



YAZOR, WIDEMARSH AND EIGN BROOKS STRATEGIC DEVELOPMENT PLAN

A Vision for the Yazor brook blue green corridor through Hereford
City

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collaboration with the Hereford Yazor Brook Restoration Project
<https://www.herefordshirewt.org/loveyourriver>

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Ambitions of the Hereford Yazor Brook Restoration Project

**Improved connectivity,
reduced flooding risk, pollution control,
enhanced natural beauty.**

'Cleaner air, naturally'

Planting suitable space with Norfolk reed to remove pollutants from the water and air.

Improve connectivity for people and wildlife

Improve the pedestrian network.

Enhance and create bridges and foot paths.

Zero pollution
Action
Plan

'Stream daylighting'
Innovative urban landscaping

Use modern urban landscape techniques to reintegrate the brook with the landscape

Support local communities to take action against polluters and action for wildlife

Working with farmers and landowners to help adjust to climate change and extreme weather events

Support Herefordshire Council and associated industry to understand the ecological value and aesthetic potential to ensure best practice urban development.

Introduction

The purpose of this report is to identify how the blue green corridor can further be protected and enhanced for the benefit of wildlife, amenity, flood resilience, community health and wellbeing and climate change mitigation.

Background

The Hereford Yazor Brooks Restoration project (HYBRP) is the principal project run by the city branch of Herefordshire Wildlife Trust (HWT) and fully supported by HWT. The Project has run in its current form since 2017 but inconsistencies with funding have limited the breadth of operations. It is testament to the efforts of the voluntary management team that continuity is and has been ensured.

Achievements to date

Strategic overview

A steering group was formed in 2018 to include stakeholders from The Environment Agency, Welsh Water, The Wye and Usk foundation, Herefordshire council and Herefordshire wildlife Trust officers and volunteers. Ongoing relationships have allowed effective collaborations to address issues to include pollution, abstraction, fish rescue permissions, landscaping consents and risks to the watercourse including development.

Physical interventions

- Tree planting and protection,
- pollution monitoring and reporting,
- invertebrate surveys,
- phosphate sampling,
- riverbed enhancement,
- landscaping enhancements,
- habitat creation,
- wildflower enhancement work and mapping.
- The project enjoys robust community input guided and delivered by a number of key professionals. Project details can be found at <https://www.herefordshirewt.org/loveyourriver>

Potential and Project vision

The HYBRP's core objectives are to act on behalf of urban nature and the restoration of ecosystems for wildlife and people alike. The project seeks to embed nature within the city making access easier, increasing residents connection with nature – especially those who do not have the means to access rural reserves. It enhances amenity value and an awareness of our local heritage. It strengthens community ties and enables greater community engagement.

Towns and cities are increasingly undertaking projects to uncover their hidden watercourse assets, reconnecting them to their floodplains, creating urban wetlands,

nature-rich walking routes and recognising the many health benefits they bring. We can take inspiration from these projects and as a result, action.

Community relations have been important to HYBRP. Community feedback has been positive and predisposed additional support and ownership. Additional tree maintenance, informal monitoring, fish rescues, litter picking and pollution reports have consistently secured support from local people during work-party interventions. HYBRPs practical interventions have

- enabled better visibility of the watercourse, thereby increasing public appreciation.
- increased aquatic invertebrate populations and riparian biodiversity,
- reduced the impact of pollution.

Because of the proximity of the corridor to the built environment the brooks will always experience certain pressures. As a consequence, the need for a robust cohort of volunteer wardens to maintain support for HYBRP work is essential.

Our vision

- To restore, maintain and improve the watercourse as a healthy blue green corridor.
- To better integrate the watercourse into the existing floodplain through intuitive landscape design schemes.
- To improve public access both by enhancing the existing cycle and footpaths but also by developing new routes
- To increase the tree canopy throughout the corridor where appropriate as we recognise that tree cover is relatively modest throughout the city
- Stopping pollution discharged from land drains, Welsh Water assets and other abutting industry, housing and development
- To improve the aesthetic impact of the watercourse through the corridor.
- To increase biodiversity through habitat management and additions such as planting and refuge creation.
- To increase community ownership and enable a greater understanding of the natural importance of the corridor

Problems to address

- ***Permissions***

During all previous practical interventions, we have ensured that any consent for activities including tree planting, brook excavations, tree coppicing and sign installation have been secured from identified landowners. However, there are a couple of green spaces including the 'prairie' area adjacent to Yazor Open Space, where landownership is unclear with land registry documents contradicting the understanding of local landowners. Time is required to clarify true ownership of some

of the green spaces along the corridor. It is also true that some landowners are difficult to engage with any sense of continuity. We are acutely aware that relationships with landowners should be consistently maintained for best results.

