

THE WOOLHOPE NATURALISTS' FIELD CLUB
(ARCHAEOLOGY RESEARCH PAPERS)



**RESEARCHING
THE
LEOMINSTER CANAL**

Paper 2 : SURVEYS
(The Route & Landscape)

**Recalling the Survey of 1789
by
Thomas Dadford Junior**

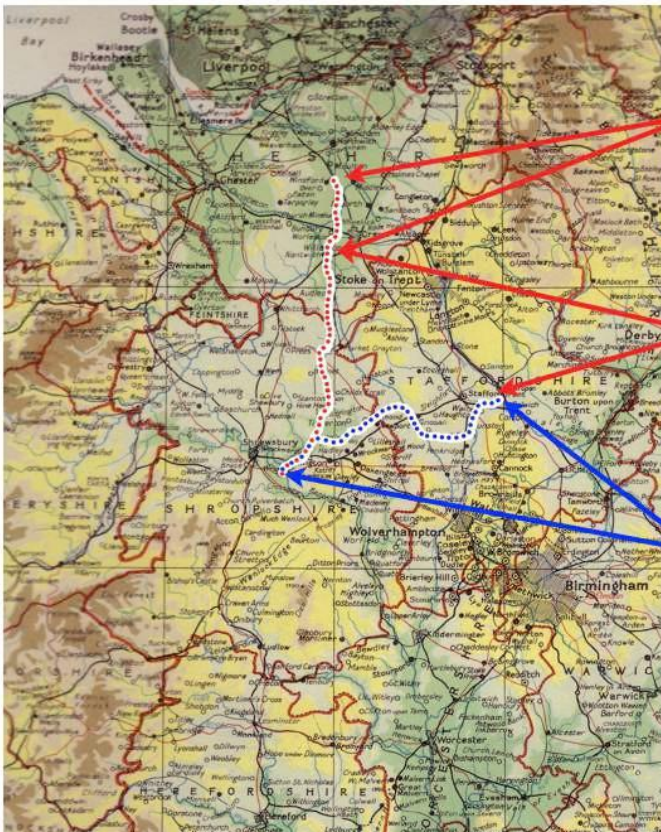
(described by Gerry Calderbank)

BEFORE THE CANALS . . . *the local rivers*

- 1662 ‘An Act for making navigable of the River of Wye and Lugg . . .’ this empowered Sir William Sandys and two others of his family (*Worcestershire*) to improve the navigation - but nothing was done on the Lugg.
- 1695 This Second Act stated the ineffectiveness of the first and provided for persons to survey and improve the navigable portions of *both* rivers.
- 1697 Daniel Denell made a survey, recommending certain ‘*improvements*’ which were then executed within the next few years. In the case of the Lugg, this actually proved detrimental where the old mill weirs had been removed.
- 1727 The Third Act appointed separate overseers for each river but was largely retrospective - and a throwback to the pre 1695 approach, with the powers for private individuals to reinstate earlier mills and weirs; but, also, they might build alternatives if necessary.
- 1809 An Act merely intended to establish a horse towing path, but on the River Wye only - thereby effectively excluding further Lugg improvements.
- 1992 ‘*The Wye Navigation Order*’ This was eventually adopted in lieu of the old Acts, but only after a lengthy (*and costly!*) Public Inquiry in Hereford.

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Early Midlands Schemes . . . *Some of these were intended to thwart Josiah Wedgwood, James Brindley and other proponents of the impending ‘TRENT & MERSEY CANAL’*



1765 : The Weaver Navigation proposed an extension from Winsford to Nantwich and then to link with the Severn via Audlem, by taking the Duckow and Tern valleys.

- furthermore -

1765 : A December meeting in Chester now proposed to link with the Trent - again from Nantwich - by using the Checkley Brook valley via Wrinehill, Madeley and Whitmore.

1765 : Richard Whitworth of Stafford was already intending just such a broad-gauge (river-barge) system from Great Haywood on the Trent to Atcham on the Severn.

This too included a Weaver link via Standon, Whitmore and Madeley.

Whitworth’s proposal therefore had more in common with the Weaver Navigation than with the Wedgwood consortium’s route via the Potteries.

THE LOCAL SCENE

Whereas the Wye Navigation (including the River Lugg) had existed from time immemorial, we have seen that its statutory basis merely dates from the series of Navigation Acts commencing in 1662.

Although these four Parliamentary Acts were intended to improve the natural navigability of the rivers, they had proved ineffectual, due mainly to flooding, droughts and financial constraints.

- Pressure from the Herefordshire municipalities and agitation from the gentry eventually led to several public meetings, the outcome of which brought various proposals for canals, rather than river improvements.
- Some such proposals were amongst the routes prospected by Robert Whitworth in 1777 - as mapped for him by the celebrated London cartographer William Faden - and then presented by Whitworth in his printed circular: '*Report to The Gentlemen of Hereford*'.
- Three of the proposals affected Leominster in particular. The first two were from Leominster to Hereford by either the Lugg valley or via Weobley and the Yazor valley.
- In addition to these however, Robert Whitworth now proposed an entirely *new* concept - a canal from Leominster to Stourport on the Severn Navigation.

Enter . . .

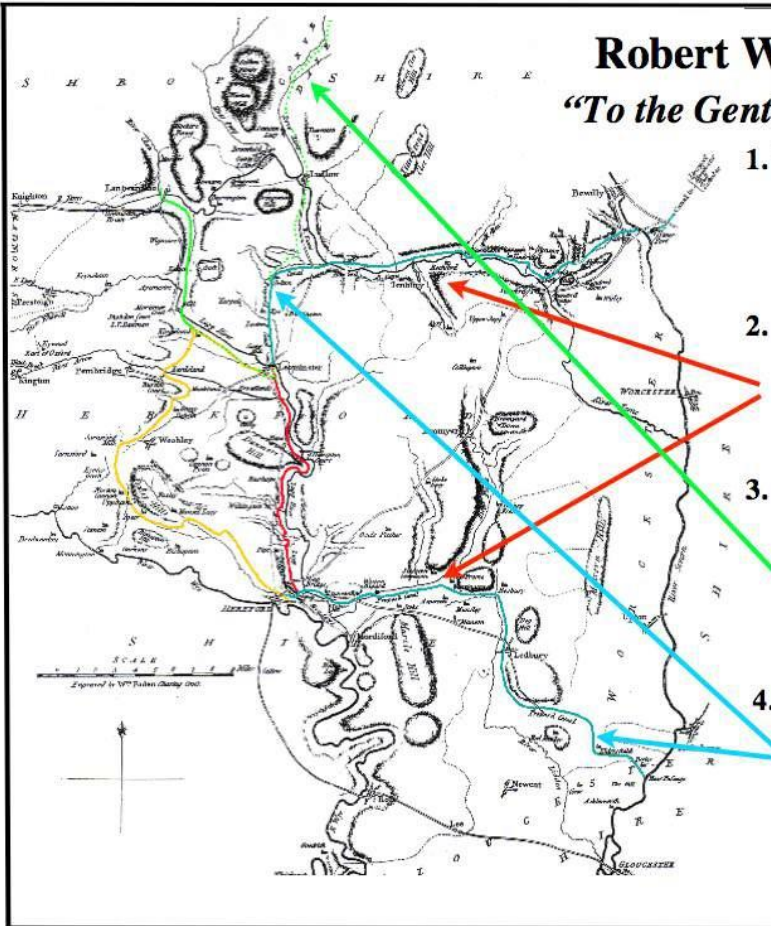
***THE GENTLEMEN
OF HEREFORD***

and

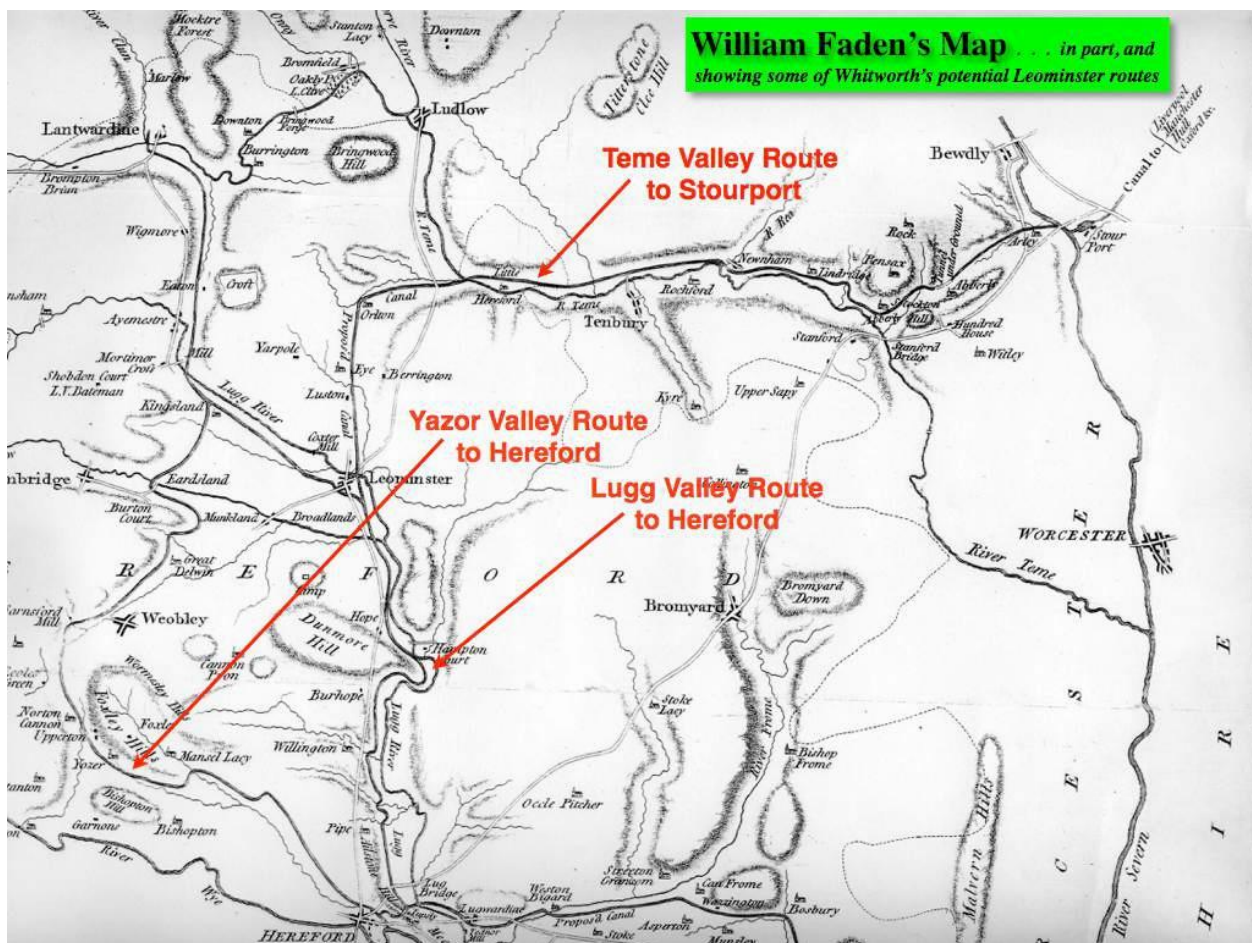
ROBERT WHITWORTH

(but not to be confused with Richard Whitworth!)

