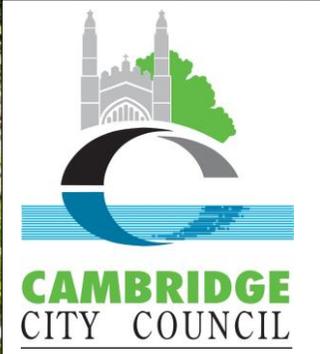


Greater Cambridge Chalk Streams Project Report



Prepared for Guy Belcher, Cambridge City Council, and Jennifer Thomas, Cambridge Water
Version 1.1

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Introduction

Purpose of this report

This report was commissioned by Cambridge City Council and Cambridge Water as an audit of chalk streams in the upper Cam catchment. It provides a brief overview for each river of the main issues affecting it and key opportunities. It also identifies some potential projects. These projects range from well-researched plans which will be delivered in 2021, to project ideas and long-term ambitions.

Almost all the watercourses in this report have at least one local person or group who know the river very well and will have more to add. The aim of this report is to start conversations about what needs to be done, where, and by who; and to facilitate funding and delivery of projects which improve the health of local chalk streams.

What is a chalk stream?



River Shep, Fowlmere

Chalk streams are mainly spring-fed watercourses rising from a chalk aquifer. Rainwater percolates slowly down through the chalk to the water table. Groundwater moves through the chalk bedrock and emerges at springs; there are often multiple springs along the course of a stream. The filtering and purifying action of the chalk means that water from chalk springs is characteristically “gin clear”, mineral rich, slightly alkaline, with a relatively stable flow. The stream bed is generally made up of flint gravel, because chalk geology contains flint deposits, with very little clay or sand.

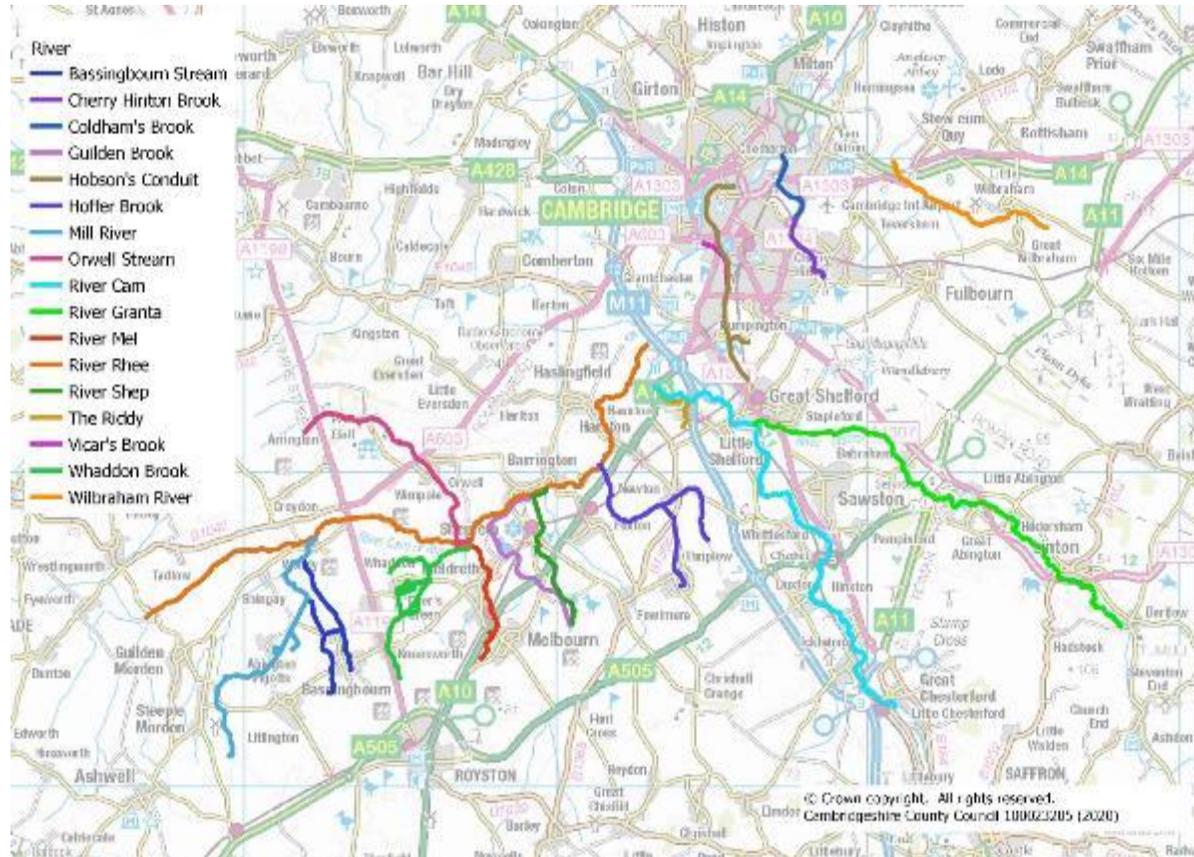
There are only around 200 chalk streams, found exclusively in England and northern France, as the chalk geology that supports them is limited to this area. Around 85% of them are in England. The unique characteristics of chalk stream water are linked to a unique ecology, supporting a wide range of flora and fauna from plants such as water-crowfoot, lesser water parsnip and water starwort, to a diverse collection of invertebrates and fish including the iconic brown trout. A chalk stream teeming with life is also attractive to water voles, which need plentiful plant cover and food, and to predators such as kingfisher and otter.

Because chalk streams are fed mainly from an underground aquifer, they have a stable temperature of around 10°C year-round. This seems cool in summer and warm in winter.

The unique and diverse ecology of chalk streams makes them a globally rare, and globally important, habitat. It could be argued that chalk streams are our local equivalent of rainforests.

Where are our chalk streams?

There is some discussion about exactly which watercourses to consider as chalk streams in this area, as rivers may rise from the chalk but then flow over clay. They receive water from runoff and treatment works in addition to groundwater, and display chalk stream characteristics in varying degrees. The map below shows the watercourses covered in this report.



Current threats to chalk stream ecology

Very few of our chalk streams are in “good” condition as defined under the Water Framework Directive, and nationally none achieve “high” status. There are several key reasons for this:

Flow Pressures: The high quality groundwater in chalk aquifers is in demand for public water supplies and irrigation. Groundwater supplies the population of Cambridge and surrounding areas with drinking water, so increases in our water consumption have an impact on the water available to maintain healthy chalk streams. Rivers gain and lose flows at different points and where groundwater levels are low water can simply seep back into the ground, despite

flow support. This occurred in 2019 on the River Granta at Stapleford. Our other chalk streams had similar problems. Even when a stream doesn't dry up, prolonged periods of low flow affect its ability to clean its gravel, manage its silt, and dilute inputs from runoff or treatment works. The need for a reliable supply of clean chalk groundwater is a necessity without which there is no chalk stream.

Channel modifications: Over the course of centuries, we have changed the course of rivers, for milling, irrigation needs or drainage. Straightening and deepening rivers by dredging has removed the majority of their natural gravels, which were deposited there by the powerful river flows of retreating glaciers and will not be replaced by natural processes. These gravels are crucial for fish and invertebrates and are another key feature of a chalk stream. Furthermore, water tends to move slowly and uniformly through a dredged channel, spreading silt across the bed, which builds up until the river is dredged again. A river needs variation in width, depth and shape to create its variety of habitats. Areas of fast-moving water scour the bed clean and sort gravel; deep pools slow the water, collect silt and are a refuge for larger fish. Meanders have areas of erosion and deposition, often with gravel shoals inside the bend and deeper pools on the outside. Vegetation in the water helps create areas of faster and slower flow too.

The problems associated with poor channel shape are exacerbated by low flows, which reduce the energy of the river and its ability to create and maintain natural features.

Poor water quality: A chalk stream should be fed by groundwater, both at its source and as up-welling throughout its length, and by natural rainfall runoff. Our desire for water abstraction and land drainage means less available groundwater from a lowered water table, and more runoff entering the stream directly through ditches and drains. This water tends to contain more silt, and often chemicals including nitrates and phosphates. Wastewater treatment works discharge treated water into our rivers, which often constitutes a significant proportion of river flow in small rivers and may contain significant levels of pollutants such as phosphates. Silt can smother gravel; phosphate promotes plant growth, which can lead to rivers becoming choked with large plants like branched bur-reed. These other sources of water also affect water temperature, the impacts of which are not fully understood.

These problems are also exacerbated by channel modification and low flows, which mean the river is less able to move silt around or to dilute the other water coming in to it.

What can be done?

Although almost all chalk streams are degraded, they are such important habitats it is definitely worth doing everything possible to restore them. A huge amount of work has taken place over the last 10 years or more in the Cambridge area to tackle the problems faced by chalk streams, from campaigning to boots-in-the-water habitat creation, and there is lots more to do. All the rivers mentioned here suffer from low flows at some point in the year, and increasing their groundwater base flow would dramatically increase not only the quality of the river but the opportunities to make it even better. Our water resources situation is akin to the climate crisis – as a society we need to use water more sustainably and make changes to how we abstract, store and manage water, reducing abstractions that impact the environment. Addressing these long-term issues is essential but outside the scope of this document. However, in the shorter term there is still plenty that can be done to help chalk streams, in particular by restoring river channels to a more natural shape and size, and adding gravel to create new riffle areas. Done well, flow rate will be increased enough to keep the gravel clean, flow diversity will increase, and the river will behave more naturally, requiring less maintenance. Most of the measures suggested can be grouped under 5 general headings:

Tree hinging and creation of low brush ledges: Where trees trail or fall into water they provide multiple benefits. The mass of twigs and branches is a refuge for small fish and invertebrates, and provides cover for larger fish further out. Woody material in the channel also narrows it, meaning water moves

faster and has the energy it needs to scour the river bed, or move silt to a nearby area of slack water. This can kick-start the river to create and maintain pools and riffles.

Gravel placement: Our rivers lack natural gravels as a consequence of past river dredging. Gravel placement creates riffles, where trout and minnows can spawn and which specialist invertebrates will colonise. Riffles help oxygenate the water and improve water quality; they also increase the speed and energy of flow so the river manages its sediment better.

Bank re-profiling: Dredging leaves rivers with very uniform steep banks, which are prone to erosion (adding more silt) and limiting the scope for marginal plants. Changing the shape of the banks increases variety and can energise flows by narrowing the channel at a low level and creating a low ledge (“2-stage channel”). It can allow more light in and provide better opportunities for marginal plants, which then stabilise the banks.

Dig ‘n’ dump: This refers to creating a more varied channel by moving existing bed material around. It works best where gravel remains in the river bed to be ‘dug’ and redistributed.

Long-term ambitions: Some project ideas will probably not be realised in the near future, but would be worth pursuing. These include large-scale bed-raising on the River Rhee and removal of weirs currently needed for flow data collection but which prevent fish passage.

Next steps

The next step is to consult on this document with all stakeholders, find out what are the current barriers to projects and work together to overcome them.

Links

State of England’s Chalk Streams – WWF report 2014

http://assets.wwf.org.uk/downloads/wwf_chalkstreamreport_jan15_forweb.pdf?_ga=2.36910758.783543509.1606234407-1010499354.1606234407

WWF UK Rivers and Chalk Streams page <https://www.wwf.org.uk/where-we-work/uk-rivers-and-chalk-streams>

How do chalk streams work? Chilterns AONB <https://www.chilternsaonb.org/about-chilterns/chalk-streams/how-do-chalk-streams-work.html>

Chalk Streams First, Salmon and Trout Conservation <https://salmon-trout.org/2020/04/22/chalk-streams-first/>

Environment Agency chalk stream blogs <https://environmentagency.blog.gov.uk/2019/07/19/protecting-chalk-streams/>

<https://environmentagency.blog.gov.uk/2019/10/02/protecting-our-precious-chalk-streams/>

The Rivers Trust Chalk Streams in Crisis report https://www.theriverstrust.org/media/2019/06/Chalk-streams-dossier_June-2019_FINAL_FINAL-1.pdf

Chalk Rivers, Wildlife Trusts info page <https://www.wildlifetrusts.org/habitats/freshwater/chalk-rivers>

Guardian article on chalk streams 2014 <https://www.theguardian.com/lifeandstyle/2014/jul/24/threat-chalk-streams-unique-contribution-global-ecology>

Green Alliance blog on chalk streams <https://greenallianceblog.org.uk/2020/10/27/chalk-streams-are-englands-rainforests-and-they-need-help-fast/>

Wikipedia, chalk streams (forgets to mention there are any chalk streams in Cambs) https://en.wikipedia.org/wiki/Chalk_stream

Bassingbourn Wellhead springs – rapid assessment of biodiversity and community value

Watercourse length 6.5km

River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Water vole, otter, water crowfoot, starwort, lesser water parsnip, occasional brown trout, possibly specialist inverts at springs.	Green
Brown trout presence	Has potential to support (good numbers seen ~15yrs ago).	Amber
Community group present	Yes	Green
Public access	Yes, access via footpath to parts near village, Wellhead Springs.	Green
Nature reserve / designated site	Only at Mill River confluence.	Red
Connectivity / fish barriers	Links to upper end of Mill River Nature Reserve but flows in long culvert beneath MoD Bassingbourn Barracks. Bridges (Brook Rd) may present barriers in low flows. Rolling Mill presents a significant barrier.	Red
Invasive species present	None recorded.	Green
Presence of gravel / natural geomorphic features / mature trees with roots	Very degraded in parts then surprisingly natural in others (Shedbury Ln). Upper reach near Wellhead Springs was dug out for fish rearing. Natural springs can be seen (CCC land). SCDC maintain above Brook Rd and landowners not always happy. Bassingbourn has natural springs and gravels. Mill River Reserve section also has some natural gravel although the channel is very overgrown. Most of the channel has clearly been straightened and dredged.	Amber
Flow regime	Supported flow at Wellhead Springs. Suffers from low flows but rarely dries. High flow sees a take-off channel used. Complex link with village moats.	Amber
Effluent / run-off inputs	None known	Green
Watercourse receives management	SCDC maintain above Brook Road due to land drainage risk to low-lying farmland near Wellhead Springs. Lower reach receives (poor) private work.	Amber
Habitat enhancement potential	Potential in upper and middle reaches. But connectivity to Mill River should be focussed on. Shedbury Lane areas should be considered. Springs area - bank reprofiling and stabilising, gravel placement, desilting, Mill River end - gravel placement, tree works. Opportunity for "daylighting" (via nice new channel) as part of any land use change at barracks.	Green
Supportive landowner(s)?	Yes, some. At least one may not be keen. Unsure re MoD.	Amber

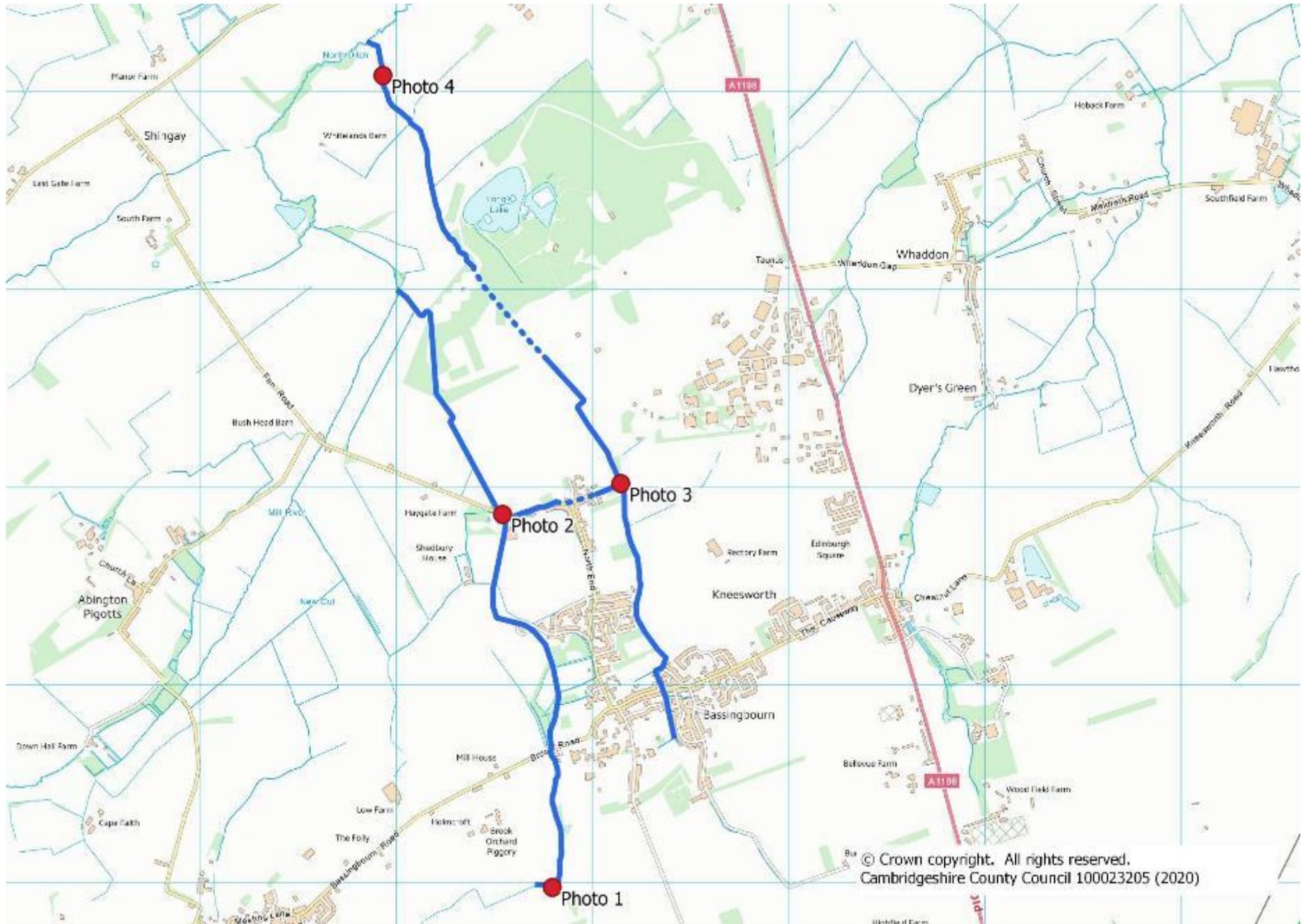
Further comment:

This is a small, short watercourse but retains natural springs (with augmentation) and some natural features. Channel alterations for milling and other purposes have produced two linked channels. One joins the Mill River upstream of the reserve, and the other runs through the reserve to join the Mill River. The area around the Wellhead Springs is publicly accessible and well-used by local people. It has evident damage from regular dog access. The local group in Bassingbourn would be interested in seeing improvements.

