

THE WOOLHOPE NATURALISTS' FIELD CLUB
(ARCHAEOLOGY RESEARCH SERIES)

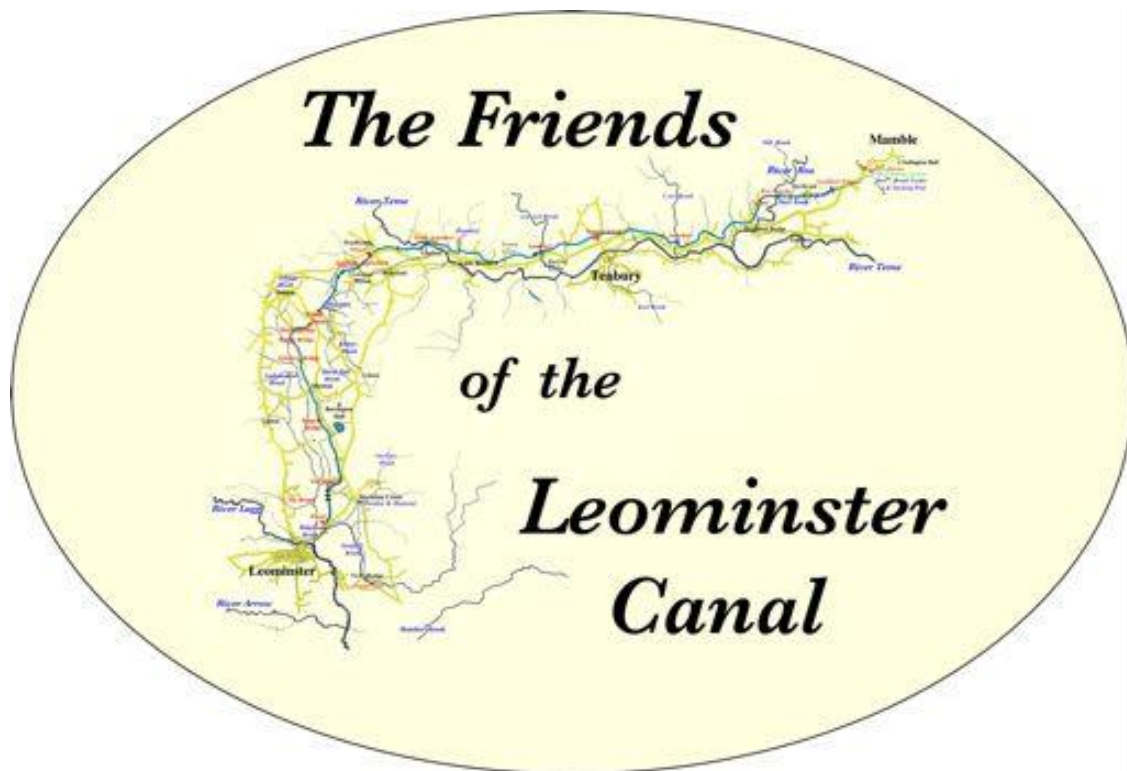


RESEARCHING THE LEOMINSTER CANAL

Paper 5 : THE SUMMIT WATER *(Ashton, Berrington & Stockton)*

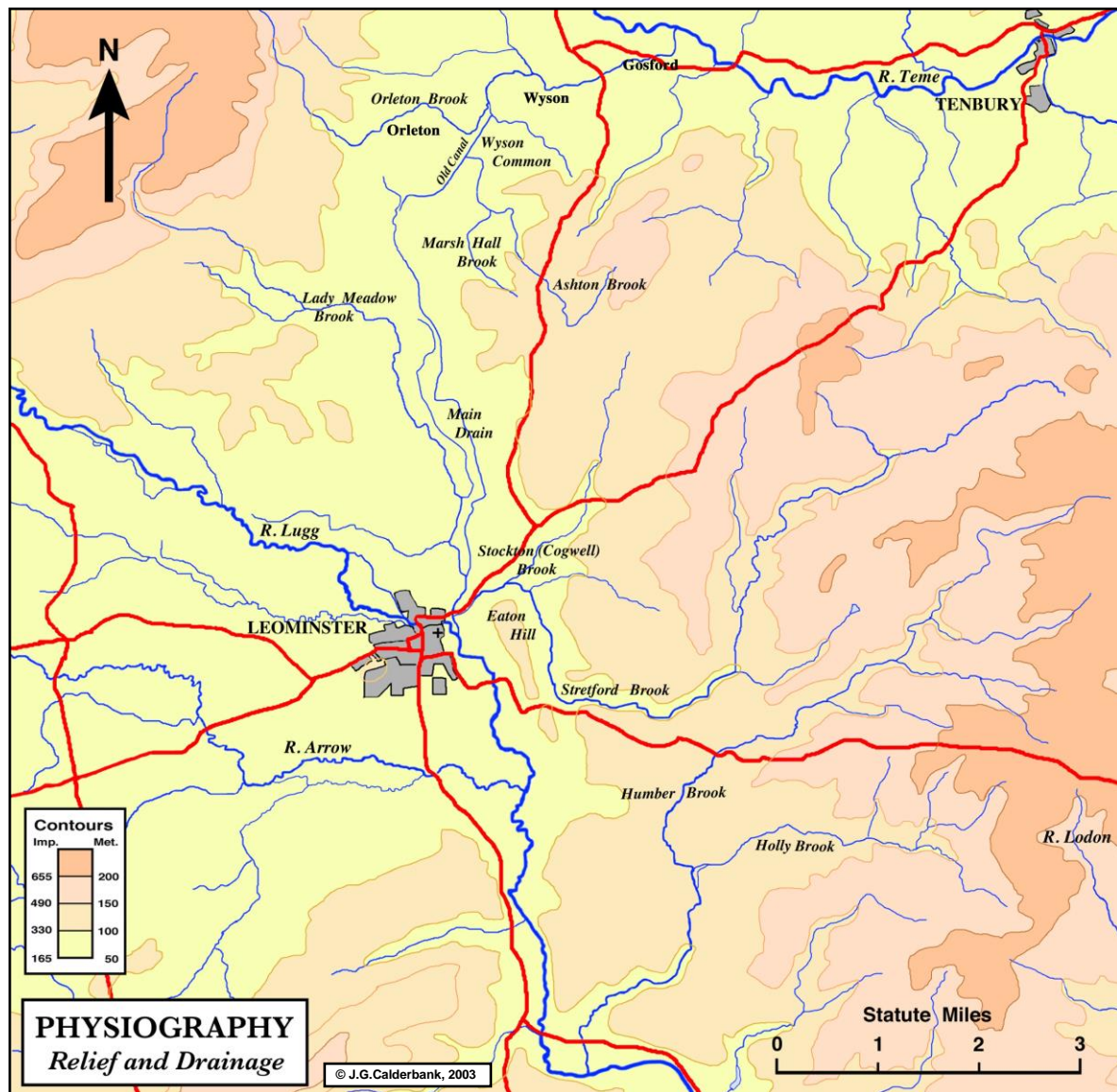
Recalling the Survey of 1789
by
Thomas Dadford Junior
(revisited with Gerry Calderbank)

