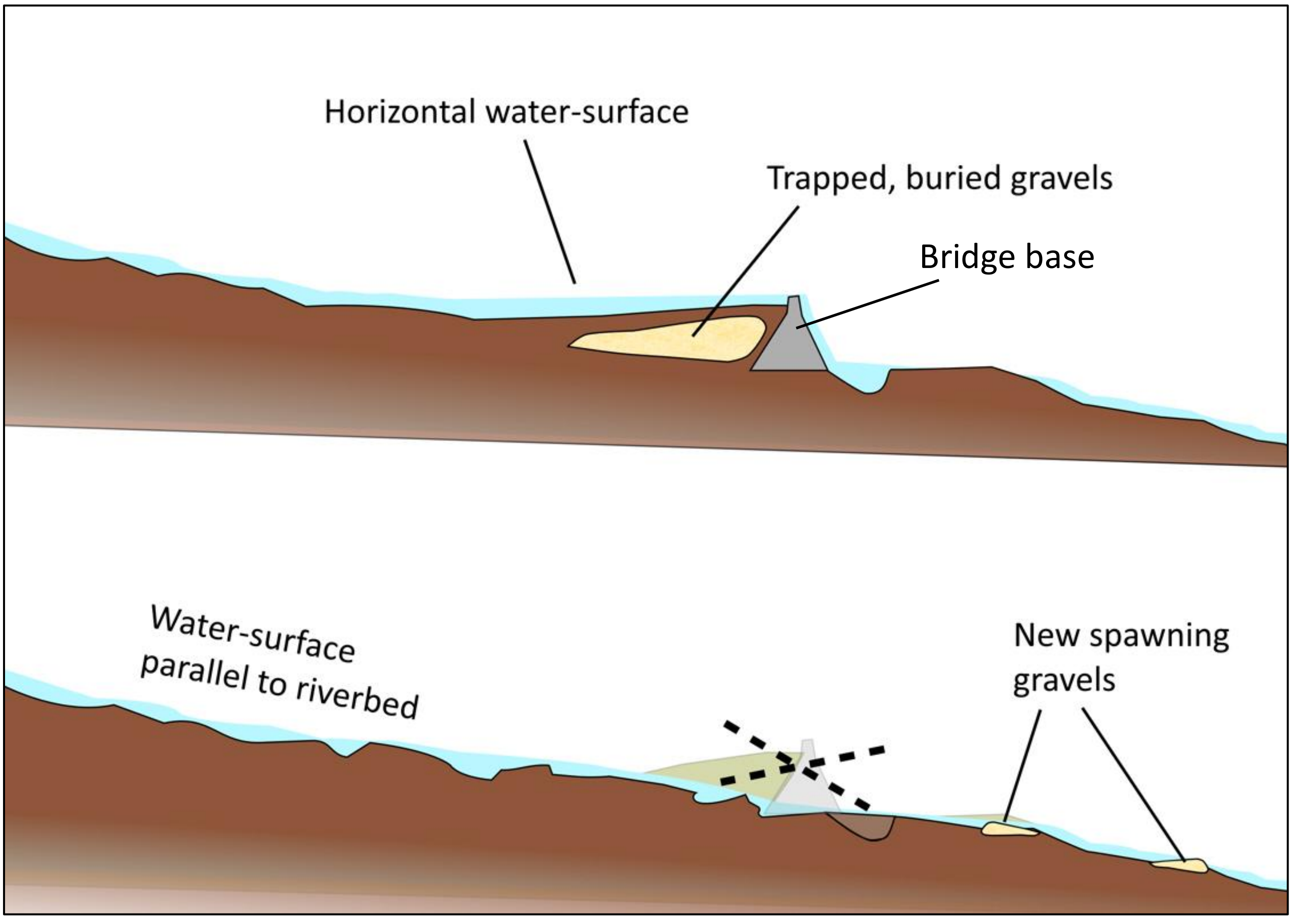
Himalayan balsam, an invasive non-native species. It can colonise extensive tracts of riverbank through the production of high numbers of seeds which are dispersed through 'explosive' seed capsules. Once balsam is present, it tends to grow tall and outcompetes native plants. This leads to a monoculture of balsam which creates two problems. Firstly, native invertebrates are not well suited to exploiting non-native plants for food or shelter, so their abundance is reduced. Secondly, the roots of balsam are shallow providing limited bank stability, especially given that balsam is an annual and dies-back entirely in winter, leaving banks exposed to erosion. Himalayan balsam should be controlled by pulling. More information on Himalayan balsam control can be found at [Biological control of Himalayan balsam - CABI.org]

Of greater concern is the presence of giant hogweed. The plant can grow even taller than balsam, and as such has the ability to colonise even greater tracts of riparian habitat. Of particular concern is the photo-toxic sap of the plant which can lead to sever blistering of human skin that it comes into contact with. It is encouraging that the plant is being controlled through the application of herbicide.

