River Chelt

Guardians of the River Chelt

Gloucestershire

2025

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Contents

Key Findings

- The Chelt is heavily modified throughout, either through urban development or historic approaches to flow and flood risk management.

- In-channel and riparian habitat is degraded as a result of modification. However, plants, invertebrates and fish are clearly ready to make the most of opportunities within this and will make a comeback immediately if given the conditions to do so.

- The up and downstream connectivity of the Chelt is heavily fragmented and disconnected due to historic development, with the river passing through several major culverts and weirs.

- Brown trout are present here and were seen on the day of the visit.

- If ambitious approaches are taken to improving fish passage through culverts and weirs, river habitat and fish population connectivity can be restored.

- There is potential to improve the river habitats in certain areas and work alongside managing flood risk.

1. Introduction

The Wild Trout Trust was approached by the Guardians of the River Chelt to conduct an Advisory Visit (AV) and report on the watercourse.

The Guardians of the River Chelt (abbreviated to GORC in this report) are a voluntary community group that care for their local watercourse throughout its length, from source to confluence. To date, the group has carried out multiple beneficial activities to help the river. These include litter-picks and public engagement events, through to systematic sampling of water quality and developing partnerships with other local conservation bodies.

As such, the group selected the reach of watercourse they were interested in assessing for the day of the visit (Figure 1). This was in the middle of the catchment, within the town of Cheltenham. The reach was reviewed from an upstream to downstream direction.

Four members of GORC attended the walkover, which also provided an opportunity to get the Angling Trust's Angler Water Quality Monitoring Initiative Officer along to discuss sampling equipment and results with the group.

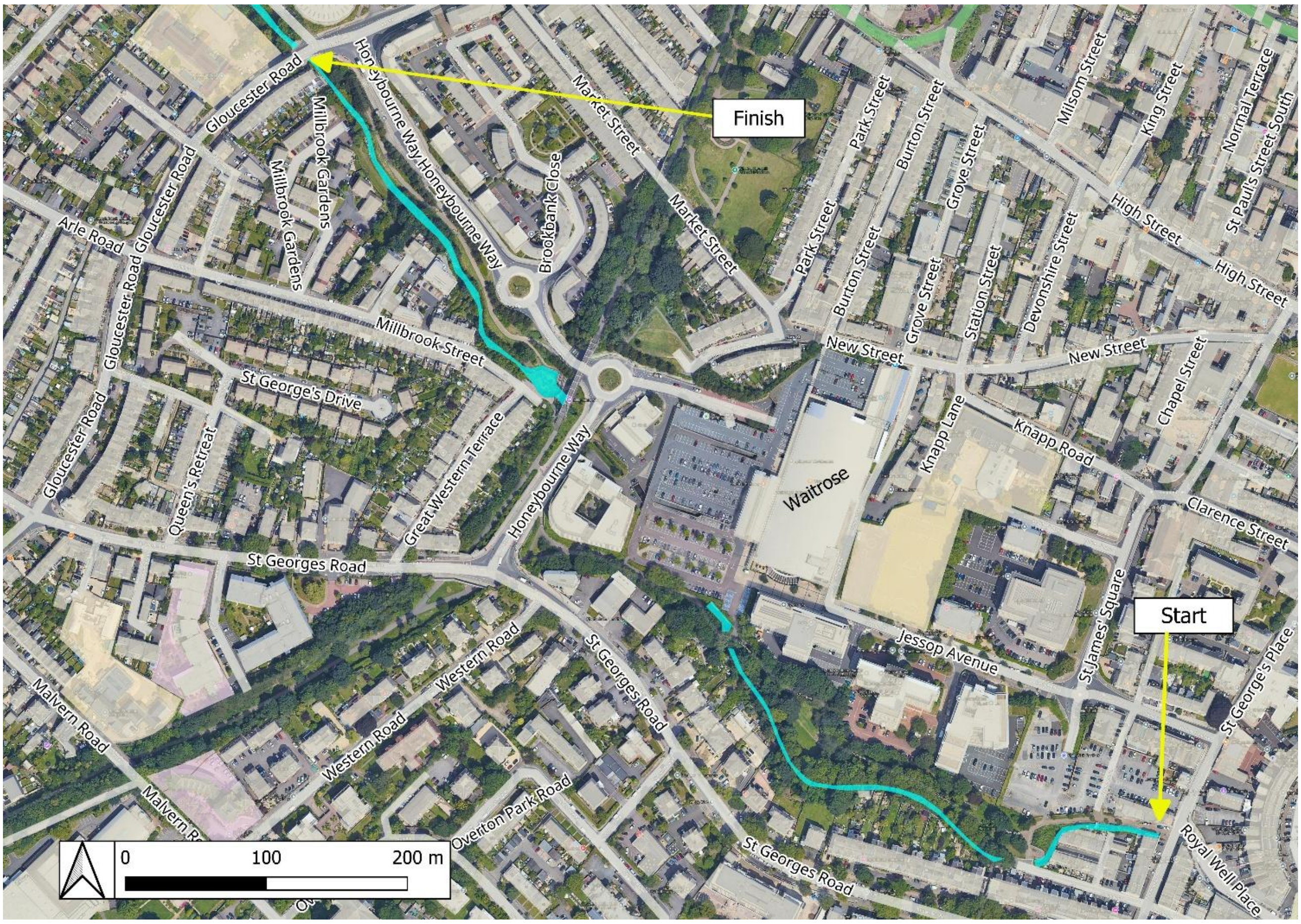

Figure 1 Overview of the watercourse sections reviewed on the day of the visit.

Comments in this report are based on observations on the day of the visit and conversations during the walkover. Some subsequent desk-based review of maps and online data have helped validate some of what is described in the following report.

Specific locations are identified using decimal latitude and longitude (e.g. **56.044896098, -3.16176523829**), which can be pasted straight into Google Maps to identify locations. Figure references within the text of the report are hyperlinked (green font), so holding Ctrl and left-clicking on them will move to that point within the document.

Standard convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right-hand bank (RHB) whilst looking downstream.

2. Background

At 14 miles long, the River Chelt is a relatively short tributary of the lower River Severn (Britain's longest river). Despite its length, the Chelt runs through a wide variety of landscapes and situations before it reaches the Severn. Its headwaters, which run off the steep western edge of the Cotswold Escarpment, just south of Ham Hill, are quickly captured as they enter directly into Dowdeswell Reservoir. This reservoir is now used specifically as a flood storage feature, to manage the rate at which water heads down the Chelt from the upper valley during storm events (regulated flows). However, the hydrograph from the nearest river level monitoring station (Hydrology Data Explorer - Charlton Kings) shows the Chelt is still a 'flashy' watercourse, capable of rising very quickly following rain, also due to the number of unregulated minor tributaries which join it further downstream. Flood risk was mentioned as a serious concern during the visit, with floods badly impacting Cheltenham residents in recent years, and an issue that any habitat recommendations needed to prioritise. At the other end of the scale, an arguable ecological benefit of the headwaters being regulated by the reservoir is that the managing body (Environment Agency, EA) will ensure releases of water to maintain flows during periods of no rain.