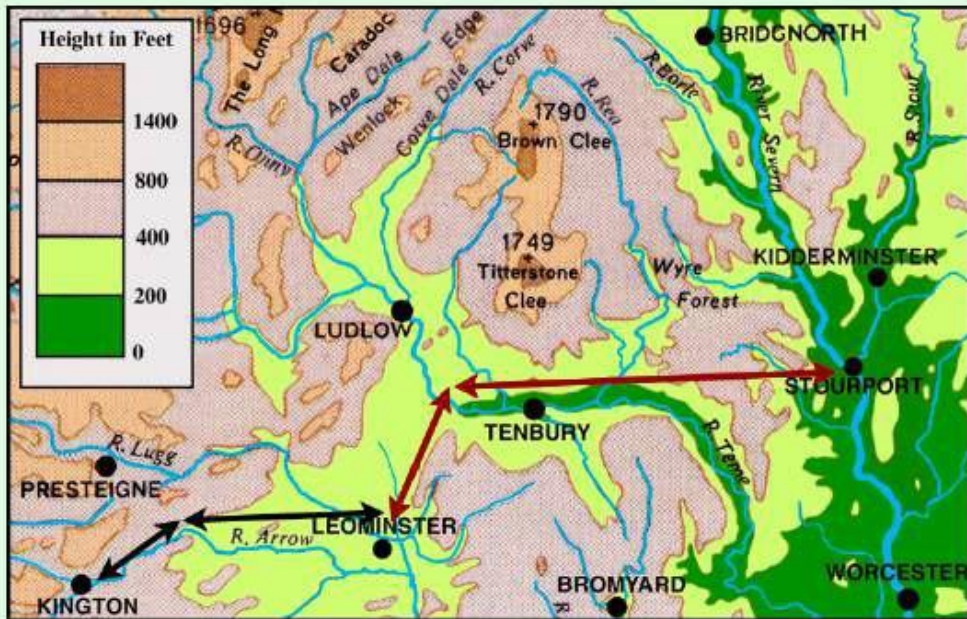
Robert Whitworth's Proposals "To the Gentlemen of Hereford" - 1777



1. Whitworth prospected all the routes shown in solid colours, although none were subjected to a full ocular survey
2. Whitworth also considered a route via the Frome valley and the Kyre Brook to Tenbury - although this was not mapped
3. He reported that some earlier surveyor had prospected a route from the Severn via Corvedale to Leintwardine - so this is partly shown as a broken green line
4. Whitworth's preferred routes are shown in blue and, although both were eventually adopted, each was to be modified in practice



- DIAGRAMMATIC PLAN . . . of the intended route -



1. Kington did not at first feature in any promotional or engineering plans. Neither was Hereford involved with this Stourport scheme - so Dadford's initial survey was merely for a canal from Leominster to Stourport.

2. Dadford's westward extension was next appended to his first survey, following stirring and public meetings which instigated the more expansive Kington to Stourport concept.

Thomas Dadford's Route . . . its Landscape and Physiography

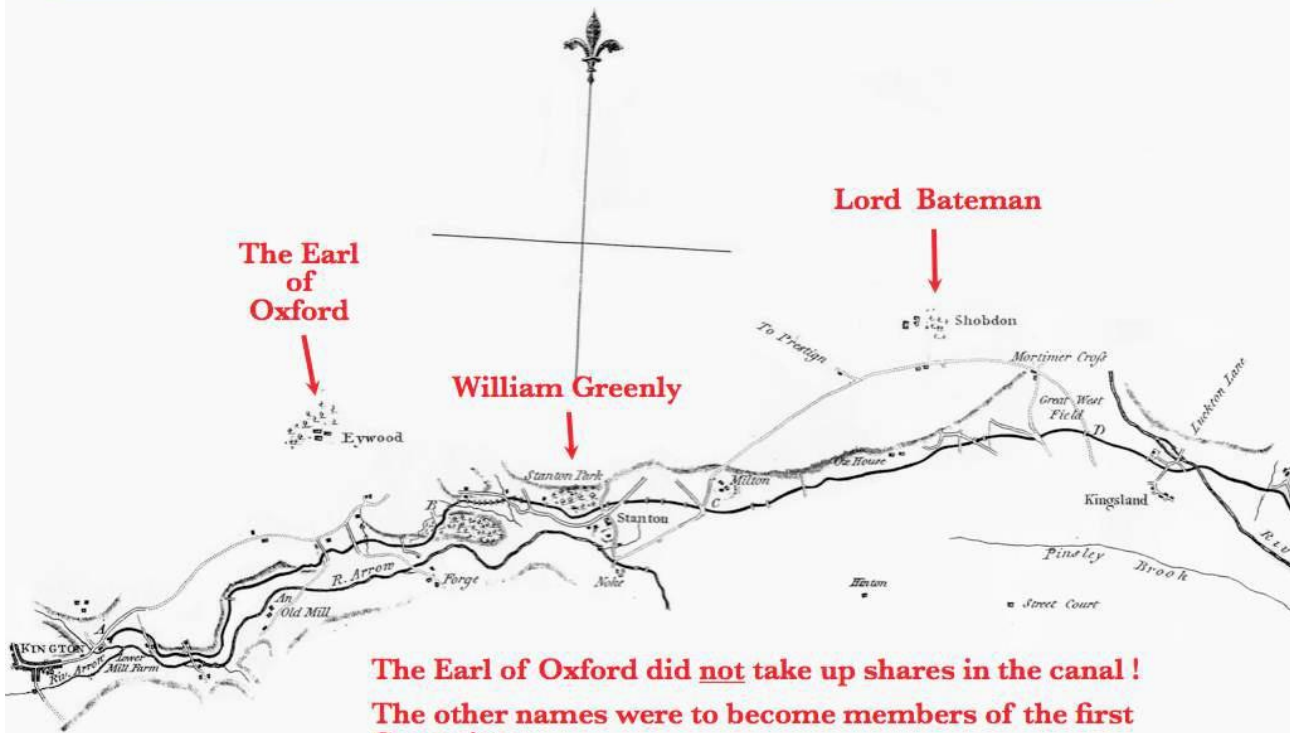
Physiography - "the science of the surface of the earth, and the interrelations of air, water and land" - is a little used word nowadays, but it has a precise meaning that seems useful in this context, because here we're mainly considering the superficial landforms through which Dadford and his contemporaries routed their canals. The word 'physiography' was then in common usage, whereas geology was still in its infancy and probably not even named as such in Dadford's day, whereas the subject matter had long been of interest to some scientists, philosophers, and certain theologians. People with such interests were then usually known either as 'cosmographers' or 'cosmogonists' at the time - depending upon their background and particular aspect of concern with this branch of 'Natural Philosophy'. When superficial landforms are further considered in relation to the underlying solid geology, then it's customary to refer to the subject as geomorphology. Whilst the importance of the physiography is probably self evident with roads and canals, in this instance there are sound reasons for separating the solid geology because, as this relates to our study, the rocks have much greater significance as and when we come to consider the Mamble and Pensax colliery districts - and the tunneling of course!

Kington to Kingsland:

The proposed route starts near the site of a former Kington railway station, not in the main Arrow valley but on a major tributary, the Gilwern Brook (alias the 'Back Brook'), with the actual river confluence being some little distance downstream (SO 308 572). From its origins on the Gilwern Brook the projected route contoured the side of the Arrow valley for a distance of 3.75 miles before commencing a precipitous descent of 152' in a little under 2.5 miles via an intended flight of locks so as to occupy the low watershed separating the rivers Arrow and Lugg in the vicinity of Staunton and Milton. A further smattering of locks would then have more gradually lowered the canal, so as to cross the site of the present Shobdon aerodrome towards the Great West Field, NW of Kingsland, whereupon the route missed out the village and headed for Lugg Green.

Lugg Green Aqueduct was actually completed - preparatory for descent southwards to 'The Marsh' on the outskirts of Leominster - and some traces of river-bed foundations and of the subsequent lock could still be seen in the 1960s. In Leominster, a presumed town basin is suggested from the Dadford plan, and there are property transactions on record for what would prove to be an abortive enterprise since the actual town was never reached. Instead, a (surviving) timber framed building adjacent to the A49 (SO 505 599) was acquired to serve as the Leominster terminal wharf (with overnight-barracks provided for the Mamble boatmen).

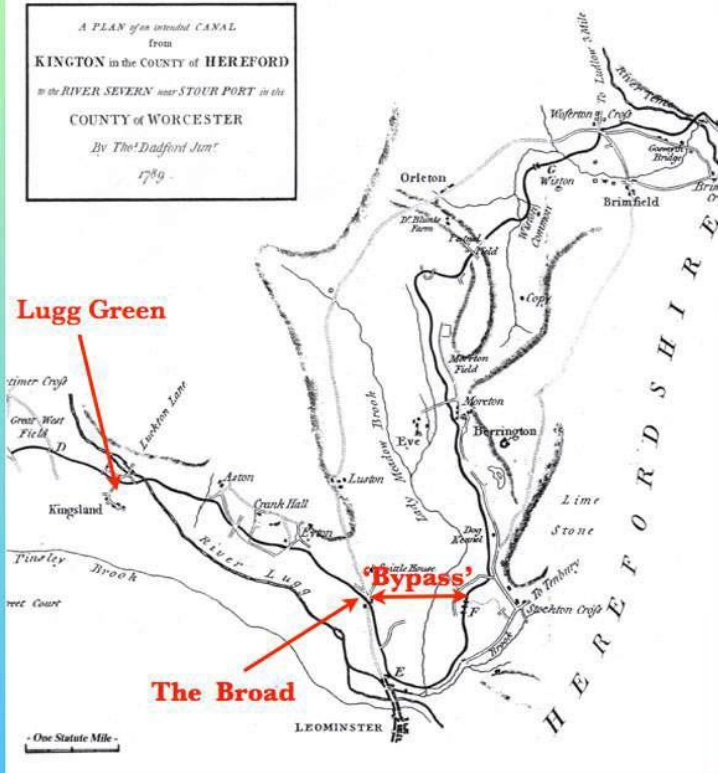
The Dadford Survey of 1789 ... from Kington to Lugg Green - and showing the estates/seats of some key landowners en route.



**The Earl of Oxford did not take up shares in the canal !
The other names were to become members of the first Committee.**

THE PARLIAMENTARY LINE - LEOMINSTER TO WYSON -

A PLAN of an intended CANAL
from
KINGTON in the COUNTY of HEREFORD
to the RIVER SEVERN near STOUR PORT in the
COUNTY of WORCESTER
By The 'Dadford Junr'
1789.



COMPROMISE!

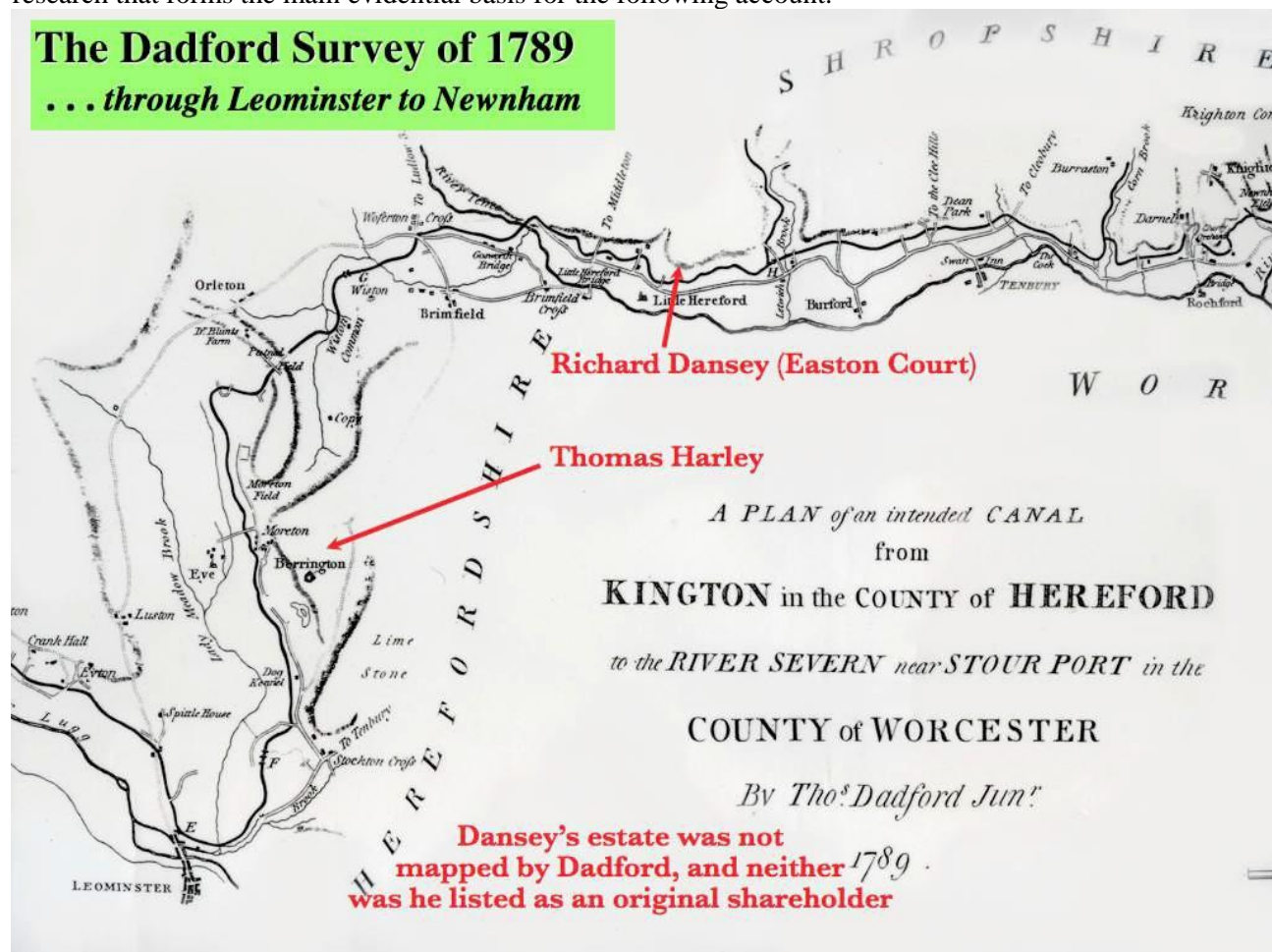
Dadford's extended route was *always* a compromise - since two canals were now squeezed into one - with the Kington portion merely appended to his original Leominster ~ Stourport survey.