The lower end of the stream is relatively inaccessible and flows through mainly arable land to join the Mill River upstream of the Mill River reserve; the other part flows under Bassingbourn Barracks. There are several old channels which could be used to create back-channels or backwater fish refuge areas, particularly at the lower end. The landowners were last approached in 2013 and were not supportive of surveys or river work, so they would need to be convinced before they would support this project. A partnership with FWAG East might be a good way forward.

Initial projects:

- Approach landowners and carry out walkover survey especially of reaches rarely accessed. Combine with information about the stream and reasons to buffer (potential joint project with FWAG East) (£5k).
- Bank reprofiling and stabilisation, gravel placement, desilting around the springs (£15k).
- Lower reaches (longer term) to have gravel placement, brash ledges to enhance in-channel sinuosity and tree hinging (£10k).
- Work with Bassingbourn Barracks (longer term) to improve habitat and where possible remove culverts on development site (£20k).



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P1

Well head Nov 2020 – augmentation still operating. Bank erosion visible.



P2

Nr Shedbury Lane Nov 2020 – more flow here than Guise Lane branch.



P3

Guise Lane Nov 2020 – small and rather shaded with good flows.



P4

Mill River Reserve Nov 2020 – natural gravels visible.

River Cam, Gt Chesterford to A505 – rapid assessment of biodiversity and community value

Watercourse length 6.5km

River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Brown trout, good invertebrate assemblage inc mayfly, blue winged olive and caddis fly, submerged plants including starwort, water crowfoot and the only occurrence of water dropwort (<i>Oenanthe</i> sp.) in the Cam at Hinxtton. White-clawed crayfish may still be present (were recorded from Ickleton in 2012).	Green
Brown trout presence	Known population	Green
Community group present	Cambridge Trout Club, Hinxtton Wellcome Trust, CURAT	Green
Public access	Yes, Hinxtton to Ickleton (Wellcome Trust land)	Green
Nature reserve / designated site	Not official, but part of the Wellcome Trust site is considered a nature reserve with WT assisting with management of wetland.	Red
Connectivity / fish barriers	Fish passage impeded by Duxford Mill, pipe crossing at Huntsman site (Duxford) in low water, Hinxtton Mill, Ickleton Mill and Gt Chesterford Mill.	Red
Invasive species present	Himalayan balsam and signal crayfish (distribution unknown). Giant hogweed is present at Audley End and has the potential to be washed downstream.	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Many natural features including gravel riffles and bars together with sweeping meanders and deeper pools. Lower end of section has noticeable levees. Degraded from dredging but natural gravel has allowed recovery of features through processes of scour and deposition of coarse sediment.	Amber
Flow regime	Recently prone to low flows (appears to have become more noticeable in last 10yrs). River flow can be supported downstream of Audley End. Has not dried up in recent droughts. River is able to flood adjacent agricultural land.	Green
Effluent / run-off inputs	Phosphates listed as WFD Reasons for Not Achieving Good would link back to multiple STW discharging into reduced river flow.	Amber
Watercourse receives management	EA undertakes occasional management.	Green
Habitat enhancement potential	Much potential exists to allow natural processes to prevail through lack of EA intervention in rural areas. Better floodplain connection is required through levee removal, esp between A505 to Duxford Mill. Cambridge Trout Club want habitat restoration at Hinxtton. Gravel placement, tree hinging - needs a couple of big trees in wood nr A505 to initiate some in-channel diversity.	Green
Supportive landowner(s)?	Yes, such as Wellcome Trust	Green

Further comment:

The upper reaches of the Cam present a river ~6m wide with a gravel bed and a variable depth of ~0.5m. Grazing land still abuts the river and ash and willows provide the dominant riparian trees.

Every parish has a mill illustrating the way in which the Cam has been realigned and harnessed for power over the centuries. All of the mills are considered to present barriers to the movement of fish and coarse sediment transport down the river. The occurrence of mills has resulted in the realignment of the river to the side of the valley.

Wetland creation has taken place at the Wellcome Trust site with excavation of the floodplain providing an increase in storage capacity. The open water habitats complement the Cam. However, no work was undertaken to the river itself. The Cambridge Trout Club have implemented small-scale habitat enhancement work (tree hinging, flow deflectors and brushwood ledges) to increase the fish holding capacity of their fishery at Hinxtun.

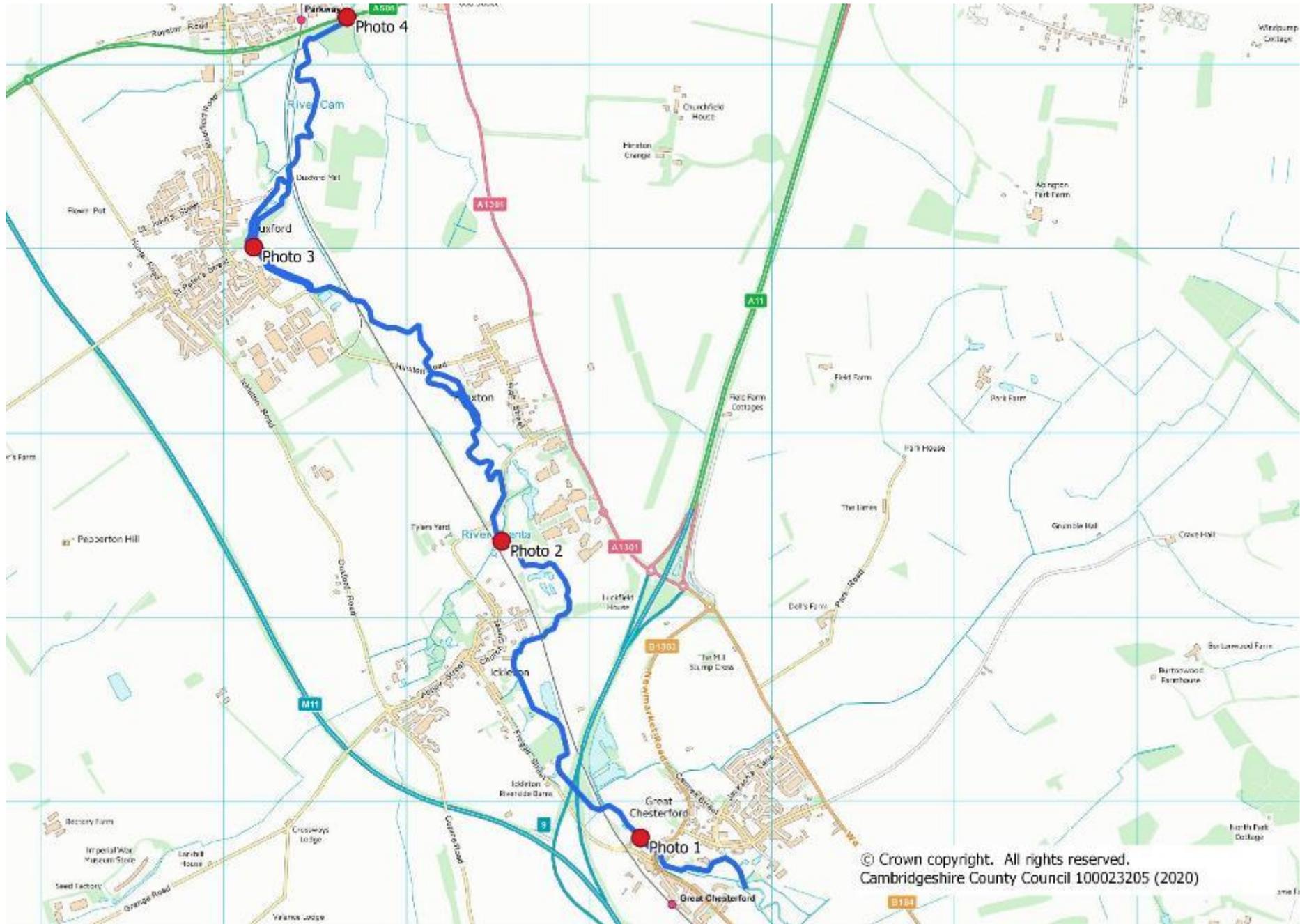
The recurring problem with the Cam through this reach is its incised channel form as a result of dredging. It has left the banks steep with little graduation to water. The dredged material has been placed on the bank top to establish levees, thus reducing floodplain connectivity. In places, such as downstream of Duxford Mill to the A505, the river is narrowing itself through the establishment of naturally vegetated berms. However, excessive bed depth prevents the process at many locations.

Whilst the river is reasonably tree-lined there is a general lack of trees within the river, suggesting that they are being removed (presumably for flood control reasons).

The Cam supports a mix of coarse fish including chub, dace and minnow together with a wild brown trout population. However, the Cambridge Trout Club are known to introduce ~200 brown trout per year to their fishery.

Initial projects:

- Assessment of the barrier to fish movements posed by the mills and other structures (£2k)
- Dig 'n dump in combination with levee removal and bank re-grading to push the banks down into the channel margins (£10k)
- Community-based habitat improvement work at Wellcome Trust site (£2k)
- Tree work to increase cover at, and below, water level (tree-hinging) (£2k)



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P1

Cam at Great Chesterford Aug 2020 – a shallow reach.



P2

Hinxton Genome Campus Aug 2020 – an over-deep reach.



P3

Duxford Aug 2020 – a pipe presents a barrier to fish passage at low-flow.



P4

A505 bridge looking upstream Aug 2020 – Himalayan balsam is present.

Cam A505 to Hauxton – rapid assessment of biodiversity and community value

Watercourse length 11.5km

River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Water crowfoot, otter, mayfly blue winged olives and caddis fly, EA fish survey point at Pampisford Mill shows good mixed populations. Brook lamprey.	Green
Brown trout presence	Known population	Green
Community group present	Little Shelford Nature Watch Group	Amber
Public access	Very little, generally only where public footpaths cross the river, although there is public access at Shelford Recreation Ground and at Hauxton Mill.	Amber
Nature reserve / designated site	No but Dernford Fen SSSI nearby.	Red
Connectivity / fish barriers	Fish passage barriers exist at Hauxton Mill, Shelford road bridges, Gt Shelford Mill, EA gauging station at Dernford Mill and Whittlesford Mill.	Red
Invasive species present	Himalayan balsam present and signal crayfish (but may not yet be above the Shelfords).	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Some sections have natural gravels and meanders with riparian trees. This section includes the stretch past Huawei (Sawston), part of which is concrete-lined. Gravel riffles used by trout for spawning downstream of A505 to Pampisford Mill, and through Whittlesford to Hauxton mill area.	Amber
Flow regime	No flow support. Has been known to flood onto agricultural land and flood meadows.	Amber
Effluent / run-off inputs	Unknown inputs from Huawei site and former Monsanto site.	Amber
Watercourse receives management	EA undertake occasional management.	Green
Habitat enhancement potential	Much potential exists to allow natural processes to prevail through lack of EA intervention in rural areas. Floodplain re-connection is required where possible, for example upstream of Hauxton Mill towards M11. There are multiple opportunities for bank re-grading, gravel placement, LWM and tree hinging.	Green
Supportive landowner(s)?	Unknown	Amber

Further comment:

This is a long stretch of river with many structures which impound water and prevent fish passage. At least 4 mills (Whittlesford, Dernford, Shelford and Hauxton Mills) retain structures which form barriers to flow and fish movement, and further barriers include the road bridges at the Shelfords and the gauging station at Dernford Mill. Despite extensive dredging and straightening, the river retains areas of natural gravel and meanders together with old channels. A network of defunct channels around Whittlesford and the Shelfords suggests historic water meadow management, and beyond the railway line is Dernford Fen SSSI, which links to the river.

Informal walkover surveys of various sections have been completed by WTT and WT, together covering around 2/3 of the whole length. One reach was rented by a fishing club until recently. No significant restoration work has been carried out although some short reaches are managed with riverine habitat in mind, and measures to stabilise the bank at Shelford Recreation Ground have been effective.

Ideally floodplain reconnection would be a priority, although this is challenging as most of the channel is deeply incised. The most suitable reach for floodplain connection is considered to be upstream of Hauxton towards the M11 bridge. There may also be opportunities to intercept water from tributaries for use on the floodplain, such as at the Huawei site (Sawston); this work should take the water needs of Dernford Fen into account. Bank regrading to create a more open channel or a 2-stage channel is also recommended. An old ditch system could be used to create wet woodland. Leaving woody material where it falls, allowing the channel to develop a more natural structure, would be valuable along most of this river.

Initial projects:

- Feasibility study for wetland creation on the Huawei site near the railway line, intercepting water from the ditch before it reaches the river (£10k).
- Gravel placement downstream of gravel riffle on Huawei site to extend existing habitat, coupled with tree hinging/LWM placement (£15k).
- Gravel placement elsewhere (several suitable sites exist) (£10k).
- Tree hinging and placement of LWM (many suitable sites) especially where pools and riffles are developing naturally (£500 - £2k).
- Assess water levels at Dernford Fen, in particular whether there is a control structure. If not, install a water control structure. Dernford Fen is suffering from drying out, but a steady stream of water was seen coming from the fen in September 2020 (£10k).
- Create 2-stage channel upstream of Pampisford Mill (there are also other suitable sites for this) (£10k).
- Reconnect river with floodplain upstream of Hauxton Mill back to M11 (£10k).
- Remove concrete channel lining at Huawei site and reshape channel, adding gravel and LWM (£50k+).
- Feasibility study for using historic channel to bypass Dernford Mill (would require moving gauging station) (£15k).
- Feasibility study for removing / notching structures to enable fish passage (£10k).
- Feasibility study for wet woodland creation (£10k).



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Looking downstream from A505, Sept 2020.



Whittlesford Sept 2020 – engineered but shallow with submerged plants.



Huawei site (Sawston), Sept 2020 – shallow gravel with water crowfoot.



Hauxton Mill, Oct 2020 – weir impounds water and prevents fish passage

Cherry Hinton Brook – rapid assessment of biodiversity and community value		Watercourse length 2.5km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Bullhead, occasional dace and minnow. Water vole and kingfisher. Lesser water parsnip, water figwort, water starwort. Hairy sedge recorded on bank 2005 - some nice bits of grassland that would benefit from scrub removal.	Green
Brown trout presence	Unlikely to support in short or medium term unless connection is made to Coldham's brook.	Red
Community group present	Friends of Cherry Hinton Brook.	Green
Public access	Footpath runs along much of the brook. Cherry Hinton Hall grounds are fully accessible.	Green
Nature reserve / designated site	City WS downstream of Cherry Hinton Hall to Sainsbury's culvert.	Green
Connectivity / fish barriers	Brook soaks into the ground before connecting to Coldham's brook. No connection at present. Weir retains pond in Hall grounds. Connectivity is very poor and is a restriction to the brook's biodiversity potential.	Red
Invasive species present	Japanese knotweed stand near Sainsbury's on opposite bank. <i>Crassula helmsii</i> present in pond at Cherry Hinton and near Forest Road.	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Poor physical habitat due to past dredging, low flow and impoundments. Deep silt dominates most of the brook. However, a gravel bed exists beneath old culverts. Gravel bed restoration has worked allowing a self-cleansing channel to evolve.	Amber
Flow regime	Suffers from low flows, but takes significant run-off from surrounding area. No groundwater support scheme and the fact that flow soaks into the riverbed, resulting in no flow in the lower reaches, is a significant restriction to biodiversity.	Red
Effluent / run-off inputs	Unknown, but leachate from historic landfill maybe an issue in the middle reaches of the brook (WFD data info). Road run-off from urban areas adds fine sediment to the brook adding to siltation.	Amber
Watercourse receives management	CCiC maintained	Green
Habitat enhancement potential	Bed raising to address past dredging is required. Where gradient exists some flow deflectors / LWM may be appropriate. Maintenance of previous work in Hall grounds is needed.	Green
Supportive landowner(s)?	CCiC control Hall grounds	Green

Further comment:

Walkover assessments have been completed by WT and WTT, and the brook is well known by City Council officers and the local friends' group. Previous work includes bed raising with gravel, and installation of flow deflectors. Some of these measures have worked to increase flow velocity resulting in a self-cleaning channel, but at some locations a lack of gradient compounded by low flows means improvement work has not been sustainable. A significant challenge lies with delivering restoration work that is sustainable, and delivers a stream environment that the public can enjoy, which is balanced with cover retained for biodiversity. With diminishing flows this is becoming harder and intervention such as vegetation clearance and desilting is likely to be required at periodic intervals.