The geology of the catchment is mixed, but as would be expected for this part of the country, limestone influences are present throughout the upper catchment. Limestone inputs to water chemistry will provide elevated levels of calcium carbonate, providing important building blocks for aquatic biodiversity in the watercourse.

As the gradient of the watercourse flattens through the middle of the catchment, it enters the realms of Cheltenham town. Here the river is strongly influenced by an urban environment, with additional urban inputs to water quality (which GORC diligently monitors) and heavy physical habitat modification (discussed in this report). The final third of the Chelt enters open farmland in the Severn floodplain. Here the watercourse is modified for drainage and surrounded by mixed arable and livestock farming.

The EA monitors the Chelt and all other English Rivers to provide an overall score for ecological quality, using the Water Framework Directive classification system (Table 1). This reviews multiple biological, chemical and physical elements of a watercourse to provide an overall grading, from ecologically 'High' through to 'Poor', dictated by the lowest scoring denominator.

Table 1. Waterbody details

River	River Chelt
Waterbody Name	Chelt - source to M5 | Catchment Data Explorer | Catchment Data Explorer
Waterbody ID	GB109054032820
Current Ecological Quality	**MODERATE** **Fish** = high; **Invertebrates** = good; **Macrophytes** = moderate; **Phys-Chem** = good/ **Phosphate** = poor
U/S limit inspected	SO 94568 22353 (51.899697 , -2.0803503)
D/S limit inspected	SO 93966 22905 (51.904649 , -2.0891147)
Distance inspected (KM)	c. 0.9km

Despite the classification above, fish populations of the Chelt have not been monitored by the EA for a decade or more (or records not updated). Several sites were surveyed prior to 2015 throughout the catchment. As many river fish species need good flow, clean water, specific habitat types and connectivity between them to exist, they are prime indicators of wider river catchment health. Due to requirements for good water quality and habitat created by natural river processes, brown trout are an excellent indicator species in this respect. Fish population and other aquatic ecology data from EA monitoring can be reviewed here: EA Ecology & Fish Data Explorer

Of particular interest to this report are the two EA fish surveys that took place at Sandford Park and Waitrose in Cheltenham, in 2014. Both sets of results record similarly good numbers of brown trout (*Salmo trutta*) and bullhead (*Cottus gobio*). A lone 3-spined stickleback is recorded and, perhaps equally important and indicative of catchment habitat issues, only a handful of eels. At this point in the lower Severn catchment, eels, and particularly in their smaller juvenile form (elvers) should be abundant in the Chelt. This suggests connectivity issues along the watercourse, where elvers are unable to freely access the middle Chelt from the estuary, when they arrive from the Atlantic in the spring.

3. Habitat Assessment

The reach of watercourse selected for the walkover started at the Bayshill Pub, heading through Cheltenham down to where it passes under the Gloucester Road (see Table 1 for geo-references).

At the start of the reach inspected, the Chelt emerges from a significant length of culverting (c. 400m) where it has been incarcerated under urban development (Photo 1). This is the first example seen in the Chelt of serious fragmentation of river habitats and connectivity for fish populations. Culverts create a specific issue for fish, through engineered flows in smooth sided channels being too fast for swimming abilities when water levels rise, or levels too shallow for passage at times of low flow. Long culverts become very dark inside, demotivating some fish to pass through (especially those reliant on visual ability) due to wariness of potential predators. Passage issues can be remediated by changing flow conditions in the culvert, by introducing a rougher channel (larger bed material) or installing low baffles though the bed of the culvert to raise water levels at low flow and reduce high flow velocities (Figure 2 and Figure 3). Innovative solutions to light the interior of culverts have been previously used in river restoration projects, encouraging fish to pass through the feature. Any action to manage low flow in the culverts would need to go through appropriate regulatory channels and flood modelling to ensure no additional impact was made on flood water levels, beyond the existing influence of the culverts themselves. Overly straight channels hemmed in by smooth concrete, move flood water very quickly along the river channel. The restriction (or ‘throttle’) created by the culvert then backs water up as it can only convey a certain amount of water at a time. All fish species require free access to different parts of the catchment for feeding, reproduction and refuge through the year. Anything that inhibits this movement – a barrier like a culvert or weir – will impact fish ability to complete life cycle or numbers of fish present

Photo 1 The start of the survey section by the Bayshill Pub. The Chelt resurfaces after several hundred metres of being buried under the town. The river is heavily modified, constrained by high artificial banks in a straight channel. The larger rubble in the bed will offer some physical habitat for fish and aquatic invertebrates, the accumulation of sediment on the left bank is allowing some vegetation to take hold. The emergent and trailing leaves provide a small amount of natural habitat structure as well.

If given space, a naturally functioning river will be well connected with its floodplain, a dynamic environment where it naturally creates turns and bends (sinuosity) through erosion of banks and deposition of material. Generally, where a river scours a deeper hole, the eroded material is then deposited downstream. The deposition of this material (substrate) where size ranges from sand and small gravel through to large boulders, form changes in river-bed and channel shape (geomorphology) which in turn creates a diversity in flows (Figure 2 and Figure 3). These dynamics drive river habitat diversity; good aquatic biodiversity is dependent on this, as it provides a range of opportunities for a wide range of species adapted to utilise each habitat type at different stages of their life cycle. Common habitat units formed by rivers, used throughout the report, include pools (deeper, slower water) riffles (shallow, faster water) and glides (smooth, steady flow, shallower than pools).

