

WILD TROUT TRUST

Project Proposal

River Kent, Kentmere

([GB112073071390](https://www.gov.uk/land-use-charge-classes/GB112073071390))

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1.0 Introduction

The following is a brief report based upon observations during a walkover of specific reaches of the River Kent, and from subsequent desk-based studies. It was carried out by Prof J Grey at the request of Simon Stainer for the Penrith to Kendal project (P2K) to assess feasibility of habitat improvements and better functionality along the channel and adjacent riparian zone.

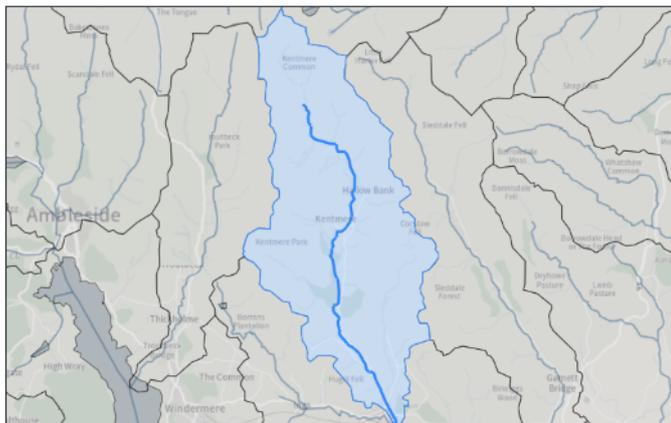
Throughout the report, normal convention is applied with respect to bank identification, i.e. left bank (LB) or right bank (RB) whilst looking downstream. Upstream and downstream references are often abbreviated to u/s and d/s, respectively, for convenience. A series of images is used to exemplify ideas generated during the walkover. Some site-specific detail is given in the legend for each figure, and more generic information can be found in the summary following on.

Comparison to the first 1830s Ordnance Survey maps (freely available via the National Library of Scotland) indicated that all the channels under consideration had been modified >200 years ago. Discussions on the ground suggested that there will be some flood modelling forthcoming from the wider project that could help steer and refine any ideas proposed herein.

Under the Water Framework Directive, the Kent – headwaters to confluence with Gowan Waterbody is designated as achieving Good Ecological Status. However, it should be noted that the hydromorphological elements were deemed 'Not High'.

Kent - headwaters to conf Gowan Water Body

Good ecological status



Get Kent - headwaters to conf Gowan data

- [Download water body \(Shapefile\)](#)
- [Download water body \(GeoJSON\)](#)
- [Download classifications \(CSV\)](#)
- [Download site classifications \(CSV\)](#)
- [Download investigations \(CSV\)](#)
- [Download challenges \(CSV\)](#)
- [Download objectives \(CSV\)](#)
- [Download protected areas \(CSV\)](#)

Related links

- [Plan maps on ArcGIS online](#)
- [Flood risk management plans](#)

Attributes

Water Body ID GB112073071390	Water Body Type River	Hydromorphological designation not designated artificial or heavily modified	NGR NY4539203208
Catchment area 4027.555 ha	Length 12.571 km	Catchment area 40.276 km ²	Natural England Revised WB Protected Area targets http://publications.naturalengland.org.uk/publication/5671588204642304

<https://environment.data.gov.uk/catchment-planning/WaterBody/GB112073071390>

2.0 Proposals

Reach 1: U/s site (NY 46152 05348)



Fig 1. Looking d/s from NY 46152 05348 with the Kent channel obscured by the artificial embankment, fence and trees – the white line accentuates the ramp of soil down from the crest of the modifications to the floodplain. The rushes demarcate the naturally wet part of the floodplain.

At the uppermost site, the Kent had been realigned and straightened, with substantial revetment and walling along the bank top to maintain its artificial course (Fig 1). The field adjacent to the RB was clearly low-lying and exhibited substantial rush growth, and probably accommodated the paleochannels of the Kent. However, the land had been substantially reworked and various smaller tributaries contributing to it coalesced into a straight drain, parallel to the Kent (Fig 2).