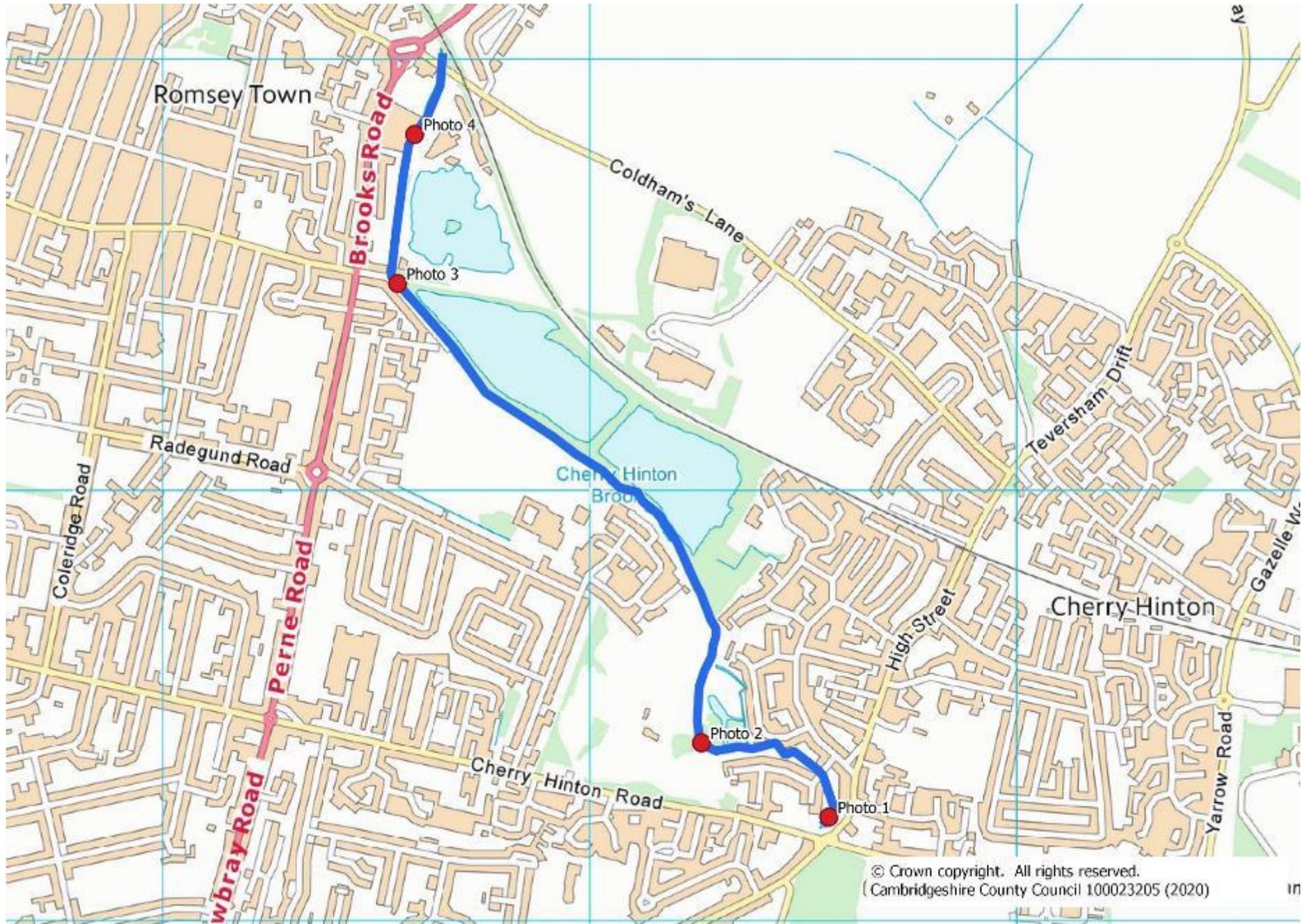
The brook would be greatly improved by having a reliable flow and occasional higher-flushing flows. However, the presence of old and narrow brick culverts and low bridges suggest that the brook has never been prone to high flow (and has low risk of flooding to adjacent properties). There is no scope for floodplain connection as the brook is entirely within Cambridge City and the land is used for housing. Much of the winter flow comes from road drains and there is limited opportunity to improve their water quality.

A major issue for the brook is its lack of connection to the main river, as well as impoundments forming barriers. At Coldham's Common the brook runs close to the Coldham's Brook, which is at a lower level to facilitate land drainage. Unfortunately, the result is that the Cherry Hinton Brook soaks into the ground before connecting to the Coldham's Brook. In the longer term, options for reconnection should be sought.

Potential work to the cycleway along the brook may provide an opportunity for access for larger-scale work and for increasing the bank margins in some areas.

Initial projects:

- Maintenance of existing restored sections at Cherry Hinton Hall and near Brookfields (£5k)
- Additional gravel placement in various locations (working with local volunteers), combined with some sensitive desilting work downstream of Cherry Hinton Hall (£10k)
- Feasibility study of options for connection to the Coldham's Brook (£10k)
- Feasibility study for removal / notching the weir at Cherry Hinton Hall (£10k)
- Assessment of road run-off to brook, including flood risk and water quality, and potential projects (£10k)
- Find a solution to prevent trespass to the lakes across the brook. The need to avoid creating crossing points severely limits restoration options on this reach (£2k).



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P1

Giants Grave springs 2013.



P2

Brook impounded at Cherry Hinton Hall July 2018.



P3

July 2018 Low bridges, Burnside.



P4

The brook alongside Sainsbury's March 2018 - bed raising with gravel.

Coldham's brook – rapid assessment of biodiversity and community value		Watercourse length 1.3km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Dace and chub are occasionally seen, fish data is required. Clustered stonewort (<i>Tolypella glomerata</i>) was recorded 2010. Water voles and occasional otter, with habitat enhancement work taking place at the very end of the brook specifically for water voles resulting from the Chisholme Trail construction.	Green
Brown trout presence	Has potential to support	Amber
Community group present	None known	Red
Public access	Footpath runs along lower part of brook in Coldham's Common. Some access to other parts.	Green
Nature reserve / designated site	Local Nature Reserve / City Wildlife Site (Coldham's Common section)	Green
Connectivity / fish barriers	Lower part links direct to River Cam, then upper part of brook appears to collect city drainage. Has potential to connect to Cherry Hinton Brook.	Amber
Invasive species present	Possible occurrence of Himalayan balsam and floating pennywort, needs monitoring.	Green
Presence of gravel / natural geomorphic features / mature trees with roots	Where the brook runs near the railway line at Stourbridge Common the gravel bed has been retained, then a short distance downstream it has been lost as a result of dredging producing a ditch habitat before its confluence with the Cam. A few deeper pools are present offering shelter to fish. The brook has been straightened leaving few meanders. The flow can split in its lower reaches (presumably to aid land drainage) but this reduces the extent to which higher flows can build and drive river processes. The chalk bed shows in places. The brook tends to be tree-lined on one side as a result of bankside cutting.	Amber
Flow regime	Presumed stable due to land drainage from beneath the City. Flood risk may be present due to proximity of built-up area.	Amber
Effluent / run-off inputs	Unknown	Amber
Watercourse receives management	CCiC maintained.	Green
Habitat enhancement potential	The brook's sinuosity needs increasing but that is challenging given its incised form and proximity of buildings. Scope could exist to re-meander the brook at the lower part of Coldham's Common and the upper part of Stourbridge Common. Potential to tether LWM along Coldham's Common to increase habitat variation and bed depth variation.	Green
Supportive landowner(s)?	Mainly assumed to be CCiC	Green

Further comment:

The Coldham's Brook runs in a deeply incised channel ~3m wide. The depth of the incised channel is estimated at ~3m and is presumably required to aid drainage from beneath Cambridge. The requirement for the brook to drain the city must not be under-estimated when considering habitat improvements.

The opportunity to create new habitats should be aligned with those that also create additional flood storage capacity. Space may exist at open green spaces such as Coldham's Common or Stourbridge Common. For example, it would be possible to undertake significant land-lowering near to the Abbey Stadium to re-create an inset floodplain but the disturbance to a Cambridge Common, in combination with the complexity of dealing with underground services together with the placement of large volumes of spoil would all need to be carefully considered before embarking on such work. Would the gain justify the action?

The placement of discrete habitat works such as flow deflectors may be possible but due to the lack of gradient and extensive summer weed growth (which may require periodical mechanical clearance) their positioning would have to be undertaken very carefully not to impound flow.

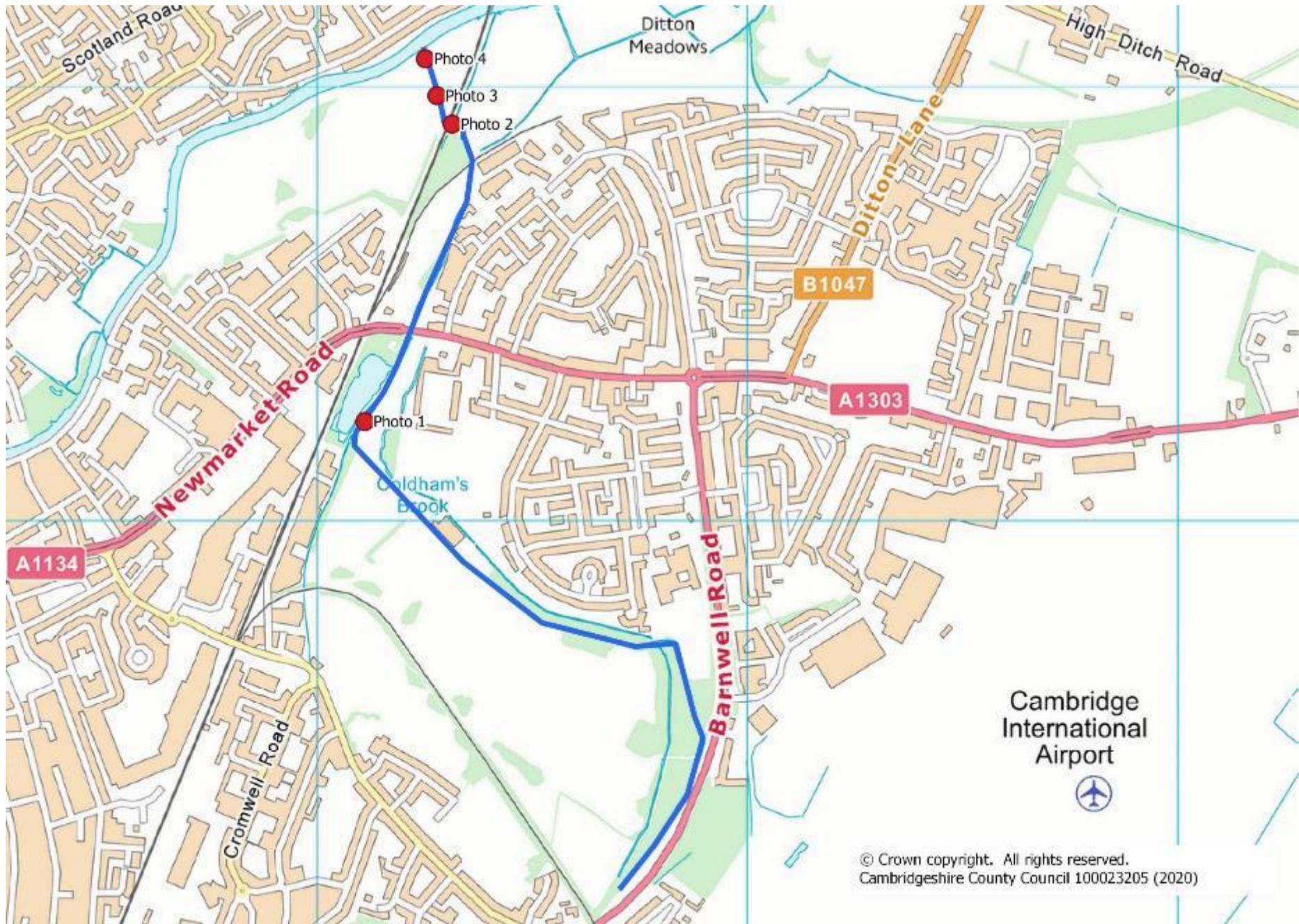
The presence of the gravel-lined areas beneath old bridges suggests that the brook was once a shallow gravel-bedded stream. To achieve its restoration bed raising through the introduction of gravel is required. However, the re-creation of a small brook would need to be managed very carefully amongst the public who may not perceive such work to be worthwhile (people often expect to see open water – like a ditch, rather than a small stream hidden by vegetation).

The cattle-damaged reach at Stourbridge Common requires attention and provides a justifiable area to work upon to deliver stream restoration, especially given the cattle damage associated with a defunct concrete cattle-feeding pad. The gravel-bedded reach above provides a template for restoration and the brook could be realigned through the area of degraded habitat to bring about a new length of the brook that is rich in habitat features such as deeper meanders, shallow riffles and vegetated glides.

The brook could connect to the Cherry Hinton Brook through careful engineering of the existing channels, if the expense justified the outcome.

Initial projects:

- Flood storage and habitat creation work at Coldham's Common (feasibility study) (£10k).
- Channel restoration and realignment at Stourbridge Common (£15k).
- Fixing of LWM at discrete locations to increase scour and habitat (£2k).
- Connection to the Cherry Hinton Brook (feasibility study) (£10k).



Cambridge
International
Airport



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P1

At Coldham's Common, Aug 2020 – note the flood line on trailing vegetation.



P2

The culvert beneath the railway, Aug 2020 – note the narrow culvert and gravel bed.



P3

At Stourbridge Common, Aug 2020 – the brook has been significantly degraded by cattle with little definition to its channel.



At the confluence with the Cam, Aug 2020 – the brook has been deepened to create a ditch.

Granta – rapid assessment of biodiversity and community value		Watercourse length 18km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Occasional water vole at Babraham, otter, water crowfoot, starwort and lesser water parsnip, brown trout, minnows, kingfisher, brook lamprey. Good aquatic invertebrates.	Green
Brown trout presence	Known population	Green
Community group present	Abington Nature Watch, Linton Friends of the River Granta. Staff at Babraham Research Campus are interested in river work training sessions and habitat restoration.	Green
Public access	Access by footpath or recreation grounds e.g. Babraham, Linton, Gt Abington, Hildersham.	Green
Nature reserve / designated site	County Wildlife Site	Green
Connectivity / fish barriers	Poor connection to Cam due to very poor habitat in lower reach resulting from cattle poaching, and EA gauging stations at Stapleford and Babraham. Shallow bed at Bourn Bridge (downstream of Gt Abington) prevents fish movement; large stepped weir at Babraham, multiple weirs for unknown purposes (Linton and above Babraham). Hildersham and Linton mills are impassable at most flows.	Red
Invasive species present	Himalayan balsam, signal crayfish.	Red
Presence of gravel / natural geomorphic features / mature trees with roots	At many locations the river is degraded due to past dredging and has been realigned for milling and land drainage (esp in lower reaches). Extensive gravel deposits exist which provide great potential for natural river processes to drive restoration through bed scour and coarse sediment transport and deposition. Floodplain re-connection is achievable through levee removal near Stapleford and at Babraham, together with bank re-grading.	Green
Flow regime	Known to dry downstream of Babraham due to porous nature of chalk combined with abstraction. EA supports flow at Linton. River is generally dry above Bartlow, River Bourn (Granta tributary) now rarely flows. However, high ground above Bartlow can shed water quickly after storms and NFM above Bartlow is required to attenuate storm run-off.	Red
Effluent / run-off inputs	Phosphates listed as WFD Reason for Not Achieving Good would link back to multiple STWs discharging into reduced river flow. Ironically, Linton STW has kept the river flowing to Hildersham.	Amber
Watercourse receives management	EA undertake occasional management.	Green
Habitat enhancement potential	Potential exists to allow natural processes to prevail through a lack of EA intervention in rural areas. Floodplain re-connection is required, and is possible, at Babraham, Linton and Stapleford. Floodplain storage could aid aquifer recharge. Fish passage easement through weir notching at Linton could act as a catalyst for habitat restoration esp if combined with work at Leadwell Meadows. Many weirs, of varying size, exist along the river, many appear to have no current purpose and should be prioritised for removal/notching. A potential dig and dump project at Granta Park should be revisited. Small-scale community-based work could take place with the communities at Linton, the Abingtons and Babraham (once COVID restrictions are lifted).	Green
Supportive landowner(s)?	Yes	Green

Further comment:

Walkover assessments have been completed by WTT for Linton and Babraham plus a River Restoration Centre report from 2011 of the entire river. Due to the river's relatively steep gradient, potential exists to allow natural processes to prevail through a lack of EA intervention in rural areas. Large woody material (such as entire fallen trees) should be retained in-channel (and secured if necessary) to initiate bed scour which will mobilise gravel to naturally create important habitats (pools, riffles and gravel bars). The river is disconnected from its floodplain as a result of historic realignment (possibly to create water meadows and for milling) and in recent times as a result of dredging and embanking for flood risk management. Floodplain re-connection is required, and is possible at Babraham, Linton and Stapleford. Floodplain storage could aid aquifer recharge, especially if undertaken in the lower reaches where the chalk is fractured and acts as a sink-point.

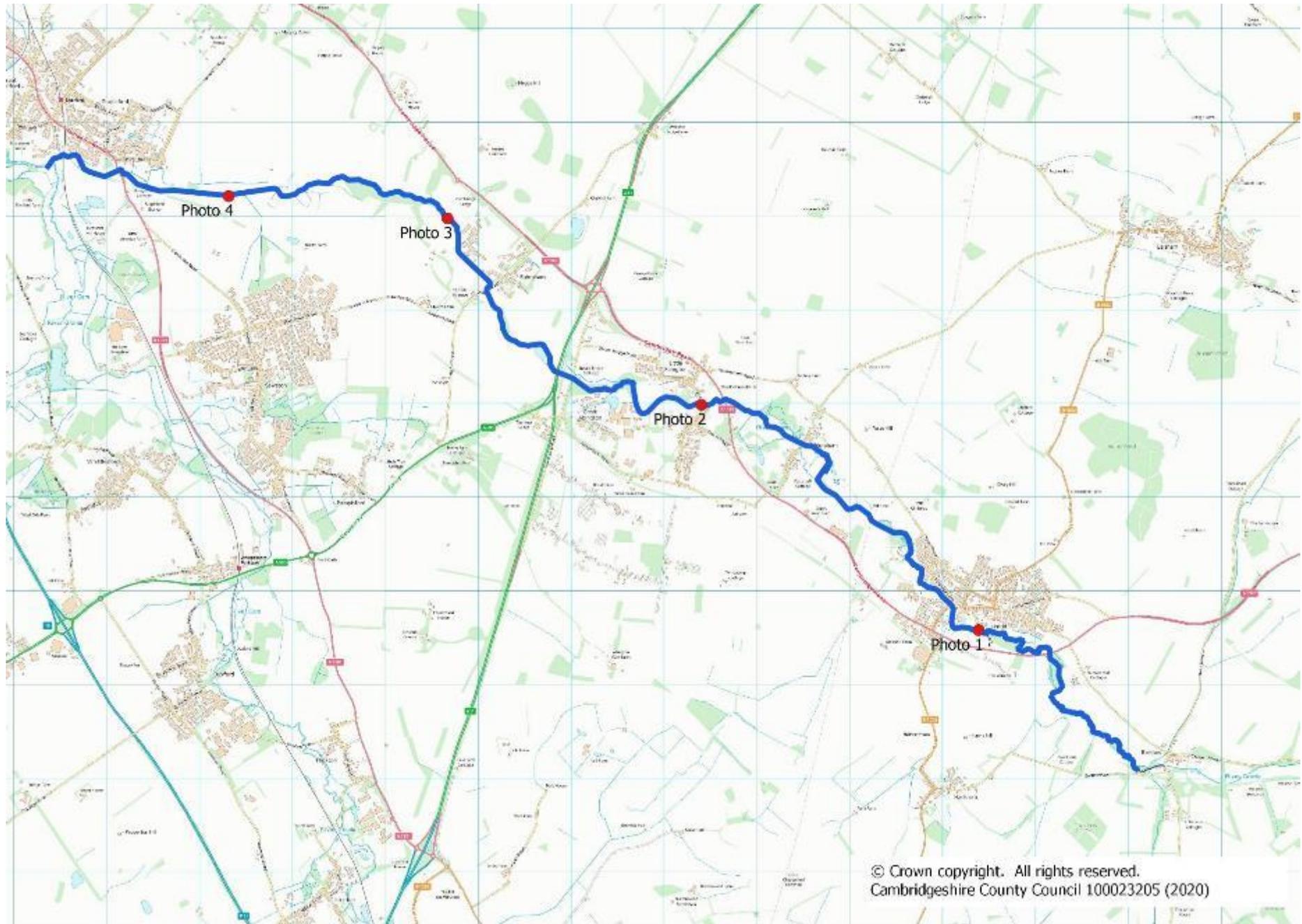
To date, some small-scale work has taken place with gravel introduction demonstrating that features will remain stable. Brushwood ledges have been created but need to be sustained/increased to remain effective (in the Babraham area).

