

# *Sheetlines*

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for the Study of Ordnance Survey Maps

Number 120

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# Sheetlines

Number 120

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When the outline arrangements were made for an AGM at Aberystwyth, the first wave of the pandemic had largely died away and it seemed quite plausible that everything would be back to normal by May 2021. How wrong we were! It now seems likely that the relaxation of social-distancing rules - which is really a prerequisite for a live AGM - will not happen until this autumn at the earliest. Accordingly, the plans for a May AGM at Aberystwyth have been abandoned and the arrangements of 2020 will be repeated.

The AGM will therefore take place by Zoom on Saturday 14 August at 10.30am. Papers will be sent out with the August Sheetlines. It will be followed by a talk by David L Walker on The Ordnance and the Hydrographic Service 1811-1843. The starting time has been chosen so that everything can be completed by 12.30. Nominations for officers and committee members, duly seconded, need to be received by the Hon Sec 60 days before the meeting.

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## **Gerry Jarvis**

*As we briefly recorded in Sheetlines 119, Gerry Jarvis - for many years an enthusiastic member of the Society and one-time visits organiser - died on 6 October, 2020. Here, CCS member **David Parsons** recalls his friend and colleague.*

What can I say about Gerry – the man who became not only my dearest and closest friend but also a much respected fantastic work colleague?

Gerry was born and educated in Swindon, where his father was a Swindon GWR locomotive works manager. He started work for Barclays Bank aged 18 and continued there until his retirement in 1987 – a period only interrupted by two years National Service, spent mostly in Germany carrying out surveying duties - something he may well have continued with had a suitable opportunity arisen. He returned to Barclays and in 1956 married Shirley who had taken over his duties whilst he was on National Service. Subsequent moves in Barclays included a period in Holsworthy, working with the farming community, and Plymouth. An opportunity to work with Barclays new O and M group led to a move to London, living initially in Wembley and then Haywards Heath before relocation to Cheshire.

I first knew Gerry whilst working on Barclays' first computer system. We started working together in October 1967 on a futuristic project, which like many others we collaborated on over the next 20 years, would revolutionise the ways in which banking was carried out. We often travelled together in the UK and overseas. In these situations you quickly learn about each other and any common interests - especially maps and books. Our friendship carried forward after he

retired in 1987 and grew to become both a very close lifelong, personal and family friendship.

After retirement he continued to work for organisations including British Aerospace and the World Bank. He worked voluntarily for the British Executive Service Overseas – a role which took him to Bangladesh and several parts of Africa.

Gerry introduced me to both the RGS and CCS. We both helped establish the RGS Cheshire and North Wales Region where for many years he was Regional Chair. He served the CCS for several years as visits organiser – indeed, he could almost be said to have created the job of visits organiser; he brimmed with ideas, some of which were turned into formal visits - and we often travelled together to CCS events, AGMs and map markets. He also went on many CCS visits both in the UK and overseas. He was a great companion in the field and in the map room.

He was an intrepid traveller and had spent time in just about every continent. I lost count of the number of countries he had visited. He loved walking, maps, books and all matters to do with railways – especially the GWR – even at one time actually driving a steam locomotive. He was happy to travel on his own or with others and successfully led small groups visiting - amongst many other places - the Himalaya, Rockies, and the Andes as well as more locally, coast to coast and Pennine Way.

The last time I saw Gerry was on 2 January 2020. My wife, Doreen, and I had visited him, Shirley and Maureen in Dawlish, where he had moved in 2013, to spend the New Year with them - something we had done for many years.

Gerry leaves his wife Shirley, daughter Maureen, son Glyn and grandchildren, Elizabeth and David.

**Gerald “Gerry” Malcolm Jarvis. CCS Member 187. 25 October 1931 – 6 October 2020**



*Gerry contemplating the harbour at Piran on the CCS trip to Slovenia, 2007  
(photo: Chris Higley)*

## ***Do you want to know a secret?***

***John Ambler***

The topic of security deletions has been mentioned before in *Sheetlines* and also in Richard Oliver's *Ordnance Survey Maps: A Concise Guide For Historians*, and I am both fascinated and sometimes bemused by the often strange logic which has been applied to "secret" locations leading to their deletion from OS mapping. Looking through an old copy of *Steam World* magazine (August 1982), I came across an interesting reference to a parliamentary exchange concerning Ordnance Survey security deletions. I quote a Letter to the Editor from a Mr Becket of Alton:

"Without wishing to prejudice the speculation of a 'strategic reserve' of steam locomotives stored for use in some future national emergency, I'd like to pass on the following extract from *Hansard*, the official report of parliamentary proceedings of April 29 this year (1982):

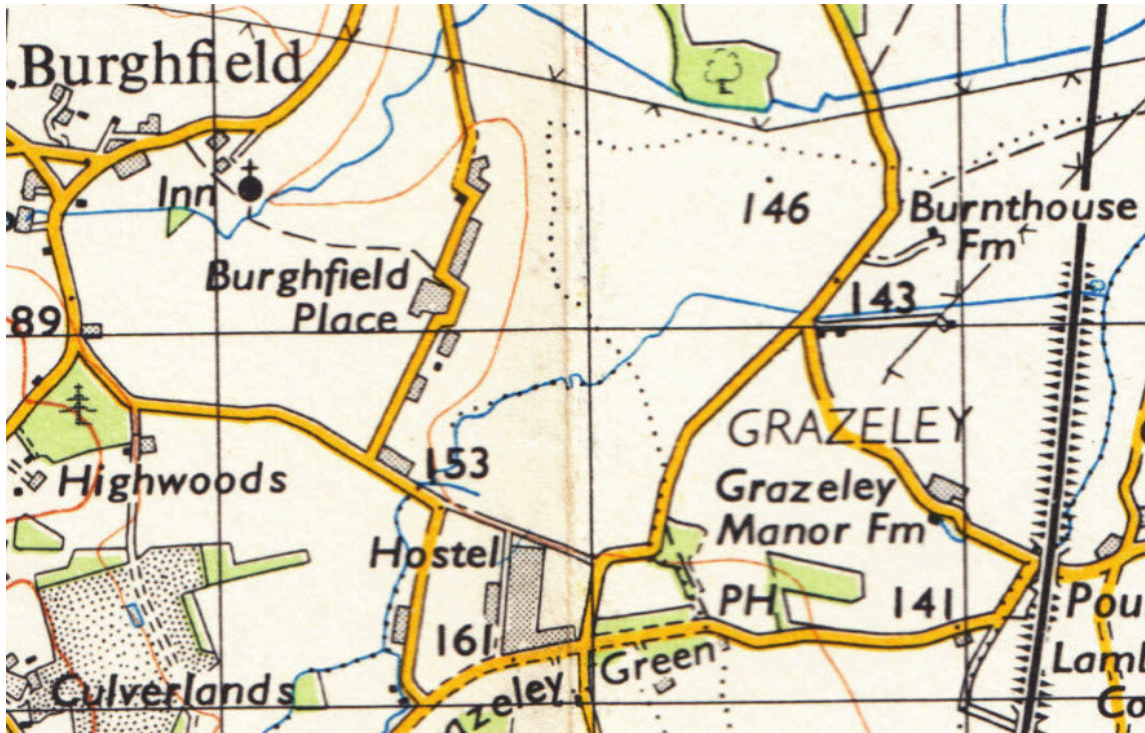
**Mr Meacher** asked the Secretary of State for the Environment (Mr Michael Heseltine) on what authority Burghfield Royal Ordnance Factory was removed from the 1980 revised second edition 1:50,000 Ordnance Survey map, when it was previously shown in the 1973 first edition, and still exists; on whose authority it has been replaced on the 1980 map by two non-existent streams flowing down to the Thames; and whether any other Ministry of Defence establishments which still exist have been removed from Ordnance Survey maps in the last ten years.

**Mr Heseltine:** Where matters of national security are involved the Ordnance Survey complies with Government requirements. Where these require the removal of previously mapped detail it is the policy of OS to reinstate for cartographic reasons any relevant topographical information which appeared on earlier maps of the areas concerned. It would not be in the public interest for me to disclose the number of such cases that have arisen in the last ten years."

The Burghfield site located in the Thames valley, four miles south-west of Reading was a product of WW2. Construction of Royal Ordnance Explosives Filling Factory No. 18 commenced in 1940 and production started in 1942. In 1953 the factory was reconstructed for the production of missiles and subsequently became Atomic Weapons Establishment (AWE) Burghfield which explains its sensitivity. I happen to have copies of the maps mentioned (my copies were issued in 1974 and 1984) so can confirm that Mr Meacher was reporting a case of "now you see it, now you don't".

To better understand the evolution of the mapping of Royal Ordnance Factory (ROF) Burghfield I have examined maps of the area that I have in my collection. ROF Burghfield was not depicted on my one-inch mapping until the early 1970s. Post-war editions of the New Popular series published between 1940 and 1957 depict the site with no major deviations from the pre-war Popular series mapping. Perhaps this is not surprising as the main survey dated from 1930 with only roads revised in 1947, so this is possibly not a deliberate security deletion as no pre-

existing roads were affected by the construction of the site. The first edition of the 7th series mapping (I have print codes A/ and A//\*) published in 1959 (*figure 1*) based on the full revision of 1956 and intermediate revisions of 1961 and 1964, were essentially the same as pre-war maps with the addition of a few buildings adjoining the eastern side of the minor road which formed the western perimeter of the site.



*Figure 1: 7th series, 1959/64 (A//\*). Very similar to the New Popular map which preceded it, but with footpaths within the boundaries of the factory deleted and a range of buildings added along the western boundary. Saunderscourt Farm not shown.*

A short stub of waterway was shown joining the Burghfield Brook in the south west corner of the site, of which more later. The absence of the ROF at this point in time must surely be a security deletion as there was much there to survey in 1956. Interestingly a large “Hostel” is shown outside the factory boundary to the south. This was presumably housing for ROF workers, and though depicted as a single building at the one-inch scale, consultation of the two and a half-inch map of 1961 (*figure 6*), shows a multitude of smaller buildings, so possibly an encampment of wooden huts which were removed after the war and not depicted on later maps. My copy of the 1971 edition of the 7th series map (print code B), revised 1967-69 (*figure 2*) however shows the establishment in detail including the embankment of the railway siding which at one time served the site which is clearly labelled “*Royal Ordnance Factory*”, so the security deletion must have been rescinded. *Figure 3* shows the map mentioned by Mr Meacher i.e. 1:50,000 First Series map (print code A/\* of 1974 illustrated) which is very similar to the preceding 7th Series map but with metric spot heights and metric labels for the imperial contour lines. A decade later, the Landranger 1:50,000 (print code A/\*/\*/\* of 1984 illustrated in *Figure 4*) shows that the security deletion has been reapplied

with the factory buildings being deleted and the depiction has not been returned exactly to its pre-deletion state as three water courses are shown within the boundaries of the site.

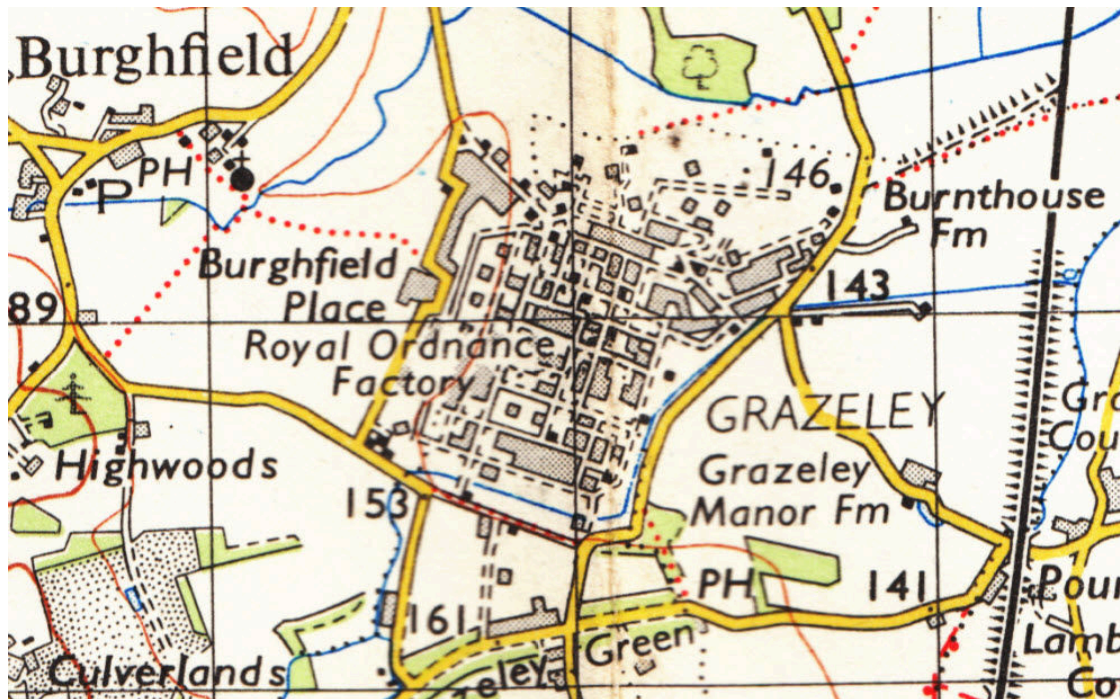


Figure 2: 7th series, 1971 (B). ROF Burghfield shown and named. Hostel no longer shown. A public right of way approaching the site from south of Amner's Wood terminates abruptly at the site's northern boundary (as it still does today even though there is no sign of a footpath on the Google Earth Street View image). Embankment of railway siding shown.

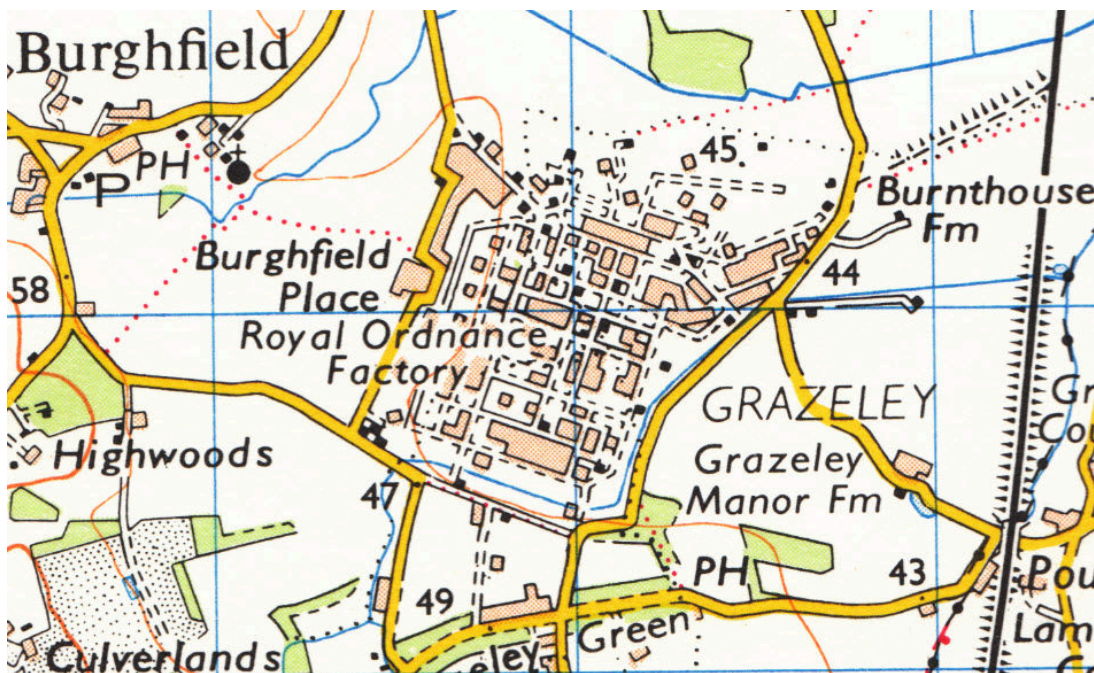


Figure 3: 1:50,000 First series, 1974 (A/\*). Essentially the same as the preceding 7th series map but with metric spot heights and metric labels applied to old imperial contours.

The embankment of the railway siding which entered the north-eastern corner of the site which was shown when the factory was depicted was not deleted from the 1980 map along with the factory, though it did gain the label “dismtd rly”. Understandably, footpaths formerly passing through the site were not reinstated.



Figure 4: 1:50,000 Landranger 175, 1984 (A/\*/\*). All ROF buildings except those on the western perimeter deleted. Old and new courses of Burghfield Brook shown along with the third “fictitious” stream. Metric contours redrawn. Saunderscourt Farm shown but not named. Track of dismantled railway siding labelled.

To clarify Mr Meacher’s comments regarding the “two non-existent streams flowing down to the Thames”, we have to look to larger scale mapping for an explanation. Pre-war one-inch maps show only Burghfield Brook passing diagonally across the site from south-west to north-east and this is consistent on all maps at this scale until the factory is depicted. One inch maps which do depict the factory show that Burghfield Brook was re-routed around the southern and eastern perimeters of the site, and it is part of this new route which was noted earlier as being shown on the censored 7th series map (figure 1). Following the security deletion on the 1984 map, this new route is depicted in full in addition to the original course, but what of the other short length of waterway linking the old and new courses: is it fictitious as implied by Mr Meacher?