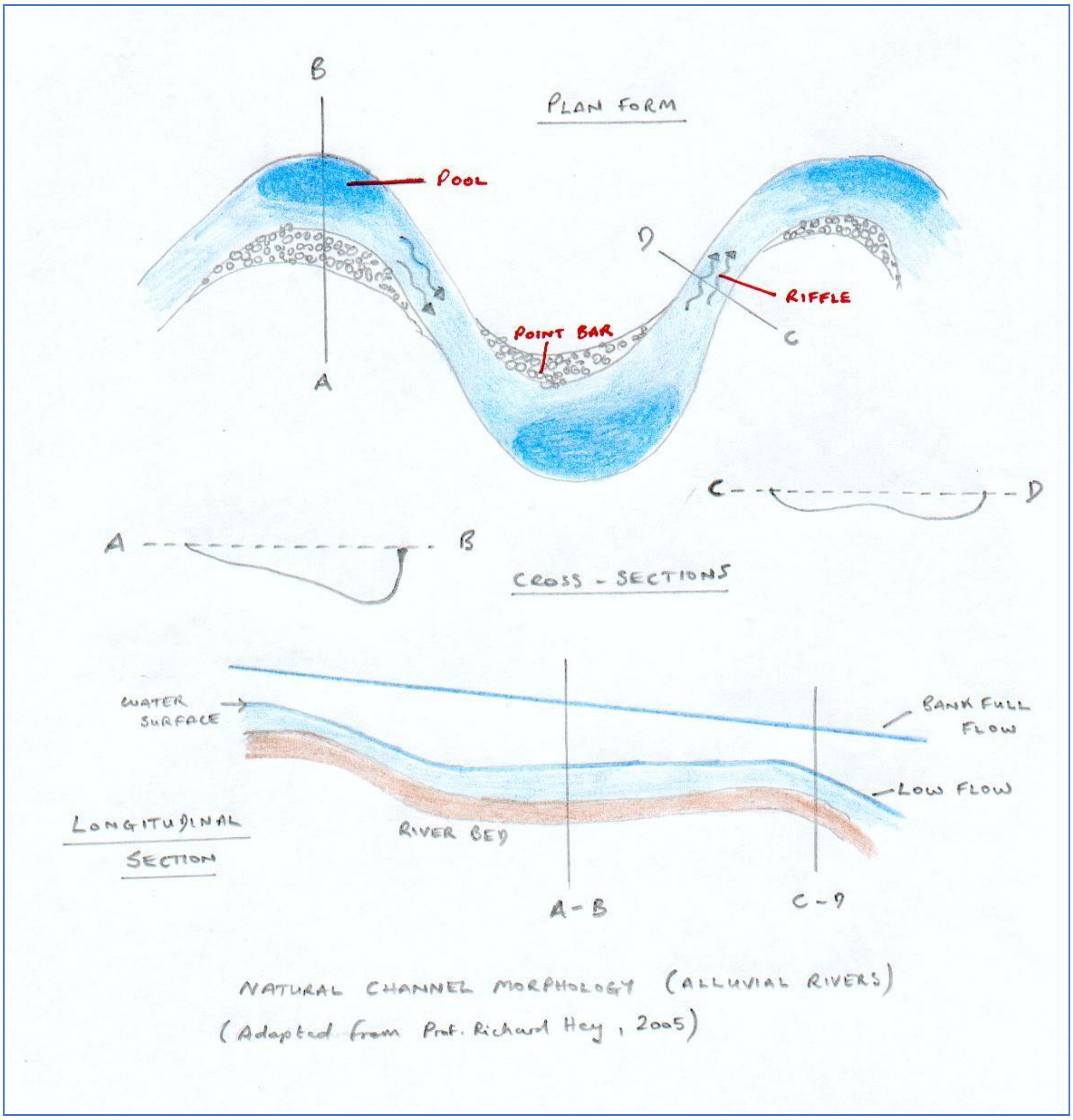

Figure 2 Natural river dynamics, displaying how meanders create channel habitat diversity.

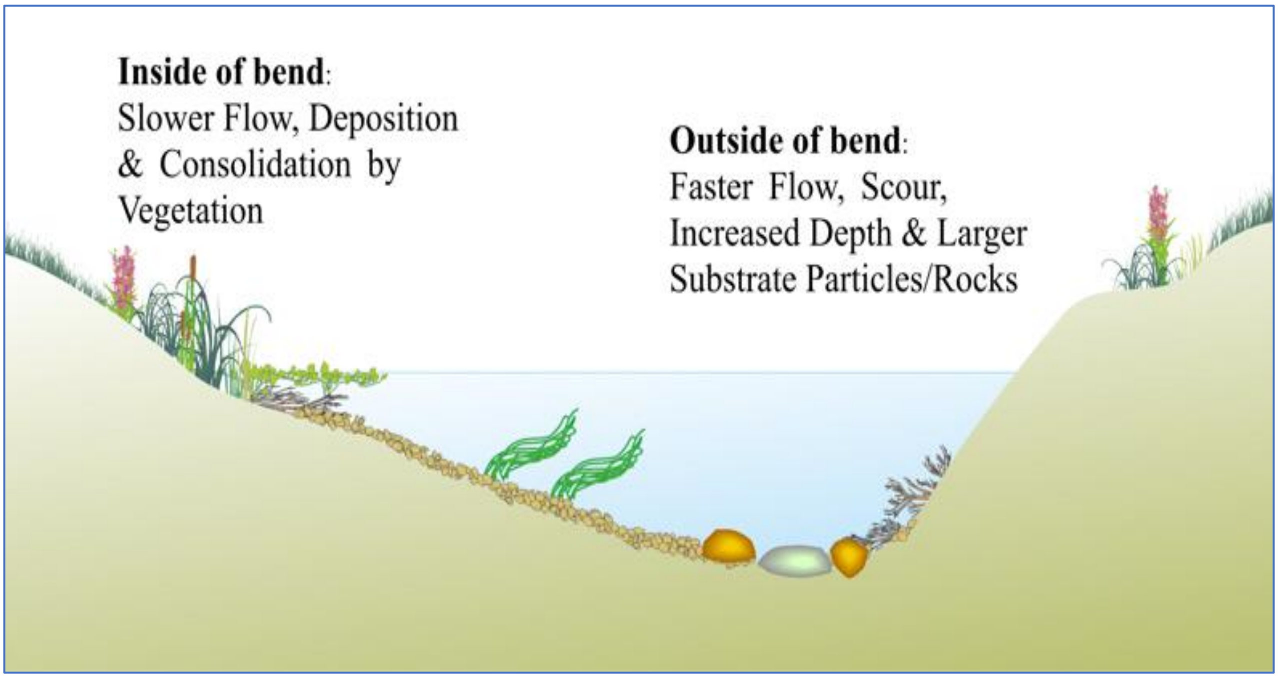

Figure 3 A cross section of a meander bend showing the changes in depth and flow created by erosion and deposition of material. Aquatic plant life is equally dependent on physical habitat and flow diversity. Plant growth subsequently creates further physical habitat structure and diversity for a range of fish and aquatic invertebrates.

Built up, urban environments generally mean watercourses end up with a high degree of modification as the conurbation develops around them. Where rivers interact with hard, built, structure and have been straightened and deepened, a watercourse is usually deemed 'heavily modified' (Photo 2). This removes natural river processes and dynamics that form diverse habitats, intensifies extremities of flows, and cuts the river off from functioning as it should with its floodplain.

However, even in urban environments where little natural river process can happen, there are opportunities for species to exist. Habitat can be viewed as essentially physical structure, and the flow conditions around that structure or within an immediate area. Where natural habitat is degraded in an urban watercourse, it can frequently be the case that artificial bed and bank materials and flow situations become 'functional habitat', allowing some species to still exist.

Photo 2 The deeply incised channel also has its movement limited by the high brick-built walkway on the RHB. Water velocities through this section are likely to be difficult as levels rise and flows speed up; the smooth brick wall provides little resistance to slow the water down. The summer vegetation on the LHB will provide some flood water refuge to aquatic wildlife, as the complex and 'shaggy' matt of branches and sticks provides resistance that saps the energy out of flow. This provides low flow pockets that fish swimming ability can cope with, so they don't get physically washed out in floods. Note the shallower faster water under the bridge where the river has deposited some material from the deeper water in the foreground, creating habitat change and flow diversity.