Fish passage easement through weir notching at Linton could act as a catalyst for habitat restoration especially if combined with work at Leadwell Meadows to store a greater volume of water on the floodplain. Initial discussions suggest EA may be willing to replace Babraham gauging weir, and BRC might consider removal of the stepped weir. Many small weirs exist along the river; one may retain a head of water for abstraction while most appear to have no current purpose.

A potential dig and dump project at Granta Park should be revisited. Small-scale community-based work could take place under FRA exemptions/existing consented work at Linton and Babraham respectively (once COVID restrictions are lifted).

Initial projects:

- Flood storage and habitat creation work at Leadwell Meadows, Linton (feasibility study) (£10k).
- Levee removal combined with dig and dump work above Stapleford over ~100m (on hold until Cambridge Rapid Transit route is known, £10k).
- Re-visit dig and dump work at Granta Park previously scoped by WT and EA (£10k).
- Floodplain re-connection at BRC needs to be worked-up into a Env Permit for delivery along with many other site opportunities (£20k+).
- Linton Friends of the River Granta are waiting to be led on habitat works (£2k).
- Fencing and large woody material placement at Hildersham extending work already done (£5k).
- NFM-type projects on small tributaries to improve aquifer recharge (£5k each).



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Upstream of Linton, Aug 2019 – a stream more typical of a chalk river.



The Gt Abington village bridge, Aug 2019 – flow has sunk into the bed.



Below BRC, March 2020 – fresh bed scour has produced a new riffle.



Upstream of Stapleford, July 2020 – the river flow was much reduced.

Guiden Brook – rapid assessment of biodiversity and community value Watercourse length 6.7km

River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Bullhead, otter, diverse array of aquatic inverts inc mayfly, water vole, brown trout, brook lamprey and minnows. Water crowfoot and lesser water parsnip, occasional starwort.	Green
Brown trout presence	Known population	Green
Community group present	None	Red
Public access	Very limited access	Red
Nature reserve / designated site	RSPB Fowlmere at source of river, also flows alongside WT owned Shepreth L-Moor nature reserve and SSSI.	Green
Connectivity / fish barriers	Almost complete passage to near its source from Rhee (via Shep). The A10 road culvert may present barrier in low flows and should be assessed. 1 amenity weir was present and should be assessed.	Amber
Invasive species present	Signal crayfish are likely to have colonised from the lower Shep. The extent of their distribution is unknown.	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Only the very upper reach retains its natural gravel bed. The majority of the brook has been over-dredged resulting in very poor habitat, a straight channel with little flow diversity and a very incised channel. Little natural gravel remains except for beneath bridges which provide crucial refuges for invertebrates and spawning areas for trout and minnows. Young trees are scarce as a result of bankside flail cutting, mature trees are limited.	Amber
Flow regime	Impacted by abstraction but supported by EA pumped flow. Support is required in most years (via a connection to very upper Shep outfalls) which provide some flow to the brook through lateral seepage and the brook being cut at a lower level than the Shep.	Amber
Effluent / run-off inputs	1 known surface water outfall from the Dobbies' garden centre.	Green
Watercourse receives management	SCDC maintain this narrow watercourse for land drainage purposes.	Green
Habitat enhancement potential	Limited potential due to its narrow width and general lack of access. Fish passage to the gravel in upper reaches should be an objective. Tree planting is required.	Amber
Supportive landowner(s)?	WT at Shepreth L-Moor	Green

Further comment:

The Guilden Brook is now little more than a drainage channel with a width ~1.5m. The water level is generally at least 1.2m below the top of bank. The brook drains low-lying arable land which is under-drained in many cases. The brook is generally straight in its alignment with natural meanders present alongside the SSSI Shepreth L-Moor, however even there the brook has been subject to many decades of mechanical clearance resulting in very poor flow diversity. At many locations the over-deep nature of the brook is allowing fine sediment to accumulate which then provides a rooting substrate for bur reed and/or common reed. The prevalence of excessive in-channel vegetation results in a need for the drainage team to cleanse the channel and the process repeats itself.

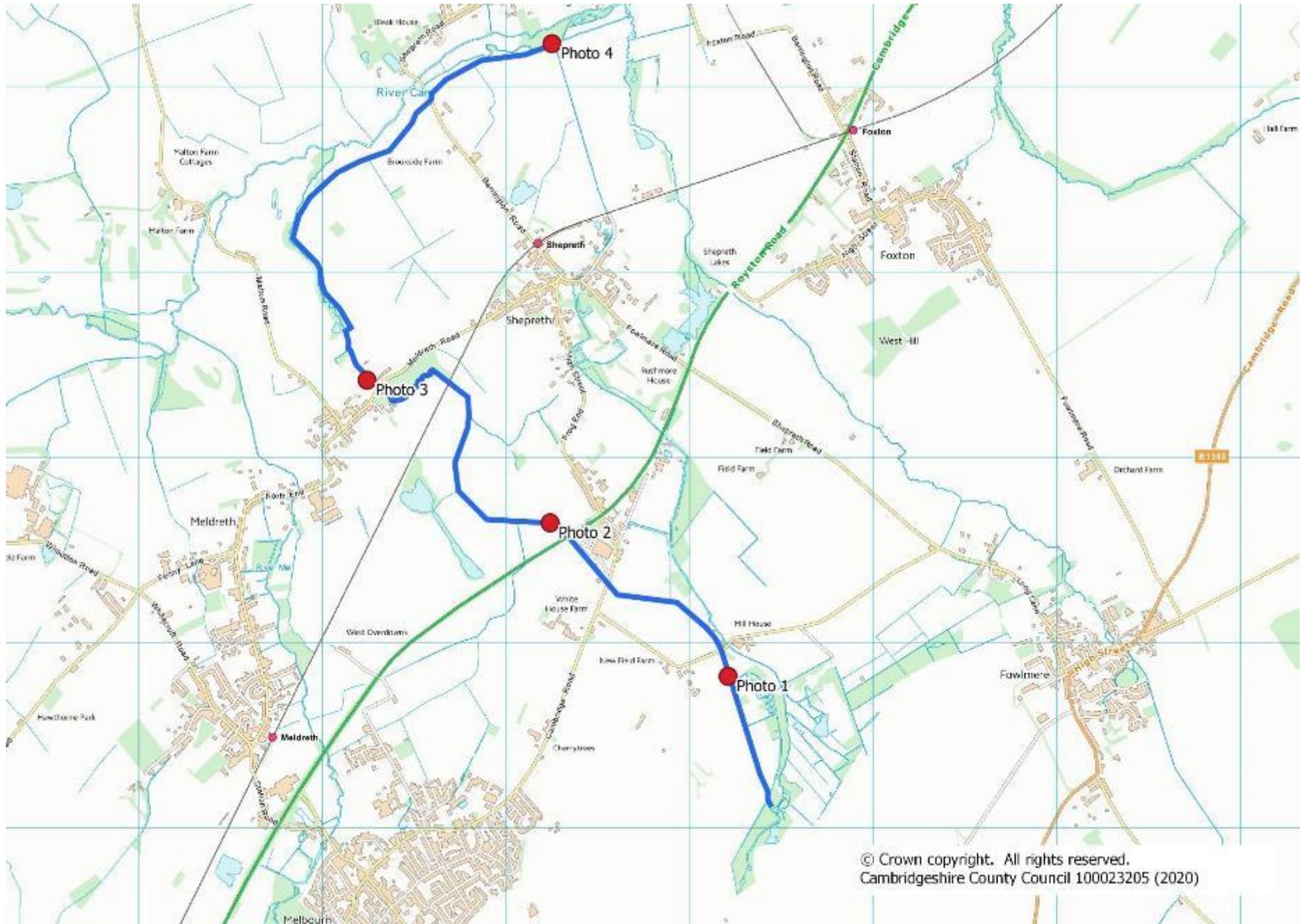
The upper reach of the brook retains a scarce habitat, that of a gravel lined channel. It suggests that at some point in the past the majority of the channel would have been much shallower, and gravel lined. However, dredging has completely removed the gravel and no more exists to replenish it from upstream reaches.

The scope for in-channel work is limited by the brook's narrow form and low gradient. There is no connection to its floodplain and it is doubtful that it has ever had a functioning floodplain. The creation of a 2-stage channel to create an inset floodplain may be more appropriate with respect to water attenuation and fine sediment deposition (but the brook rarely becomes coloured from spates).

The EA have a routine fish monitoring site and have been surprised by the numbers and diversity of fish in the past. This is most probably due to the brook's connection to the Rhee and its generally good water quality. Spawning habitat has been retained beneath bridges where mechanical excavation has never been possible. Connection and expansion of the spawning areas should be an objective.

Initial projects:

- Assess the free passage for fish along the entire length of the brook (£1k).
- Extend the 3 known spawning areas with the addition of further gravel (£5k).
- Undertake tree planting (£2k).
- Assess the feasibility of delivering a 2-stage channel in the brook's lower reach where it becomes backed-up by the Rhee (£2k).
- Use brushwood ledges to enhance flow sinuosity alongside L-Moor (£2k).



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P1

The headwaters of the brook, Oct 2020 – trout used to spawn here.



P2

The brook maintained by flail cutting, Oct 2020 – note the lack of trees.



P3

A shallow reach downstream of a bridge, Oct 2020 – brook lamprey, minnow and occasional trout spawn here.



P4

The confluence of the brook with the Shep, Sept 2020

Hobson's Brook – rapid assessment of biodiversity and community value		Watercourse length 4.2km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Minnow, bullhead, otter, starwort, water violet, otter, kingfisher.	Green
Brown trout presence	Unlikely to support due to low flow and lack of spawning gravel (requires further investigation around bridge structures for gravel and gradient).	Red
Community group present	Hobsons Conduit Trust.	Green
Public access	Footpath runs along majority of brook to Cambridge centre.	Green
Nature reserve / designated site	Nine Wells Local Nature Reserve; Brook is City WS.	Green
Connectivity / fish barriers	Nine Wells to Trumpington Street has free passage but the only connection to River Cam is via Vicars Brook relying on a narrow off-take pipe which is likely to be impassable in most water conditions. The downstream section of the brook flows mainly underground.	Amber
Invasive species present	<i>Crassula helmsii</i> has been recorded near the Botanic Gardens. Floating pennywort on tributary ditch (which is being controlled).	Red
Presence of gravel / natural geomorphic features / mature tree with roots	Gravel is limited to inaccessible locations (bridges). The brook has a low gradient and is not a natural watercourse, thus natural features are limited. Bank profile is steep becoming very incised near Nine Wells. A few tree roots and other natural features upstream of Long Road.	Red
Flow regime	Known to dry, impacted by abstraction and requires EA support in most years. Ran dry in 2019, the first time since 1976. Not prone to fluvial flooding. The recently installed flow support scheme at Nine Wells may not yet be operating to its full potential, whilst welcome it masks the underlying problem of diminishing spring flow.	Red
Effluent / run-off inputs	Unknown, but high levels of phosphorus, zinc and suspended solids recorded by APEM near biomedical campus in 2018.	Amber
Watercourse receives management	CCiC maintain the upper reaches in farmland, The Conduit Trust are responsible for other parts.	Green
Habitat enhancement potential	Brook is overshadowed in many places and requires sensitive desilting. Its potential would be much greater if it had more flow; little habitat potential in Conduit reach due to very limited flow and unnatural form.	Amber
Supportive landowner(s)?	Complex mix of landholdings, unknown support.	Red

Further comment:

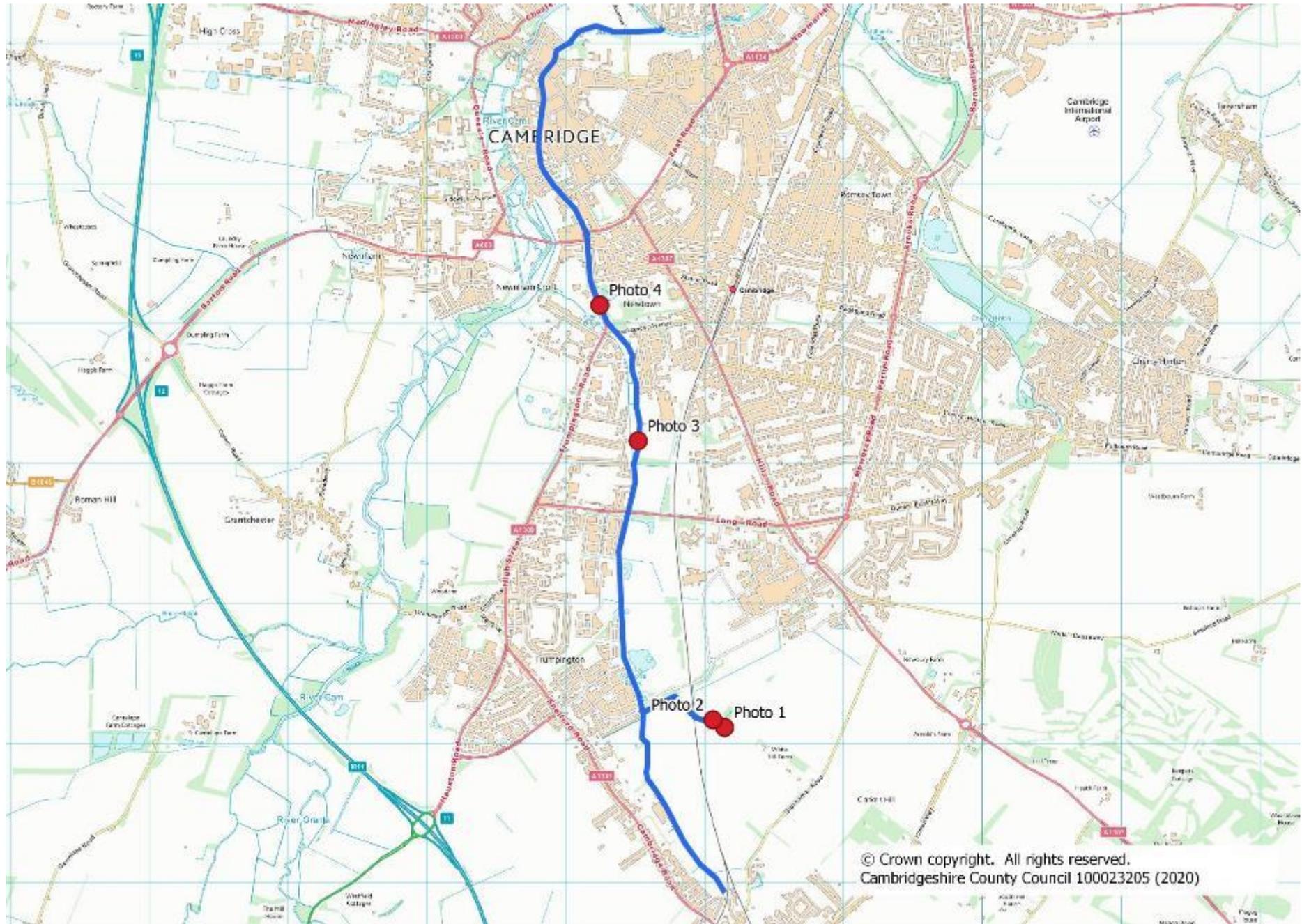
Hobson's Brook and Conduit have been impacted by recent development at the Addenbrookes site and nearby areas of house building. Sections of the brook have been surveyed, and water quality monitored, in relation to the works. This has picked up issues with nitrates and dissolved oxygen. The brook has also been severely impacted by low flows to the point where it was felt necessary to install flow support at Nine Wells. The City Council and Hobson's Conduit Trust have prepared a 10-year vision for the watercourse, which includes detailed information as well as project plans and ideas.

The Brook is heavily modified and has been maintained for land drainage for many years. Some City Council in-channel restoration work has been carried out, which is beginning to improve flow diversity and habitat. Due to the proximity of buildings, roads and services there is limited potential to reshape the channel, except along the upstream, arable section.

Potential further work includes gravel placement for bed raising and habitat creation, bank reprofiling to create areas of 2-stage channel (or even wetland areas adjacent to the channel if there is enough water), and vegetation management to open up some of the most heavily shaded sections including the spring heads.