I have three two and a half inch maps in my collection dating from 1947, 1961 and 1981 (figures 5, 6 and 7), none of which show the factory, but all show a small water course arising adjacent to the “B” of Broad Street (figures 5 and 6) and joining the original course of Burghfield Brook near Saunderscourt Farm which is not always shown, and never named on the one inch maps. This closely matches the course of the stream linking the old and new courses of Burghfield Brook shown on the 1984 Landranger to which Mr Meacher refers. Two and a half inch Sheet SU 66 (Print code C of 1961, figure 6) shows the complex of huts labelled “Hostel” to the south of Broad Street, but of the ordnance factory, only

the buildings adjoining the road inside the western boundary are shown. Interestingly on Pathfinder SU 66/76 (print code A of 1981), these latter buildings are better defined and are depicted with boundaries which suggest that they may have been detached and semi-detached residential properties, which might explain why they were not deleted. The hostel to the south had been removed. Reference to Google Earth Street View confirms that these buildings have now been demolished and replaced by lawns, beds of shrubs and small trees inside the security fence which is typically well-labelled as MoD Property, so the suggestion that they were residential cannot now be confirmed. The 1981 Pathfinder (*figure 7/7a*) also shows a short stub of the new route of Burghfield Brook, suggesting that at some point it might have been shown (or intended to have been shown) on the 1:25,000 map and not completely deleted. It would be interesting to see edition C/\* of SU 66 released in 1975 to see if the security deletion was still in place at that time. Footpaths shown crossing the site on the 1947 map were deleted on the later 1:25,000 maps.



Figure 5: 1:25,000 Sheet 41/66, 1947 (A). ROF and buildings on western boundary not shown but footpaths are shown crossing the site. The minor watercourse from Broad Street to Burghfield Brook near Saunderscourt Farm is shown.

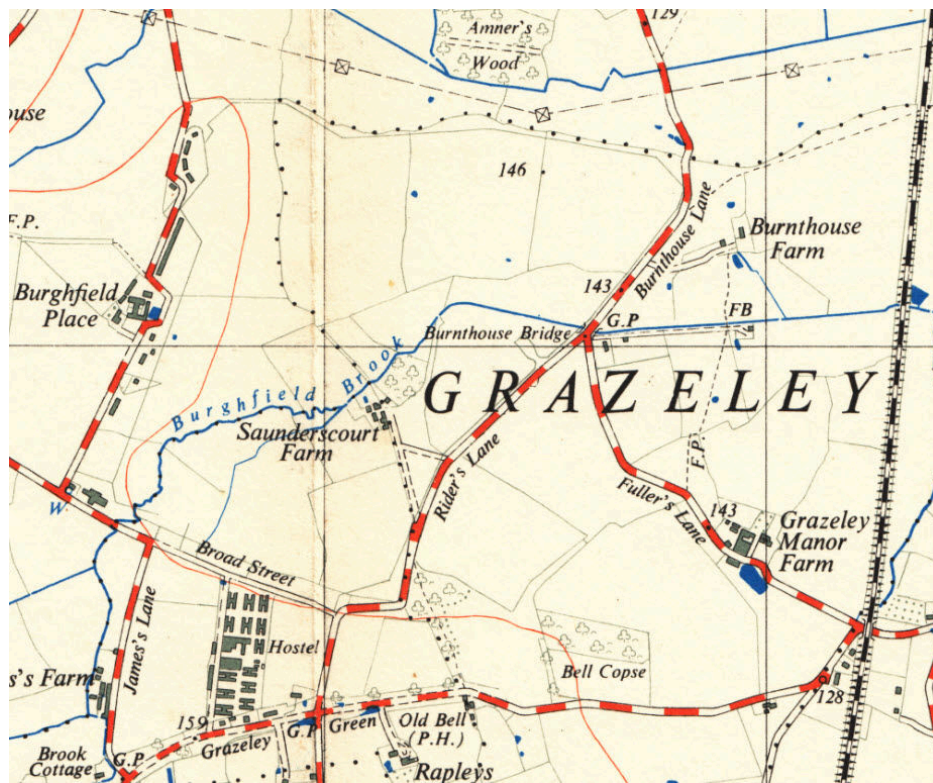


Figure 6: 1:25,000 Sheet SU 66, 1961 (C). Possible residential buildings on western perimeter of factory site, and Hostel with numerous “H-blocks” to the south of Broad Street are shown.

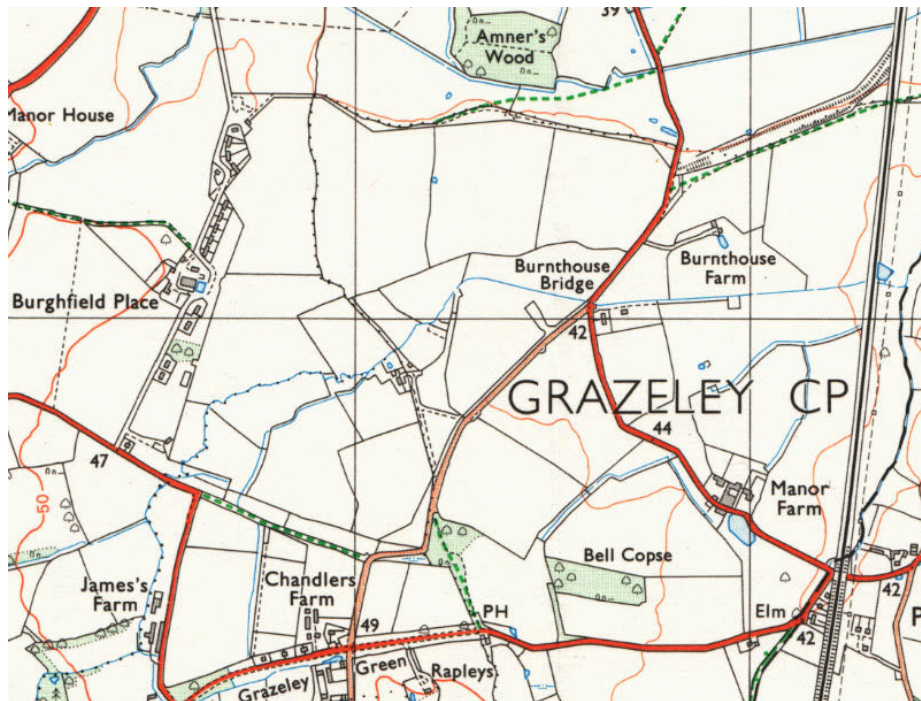
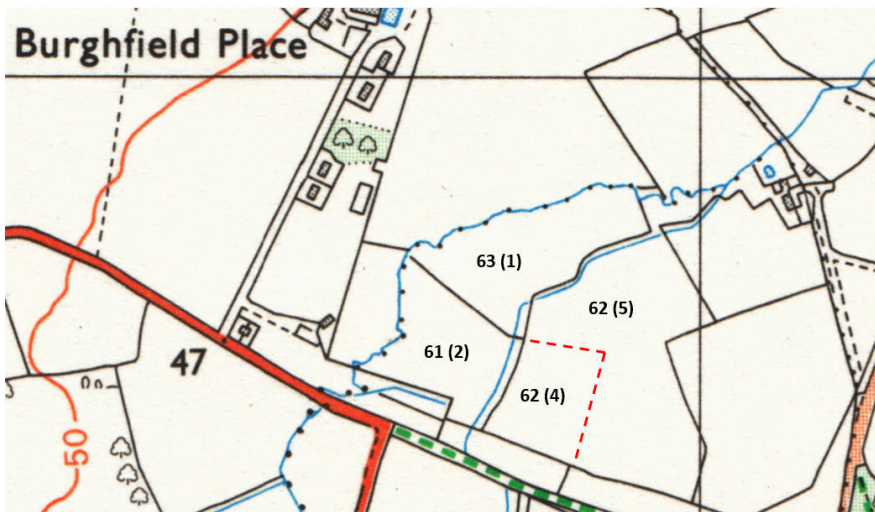


Figure 7: Pathfinder Series Sheet SU 66/76, 1981 (A). Plot boundaries around buildings on western perimeter shown in greater detail and Hostel site empty. Water courses remain largely as they were pre-war with the exception of a short length of the new course of Burghfield Brook being shown in the south-west corner.

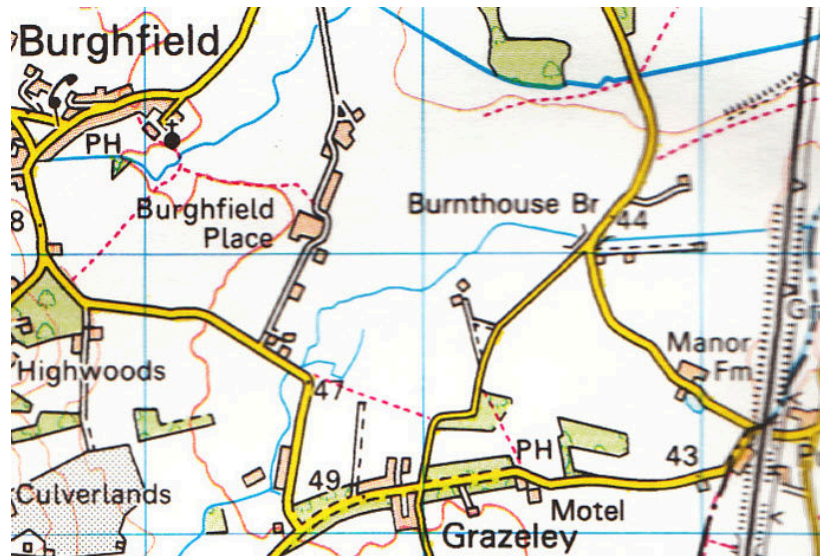


*Figure 7a: Pathfinder Series Sheet SU 66/76, 1981 (A). Enlarged extract from Figure 7 with land parcel numbers from 25 inch plans of 1898 and 1912 shown (1877 parcel numbers bracketed). The field boundary inserted by the author as a red, dotted line was removed between 1877 and 1898.*

Looking back further still using the scanned images of 25-inch mapping on the National Library of Scotland web site, I note that the small water course didn't appear to exist in full until the early 20th century. The 25-inch plan published in 1877 showed a field boundary marked with tree symbols stretching from Burghfield Brook just west of Saunderscourt Farm, south-westwards to the edge of the track known as Broad Street. The southern section between land parcels 2 and 4 was shown with a double line, suggesting a ditch, but the northern section separating land parcels 1 and 5 was a single line suggesting a hedge. On the plan published in 1899 parcels 4 and 5 were merged to form a single parcel numbered 62. On this plan Burghfield Brook lost many tree symbols and gained a direction of flow arrow eastwards in the general direction of the Thames. The field boundary to its east also lost most of its tree symbols and the southern portion bounding parcels 61 (formerly 2) and 62 (formerly 4) gained a direction of flow arrow, giving weight to the suggestion that this section was a ditch. Interestingly, the direction of flow at that time was south westwards ie away from the Thames and towards Broad Street. The field boundary between parcels 63 (formerly 1) and 62 (formerly 5) to its north remained a single line. On the next revision published in 1912, the direction of flow arrow on the ditch was reversed and the entire field boundary from Broad Street to Saunderscourt Farm was shown as a double line suggesting that the ditch had been extended and reconfigured to flow eastwards to Burghfield Brook and ultimately to the Thames after joining the Kennet on the western edge of Reading. My conclusion is that Mr Meacher was at least partially wrong in stating that the two streams were non-existent. They had both existed in the past, but one of them was not previously shown on one inch/1:50,000 mapping, and the three streams shown on the first Landranger map were probably never all in existence at the same time.

I don't have a copy of a B edition of Landranger sheet 175, but the factory remained deleted from editions C and C1, though the depiction of the watercourses was slightly modified with most of the new course of Burghfield Brook being deleted and eastern stream being truncated before it joined the old course of Burghfield Brook, perhaps depicting the ditch shown on the 25-inch plans prior to 1912 (figure 8). This is closer to, but not identical to the pre-

deletion depiction which did not show the ditch. We had to wait until edition C2 of Landranger sheet 175 released in 2006, to see the factory anonymously reinstated for all to see (*figure 9*). This reinstatement post-dates the fall of the Berlin Wall (1989) and the subsequent slight warming of the “Cold War” by almost two decades and has persisted to the present time. The logic of thinking that national security is improved or protected by the suppression of information which has been in the public domain and widely available to the public (and spies) for a decade or more escapes me, but then many political decisions mystify me.



*Figure 8: Landranger 175, 1999 (C and C1). The new course of Burghfield Brook is largely deleted along with part of the drainage channel from Broad Street towards it. The dismantled railway label has also been deleted, though part of the embankment is shown.*



*Figure 9: Landranger 175, 2006(C2). AWE Burghfield is back on the map (but for how long?)*

## ***OS mapping of water mills***

***Paul Bishop***

Richard Oliver's enduringly popular CCS publication *Ordnance Survey Maps: a concise guide for historians* went into its third edition in 2013, thereby highlighting the interest in using early OS mapping for historical research. Richard notes that such mapping does indeed offer many opportunities for the historian but he is also keen that users of OS mapping are aware of the limitations of the mapping in this regard. He has thus emphasised that much remains to be done to clarify what the mapped symbols actually 'mean' and how reliable they are.

Several of us have explored this matter in relation to, for example, the mapping of limekilns,<sup>1</sup> the mapping of horse gins (engines) in understanding the balance between pastoral and arable land-uses in the mid-nineteenth century west Central Belt of Scotland,<sup>2</sup> and in relation to the mapping of ha-has in designed landscapes.<sup>3</sup> With respect to limekilns, we found that OS did not necessarily map all the limekilns in a locality<sup>4</sup> and the reasons for this 'under-mapping' remain unclear.

Bill Bignell's excellent work on OS mapping of windmills provides the benchmark in understanding OS philosophy and practice in such work. Bignell focused on "quite simply ... [trying] to gauge how effective the Survey has been, over the long course of its existence, in the mapping of windmills at each of the different scales."<sup>5</sup> Richard Oliver has highlighted the quality of Bignell's work, also noting that the exhaustiveness of that work on windmills has yet to be matched for watermills.<sup>6</sup> This note explores OS symbology of watermill mapping in Scotland and what can be discerned about mill operation from the OS representation of watermills. These issues are explored in relation mostly to the First edition 25-inch mapping but there is also some recourse to Second edition 25-inch mapping. The focus is on the 25-inch mapping because, fairly obviously, this of all the scales of OS mapping shows the earliest, and probably the best, detail for the historian.<sup>7</sup>

### ***GB1900 data set – 'Away from the Water'***

A PhD project entitled 'Away from the Water' is being undertaken by Ms Iara Calton at the University of Glasgow, funded by the Arts and Humanities Research Council via Historic Environment Scotland. The project focuses on when and why factories in Scotland converted from water-power to steam. As part of the project, we are collaborating with the National

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<sup>1</sup> Bishop and others, *Sheetlines* 98, 101, 106 and 107.

<sup>2</sup> Paul Bishop, 'Horse gins in Baldernock, East Dunbartonshire', *Vernacular Building* 38 (2015), 7-26.

<sup>3</sup> Bishop & Oliver, *Sheetlines* 95 and 96.

<sup>4</sup> See also Bishop and others, 'Lime burning in clamp kilns in Scotland's western Central Belt: Primitive industry or simple but perfectly adequate technology?', *Industrial Archaeology Review* 39 (2017), 38-58.

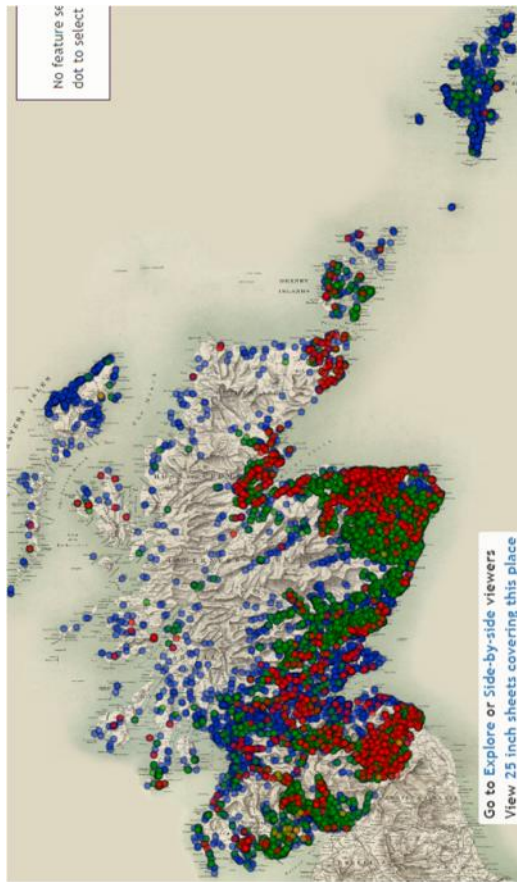
<sup>5</sup> Bill Bignell, *Mapping the Windmill. The Ordnance Survey in England*, Charles Close Society, 2013, p.viii.

<sup>6</sup> Oliver, *Ordnance Survey Maps: a concise guide for historians*, p.104.

<sup>7</sup> As well, Chris Fleet points out that the 25-inch is the most detailed scale for rural areas (and therefore, for the vast majority of mills in Scotland), even though the OS Large-Scale Town Plans at 1:1056 and 1:500 give more detail for some urban mills.

Library of Scotland to use the GB1900 data set<sup>8</sup> to build an interactive web portal for watermills in Scotland. This GB1900 Second edition 6-inch data set has been extensively cleaned and tidied by Joe Rose, a retired Canadian engineer, so that the point locators for mills in Scotland along with their various associated infrastructure (dams, lades, sluices etc – see below) all actually sit on the relevant feature. This data set is the “From Water to Steam project – Mills in Scotland”.<sup>9</sup> The relevant 25-inch and 6-inch sheets can be easily located for a particular mill or associated feature, including on the First edition, even though the starting data are the Second edition 6-inch data. First edition sheets can be viewed individually and mapped data can be viewed ‘Side-by-side’ from the Second edition mapping onwards. The cleaned data set of the “From Water to Steam project – Mills in Scotland” consists of more than 14,500 mills and mill-related infrastructure (*figure 1*). This number is clearly a major advance on the data used in an earlier study comparing the landscape settings of water mills in Scotland and England.<sup>10</sup> In that study, we found that the Ordnance Survey Gazetteer contains a total of 1050 locations in Scotland containing the words “mill”, “milton” and “miln” and 662 locations in England.