- In contemporary parlance, this 'double lockage' meant that all through traffic would have to lock down to Leominster and then up again near Stockton Cross - thus consuming twice the volume of water with each direct passage between Kington and Stourport.
- Several alternatives were still available and they occurred to Rennie, even in 1795, but each would have required some changes to certain parts of the route, as yet unbuilt.
- Since the Act of Authorisation stated "... through or near Leominster..." the simplest solution was to retain the level from Lugg Green to a point near 'The Broad' and then cross the Ridgemoor valley to Dadford's point 'F' just above the proposed locks.
- Leominster would then have been served by a 'collateral cut' or spur, thus halving the water consumption.

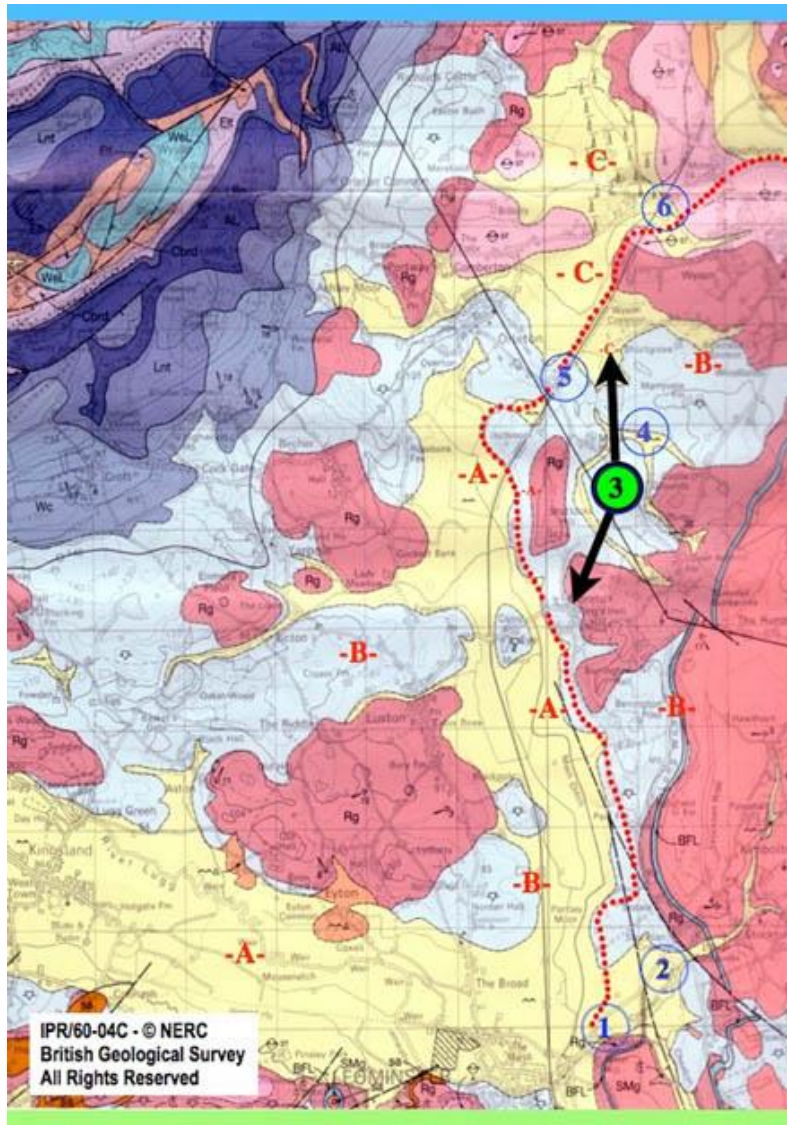
Immediately after the Lugg Aqueduct was built it was entirely swept away by the ‘Great Flood’ of February 1795 - although its foundations have been glimpsed (and even photographed on occasion), but with more pressing work in hand, such scanty traces were not recorded by the WARS. None of this route was operational and, other than the Lugg Aqueduct - together with some little cutting, plus road bridges and a couple of abortive locks - little other construction was seemingly attempted, although the terrain presented few technical problems, having been considered quite favourably by Whitworth some twelve years earlier. Nevertheless, considerable doubt remains (Calderbank, 2000/2001) as to whether the best prospective route was actually selected from this favourable topography.

Leominster to Woofferton:

Here we encounter the operational portion of the canal for the first time, together with its major geological difficulty. The anomalous circumstances to be described have excited the curiosity of geologists over many generations, from Sir Roderick Murchison (1839) onwards, and have been responsible for much theoretical debate since Pocock first suggested a river diversion in 1925. Theories and counter theories followed - including the suggestions of an earlier (pre-Devensian) glacial episode or, perhaps, of a possible pre-glacial river capture (Luckman, 1970). The true sequence was eventually confirmed by recourse to extensive individual and then combined field surveys (Cross, 1976 / Cross & Hodgson, 1975). It’s this field-survey research that forms the main evidential basis for the following account.



Beyond Leominster, Thomas Dadford’s route follows the eastern flank of a wide valley stretching N in the direction of Woofferton then Ludlow. Despite its expanse, the valley is occupied by a disproportionate (‘misfit’) stream - the Main Ditch - formerly known, in part, as the Ridgemoor Brook. Some 4.5 miles due N of Leominster Priory this broad valley is abruptly and entirely blocked by a transverse barrier of rising ground - the Orleton Moraine - beyond which the valley again continues northwards before broadening out in the vicinity of Wyson. Near Orleton the seemingly innocuous ridge of high ground arcs around the village, and extends in a south-easterly direction towards Marsh Hall and Ashton. Between these points the crest of the moraine undulates gently, being occupied for the most part by a minor road utilising the high ground in order to cross the valley. We may be sure that the low-lying valley floors on either side of the moraine was always very ill drained and marshy – certainly so in Dadford’s day! – and that such conditions probably existed until fairly recently. In fact, some areas of the valley - as, for example, on the Wyson Common - are still subject to occasional flooding - and this despite strenuous local drainage measures since Dadford’s day.



DADFORD'S ROUTE

... from Leominster to Woofferton, showing the main canal features - as these relate to the glaciation and to the superficial geology.

- SUPERFICIAL GEOLOGY -

- A - Contra-glacial lacustrine deposits overlain by more recent alluvium of mainly Flandrian age.
- B - Wye Glacier till, derivative out-wash and terminal moraine of Late Devensian age.
- C - Alluvium over pro-glacial lake deposits of Late Devensian age, including Irish Sea Ice out-wash deltaic and littoral materials.

- CANAL FEATURES -

1. - Terminal wharf house.
2. - Three locks - with eighteen foot total rise - give access to the summit level.
3. - Potential alternative route between Moreton and Shuttocks Hill to Wyson Common.
4. - Melt-water overflow channel now occupied by the Marsh Hall and Ashton Brooks.
5. - Orleton terminal moraine - the Wye/Severn watershed - and Putnal Tunnel.
6. - Two Wyson locks - of twelve foot total fall - depart the summit level.

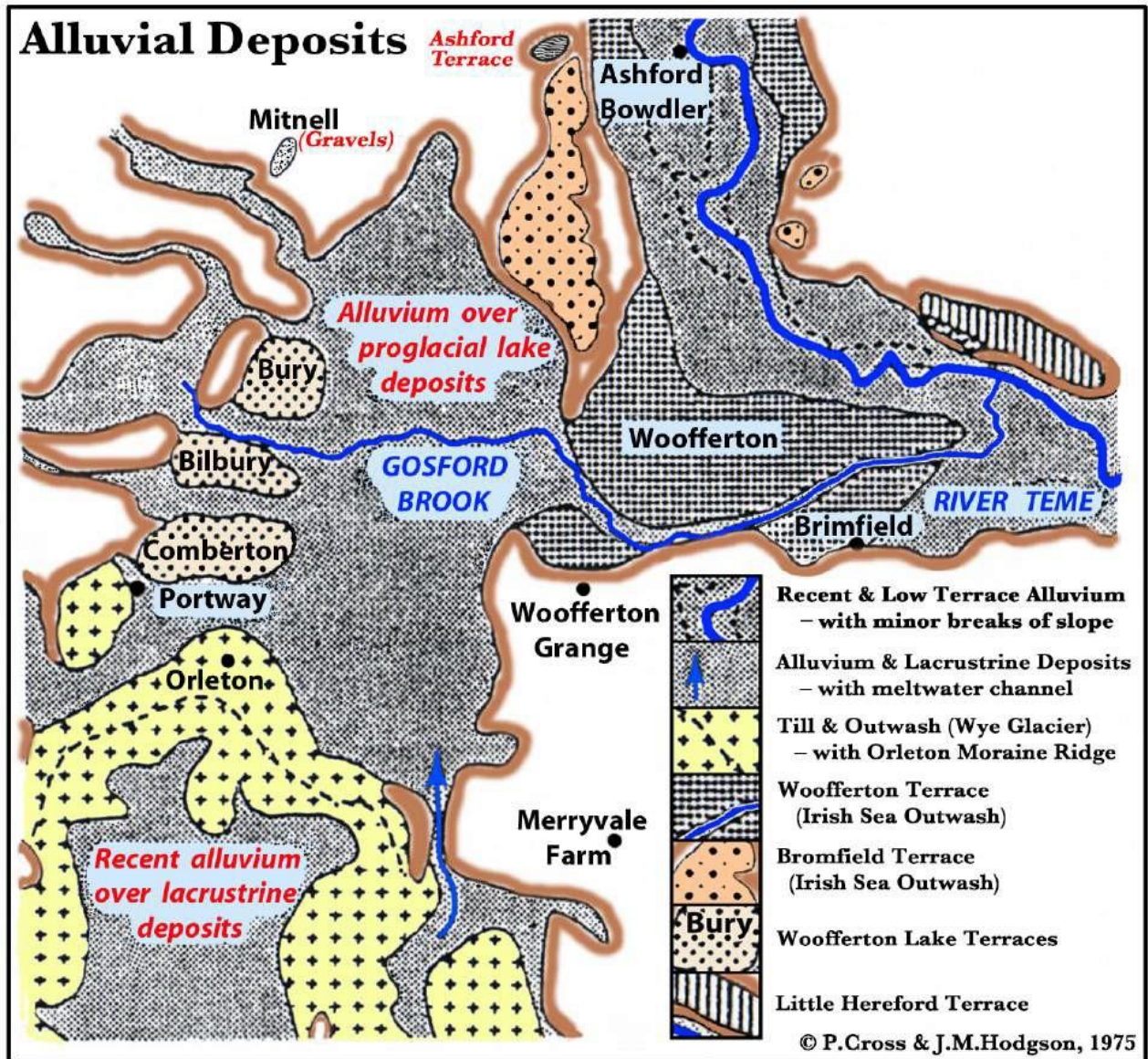
The (300' plus) Orleton Moraine necessitated a short tunnel since it impeded the route between Leominster and Woofferton so that, given his line and contour, Dadford could neither go over nor around the obstacle - although he might have circumvented the obstruction by taking a different line between Eye and the Wyson Common. Contemporary reports indicate tunnelling conditions within the glacial moraine to have been horrendous when they encountered pockets of 'running sand' and flooded workings ensued. This Putnal Tunnel problem defied Dadford's team for several years, with its significance being that much capital and valuable time was wasted through delay, and so this setback, compounded by intense inflationary pressures, meant that the project would succumb, irrecoverably, to the Canal Mania of late 1792 - but more of that anon!