Handout, originally issued for a Guided Walk



Berrington Hall

Friends of the Leominster Canal : A Guided Walk – 11th May, 2013

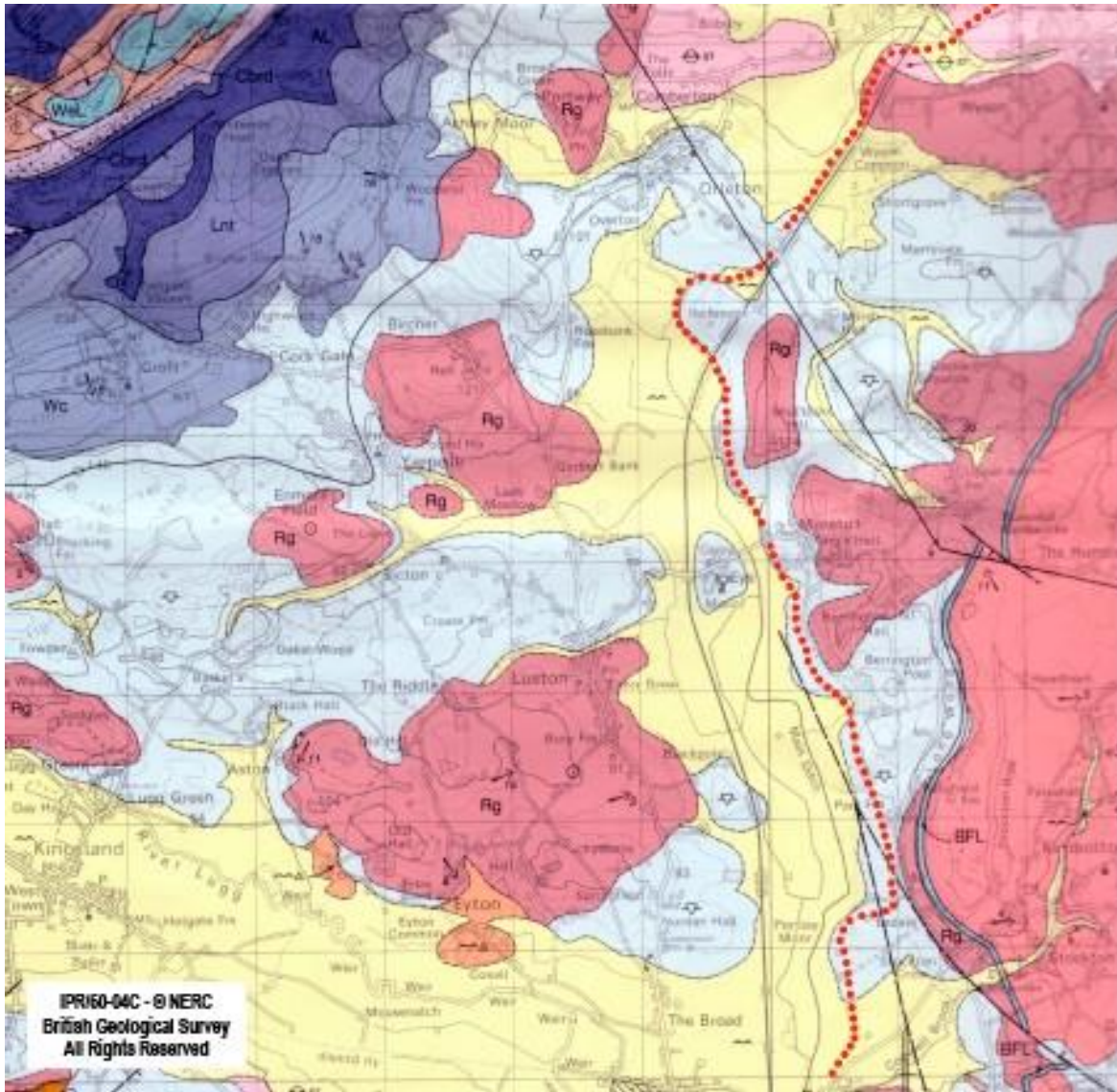


The Leominster Drainage Network

With the Leominster summit and its feeder system, superficial geology is of far greater significance than the bedrocks; furthermore, it's clearly the post-glacial topography that played the vital role in the route planning, and then the building of the canal. All our mapping shows that Whitworth and Dadford found the most logical route, but unfortunately, in his day Dadford would have no inkling of the geological problems and resultant misfortune lying in wait for his workers at Putnal – and there was also Thomas Harley in the frame!

Aside from the relief and river network shown above, glacial history and altered hydrology are two key factors in this part of the story. In fact, some of these rivers and lesser streams do rather extraordinary things, so their curious twists and turns invite our attention. Of these, the Orleton Brook, Ladymeadow Brook, Ashton Brook and Stretford Brook seem most obviously wayward. With each of the above we see that in their higher reaches the drainage appear to be converging in a generally S direction before suddenly making sharply angled turns. Some of these streams practically double back on themselves over a relatively short distance, and this is because, prior to the last glaciation, they were indeed flowing to a confluence with the former 'Proto-Rea-Teme-Corve' (*hereafter, PLTO*) drainage system.