- ***Biodiversity loss.***

Poor urban development strategy and insensitive landscaping practises have meant that the brook channel has been repositioned and channelised within the corridor in a number of areas. Examples include the Essex arms site and the prairie where much of any naturalised character has been lost, as have any features such as pools and riffles within the stream bed. When this happens, the watercourse loses some of its ability to maintain and contain flows and as a consequence flooding and extended periods of drying are more likely. Shading of the watercourse and excessive marginal vegetation compromises light and reduces aquatic life.

- ***Reduced maintenance offered by external agencies/funding cuts/relinquished ownership***

Excessive blockages of litter and debris increase the risk of localised flooding and microplastic contaminates. The HYBRP cohort have removed many large litter and debris dams throughout the corridor and reported several incidents of fly tipping to Herefordshire Council. HYBRP works with other litter picking groups in Hereford to ensure litter contamination is kept to a minimum. Given the limitations of local authority contractors to effectively manage pollution control, HYBRPs contribution is highly significant.

- ***Maintain scrutiny around pollution***

Pollution continues to be a problem and ongoing efforts to remove litter and report spillage from land drains and CSOs continue to hold real value. HYBRP have worked closely with the Environment Agency to investigate a variety of pollution events identified from Industry, and discharges from assets belonging to Welsh Water. Continued lobbying and incident reporting are essential if the ongoing health of the watercourse and its surrounds is to be upheld.

- ***Flooding***

Since the Yazor brook flood alleviation scheme (YBFES) in 2012, where hard landscaping below Credenhill redirected excess flows from the upper Yazor catchment into the river Wye, deposition of sediment has increased quite dramatically through the channel below the take-off point. Because of the change in natural flow regimes and fluctuations in flow, which would naturally remove debris and sediment, the bed of the watercourse has risen as a direct consequence of silt deposition. Whilst in the immediate term the YBFES has reduced excess flows and possible flooding in areas such as Merton Meadow in the city, it has predisposed the likelihood of more severe localised flooding events because of the reduction of flow capacity in the watercourse throughout the city. We have identified a number of areas where the channel can be re-naturalised. (please see strategic goal 6)

We propose to monitor vulnerable areas and make physical interventions where suitable and practical.

STRATEGIC FIT

HYBRP will continue to connect people to nature through its aim to make the Yazor Brook a blue green corridor that forms a highly visible, high value amenity swathe through Hereford City. It will provide local neighbourhood groups, organisations, schools, tourists and residents with an opportunity to:

- Restore wildlife habitats, monitor wildlife, and support citizen science work.
- It will help put nature into recovery, providing a valuable 'public good', contributing to climate adaptation and mitigation.
- It will provide a broader range of events and experiences for people to enjoy while contributing to the health and mental wellbeing of Hereford's citizens.
- it will support local neighbourhoods and groups to campaign to bring nature closer to them.



Strategic goal 1

Promote health and wellbeing through 'green prescribing.'

It is now widely recognised that people need nature and natural settings for a healthy mind. Improved green infrastructure will nurture everyone. We propose working with Hereford Medical Group and Station Medical Centre during the landscaping phases of the Essex arms site in the event of its transition to a Wetland Reserve. Our approach would be to work with the sector to establish the most effective means of green social prescribing. This will enable the centre and partners to develop a more holistic approach to healing, providing onsite training to enable collaborators to experience nature and the tranquility of a wetland environment as a proven remedy to address mental health. The Wildfowl and Wetland Trust (WWT) are among many recognised organisations that support this aptly named 'blue prescribing' <https://www.wwt.org.uk/discover-wetlands/wetlands-and-wellbeing/>

Strategic goal 2

Working with local schools

- *Additional tree planting adjacent to Whitecross High school*

This area has been identified as a suitable location for additional tree cover. It is part of the flood plain and predominately scrub grass. Workshops with pupils have

identified a reasonable mix of flora and fauna. The landowner has been contacted previously in an attempt to secure permission to populate the area with additional planting. Permission has not been granted at this point but the opportunity to liaise with the landowner during future landscaping schemes has been offered. We would propose working inclusively with pupils from the school and have established that this scenario would be possible and would be welcomed by the school itself.