Initial projects:

- Gravel placement for bed raising and habitat creation (several possible locations) (£10k).
- Bank reprofiling to create areas of 2-stage channel or even inline wetland areas (if there is enough water) along the arable reaches of the brook (£10k).
- Vegetation management at Nine Wells to open-up the spring heads, allow monitoring, and possibly create an area of chalk grassland (£5k with volunteer help).
- Vegetation management (hedge cutting, tree pollarding and crown lifting, scrub management) to open-up some of the more shaded sections of brook (£5k).
- Improve flow diversity and narrow the channel with LWM where appropriate. This could be combined with a careful desilt, particularly on the lower reaches (£10k).
- Where hard channel edges are failing, replace with soft engineering. Fix pre-planted coir rolls in front of intact hard edges (£10k).





P1

One of the spring areas at Nine Wells Sept 2020



P2

The brook as it leaves Nine Wells Sept 2020 – the brook becomes a drain through farmland.



P3

The brook Sept 2020 - showing chalkstream characteristics once plants have narrowed the channel. Note the extensive gravel bed.



P4

The brook has become the conduit as it leads to Cambridge, Sept 2020. The channel is prone to siltation, algae and poor habitat.

Hoffer Brook – rapid assessment of biodiversity and community value

Watercourse length 7.2km

River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Water vole, otter, water crowfoot, starwort, lesser water parsnip, low numbers of brown trout, minnow, kingfisher, brook lamprey, good variety of invertebrates inc mayfly species.	Green
Brown trout presence	Known population	Green
Community group present	None, but residents of Foxton and Newton were interested.	Amber
Public access	Limited access between Foxton and Newton only.	Amber
Nature reserve / designated site	Yes, lower part CWS due to veteran pollard willows. Thriplow Meadows SSSI & Thriplow Peat Holes SSSI.	Green
Connectivity / fish barriers	Links to Rhee with one slight weir which may become impassable in very low flows.	Green
Invasive species present	Chinese water fern (<i>Azolla</i>), particularly problematic in low flows. Japanese knotweed (patch of) near Newton.	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Meanders with tree root features. Semi-natural reach in woods between Foxton and Newton. Existing restoration work has shown potential but also highlighted the susceptibility to low flows in middle to upper reaches. Degraded in parts due to dredging combined with underlying peat from ancient marsh. Steep incised banks in lower reaches.	Amber
Flow regime	Suffers from low flows with the brook drying out in upper reaches compounded by water flowing down sink hole into gravel strata. Flow is constant below railway line. River is supported at Chardles' Springs, Foxton. Known low-flow river since early 90's, channel now too wide for normal flow resulting in slow flows, siltation and algae.	Red
Effluent / run-off inputs	A small STW discharges to very upper channel near Heathfield but it is generally dry, so water sinks into ground. Otherwise no known discharges.	Green
Watercourse receives management	SCDC maintain lower reach over ancient marsh near Manor Farm, Harston. Most of the brook is left alone with occasional landowner intervention for fallen trees or vegetation clearance near properties in Newton.	Amber
Habitat enhancement potential	Would be vastly greater if it had reliable and stronger flow. Potential in lower reaches where flow is guaranteed. Could expand on gravel placement work done in 2012. Wetland creation on low-lying ground between B1368 and Brook Rd, Thriplow.	Amber
Supportive landowner(s)?	Yes	Green

Further comment:

Hoffer Brook has two main upstream reaches which join downstream of Newton. One begins at Thriplow Meadows SSSI and the other at Thriplow Peat Holes SSSI. Flow augmentation at Thriplow Meadows SSSI supports the status of the protected site. However, most of the water flows alongside the site in a ditch, and then soaks into the ground before it can contribute to flow in the main part of the brook. This may be a waste of resources, only providing the SSSI with very local groundwater support with little benefit to the brook. Both the brook and the SSSI require more water.

The Hoffer Brook has been known to suffer from low flows for many years, and was identified by the NRA in 1993 as one of the country's low flow rivers. Physical habitat restoration is challenging due to the lack of water, although the brook retains many natural features with the lower reaches supporting brown trout and a variety of aquatic invertebrates. Riverfly monitoring regularly finds the blue-winged olive mayfly, which is declining nationally and is relatively scarce in Cambridgeshire.

The geology of this area is complex. There are springs adding to flows along much of the brook, and the stream bed is alternately hard chalk and very soft deep silt. Experimental restoration work has successfully raised the bed over a reach of soft silt, using plastic mesh to support gravel over an otherwise soft and deep bed. Future work should focus on sections where the bed is already firm.

Previous work on the brook includes gravel placement and flow deflectors as well as some bank reprofiling and creation of point bars. The flow deflectors have not been particularly successful due to a lack of water, but where gravel has raised the bed this has led to improved flows resulting in bed scour. These areas have been used by brown trout for spawning.

Initial projects:

- Add gravel to unrestored sections of the lower reaches, where there is a suitable hard bed. Regrade banks to create a more natural bank profile (£10k).
- Feasibility study to avoid / seal sinkholes below Fowlmere Road (Newton) and Whittlesford Road (Newton), and to create a wetland on low-lying land at the junction of Brook Road with B1368 (£10k).
- Move augmentation point on Thriplow Meadows so that water flows over the land rather than by-passing it (£10k).
- Re-work cattle drinks nearby on the Rhee (no longer functional due to drop in river levels) or install pasture pumps to reduce poaching on the lower parts of the brook (£2k).
- Continue to manage the pollard willows along the brook (£2k).



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P1

The brook upstream of Newton Sept 2020 – water was flowing but it sunk into the ground a short distance downstream.



P2

The brook immediately above Chardles' Springs Sep 2020.



P3

The brook downstream of the railway suffering from low flow Sept 2020



P4

Lower reach choked with vegetation, Oct 2020 due to low flows.

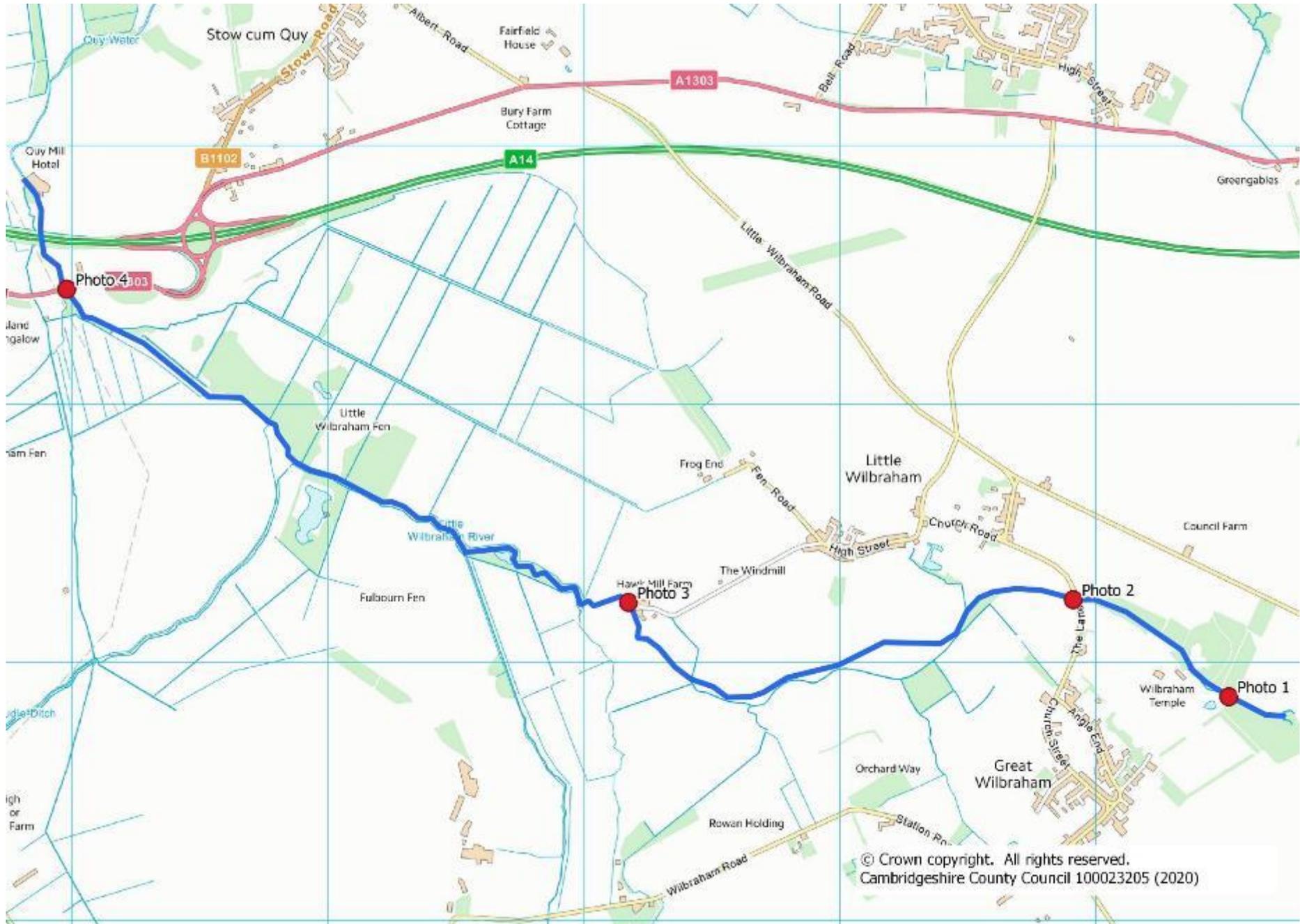
Little Wilbraham River		Watercourse length 6.8km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Limited fish, aquatic invertebrates and plants due to repeated drying of the watercourse in the last few decades. Fen pond weed (a specialist of lowland fens) was recorded in past but not in 2015 survey. The river is becoming dominated by common reed which appears to be able to tolerate the land drainage management and drying out the channel.	Red
Brown trout presence	Unlikely to support due to frequent drying of the river, lack of connectivity and non-existent spawning habitat.	Red
Community group present	Wilbraham River Protection Society	Green
Public access	Footpath runs along parts of the river in Wilbraham Common.	Green
Nature reserve / designated site	SSSI through Wilbraham Common and Fen sites, and parts are also a CWS.	Green
Connectivity / fish barriers	Quy Mill and Hawk Mill present barriers to fish passage, as may some culverts.	Red
Invasive species present	None known	Green
Presence of gravel / natural geomorphic features / mature trees with roots	The river is part of an unnatural drainage and mill river system. The river has been straightened and deepened to the point where it is little more than a fen drainage system. Almost no coarse substrate exists. No meanders with pools, and there are negligible mature trees.	Red
Flow regime	Very prone to drying out.	Red
Effluent / run-off inputs	None known	Green
Watercourse receives management	SCDC maintains this edge-of-fen system to support adjacent low-lying farmland. Land drainage is given priority and it will remain so with current farming practices and the Council's obligation to maintain land drainage needs.	Amber
Habitat enhancement potential	Potential would be greater given certainty of flow. Limited habitat restoration potential given the narrow nature of the channel and general lack of gradient.	Red
Supportive landowner(s)?	Unknown	Red

Further comment:

The Little Wilbraham River has been severely affected by repeated low flows and poor physical habitat. The river's flow has often declined to the point where it depends entirely on the EA compensation flow in most summers. This can result in the river flowing near its source, the Wilbraham Temple Springs, but flow seeps into the ground a short distance downstream due to the lack of water in the chalk aquifer to support the river from beneath. Note that in October 2020 the river was entirely dry from the gauging station to the A1303, a distance ~6km.

The river has been managed as a fen drainage system for many decades which has removed habitat features such as gravel and bedform variation. There is little scope to restore the river due to the low-lying nature of the adjacent farmland and the legal obligation of SCDC to maintain the current drainage network.

Due to the combination of low (or non-existent) flows and poor physical habitat without a current opportunity for change, there are no habitat improvement projects proposed for this watercourse. If reliable flows were reinstated, this river would have multiple project opportunities.





P1

Nr to Temple Springs, April '15 – a stream more typical of a chalk river.



P2

The road bridge between Lt and Gt Wilbraham, Oct '20 – the mud had cracks showing it to have been recently dry. The flow will be from the EA support outflow at temple Springs.



P3

Hawk Mill, Oct '20 – the river was dry upstream and downstream.



P4

The A1303 bridge, Oct 20 – a dry river but fresh otter spraints were found

River Mel – rapid assessment of biodiversity and community value		Watercourse length 4.5km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Stickleback, bullhead, brown trout, good assemblage of aquatic invertebrates, good diversity of plants including water crowfoot and starwort, water vole present.	Green
Brown trout presence	Known population just holding on.	Green
Community group present	River Mel Restoration Group.	Green
Public access	Footpath for majority of length and public playing fields.	Green
Nature reserve / designated site	Melwood Local Nature Reserve.	Green
Connectivity / fish barriers	Lower 1/3 connects to Rhee, Topcliffe Mill / EA gauging station is a barrier, upper 1/3 blocked by recent weirs and Sheen Mill	Red
Invasive species present	Signal crayfish are present in lower 1/3, and possibly higher; <i>Azolla</i> present throughout.	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Occasional gravel with much added for habitat enhancement, meanders with extensive tree roots in places, steep banks, deep silt, springs can be seen emerging from the bed in the playing fields, generally low gradient with mills creating a stepped profile. Chalk bed visible at many points.	Amber
Flow regime	Supported low-flow but upper 1/3 runs dry, no history of fluvial flooding.	Red
Effluent / run-off inputs	Road drains from Station Road, Melbourn. Melbourn STW is a known problem which tints the water and causes a twice daily rise and fall of the river level. Storm overflows have left foul products in the river on a number of occasions.	Red
Watercourse receives management	By RMRG, private landowner (nr Meldreth church), by SCDC in lower 1/3.	Green
Habitat enhancement potential	Bed raising with gravel along playing fields, tree management to balance shade, gravel placement with LWM above the Court downstream to Topcliffs Mill, Topcliffs Mill to North End gravel placement with LWM, Church area shrub management, lower end needs bank regrade and gravel placement. Lower reach would benefit from realignment to introduce sinuosity.	Green
Supportive landowner(s)?	Yes, most are supportive.	Green

Further comment:

The River Mel is one of the most worked-upon rivers in the area having a very active conservation group, the River Mel Restoration Group. Much of their work has focussed upon the river along the footpath which runs between the villages of Melbourn and Meldreth.

Over the last decade the group has placed several hundreds of tonnes of gravel into the river to improve its flow characteristics and spawning opportunities for its trout. The most ambitious project saw the raising of the bed beneath the A10 where the river had been set in an over-wide box culvert resulting in deep silt. The delivery of complex projects is a credit to the group and its ambition.

The group's volunteers have created extensive brushwood ledges to enhance the river's sinuosity and to create continuous vegetated margins to aid water vole conservation. The group had grown its own marginal plants for planting out.

Flow deflectors have been installed to enhance flow diversity.

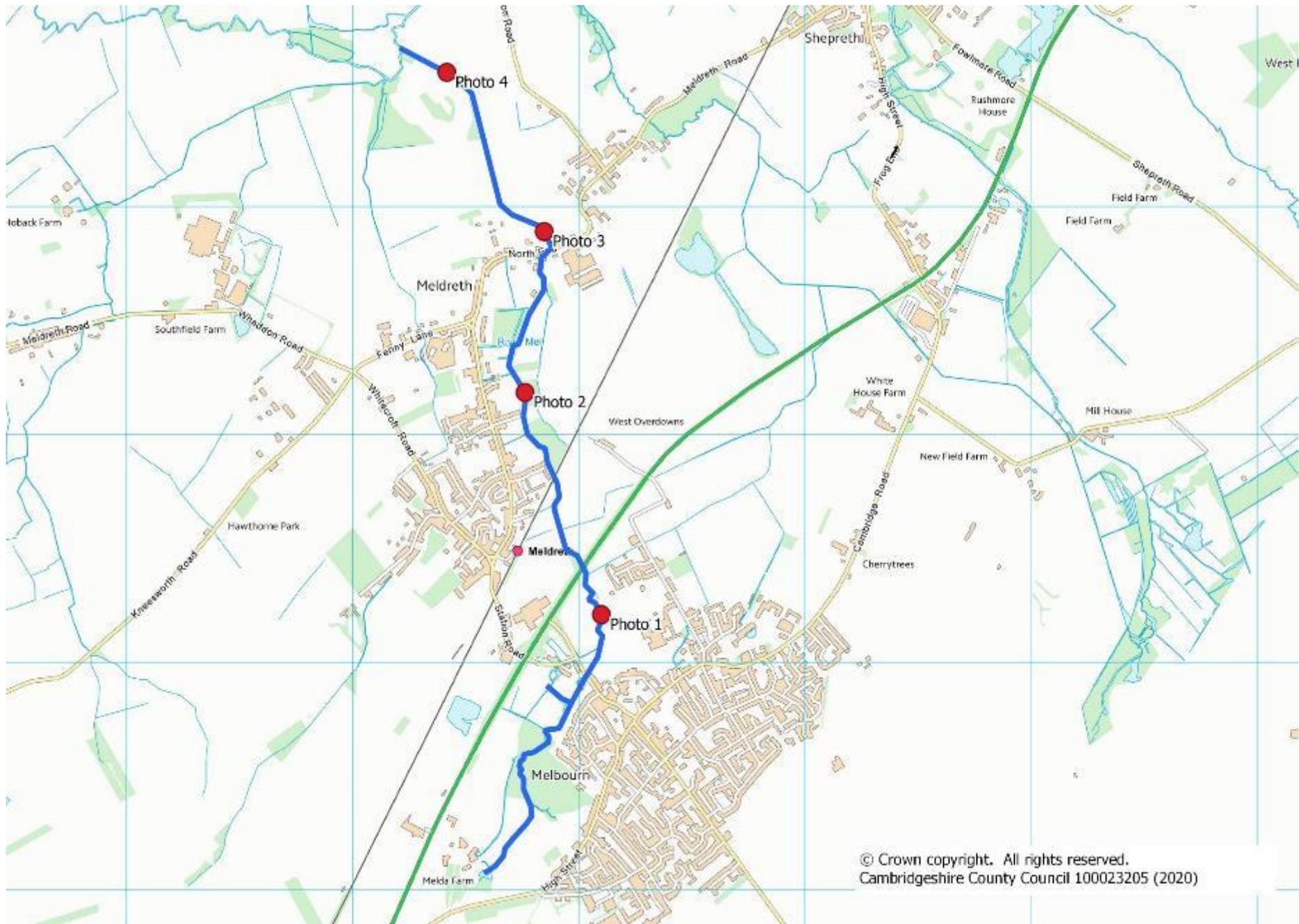
Public access to the river, especially dogs entering it, has been an issue that has required careful management and continues to remain so. Work at the rear of playing fields inevitably results in children tampering with some structures – emphasising the need for completed work to be safe and secure, further training could address this.