They were all diverted by the last push of a 'Wye Glacier' that finally ground to a halt in this area, and where, in a lengthy 'standstill' mode, the ice steadily melted, thereby depositing a huge spread of glacial moraine that blocked the valley around Wyson. This moraine stretches from about Ashton in the east to the high ground on the opposite side of the valley near Orleton Common. Against the wall of ice and debris, the pre-glacial PLTO drainage was impounded and rapidly became 'Lake Wooferton', stretching northwards beyond Ludlow to the Bromfield district and also eastwards beyond Newnham, whereupon it gradually flooded and overflowed a minor Rea tributary that was then draining N from the Shelsley area. The volume of Shropshire melt-water became immense, until it eventually overflowed *via* its present-day Teme valley, an escape route *via* Powick and confluence with the River Severn – itself, an even larger victim of glacial disruption!



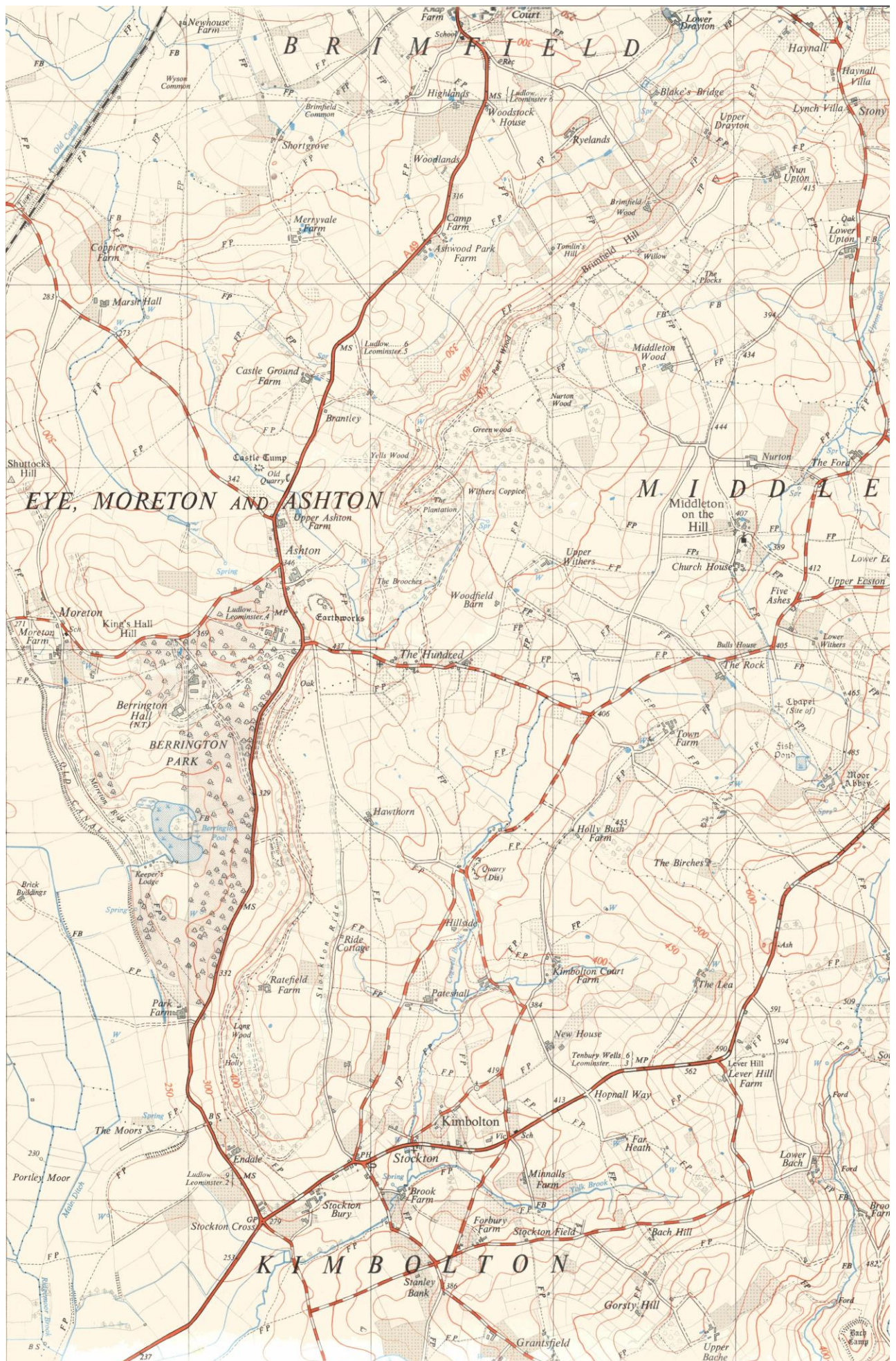
Dadford's Summit Route

Having in mind an outline route (Leominster - Wooferton - Teme Valley, etc.), Thomas Dadford's final decision was essentially a balancing act because he needed to consider several factors and try to accommodate them as best possible – and the major considerations were as follows:

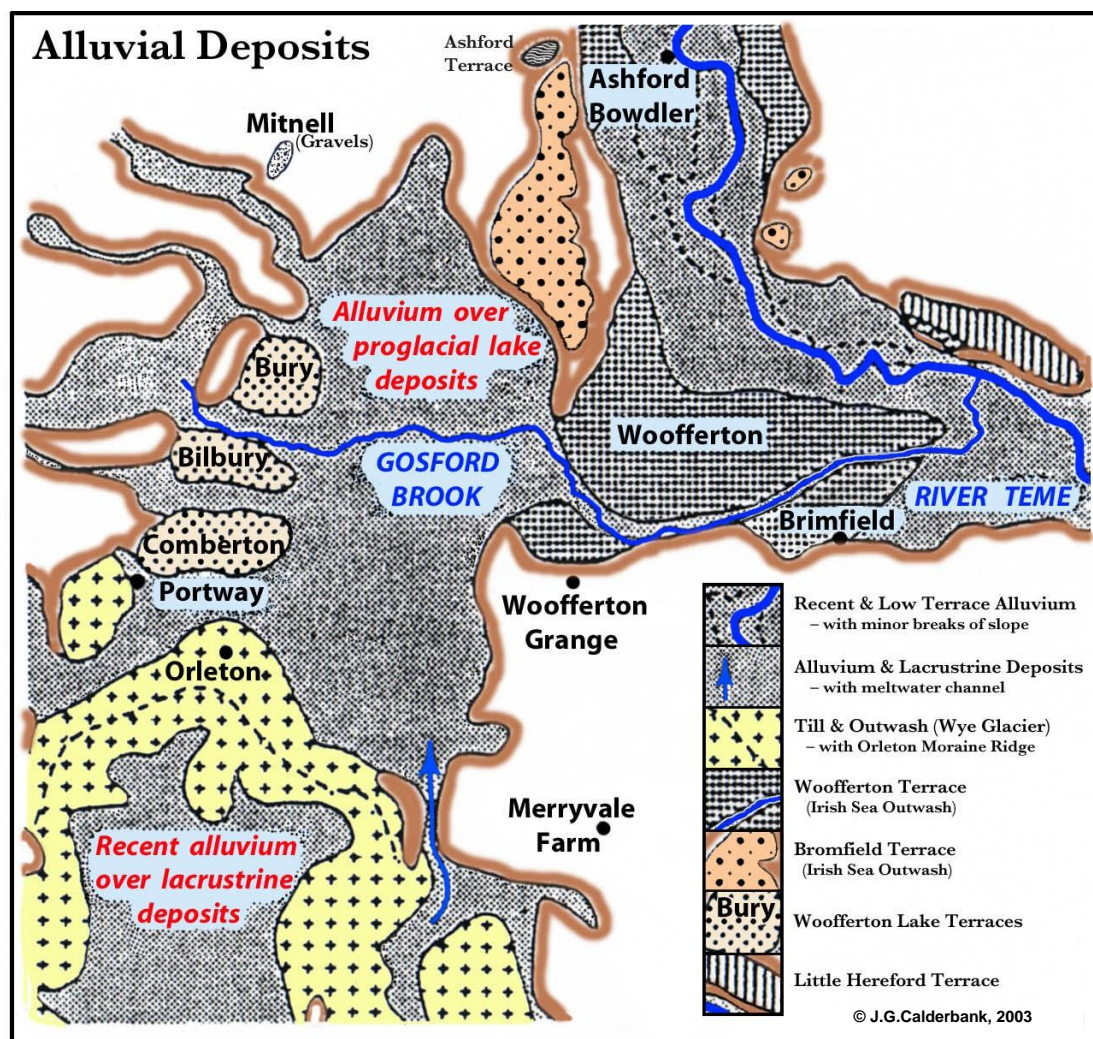
1. Serve the commercial needs of his principal investors – in this area, it was mainly Thomas Harley!
2. Aim for the most direct route – whilst maintaining a given contour throughout
3. Maximise the summit length between the terminal locks in order to conserve adequate summit water
4. Maximise the potential water supply to this summit – by procuring adequate feeder streams
5. Choose an appropriate summit contour level commensurate with the above.

From the older OS 'Two and a Half Inch' (Imperial) mapping it would appear that the best compromise was approximately 250' OD and a level fractionally below this was selected. In the circumstances, Dadford's Putnal Field site seemed ideal in so far that it only required a relatively short tunnel with very little cutting needed for the approaches, but the engineer had no idea of the difficulties they were to encounter within the moraine!

It's easy to be wise after the event, but Dadford might have taken an alternative route; but inevitably, this would have disturbed some of the above listed parameters since a higher contour level was envisaged with the change in question. It therefore seems unlikely that Harley would ever have favoured the extent of encroachment on his parkland entailed with such a raised contour level; and furthermore, the principal feeder arrangements would also have been drastically affected. Much of the directness with his intended line would also have been sacrificed. Nevertheless, Dadford's eventual route did noticeably deviate from his original Plan: instead of contouring around Wyson Common, he chose to maintain his water-level by embanking the canal shortly beyond the N portal approach cutting, then across the former lake floor, and onwards to higher ground adjoining Newhouse Farm.



The late Dr. Peter Cross took a great interest in the WARS Leominster Canal Survey, as did his wife Patricia; they each gave much assistance and Peter kindly supplied me with some of his relevant mapping, including a large map of the superficial geology in and around the Teme Valley. Patricia taught at Leominster Grammar School and, as a keen member of the WARS, she researched the Shropshire archives for us. A portion of Peter's large-scale map has here been digitised and tinted:



Superficial Deposits

The key is in geochronological sequence from pre-River Teme reversal (Little Hereford Terrace) to present day (Recent & Low Terrace Alluvium) and it identifies the variety of superficial deposits, both alluvial and glacial in origin, encountered during our walk. The map is chosen because its authors depict a meltwater overflow channel just to the east of Merryvale Farm. At a late stage in the regional deglaciation, meltwater would also have accumulated and been impounded behind the main ridge of the Orleton Moraine as a gap developed between the receding glacier and the morainic ridge. This newly impounded water couldn't, as yet, escape southwards because of the residual glacier and so it overflowed the lowest point of a (relatively) lower lying part of the Orleton moraine between Merryvale and Shuttocks Hill where it quickly cut the overflow channel northwards to Lake Woofferton occupying what is now Wyson Common and beyond.

This is the area we shall traverse en route from Putnal to Berrington and, in doing so, we cross two streams which coalesce to provide the Ashton Brook Feeder. We can see from its acute change of direction that the larger Ashton Brook clearly predates the glaciation, but has been drastically diverted by the ice and now feeds into the Teme/Severn catchment instead of the Wye drainage system via the Lugg. The Marsh Hall Brook is very much smaller and quite possibly post dates the glaciation; at one time, it would temporarily have been a raging torrent as it drained the new meltwater lake accumulating between moraine and glacier.

It's part of the former meltwater channel that could conceivably have provided an alternative route for Dadford, albeit subject to the various provisos mentioned above. Nevertheless, it might equally well have served John Hodgkinson's purpose if his drastic advice had ever been taken up – but that's another story, and possibly a subject for future exploration.

At the start of our walk we're briefly on Old Red Sandstone, then quickly encounter alluvium in the bed of a small spring-fed stream; following that, it's glacial deposits nearly all the way, plus a little stream bed alluvium, until we again reach the Old Red Sandstone forming the higher ground near Shutlocks Hill, then Berrington Park, where the seat of Thomas Harley is situated.