Heading a little further down the watercourse from the start point, the watercourse has deposited a riffle feature under a small footbridge (Photo 3). This was a good place to view what material, both man-made and natural, the Chelt was using to form these features, and how useable they might be as functional river habitat. As per the previous diagrams, a riffle can start a chain reaction in the watercourse as it energises flows, which then drives habitat dynamics immediately downstream. The attraction of diverse habitat features in proximity to each other for stream wildlife was proven, when two wild brown trout were spotted sitting on the uplift of water into the riffle.

Photo 3 A mixture of natural and man-made material blend to create some functional habitats here, allowing nature to keep a hold in this section of the Chelt. The large pieces of masonry stone and rip-rap from the bank provide a complex river bed profile. The gaps underneath this larger material create suitable locations for invertebrates, trout and bullhead to hide in. Two brown trout were seen here.

The riffle contained a range of bed materials in a wide range of sizes, from sand, pockets of gravel, some pebbles and then large pieces of masonry or rip-rap rocks that have been used at the bottom of the LHB to prevent erosion previously. This pattern of bed material was seen in places throughout the remainder of the Chelt being reviewed. This diversity of bed material, creating pockets of different depth and flow, will attract a range of aquatic species, if present. The large material provides a variety of gap sizes underneath and between it which will provide essential opportunities for trout and bullheads to seek refuge. Additionally, bullheads will lay their eggs under these larger pieces of stone. The mix of larger material, shallower water and flow diversity provides habitat for juvenile trout, too.

This 'cover' created by the large material – where trout can access a hiding place to avoid danger or predators – is a critical habitat component for this species. This is why trout are an ultimate indicator species of flowing watercourses and overall river health, as they need both complex dynamic habitat and good water quality to exist. The trout seen at this location will also be making use of deeper glide habitat and undercut rocks on the bankside, downstream, for additional refuge. The riffle will be a key location for aquatic insects, too, due to water depths, substrate structure and adjacent vegetation which will host a wide range of species. These are then fed on by the fish, local nesting birds and bats at night.

Moving to the bottom of this straight section of channel, the Chelt turns a left-hand bend, initiating a short section of more natural river response, despite being constrained on both banks (Photo 4 and Photo 5).

Photo 4 Emergent vegetation has pushed into the channel here, helping to self-narrow the pool as it approaches the bend. Not just fantastic cover for the fish present in this stretch, the vertical physical structure will be important to aquatic and wetland invertebrates such as demoiselle fly (Calopterygidae), damselflies (Zygoptera) and other species that use this to emerge from the water or crawl under it to lay eggs. A small number of mayfly (Ephemera danica) were hatching from this section of the Chelt on the day of the visit, suggesting reasonable water quality. Trout will thrive in this environment, with invertebrate food drifting down from the riffle above and additional refugia under the rip rap on the left-hand bank.

The habitat on the bend is a great example of what the Chelt could start producing, if it was in a less modified and impacted state (51.899535 , -2.0815380). Rivers quickly start to recover when given the space to do so, with natural dynamics of flow and movement of bed material forming beneficial habitats. Here the bed level is appropriate to the height of the bank, which allows flood water to quickly spill out into the surrounding space, slows how quickly it moves downstream and moderates the flow energy within the channel, making floods less hostile to river wildlife. The deposition of good quality, natural gravels - as would expected of a small Cotswold watercourse - has formed small side bars, short riffles and a glide; excellent flow and habitat diversity. Areas of slower flow allow this smaller material to deposit. The size of the substrate also provides opportunities for trout to spawn in winter. It would be well worth checking this area in December to look for where trout have dug nests in the gravel (called 'redds'). In a more natural setting, the expansive area of wetland plants on the RHB would be seen as an extremely beneficial buffer strip to surrounding land use, and good quality habitat. However, given this is growing across the front of an underground flood alleviation channel, it is not known if this habitat will be retained or removed for flood risk as seen at many other locations downstream.

Photo 5 Channel recovery, once the watercourse was given space to meander and deposit material naturally; habitat diversity and species respond positively to this.

Immediately downstream of the recovering river channel, the Chelt is buried under the first culvert in the stretch (Photo 6). This will disrupt the natural processes of the river and damage formation of habitats immediately downstream. The low height of the culvert and footpath on top has potential to disrupt the lifecycle of certain river invertebrates, especially when making upstream flights as mating adults. At around 25 metres in length, this culvert could influence fish movements but has retained enough depth at low flows to allow fish to pass through relatively easily.

Photo 6 The culvert supporting the footpath onto Royal Wells Way (51.899522 , -2.0816930).

Downstream of the culvert, the Chelt enters a long stretch of similar habitat and situation; heavily incised, modified and straightened (Photo 7). The LHB is a brick wall, the RHB very high. This channel form will transfer flood water extremely quickly downstream, increasing flood risk at the first point it is constrained. Equally, when flows start to elevate in the confined channel, the increasing flow velocity becomes very hostile for aquatic life, which has little opportunity to escape the flows within straight, high banks. This also prevents beneficial bed material deposition and formation of diverse depths and flows, limiting habitat potential for all river species.

The land along the RHB is open amenity parkland, with the Chelt Walk passing through it for around 250m. There are several large bankside trees along the bank top, creating beneficial shade that will help keep the river cool during hot summer weather and provide leaf matter to the watercourse which provides basal resources for aquatic invertebrates.

Although ambitious, an opportunity to re-naturalise the river and hugely increase flood water storage capacity could considered here (Photo 8). By removing a large amount of the RHB soil, back toward the footpath and down to the current level of the Chelt, and where trees allow (although some timber could be taken down and root-plates repurposed), the watercourse could be re-meandered through the new space. This would give the channel space to function more naturally (similar to the bend in Photo 5) and produce more dynamic river habitat. Equally, the space provided to the river by removing the banks will let flood water be stored more naturally and dissipate more slowly downstream. There would be huge scope to landscape this to make it a very pleasant, nature rich, public space for residents of Cheltenham to use.

Photo 7 The channel for 250m downstream of the culvert – heavily modified! The large rubble and brickwork in the bed will at least function as physical structure for bullheads, trout and aquatic insects (central point: 51.899522 , -2.0816930).