Before turning to OS 25-inch mapping of water mills, I provide a little background on water wheels that is important to the discussion that follows.



*Figure 1. Screen shot of the map showing locations of mill-related features in the GB1900 “From Water to Steam project – Mills in Scotland” data set. Key to dots: Blue – Mill; Red – Mill lade/ lead; Green – Mill dam; Mustard – Mill race*

*This and all other maps and plans in this paper are published by kind permission of the National Library of Scotland.*

<sup>8</sup> Paula Aucott, Chris Fleet and Humphrey Southall, ‘The GB1900 project – from the horse’s mouth’, *Sheellines* 111 (2018), 46-8.

<sup>9</sup> <https://geo.nls.uk/maps/mills/index.html#zoom=7&lat=56.6522&lon=-4.5247>

<sup>10</sup> Paul Bishop and Esperanza Muñoz-Salinas. ‘Tectonics, geomorphology and water mill location in Scotland, and the potential impacts of mill dam failure’, *Applied Geography* 42 (2013), 195-205. The comparison between Scotland and England reported in that publication will now be expanded in a new 42-month project with funding awarded to Bishop and Dr Adam Lucas (University of Wollongong) by the Leverhulme Trust.

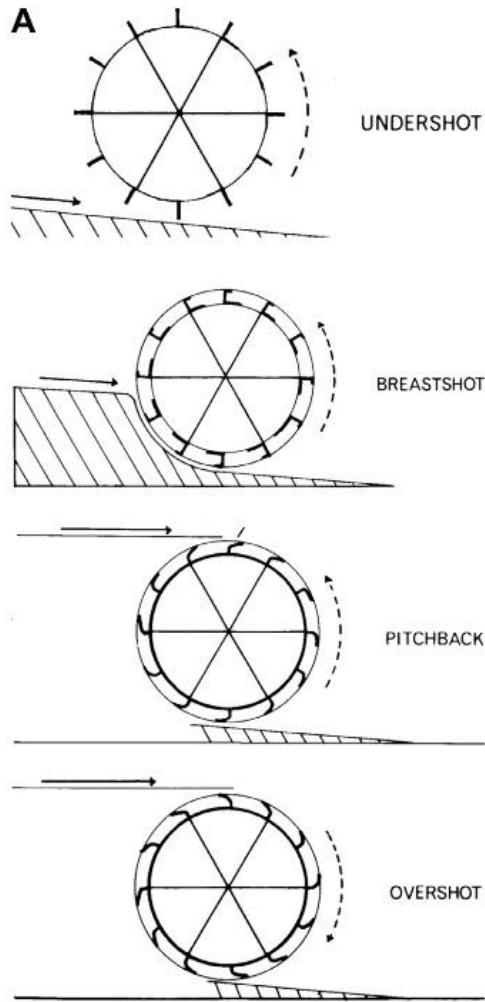


Figure 2 (left). Types of vertical water wheel, modified by the author from Figure 5 in John Shaw's *Water Power in Scotland*, John Donald, Edinburgh (1984). The undershot wheel has open-sided radial blades or vanes (also called floats, floatboards or paddles) against which the water flow turns the wheel. The others – breastshot, overshot and pitchback (also called backshot) – have sides to the vanes to form buckets and it is largely the weight of the water in those buckets that turns the wheel. The overshot wheel has a slight inefficiency in that the water leaving the buckets at the bottom of the wheel drains away (to the right here) against the direction of the wheel's turn (clockwise here).

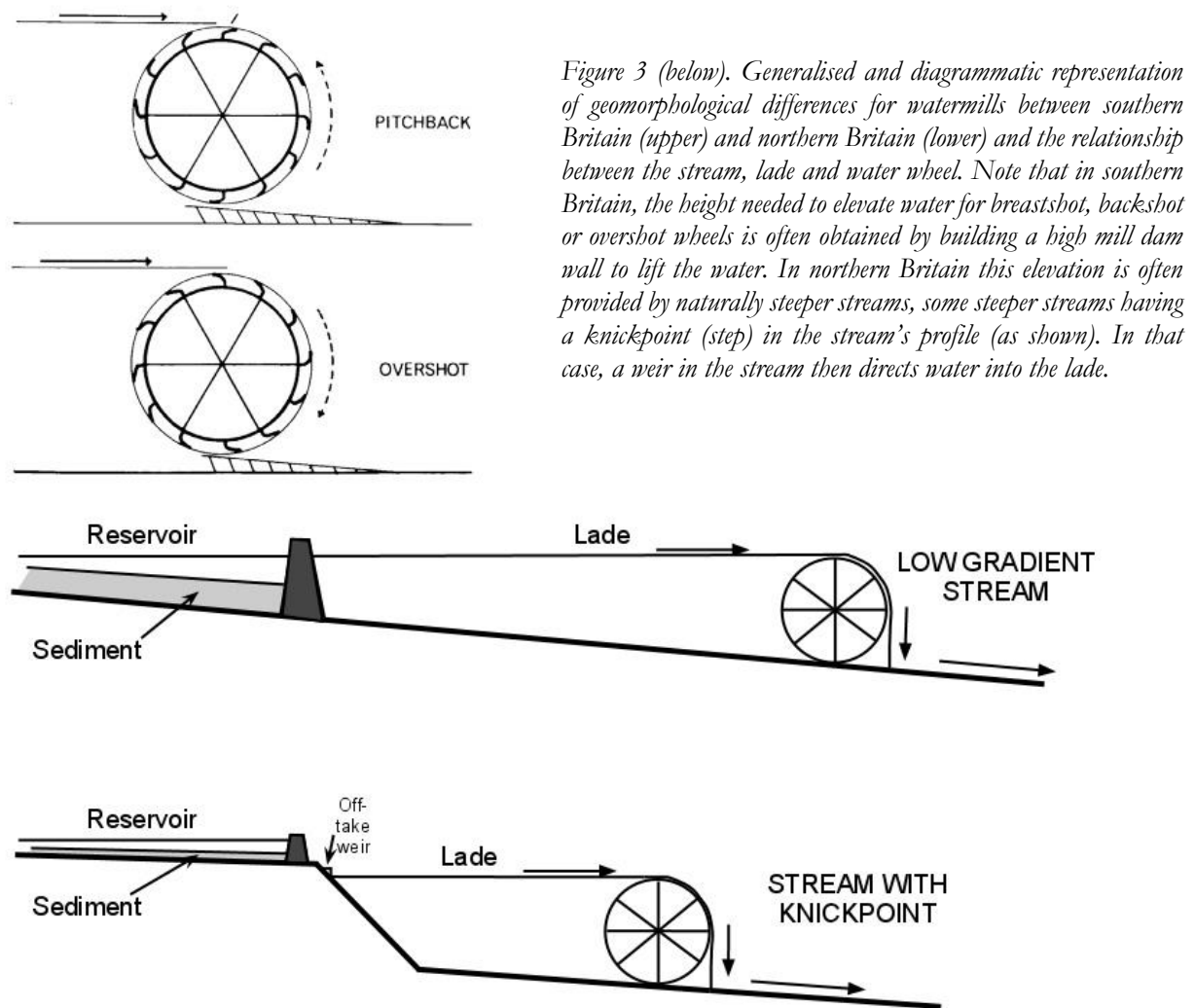


Figure 3 (below). Generalised and diagrammatic representation of geomorphological differences for watermills between southern Britain (upper) and northern Britain (lower) and the relationship between the stream, lade and water wheel. Note that in southern Britain, the height needed to elevate water for breastshot, backshot or overshot wheels is often obtained by building a high mill dam wall to lift the water. In northern Britain this elevation is often provided by naturally steeper streams, some steeper streams having a knickpoint (step) in the stream's profile (as shown). In that case, a weir in the stream then directs water into the lade.

### **Water wheels**

The vertical water wheels that drive water mills can have several configurations (*figure 2*). John Smeaton, the famous eighteenth-century civil engineer, published a series of experiments in 1759 that showed that delivering water part-way up the wheel (breastshot) or to the top of the wheel (overshot and pitchback [backshot]) provides at least double the power of the undershot wheel, where the water rushes by the bottom of the wheel, striking the blades or vanes. Thus the optimal site for a mill is one where water can be delivered some way up the wheel, and, for economy, via a channel – lade, lead, leat or race – that is as short a distance as possible to the mill from the water source. The glaciation of northern Britain with the attendant sub-glacial erosion and post-glacial isostatic rebound (uplift) mean that streams tend to be steeper in northern Britain and lades therefore generally shorter (*figure 3*).<sup>11</sup>

One of the aims of this exploration of watermill symbology is to assess whether water wheels have been represented in OS First edition 25-inch mapping and whether that representation contains information about the type of wheel. The siting of the mill in relation to its water source, and, as far as can be determined from OS mapping, the geomorphology of that water source if it is a river, are also relevant to a mill's particular technology.

### **The full mill system**

*Figure 4* shows the various elements of a watermill system. For some parts of the mill system there are terminological differences across the UK. For example, *Ordnance Survey Maps: a concise guide for historians* notes under “Mill race and mill stream” that ‘It is OS custom to write “mill race” to all water leading to a water mill and “mill stream” to the water leaving it. This custom will be followed unless it disagrees with local practice.’<sup>12</sup> This instruction is from 1963 and a 10 December 2020 email from Richard Oliver has noted that he does not know of any instructions in this regard earlier than 1963. The local practice in Scotland for the channel that brings water to the mill is generally ‘lade’ or ‘lead’ (though with some variations – see below).

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<sup>11</sup> Geomorphologists call a steep drop in the river bed elevation a knickpoint (like a cascade), which can be exploited in setting up a mill.

<sup>12</sup> *Ordnance Survey Maps: a concise guide for historians*, 3rd ed., p.104.



Figure 4a. First edition 25-inch map of Baldernock Mill and its associated features – mill dam, sluices, lade and the corn and saw mill buildings. (Stirlingshire sheet 32.2 (Baldernock) Surveyed 1860; Published 1863)

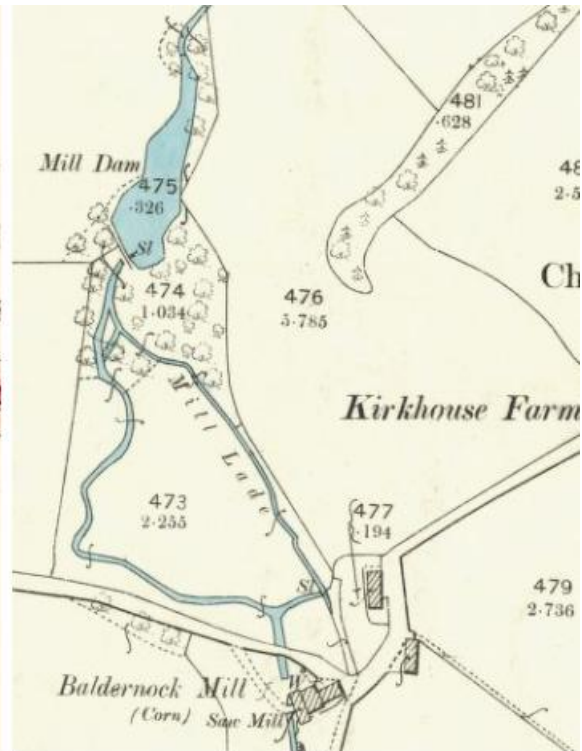


Figure 4b. Second edition 25-inch map of the Baldernock Mill set-up. The jetty projecting out from the dam wall is also shown on the First edition 6-inch mapping. This jetty presumably gave access to a shaft that controlled a screw valve (sluice – 'Sl') in the bed of the reservoir either for releasing water downstream and hence to the lade and/or for flushing sediment from the reservoir. (Stirlingshire sheet 32.2 (Baldernock; New Kilpatrick) Revised 1896; Published 1897)

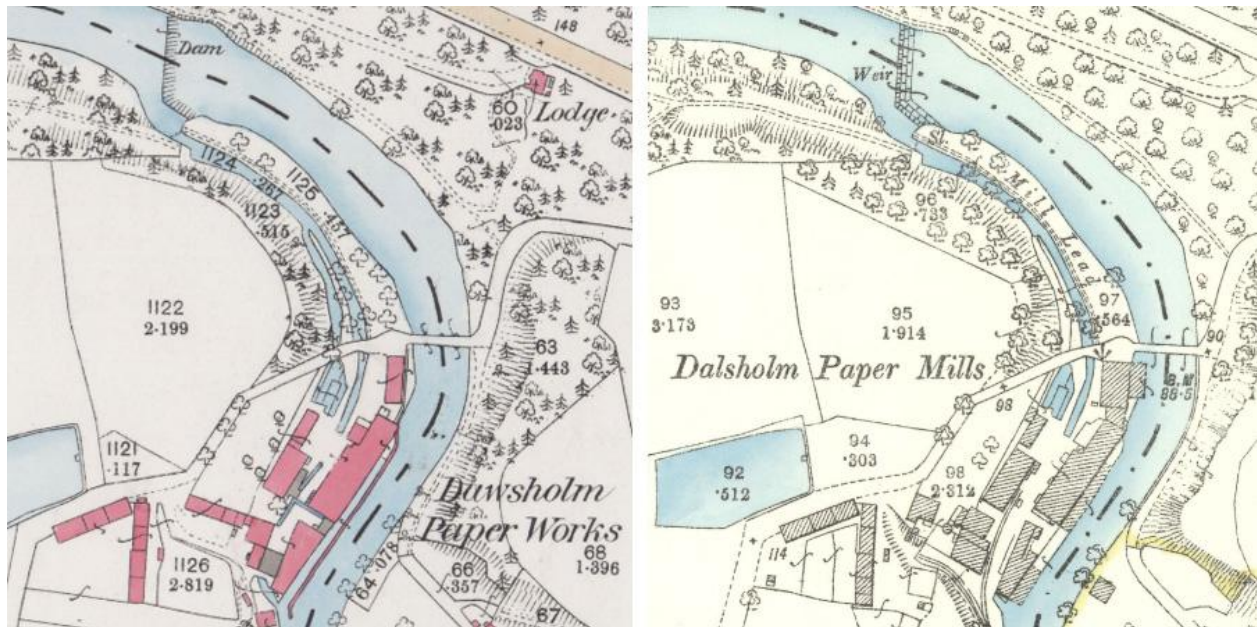


Figure 4c. Modern view downstream through the breach in the Baldernock Mill dam wall, showing two cast-iron pillars (centre right) that presumably supported the jetty from the dam wall

### ***The dam***

I take ‘dam’ to indicate a structure that holds back and stores water. It seems that mill dams in Scotland often filled overnight and water was then released throughout the day for the mill if there was insufficient flow from the river (particularly, say, in dry periods). For this reason, mill dams in Scotland, especially in the west, are generally small because rainfall and stream flow are reliable. The dam in the example in *figure 4* sits atop a knickpoint in the bed of the river and water is taken off the stream a little way down the face of the knickpoint (as in *figure 3 lower*).

In some cases in OS mapping, a structure labelled as a ‘Dam’ would normally be thought of as a weir to direct stream flow into the lade. In the example in *figure 5*, the ‘Dam’ so labelled in the First edition does not actually store water for mill operation and it has become a ‘Weir’ by the Second edition. Cowden Mill (NS 567 883) near Balfron has a ‘Dam’ labelled on the Endrick Water on the First edition and a ‘Dam’ and a ‘Weir’ both labelled on the Second.<sup>13</sup> The ‘Dam’ does not appear to act to store water, rather serving to direct water into a large artificial side channel (like a large lade) and the ‘Weir’ then directs the flow into the lade itself, controlled by a sluice.



*Figure 5. Dalsholm paper mill on the River Kelvin in Glasgow*

*Left: Dumbartonshire sheet 28.4 (Combined) Surveyed 1857 to 1860; Published 1893*

*Right: Lanarkshire sheet 1.13 (Cadder; Glasgow; New Kilpatrick) Revised 1893; Published 1896*

<sup>13</sup> See <https://maps.nls.uk/view/82905861#zoom=6&lat=9648&lon=8192&layers=BT>

### Weir

Dam or no dam, mills in Scotland powered by water from a stream usually have a weir directing stream flow into the lade, the channel to the mill. In the Baldernock example in *figure 4*, remains of such a weir that directed flow into the lade can be discerned<sup>14</sup> but it was presumably already too ruinous to be mapped when the First edition was surveyed. In that situation, the mill is a run-of-the river mill, reliant on water that flows naturally into the head of the lade.