- THOMAS HARLEY...the Leominster Canal, and its water management -

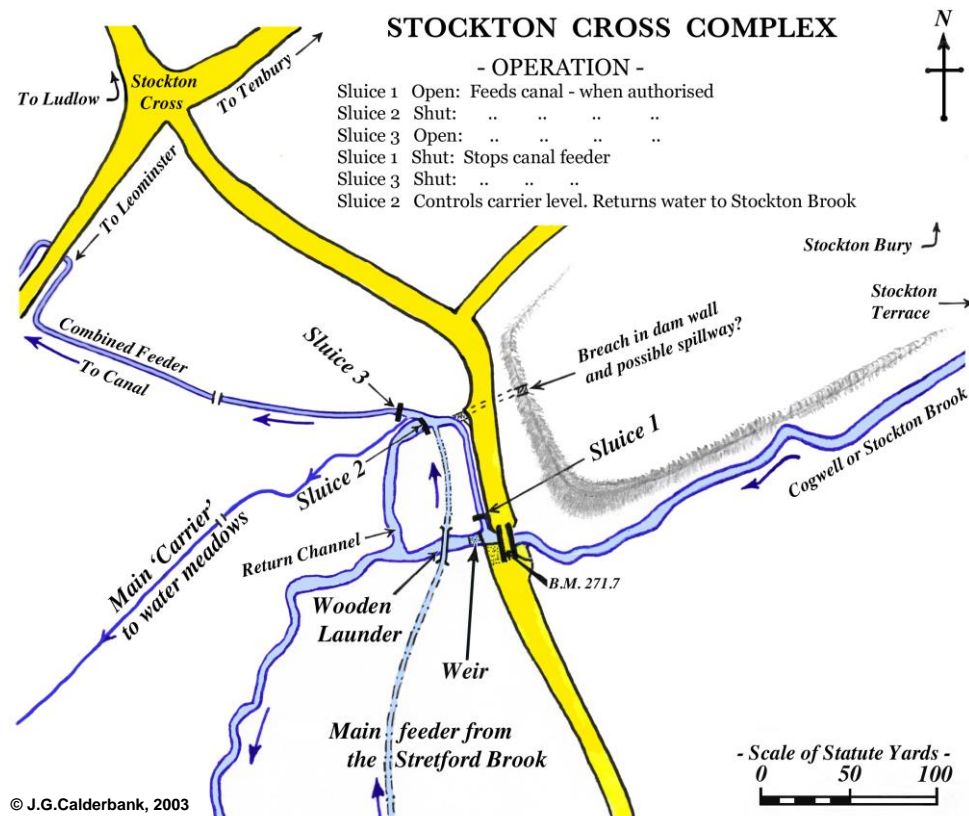
The career of Thomas Harley is well documented, so doesn't require much mention here, except that one particular aspect seems not to have attracted much attention. Having made his fortune with London banking and government contracting, Harley next exchanged London politics and the City life for largely that of a wealthy country gentleman in his ancestral county where he bought the Berrington estate and commissioned the building of his new house and parklands. Nevertheless, from a (1793 dated) document in the East Yorkshire Record Office, we now see that Thomas Harley continued banking in a smaller, more localised way because, 'Messrs. Harley & Co.' of Leominster are seen to handle the subscriptions and general finances of the Leominster Canal Company, of which Harley was, of course, also a major shareholder / director.

Within the 1791 First Leominster Canal 'Act of Authorisation' there are certain 'Sections' under the general category of Engineering - Powers & Provisions - that deal in both general and more specific terms with water rights, the acquisition of feeder water, and certain exemptions and restrictions pertaining to these matters. Water was, of course, still the most valuable natural power resource in the late eighteenth century, and its proprietary use and management was frequently the subject of legal dispute, so small wonder that the Act made great play on the subject. This is because the new canal was sure to make considerable demands on the local water supplies in general and, of particular interest to us here, Section 4 of the Act specifies the following clause:

WATER RIGHTS – EXEMPTIONS:

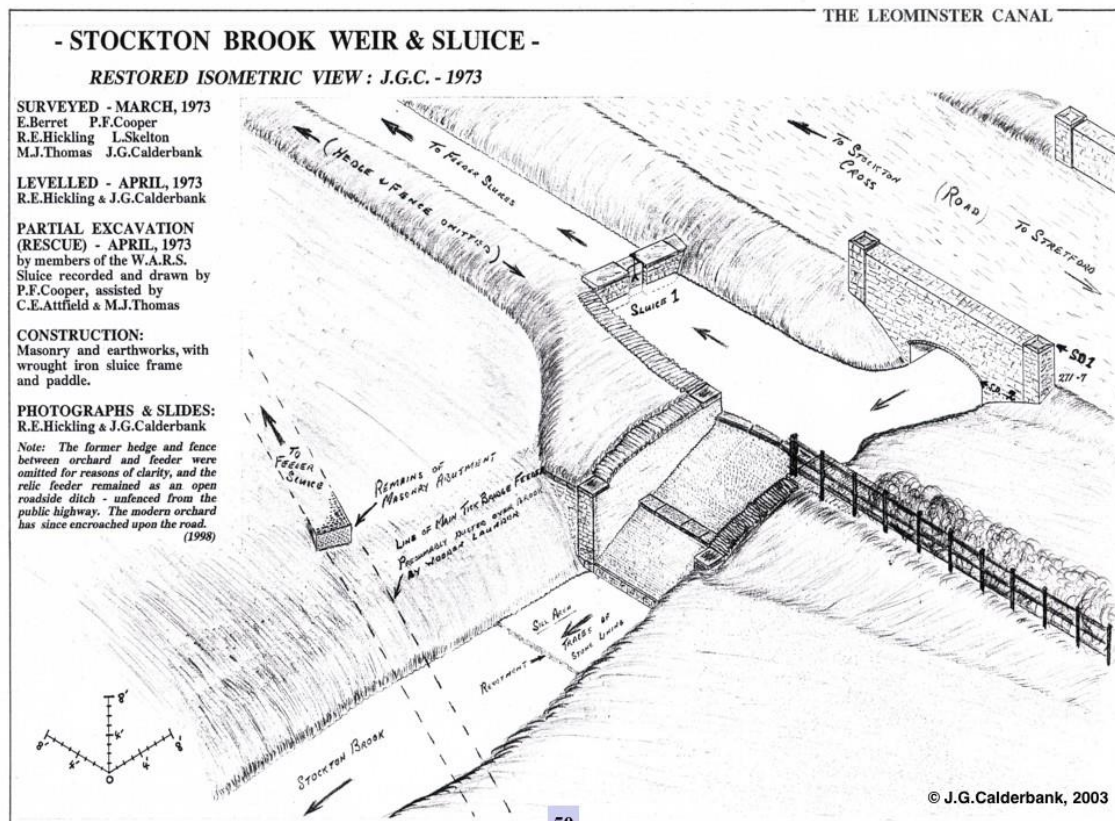
Provided also, and be it further Enacted, That nothing in this Act shall restrain or prevent the Right honourable Thomas Harley, his Heirs and Assigns, or his or their Tenants, from diverting the Course of and taking the Whole of the Water of a certain Brook, in the County of Hereford, called the Stockton Brook, for and during such Time and Times as he or they shall think proper, not exceeding Forty-eight Hours in any One Week, for the purpose of flooding or watering his or their Lands, or for any Purpose he or they may think proper.