Further scrub and tree management is now required to areas that have been previously opened up.

Two pairs of spawning trout were seen in the Mel in December 2020.

Initial projects:

- Habitat enhancement and scrub management at the rear of Meldreth church (~£5k, fund applied for through Pebble grant).
- Continuation of bed raising works at the rear of Melbourn playing fields (~£7k).
- Management of dog access points through the use of dead hedging and additional gravel (£2k).
- Scoping of habitat enhancement projects to private land from the British Queen to Topcliffe's Mill (£2k).
- Scoping of habitat restoration in the straight open reach connecting to the River Rhee (£2k).
- Re-pollarding of veteran willows (£2k).





P1

Melbourn playing fields, June 2020 – the bed has been restored with chalk and gravel to increase fish spawning habitat.



P2

Meldreth May 2012 – the margins have been enhanced through planted brushwood ledges.



P3

Downstream of Meldreth church, Sept 2020 – the reach is over-shaded. It is to be the focus of habitat enhancement work in 2021.



P4

Near to the Rhee confluence, March 2018 – the river flows in a straight channel with little habitat diversity.

Mill River – rapid assessment of biodiversity and community value		Watercourse length 4.5km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Minnow, brown trout (fish survey needed), otter, water vole, kingfisher, starwort and water crowfoot, lesser water parsnip, good assemblage of aquatic invertebrates and bird life.	Green
Brown trout presence	Two pairs seen spawning in Dec 2020; the first for many years.	Green
Community group present	Yes	Green
Public access	Open space accessible to villagers only.	Amber
Nature reserve / designated site	Yes, Mill River Nature Reserve.	Green
Connectivity / fish barriers	Good connectivity to River Rhee (although an EA gauging weir at A1198 bridge limits connectivity further downstream).	Green
Invasive species present	None known	Green
Presence of gravel / natural geomorphic features / mature trees with roots	Natural gravels present, which have been augmented with imported gravel. The river also retains some natural meanders and pools, although it is deeply incised along most of its length and sections have been straightened. Degraded physical habitat due to past dredging with levees.	Amber
Flow regime	Reliable flow from upstream sewage treatment works plus augmentation at Bassingbourn, so the river is not prone to drying. Occasional localised flooding but negligible flood risk to property.	Amber
Effluent / run-off inputs	Sewage treatment works discharge into the river (although these may receive phosphate stripping in the next AMP). Some field margins remain unbuffered and may present a source of diffuse run-off. High turbidity has been a concern for many years.	Amber
Watercourse receives management	Reach through Mill River Reserve is managed by South Cambs Conservation Consultants, the remainder is managed by EA.	Green
Habitat enhancement potential	Significant work completed with more underway to enhance habitats through the Mill River Reserve. Potential to work upstream where there is unimproved grassland and visible gravels on the riverbed. More gravel placement and bed raising is needed to address past dredging. Where gradient exists some flow deflectors or LWM may be appropriate. Maintenance of previous work requires vegetation management. SCCC are keen to create a wetland.	Green
Supportive landowner(s)?	Yes, through Mill River Reserve and downstream to Rhee confluence.	Green

Further comment:

The more open sections of the river at the downstream end of the reserve have been extensively restored, through a mixture of bank reprofiling and placement of woody material and gravel. An old ford has been reinstated with gravel and stepping-stones, and the river has improved velocity and aeration due to channel narrowing and bed raising. Improvements and maintenance are continuing on this section.

The managers of Mill River Reserve are keen to continue their work at the upstream end of the site, including tree management, placement of woody material and bed raising with gravel. They are also planning to create a wetland, to improve both habitat and, potentially, water quality. No costs proposed as South Cambs Conservation Consultants are applying separately for funding for these projects.

There is potential to work upstream of the reserve, although the river is harder to work with being more incised and straightened. There are a number of defunct / mostly dry channels in this area. Initial projects:

- Contact the relevant landowners to discuss management of the adjacent land, and particularly buffering the Mill River (£5k).
- One shaded section has gravel visible on the bed and unimproved grassland on the right bank (last seen 2014). Working with this landowner could improve grassland management as well as opening-up and improving a section of river.
- There are several places where hinging small trees or tree limbs into the river would be beneficial (£2k).

Summer 2020 saw unusually high flow in the Mill River. But by September the river was again suffering from low flows. Low flows are considered a limiting factor to the delivery of sustainable restoration.





P1

At Abington Piggots Sept 2020 – small silty stream.



P2

Upstream of Mill River Reserve, Sept 2020 – a shaded, uniform channel.



P3

Mill River Reserve, Sept 2020 – a reprofiled section with lush growth.



P4

Mill River Reserve, Sept 2020 – a restored section.

Orwell Stream – rapid assessment of biodiversity and community value		Watercourse length 8km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	White-clawed crayfish recorded 2014. Water voles present. Otter at lower end. Fish populations unknown, survey required.	Green
Brown trout presence	Has potential to support brown trout due to good gravel deposits on bed Orwell to Wimpole. But weirs restrict fish movement from Rhee up to Wimpole.	Amber
Community group present	No, but potentially interested locals in Orwell.	Amber
Public access	Yes, access on Wimpole Estate (NT) and public footpath along a section of brook downstream of Orwell.	Green
Nature reserve / designated site	No (but there is Wimpole Estate).	Amber
Connectivity / fish barriers	Poor connectivity at lowest end in 2014 at confluence with Rhee. A further 2 barriers exist at the upper end at Thornberry Hill Cottages (weir) and Wimpole lakes (sluice and weir).	Red
Invasive species present	None known	Green
Presence of gravel / natural geomorphic features / mature trees with roots	Yes, gravels above Orwell. While much of the channel has been straightened, there are mature trees with roots providing habitat. The stream within the NT's estate has more gradient increasing its potential for restoration.	Amber
Flow regime	Prone to low flows and drying.	Red
Effluent / run-off inputs	Poaching by cattle at several points	Green
Watercourse receives management	Lower section managed by farmers as a drainage ditch. Very little management on the rest of the stream. SCDC undertake occasional blockage clearance downstream of Orwell.	Amber
Habitat enhancement potential	Potential for low-level woody material, tree work and creation / widening of field margins. Ideally the lower section needs reprofiling so the banks are not so steep and fish barriers are removed. Shade reduction required at some points.	Amber
Supportive landowner(s)?	Yes / neutral - National Trust may wish to come on board, one local farmer may be interested, others unknown.	Amber

Further comment:

A walkover assessment was completed by WT in 2014. The stream is heavily engineered at its downstream end and heavily shaded upstream, but retains some chalk stream characteristics and chalk geology although its upper reaches are on clay. It is also one of the few sites in the catchment with recent records of white-clawed crayfish. It has two connections to the Rhee, but neither allow fish passage. One pathway results in the flow moving through gravel (rather than over it) before discharging to the Rhee via a concrete outfall, and the other pathway is partially impounded by a natural clay weir. Improving its connection to the Rhee and allowing fish passage may encourage signal crayfish to colonise the stream, to the detriment of the native crayfish (but there is nothing to stop the signal crayfish moving upstream at present as they will overcome the 2 barriers).

No restoration work has been carried out on the stream, although there are opportunities on National Trust land and through Orwell village. The stream feeds the lakes at Wimpole Estate and is prone to drying out at the upstream end. Landowners are not yet on board for work on the stream.

Initial projects:

- Reprofile lower section of watercourse to create a 2-stage channel and use LWM to create in-channel diversity (requires landowner contact, £10k).
- Add gravel and LWM to the section upstream of Orwell (£10k).
- Add LWM and investigate possibility for further NFM measures in woods on Wimpole Estate (£2k).
- Add gravel to create stable cattle drink areas or fence and provide a pasture pump (£2k).
- Work with local farmers to increase field margin width along brook (£500).





P1

Upstream of Thornberry Hill Cottages, April 2014.



P2

Upstream of Orwell, April 2014.



P3

Downstream of Orwell, April 2014.



P4

Outfall to Rhee, June 2014 – no fish passage.

Rhee Guilden Morden to Malton – rapid assessment of biodiversity and community value

Watercourse length 10.7km

River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Water vole and otter present. Water starwort, lesser water parsnip and water crowfoot present near Tadlow Bridge. Water crowfoot and willow moss present near Malton.	Green
Brown trout presence	Has potential to support. EA fish data needs reviewing. Trout in lower Mel are likely to come from the Rhee.	Amber
Community group present	No	Red
Public access	No, only 2 footpaths cross the river.	Red
Nature reserve / designated site	Yes (river is CWS)	Green
Connectivity / fish barriers	EA gauging weir at Arrington Bridge impedes fish passage. There is also a weir downstream of Tadlow which diverts water into an adjacent pond and impounds the river for a significant distance (500m). Two fords impound water but do not present a barrier to fish.	Red
Invasive species present	None recorded	Green
Presence of gravel / natural geomorphic features / mature trees with roots	This stretch of river has been over-widened, over-deepened and straightened with levees which disconnect the river from its floodplain. Gravel is present near Tadlow, but otherwise the channel is incised, silty and featureless except where small amounts of woody debris provide fish refuge and energise the flow. Banks are eroding in many places. Some veteran willows are present. Some side-channels have good flows and with gravel beds.	Amber
Flow regime	Stable but considered reduced, does not dry out. A few small areas known to flood.	Green
Effluent / run-off inputs	Past incidents with a pump failure at sewage treatment works near Guilden Morden have impacted the river. One horse field where the river is affected by poaching and run-off from a muck heap too close to the river.	Amber
Watercourse receives management	Occasional management by EA.	Green
Habitat enhancement potential	Removing weirs is an important objective. Investigation is needed regarding the river-supported pond near Tadlow and an alternative approach found (EA should be informed). There is scope for tree hinging and low-level woody material placement, combined with bed raising and bank reprofiling. Adding gravel to the fords could provide spawning habitat without affecting their function. Bank re-grading (or expanding old cattle drinks) could reduce erosion. Improvements to the STW should be sought. Some smaller channels could be expanded to provide fish refuges (e.g. at Hook's Mill). Look at potential for re-wetting areas of woodland to make better use of the floodplain. Better floodplain connection is required.	Green
Supportive landowner(s)?	Multiple landowners, not approached, some will be more interested than others	Red

Further comment:

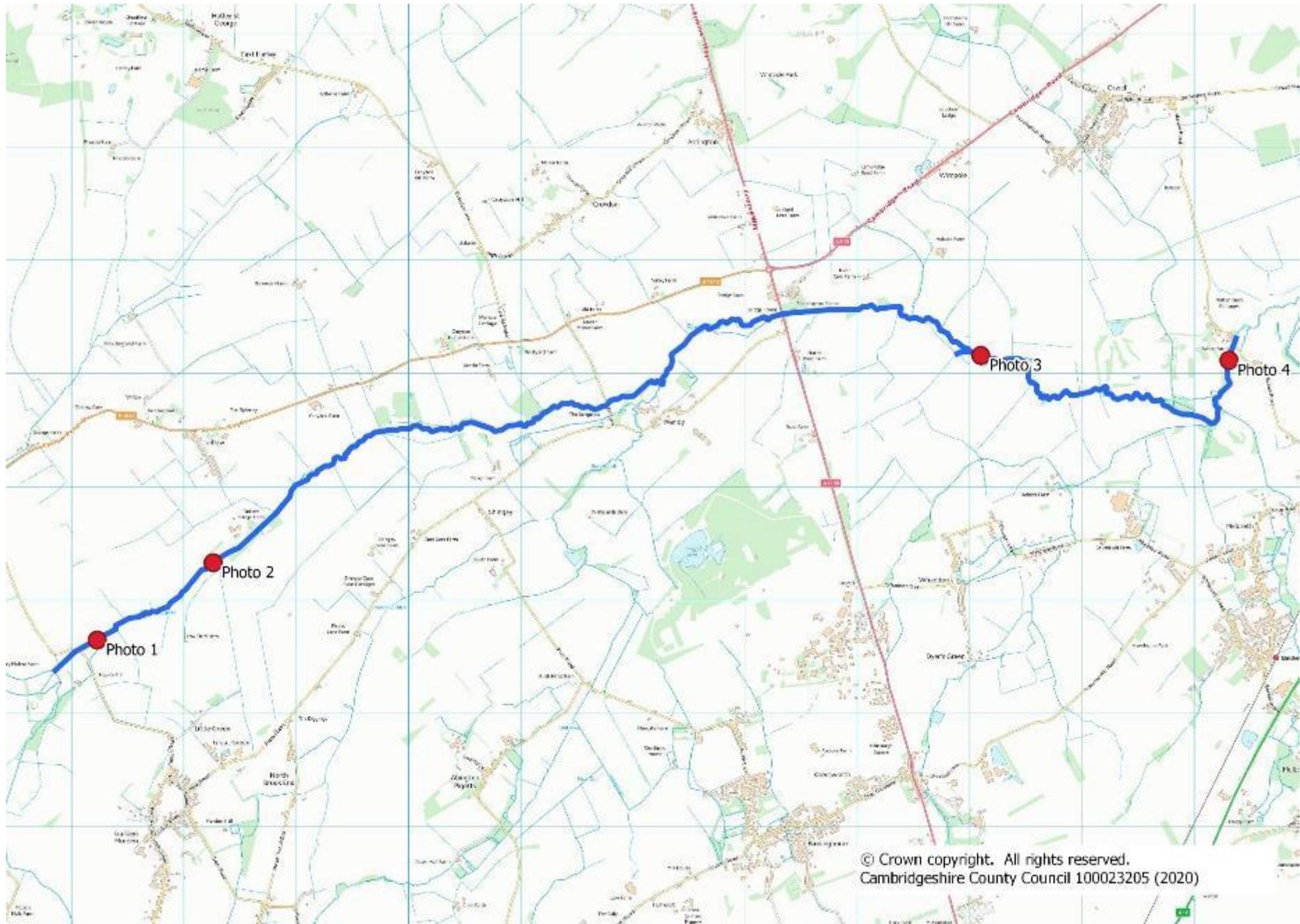
The Rhee rises from chalk springs at Ashwell but soon runs over clay rather than chalk. It does retain some chalk stream characteristics at its upper end and in its tributaries. Some drainage ditches at the upper end are straight but have clear water and a firm gravel bed giving them potential as fish nursery areas to aid recruitment of the main river.

Walkover assessments have been completed by WT in 2013. The river is generally lacking natural features and dredging has removed gravel leaving the bed silty and the water prone to turbidity. While some sections are heavily shaded, much of the river has a mix of sunlight and shade, and supports both submerged and emergent vegetation which in turn supports an extensive water vole population. The banks are generally steep, particularly at the toe-of-bank, and are sparsely vegetated. In places the bank-toe is eroding. The river is so deeply incised that it has become disconnected from its floodplain with out-of-bank events being rare and extreme. Dredging has left a uniform channel shape, and flow diversity is linked to a limited amount of fallen woody material in the channel. There are a number of veteran willows along the banks, most of which have been left to age without pollarding. This section of the Rhee has limited gradient, meaning that obstructions to flow impound water upstream for a considerable distance.

Only a small amount of restoration work has taken place to date, including an EA project near Wendy approx. 20 years ago which saw bank re-grading and a backwater created. Some parts of the river have good potential for restoration work such as adding LWM and bank reprofiling. Fish passage is an issue with two significant barriers known (the impounding weir at Tadlow and EA gauging station at Arrington), although higher flows may allow some fish species access. In the long-term this river needs significant bed raising and reconnection to its floodplain.

Initial projects:

- Increase flow diversity by adding LWM to channel (requires a supportive landowner, such as near Wendy) (£2k).
- Tree hinging / LWM in other location (£5k).
- Reprofile banks at site of old cattle drink near Arrington Bridge (or other location / old channels) and potentially create wetland areas (£5k).
- Fish refuge creation and habitat work in side ditches (£10k).
- Programme of pollarding a selection of veteran willows (£10k).
- Bed raising with gravel near Tadlow Bridge (or near Wendy) (£15k).
- Adding gravel to existing fords (£10k).
- Feasibility study for creating areas of floodplain wet woodland (£5k).
- Look at fish passage at Arrington gauging weir with Environment Agency (£10k+).
- Investigate options for removal of private dam while maintaining river-fed pond (£5k).
- Improvements to the STW at Guilden Morden were listed in Anglian Water's AMP6 – check current situation and whether these have solved the problem of untreated sewage overflowing onto Potton Road, into drains and from there to the river (not solved 2017).
- Landowner advice including the importance of wide field margins and keeping fire sites and muck heaps away from the river (£5k).
- Feasibility study for large-scale bed-raising (£10k).



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Near Guilden Morden 2013 – banks erode but rarely overtop.



Tadlow bridge 2013 – a rare wide and shallow, gravelly section.



Ford near Wimpole 2013 – impounds water but not a barrier to fish.



Near Malton 2013 – over-deep and over-wide.