- *Working with Trinity Primary school, St James (Bartonsham), St Thomas Cantilupe.*

HYBRP has worked with several primary schools to create some of the design and information contained in HYBRPs interpretation panels which are spaced throughout the Yazor corridor. Students have built habitat boxes and undertaken ecological surveys. We should ensure this work continues and our connections with schools are maintained and developed.

We also propose engaging with students from the wider Hereford City's educational cohort to include the 'New Model Institute for Technology and Engineering' (Nmite) as a statement of intent for the future ambitions of the Essex Arms site and other locations to suit.

Strategic Goal 3

- ***Increasing our effectiveness to challenge polluters and reduce pollution***

Pollution has been a consistent and growing issue throughout the brook's length across the city. Over the last 7 years we have observed several land drains and other outfalls secreting untreated sewage and grey water. We have reported these events to the perpetrators which include Welsh Water on numerous occasions but still sadly many Welsh Water asset outfalls continue to secrete grey water and untreated sewage into the watercourse. Our ambition is to create a group that is able to apply greater pressure to the polluters and source funding to take independent legal action against the polluter. We are currently exploring a mechanism with Fish Legal <https://fishlegal.net/> that might enable us to do this. We may work in association with Hereford Angling Association to realise the brook's value to Angling in the county given its standing as an important River Wye juvenile fish refuge.



Citizen science has played an important part in establishing the extent of pollution throughout the Wye catchment. Testing for high phosphate levels and other contaminants falls to a network of volunteers along the Yazor brook, some of whom have enjoyed recognition for their efforts in recent national media coverage <https://www.theguardian.com/global/2023/aug/12/citizen-scientists-make-a-vital-difference-the-locals-who-proved-the-river-wye-was-polluted>

Testing for contaminants to this extent has never been more important. Firstly, to ensure that the Environment Agency (EA) are constantly updated with the results but also to ensure that there is an opportunity to establish the source/s of excessive illegal concentrations of contaminants. At the point of writing there is an ongoing investigation by the EA into excessive concentrations of ammonia found to be particularly high in the Widemarsh and central sections of the brook. The EA has also recently discovered the source of contaminants that had caused the manifestation of sewage sludge in the section of watercourse along Widemarsh walk. Reporting by HYBRP continues to support the watercourses welfare. We propose to ensure that there is always sufficient capacity to continue working with the EA and associates to bring polluters to task.



Image: photo taken by HYBRP of sewage sludge on the bed of the brook as it runs along Widemarsh walk.

Phosphate sampling sites are located as SP5 on the interactive map; see also appendix 1

<https://www.google.com/maps/d/edit?mid=1aJsoaoWccRadW0EhOZYVuy7BSULgQcY&usp=sharing>

Contributing to planning consents where development may influence the brooks welfare

HYBRP has more than sufficient capacity to offer thoughts and recommendations to the planning department to inform on how any urban development can make the best use of the watercourse, best avoid contamination, and/or compromise biodiversity.

Increasing areas of Norfolk reed colonies for improved water and air quality at Sedgefield, Essex Arms site, the Prairie. Cleaner air, naturally!

Herefordshire Council are very aware of the associated problems of contaminated air. Recent modest attempts to address these include placing three small moss filters in the city. <https://www.herefordshire.gov.uk/mossfilters> . There are a number of areas including the green space immediately adjacent to Whitecross school, sections through Moor Park, the 'prairie', the Essex Arms site and Sedgefield, a designated national nature reserve, that would lend themselves to significant planting schemes. Schemes of this nature covering hundreds of square metres would have a significantly greater positive impact. Strategic tree and vegetation planting schemes will help to adopt climate change, water and air pollution mitigation and adaptation strategies.

Planting *phragmites sp* or Norfolk reed has long been recognised as a highly valuable means of locking up and treating contaminants in water. We have established three potential areas that lend themselves to the introduction of Norfolk reed along the corridor through the City reaches. We are also aware of significant potential in establishing reed beds above the city limits especially below the newly proposed developments around Huntingdon. Reed beds are also highly attractive features and provide valuable wildlife refuges. Equally these sites should be managed for the long term with a cyclical management program and adequate budget set aside at the planning stage.