In this case however, it's noteworthy that Harley's concern was not water-power; instead, he (or perhaps his tenant) was either contemplating or (more likely) already operating a water-meadow system near Stockton Cross. It was this legislation, together with its implications for the canal feeder system, that first caught our attention and eventually caused the Woolhope Archaeological Research Section (WARS) to investigate and later undertake emergency field investigations and recordings in the vicinity of Stockton Cross.

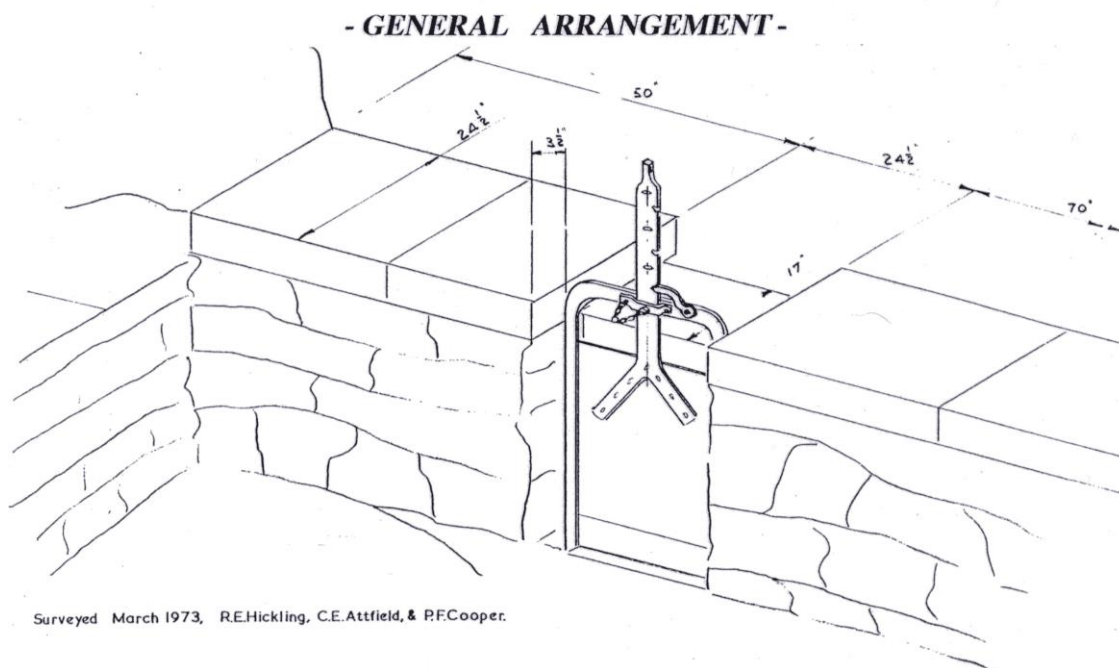


In 1973 the County 'Roads & Bridges' Engineer, Major J. Tulloch (a Woolhope Club member since 1968) alerted us to intended road and bridge widening over the Stockton Brook, thus destroying a sluice and remnant feeder. Permission was hurriedly obtained for an emergency excavation together with a more general site recording session. We recorded the remains of a control system with a weir and series of channels and regulatory sluices that had not only accommodated the direct canal feeder conducting water from near Tick Bridge, but which also regulated feed-water drawn, as the Act had indicated, from the Stockton (*aka* Cogwell) Brook.

STOCKTON CROSS . . . *some feeder details*



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SLUICE No.1 . . . drawn by Peter Cooper

- THE LEOMINSTER SUMMIT LEVEL -

The Stretford Brook, together with the Stockton Brook, were obviously intended as the major water supply for the Leominster to Woofferton summit level. Nevertheless, there was also the smaller volume of feed-water available from the Ashton and Marshfield Hall brooks; this supplementary source featured on another of our guided walks - and is described below.

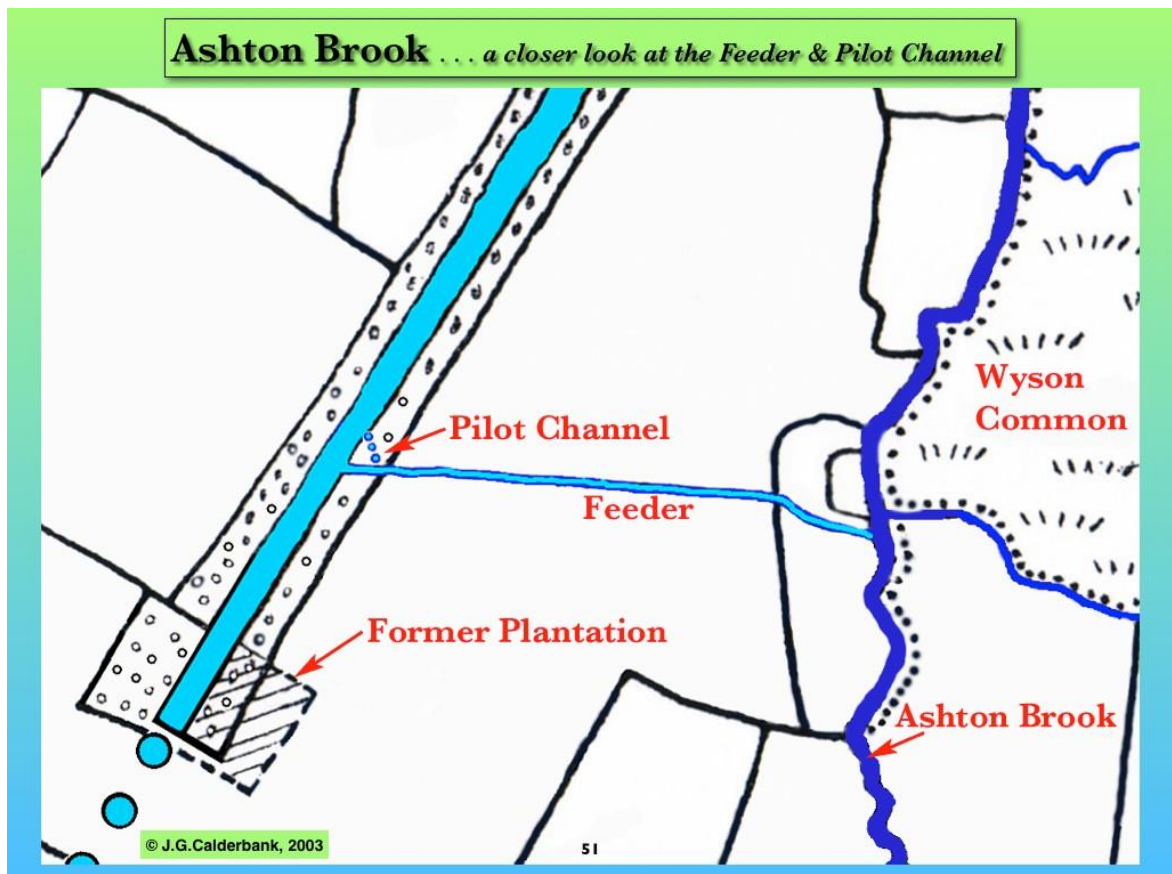
Prior to canal and railway, the Ashton Brook flowed across Wyson Common in a northerly direction, but was subsequently culverted under both the canal and (subsequently) the railway near Newhouse Farm. Within a short distance it then makes a confluence with the Orleton Brook and, beyond that point, the combined drainage changes its name to Brimfield Brook, before ending up as the Gosford Brook – which finally flows into the R.Teme adjacent to the Teme Aqueduct near Gosford.