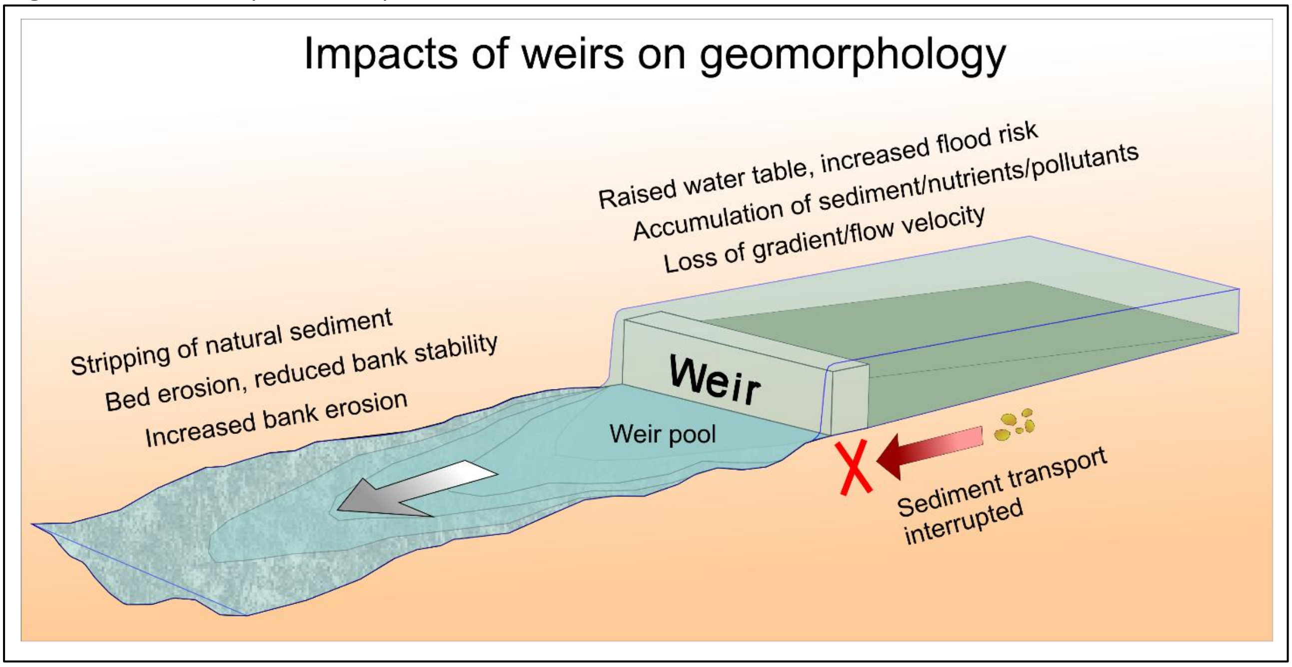
Pic 52 – Giant hogweed, it should be eradicated by persons trained to use herbicide adjacent to a watercourse. It must not be strimmed or pulled due to the serious hazard to health presented by its sap.

3.7 Bridge (or weir) removal

The second bridge encountered on the Stevenage Brook has a raised concrete bed, this acts as weir resulting in impounded flow upstream. The impact of impounded flow is shown in the images below. With base of the bridge fully removed the Brook would become more dynamic. The same issue applies to the base of weirs retained in the River Beane.



Figures 1 & 2 The impacts of impoundments on watercourse.



3.8 Channel realignment

Straightened channels can be realigned to follow a more natural course once again, which in turn provides for greater biodiversity, initiates natural processes and allows greater flood storage.

Pic 53 - Channel realignment to create a new longer sinuous channel where it previously ran in a straightened channel (white arrow).

3.9 Fish passage easements

Some artificial structures such as the concrete bases of bridges present hostile environments for fish to traverse. The thin water can prevent larger fish from moving, and slight rises within the structures can prevent smaller fish from ascending. Structures can be roughened using fixed rocks or a series of baffles can be installed to raise water levels.

Pic 54 – Stone sets to increase channel roughness to aid fish passage.

Pic 55 – Baffles can be attached to structures (particularly weir aprons) to increase the depth of water, slowing the flow enough to enable fish passage.

3.10 Riparian fencing

Fencing to keep animals out of watercourse is essential to reduce to input of fine sediment. Fencing should be set-back a minimum of five metres to allow a natural vegetated buffer zone to evolve.

Pic 56 – Fencing in combination with a vegetated buffer zone prevents fine sediment entering a river.

3.11 Cattle watering

Pic 57 – A pasture pump in use. The pump allows cattle to lift water from a nearby water source.

4.0 Making it Happen

Tarmac should review the ideas within this report to establish which may be viable to pursue.

Once clarity is gained on which ideas to take forward the WTT can advise further on means for achieving delivery, such as funding streams and partners, as well as Designers and Contractors.

To implement the majority of the ideas, permission(s) will be required from the Environment Agency (such as a Bespoke Environmental Permit). To secure a permit it is advisable to undertake flood modelling (particularly if floodplain connection is being delivered). Once clarity is gained on the final scope of the works items, such as large woody materials, bed raising and flood embankment removal can be included in the modelling. The WTT could assist with delivery of the ideas such as brash and timber fixings, and combine it as a training exercise for Tarmac employees or local river conservationists.

The WTT website library has a wide range of materials in video and PDF format on habitat management and improvement:
www.wildtrout.org/content/library

An important source of income which helps to fund the WTT's work is our Annual

Spring Auction. The auction is our biggest fundraising event and includes fishing days, tackle, books, art and more. Many of our AV and PV recipients subsequently help us with auction lots each year, and we're very grateful for this extra support. To donate a lot, please contact WTT via Christina Bryant office@wildtrout.org.

5.0 Acknowledgement

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

6.0 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.

Legal permissions may be required before commencing work on site. These are not limited to landowner permissions but may also involve regulatory authorities such as the EA, lead local flood authority and any other relevant bodies (e.g. Natural England and Forestry Commission) or stakeholders. Alongside permissions, risk assessment and adhering to health and safety legislation and guidance is also an essential component of any interventions or activities in and around your river.