Reed planting to treat contaminated water through absorption including phosphates and heavy metals into their root mass. Examples include the Firs Farm wetland created off the Moore brook in north London where Norfolk reed plantings have reduced phosphate levels by 70% <https://open-city.org.uk/films/moore-brook-green>

Strategic goal 4

Additional tree planting and ongoing maintenance requirements

During the delivery of the HYBRP, numerous trees have been planted throughout the corridor to include tree enclosures and larger fenced-off areas. It has fallen to HYBRP to maintain these trees and enclosures and we have established good relations with landowners including Herefordshire Council and Connexus to ensure their sympathetic management of abutting green space. Given the need to maintain adequate protection and tree care such as watering and repairing guards and enclosures it is essential that the warden network is supported over the next 5 years or until such time as the majority of the recent planting is robust enough to self-sustain. We also anticipate the need to remove the fencing around the larger tree compounds/enclosures and reuse the fencing elsewhere sometime around 2025.



Aerial view of a tree compound immediately south of Yazor Road. Ref Y7 on the Interactive map.

Strategic goal 5

- **Landscape enhancement work**

‘Stream Daylighting’

There are several sections through the city where the watercourse runs underground and/or where it seems occluded by tree canopy or excessive riparian vegetation. There are many sections of the watercourse where access is difficult and little effort other than those by HYBRP to maintain and enhance these sections has been performed to our knowledge. Sections of the brook including that next to KFC and



the section running between the hospital and the retail park, could be enhanced considerably with a scheduled management regime which would allow greater awareness and enjoyment by people passing these sections. HYBRP has worked to clear and maintain many sections of the brook and where we have increased the light intensity, we have recorded improved aquatic life and visual impact. Enjoyment by pedestrians is frequently shared with HYBRP work parties. The expression 'Daylighting' is generally used to describe the global movement to open up waterways and make best use of their existence. We propose to open up some of the hidden stretches of the brook to better integrate them into the city landscape. A good example of

daylighting can be found here:

Image left; HYBRP brook clearance work alongside Widemarsh walk. We propose additional operations of this type throughout the corridor

<https://www.theguardian.com/cities/2017/aug/29/river-runs-global-movement-daylight-urban-rivers>

Removal and greater exposure of land drain outlets in Moor Park and The Rose Garden, Ledbury Road

The size of the Yazor brook has diminished significantly over the last 20 years with much of the drainage infrastructure that was built into the corridor prior to the last two decades having a much greater physical presence than needs be. We propose removing and reducing the size of some of the brooks concrete protrusions to better integrate the outfalls into the modern landscape. We have sufficient in-house capacity through the HYBRP cohort to deliver on these ambitions. Improved integration of some of the uglier outfalls will improve the aesthetics of the corridor. Improved visibility of the outfall flows will also enable the warden network to observe and report pollution incidents on a more consistent basis, in turn reducing the likelihood of discreet, deliberate or accidental, pollution events to go unnoticed.

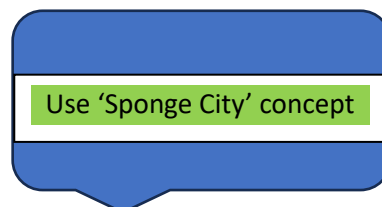


Both these images show examples of structures that should be removed with the outfalls better integrated with the landscape



Increasing surface area of strategic planting schemes for improved water and air quality to Sedgfield, Essex Arms, Pentagon

We propose working with all landowners and partners to enhance the green infrastructure to better withstand the effects of climate change and pollution mitigation.



Strategic goal 6

Implement natural flood management techniques.

Modern thinking recognises that urban areas should be full of natural spaces such as wetlands, planted trees and other sympathetic green infrastructure. Hereford City is lucky in that whilst it has by no means made the best of maintaining its green spaces it has the luxury of having some green spaces to make better! We would like to ensure that planning and development is not fixated on short term economic gain, so that when contemplating biodiversity net gain Hereford City would genuinely benefit from the Yazor corridor, through deliberate policy interventions.

Reintegrate the watercourse with the floodplain and naturalise the brook channel

Over recent years several sections of the watercourse have been channelised and redirected to facilitate a variety of developments including new road building. This in turn has made sections of the brook less attractive and less effective as habitat given

the uniform morphology. We have identified two different sites that lend themselves to this effort in a new approach to increase and support a return of wildlife.