- GLACIAL LAKE WOOLFERTON -

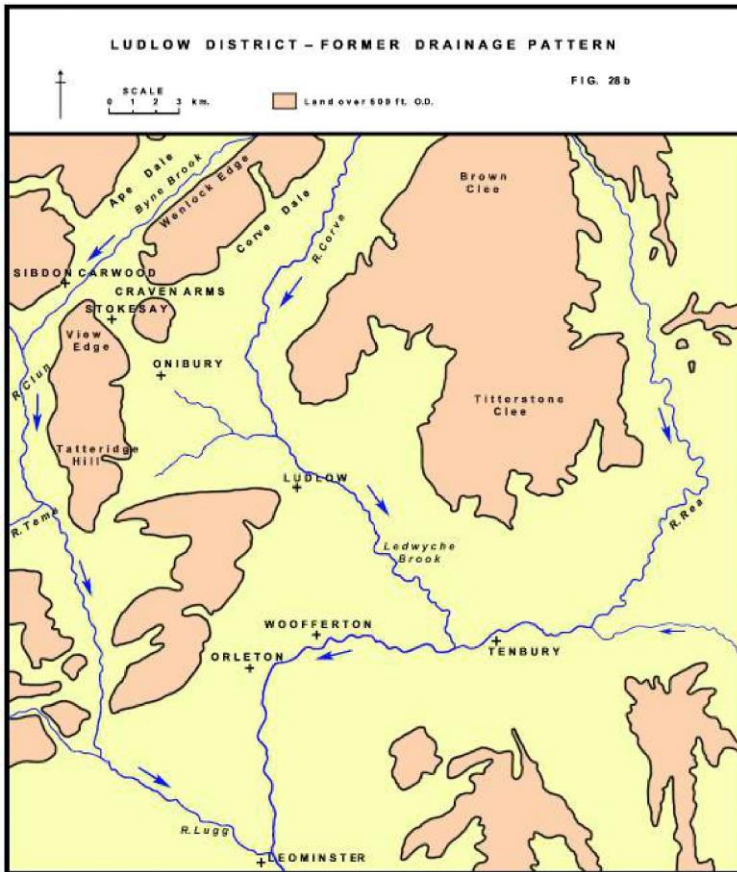
Orleton Moraine was also significant on the geological time-scale, albeit very recent 'history' to the geologist, since it was only formed possibly 26,000 to 20,000 years ago (B.G.S.) by a lobe of ice from the so called 'Wye Glacier' during the last major (Devensian) glaciation. This ice had descended (fairly widespread) from the S Central Cambrian uplands and crept outwards across the low-lying Herefordshire plain until confined by the East Herefordshire (Bromyard) Plateau, broadly along the N-S line of the present A49 trunkroad.

But before this ever encroached upon our area, a sizeable river had previously carved the wide valley extending between Ludlow, Leominster and beyond. This torrential river - the result of large scale 'Irish Sea Ice' melting - was then draining much of South Shropshire towards a confluence with its then major tributary, the Wye. The former Shropshire river system is termed the 'Proto-Lugg-Teme-Onny' (PLTO) by some geologists, several of whom would probably still debate the precise extent and detailed effect of the Devensian ice hereabout. Whatever the facts, in this instance it seems sufficient merely to explain that the S Cambrian glaciation proved adequate to block our valley with a wall of stationary ice that gradually melted and thus deposited the massive end-moraine now arcing past Orleton and reaching the Berrington district.

Against the Orleton ice front a huge lake next developed, backing up the river PLTO. and its tributaries, the largest of which was a stream that had previously flowed (east to west - prior to the Wye glacier) from the Newnham Bridge direction and beyond. This was the river 'Proto-Rea' with tributaries such as the Kyre Brook, Mill Brook, Corn Brook, and Ledwyche Brook. Most of these tributary streams are seen to flow in a convergent direction that's indicative of having formerly fed the present day Lugg/Wye drainage - although the exception here is the Ledwyche Brook, which has an unusual history of possible river capture - but alas, this Ledwyche background seems rather complex (possibly controversial?) - so possibly revisited elsewhere.



PETER CROSS : THE 'PLTO' DRAINAGE . . . extract from a higher degree thesis.
(later digitised and tinted for Dr. Cross by this writer)



Prior to the Wye Glacier, the volume of PLTO melt-water was already becoming immensely swollen by melting of an even larger ice sheet - the 'Irish Sea Ice' - that had advanced S across Shropshire via the 'Cheshire Gap'.

Not only had this Irish Sea Ice arrived earlier than the Wye Glacier ice, but its volume and (local) scale of effects were also considerably greater, as can be deduced from the vast quantity and topographical extent of the alluvial materials deposited from its melt-waters. In 1968 for example, when excavating the Bronze Age urn-field (Bromfield), we found a striated /water-worn clast of unmistakably Shap Granite.

The resultant glacial 'Lake Woofferton' flooded much of the PLTO drainage basin, until it found its lowest boundary at the head of a Proto-Onny tributary, which was then flowing S to N from the Knightsford area towards Newnham. It is assumed that the lake overflowed a low col (Knightsford Bridge), cut an overflow channel, and started to drain the lake towards the Severn.

- THE MYSTERIOUS MATHON RIVER ? -

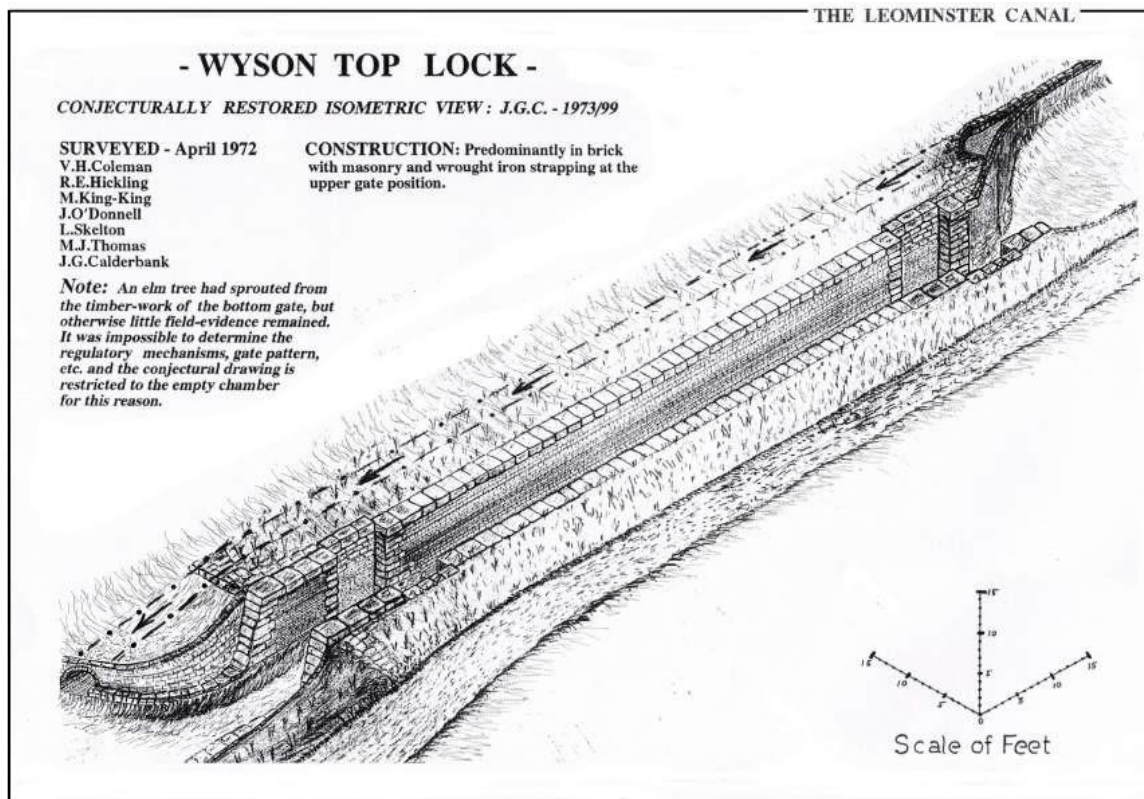
A brief interjection here that concerns the yawning Teme valley - the section beyond Newnham Bridge, then Knightsford Bridge and downwards towards the Severn. Various theories regarding its origins have been postulated and continue to circulate, including a persuasive concept that this part of the Teme valley might well be remnant from the one-time 'Mathon River'. Like the PLTO, the Mathon river - associated with an earlier Anglian glaciation (c. 478 - 424 KaBP) - is held to have also originated somewhere well to the N of our area under discussion, although there seems no certainty nor consensus of opinion about its exact course nor indeed other details such as its continued course. Nevertheless, there is much persuasive visual evidence; in particular, the hugely impressive depth of the Teme valley hereabout, a depth which might otherwise seem to be of far greater magnitude than ever the post-Devensian time span (c. 10 KaBP) might allow for such enormous erosion to have occurred? There seems, however, no conflict in this Anglian glacial theorising with the Devensian Lake Woofferton episode, assuming that the reversed drainage simply inherited an already over-deepened river valley - so back to our main story.

We resume with Lake Woofferton shallowing - a combination of falling water level with continued intensity of meltwater - and continued alluvial deposition at the N head of the lake (Irish Sea outwash). A delta quickly formed N of Ludlow (Bromfield Terrace) and this progressively silted the lake in the direction of Woofferton and Brimfield - much as is seen with the silting of the Cumbrian and Scottish post-glacial lakes. Hereabout, these Irish Sea outwash deposits are mostly finer graded (Woofferton Terrace) and their deltaic frontal stages are readily discernible by a dip on the A456 road level at Gosford, although beyond which point the lake was presumably draining too rapidly for further significant deltaic deposition. In fact, Dr. Cross rather suspected that this 'staggered' drainage was partly due to phased erosion of the cross-valley Brockhill Dyke intrusion - although there was never sufficient time to investigate further (*personal communication*).

Continuing northwards, immediately beyond the Orleton watershed, the canal lies in the Severn/Teme catchment, so any post-glacial drainage initially flows N towards Woofferton, with the various streams from either side of the wide valley coalescing to form the Orleton (becoming) Brimfield/Gosford Brook, which joins the Teme near the hamlet of Gosford. Beyond Putnal Tunnel, Dadford's route had crossed the Wyson Common area (still on the summit level) before descending twelve feet, via two locks, near Wyson. This was

preparatory to crossing the Brimfield Brook, then entering a shallow cutting through the deltaic deposits that here form a low interfluvium between the brook and the Teme.

Heavily silted and partially backfilled Wyson Top Lock was the only survivor we encountered with sufficient residue to be worthy - or indeed possible! - for us to measure and record; all the others had either ceased to exist or were too ruinous, and where traceable, they were also usually robbed of bricks and stone.



Between the Salwey Arms and Gosford the canal was excavated on the edge of the deltaic deposits and thus overhung the Low Terrace alluvium of the 'modern' Teme as its route made directly towards the bridging point - and so it descended this stretch by means of two intermediate locks and a turnover bridge, followed by a massive embankment (derived from the modern Teme alluvium) leading to the Teme Aqueduct.

Woofferton to Newnham:

The whole line of the operational canal was seemingly surveyed by Colonel Page (1803) whereas, in reality, he possibly only levelled the route rather than conducting a full ocular survey; nevertheless, his data and a map were later published by Bradshaw (1833) and at some time the findings were referred to the Liverpool datum (although that datum site would subsequently prove unreliable, so hence the O.S. switch to Newlyn).