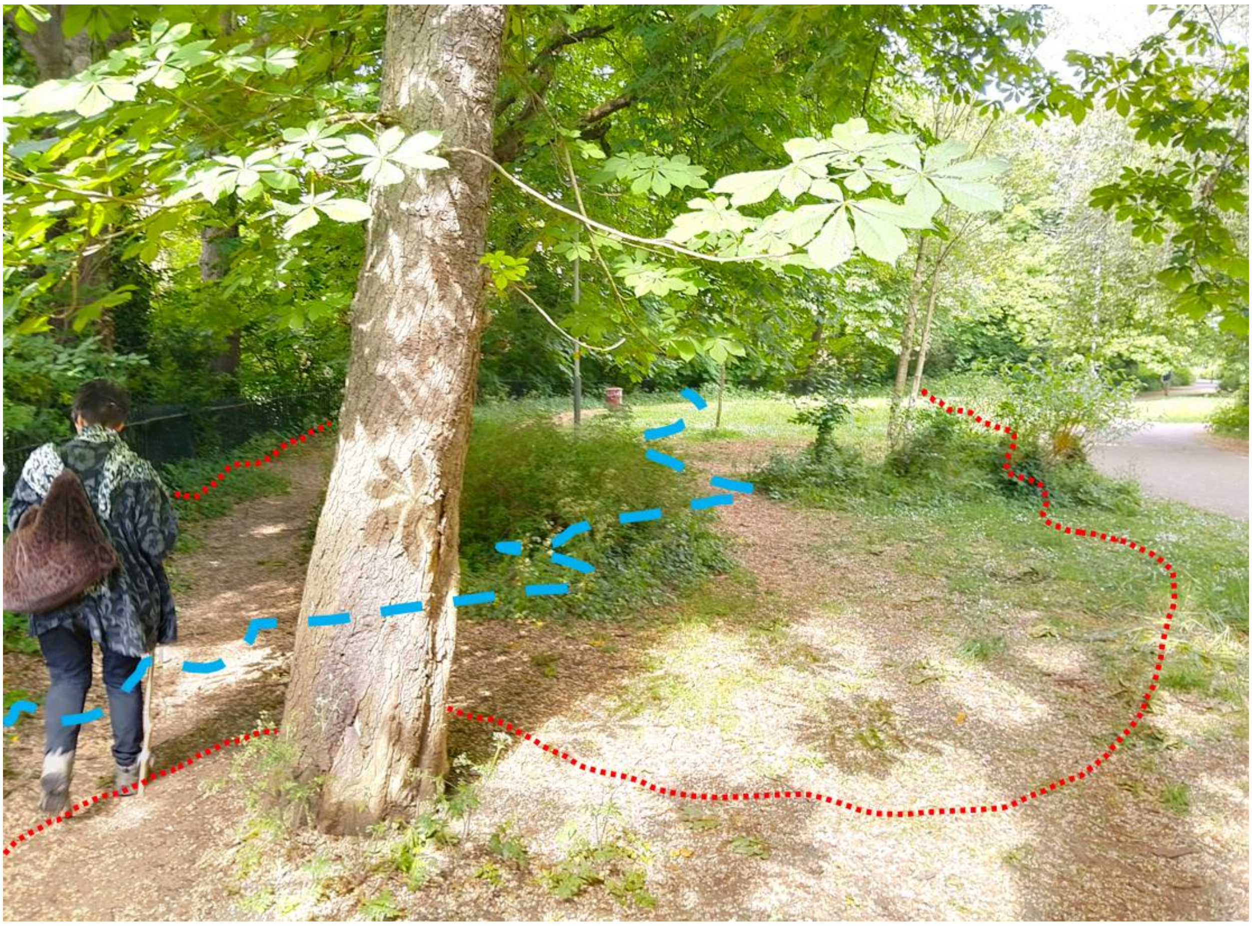

Photo 8 Although ambitious, large areas of bank material could be removed down to the current level of the Chelt, for example between the red dashed lines in this photo in this pocket park. The watercourse could then be re-meandered through this space (blue line), which will also provide better flood water storage when it reaches this point of the watercourse. Grading banks, allowing vegetation growth, providing stepped access, information boards and log benches for the public to sit on could provide an immersive encounter with river nature in the middle of town.

At the end of the parkland, the Chelt is put through another box culvert of around 12m length, which forms the footpath bridge out of the park to Waitrose carpark. This has the additional issue of a small step in the concrete bed at the downstream end creating a barrier to fish at low flows. The Chelt is then put through a fully lined concrete channel before it hits the start of the Waitrose car park culvert (Photo 9 and Photo 10). Obviously, this is a very degraded place for river wildlife, devoid of any natural habitat. The key issue for fish in engineered water conveyance channels (these are not rivers anymore) is the same as for culverts; too shallow at low flow and once levels pick up, flow velocity quickly becomes too fast, especially for smaller fish with poorer swimming ability. Easy wins to help alleviate this is to use low baffles on the concrete bed which raise water levels at low flows, and slow flows when velocities increase, to aid fish passage through these man-made features (Figure 4 and Figure 5).

Photo 9. The downstream end of the culvert with the footbridge over the top of it, a small step in concrete bed level creates further fish passage issues.

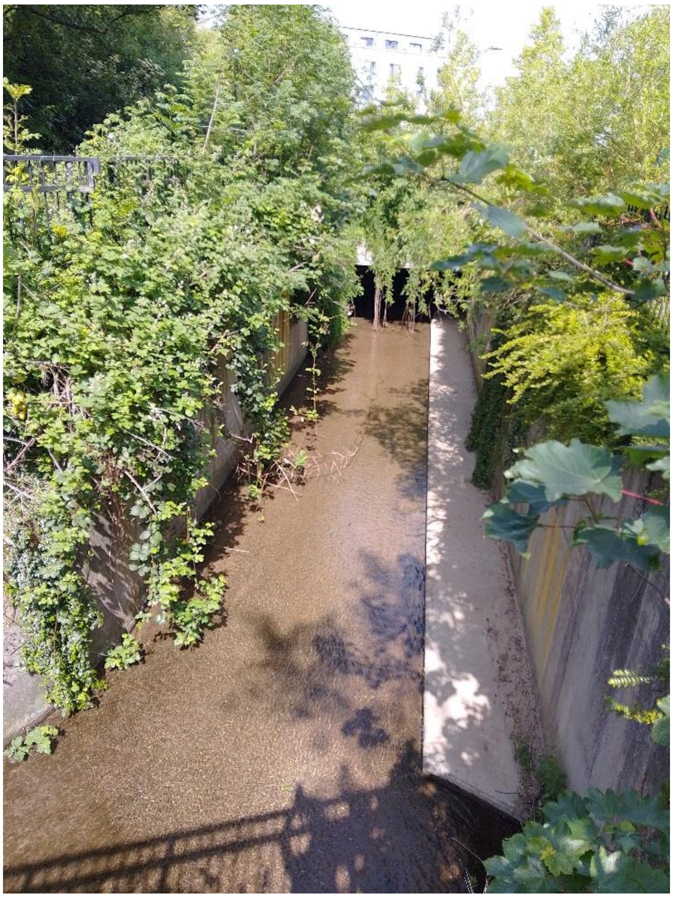

Photo 10 The concrete lined channel as it heads to the Waitrose car park culvert.