These weirs in Scotland are generally low structures because, firstly and as noted above, weirs generally did not function for water storage, and, secondly, stream steepness means that only a relatively small elevation of the water surface is necessary to direct flow into the lade. The weir is usually labelled on OS mapping in Scotland (*eg figure 6*). In this not particularly systematic trawl of “From Water to Steam project” data, one example was found of a weir labelled as ‘Caul’, a Scots word for weir.<sup>15</sup>

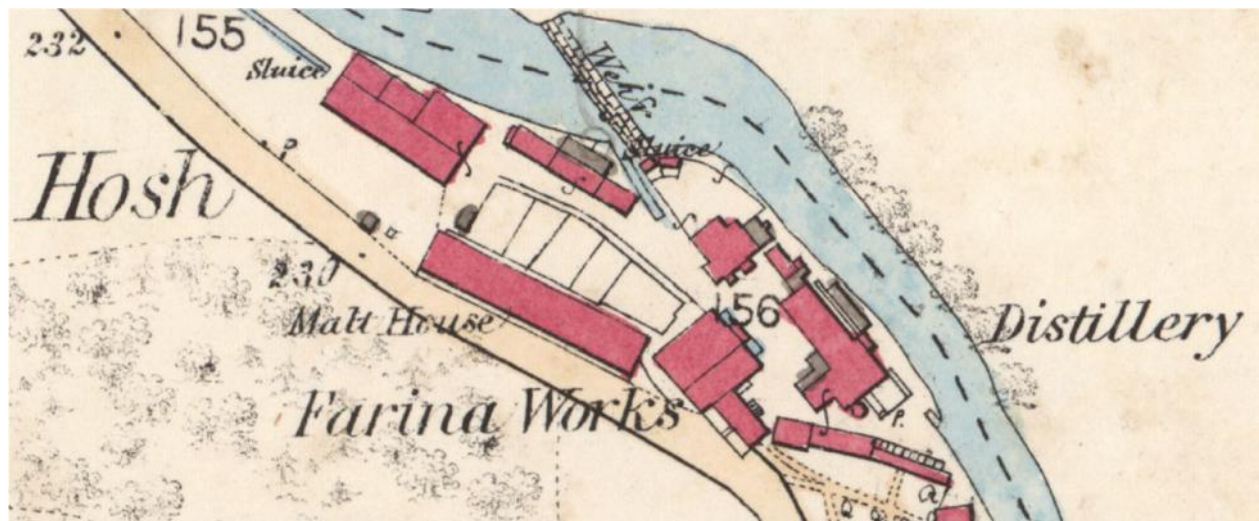


Figure 6. The water-powered Farina Works, showing the weir on the Turret Burn, near the locality of Hosh. (Perth and Clackmannanshire sheet 95.6 (Monzievaird & Strawn) Surveyed 1863; Published 1865)

### Sluices

The sluices regulate flow into, along and out of the lade. As far as I have seen, they are indicated only by a label and are not represented by a symbol. One sluice is at the upstream head of the lade, shown in the First edition (*figure 4a*) but not in the Second edition (*figure 4b*). It must have been present at the survey for the Second edition, however, because the short channel that is an integral part of a sluice, returning water to the stream when the sluice was closed, is shown.

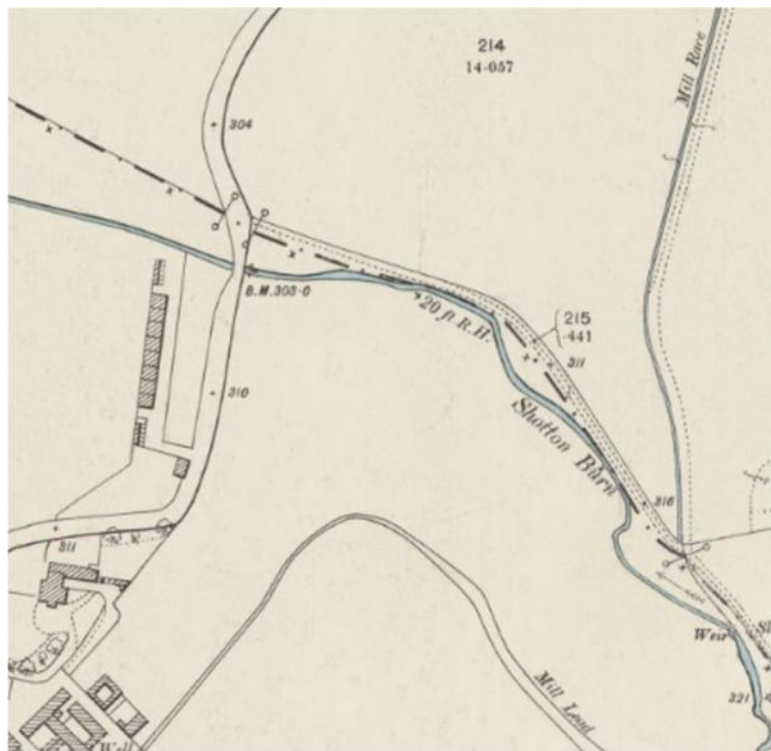
<sup>14</sup> Paul Bishop and others, ‘The character, volume and implications of sediment impounded in mill dams in Scotland: The case of the Baldernock Mill dam in East Dunbartonshire’, *Earth and Environmental Science Transactions of the Royal Society of Edinburgh* 101 (2010), 97-110.

<sup>15</sup> <https://maps.nls.uk/view/74947387#zoom=8&lat=7713&lon=9276&layers=BT>

A second sluice is found some way along the lade, generally close to the mill, and used temporarily to stop flow to the water wheel but retain water in the lade. This sluice, sometimes called a penstock, is labelled in both First and Second editions in *figure 4* and is also evidenced by a channel to return flow to the stream when the lade has been blocked by that sluice. Somewhere also close to the mill will be a heck (also called a ‘haik’ in Scotland), a screen to stop debris reaching the water wheel. At Baldernock Mill, the heck is immediately ‘down-lade’ of the second sluice.

### ***Lade***

The OS custom quoted above is to use “mill race” for water leading to a mill and “mill stream” for the water leaving the mill but local practice in Scotland is clearly to use ‘Lade’ or ‘Lead’ for the channel taking water to the mill. There are only ten examples of ‘Race’ in the GB1900 “From Water to Steam project – Mills in Scotland” data set (the mustard-coloured dots that might just be visible in *figure 1*); eight of these ten are in southern Scotland (in the Borders and Dumfries & Galloway). An interesting example of how local practice varied over short distances is shown in *figure 7*.



*Figure 7. Evidence of differing local practices in labelling the channels that take water to watermills either side of the border between Scotland (lower part of the figure: ‘Mill Lead’) and England (‘Mill Race’). Yetholm Mains farm is at bottom left. (Northumberland (Old Series) sheet 18.2 (Paston) Revised 1896; Published 1898)*

In some examples, which were not mapped at the 25-inch scale for the First edition, a ‘Mill Race’ is labelled on the new series of the 1890s but has become a ‘Mill Lade’ by the edition of 1909 (*figure 8*). The OS-specified label of “mill stream” for the water leaving a mill

has not so far been observed for any mills in Scotland. Indeed, I have seen only such channel actually labelled, as Mill Lade,<sup>16</sup> which seems reasonable given that it should be quite obvious what the channel is. If I have to name such a channel that leaves the mill, I am inclined to call it the ‘tail race’ or ‘outflow lade’. I have no justification for those terms except that ‘tail’ and ‘outflow’ seem to me to convey better than does ‘stream’ the sense of water leaving the mill.

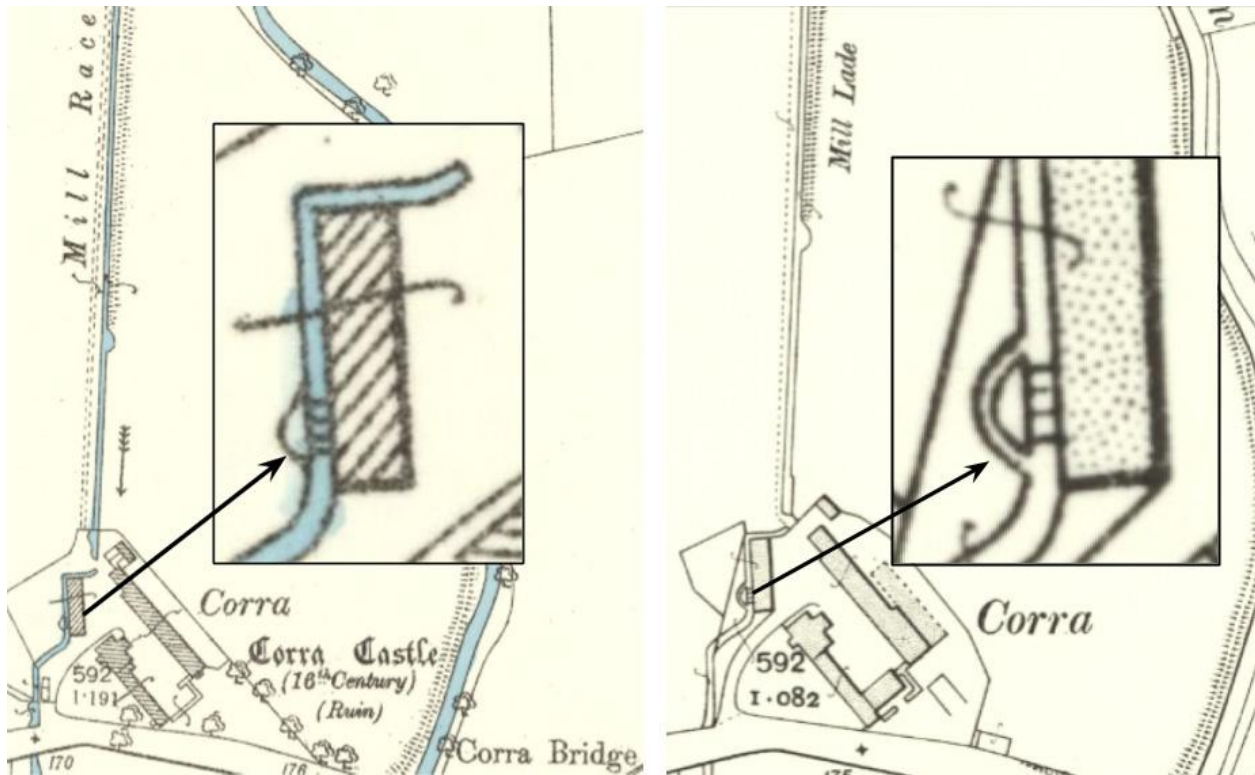


Figure 8. Corra Mill near Kirkgunzeon

Left: Mill Race (Second edition; this area not mapped at the 25-inch scale for the First edition) (Kirkcudbrightshire sheet 37.9 (Kirkgunzeon) Revised 1893; Published 1894)

Right: Mill Lade (edition of 1907) (Kirkcudbrightshire sheet 37.9 (Kirkgunzeon) Revised 1907; Published 1909)

Lades are generally represented by a pair of parallel lines, often with blue shading on First edition 25-inch mapping (and occasionally on Second edition). They may also be indicated by a single line that is identical to a field boundary. I assume that whether a lade is shown as a double- or single-line follows the OS prescription for mapping a channel on National Grid mapping and, Richard Oliver assumes, on County Series mapping.<sup>17</sup> That is, that “watercourses are shown by a single line if less than ... 2 metres (1:2500) [in width]; otherwise

<sup>16</sup> Garscube Mill on the Second edition Dumbartonshire sheet 28.4 (Combined)

<https://maps.nls.uk/view/74478365#zoom=7&lat=10485&lon=11176&layers=BT> The mill is also mapped on the Second edition Lanarkshire sheet 1.13 but the outflow lade is not labelled on that sheet.

<sup>17</sup> *Ordnance Survey Maps: a concise guide for historians*, 3rd ed., p.115.

by double lines.”<sup>18</sup> *Figure 4* shows the lade narrowing in this way close to the mill, downstream (south) of the second sluice. Richard Oliver notes in the email quoted above that the specification of 2 metres is from 1963 but the fact that 2 metres is practically the same as 10 links, give or take a few centimetres or inches, does suggest that the specification of 2 metres continues the earlier practice of 10 links being the minimum width for representing a channel by double lines.

A lade might be less than 2 metres wide for its whole length and so will be represented as a single line throughout. This can be confusing – is the single line a field boundary, a lade or both? – but the labelling of sluices and the path(s) of the single line help. *Figure 9* shows the two lint mills near Avonbridge with the various lades represented by single lines. That these are not simply field boundaries is confirmed by the ways in which the lines connect the dam to the two buildings labelled as mills and the sluices associated with those line connections. The line connecting the northern mill building back to the stream is also telling, but the lack of an outflow lade from the southern mill building (the larger building to the east of the dam) and the fact that it seems that not all sluices have been labelled could be confusing.



*Figure 9. The two lint mills at Linn near Avonbridge. (Stirlingshire sheet 35.8 (Slamannan) Surveyed 1860; Published 1862)*

Not all lades are channels. Some lades are piped (*figure 10*) and sometimes the lade is underground (*figure 11*). In the latter case, Canmore, Historic Environment Scotland’s catalogue to online records of archaeological sites, buildings, industry and maritime heritage across Scotland, reports the “later piping of the lade”.<sup>19</sup>

<sup>18</sup> *Ordnance Survey Maps: a concise guide for historians*, 3rd ed., p.115.

<sup>19</sup> <https://canmore.org.uk/site/128360> (consulted 18 November 2020)



Figure 10. The threshing mill at Chapel farm near Dunscore, Dumfriesshire

Top left: First edition 25-inch showing lade as represented by a single line (narrow channel?) (Dumfriesshire sheet 40.9 (Dunscore) Surveyed 1856; Published 1856)

Top right: Second edition with the same representation of the lade (Dumfriesshire sheet 40.9 (Dunscore; Glencairn) Revised 1899; Published 1899)

Lower left: the threshing barn with overshot water wheel driven by water from the pipe at upper left

Lower right: view along the piped lade towards the water wheel

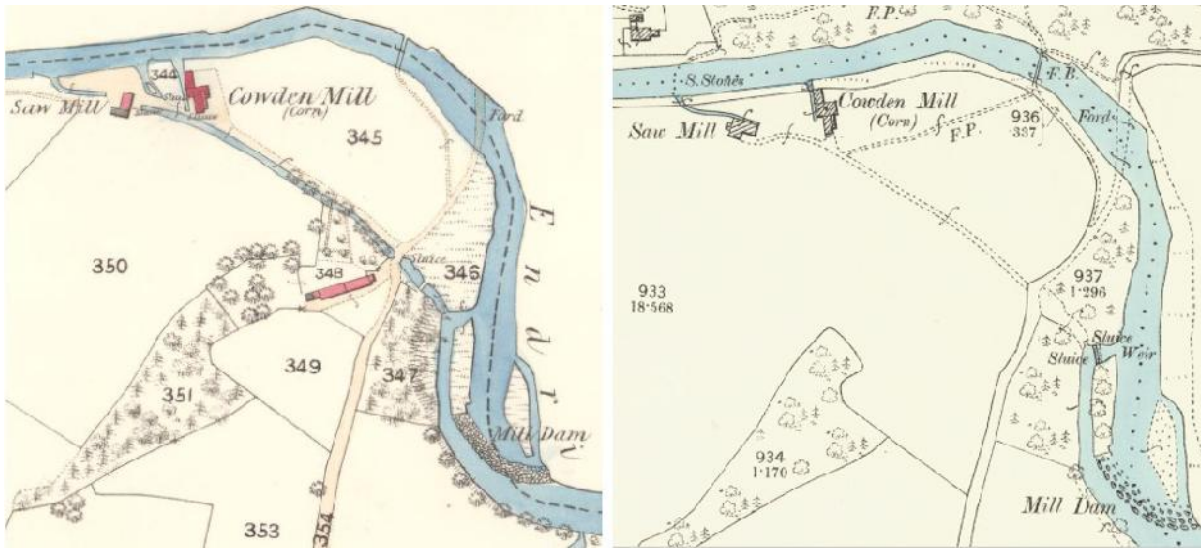


Figure 11. Cowden Mill on the Endrick Water near Balfon

Left: First edition 25-inch showing the lade (Stirlingshire sheet 21.2 (with extension 15.14) (Killearn) Surveyed 1861; Published 1863)

Right: Second edition 25-inch with the lade no longer visible (Stirlingshire sheet 21.2 (Balfon; Killearn) Revised 1896; Published 1898)

It is also noteworthy in *figure 9* that the northern mill building is adjacent to the drop in the bed of the stream marked by the rock exposed in the stream bed. The siting of the mill is exploiting the drop in water level so that water can be brought by the lade to some way up the water wheel (as in *figure 3, bottom*). On larger and more perennial streams in Scotland, where there is generally always enough flow and a dam is not needed, a mill can be sited beside the drop in the river bed (ie, beside the knickpoint). The mill exploits the drop in the river bed across the knickpoint by being located on the drop itself, thereby avoiding the costs of one or more of the dam, weir and/or lade (*figures 12 and 13*).

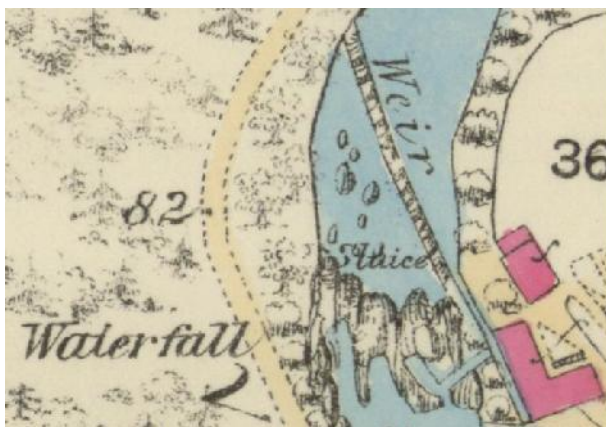


Figure 12. Carlonan Mill (Carloonan on the Second edition) near Inveraray. The mill building sits astride the drop in elevation that is marked by the bedrock knickpoint in the river, here labelled explicitly as a Waterfall. The weir and (unlabelled) lade show that flow is to the south. (Argyllshire and Buteshire sheet 133.1 (Inveraray) Surveyed 1870; Published 1871)



Figure 13. The Sandhill Craigs knickpoint on the White Cart River in Paisley with mills on both banks astride the drop in elevation; flow is to the north. The left-bank mill has a narrow unlabelled lade. The wide, labelled lade to the right-bank mill might have been constructed by widening a natural structure in the bedrock that crops out in the knickpoint. (Renfrewshire sheet 22.2 (Abbey, Middle Church, High Church) Surveyed 1858; Published 1860)

### ***The water wheel***

The role of the water wheel in generating the power needed for a mill's operation and whether the type of wheel can be discerned, or at least inferred, from OS mapping, make water wheel symbology an important consideration. The water wheel is occasionally labelled by OS (*figure 14*) but mostly is not. And it was unclear to me at the start of this exercise whether the wheel was ever represented. In fact, I began to look at this issue of water wheel symbology only when I noticed a water wheel apparently represented for the abandoned and unroofed Townhead Paper Mill near Kilsyth (*figure 15*). That wheel apparently 'hung down' into the channel and was therefore presumably undershot.