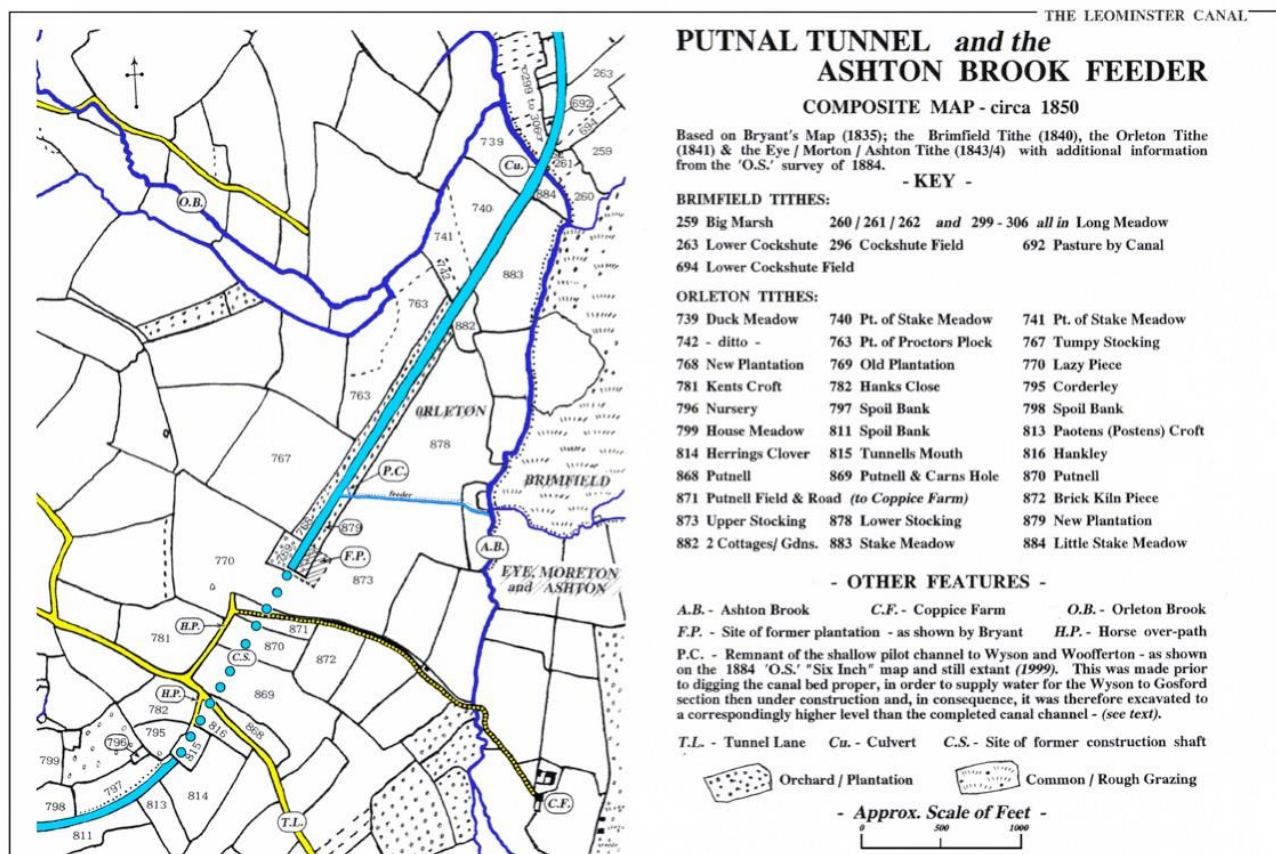
During prolonged spells of very wet weather the Ashton Brook culverting overloads, whereupon the stream readily reverts to its natural course and a low-lying area of adjacent common then becomes a temporary lake, although it's most likely that such flooding is acerbated by the canal and railway engineering works. This flooding area is defined by an extensive growth of alder trees, whereas the rest of the common is rough grazing; however, it should also be mentioned that the Ashton and Marsh Hall streams are equally liable to drought on occasion – even to the extent that they are sometimes bone-dry. The effectiveness of the feeder was therefore very variable, as once remarked upon by consulting engineer John Hodgkinson whose services were twice called upon by the canal company in their desperate attempts to maintain reliable traffic.

Ashton Brook Feeder

Relative water levels – feed-water to canal – are key to understanding the engineering, with the canal's level being of prime importance when determining the point of feed. Preliminary levelling would have determined the optimal point at which a potential feeder could be made so as to intercept the Ashton Brook with sufficient gradient to enable a gentle gravity flow. The feeder cutting would have been started from this canal-side point, albeit slightly above the intended operational level, and then continued on a rising grade until they reached and intercepted the brook.