Straightened channels are steeper and retain more erosive power, and coupled with the revetment to each bank, there is little opportunity for spate flow to engage with the floodplain where the energy could dissipate. That excessive power reduces the physical habitat diversity within the channel, and hence the potential for biodiversity.

Options:

- Boulder revetment and walling stone along with the ramp of soil could be excavated from the RB to a depth of 1-1.2m (ie level with the floodplain adjacent – see Fig 1)
- Ideally this would be conducted for the full length between the orange and grey arrows in Fig 2 to maximise impact.



Fig 2. LiDAR & MAGIC views of the heavily incised Kent channel. Orange arrow marks the field boundary below which the embankment could be removed, potentially as far as the grey arrow. Orange rectangle denotes straightened field drain that could be filled / modified for pools & scrapes – NB works should be extended around the bend d/s.

- A lower impact option would be to reduce the height of the embankment by 1-1.2m as before, ie starting at the orange arrow, but for a reduced length, min 30m, to allow spate flow to access the floodplain.
- Spoil arising from the excavations. Boulder and stone probably originally taken from the channel anyway should be returned to the channel as a dispersed matrix to subtly raise the bed level. Soil and smaller stone could be used to infill the drainage channel in the floodplain.
- The drainage channel could be infilled completely using the spoil (as described above) as well as material that was laid along each bank of the drain when it was excavated – this would essentially be a 'stage-zero' approach, letting the water find its own way across the floodplain.
- An alternative might be to excavate the drain sides to form a series of broader, shallow pools and then use the spoil arising to block the extant drain channel in between the pools for short distances.
- In conjunction, the Kent bank reduction would allow spate flow to inundate the floodplain more readily where there would be increased storage capacity in the pool network. That area should remain wetter for longer as well, creating valuable habitat for a greater range of flora & fauna.

Requirements:

- To maximise impact, fencing on either side of the drain will need to be removed.
- Ideally, the fence on the Kent RB would be removed entirely when lowering the artificial bank height – It cannot be replaced as it would be susceptible to flood damage. Hence, there would be a need for engagement with the neighbouring landowner; livestock from the LB would need excluding from the watercourse for the full extent of the field opposite the proposed works, otherwise under low flow, stock may cross. These proposed works will theoretically reduce erosion on their bank, as well as the likelihood of flooding, so they may be amenable.
- Under the lower impact scheme (~30m length of bank reduction), it may be possible to construct a series of watergates to retain the current fenceline but there would be ongoing maintenance / cost issues.

Reach 2: Hall Gill and R Kent confluence (NY 45443 03636) environs

Hall Gill has been historically straightened and embanked to act as a drain for the fields to the LB but in doing so seemingly has impounded flows off the valley side to the RB where rushes now dominate – see Fig 3. The channel has been reduced to a trapezoidal cross-section, effectively a gutter with no physical variability to sort the sediment into different size classes, leaving it homogenously distributed. Coupled with scant tree cover, the channel was extremely susceptible to warming – poor conditions for cold-adapted aquatic invertebrates and fish species.



Fig 3. Views along the straightened Hall Gill. Upper – from a drinking bay at NY 45302 03840 looking d/s. Lower – from NY 45411 03681, the bridge near the confluence looking u/s.

Although the majority of Hall Gill was buffer fenced and recovery of vegetation from livestock grazing was evident, the lowest reach near the confluence was not, and even further exposed to the effects of warming (Fig 4 – upper). The RB of the Kent on either side of the confluence was heavily modified with a mix of concrete, walling, gabion baskets and boulder revetment of various ages and states of repair (Fig 4 – lower). Boulder revetment extended some 50m d/s from the confluence along the RB (Fig 5), preventing floodplain connection and any dynamism and therefore functionality of the channel.



Fig 4. Upper – Hall Gill looking u/s from the confluence. Lower – The R Kent and the confluence of Hall Gill on the outside of the bend amidst all the artificial bank modifications.