*Figure 14. Three examples of labelling of the water wheel on First edition 25-inch maps*

*Left: near Loch Winnoch (Renfrewshire sheet 15.1 (Lochwinnoch) Surveyed 1856; Published 1858)*

*Middle: Plean (Stirlingshire sheet 24.2 (St Ninians) Surveyed 1859; Published 1862)*

*Right: Larbert (Stirlingshire sheet 24.14 (Combined) Surveyed 1859 to 1860; Published 1891)*



*Figure 15. Townhead paper Mill in First edition 25-inch mapping. It is assumed that the ladder-like symbol on the eastern edge of the channel represents the water wheel. (Stirlingshire sheet 29.9 (Kilsyth) Surveyed 1859; Published 1862)*

Before I explore water wheel symbology further, I note that it is reasonable in some situations to infer what type of wheel was installed. For the mill in *figure 16*, for example, the wheel was almost certainly undershot. Flow in the adjacent Luggie Water is from right to left, and the outflow lade is still present. The inflow lade has been infilled by sediment from floodwaters flowing into that lade, in the same way that the upstream end of a meander cutoff (oxbow) is more quickly filled with sediment than the downstream part of the cutoff.<sup>20</sup> *Figure 17* shows that there is no knickpoint in the stream, which meanders within its floodplain (a setting that can be inferred from the OS mapping). The stream does not have a steep reach and so the water must have come to the water wheel at a relatively low elevation, presumably having been 'lifted' to the inflow lade by a weir, now long gone. The water could not have

<sup>20</sup> F. Douglas Shields and Steven Abt, 'Sediment deposition in cutoff meander bends and implications for effective management', *Regulated Rivers: Research & Management* 4 (1989), pp.381-96.

been brought to any appreciable height on the wheel which therefore was almost certainly undershot. Basic geomorphology and OS First edition mapping enable these conclusions.

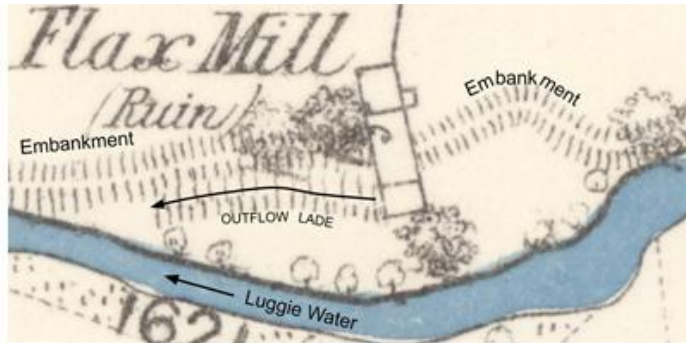


Figure 16. Annotated OS first edition 25-inch mapping of the ruined flax mill at Drumsbanty, on the Luggie Water upstream of Kirkintilloch. (Dumbartonshire (Det.) sheet 25.10 (Kirkintilloch) Surveyed 1859; Published 1862)



Figure 17. Oblique aerial view of the Drumsbanty site with the ruined mill diagrammatically superimposed and the Embankment and Outflow Laze indicated. (Photo courtesy of Edward Z. Smith)

In a similar vein: for the mills in *figure 9*, it was noted that the northern mill sits beside the rocky drop in the river bed (a knickpoint) and given this fall in elevation through the mill building it is likely that its water wheel would have been at least breastshot and perhaps overshot or backshot. On the other hand, the southern mill in *figure 9* does not seem to be associated with any drop in the river bed, being beside the flatter reach upstream of the knickpoint. Thus, a first 'guess' would be that that mill is powered by an undershot wheel.

Should we expect the water wheel to be indicated on OS maps? In some mills, the wheel was often completely internal and so there can be no indication as to the wheel (*figure 18*). Where the wheel is hidden beneath a launder, it might also be expected that the wheel will not be indicated. *Figure 19* shows the situation at Baldernock Mill (see also *figure 4*). This is a backshot (pitchback) wheel with the water coming to the wheel via the launder, the black timber trough which is the same width as the wheel. A sloping trapdoor in the floor of the launder turns the water back as it falls from launder to wheel, driving the wheel clockwise in this view. The water wheel is hidden by the launder. Moreover, the wheel was historically enclosed by timber cladding.<sup>21</sup> In some situations, but not in this Baldernock example, OS does indeed indicate by the colour of shading that a timber building is attached to the end of a mill building, possibly enclosing the wheel.

<sup>21</sup> See <https://canmore.org.uk/collection/643567> and <https://canmore.org.uk/collection/643568> (consulted 22 November 2020)



Figure 18. Examples of mills with internal wheels, as indicated by lades passing into the centre of the mill buildings

Left: Cromwellpark Mills on the River Almond near Pitcairngreen Perthshire. (Perth and Clackmannanshire sheet 85.15 (Redgorton) Surveyed 1864; Published 1865)

Right: Cotton Mill in Milngavie Dunbartonshire. (Stirlingshire and Dunbartonshire sheet 23.8 (New Kilpatrick) Surveyed 1860; Published 1863)

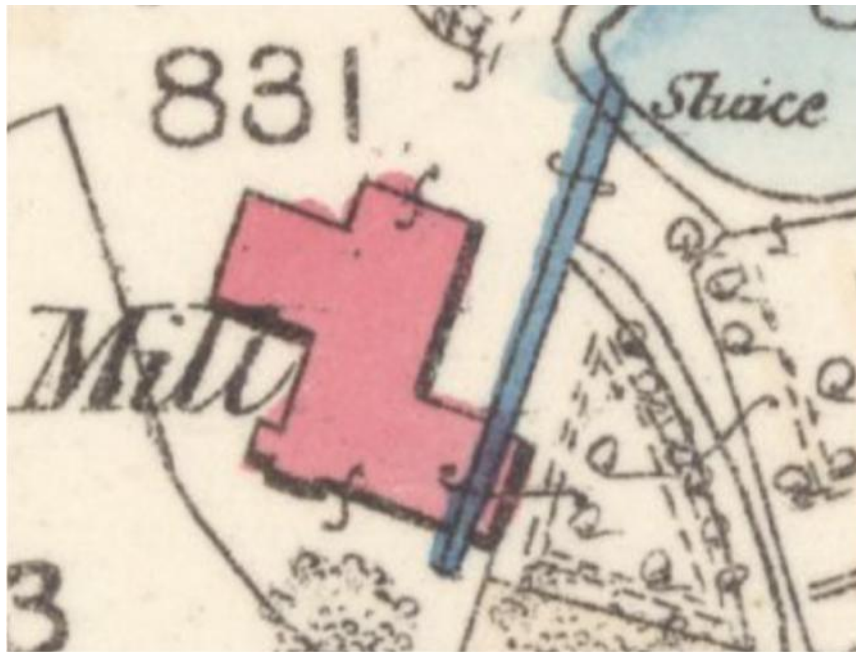


Figure 19. Left and centre: Baldernock Mill showing the relationship between the launder and the water wheel  
Right: First edition 25-inch mapping of Baldernock Mill. (Stirlingshire sheet 32.2 (Baldernock) Surveyed 1860; Published 1863)

For an overshot wheel, the visibility of the wheel depends on the arrangement with the lade. For the overshot wheel at Chapel (*figure 10*), where a pipe delivered water to the wheel, the wheel should be mappable. The Second edition map in *figure 10* shows a small rectangle where the wheel is, suggesting some attempt to indicate a structure. On the other hand, it would be difficult for the OS to represent the wheel in the more usual overshot situation of a launder projecting out to beyond half-way across the wheel. This set-up leaves only a part of the outer 'half' of the wheel visible, as in *figure 20*, for which the OS does not attempt to represent the wheel. One wonders if the representation in *figure 21* is the OS's attempt to represent the situation of a backshot wheel of the type shown in *figure 19*, with a launder hiding the wheel, or perhaps the situation of an overshot wheel.



*Figure 20. Overshot wheel at Gavin's Mill, Milngavie Dunbartonshire*



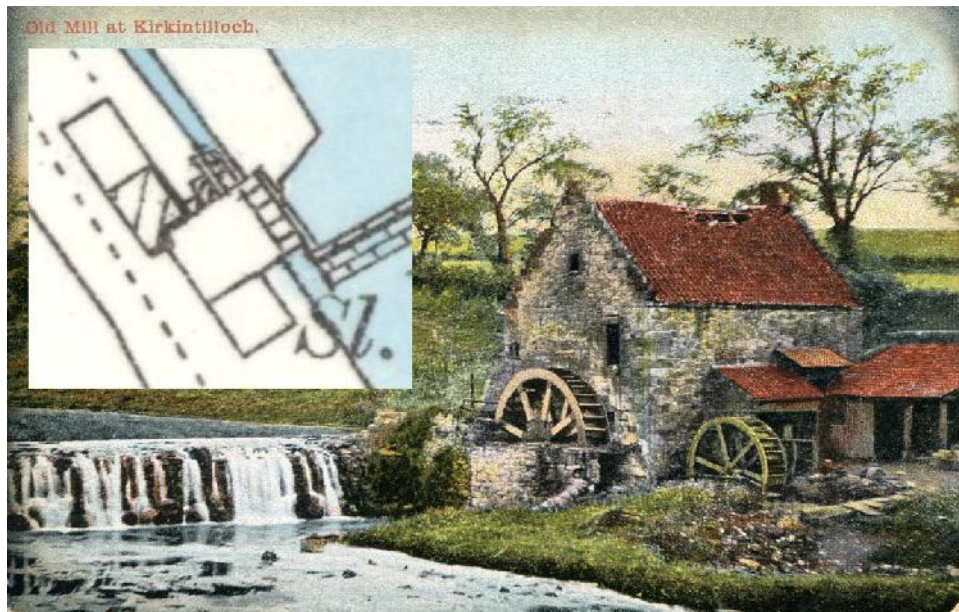
*Figure 21. Gardrum Mill, near Fenwick Ayrshire. (Ayrshire sheet 13.15 (Fenwick) Surveyed 1856; Published 1857)*

The most common symbol used by the OS when it does represent the wheel is a ladder-like symbol that is very similar to the symbol for outside stairs on a building (*figure 22*). That this ladder-like symbol does indeed represent the water-wheel is confirmed by the examples in *figure 23*.



*Figure 22. Bennet's House, Culross*

*OS First edition 25-inch map of Culross with the ladder symbol showing that multiple buildings have outside stairs. Bennet's House is the long, narrow north-south rectangular building with the stairs at its northern end, to the immediate west of the Town House. (Perth and Clackmannanshire sheet 142.8 (Combined) Surveyed 1859; Published 1893)*



*Figure 23a. Postcard postmarked 1906 of the Old Mill at Waterside near Kirkintilloch, Dunbartonshire, showing the main wheel and a subsidiary wheel (author's collection). The larger wheel would have been breastshot and the smaller most likely undershot, powered by the outflow from the first wheel.*

*Inset: Second edition 25-inch mapping of Waterside Old Mill. Note the two ladder-like symbols, one large and in the lade immediately below the weir, and a second, smaller one driven by the outflow from the first. The approximately diagonal line-work beside that smaller wheel is poorly executed shading to indicate the small stone-built lean-to beside the smaller wheel. (Dunbartonshire sheet 33.7 (Kirkintilloch) Revised 1896; Published 1898)*

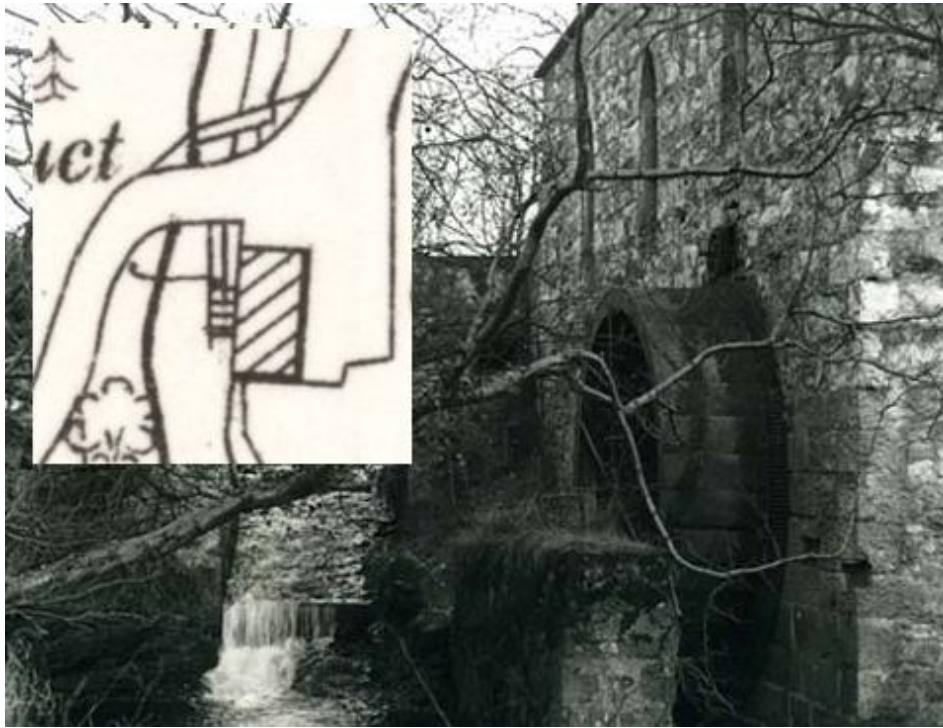


Figure 23b.  
 Photograph dated  
 1910 of Garshake  
 Mill Dunbartonshire  
 showing a low  
 breastshot wheel  
 (Courtesy of West  
 Dunbartonshire  
 Council)

*Inset: Second edition  
 25-inch mapping of  
 Garshake Mill  
 showing the lade  
 leading to the ladder-  
 type symbol, being the  
 water wheel.  
 (Dumbartonshire  
 sheet 22.2 (Cardross;  
 Dumbarton) Revised  
 1896 to 1897;  
 Published 1898)*

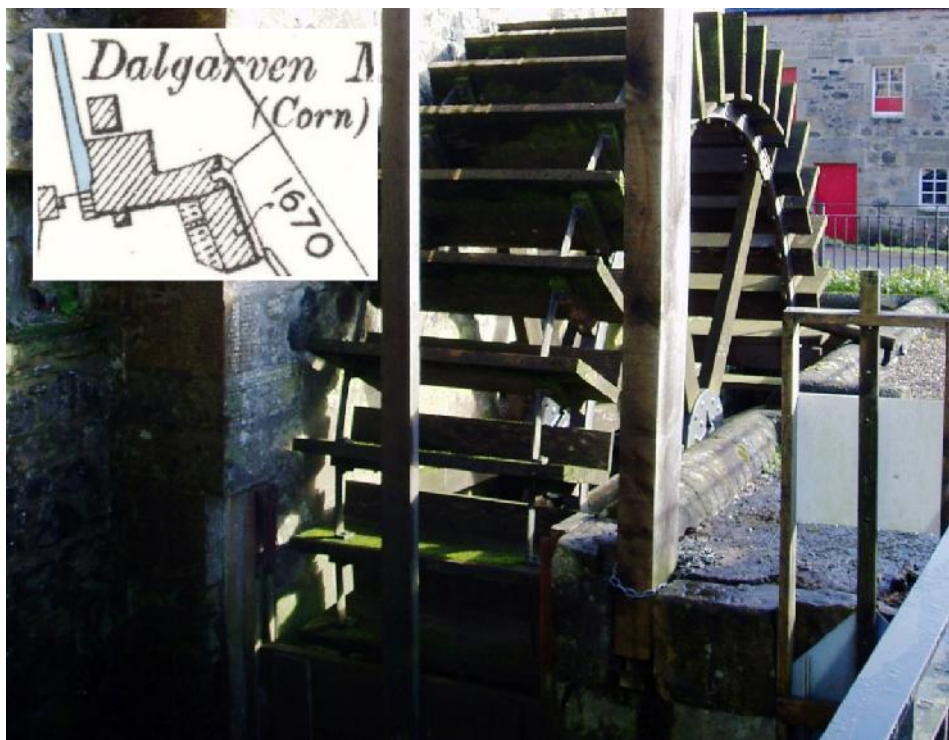
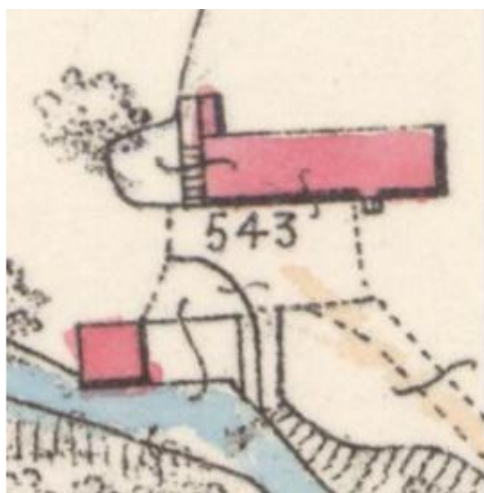


Figure 23c. A low  
 breastshot wheel at  
 Dalgarnen Mill  
 Ayrshire

*Inset: Second edition  
 25-inch mapping of  
 Dalgarnen Mill  
 showing the lade  
 leading to the ladder-  
 type symbol, being the  
 water wheel. (Ayrshire  
 sheet 11.12 (Dalry;  
 Kilwinning) Revised  
 1895; Published  
 1897)*

It would be of course possible to confuse the ladder-type symbol for a water wheel with that for outside stairs but the symbol's meaning should be clear, especially if a channel (lade) is also mapped. Corra Mill (*figure 8*) shows a ladder-like symbol that is clearly on the end of the building and fed and drained by channels (lades). Moreover, a lade to by-pass the wheel can also be discerned in the highlighted extract of the 1907 map in *figure 8*, as also in Kilmahew Mill, near Cardross Dunbartonshire, where the water wheel is represented by the ladder symbol (as confirmed by the lade coming in from the north and having a loop for bypassing the wheel) (*figure 24*). In *figure 25* the ladder-like symbol clearly represents stairs on the outside of the building. Further examples of the wheel symbol are given in *figure 26*.