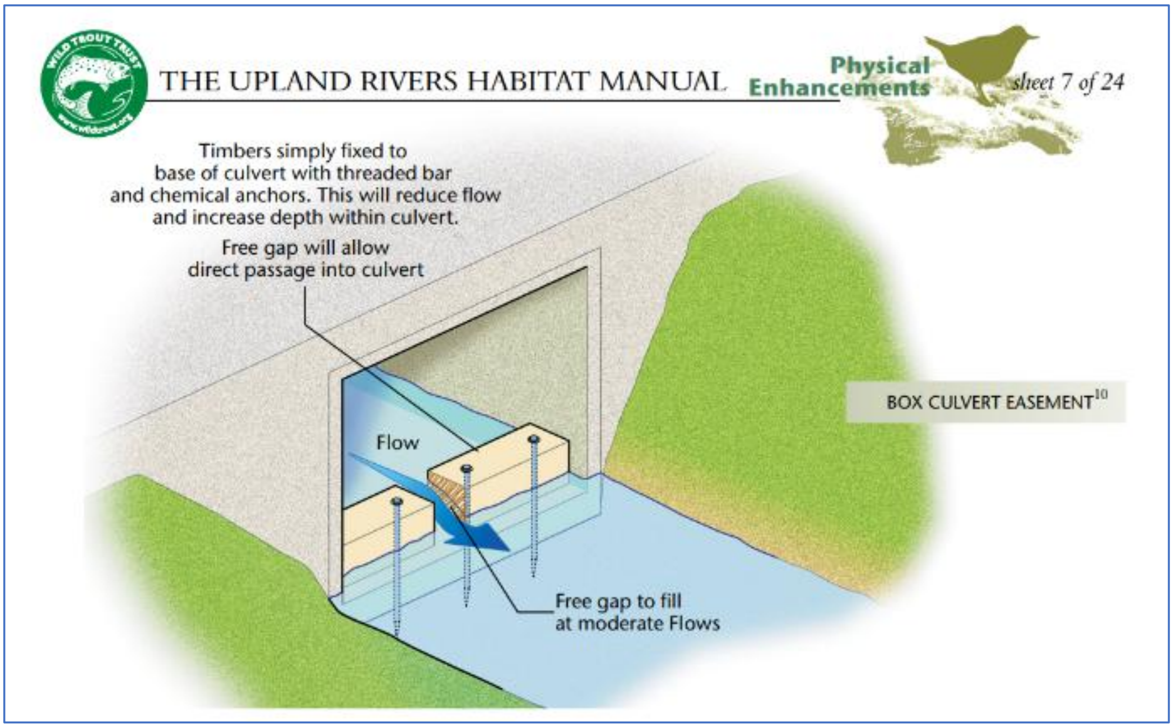

Figure 4 An example of a simple intervention to raise low flow levels in a culvert for fish passage. The bed gradient in the culvert will dictate how long a culvert this would work for. This could be replicated downstream of the low weir created in picture 9, to 'drown' it out by elevating water levels just downstream.

Figure 5 Alternatively, a series of low baffles can be installed in a culvert to create depth and flow conditions allowing fish to pass through at low flows (red arrows highlight the baffles)

Now some serious fragmentation happens to the Chelt (from 51.901170, -2.0849798), with the following situation effectively cutting the watercourse in half from an ecological connectivity point of view. This is a relatively complex situation, most easily understood in the overview map in Figure 6.

The Chelt is buried under Waitrose car park for 80m in a culvert (Photo 11), it then reappears, and the channel is split, with one side going over a large vertical weir and put through another 60m culvert (Photo 12). The second, left-hand channel (St James Walk Flats overflow channel) goes through a short additional culvert (Photo 13), reappears for 35m, is culverted under Honeybourne Way (Photo 14), then put over a high vertical weir. Whichever route fish try to take up or downstream, they are faced with an impassable vertical barrier or significant length of potentially impassable culvert (Photo 15 and Photo 16).

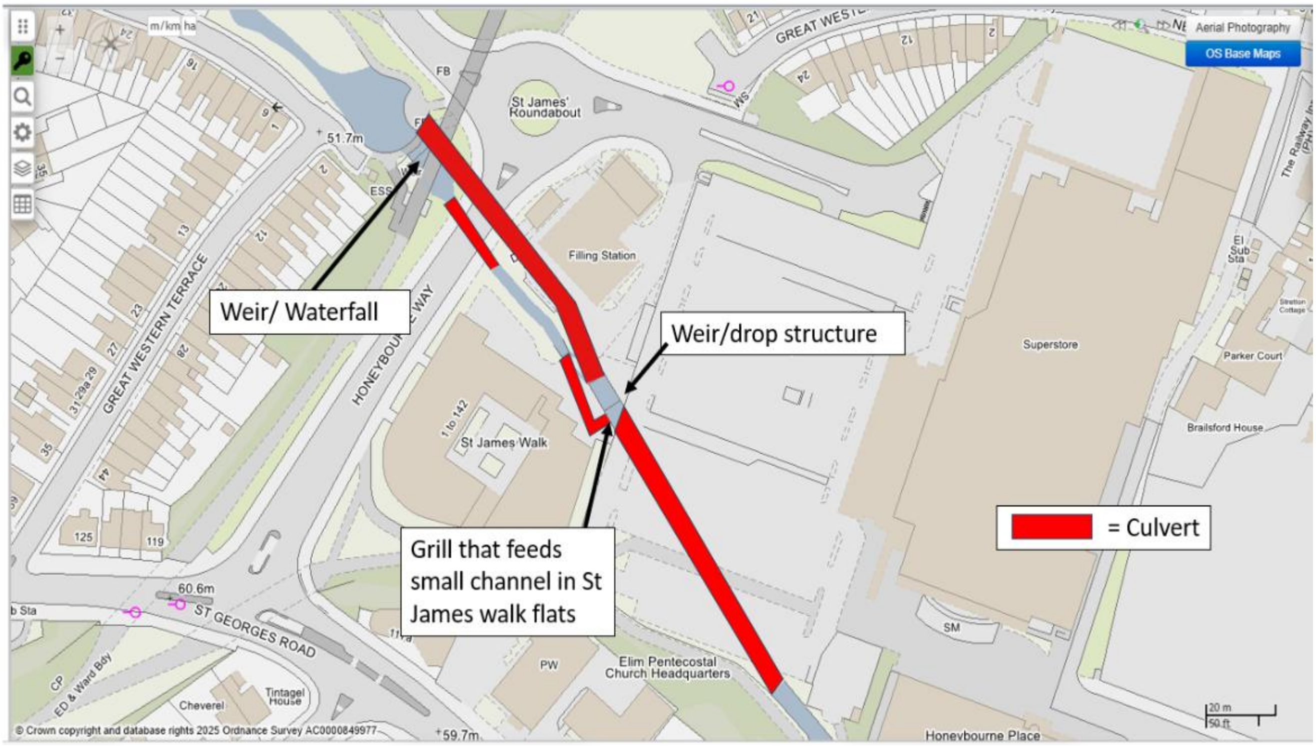

Figure 6 An overview of the complex situation the river is put through under Waitrose carpark, high weirs and culverts downstream. This ecologically severs the Chelt here for aquatic life (Map courtesy of Environment Agency data and Cheltenham Council).