1. The prairie

This green space that lies to the east of the Yazor brook exists as a block of scrub land primarily colonised with bramble and bindweed. During the growing season it remains impenetrable to human traffic but in turn provides valuable refuge for



nesting birds and foraging mammals. Whilst the reasons are not fully understood the brook skirts around the periphery of this green space in two distinct directions. This highly channelised setting could be vastly improved by enabling the watercourse to meander through the green space. We propose excavating a meandering channel and allowing this stretch of brook to reconnect with its floodplain. We would also propose creating a number of scrapes within the folds of the newly created channel down to ground source. These in turn will enable the proliferation of amphibian and insect life. We propose planting additional wetland loving species to enhance biodiversity, adding species into a space currently inundated with primary colonisers.

Image above: a section of the brook below the splitter weir leading into the 'prairie'. This length of the Yazor brook becomes known as the Widemarsh brook through this section. This tract was opened up by HYBRP allowing light to prevail and increase the amenity value. Ref W9 on the interactive map.

2. Essex Arms site

The Essex Arms site lies opposite The Station Approach Medical Centre adjacent to the link road. During the construction of the link road the brook channel was bridged over and redirected to run along the periphery of this site. During this time there was a period of drying of the Eign brook below the construction works resulting in a massive fish and invertebrate kill. Subsequently the brook here has regained its original flow volumes. We have had a great deal of contact with various council officers and members, and our (HWT) interest to take on the management of this space to include a natural landscaping scheme is well documented. The proposal to develop the site as a wetland reserve has been included In Herefordshire Council's draft City Centre Masterplan 2023, but despite considerable local authority support, there is some uncertainty around our proposal for a wetland reserve due to what we understand to be continued economic development arguments. There is, however, some agreed recognition and consideration as to how any biodiversity net gain can be used as a component to complement these ambitions.

Designs to better integrate the watercourse into the urban landscape, improve public access and amenity value, increase biodiversity and create a learning zone have been factored into HYBRP plans for the site. Please refer to the appendix for more details.



Image of Essex arms site from the air; the medical centre can be seen in the top right of this image.



A shoal of chublets photographed in a pool in the brook adjacent to the Essex arms site. At the time of writing a healthy shoal of chublets are still to be found in this pool. REF E1 on the interactive map.

3. Merton Meadow

This stretch of water course continues to be adversely affected by increased siltation. The area surrounding this part of the brook is earmarked for development. We propose that HYBRP is consulted by any developers and landscape architects that might be involved in developing the Merton meadow site to ensure that they are aware of the character of the watercourse and enable best practise to integrate and landscape the brook and make best use of the green infrastructure.

Benefits

- Improve brook corridor water storage
- Increase infiltration and groundwater recharge
- Improve aquatic and riparian habitat
- Increase filtration of pollutants
- Increase biodiversity
- Reduce erosion
- Increase aesthetic value
- Protection of ecosystems and better use of green infrastructure
- Improved opportunities for adult fish brook species including bullhead and stickleback and juvenile fish that use the brook as refuge during periods of flooding in the main river Wye such as chub, roach and dace.
- Improved recreational opportunities.

Strategic goal 7

Maintenance ambitions

To secure funding to purchase a Padi cargo vehicle or similar on which to transport water to attend to the needs of newly planted trees and transport working party equipment to support other enhancement works along the Yazor brooks system.

To secure funding for a lockup lease or purchase a shipping container to keep close to Moor Park or Foley Trading Estate to store equipment including a Padi cargo vehicle. The lock up could also be used for other HYBRP tools and equipment currently stored in a variety of volunteers homes and outbuildings.

Strategic goal 8

Connectivity

Despite excellent walking and cycling routes along residential sections of the Yazor brooks system, it is by no means complete and largely lacking adjacent to some of the larger industrial sites

- We propose to explore ways in which to create a cycle way behind the Avara and Heineken industrial plants.
- Currently, access for cyclists, pushchair users and those with a physical disability from Widemarsh Common to Plough Lane is impeded by a short metal pedestrian bridge. Access is impossible for wheelchair users so we would also like to work with Herefordshire Council and Heineken to source funding to re-engineer the pedestrian bridge or reroute the pedestrian access completely. This will then enable all non-motorised traffic to reach their destinations of work education and/or leisure more time-efficiently.



left; an aerial view of the pedestrian bridge.