*Figure 24. Kilmahew Mill, near Cardross Dunbartonshire, with the ladder symbol marking the wheel. Note the short set of stairs on the southern side of the mill building, also indicated by the ladder-like symbol (Dunbartonshire sheet 17.15 (Cardross) Surveyed 1860; Published 1862)*

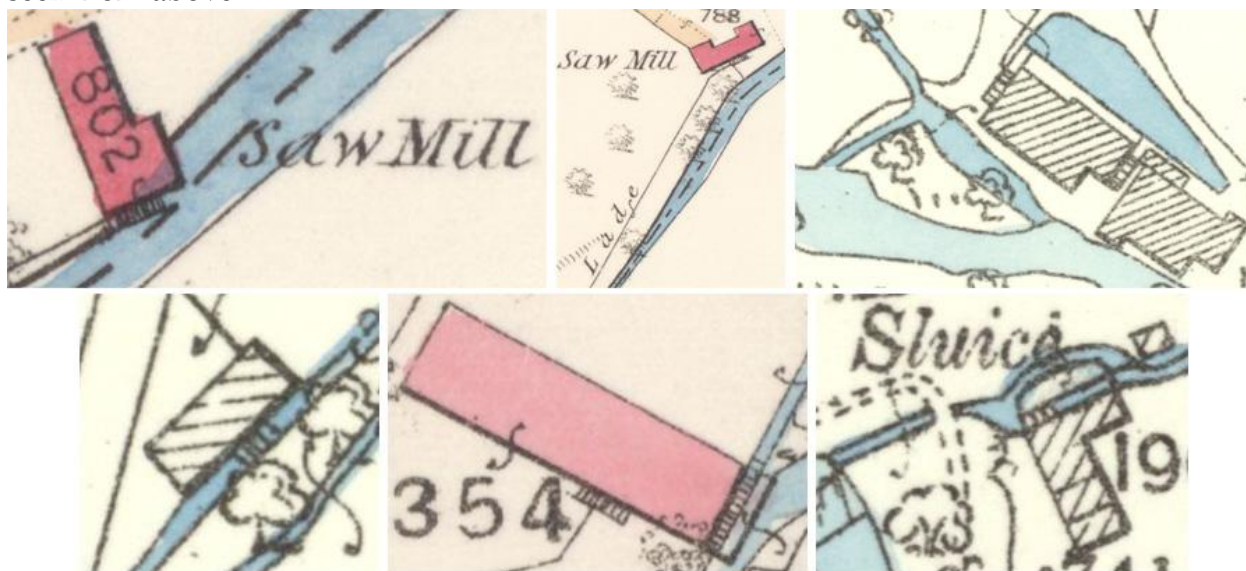


*Figure 25. Huntingtower Mill, near Almondbank Perthshire, with a set of stairs at the northern corner of the building at lower right, nowhere near the lade. It seems that the lade probably passes beneath the small building in the centre, which was therefore probably a structure enclosing the wheel. (Perth and Clackmannanshire sheet 97.3 (Tibbermore) Surveyed 1863 to 1864; Published 1866)*

A single example has been found of a somewhat unusual symbol to represent the water wheel (*figure 27*). Here the wheel is represented with the 'vaness' being shown in a perspective kind of way (getting closer together as you move away from the top of the wheel). In other words, this mapping symbol seems to be more 'pictographic', attempting to represent visually a three-dimensional image of the object from an overhead viewpoint (*figure 28*). The representation of the Malt Land wheel in *figure 27* is changed on the Second edition to the much more conventional ladder-type symbol.

A delightful example of the same representation is found in a plan from the papers of Robert Stevenson, the 'founding father' of the Stevenson civil engineer dynasty which is so

well known for the construction of lighthouses in Scotland.<sup>22</sup> This is on an 1814 plan of the Belton Waulk Mill with the mill and its water wheel depicted as if the roof of the mill was not present (*figure 29*). The representation of the Belton Waulk Mill wheel has that same sense of the water wheel being depicted not so much as by a symbol as by a representation of it as seen from above.



*Figure 26. Examples of OS representations of water wheels*

Top L to R: Saw mill in Croftamie Stirlingshire with water wheel apparently 'hanging down' into the Catter Burn but actually fed by water brought from a mill dam by a lade (Dumbartonshire sheet 15.9 (with inset 15.5) (Kilmaronock) Surveyed 1859; Published 1862); Saw mill in Croftamie Stirlingshire, a little further downstream, with water wheel fed by a lade from Catter Burn (Dumbartonshire sheet 15.9 (with inset 15.5) (Kilmaronock) Surveyed 1859; Published 1862); Maidenholm Forge near Dalbeattie Kirkcudbrightshire, showing two water wheels fed by short individual lades from the mill dam (Kirkcudbrightshire sheet 43.8 (Kirkgunzeon; Urr) Revised 1893; Published 1894)

Bottom L to R: Midtown of Urr Mill near Hardgate Kirkcudbrightshire (Kirkcudbrightshire sheet 36.10 (Crossmichael; Urr) Revised 1893; Published 1894); Milligs Mill, Helensburgh Dunbartonshire, with an apparently large wheel spanning the whole of the southeast end of the mill building (also shown this size on the Second edition). Note outside stairs on the southwest wall (Dumbartonshire sheet 17.5 (Row) Surveyed 1860; Published 1862); Spottes Saw Mill on Spottes Burn a short distance upstream of its confluence with Urr Water Kirkcudbrightshire (Kirkcudbrightshire sheet 36.10 (Crossmichael; Urr) Revised 1893; Published 1894)

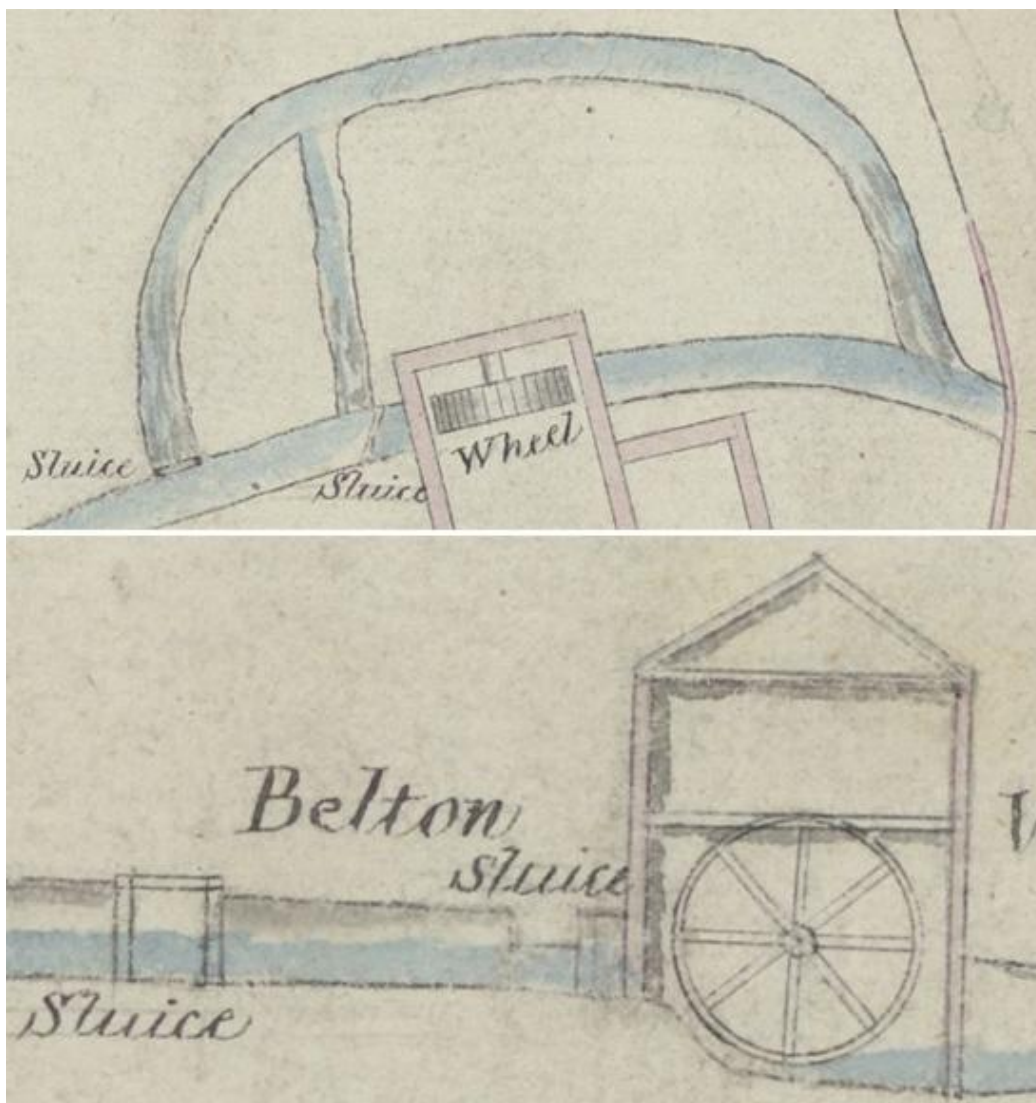


*Figure 27. First edition 25-inch labelling and representation of the water wheel at Malt Land on the River Aray a short distance inland of Inveraray (Ayrshire and Buteshire sheet 133.5 (Combined) Surveyed 1868; Published 1892).*

<sup>22</sup> <https://maps.nls.uk/projects/stevenson/about.html> The Stevenson papers have been digitised and put online at the National Library of Scotland.



*Figure 28. The water wheel at Gavin's Mill Milngavie illustrating how the vanes 'facing the camera' appear more widely spaced than those on the curve away from the camera. This is a side-on view of the wheel but the same effect operates from above.*



*Figure 29. Top: Part of the mill building and water wheel on Robert Stevenson's 1814 Plan of Belton Waulk Mill.*

*Bottom: Section through the mill building on Stevenson's plan, showing that the water wheel was a low breastshot wheel.*

The section through the mill in *figure 29* confirms that the water wheel was a low breastshot wheel. The Belton Waulk Mill was roofed but in the more common external wheel set-up, a breastshot wheel would be visible from above and not covered by a launder of the types shown in *figures 19* and *20*. A working hypothesis, then, is that where a water wheel is represented by a symbol, the wheel would have been undershot or breastshot. This hypothesis is supported by the examples in *figure 23*. However, known undershot or breastshot wheels that are not represented by OS by any wheel-type symbol include, for example, those at Preston Mill in Haddingtonshire (modern East Lothian) and Killin Mill in Perth & Clackmannanshire (modern Stirling). The latter sits astride the Falls of Dochart knickpoint.

A further issue in whether the wheel was represented relates to the size of the wheel and has been raised by Richard Oliver in his 10 December 2020 email. Richard wonders whether the “2 metres/10 links/6.6 feet minimum width ... noted for watercourses” might also apply in some way to water wheels. He speculates that water wheels not projecting as far as 10 links might not have been mapped (or supposed to have been mapped). Richard’s use of the word “projecting” implies the width of the wheel, being the horizontal dimension of most relevance to mapping. It is obvious that if a water wheel is mapped and at the same width as the lade, which is represented by a double-line, then the wheel must have been at least 2 metres/10 links/6.6 feet wide (e.g., *figures 8, 23, 24, 26*). This notion can be tested further by using the distance measuring function on the ‘Explore georeferenced maps’ feature on the NLS Maps website to measure the width (the projection) of a water wheel (albeit that the measurement of such small features, even on the 25-inch maps, must be subject to a fair degree of uncertainty). All water wheels on the Second edition 25-inch maps given above are indeed at least 2 metres wide when measured in this way, except for the smaller of the two wheels at the double-wheeled mill at Waterside, which is just 1 metre wide (*figure 23a*). Perhaps the novelty of having two wheels, one ‘below’ the other, prompted the representation of both wheels.

Thus, two issues emerge in whether the OS indicated a water wheel by a symbol: (i) whether the wheel was mappable in terms of being visible from above, and (ii) how wide the wheel was. The latter is important in terms of the water wheel’s power, given that it is fundamentally the weight of the water in the buckets of overshot, breastshot and backshot (pitchback) wheels that generates the power. An internal water wheel, generally in the basement of a mill buildings, in a wheel pit so that the water could be brought to some height up the water wheel, was often wide so as to generate the necessary power using a wheel with relatively few buckets (because of its small diameter). For example, images of the 25-foot-diameter breastshot wheel at Aberdeen’s Grandholm(e) Mill, which generated 200 hp, indicate that its width must have been close to its diameter.<sup>23</sup> These particular internal water wheels are not relevant to the issue of symbology and mapping but they demonstrate the importance of the water wheel’s width and hence the potential for OS mapping to elucidate the power generated by mapped external wheels.

### ***Discussion and conclusion***

Historically, the UK had thousands upon thousands of watermills, providing the power for a multitude of different industries, almost too numerous to list. These industries had differing power requirements and these different energy needs were an important determinant of the type of waterwheel and mill setup that was implemented. Or put another way, a particular locality’s geomorphology (river steepness) and hydrology (amount and reliability of river flow) determined what watermill-based industries could be established in that locality. A corn-grinding mill, powered by a waterwheel turning a heavy stone on a stationary nether stone (bed stone), required substantial amounts of power, particularly once all the added machinery of a fully developed 19th century grain mill – multiple pairs of stones, sack lifts, blowers, fans, etc – had been installed. Thus, while it is possible that Baldernock Mill was early powered by

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<sup>23</sup> <http://www.mcjazz.f2s.com/GrandholmMill.htm>

an undershot wheel,<sup>24</sup> it had converted to backshot by the time of mid-19th century OS mapping, when a saw mill was also being powered. Mills such as lint (flax) mills and threshing mills had lower energy requirements because of their lighter machinery. Thus, it is reasonable that a flax mill could be driven by an undershot wheel, as has been argued for the flax mill shown in *figures 16 and 17*; this mill's setting on a low gradient, floodplain river is thus understandable. If breastshot or overshot/backshot wheels were necessitated by the power requirements of a mill in an area with streams of only gentle gradients – such as the downstream reaches along floodplains – then the lade was long, having to take the water off the river far enough upstream so as to bring the water to part-way up the wheel. The set-up at Kilmahog textile mill, near Callender on the floodplain of a tributary to the River Teith, is one such example, with a long lade that brings the water to a low breastshot wheel.<sup>25</sup>

Overall, the OS mapping of watermills generally identifies all of the key features of the whole mill system but not necessarily for every mill. In some instances, it seems that the OS does not label all sluices but it is also noteworthy that the OS records details such as the jetty projecting out into the dam in *figure 4b*, along with its labelled sluice, thereby informing our understanding of the operation of the whole system. Representing a lade by a single line can be ambiguous but considering such mapping within the context of the mill and its water supply system generally resolves such ambiguities.

The wheel symbology is perhaps the most interesting issue in OS mapping of watermills. The importance of knowing the type of waterwheel is that it informs our understanding of the spatial distribution of water milling technology (ie., whether more powerful wheels were regionally concentrated) as well as the ways in which the Scottish situation exploited Scotland's particular river geomorphology (generally steeper rivers) and hydrology (generally more reliable stream flow). And whether the representation of a water wheel indicates that the wheel was wider than 2m and therefore potentially more powerful certainly deserves more attention.

It is so far unclear as to whether the appearance of a water wheel symbol on the Second edition, when a water wheel is not indicated on the First, signals a change in the operation of the mill (from, say, an overshot wheel or one that was internal at the time of First edition mapping to an external backshot or breastshot wheel). I think it more likely that the wheel set-up has not changed between the First and Second editions and that a decision was taken to represent the wheel on the Second edition. Garshake Mill (*figure 23b*) is a case in point. The First edition mapping<sup>26</sup> shows, in effect, the same lade as is present in the Second edition mapping (and now) and a rectangular shape coinciding with the wheel pit. I think the wheel was simply not represented on the First edition. Lower precision in mapping, with subsequent improvements, is not restricted to the First edition. The poor representation of the lade by-passing the wheel in the Second edition mapping of Corra Mill (*figure 8 left*) is corrected in the mapping for the edition of 1907 (*figure 8 right*).

<sup>24</sup> Paul Bishop, 'A rural water mill in Baldernock, East Dunbartonshire', *Vernacular Building* 42 (2019), pp.77-96.

<sup>25</sup> <https://maps.nls.uk/view/74956872#zoom=6&lat=3717&lon=13017&layers=BT>

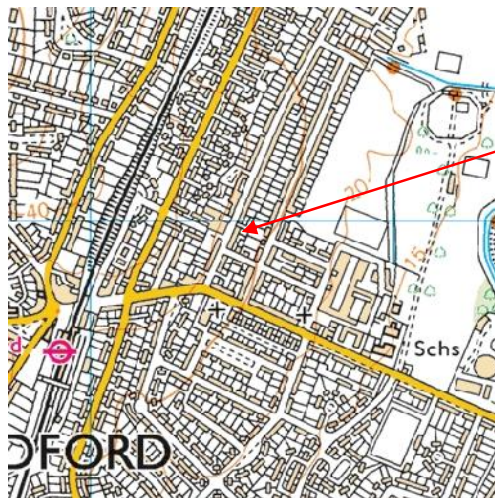
<sup>26</sup> <https://maps.nls.uk/view/74941039#zoom=8&lat=3392&lon=15579&layers=BT>

First edition mapping is evidently more variable in its symbology, which seems to become more standardised by the Second edition, often adding more detail and the ladder-type symbol for the water wheel. It is clear that OS mapping of watermills forms a rich seam that will repay further exploration, in terms of both OS symbology and the details of individual mills and their operation, and also of mills by region.