Photo 11 Car park over the River Chelt. The dark, underground channel will not be used by fish.

Photo 12 The large vertical drop and next culvert – right hand channel. An elver pass has been installed to the side of this.

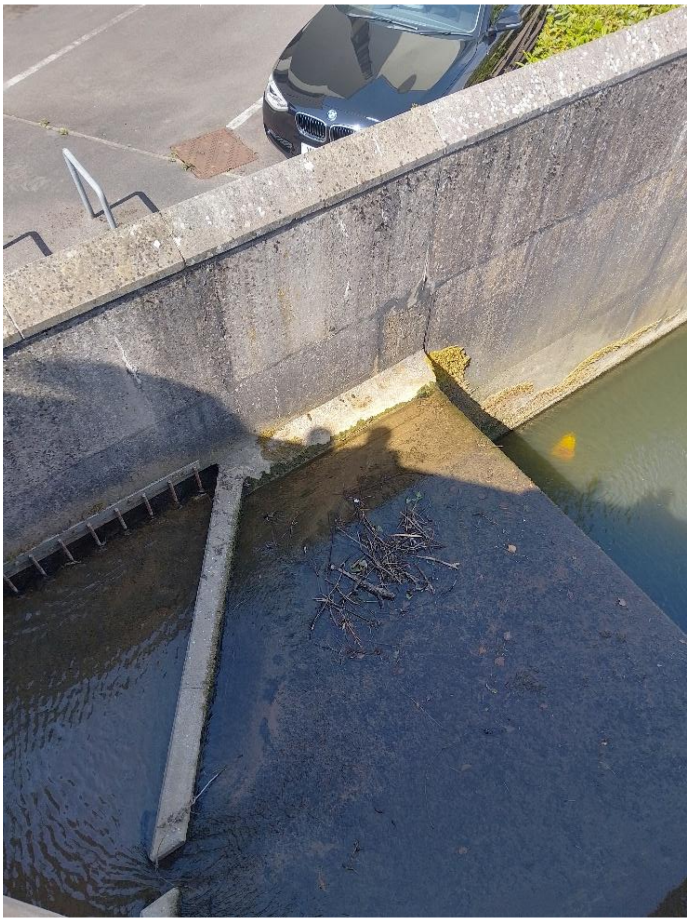

Photo 13 The grill that feeds the small left-hand channel past St James Walk Flats.

Photo 14 The short section of watercourse past St James Walk Flats, before it is culverted under Honeybourne Way. The emergent marginal vegetation should be

allowed to develop to provide a little habitat here; cutting it does little to reduce flood risk, compared to the adjacent hedge or huge throttle effect of the culvert entrance which are potentially far bigger issues!

Photo 15 The vertical drop at the end of the St James Walk 'overflow' channel. Another elver pass has been installed on the far bank.

Photo 16 Looking back upstream at the two connectivity issues fish face in this section of the Chelt – a massive culvert or a vertical weir. It is unsurprising eels are not well represented in fish surveys upstream, as they can't easily get there, despite the elver passes. Should pollution events occur, and fish populations are lost upstream, it will be very difficult for natural recolonisation to occur. The Chelt regains a little dignity here, escaping completely concrete lined channels. Despite the LHB being heavily strimmed, the slightly undercut bank and remnants of vegetation trailing in the water afford some refuge to fish and invertebrates. Submerged aquatic plant life starts to proliferate – water crowfoot (Ranunculus sp.). This is a very beneficial species and provides habitat for a great range of insect life, excellent cover for all fish species and constrains the channel to create positively energised flow diversity amongst its submerged clumps. This in turn drives a plethora of habitat niches for aquatic species to exploit. Lowering all of the grassed bank area would allow space for moving the channel away from the concrete retaining wall and provide a large area of additional flood water storage through a better-connected floodplain area.

The remainder of the Chelt down to the Gloucester Road is straightened and modified. Although within a small 'green corridor', the Chelt now has housing adjacent to the left-hand bank, a footpath and key access road (Honeybourne Way) above the right-hand bank. The left-hand bank is wooded at the start of this reach, the grassland on the banks between the footpath and housing is heavily strimmed everywhere else, again in the interest of reducing flood risk (Photo 17).

The substrate in the river channel along the first 100m or so is generally man-made rubble, with a small amount of natural material filling the gaps. The size of the rubble creates some flow diversity and structure the fish species present can utilise as functional habitat. This is too large for trout to spawn in, so uptake of habitat by juvenile fish may be limited. Water crowfoot, (*Ranunculus* sp.) is generally absent along the first section, most likely due to natural levels of shade from the bankside trees on the left-hand bank. Other features present were surface water drains with flap valves and erosion (Photo 18 and Photo 19).

Photo 17 The Chelt along Honeybourne Way (51.903077 , -2.0873508). Straight and within a classic flood engineered trapezoidal channel shape. Due to lack of natural sediment supply, the substrate is mostly man-made materials but will possibly function with the same effect as larger cobbles and boulders found naturally in streams. Trout, bullheads and all aquatic invertebrates will use the structure as key habitat in this section. Leaf litter from the adjacent trees will provide basal resources for shredding and grazing aquatic invertebrate groups.

Photo 18. One of two adjacent storm overflow drains (51.903289 , -2.0874793). What gets discharged to the watercourse from these drains is always a big concern. Obtaining a services map of pipework to review the likely inputs will help understand water quality impacts to the Chelt. GORC can also actively monitor upstream and downstream during periods the pipe is running. Concerns would be contents of road run off (microplastics and pollutants) and misconnections in residential properties (washing machine phosphate input). Mapping features like this and engaging the Council may provide opportunity to break these out (space provided) and run through an urban sustainable drainage system feature (SUDs – e.g. swales, retention pools etc) to allow the water to settle out fine sediment and contaminants a little before reaching the river. Examples such as the 'Outfall Safari' highlight where community groups have mapped issues before: https://www.southeastriverstrust.org/projects/outfall-safaris

Photo 19 Points of bank erosion and unknown flexible pipes entering the river along the right-hand bank. Unvegetated and un-naturally high banks are very susceptible to erosion. Overly rapid (accelerated) rates of erosion create issues for stream ecology as fine particles of riverbank soil settle on the bed, smothering available habitat for fish and invertebrates. The reason for the pipes and what they are doing should be identified. If discharging to the watercourse, there may be implications for water quality (assuming they aren't for abstracting water).

The final section of watercourse reviewed on the day had open grassy banks on both sides. The grass has been heavily strimmed, limiting habitat value. With less tree shade here, in-channel plant growth is now much more prolific, with some excellent *Ranunculus* growth mitigating the lack of habitat in the channel and margins of the high banks (Photo 20), although only during the summer. Ranunculus can exert a strong, beneficial influence on flows, by narrowing the channel to speed flow up between clumps of plant growth (and keep the riverbed clean of silt) and slowing flow down even to areas of no flow in places. The physical structure of the plant and flow diversity it drives creates a wide range of opportunities for all manner of aquatic animal life. As an indicator of this, emergent bur-reed, a marginal or still water species, is growing through the middle of the water crowfoot clumps, where flows have been reduced to nil. The modified channel form may also be over capacity for the volume of water available, facilitating this mid channel growth of reed. However, this is excellent structure for emerging dragon and damselflies when growing in the appropriate location. As the year progresses, the plant growth will naturally weaken and start to die back at the end of the summer; higher flows will naturally remove the plant material returning full flood capacity for the wettest parts of the year.