Right; a view of the precipitous decent! Ref



Fantastic examples of cycle bridges occur around the world including the Melkweg Bridge in the Netherlands. <https://urbannext.net/melkwegbridge/> <https://www.nextarchitects.com/melkweg-bridge/> . Working with HYBRP Heineken and Herefordshire council could explore funding opportunities and work collaboratively to create a much more user-friendly pedestrian bridge. Improving both the pedestrian and cycle access through Hereford city but also demonstrating how forward-thinking industries can work with the local authority to enhance the local environment for the greater good.

Strategic Goal 9

Increasing and protecting biodiversity

In many respects the majority of the strategic goals have some bearing on increasing and protecting biodiversity.

Maintaining flows

Prior to 2003 the water generated from the then ongoing gravel excavation works at Stretton Sugwas was pumped into the Yazor brook. This maintained flows and so even during periods of low flows there were sufficient flow volumes to keep the brook



flowing. We propose exploring options with the Environment Agency to establish whether new arteries from the now flooded gravel workings could be created to inundate the brook channel during periods where it might be in danger of drying up. This will then ensure there will be no further losses to aquatic life during extreme weather events.

Image shows fish kill during period of drying below the link road excavation works

We propose to engage some of the larger industries including Heineken and Avara to establish whether a) it might be possible to top up flows to avoid drying by means of additional flows via temporary borehole extraction and b) whether they would be prepared to do so? We are aware that neither industries abstract as much volume as they are permitted to do so from the Yazor aquifer so if they were agreeable this might be an option as a short-term solution. Whilst it's likely that extreme weather events become more frequent, it has been our experience that periods of drying of the brook tend to be short lived although often devastating to aquatic life. Access to emergency short term flow top up would certainly be a life saver.

Creation of habitats and refuges HYBRP has in many sections of the water courses installed a number of bird boxes, bat boxes and built two otter holts, in addition to the natural working practise of creating log piles and dead hedges etc. Otters are occasionally spotted passing up along the brook and witnesses have testified as having seen otters hunting in a couple of areas where shoals of chublets have congregated. We propose to continue increasing the discreet installation of additional refuges and create additional habitat wherever possible.



Image. This photo was taken in April 2023 clearly showing the head and shoulders of an otter in Meyrick Street some few dozen yards from the brook corridor. HYBRP hope to continue to set camera traps along the corridor to record the valuable wildlife the brook supports. REF W10 on the interactive map.

River fly survey work

Over the last 6 years HYBRP has been undertaking river fly surveys by kick sampling in a number of specific sampling locations throughout the corridor. This is done as part of The Riverfly Partnerships Anglers Riverfly monitoring initiative (ARMI) <https://www.riverflies.org/anglers-riverfly-monitoring-initiative-armi>.

All our recordings are downloaded onto a system which then flags up any issues in light of declining test results and findings. It is important that this work is consistent and ongoing because it is the best indicator of the brook's health. We have established a real understanding of the healthiest sections of the brook and many of our physical interventions have increased fly life numbers in certain sections.



Volunteers sifting through a kick sample taken from a section of the Eign brook.

REF SR on the interactive map.

Strategic goal 10

Monitor extractions

The current Yazor Model Groundwater update project being undertaken by the EA is not yet complete. Once the EA has all the updated information regarding quantities of abstractions, locations and effects, it will be possible to better understand the effects of abstraction and the impact that abstraction from groundwater sources might be having. The EA might then be able to review licensing of abstractions.