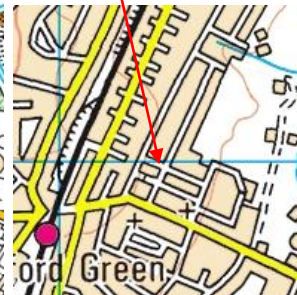
### ***Acknowledgements***

Joe Rose's work in 'cleaning up' the GB1900 data for this mills work has been a gargantuan effort and is much appreciated. I also thank Chris Fleet of the NLS Maps Library for his continuing support and help, as well as PhD student Iara Calton for her thoughts and insights on water mills. Richard Oliver and Chris Fleet provided very helpful advice on the first draft of this paper, for which I am grateful. I thank all mill and land owners for access to their property. I am especially grateful to Crawford Currie for ongoing discussions about Baldernock Mill and to Archie McConnel for kindly arranging access to the Chapel threshing mill. I thank Edward Z Smith for the oblique aerial image in Figure 17.

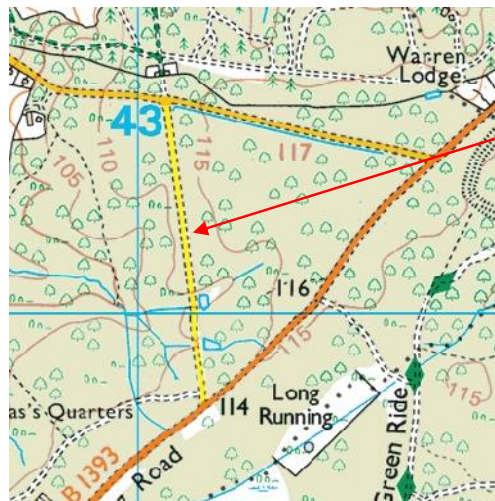
### ***Unreliable Explorers!***



*Bowland Road  
(TQ 413920)*



*Lodge Road  
(TL 431001)*



The Blackmore story (*Sheetlines* 119,43) showed how *Explorer* and *Landranger* maps differed in their depiction of that Essex village.

The examples on the left, (all taken from current online OS maps) show *Explorer* mapping that is considerably out-of-date. In both cases, the *Landranger* shows the true situation on the ground, as it is and has been for many years.

Both examples are in the vicinity of the London / Essex border. Bowland Road appeared on the 1986 revision of sheet 177, whilst Lodge Road was de-surfaced and reverted to a woodland track about twenty years ago.

***John Davies***

## ***One-thousandth of an acre: the measurement of areas***

***Chris Higley***

David Archer, as always, provided an elegant *musings* in *Sheetlines* 115. In it he discusses the acreages of parcels of land, which were for many years shown to a heroic three decimal places on OS 1:2500 plans (Figure 1).

Seymour notes that in 1959 automated methods of computation were trialled and it was decided in future to round parcel areas to two decimal places rather than three. While this was notionally to suit the new equipment, he admits, 'the value of the third figure had always been doubtful'.<sup>1</sup> This raises two

questions. Why was the third figure ever used and why, given that it was known to have uncertain validity, did its use continue for so long?

Areas were not calculated by the surveyor on the ground but instead were computed from the plan after field boundaries had been drawn. The method used looks back to the ancient open field system of agriculture. If a field is divided into strips one chain wide, a strip one furlong long makes up a 'perfect acre'.<sup>2</sup> The area of the field in acres can therefore be found by simply adding up the lengths of all the strips in furlongs.

We can divide a parcel into strips on paper by laying over the plan a sheet of tracing paper or acetate ruled with parallel lines a scale distance of one chain apart (figure 2).

In practice the 'trace' is ruled in both directions to form a grid of squares, so we could estimate the area of the parcel by counting the number of squares which fall within it. Far better is to use a 'computing scale' to sum the lengths of parallel strips.

Palmer describes this as 'a beautiful and simple contrivance, invented by an

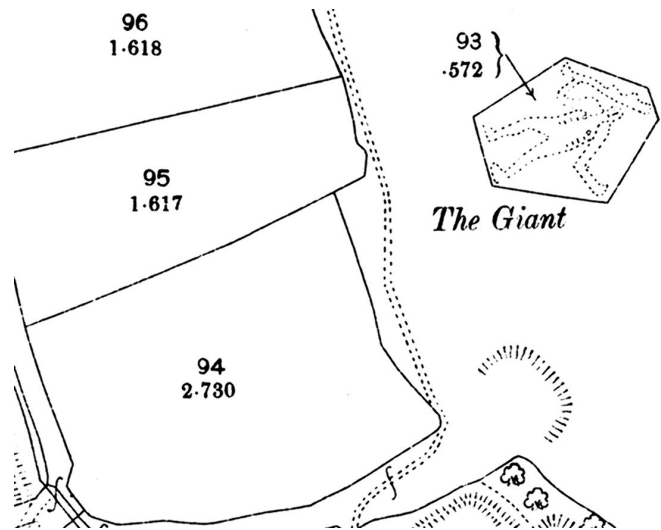


Figure 1: 1:2500 plan showing parcel areas in acres

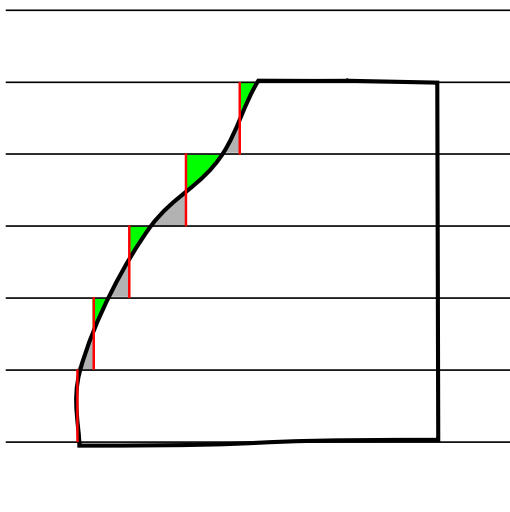


Figure 2: A parcel divided into strips

<sup>1</sup> W A Seymour, *A History of the Ordnance Survey*, Folkestone: Wm Dawson and Sons Ltd, 1980, p304.

<sup>2</sup> 22 yards = 1 chain; 10 chains = 1 furlong; 8 furlongs = 1 mile. 1 acre = 4840 square yards or 4046.856 m<sup>2</sup>. The acre was historically divided into 4 roods, and each rood into 40 perches.

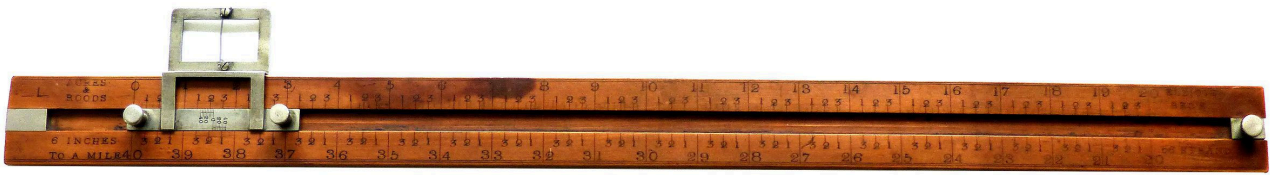


Figure 3: Computing scale for use on a six-inch plan

*employé* of the department'.<sup>3</sup> My thanks to David Archer for the loan of a typical computing scale (*figure 3*).

As can be seen, the instrument looks rather like a slide rule. This example is graduated for use on a six-inch plan.

The cursor is set to zero and the scale laid along the first strip to be measured, with the index wire placed over the left-hand end of the strip. The exact starting position is estimated by a 'give and take method', as shown by the red lines in *figure 2*: the grey areas omitted from the calculation are balanced by the additional green areas included.

Holding the computing scale firmly in place, the cursor is moved along the scale until the wire is over the right-hand field boundary. Without adjusting the cursor, the scale is moved down to the next strip and the operation repeated until



Figure 4: Scale measuring acres, roods and perches

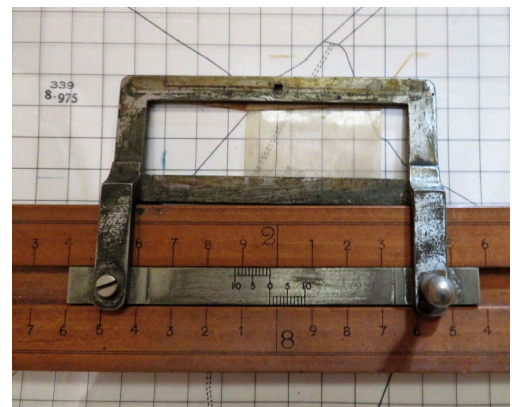


Figure 5: OS scale measuring acres and decimal parts of an acre

the lengths of all the strips covering the field have been added together. The total area is then read directly from the scale. As shown in *figure 4* the scale is graduated to give a reading in acres, roods and perches. Decimal parts of a perch may be estimated by eye.<sup>4</sup>

By using different graduations on the scale, we can read the area of the parcel in any units we like. I am very grateful to John Wilks for *figure 5* and for confirming that, up to the mid-1960s, Ordnance Survey used traces with a 20m grid and computing scales like the one shown. This gives a direct reading in acres,

<sup>3</sup> Captain H S Palmer RE, *The Ordnance Survey of the Kingdom*, London: Edward Stanford, 1873. Seymour records that the sapper who invented the method received a reward of 6d a day extra pay for the remainder of his service.

<sup>4</sup> If the size of the parcel exhausts the capacity of the upper scale, the cursor may be moved back from right to left using the graduations on the lower half.

tenths of an acre and hundredths of an acre without further calculation. Again, the third decimal place could be estimated by eye.

From personal experience, John goes on to say, 'This method proved to be very accurate ..., however it was very time consuming.' This echoes Maling's commendation that scale and trace was so reliable 'in skilled hands' that it remained the only method of measuring areas on the basic scale Ordnance Survey maps for more than a century.<sup>5</sup>

However accurate the method used, there are problems inherent in any procedure that calculates parcel areas from the plan. An acre is 4840 square yards or, as some of us were taught at school, ten square cricket pitches. Hence .001 of an acre is tiny, 4.84 sq. yds., one-tenth of a square cricket pitch or about 4m<sup>2</sup>. Just because the third decimal place can be estimated from the computing scale reading, it does not mean that it is valid to do so.

Consider the parcel area of 4.370 acres given as an example in the marginal note quoted in David Archer's *Kerry Musing*. We may assume that this is a square field. Palmer, describing the scale and trace method in 1873, notes 'In consequence, however, of the daily expansion and contraction of the paper, absolute accuracy can seldom be attained, and a small percentage of error, about 0.2 per cent is allowed'. For our field, this amounts to a potential error in the calculated area of a little over 0.008 acres.

As well as this, the plan will only be measured by human eye to an accuracy of, at the very best, 0.1mm. We get a similar error in the parcel area if we assume that the measurement of just one side of the field is out by this amount, equivalent to  $\pm 0.25\text{m}$  on the ground.<sup>6</sup>

Separately and together these calculations show that the third decimal place in the area measurement is essentially meaningless.

But this is not the end of the difficulties. We also have to consider that small irregularities in the field boundary will not be shown on the plan; hedges and fences are shown as having zero width, etc, etc, ...

Rob Wheeler makes the very valid point that as land surveyors were accustomed to quoting areas in perches (and sometimes fractions of a perch), customers would not have been happy if Ordnance Survey had shown parcel areas with less precision than this.<sup>7</sup> The computing scale could be read to one-thousandth of an acre and consequently OS would be under strong pressure to use that third decimal place.

Also, 1:2500 County Series plans measured 1½ miles by 1 mile and hence each covered an area of 960 acres. The general public are not comfortable with rounding errors: OS 'adjusted' some parcel areas after computation so that the total of all parcel areas on each sheet came to exactly 960 acres. This fudging would have been less apparent if the third decimal place was available, rather

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<sup>5</sup> D H Maling, *Measurements from Maps*, Pergamon, 1988.

<sup>6</sup> J B Harley, *Ordnance Survey Maps, a descriptive manual*, Southampton: Ordnance Survey, 1975, confirms that  $\pm 0.25\text{m}$  is, in any case, a good deal smaller than the surveying error regarded as acceptable on 1:2500 plans.

<sup>7</sup> Private communication.

than changes having to be made to the second.

The plan maps the ground as if it were level. Suppose that our field slopes at an inclination of 1 in 20. This means that field boundary running up the slope will actually be slightly longer on the ground than implied by the length of line representing it on the plan. Not a huge amount, but enough to increase the parcel area from 4.370 acres on the plan to 4.375 acres on the sloping ground. Captain H S Palmer, an officer of the Ordnance Survey writing in 1873, is worth quoting at length on this subject:

‘To attempt to roll the country out flat – in other words, to take account of inclinations of the ground in the delineation of features, or the calculation of areas – would be to defy all principles of accurate map-making, and to pass beyond all limits by which areas can be checked. The horizontal system, therefore, as the only one applicable to a general national map, is that which has been adopted for the Ordnance Survey. We believe, moreover, that it is the best and truest system. *The produce of land, and therefore its real value for sale, or letting, or taxation, are, if we mistake not, directly proportional to its horizontal area.* Then, as regards tillage and labour on the land, it can hardly be doubted that both employers and employed would benefit in the long run by adopting as the final basis of agreement the areas given by the Ordnance maps. They would certainly gain in the prompt settlement of disputes, and in the saving of the sums now so constantly paid for land-measurements to local surveyors. And although the labourer or ploughman who works by the acre may naturally prefer to be paid according to the superficial rather than the horizontal measurement of sloping land, and will doubtless imagine, when he comes to think about the matter, that he is a considerable gainer by that mode of reckoning, the difference between the two is in reality extremely small, very much smaller, indeed, than is generally supposed, seldom exceeding two or three per cent. on the steepest slopes that can well be cultivated.’

The defensive tone is notable; we hear a similar voice when revision work is being discussed in *Instructions for computation and examination of areas*, 1907:<sup>8</sup>

‘The great principle [the computer] has to remember is that old unaltered areas are not to be tested or computed, but are to be accepted as correct, unless there is a strong reason to suspect an error.’

‘Parcel areas should not be altered if there has been no alteration in detail on the ground. But when the original area is found to be in error, it will be corrected, if the circumstances of the case warrant this being done. Small alterations in old areas should be avoided, as such will destroy confidence in the Survey work generally.’

The conclusion is that it is not possible to measure field areas with absolute accuracy, but that this does not matter provided that an independent authority has defined the parcel to have a particular area and the figure given cannot be

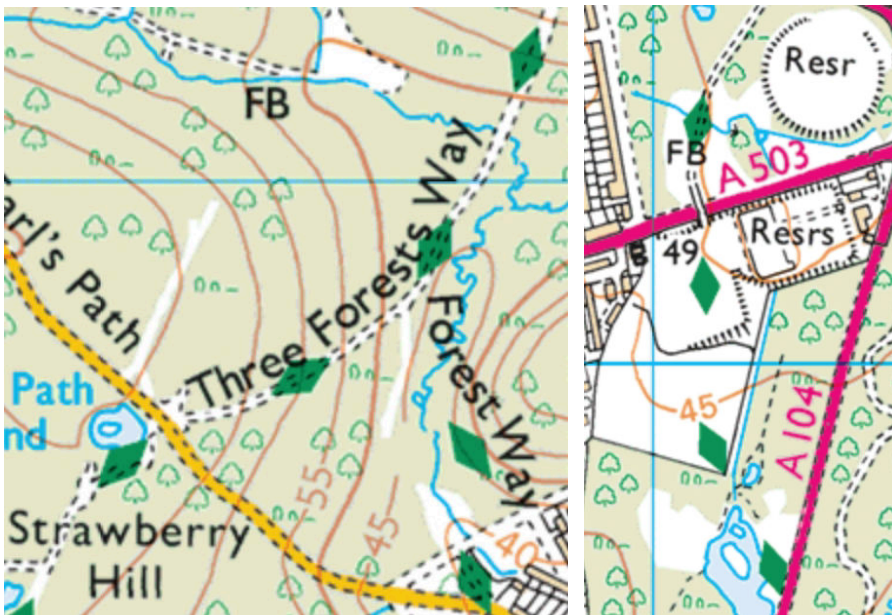
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<sup>8</sup> Ordnance Survey, *Instructions for computation and examination of areas*, 1907. My thanks to Richard Oliver for sight of this document. A copy is held by The National Archives (OS 45/5).

disproved. If there is dispute between buyer and seller, landlord and tenant, land owner and tithe collector, the fact that the Director General of the Ordnance Survey has impartially certified the area of a field to three places of decimals of an acre will be accepted by both sides without further argument.

However, in the same way that a Bank of England note will only retain its value if everyone has faith in it, confidence in OS area measurements is only maintained by their not being subject to arbitrary change. As the computer scientist, Professor David Wheeler, once put it, 'The pursuit of compatibility consists of deliberately not putting right other people's errors'.<sup>9</sup>

### ***Diamonds are forever ... getting me lost!***



This green diamond symbol seems to be casually strewn across the countryside on *Explorer* maps with little regard to the actual presence of a way on the ground.

The use of occasional chunky lozenges to depict a continuous linear route is not only unhelpful for navigation, but also creates ugly clutter on the map, as these two examples from Epping Forest illustrate.

The single marker on the south-bound fork of the Three Forests Way offers no help in locating the point at which to leave

the main track, whilst the apparent direct line from the A503 to the A104 actually crosses fenced allotments and a bog.

Surely the cartographers could devise a suitable continuous coloured line which would look neater on the map and provide clear navigational information?

***Ramblin' Jack***

<sup>9</sup> In a lecture on computer system design about fifty years ago.