Rhee, Malton Farm to Harston – rapid assessment of biodiversity and community value

Watercourse length 6km

River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Water voles and otter present. Brown trout and a range of coarse fish (although depleted in recent years).	Green
Brown trout presence	Known population	Green
Community group present	No	Red
Public access	Yes, Boot Lane Barrington, Barrington to Harston, Shepreth Riverside Walk.	Green
Nature reserve / designated site	CWS	Green
Connectivity / fish barriers	Barriers exist at Foxton/Barrington Road bridge, similar problem at Barrington/Shepreth bridge. Fish passage through Barrington Mill is required. EA have removed weir impoundment at Harston Mill.	Red
Invasive species present	Signal crayfish and water fern (<i>Azolla</i>) known to be present.	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Limited natural gravels and meandering channel course present downstream of Malton Farm. Lower sections have been widened, straightened and deepened. Some gradient but a number of obstructions impound flow (and are a legacy of ancient mill sites). Lower sections are very silty with collapsing banks following the weir removal at Harston. The entire length is largely degraded due to past dredging and a lack of coarse sediment supply. The river has been realigned for milling creating a perched channel and levees disconnecting river from its floodplain in places.	Red
Flow regime	Stable flow but considered reduced. Extensive flooding can occur on floodplain meadows (still retained along entire length).	Amber
Effluent / run-off inputs	Phosphates listed as WFD Reasons for Not Achieving Good would link back to multiple STW discharging into reduced river flow. Unknown nutrient levels in discharge may be reason for excessive plant growth downstream. Long length of cattle poaching at Riverside Walk.	Amber
Watercourse receives management	EA undertake occasional management.	Green
Habitat enhancement potential	Much potential exists to restore former bed levels through gravel placement. Opportunities for tree hinging and LWM fixing. Reduce poaching by constructing cattle drinks or installing pasture pumps. Flood storage / backchannel project at Shepreth Riverside Walk. Fish passage project at Bulbeck Mill. Improved floodplain re-connection is required, such as between Barrington and Harston. The removal of Harston weir is likely to increase channel incision and fine sediment transport unless bed raising is undertaken. Fish passage at Barrington Mill could be combined with habitat restoration to deliver significant spawning riffles and glides.	Green
Supportive landowner(s)?	Multiple landowners, most not yet approached. Some supportive.	Green

Further comment:

Walkover assessments have been completed by WT and WTT. The upper section near Malton Farm retains some natural gravels and meanders; further downstream the river has been widened, straightened and deepened with very few natural features remaining, although there is a gravel riffle downstream of the Foxton road bridge in Barrington. Weir notching at Harston Mill caused river levels to drop by 1m or more and caused mobilisation of large amounts of silt as well as bank collapse in places. This section needs LWM and channel reprofiling to help stabilise it, or preferably bed-raising on a large-scale with gravel to prevent bed incision and to aid floodplain connection.

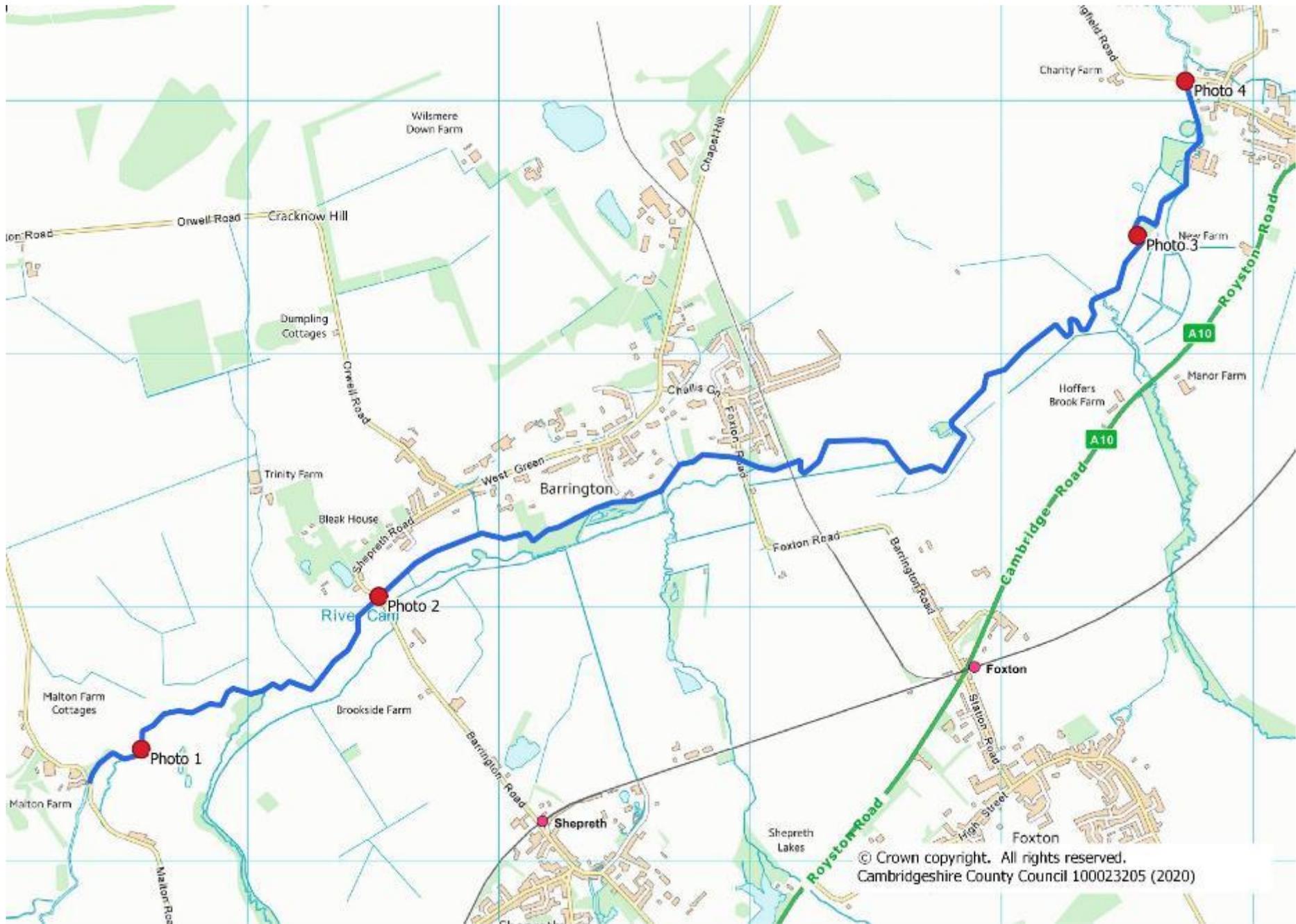
Cattle drinks upstream of Harston mill could be reshaped to account for the new water levels (due to fencing they are currently unusable). The central section of river around Shepreth and Barrington has multiple back channels / old river channels which could be used for habitat creation and better management of flood water and floodplain re-connection. Parts of the river which are not poached have actively eroding banks which could benefit from LWM. Shepreth Riverside Walk suffers from cattle-poaching and there is an opportunity to install cattle drinks or pasture pumps.

At Bulbeck Mill the river splits into two with a channel passing beneath the mill with good potential to improve fish passage, and another channel forming a flood by-pass channel with a weir (EA owned) resulting in a drop of ~1.75m which is entirely impassable. The mill owner is interested in a restoration and fish passage project.

Restoration on this section so far has been limited to weir notching and creation of a few cattle drinks. Project planning is already underway for fish passage projects at Barrington Mill and the two road bridges, and a habitat / floodplain reconnection project at Shepreth, although not all of these are likely to go ahead in the short-term.

Initial projects:

- Fish passage at the two road bridges (£20k each).
- Barrington Mill feasibility study (£10k).
- Shepreth Riverside Walk backchannels feasibility study (£10k).
- Shepreth Riverside Walk fencing / cattle drink project (£10k).
- Cattle drink and fencing project upstream of Harston (£5k).
- Restoration of defunct channels as fish refuge / flood storage (£5k each).
- Wet meadow survey and restoration near the confluence with Hoffer Brook (£10k).
- Willow pollarding of selected trees (£10k).
- Feasibility study for large-scale bed raising of lower reaches (£10k).
- LWM and bank reprofiling to stabilise lower reaches (£5k).



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P1

Near to Malton March 2018 – the river flows through quite open countryside with only the occasional tree as a feature.



P2

Downstream from Shepreth bridge, May 2020 – many veteran pollard willows are present.



P3

The river between Harston and Barrington following the weir removal at Harston Mill, April 2019.



P4

The view upstream from Harston bridge Oct 2020.

River Rhee, Harston Mill to Hauxton Junction – rapid assessment of biodiversity and community value

Watercourse length 4.3km

River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Water vole and otter present, plus a variety of emergent vegetation including arrowhead. Brown trout and a range of coarse fish (although considered depleted). Mayfly present.	Green
Brown trout presence	Known population	Green
Community group present	No, but potential interest from staff at Harston Mill.	Red
Public access	Limited to footpath crossing at Burnt Mill, Haslingfield.	Red
Nature reserve / designated site	CWS	Green
Connectivity / fish barriers	Fish easement installed at Haslingfield gauging station by EA. Weir at Harston Mill has been removed by EA providing complete passage to upper Rhee.	Amber
Invasive species present	Water fern (<i>Azolla</i>) and signal crayfish present. Crayfish are believed to be a major source of the river's high turbidity as they constantly mobilise bed sediment.	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Channel is over-deep, over-wide and silty, impounded by bur reed and the gauging station. General lack of gravel and bedform variation. Good number of veteran pollard willows.	Amber
Flow regime	Constant flow, suffers from turbidity, known to flood over agricultural land.	Amber
Effluent / run-off inputs	Sewage treatment works (Foxton and Haslingfield). It is assumed that phosphate levels will be high leading to excessive plant growth.	Amber
Watercourse receives management	Occasional management by EA.	Green
Habitat enhancement potential	Tree hinging, bed raising, LWM fixing, channel reprofiling, backwater creation. Reedbed for STW outflow (no Anglian Water driver). Levee removal downstream of STW. Silt traps / in-ditch wetlands on arable drains to improve quality of water entering river. Allowing more floodwater onto land at Hauxton Junction in combination with wetland creation.	Green
Supportive landowner(s)?	Multiple landowners, some potentially supportive	Amber

Further comment:

The reach of river is relatively remote with public access limited to a short riverside path and crossing at Burnt Mill. The EA recently completed a fish passage easement over their gauging station. The gauging station impounds flow upstream for at least 300m resulting in the drowning out of former riffles (which became exposed during recent work when the river was lowered). The effect of the impoundment caused by the weir at Byron's Pool is notable at the bottom end of this reach.

The river has meanders which could be enhanced through the introduction of brushwood ledges to enhance their sinuosity. In straighter reaches it may be possible to hinge-cut or tether trees into the river to create flow diversity.

The river has been over-deepened resulting in a largely uniform bed profile. The lack of coarse sediment supply prevents the river from naturally forming gravel bars and riffles. Extensive bed raising to re-create the river's missing bars and riffles is required.

The river does flood on to adjacent grass flood meadows. However, work to better connect the river with its floodplain is still required, and there may be opportunities for levee removal.

Initial projects:

- Scoping of gravel placement to lead to extensive bed raising (£2k).
- Tree hinging and LWM tethering, in combination with brushwood ledge creation, to enhance flow diversity (£2k).
- Scoping of floodplain connection opportunities (£2k).
- Re-pollarding of veteran willows (£2k).
- Scoping of backwater creation and wetland projects, such as at Clock Holt, Haslingfield (£2k).



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P1

View from Harston bridge, Aug '20 – the river is often turbid.



P2

View from Burnt Mill foot bridge, Aug 20 – the incised channel is apparent



P3

The EA gauging station at Burnt Mill (Haslingfield), July '19 – fish passage has been eased by recent EA work.



P4

Downstream of Haslingfield Aug '20 – good marginal cover but the river lacks flow diversity.

Hauxton Riddy – rapid assessment of biodiversity and community value

Watercourse length 2.3km

River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Occasional starwort and lesser water parsnip, dace, roach, minnow, bullhead and occasional trout were previously known alongside former factory site but low flow and poor water quality now thought to limit species richness. Otter signs are present.	Green
Brown trout presence	Known population. Trout are reported to be in the middle reaches with some very limited spawning present. Requires checking at spawning time.	Green
Community group present	None known	Red
Public access	Short length accessible near former factory site. The Riddy goes through Hauxton Primary School grounds.	Amber
Nature reserve / designated site	None known	Red
Connectivity / fish barriers	Free passage from Cam but shallow gravel bars prevent fish movement in low-flows.	Green
Invasive species present	Signal crayfish	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Gravel bed and meanders alongside former factory site, much of the middle reach has been over-deepened and straightened, but small areas of gravel remain. The stream then becomes a vegetated ditch nearer to Hauxton primary school.	Green
Flow regime	Stable but susceptible to low-flows. Not known to have dried in 2019.	Amber
Effluent / run-off inputs	Unknown, but concern still remains regarding contamination beneath former factory site. Springs emerging from beneath the site retain a chlorinated smell.	Amber
Watercourse receives management	SCDC maintains upper reach by hand to clear blockages.	Green
Habitat enhancement potential	Former factory site delivered poor channel restoration work. Perhaps improvement work could be taken forward with new residents. Scope exists to adjust fallen debris in places. Bed raising should be delivered in middle reach and possibly realign channel to introduce sinuosity. The small areas of gravel should be increased to enhance fish spawning habitat.	Green
Supportive landowner(s)?	Some present	Amber

Further comment:

This small stream rises from springs emerging upstream of Hauxton Primary School and in its upper reaches it has largely been turned into a ditch habitat.

After flowing beneath Hauxton High Street the Riddy flows over a short length of shallow gravel bed at the former University Arms Farm site. It then reaches the Cam floodplain where it has been realigned and deepened to follow the edge of the floodplain to drain land around Hauxton Mill. The channel is prone to siltation. However, it is reported that due to the depth fish such as trout and minnows can be found.

The Riddy flows parallel to the Cam in its straightened channel with a few meanders encountered once the former factory site is reached near Hauxton Mill. The stream here is typically less than 0.3m deep and flows over a gravel bed.

The former factory site has been subject to a clean-up operation but local concern still remains for the quality of the water emerging from springs beneath the former factory.

There is free fish passage to the Cam but shallow gravel bars can trap fish in deeper pools in periods of low flow.

Re-development of the former factory site resulted in habitat improvement works being undertaken to the Riddy in order mitigate the discharge of surface water into the stream. Bank re-grading was undertaken but it has been poorly undertaken with pre-planted coir rolls set incorrectly. Tree thinning work should have been undertaken to let in light but that has not been completed.

Initial projects:

- Visit middle the reach of Riddy to assess the scope for addressing the siltation that occurs to the over-deep reach (£1k).
- Tree work near former factory site to allow marginal vegetation to establish (£5k).
- Improve flow characteristics between pool and riffle alongside the former factory to aid fish passage in low flow periods (£2k).
- Re-visit the stream in mid-January to look for trout redds (£500).



The Mill House

Cottages

Photo 4

Photo 3

Hauxton

Church Road

Photo 2

Photo 1

Hauxton

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P1

At Hauxton Primary School Oct 2020 – a narrow ditch-like habitat.



P2

The Riddy downstream of the High Street Nov 2020 - a small stream.



P3

Below Hauxton church Nov 2020 – over deep and wide.



P4

Downstream of Hauxton mill, Oct 2020 – note the shallow gravel bed.

River Shep – rapid assessment of biodiversity and community value		Watercourse length 5.6km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Bullhead, spined loach, stone loach, otter, diverse array of aquatic inverts inc mayfly and blue-winged olive, diverse array of plants, water vole, water shrew and brown trout.	Green
Brown trout presence	A good population spread along its entire length.	Green
Community group present	Friends of the River Shep	Green
Public access	Footpath runs along majority of river and takes in Shepreth village centre.	Green
Nature reserve / designated site	RSPB Fowlmere at the source of river is also Fowlmere Watercress Beds SSSI, and CWS.	Green
Connectivity / fish barriers	Lower half of river connects to Rhee. 2 mills are believed to prevent fish passage to upper reaches. Flow is too low to be split into a by-pass channel.	Red
Invasive species present	Signal crayfish established along entire length.	Red
Presence of gravel / natural geomorphic features / mature trees with roots	Limited natural gravel but has been extensively supplemented. Riffles and pools have been created, bank profile is incised, and is being undercut by signal crayfish. Gradient is reduced by mills. The river is not considered to be natural having been created to direct the flow of water to mills. The original channel cannot be found in the landscape (if it ever existed).	Amber
Flow regime	Supported and impacted by abstraction. Requires EA support in most years. Aquatic vegetation has to be cleared at Fowlmere to allow pumped water to flow down the channel. River flows more strongly in the upper reaches than downstream of Shepreth village. The river has not dried since 1976. It is not prone to fluvial flooding.	Amber
Effluent / run-off inputs	Only 2 domestic effluent outfalls known, upper half of river is not affected. Road and agricultural run-off not considered an issue.	Amber
Watercourse receives management	SCDC who are generally sympathetic, annual flail cutting, occasional desilting and aquatic weed removal. Friends of River Shep (led by RM) undertake hand weed cutting and fallen tree management. RSPB maintain the upper reaches (through liaison with RM).	Green
Habitat enhancement potential	Work needed to address deer damage and siltation at Fowlmere. Opportunity to create a community-focussed project in Angle Lane using channel narrowing and LWM. Further riffle enhancement, bank re-grading and LWM along Manor Farm. Further riffle enhancement at Tyrell's Hall. Review fish passage at mills. Placement of gravel in the straight lower cut to enhance the incised channel.	Green
Supportive landowner(s)?	RSPB & most landowners generally approachable	Green

Further comment:

Some work still needed to address deer damage to banks at RSPB Fowlmere, and occasional desilting is required to remove fine sediment accumulations following repeated low-flow years. An opportunity exists to scope a community-based project centred on Angle Lane, Shepreth. It would see riparian residents trained-up (along with other volunteers) to create channel narrowing through brushwood ledge creation and flow deflector installation. The reach along Manor Farm is suitable for further gravel introduction to increase the number of riffles, bank re-grading to a shallow angle could reduce the impact of signal crayfish but it would have to be carefully balanced with water vole presence. An opportunity exists to improve and extend the riffle at Tyrell's Hall.

The mill pond behind Delahay's Mill requires periodic desilting due to low flow leading to fine sediment accumulation.