Conclusions

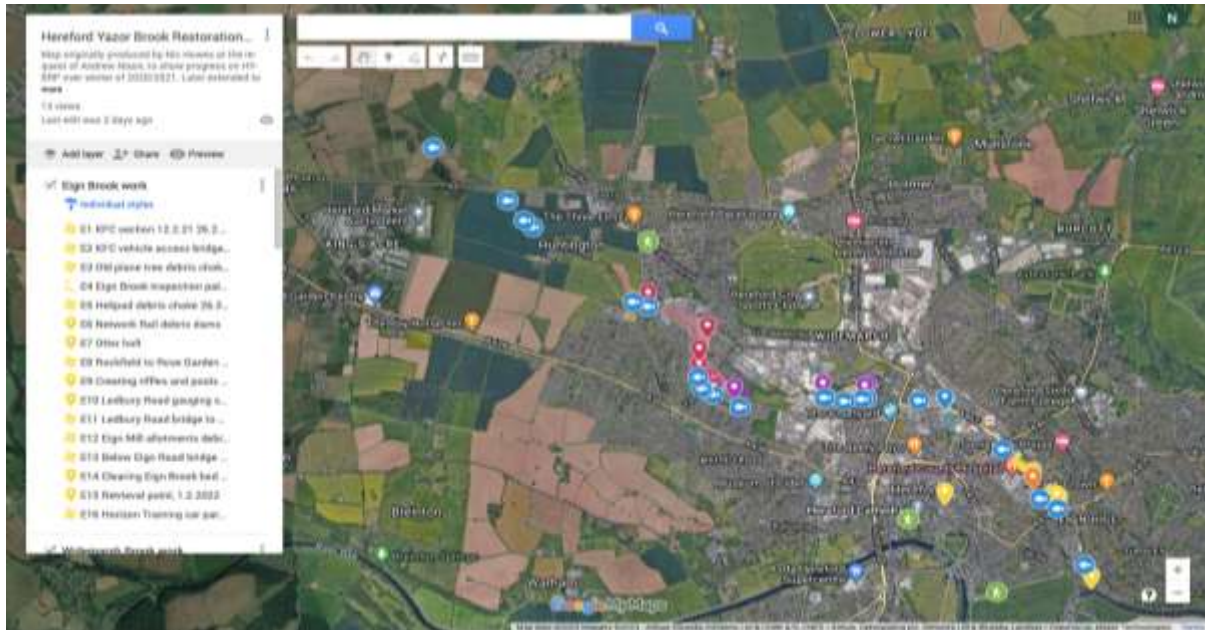
The delivery of many of the city's strategic green infrastructure and biodiversity ambitions are intrinsically linked to the brooks infrastructure and it is hoped that this report has enabled a greater understanding of how funding for 'greening the city', flood alleviation and adapting to climate change could be best directed for maximum affect.

Richard Fishbourne and HYBRP volunteer team, 2023.

Appendix 1

Hereford Yazor brooks restoration project – strategic development plan location reference map.

<https://www.google.com/maps/d/edit?mid=1aJsoaoWccRadW0EhOZYVuy7BSULgQcY&usp=sharing>



Appendix 2

HYBRP: MEET THE TEAM

<https://www.herefordshirewt.org/yazor-brooks-restoration-project-meet-team>

Appendix 3

Health and wellbeing 6

<https://www.england.nhs.uk/personalisedcare/social-prescribing/green-social-prescribing/>

<https://www.mentalhealth.org.uk/explore-mental-health/publications/wetlands-and-wellbeing-guide-winter>

<https://www.wwt.org.uk/discover-wetlands/wetlands-and-wellbeing/>

<https://time.com/6171174/nature-stress-benefits-doctors/>

Appendix 4

Tree and vegetation planting strategies to address air and water pollution 9

<https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.10245>

Appendix 5

Environment Agency Natural Flood Management and Evaluation Report Dec 2022

<https://www.gov.uk/government/publications/natural-flood-management-programme-evaluation-report/natural-flood-management-programme-evaluation-report>

Appendix 6

Suggestions to capitalise on the assets of the former Essex Arms site on the City Link Road

See attachment

Appendix 7

Maintaining flows and monitoring abstractions.

Note from The Environment Agency

p.16 – Maintaining Flows

With regard to connecting the flooded gravel workings at Stretton Sugwas to the brook, the water in the workings is thought to be at least partly groundwater-fed, and the relative levels of the lakes, groundwater, and the brook would need to be surveyed since the water table is generally lower than the brook here. Otherwise, you could potentially get water flowing out from the brook back to the lakes if the lake levels are lower, or no transfer happening at all when you need it. Seasonal fluctuations in levels of both water bodies would need to be surveyed too. This could also need a transfer licence for one source of supply to another, depending on a hydrogeological assessment.