- CANAL AND RAILWAY PAMPHLETS : 1797 to 1803 -

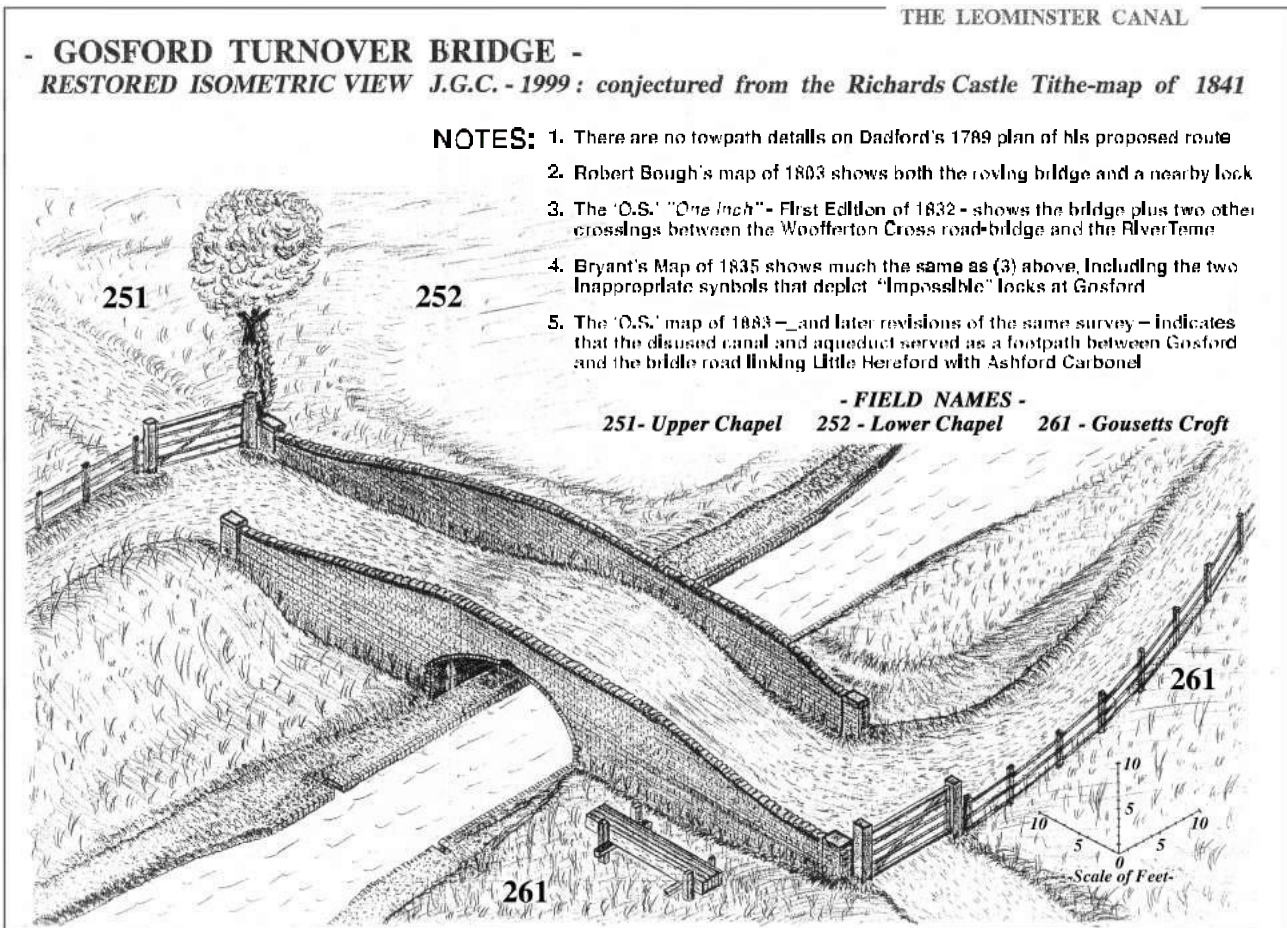
	Miles	Frigs.	Lks.	Rise	Fall
<i>Kington and Leominster Canal.</i>					
From the River Severn, near Stourport, to the North West end of Sournat Tunnel, by the proposed line in 1791, (not yet executed)	11	6	22	207	0
Thence to the bottom of the 6 Locks (completed)	1	0	6		36 2
Thence to the 2 Locks, near Tenbury	6	5			
Thence to Putnal Field Tunnel	5	2½	7	41	4
Thence to the termination of the Canal, near Leominster	4	3½	3		18 6
	29	1	38	248 4	54 8

Facsimile extract from p. 12 of Col. Page's tabulation - as published in 1843. Whereas the incomplete Stourport section still featured, the absence of all data for the Kington extension possibly suggests that it was no longer considered to be a realistic objective by 1803? It seems distinctly possible that Col. Page conducted an ocular survey since his figures differ, albeit very slightly, from the normally accepted data.

(Courtesy of the Institution of Civil Engineers)

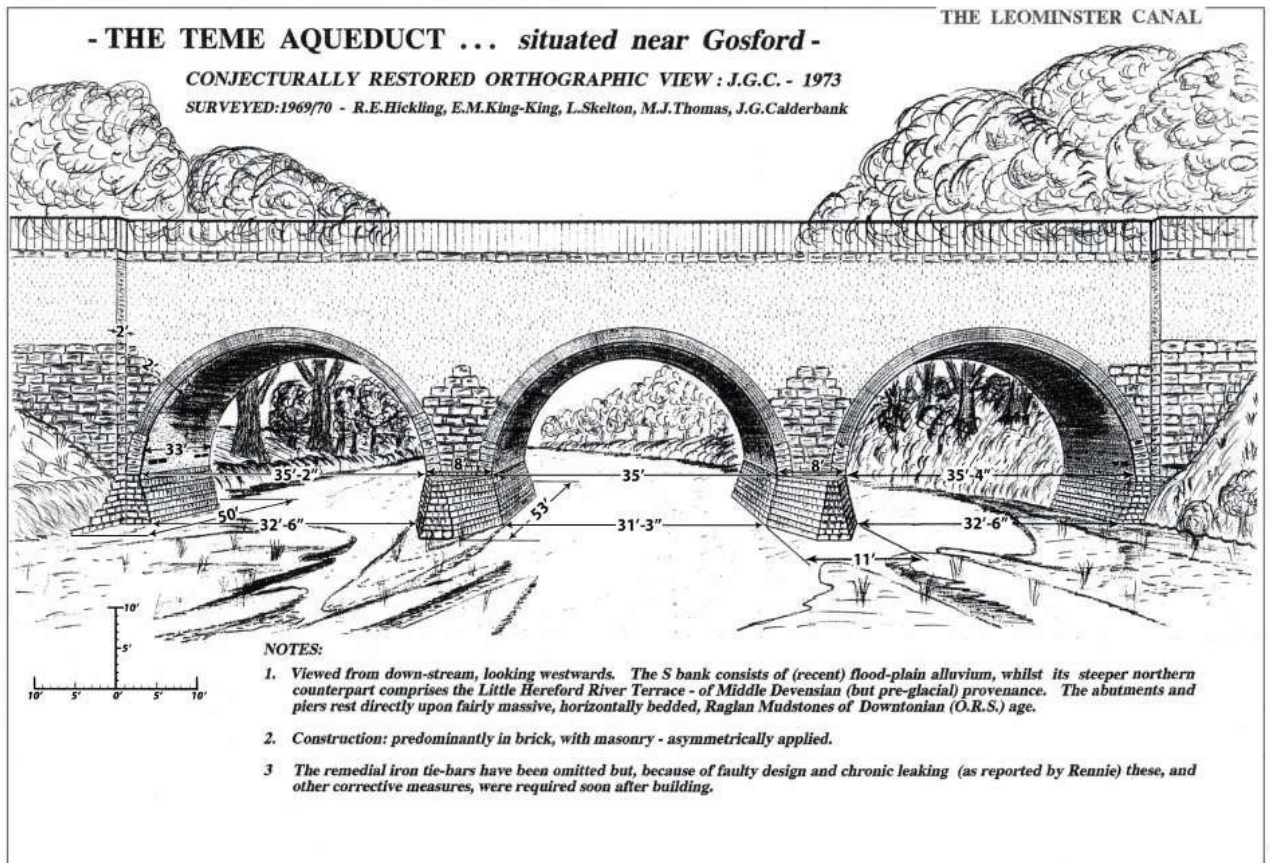
Later research had shown (Calderbank, 2001) that there was a different disposition of locks from Cohen's depiction (Wyson to Gosford) and likewise, regarding those derived from Page, as shown by Bradshaw. We now realise that the canal water-level descended a further 12' from the Salwey Arms Wharf to the top of Gosford Lock. On this stretch of canal the Tenbury Railway construction work entailed some regrading, and so this had negated an actual WARS resurvey of the canal bed. Incidentally, it's also suggested from the (corrected) data that this twelve foot step seemingly accords with a terminal slope of the Wooferton delta in its final phase when the depositional episode ceased and the lake drainage gathered pace.

At the height of CanalMania there were numerous schemes afoot similar to the Leominster Canal, including those in S Wales, that were undertaken by the Dadfords in collaboration with Thomas Sheasby and son; in fact, it was the Monmouthshire Canal that would tempt Thomas Dadford away and which was probably instrumental amongst other factors leading to the Leominster failure. But much closer to hand was the proposed Montgomery Canal, surveyed by another Dadford brother, John Dadford.

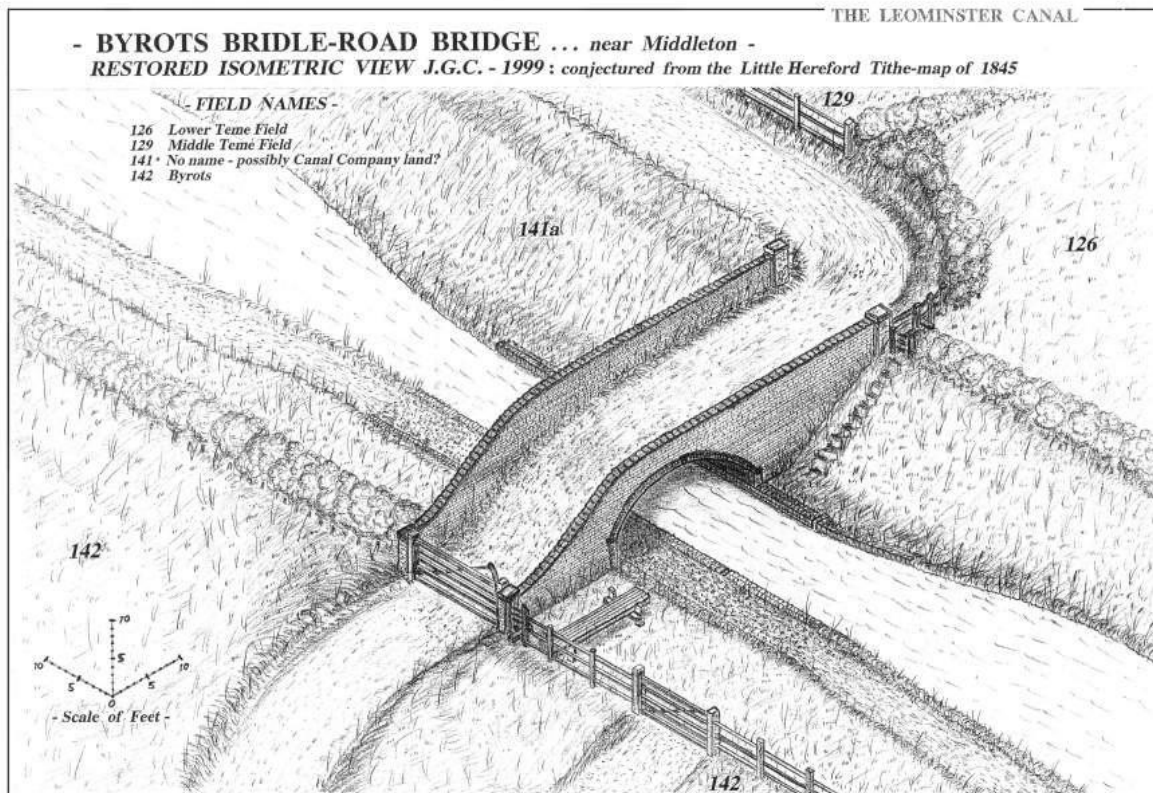


A link from this 'roving' bridge was intended to share the same Gosford Aqueduct river crossing, albeit with a separate towpath continued under the turnover bridge and therefore situated on the opposite side of the canal in order that traffic might pass uninterrupted between Leominster and the Ludlow direction, as depicted above. Presumably a canal branch layout similar to that at Atherley Junction on the Staffs. & Worcs. Canal was also intended? However, this intensely rural Montgomery project never materialised!