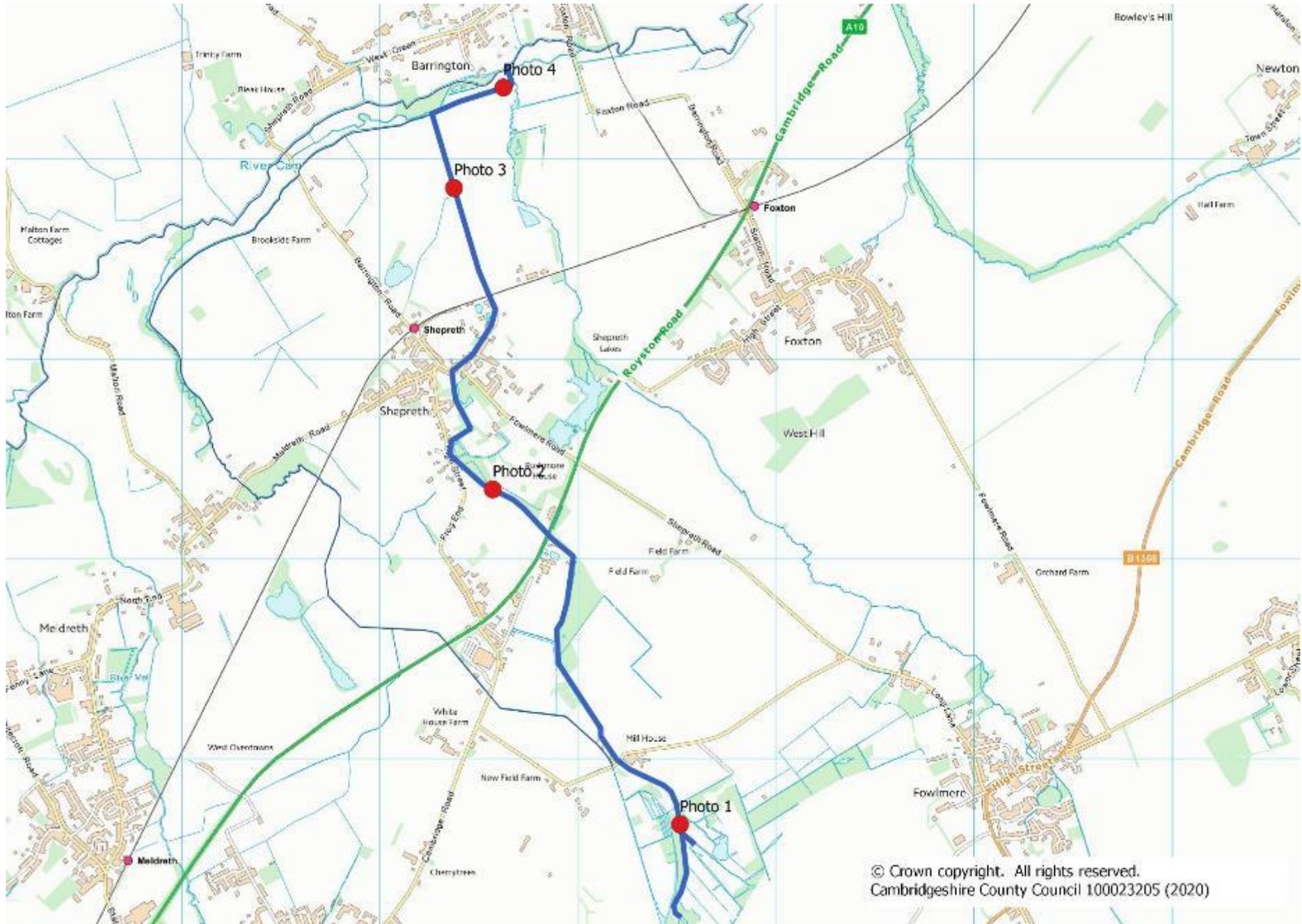
Downstream of the railway line the river flows in cut resulting in a deeply incised channel. Gravel could be added to increase flow diversity and mitigate for the continued down-cutting resulting from the excavation of vegetation and sediment. Better still seek agreement with SCDC not to annually maintain this reach.

The two mills are believed to present barriers to the upstream movement of most fish (except large trout which may be able to push up the sluice in certain water conditions). The provision of by-pass channels is the obvious approach but the flow is too low to be split. In fact, an old by-pass channel exists for Upaloft Mill but the owner has blocked it so as not to lose flow to the mill; conflict over flow splitting will arise.

Signal crayfish are starting to cause bank collapse at some locations. Appropriate mitigation work (bank re-grading, and protection of the toe-of-bank with a gravel/cobble mix) should be considered.

Initial projects:

- Scoping of a community-based habitat improvement scheme for Angle Lane (£2k)
- Gravel placement and bank re-grading along the Manor Farm reach (£4k).
- Signal crayfish mitigation work (£2k).
- Riffle enhancement and extension at Tyrell's Hall (£5k).
- Delahay's Mill Pond desilting (£2k).
- Gravel placement in lower cut downstream of railway line (£2k).
- Exploration of fish passage issues at mills.





P1

At RSPB Fowlmere May 2014 – a restored reach following bed raising.



P2

Manor Farm, Shepreth April 2020 – lush emergent plants provide cover.



P3

Downstream of Shepreth, Jan 2020 – the long cut is a stark contrast.



P4

Near Boot Lane, Barrington, Sept 2020 – a restored section.

Vicar's Brook – rapid assessment of biodiversity and community value		Watercourse length 1.7km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Dace and roach regularly use the lower reaches near its confluence with the Cam. Fisheries data is needed. Has potential for water voles if marginal vegetation was more abundant.	Amber
Brown trout presence	Has potential to support.	Amber
Community group present	CCiC volunteer work parties could work on the brook with leadership. As could the Empty Common Allotment Society members.	Amber
Public access	Footpath runs along 1/2 of the brook at New Bit Common.	Green
Nature reserve / designated site	Brook is a City WS.	Green
Connectivity / fish barriers	Lower part links direct to Cam with no barriers. The brook receives flow from the Hobson's Brook from at least 3 water take-off points. But only at one point is there a connection (through a 15cm diameter concrete pipe) which may allow fish swim through but only at favourable water levels and velocities. Without favourable flows the Vicar's Brook is not considered connected to Hobson's.	Amber
Invasive species present	None known.	Green
Presence of gravel / natural geomorphic features / mature trees with roots	An extensive gravel bed is present along the entire brook. However, the bed profile is very uniform due limited bed scour and a lack of coarse sediment transport. Gravel is poorly sorted and contains a high proportion of fine sediment. Occasional willow tree roots provide cover, otherwise the margins are relatively devoid of cover and trailing vegetation.	Amber
Flow regime	Flow is stable due to the presence of fixed weir structures allowing take-off flow from Hobson's Brook. There appears inadequate flow to support the Vicar's Brook and the higher-level Conduit. Flow sent down the Brook is considered ecologically more valuable. The Vicar's Brook did not run dry in 2019.	Amber
Effluent / run-off inputs	Road run-off enters from Trumpington Road and is hard to attenuate.	Amber
Watercourse receives management	CCiC maintained.	Green
Habitat enhancement potential	Potential for LWM fixing and small tree-hinging along New Bit Common to increase habitat variation and bed scour to initiate sediment sorting. Dig 'n dump should be used to establish new pools and riffles. An increase in bed depth will vastly increase the brook's fish holding capacity. Marginal planting is necessary to increase cover, but one should be aware that cattle may graze the plants. Discussion should be had as to whether cattle should be prevented from entering the brook (the risk is that without cattle grazing, scrub will establish behind the fence leading to the brook's shading). The lowest reach of the brook has been over-deepened and is prone to siltation. It should be addressed through bed raising with gravel to restore habitats and to create an attractant flow for fish moving upstream from the Cam.	Green
Supportive landowner(s)?	Complex mix of landholdings, unknown support	Amber

Further comment:

The upper reaches of the brook present a very narrow watercourse little more than 0.5m wide as it flows to the rear of New Bit Allotments. The brook here is gravel bedded and appears largely unmaintained. Habitat exists for small fish such as minnow and gudgeon, and it may even shelter the occasional brown trout. Due to narrow width few habitat enhancement options are suitable, however benign neglect has sustained evolving habitats. The connection to the Hobson's brook can be found at the upper most limit but that connection, being a 15cm diameter pipe, is very vulnerable to blockages which cuts off flow. Other off-takes from Hobson's to Vicar's exist but offer no opportunity for fish passage due to impassable barriers.

The lower reaches of the brook have excellent potential for habitat restoration given the gravel bed and its connection to the Cam. The brook provides habitat for fish but in general they are only found in the deeper locations where depth provides cover. The current channel form and flow is not sufficient to create the conditions that will enable bed scour to take place. It is recommended that habitat restoration focusses upon creating, and sustaining, the conditions necessary to create bedform variation. The relatively accessible conditions found mean that an excavator could be used to create pockets of deeper water through the careful digging of the bed and the placement of the excavated material to create new marginal habitats and riffle features – this is the essence of the dig 'n dump approach to river restoration.

The brook's connectivity to the Cam presents an important opportunity to restore and enhance it as a nursery stream for fish that, once mature, can survive in the main Cam. The current confluence is over-deep and silted. The flow to the Cam is not as strong as it could be; this results in a sub-optimal attractant flow. Undertaking bed raising with gravel to replicate the gravelly-stream habitats found further up will appeal to a wider range of fish, which once habitat is improved within the brook will be more likely reside within it.

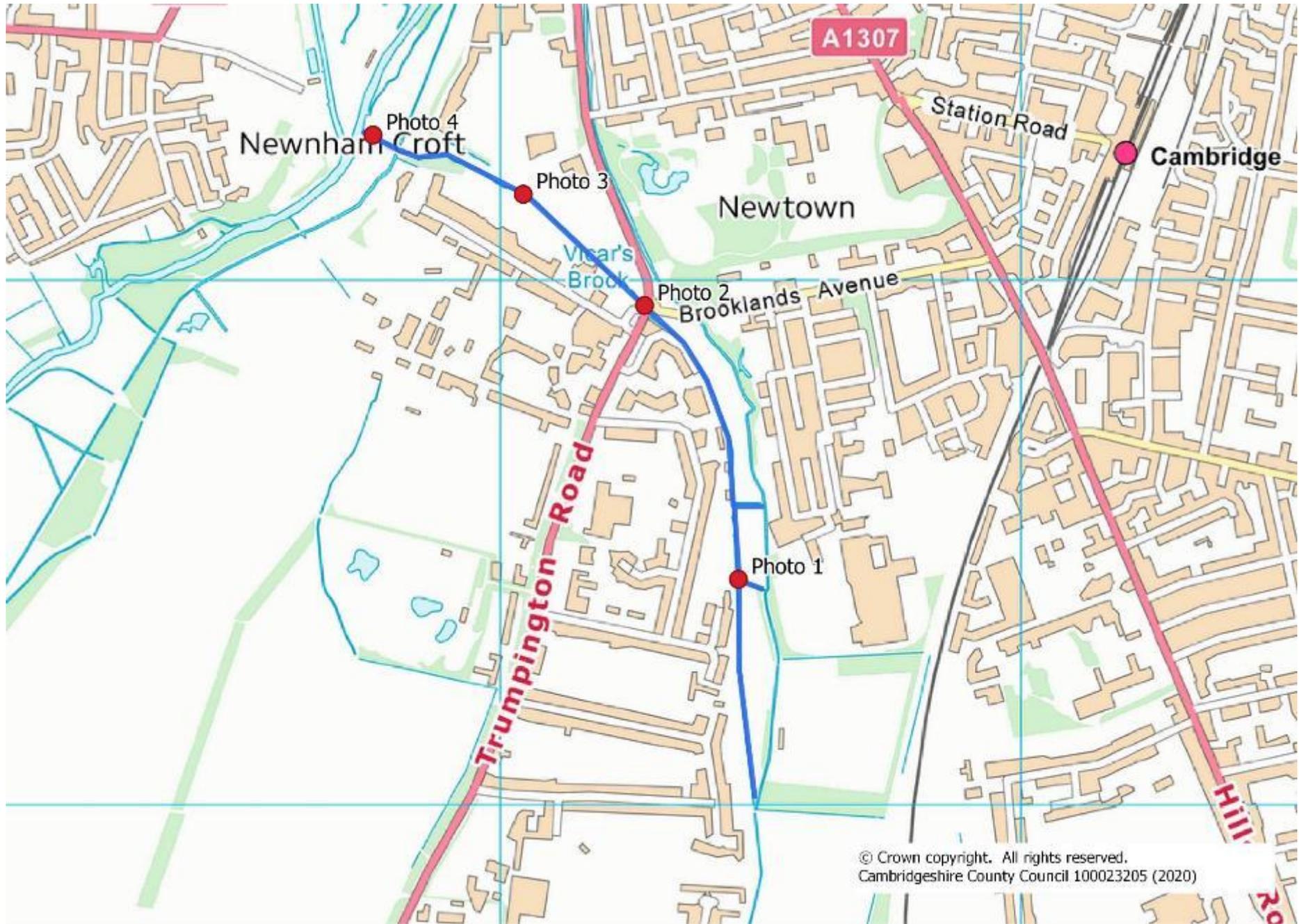
Although tree-thinning work was undertaken several years back, the brook is still partially shaded. The trees should be re-assessed to see if agreement can be obtained for further tree thinning. Cut material could be utilised for in-channel habitat work such as brushwood ledges and flow deflectors. It may even be possible to hinge-cut some trees so that they trail at water level providing overhead and below water cover.

The site is very prominent within Cambridge and will make an excellent show case for the project's work. The brook is shallow which makes it safe to work in, providing an excellent opportunity for community involvement.

This site has already been submitted to Cambridge Water Company's Pebble Fund for £5k grant funding:

Initial projects:

- Dig 'n dump in combination with bed raising using imported gravel, and marginal habitat enhancement (£5k).
- Community-based habitat improvement work (£2k).
- Further tree works (such as crown lifting) (£2k).
- Further assessment of the connectivity to Hobson's Brook (£1k).



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P1

The very upper reaches of the brook, Sept 2020 – a gravel lined stream.



P2

The brook downstream of Trumpington Road, Sept 2020.



P3

The brook at New Bit Common, Sept 2020 – note the shallow depth and lack of cover.



P4

The brook at the Cam confluence, Sept 2020 – note the deep silt creating a sub-optimal habitat for fish wanting to migrate upstream.

Whaddon Brook – rapid assessment of biodiversity and community value		Watercourse length 2km
River assessment feature	Comment	Red/amber/green
Species of biodiversity importance	Water vole, otter, water crowfoot, lesser water parsnip.	Green
Brown trout presence	Has potential to support.	Amber
Community group present	None known	Red
Public access	Limited to road bridges.	Red
Nature reserve / designated site	None known	Red
Connectivity / fish barriers	The upper end of the brook has many channels, some with control structures, and multiple culverts, some of which present a barrier to fish. A weir under the bridge at Kneesworth House impounds water forming a small lake. There is an EA gauging station downstream of Whaddon Rd.	Red
Invasive species present	None known	Green
Presence of gravel / natural geomorphic features / mature tree with roots	Very degraded physical habitat due to past dredging and straightening of lower reaches, continued annual maintenance by SCDC. Lack of gradient and flow limits the brook's ability to recover. Natural bedform still present in the grounds of Kneesworth House but is short relative to the brook's and is isolated from other reaches.	Red
Flow regime	Suffers from low flows. Flow is split into different channels further reducing it. An informal arrangement over flow splitting can leave channels dry at short notice.	Red
Effluent / run-off inputs	Royston STW present upstream. Unknown nutrient loading.	Amber
Watercourse receives management	SCDC maintenance is due to land drainage risk to low-lying farmland. Vegetation clearance is annual through village.	Green
Habitat enhancement potential	Limited potential due to conflict with land drainage on a narrow watercourse with side channel off-takes and culverts in village. If any restoration is to take place it should focus on the lower reach connecting to Rhee. Some good habitat remains at Kneesworth House but is isolated and not known to contained species of value. Tree management and bank regrading in lower reaches may be suitable.	Amber
Supportive landowner(s)?	Neutral, landowner to be contacted.	Red

Further comment:

A walkover assessment of the lower part of the brook was completed by WT in 2014. This watercourse has been extensively modified and moved, but still retains some natural features and a gravel bed in a few places. Water crowfoot and water starwort are present in some of the more open downstream sections. There are 2 main channels in Whaddon village, plus evidence of an older channel which remains as a line of willows. A further channel flows past Kneesworth House and Dyer's Green, by-passing the main part of Whaddon village. Some sections of channel hold ponded water even when there is no flow. Much of the brook is very heavily shaded and there is very little marginal vegetation. The arable sections generally have wide field margins buffering the brook.

So far there has been no restoration work on the brook, but the lower section has potential to support brown trout, water vole, and a variety of invertebrates. It would at least be worth considering the length connecting to the Rhee as a fish nursery ground, and a starting point for habitat improvement. The gauging station is likely to prevent fish passage.

Initial projects:

- Reprofile sections of bank at the lower end of the brook to create a wider pool or 2-stage channel. There is a potential small area where a strip of land is not cropped, near the confluence with another tributary stream (£10k).
- Feasibility study for restoration / wetland creation in the grounds of Kneesworth House. If wetland creation is possible, it could improve water quality for the rest of the brook (£5k).
- Feasibility study for NFM measures near Fountain Farm to hold back some water within the existing deep channel (£5k).





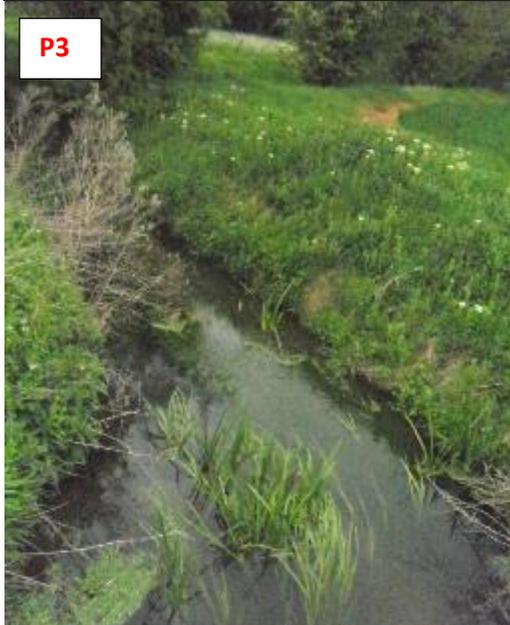
P1



P2

Kneesworth House Sept 2020– water impounded.

Near Fountain Farm Sept 2020 – an almost-empty farm ditch.



P3



P4



P5

Lower section of brook 2014 – steep-sided and very shaded in some areas, but some potential for 2-stage channel.