Fig 5. Large boulder revetment extending for ~50m d/s of the confluence on the RB

Options – Hall Gill:

- Reprofile the entirety of the RB to just u/s of the bridge, removing boulder revetment and lowering the soil embankment – see Fig 6. Boulders should be returned to the channel in clusters to the extant LB to encourage sinuosity and natural erosion into the RB. Any soil arising could be used judiciously as low bunds within the floodplain to accentuate retention of water.
- Consider introducing some sporadic alder tree cover to the RB to help with shading. Riparian vegetation should bounce back to colonise bare gravel banks etc relatively rapidly if unfettered livestock grazing ceases.
- Works would negate need for any fencing west and south of Hall Gill, nor watergates and drinking bays, if light conservation style grazing with ponies (as per tarn environs) was prioritised (but note need for recovery post works to allow riparian vegetation to re-establish).
- Rewetting the meadow from Hall Gill would also complement plans to block or impede flow from the wood to the west.

Options – Kent:

- Break-out all artificial RB modifications immediately u/s of the confluence to ~50m d/s – see Figs 4-6. Any boulder material should be dispersed within the channel from whence it originally came.

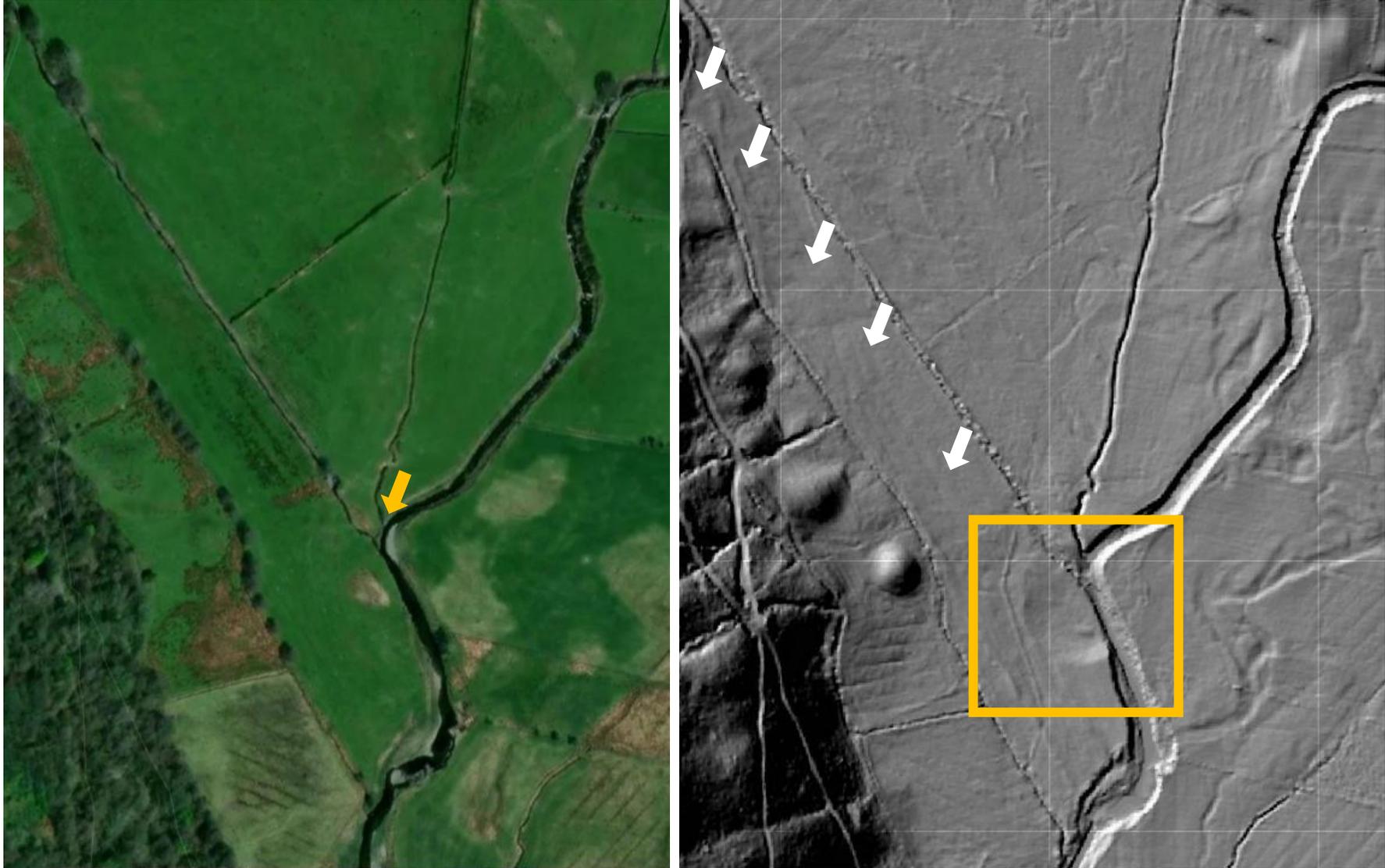


Fig 6. Satellite & LiDAR of Hall Gill & confluence with the R Kent. Orange arrow points to perched control culvert for the field drain running N-S. White arrows indicative of breaking out boulder revetment along the length of the Hall Gill RB. Orange square highlights the confluence area and depression to the south west indicative of a paleochannel of the Kent which could be reinstated.

- Removing the concrete, gabion baskets and boulders would a) renaturalise the confluence with Hall Gill, but crucially b) reinstate connection into a paleochannel depression.
- Potential to further partially connect that paleochannel with the drains to the west to accommodate spate flows, but this will require more detailed topographic survey to establish feasibility. There were several artificial bunds between which would need to be removed.
- Care will be needed 'exploring' the paleochannel reconnection as discussions on the ground suggested the depression was historically part-filled with a vehicle and other waste materials.