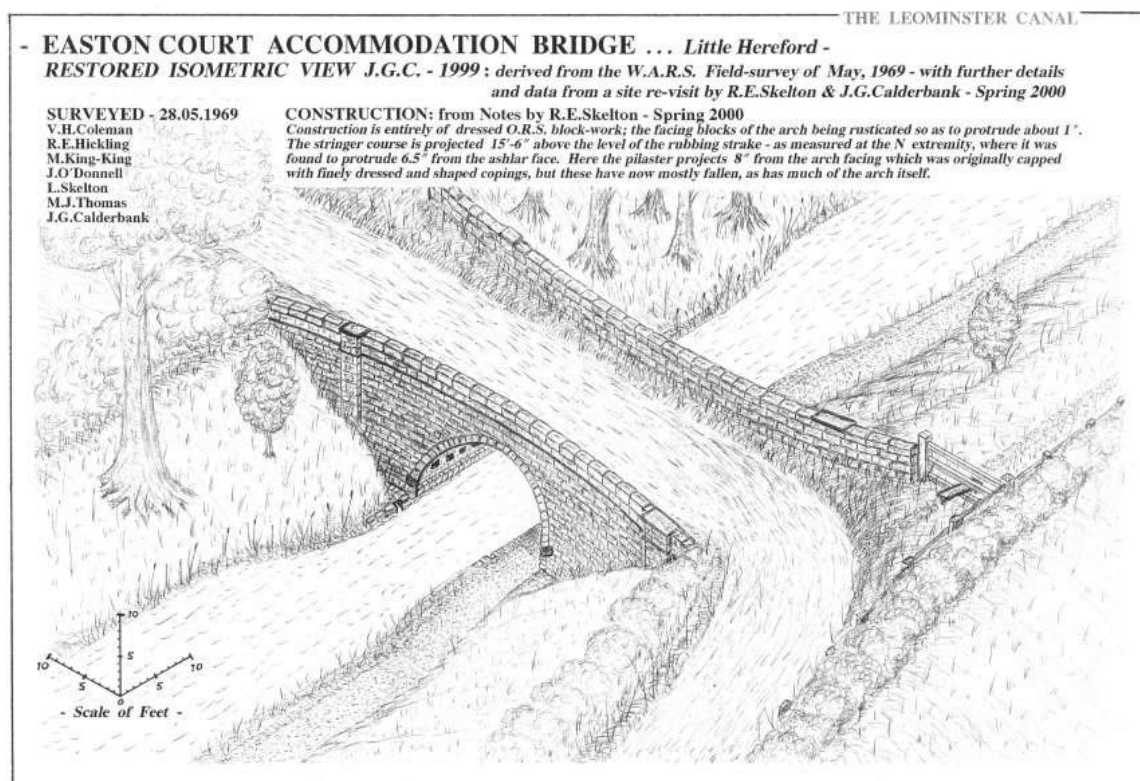
The Brimfield Brook between Wyson and Gosford marks the Shropshire boundary, but on the far side of the Teme aqueduct lies the civil parish of Little Hereford, a small Herefordshire enclave, and thus requiring our attention. By crossing at Gosford, they had preserved a considerably higher datum level than if the Brimfield Brook was followed from Wyson down to its confluence with the Teme. This strategy was inherited by Dadford from Robert Whitworth's Survey and Report of 1777/8, whereby Whitworth had opted to gain the higher L bank since it permitted a favourable left bank route along the Teme valley. We should always bear in mind that Whitworth and the Dadford family had a long-standing association dating back to Brindley, and recall the father and his sons' employment on Brindley's other works, including the Staffordshire & Worcestershire Canal. By virtue of this Gosford bridging point, Dadford next took advantage of the Little Hereford river terrace along the valley side, so that the same water level was maintainable until a pair of locks just before the Ledwyche Brook crossing.



THE TEME AQUEDUCT - GOSFORD ... a view downstream from the left bank
(Photographer unknown)

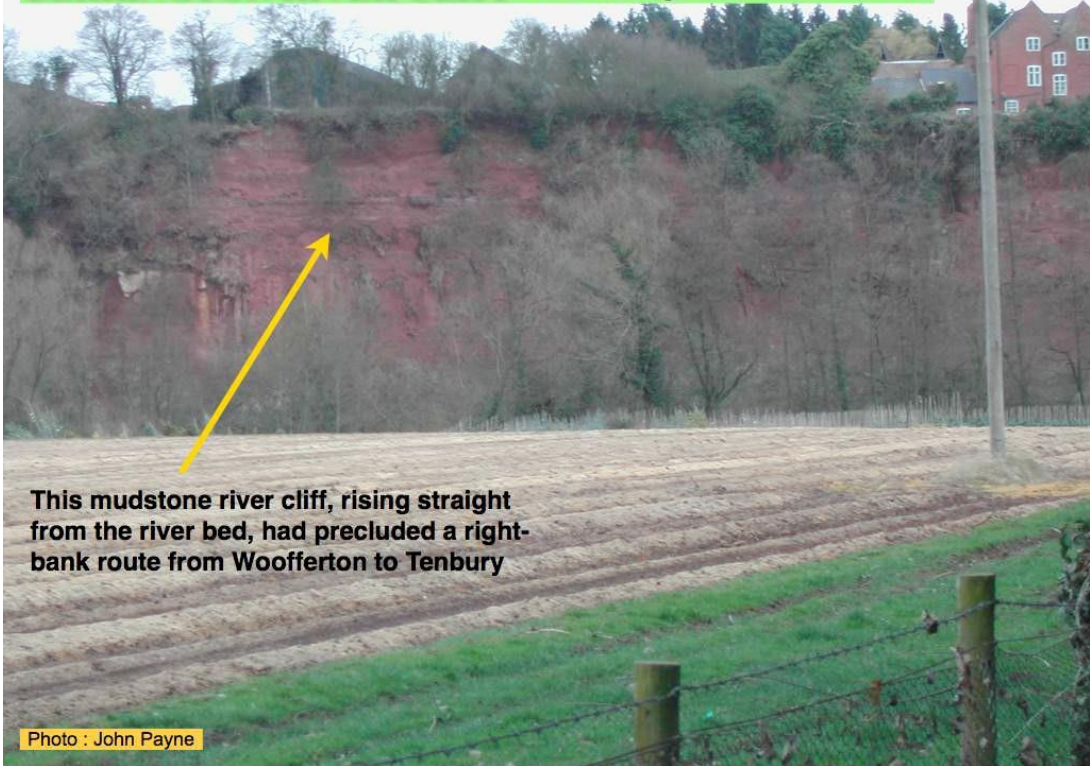


Early mapping by Bryant, Baugh and the Ordnance Survey, etc. shows an important equestrian short cut between the Tenbury and Ludlow districts. Byrots Bridge provided this route with a canal crossing at a convenient point with sufficient space to bridge before reaching the constricted canal/river area around the Gosford Aqueduct, which would clearly have been problematical. It lifted the road level from Teme valley alluvium onto a pre-glacial feature identified by Peter Cross as 'The Little Hereford Terrace' – the lowest of three such terraces he identified as predating the river reversal.



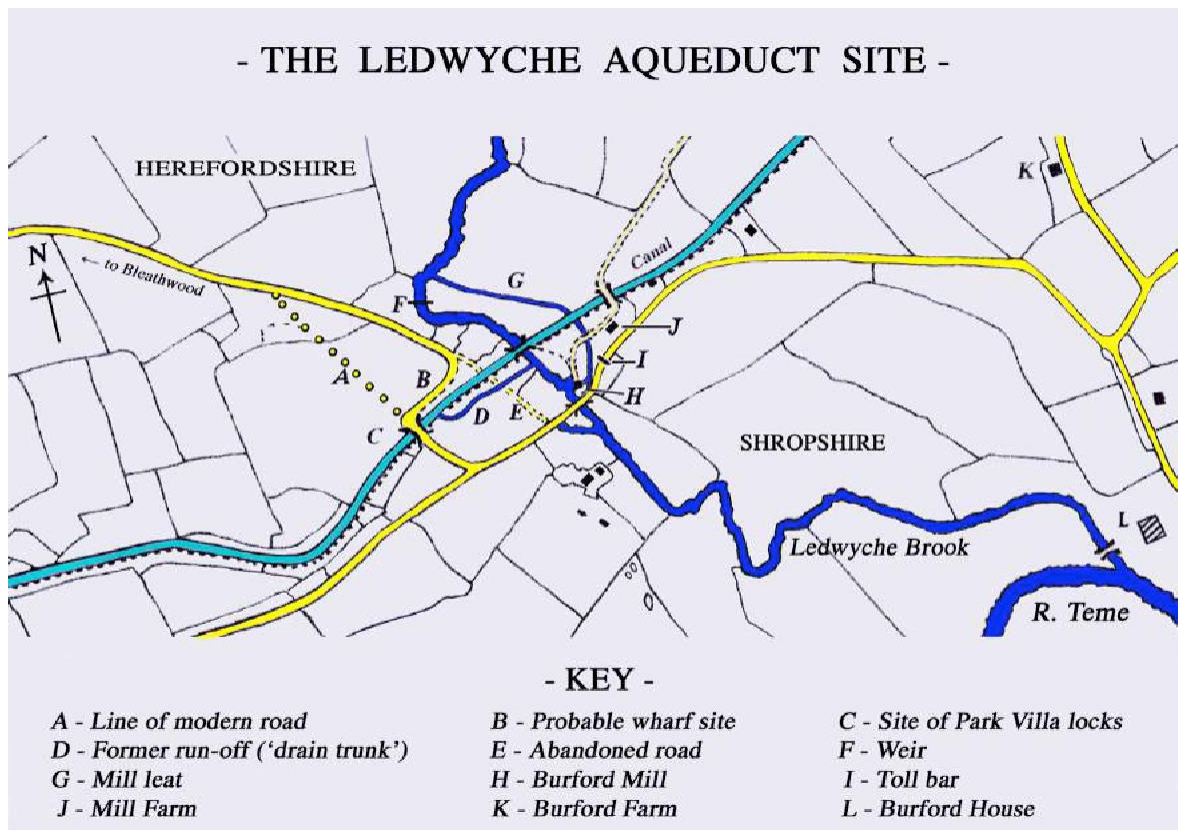
An original Easton Court driveway was blocked by the canal, thereby necessitating this new bridge which was approached by a ramp before accessing the Little Hereford river terrace in similar fashion to Byrots.

BERRINGTON RIVER CLIFF . . . showing the mudstone strata



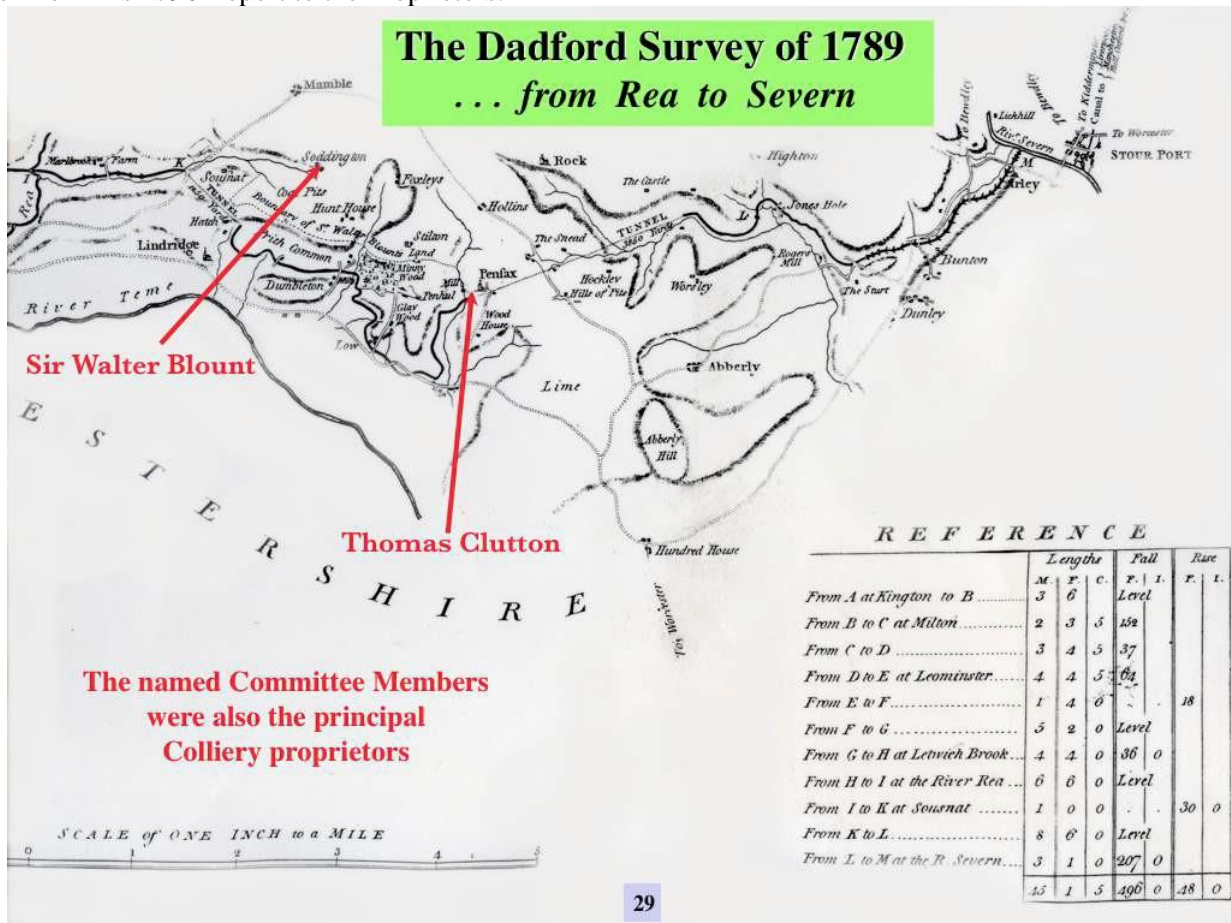
Robert Whitworth had realised that a R bank route to Tenbury was barred by the massive river cliff at Berrington Court, impassable to the canal unless undertaken with huge engineering costs! The Ledwyche crossing needed high embankments leading to the aqueduct bridge itself - and this despite the elevation having been lessened by a further 12' with the twin locks at Park Villa.