In this case, the canal's actual feed point has been preserved as a 'pilot channel', although such survival is a fairly rare occurrence since the pilot is normally subsumed into the construction work. It was thus of considerable interest to industrial archaeologists in particular and to students of canal engineering in general, especially since it here confirms the sequential construction outlined in what few historical references exist.





When laying out his 'line of the cut', and having previously done the detailed levelling, the eighteenth century engineer was (within the terms of the Parliamentary Act) frequently authorised to utilise any convenient watercourse, albeit normally for a specified period of time. Such usage might either be temporarily granted during construction, or else in perpetuity, as specified by the wording for particular streams, so hence the above quoted example pertaining to Harley's interest in use of the Stockton Brook.

The Leominster 1791 Act of Authorisation contains a few other such 'water rights' clauses, but surely none more important than the total prohibition from using any water whatsoever from the R. Rea – which must surely have influenced and restricted Dadford's route planning. This constraint was doubtless because the Rea valley was then a hive of water powered industry, and so any extra water usage would have been out of the question for those vested interests; otherwise the Rea valley (with tunnel to the Dowles Brook headwaters) might have offered a potentially superior route to the Severn near Bewdley.

Whereas historical records are sparse, we happen to know from Hodgkinson's Report that despite the three Leominster summit level sources, the canal was clearly under-provided; that it was chronically short of water at times of severe drought and furthermore, that the droughts occurred to such extent that the canal traffic was then jeopardised.

Elsewhere on the summit, because of the relative water levels in question, there were few other places where alternative natural drainage could possibly be accessed for feeding the canal. Although suitable streams were few and far between, there was a small spring near Moreton Farm, but this provided only a trickle of water that was totally insignificant to their needs.

The 'Red Herring' Feed-water!

Everything depended upon relative water levels – stream to canal summit level – and it so happened that the only other potential feed-water seemingly occurred a short distance to the south of the Moreton spring, at the other extremity of Berrington Park. Just inside the southern park boundary the public footpath crosses a tiny stream draining the park lake, and a short distance beyond this simple plank crossing, the water comes up against the canal alignment. Some older OS mapping indicate water in the canal bed, perhaps with the implication being that it therefore fed the summit – but this was not the case. It's true that, on occasion, some water might well have overflowed from stream to canal bed, although that was never intended; instead, we find that the stream simply vanishes underground, only to reappear on the far side of the canal bed!

We've evidently encountered something predating the canal alignment: in fact, it must have been constructed by Dadford's workmen as an 'inverted, single-tube siphon' burrowing under their intended line. So not only is the siphon older than the Leominster Canal, but it's actually conceived to deprive the canal company of a useful quantity of potential feed-water – and just where most needed, on the summit level!

Given the likelihood of water shortage and potentially disrupted operations, it seems incredible that the structure was even considered and that it was subsequently allowed to survive, so the siphon must surely have served some important purpose? From the field and legislative evidence pertaining to Stockton Cross, we were drawn to conclude that the Berrington Pool effluence was likewise required for another Harley water-meadow : there seemed no alternative reason for its.

- THE LEOMINSTER SUMP LEVEL -

Further evidence for yet another extensive water-meadow system was discovered by Les Skelton on Harley estate land nearer Leominster. Situated on the A49 trunk road, barely one mile north of the town, there's a timber-framed building that had once functioned as the wharf house and terminus because the town wharfage had failed to materialise. Presumably this would originally have been considered only a temporary arrangement, but sadly the canal never progressed to its intended basin in Leominster; nevertheless, throughout its entire working life the canal's town traffic was always handled at the roadside canal basin, and there were said to be overnight sleeping facilities in the outbuilding (allegedly hammocks) provided for the boatmen. This 'overnighting' was absolutely essential since a return trip from Mamble took two days to complete because, although their 'starvationer' open boats were of standard narrow-boat dimensions, there was no on-board accommodation, nor any sort of shelter afforded the boatmen!

Obviously, the terminal basin was in constant and uninterrupted receipt of summit water, - whether operating or not - so provision would likewise be needed for continuous discharge, but with the Cheaton (Stretford) Brook situated just across the road, that stream seemed the most obvious receptacle for dumped water; however, it may not necessarily have been so. Dadford would probably have also arranged for some of the sump water to periodically discharge under the road to the Cheaton Brook via a 'drain-trunk' since it facilitated routine maintenance work and also clearance of the inevitable silting and coal spillage. However, it was preferable that the waste water be put to some practical use, rather than simply dumped.

Although the canal bed was barely traceable, Les had located the most likely site of a (half expected) waste-water spillway, faintly marked in our day by a scatter of bricks (SO 5062 6031). This overflow must have fed into a drain channel discharging to the Main Drain. The scattered bricks were insufficient for us to identify their original placement or draw any firm conclusions, although we suspected a Dadford 'drain trunk'- probably similar in form and function to Dadford's provision at Wyson (where it protected the multiple siphon) Since this Leominster overflow was fairly close to the terminal wharf and basin, it may also have featured a stop-gate, in which case the basin could have been cleaned and maintained without any recourse to the above-postulated Stretford Brook discharge?

It seems likely that there may also have been more than just this one spillway situated between the bottom lock and the wharf house since the waste water would require extensive and complex regulation when flooding a (presumed) water-meadow system; we supposed something probably resembling the adjacent Stockton Brook system on the opposite side of the (A49) main road, but on a larger scale. It's assumed that there once existed the usual network of channels (termed 'carriers' and 'drowns') controlled by the series of low weirs and 'hatches' that were associated with this type of flowing or 'floated' meadow system. Whereas we had made several excursions (under Mary Thomas's leadership) to view Roland Vaughan's celebrated 'water-works' in the Golden Valley, the WARS did not investigate the water-meadows around Leominster, and it is not known if any such detailed research has ever been undertaken nor, indeed, if much now remains to view.

It might even be the case that Berrington and Leominster water-meadows were one and the same - as a possibly continuous system stretching the full distance from The Marsh, across Portley Moor and northwards towards Eye. Perhaps also, the isolated 'brick buildings' (SO 501 627) seen on some older O.S. mapping might have something to do with water-meadows, but we never investigated this - and regrettably, neither did we survey and record the canal company's lock cottage that had once served the three Leominster locks.

Selected Further Reference:

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