Photo 20 The final section reviewed, running down to the Gloucester Road. Nice in channel plant growth is present in between the modified banks and channel.

While reviewing the watercourse, a couple of local residents engaged in conversation and gave very useful background to flood issues and previous experiences where properties have flooded. Obviously, there is a high level of resident concern about future floods – properties are relatively close to the watercourse toward the end of the reach here (Photo 21).

Once again, the channel of the Chelt has been artificially deepened and straightened, in between high banks, in the interest of water conveyance and flood risk management. In this situation, the bankside material is again taking up space that could be used for flood water capacity. Once the river level gets to the top of the bank, it can then only spread toward the surrounding infrastructure and homes. Regrading both the left and right bank and removing spoil, plus removing any throttles and impoundments to flow downstream, will provide much better flood resilience and capacity before it spreads to the surrounding area (or help avoid this). This will also help natural vegetation growth occur with water plants growing in the right places to help drive habitat quality.

Photo 21 Removing a large amount of the bankside material here would increase flood water storage capacity, while also giving an opportunity to lower bank heights, re-meander the watercourse and create bed level diversity and

subsequent variety in flow. It would also provide an opportunity to reinstate some natural and local material in the riverbed, especially gravel and pebble sized substrates for trout spawning. Giving the watercourse more space by regrading banks could offset allowing natural habitat features to evolve flood capacity wise. Leaving the water crowfoot and allowing a small marginal fringe of vegetation to develop will provide a huge boost to both aquatic wildlife and general insect life (especially pollinators) – equally important to local bird and bat food webs.

Photo 22 The end of the section of Chelt reviewed at Gloucester Road. The end of the channel that can be seen in the middle distance becomes quite constrained and a small brick wall interacts with the channel. This should be reviewed to avoid any influence on flood water being backed up by the constraint here.

Given the flood risk concerns, proposing habitat enhancements based on the current channel dimensions and bank profiles are unlikely to be received well by adjacent residents, as any further constraints to flow may increase flood risk perceptions. On the day, residents were suggesting the in-channel plant growth was in fact the grass that had been strimmed off the bank and thrown in the channel, causing increased flood risk. A habitat restoration scheme could be developed that helps alleviate flood issues, creating dual benefits, especially if delivered alongside a suite of other interventions in the wider catchment, aiming to engage residents and win their support.

4. Recommendations

- Advocate for allowing instream and marginal vegetation to develop and provide fantastic habitat for a wide range of animal species associated with the river, where it is currently managed for flooding.

- The most feasible option for fish passage at the massive barriers around Waitrose car park would be to create a route through the overflow channel. This would involve adapting the weir at the downstream end (Figure 7), ensuring passage conditions in the culvert under Honeybourne Way, adapting the grill and offtake into the overflow channel just downstream of Waitrose and adapting the culvert under the car park, below.

- One option for improving fish passage at Waitrose car park is cutting out discreet sections of carpark over the Chelt and replacing with solid grating to allow some light down to the channel. Locating these at up to eight car parking spots as per (Figure 8) may be a viable approach. Additional approaches to managing flow and water levels through the culvert should be considered with a fish passage specialist (e.g. feasibility of baffles, location and installation).

- Consider lowering or regrading of the riverbanks through the green spaces to allow for more space for the river to develop and improve flood water capacity and flooding resilience.

- Engage with local partners at the Council, Environment Agency, Severn Trent Water to develop projects. Continue involvement and engagement at the Severn Vale CaBA group.

- Keep up the great water quality monitoring work and flying the flag for the Chelt!

Figure 7 Example of a rock ramp. It could be possible for the concrete in the overflow channel between Honeybourne Way and the weir to be chopped out, reformed and a rock ramp installed across the gradient between the Chelt downstream on the road culvert – buried underground service cables and pipes allowing. Alternatively, a technical fish pass could be investigated, but these are very expensive to install and need maintenance. Baffles at the entrance to the culvert may be required to maintain water depths and velocities to enable fish passage. It may be a variation on this solution could be used at the top of the overflow channel to get fish up to the Waitrose car park culvert.

Figure 8 A potential concept for letting light into the culvert below the Waitrose carpark; replacing car parking spots with a solid steel grate (▨ highlighted by the white bracket). This should allow light through while retaining car parking capacity. It may be possible to install some sets of baffles in the culvert, by engaging with the engineering team responsible for maintenance of the channel asset.

Figure 9 Pulling banks back will provide space for the water course and more flood water capacity, whilst easing impacts of high velocity flows.

Figure 10 Regraded banks alongside modified channels allow natural river features and marginal plant growth to develop , without impacting flood water conveyance capacity. . In conjunction with a modelled suite of catchment wide flood resilience interventions, it may be possible to consider actions such as this on the Chelt, allowing nature to return at the same time.

5. Further assistance

The WTT may be able to offer further assistance such as:

- WTT Practical Visit

    - Where recipients require assistance to carry out the improvements highlighted in an advisory report, there may be the possibility of WTT staff conducting a practical visit. This would consist of 1-3 days' work, with a WTT Conservation Officer(s) teaming up with interested parties to demonstrate habitat enhancement methods (e.g. pinned woody material, willow planting, willow laying, etc.). Please contact your local WTT Conservation Officer for further information.

- WTT Project Proposal

    - Where recipients require a more substantial restoration project developed, involving larger capital delivery and exterior funding, WTT may be able to develop recommendations from this document into outline proposals, indicative costs and designs to take forward for funding. Often this can be in collaboration with other catchment conservation partners, such as Environment Agency, Rivers Trusts and Wildlife Trusts.

    - **Trout in the Town**. WTT has specific focus on urban watercourses and community groups, delivered through the Trout in the Town project. This provides help and support on how to care for urban rivers and deliver beneficial projects, including get togethers and the Urban River Toolkit: https://www.wildtrout.org/content/trout-town

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

https://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 debris, enhancing fish populations and managing invasive species.

The DVD is available to buy for £10.00 from our website shop www.wildtrout.org/shop/products/rivers-working-for-wild-trout-dvdhttp://www.wildtrout.org/shop/products/rivers-working-for-wild-trout-dvd or by calling the WTT office on 02392 570985.

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 Christina via office@wildtrout.org.

6. Acknowledgements

The WTT would like to thank the Environment Agency for supporting our advisory and practical visit work in England.

7. 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 must be sought before commencing work on site. These are not limited to landowner permissions but will also involve regulatory authorities such as the Environment Agency, local Council – and any other relevant bodies 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 fishery.