Several Teme tributaries are encountered between the Gosford aqueduct and bridging the Rea, including both the Corn Brook and the Bickley Brook - but nothing so formidable as crossing the Teme or Ledwyche. The remainder of the route, as far as the Rea aqueduct, is less remarkable apart from the Corn Brook crossing and the Oxnalls Tunnel; and furthermore, being also 'out-of-county', neither did this section fall within our original WARS Survey remit, although with the Rea Aqueduct and the Mamble coalfield did we exceed this.



Newnham to Stourport:

From Park Villa until just across the Rea Aqueduct the route is on its base (sump) level, so the construction is that of a normal contour canal, whereas once across the Rea, the terrain again proved problematical because thereafter, Dadford's route seemed decidedly overambitious - as seized upon and fiercely criticised by John Rennie in his 1796 Report to the Proprietors.

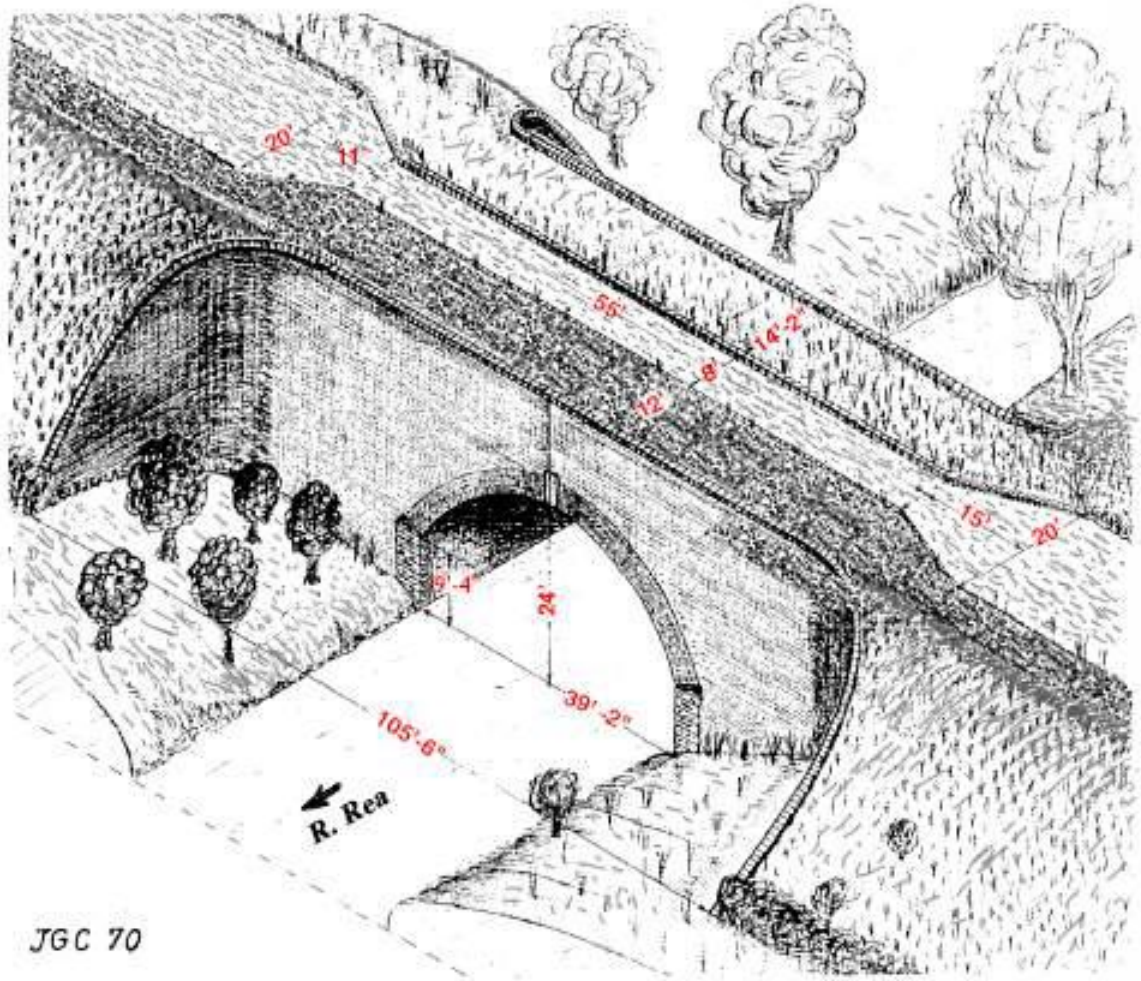


The Rea extends upwards from its Teme confluence to headwaters N of Brown Clee Hill - only a few miles short of Bridgnorth - and, like many of the Teme tributaries, there's considerable rejuvenation in its lower reaches. Presumably this is due to the increased erosional powers of the post-glacial Teme on its abbreviated melt-water route via the river Severn. The Severn, in turn, suffered major glacial diversion, and is known to have formerly drained northwards to join the Dee drainage until blocked by the effects of glaciation. The rivers Severn and Teme/Rea thereafter displayed considerable erosional vigour, with the vertical dynamic having far exceeded any lateral effects. This resulted in deep and relatively narrow valleys, carved through higher land that, for the most part, has not yet been removed, so neither have interfluves been significantly lowered, even despite their steeply graded tributaries, although prominent nick points are obvious on some minor streams throughout the Wyre Forest to Martley district.

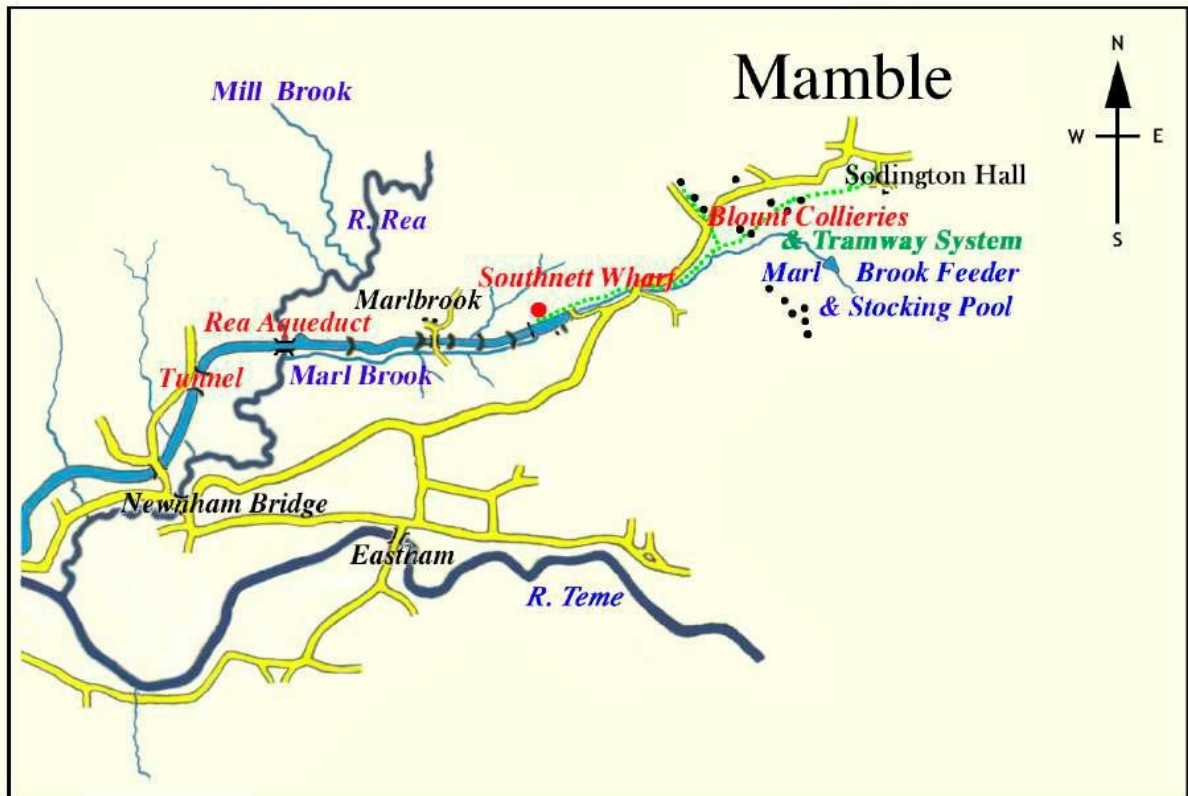
One of the finest topographical views is obtained from the heights of Raddle Bank on the A4112 road between Stockton Cross and Tenbury Wells. Prominent, is the ridge of high ground between the Woodbury/Abberley Hills and the Clows Top/Bayton area. There is marked contrast between the depth of the Teme/Rea valleys and this ridge of high ground barring them from the Severn valley in general and of course from Stourport in particular. This formidable ridge of high ground confronted any would-be canalisers from the time of Robert Whitworth onwards. Indeed, any such prospector recognised that a tunnel would be essential to obtain direct access to Stourport.

Standard practice also required Dadford's secondary summit level to be as long as practicable in order to collect and store the maximum volume of water between Southnett and the Stockton on Teme area for what Whitworth termed a "double lockage" in contemporary parlance. A long tunnel would needs penetrate the ridge near Abberley, emerging somewhere on the Dick Brook, but there to be interrupted by a staircase of locks down to the Severn. Dadford's plan was fairly similar to Whitworth's, only instead of continuing down the Teme valley from Newnham, he intended to route his canal round into the lower Rea valley, cross the river by aqueduct, and climb the Marl Brook valley with a series of locks in order to reach his second summit level at Southnett basin and wharf, thereby giving access to the adjacent Mable coalfield.

THE REA AQUEDUCT . . . its siting, design and construction

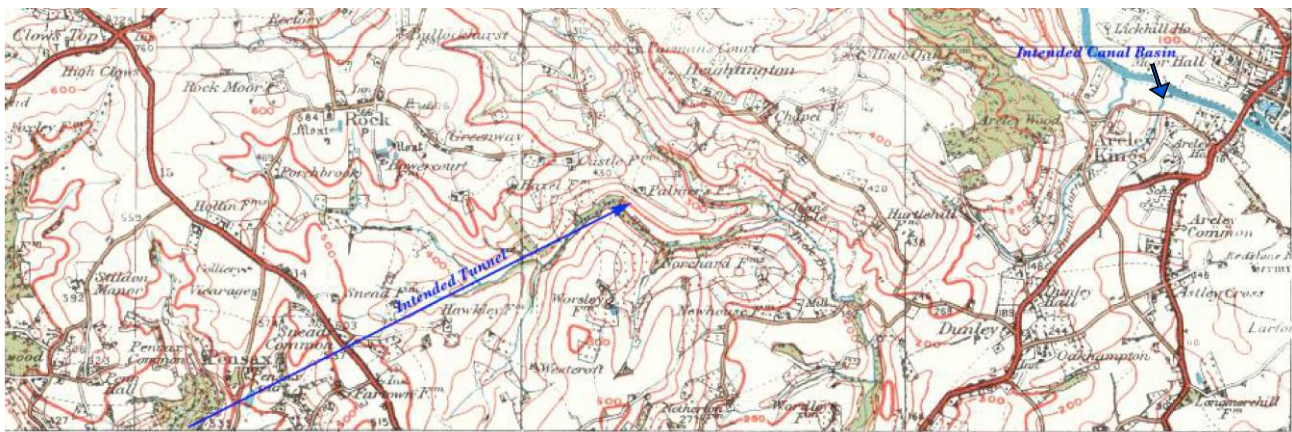


CANAL TERMINUS . . . showing Southnett Wharf and the coalfield



In practice, the final (Pensax) summit level would be fed by the Stockingpool reservoir on the upper Marl Brook - using the stream itself as the feeder - although both the authorising Act and Dadford's plan indicate that the Dumbleton and Stockton Brooks could also have been tapped. From Southnett basin the intended route required an immediate tunnel, known as the Southnett (alias Sousant or Sousnat) tunnel, reputedly of 1,250 yards in length; but unfortunately, it was only partially constructed and never of practical use. The Southnett tunnel nevertheless became an object of enduring mystery, giving rise to a local mythology of flooding, lost boats, and buried workmen with abandoned tools etc. Such accidents were not uncommon, and tools have indeed been recovered; however, the tunnel would obviously not have been watered during construction, and in any case we happen to know from the Dadford and Waring 'Progress Report' (June, 1794) that in this case they had obviously used light railways rather than boats for transporting this tunnelling spoil.