With regard to pumping from Avara or Heineken boreholes to top up the brook, this would have to be done under an abstraction licence since it would be more than 20 m³/day. Whilst both companies do have some headroom as you mention, their licences only currently permit the water to be used for purposes related to their specific businesses. Whether one of their licences could be varied to add in a new purpose, or a new licence altogether is required, I'm not entirely sure. We would also have to determine the appropriate volume of water to be assigned to this purpose so that it is in line with the brook's minimum requirements for ecology. This would likely also involve undertaking some pumping tests to assess aspects such as how much water is retained in the channel downstream of any input. There is also the problem that the EA does not favour these schemes as they are seen as unsustainable (whole carbon footprint not just water use), so I would have to consult with our National team on whether we would even be allowed to issue a licence for this purpose here. The Environment Agency's Technical Guidance on this matter states that "There is a presumption against increased abstraction within unsustainable groundwater bodies (actual or fully licensed). This includes any increased abstraction to alleviate other environmental issues, for example, river augmentation to achieve flow compliance".

p.19 – Monitor Abstractions

Modelling of groundwater undertaken by the EA to date suggests that there is limited connection between groundwater and the Yazor Brook from around Kenchester down to Ledbury Road in the city. This is likely due to a mixture of natural and anthropogenic influences: low permeability glacial deposits (boulder clay) in the central area of the catchment restricting water movement due to sitting between the brook bed and the underlying permeable gravel aquifer; interactions with drainage infrastructure in urban areas; the gravel aquifer being highly permeable so able to transmit large volumes of groundwater; losses of groundwater directly to the River Wye channel from the gravels; and losses of water via commercial borehole abstraction. There could also be losses of water from the brook through its bed where it sits directly on more permeable gravels in parts of the upper and lower areas of the catchment, depending also on the amount of silt accumulation in the channel. Modelling also suggests that the impacts of groundwater abstraction on Yazor Brook flows are proportionally much greater during wet periods compared to dry periods – for dry periods there is generally more disconnection between water in the brook and a seasonally lower level of water in the aquifer. The current update of the groundwater model will hopefully be complete later this year so we should then be able to use the outcome to plan future management of the catchment and data collection.

The EA is committed to managing water abstraction in the catchment sustainably, whilst also having to consider local economic factors. Flows or levels of water in the brook are monitored at two locations, and groundwater levels are monitored at seven locations. Periodic spot gauging of flows in the brook is also undertaken for the whole length of the catchment. Ecology and water quality is also sampled in spring and autumn. Provision of abstraction licences is managed through Abstraction Licensing Strategies (ALS) and the Yazor Brook falls under the remit of the overall Wye ALS.

There are a few other possible options for managing existing abstractions. Unused permanent licences may currently be revoked without compensation if unused for a period of at least 4 consecutive years. From January 2028, under Section 88 of the Environment Act 2021, the EA should be able to make changes to permanent licences without paying compensation to the licence holder if it is causing 'damage' to the environment (rather than 'Serious Damage' under current legislation) or there is a need to meet an environmental objective. Also under the new Environment Act 2021, the EA should also be able to reduce volumes on under-used permanent licences as long as they have used at least 25% less than their licenced volume for every year over a 12 year period. However, these options are expected to be used as a last resort and the EA should work with abstractors to try for a voluntary agreement in the first instance.

If licences are time-limited when issued then there is an opportunity to periodically review them and decide if any changes need to be made, e.g. capping licence volumes at recent usage rates in preceding years. However, many older licences (over half in the Yazor catchment) were issued before time-limiting was introduced so they do not have an end date, and are therefore considered to be permanent licenses under current legislation.

Any of the above options might also need to be subject to a cost-benefit analysis which takes account of impacts on the local economy as well as the environment.

Groundwater protection

Good practice suggests having distributed storage in different features across the site in a 'treatment train' rather than just one basin at the bottom of the pipe. Distributed storage can more effectively slow down the flow of water into the basins and possibly result in a smaller capacity and/or depth being required. This could be beneficial in terms of limiting basin excavation volumes and depths into the protective Glacial Till cover within Groundwater Source Protection Zones. Examples of features that could be included are rain gardens, green roofs, water butts, permeable paving, swales, rills, ponds and wetlands. Biodiverse basins in terms of plant species are also considered beneficial to wildlife, rather than a mown grass mono-culture. Keeping as much water at the surface as possible and utilising natural drainage pathways is recommended. Winter springs, historic channels and culverted watercourses could be considered 'natural drainage pathways'. Culverts could be opened up and historic channel meanders re-instated to further 'slow the flow' of water towards the city.