- Reinstatement of a natural bank line would alleviate pressure on the LB erosion scar d/s (a function of the highly straightened and constrained channel conveying too much power to that point), as well as instigate natural processes of erosion to the RB thereby resupplying alluvial gravels etc.
- The perched culvert controlling flow from the N-S field drain (see Fig 6) could be left in situ or even modified further to retain more water within the drainage network.

3.0 Recommendations & prelim estimate of costs

- Review all options proposed here considering flood modelling data generated for the wider project.
- The Kent at both locations is considered main river and therefore an Environment Agency Flood Risk Activity Permit (FRAP) would need to be applied for. Indicative costs – drawing up application 4 days plus fee = ~£1600.
- Flood modelling data might need to be modified to account for interventions to smooth the FRAP application process. Poss £3-4k
- Hall Gill is considered ordinary watercourse and should require a land drainage consent from the local council. Indicative costs – drawing up application 3 days plus fee = ~£1100
- Groundworks should be relatively simple – plant & potentially dumper to move spoil ~9 days – local rate ~£700 per day all in = £6300
- WTT CO time to oversee groundworks with contractor = £3600
- Issues to contend with – removal and reinstatement (in places) of fencing, and potential waste from Kent paleochannel. Cost dependent upon distance plus ancillaries.

4.0 Acknowledgement

The Wild Trout Trust would like to thank the Environment Agency for partial support of this Project Proposal, in part funded through monies from rod licence sales. The advice and recommendations in this report are based solely on the expert and impartial view of WTT's conservation team.

5.0 Disclaimer

This report is produced for guidance; no liability or responsibility for any loss or damage can be accepted by the Wild Trout Trust as a result of any other person, company or organisation acting, or refraining from acting, upon guidance made in this report.

Legal permissions must be sought before commencing work on site. These are not limited to landowner permissions but will also involve regulatory authorities such as the Environment Agency – and any other relevant bodies (e.g. Natural England and Forestry Commission) or stakeholders. Alongside permissions, risk assessment and adhering to health and safety legislation and guidance is also an essential component of any interventions or activities in and around your watercourse.