Southnett tunnel E portal is situated near 'The Hatch', a fine Georgian house nearly half a mile due N of Lambswick Farm in the parish of Lindridge; little construction was obvious beyond this point, apart from preliminary attempts to install the Dumbleton Brook feeder. The original intention was to continue contouring on the summit level so as to collect water by this (statutory) feeder from the Dumbleton Brook, and then to proceed via Lowe Green, above the Worcester (A443) road, nearly as far as Stockton on Teme. Still on the same summit contour, Dadford's route next headed due N along the wooded Stockton Brook valley before reaching an intended SW portal for a major tunnel near Yeldon (just short of Pensax). If the project had been completed, then it would have resulted - at 3,850 yards - in the second longest contemporary British canal tunnel, although that figure has since been surpassed for length.



Dick Brook & Porch Brook . . . the confluence near Joan's Hole

The canal was intended to emerge - still on its summit level - from a portal in the Porch Brook valley. After only a short distance - just above Joan's Hole - there was intended to be the first lock since leaving the Southnett wharf and basin. There seems no trace of either portal or lock site; nevertheless, an intended lock should have lowered the canal 6' in order to double back and then bridge a narrow point on the Dick Brook. Having thus tunnelled through the watershed and continued above the L bank of the Dick Brook, the route was soon confronted with a stupendous fall of 207' in a horizontal distance of only 3 miles, 220 yards: this 'staircase' would have occupied the Bickley Brook valley to Areley Kings on the Severn, opposite Stourport.

Dadford's intended route is known only in outline hereabout, but his plan indicates that he would first have contoured away from the steeply graded Dick Brook rather than canalise the actual brook, mainly because it was heading in generally the 'wrong' direction for straightforward access to Stourport. Doubtless any such interference with the Dick Brook would, in any case, have drawn considerable opposition from the established water-milling interests. There is also the further question as to whether Andrew Yarranton's long-established river-barge locks from the Severn (serving iron works on the Dick Brook and dating from the mid seventeenth century) were still relevant? Judging from his plan, Dadford seems, instead, to have favoured a contoured approach, of about one mile, towards Dunley, before commencing his stupendous flight of locks (about 28 would seem to have been proposed) in order to reach a terminal basin adjoining the Severn.

Throughout the whole of this incomplete and non-operational alignment - between Southnett and Stourport - there were few indications of serious canal engineering, apart from a portal of the Southnet tunnel; some work on Frith Common (both described by Cohen); and the abandoned feeder together with its possible dam on the Dumbleton Brook - plus possibly some slight excavation in the Stockton Brook woodland.

It is also just possible that traces of a (presumably?) later and abortive tramway leading up from the Severn may once have been observable in places between Joan's Hole and Areley Kings. This is mentioned by Charles Hadfield - and tentatively ascribed to the Hodgkinson initiative of 1803/5 - although the field-evidence seems rather dubious nowadays unless the 'tramway' was something else?

- A NWAG discovery near Joan's Hole -



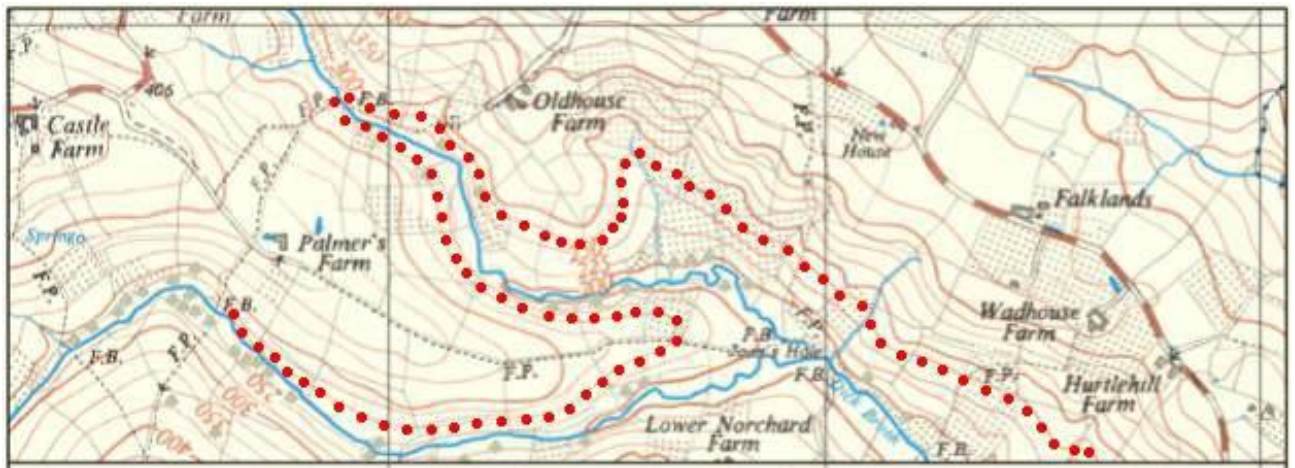
The North Worcestershire Archaeology Group (NWAG) also investigated the Joan's Hole district, whereupon they found earthworks in the woodland that obviously look like an abortive canal bed. Possibly this is the 'tramway' mentioned by Hadfield, but whose informants may have misidentified its purpose? More likely it's relic workings for the intended canal, but which were discontinued following the Southnett tunnel collapse and abandonment of the canal project?

It was, of course, standard practice for such canal works to be independently and yet simultaneously undertaken by several different contractors at widely distant locations along the project

engineer's line of survey, so maybe this accounts for these excavations? Likewise, temporary brickworks were established wherever locks, bridges and other engineering requirements coincided with available clays and silts. Our thanks to Terry Chandler (NWAG) for permission to include their photograph!

A quick check with the Google Earth mapping showed the elevation to be c. 80 metres ASL, which seems significantly close to the Southnett - Pensax summit data; indeed, it could well be the case that Dadford was intending to dispense with the post-tunnel lock shown on his Plan, and thereby prolong the summit level, which would then have significantly increased this summit water storage – by many thousands of gallons!

Also possibly associated with Hodgkinson's intervention is another short tramway system linking the renewed mining activity at Pensax with Wharf Farm near Stockton-on-Teme, although it should be noted that, whilst fairly adjacent, this Teme valley wharf was not directly situated on the intended line of the canal: on balance, it therefore seems more likely that this Wharf Farm plateway not only post-dates Dadford's project in particular, but also the Leominster Canal more generally.



Note: 264 ±' (80.47m) OD is usually cited as the Southnett - Pensax summit level

Whichever the case, tramway activity of the period 1803/5 is both intriguing and ominous, since it could be indicative that any realistic hopes for further canal development and completion were virtually defunct by that date. If we accept this premise, then it would seem to suggest that difficult physiography had defeated the enterprise. Such a conclusion may, however, be premature because viability of the canal would clearly have been tied to any future development of the West Worcestershire coalfield as a whole and this - together with a suggestion of possibly conflicting railway versus canal interests? - must be deemed a complex and speculative subject; some further consideration is offered in this series under the heading of 'Economic Geology'.

- *QUESTION & RESPONSE* -

1. Was the best overall route chosen between Kington and Stourport? . . . Not exactly; but this was probably for the commercial and/or proprietorial reasons which seem to have constrained and overridden the engineer's best judgement.
2. Were there obvious alternative routes? . . . Theoretically, yes, between Kington and Woofferton and, also, between Newnham and the Severn - whereas the operational section seemed fairly satisfactory, except for the crossing of the Gosford Brook at Wyson.
3. Why were these alternatives not pursued? . . . The Kington section was an afterthought and therefore an inevitable compromise . . . On the other hand, the Newnham to Stourport section was obviously dominated by the Blount family proprietorial considerations, but also by certain legal constraints within the 1791 Act of Authorisation, specifically, by the statutory prohibition of R.Rea feed-water supplies.
4. Should the canal have been completed? . . . Probably not in its entirety - as a canal - but more might have been attempted with the tramway proposals, some of which could then possibly have been further developed and/or perhaps ultimately adapted as railways.
5. Would the route have thus been viable? . . . Not entirely, although its usefulness might have been increased, and possibly prolonged - perhaps to some slight commercial improvement. Much would have depended upon potential development, exploitation, and the market viability of the local coal resources. However, the latter prospects were not encouraging, since the Sulphur Coal would probably have fared poorly in competition against the Staffordshire and Forest of Dean imports via the Severn.

- *SUMMARY* -

It was easy to be wise after the event, but seemed opportune and instructive, to ask the foregoing questions arising from a combination of speculation, over-ambition, and misplaced endeavour. The outcome clearly indicated an unhappy accumulation of various human errors - rather than any single miscalculation, although error was clearly mitigated by difficult topographical conditions. So having painted this gloomy picture, an adverse verdict seemed inescapable.

Nevertheless, as a matter for further reflection, it took eight years to bore the Harecastle tunnel (2,880 yards.), thirteen years for the Morwelldown (Tavistock) tunnel of 2,560 yards, and a staggering sixteen years to complete the Standedge tunnel (5,415 yards.) under the Pennines. The reader is invited to compare these statistics with the known rates of progress at Putnal Field, Southnett, and Pensax, and also to consider the relative magnitude of other such enterprise when assessing progress with the Leominster Canal project.

We've seen that the proposed canal between Kington and Leominster, whilst not ideally routed, would have encountered little topographical difficulty, although it's doubtful if best use was made of the favourable hydrology. The operational section between Leominster and Newnham certainly made good use of the topography for the most part, but it is again questionable (backed up by historical and field-survey evidence) as to whether Dadford's route optimised the hydrological resources: it is surely significant that Robert Whitworth's route favoured the W flank of the PLTO, as did Hodgkinson. Overall, it seems likely that greater (and improved) use could have been made of the available water resources between Kington and Newnham - especially the R.Lugg potential - and that failure to do so would have contributed to some of the operational default inferred from Hodgkinson's reporting in the early nineteenth century.

From Newnham onwards, and given (conflicting) commercial pressures that were almost certainly in play, it could be argued that Dadford made skilful use of what little water was available on the Teme/Rea valley (western) side of that watershed, and that he also made the best of any awkward topography that constrained his route. In different circumstances there may well have been other options available to Dadford but, by extending the proposed second summit to 8.75 miles (or more?) through the watershed he could at least be said to have improved the operational prospects for the intended canal as compared to the earlier proposals, and - regarding those earlier plans - it seems puzzling to envisage how the Whitworth proposals could have been made to work as judged from what was depicted on the Faden map.

As Rolt points out, canal tunnels are predominantly sited on the summit levels. In this instance it would seem that, additional to the Marl Brook, Dumbleton Brook and Stockton Brook feeders, his final (Pensax summit) tunnel would then have placed Dadford's canal in a suitable location to gather further feed-water from the Dick Brook and, perhaps, elsewhere on the E side of the watershed. As to whether such additional water resources could ever have been legally accessible and/or privately negotiable (without extra parliamentary powers?) is an entirely different matter. This must remain in the realms of speculation but, if such extra water had been available, then a completed canal might possibly have been more viable.

Whereas the outlook may never have been auspicious, all the blame for failure should not necessarily be attached to the engineers involved, since certain questions needed to be asked of the canal promoters and proprietors who allowed such a situation to develop. Rennie recognises this in his Report and is outspoken in summarising the situation as, essentially, an issue of management failure.

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N.E.R.C. / B.G.S. "Ludlow : England & Wales, Sheet 181 : Solid & Drift Geology" - Scale 1:50,000
(Provisional Series) Ordnance Survey

NOTES:

Numerous other (both historic and current) maps, of varied issue and scale, were consulted:-
In particular, the former (1960s) Ordnance Survey 1 : 25,000 Scale (Imperial) - cloth/paper 'Blue' Survey Series sheets, "*Published by authority of the Ministry of Agriculture, Fisheries and Food*" are derived from the 'Six Inch' Series mapping data, and are especially useful because they frequently depict certain (lost) historical details that have since been deleted, modernised or superseded on their more recent 'Green' (Metric) successor sheets.

* Geologists will find some local details here (stratigraphy and literature, etc.) including reference to the other cited specialist authors such as Murchison, Luckman, Pocock, *et al.*