## ***A moorland mystery***

***Andrew Darling***

In 1813 the Ordnance Survey produced Sheet 30 of its first one-inch map of England (the ‘Old Series’). Entitled Camelford on indexes, the map covered part of north-eastern Cornwall, including a large area of the wild and sparsely populated highland district which forms part of the granite ‘spine’ of the peninsula, a spine which in neighbouring Devonshire surfaces as Dartmoor, named for the river which rises among its tors. The third significant expanse of moorland in the two most westerly counties is also named after its river – Exmoor.

The equivalent Cornish moorland was from ancient times similarly identified by reference to its principal watercourse – the Fowey, which rises in the heart of the uplands. A document of 1185 refers to Fawimore, and one of 1347 to Fowymor.

In Saxon times, a great Manor grew up on the south side of the Moor in the parish of St Neot, and this became known as Fawy-ton. Throughout the medieval period and into the sixteenth century, the name Foweymore was in common use. In 1538, John Leland wrote: “The River of Fawey risith in Fawey More ... in a very waggmire in the side of an hill.” A lease of 1625 in the county records office refers to pasture on Fowey Moor in St Clether parish.<sup>1</sup>

In 1813, however, on Sheet 30, the OS dispensed with this historic name. In its place, it substituted ‘Bodmin Moor’. “The name was apparently invented by the Ordnance Survey, and it has unfortunately supplanted the ancient name,” wrote the eminent Cornish scholar Dr Oliver Padel in 1988.<sup>2</sup> The two-inches-to-the-mile OS drawing on which Sheet 30 was based was produced eight years earlier, in 1805. It, too, refers to ‘Bodmin Moor’ (*figure 1*). Today, a little over two hundred years after the map’s publication, Bodmin Moor has become established as the name for the place (notwithstanding the fact that the town of Bodmin is not in fact located on the moor), and there seems no prospect of the old name being resurrected. Did the OS take a conscious decision to ignore the centuries preceding its one-inch survey? Richard Oliver<sup>3</sup> believes this is unlikely.

“In default of other evidence, it must be assumed that the name ‘Bodmin Moor’ was supplied by the surveyor on the evidence of local usage: presumably he asked local people in a position to know: ‘What’s this area called?’ Someone said ‘Bodmin Moor’. I can see no reason at all for the OS naming it Bodmin Moor off its own bat, particularly as Bodmin isn’t actually on it. It could equally well be Camelford Moor, Launceston Moor or Liskeard Moor, but Fowey Moor would be better than all of them. The ‘culprit’ for Bodmin Moor is far more likely to be a local worthy or savant than some Board of Ordnance bureaucrat. I very much

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<sup>1</sup> Kresen Kernow CF/1/986

<sup>2</sup> OJ Padel, *A Popular Dictionary of Cornish Place Names*, Penzance, 1988.

<sup>3</sup> Co-author (with Roger Hellyer), *The First Ordnance Survey Map: the one-inch Old Series of England and Wales*, London: Charles Close Society, 2015.

doubt that this was a ‘centrally imposed’ decision: a local (mis-)informer seems more likely.”<sup>4</sup>



Figure 1: Ordnance Survey Drawing 11 (two-inches-to-the-mile), produced 1805, and forming the basis for part of Sheet 30 of the ‘Old Series’, 1813. (British Library OSD11).



Figure 2: detail of OS ‘Old Series’ sheet 30  
(National Library of Australia, accessed via Sheetfinder on CCS website)

<sup>4</sup> Pers.corr. October 2020.

The OS was not the first map-maker to dispense with the old name (although it is perhaps unfortunate that by virtue of the popularity of its products, its rechristening will have the greater and longer-lasting impact). The John Speed map of 1610 refers to the area simply as 'The Moares', while cartographers and engravers of the late seventeenth and early eighteenth centuries prefer Temple Moor, as evidenced by Joel Gascoyne in 1699, Robert Morden in 1708, and Thomas Osborne in 1748 (among others).

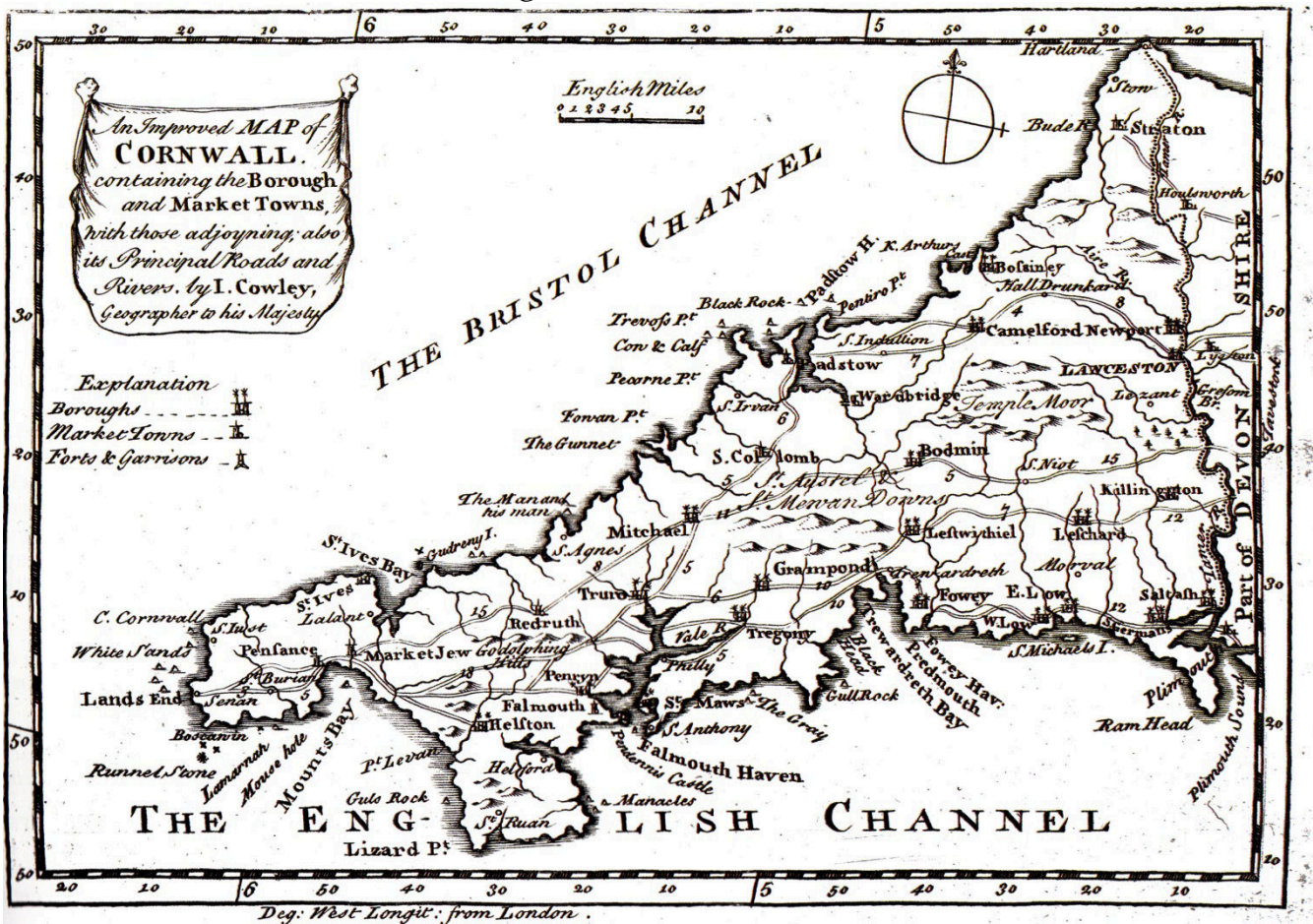


Figure 3: Cowley's 'Improved Map of Cornwall', 1744, showing Temple Moor.

The name Temple Moor at least has the virtue of logic. Although now little more than a handful of homes and a small church in a cleft of the moor, it was a place of consequence for a considerable period. Founded by the Knights Templar in the twelfth century, and owned by the Knights Hospitallers for many years after the suppression of the Templars in 1314, the church was a welcome refuge for travellers caught in unfavourable weather or other disagreeable circumstances while crossing the bleak uplands. Being exempt from the jurisdiction of the Bishop at Exeter, it gained repute for other, less wholesome, reasons. "The place seems to have been a regular Gretna Green, where all sorts of irregularities were carried out with impunity," wrote the historian Charles Henderson <sup>5</sup> - a view shared in 1602 by Sir Richard Carew: "The little parish called Temple, skirteth this

<sup>5</sup> Henderson, *Cornish Church Guide and Parochial History of Cornwall*, 1925.

Hundred [*Trigg*], on the waste side thereof: a place, exempted from the Bishops iurisdiction, as once appertayning to the Templers, but not so from disorder; for if common report communicate with truth, many a bad mariage bargaine is there yerely slubbred vp.”<sup>6</sup>

Place-names, of course, are constantly evolving and changing, but usually with some discernible reason. Why Fowey Moor should have been discarded by the OS is a mystery which does not appear to have any rational explanation.

### ***Acknowledgments and Endnote***

My grateful thanks to Richard Oliver and Oliver Padel for their help in the preparation of this article, and to Oliver Padel for the following note:

Whether the name Foymore actually referred to the whole of what we now call Bodmin Moor, or only to part of it in Altarnun and adjoining parishes, the area around where the River Fowey actually rises, has been a matter for conjecture. At least one local historian has suggested the latter, and it is true that the majority of references to Foymore do seem to refer to that area. However, I have found one reference in 1271 to ‘as much hay on Fauwemore as belongs to 1 acre in Kardynam’, which probably does not refer to that area, so the name may have denoted the whole of ‘Bodmin Moor’. I have also noticed a very late instance of Foy Moor (so spelt), in an advert of land for sale in the *West Briton*, 1844 (cited by RM Barton, *Cornwall in the Mid Nineteenth Century* (1971), p 111). I think that is the latest instance of it that I know -- probably (in this case) taken from an older document about the manorial rights of the land in question.

*Dr Padel is Honorary Research Fellow in the Department of Anglo-Saxon, Norse and Celtic at the University of Cambridge, and Editor of the Journal of the Royal Institution of Cornwall.*



‘... many a bad mariage bargaine is there yerely slubbred vp’

<sup>6</sup> Carew, *Survey of Cornwall*, 1602.

### ***'Life On The Ordnance Survey'***

*In Sheetlines 117, Trevor Radway wrote of his experiences as an OS trainee in the 1950s. Here, reprinted from 'The Sapper' of October 1895 and June 1901, are the recollections of two of his predecessors.*

When a squad is approaching completion of the recruits' course of fieldworks, it is not uncommon for the men composing it to be asked, among the many other openings offered to them, to volunteer for duty on the Ordnance Survey.

Possibly there is no other work, affecting them, about which so little is known to the average young sapper as that of the "Survey"\*

Beyond the information that the rates of working pay are higher than those of the corps, he can gain but little information.

After being duly transferred to one or other of the four companies engaged on the survey, he will proceed to one of the offices, which are situated in a number of the larger towns of the Kingdom such as Southampton, Dublin, Edinburgh, etc., there to sit, day after day, at a desk, learning to manipulate the pen and pencil (a rather nice change after field-works), receiving  $\frac{1}{4}$  per diem working pay.

After three months or so of comparative indolence, providing he has shewn sufficient ability in that period, he is set to work in earnest, and his pay increased to  $\frac{1}{6}$  per diem. From the time of his earning this rate of working pay, if he is hardworking and fairly successful with his work, he may confidently expect a yearly increment of 2d. per diem, although it lays entirely with his division officer to recommend him for more or less. The highest rate of working pay for R.E. employees is 4/- per diem.

If our sapper has been sent to any office save Dublin or Southampton (where accommodation is provided at the offices), he would live in private lodgings, and would receive a lodging allowance of 4d. and a ration allowance of 6d. per diem, thus starting life on the survey, if possessing no good conduct badge, with £1 0s 10 1.2d., and after three months, £1 1s. 10 1/2d. weekly.

As soon as he is regarded as having acquired a sufficient knowledge of office work, he will very probably be drafted to a Field Survey Section, where, after a month's instruction, he is served out with a chain, and, pocketing his appointment, starts, accompanied by his chainman, to survey his first triangle. Here begins his real hard work; for the continual bending whilst measuring, the jumping of ditches, and the climbing of all natural and artificial obstacles, from morning to night, is, to say the least, tiring. But his hard work at this period is afterwards rewarded by his being placed on the "Examination," a change which is all the more welcome because of the extra 6d. per diem which accompanies it; or he may be employed revising plans, which is similar work. If of a roving disposition life in the "Field" will suit him very well, moving as he will from place to place every few months. As regards the cost and quality of lodgings, they may be said to be good, and at a moderate price in well populated parts, say from 12s. to 15s. for board and lodging; and in remote districts, such as the West of Ireland, or the North of Scotland, may be classed as bad at any price. An extra shilling, however, paid for comfort, is not lost. Men employed on special duties, such as

trigonometrical surveying, levelling, etc., receive extra allowances as, owing to the short period they stay in one place, their expenses are higher. Of course, there are sappers employed as photographers, engravers, etc., at the various offices, who do not travel at all. One thing I may mention, and that is, promotion is exceptionally slow. But if a sapper wishes a semi-civil life, civil diet, and civil comforts, the survey will suit him. It will certainly improve his knowledge and intelligence, and I venture to say that there are few other duties which the sapper has to perform, so well calculated to test and prove his abilities as that of the Ordnance Survey.

‘A Sapper’, October 1895.

(\*The object of this Article is to give a clearer idea to those interested, of the life and pay of a sapper employed on this duty.)



*RE 1st Field Survey Section, 1890*

*(reproduced by kind permission of the Military Survey (Geographic) branch of the Royal Engineers Association).*

It is just 62 years ago since I received a copy of the Aberdeen Journal in London, from some of my relations in Scotland, containing an advertisement to the effect that a few young Scotchmen were required for the Royal Sappers and Miners, to be employed on the trigonometrical survey of Scotland; application to be made to an officer of the R.E. (a Captain Gordon, I think), then stationed in Aberdeen, - or at the headquarters of the R.S.M. at Woolwich. At that time, I was working in Lord Ravensworth's gardens at Waltham Green, and, like most young men, being fond of change, new sights, and adventures, I well studied this advertisement, and, after a little while, ventured a letter of enquiry to Woolwich, receiving a reply to the effect that if I was medically fit, and, could produce satisfactory testimonials as to character, I would be enlisted. My next step was a journey to Woolwich, to have a look around and to pass the doctor; that came off alright, and I returned to London, gave up my position, and was finally enlisted at Woolwich, by Sergeant-Major James Forbes, on September 22, 1839, age 20 and 9/12 years.

At that time, a batch of recruits had just arrived from Scotland, so we were put under Lance-Corporal Harding to learn our "facings" in a barrack room, a motley group in various coloured garments, until we were issued with our regimental outfit.

Three months completed the training of the advanced squad to which I belonged, and 12 or 15 of us were then moved to Chatham for fieldworks, pontooning, and the usual course of instruction in force, at that time. The 10th Company had been formed in the early months of that year (1840), and Colour-Sergeant Hopkins was the principal instructor in "sapping and mining". The East India Company Depot for recruits, occupied the west range of Brompton barracks, under their own officers, but as far as I can remember, the young E.I.C. officers were trained in military and other duties with our own officers. Lieut. Harness, R.E. was the instructor of the officers in astronomy and the higher scientific engineering duties.

In those days there was only a small staff of officers at the S.M.E.; there was no band, but two buglers played all hands off duty, round the square, every Saturday!

Five of us Sappers, after completing fieldworks, were struck off guards, and put on special training for the survey. After an uneventful three months or so, we were posted to survey companies and sent, via Gravesend and Hull, to York, to join Lieut. Charles Bailey, R.E., who was about to commence the cadastral survey of England, the survey of Ireland being then very near completion. This move from Chatham took place in the early years of December, 1840, and I have never seen Chatham since then.

Our party of five only remained in York a day or two, and was then divided into sections, one man and myself being handed over to Serjt. Ambrose Cottingham, and the other three to Corpl. James Souter. Both parties left York on Tuesday, December 8, the first going to Bramley, near Leeds, and the other to Otley. The names of the five men were as follows, viz. : -

1. James McDonald. – Discharged by purchase in 1845. Obtained very good employment during the railway mania as a surveyor, re-enlisted a year and a half afterwards, received early promotion, and employed on many special duties, including survey of ground for Aldershot camp, 1854; survey of Jerusalem, 1864, under Sir C. Wilson, KCB.; survey of Sinai, 1868-9, under same officer; a superior photographer. Many of his views of Jerusalem and Sinai were published at O.S.O., and exhibited, by himself, by special appointment, to Her late Majesty Queen Victoria, at Osborne; commissioned Quarter-master from Serjt.-Major in 1873, and died at Southampton, 1885.
2. Timothy McCausland.- A very lively Irish youth. He also purchased his discharge, and afterwards had a rather chequered career. I have lost sight of him.
3. James Black. – A very steady plodding Scotchman, died a sapper, 1845 or 1846.
4. Joseph Dotson. – A quiet Cornishman; deserted about 1842.
5. John Shearer. – Still above the ground; a grey-haired old man, who stuck to his old ship till 1892, and lives to tell tales of his old comrades.

I remained with Lieut. (afterwards Capt.) C. Bailey, till 1843, at field work, when he kindly brought me from the field survey at Leeds to York, to learn office duties. He was soon after removed from the Ordnance Survey, and Capt. Henry Tucker was my next officer. In 1844, Capt. (afterwards Sir Henry) James came to York, to try to find some sappers for employment on the geological survey of Ireland, which he was about to commence. I was recommended for this duty and sent to Ireland in December of the same year. An office was opened in Lifford, County Donegal, and the work went on till the end of March, 1845, when it was given up, and the geological party, scattered. I, and one or two others, were sent to Capt. (now Sir George) Leach, at Londonderry, for the revision of the maps of County Donegal. I was appointed Lance-Corporal early in 1846, and in the beginning of 1847, (the Irish famine year), was sent from Ballyshannon to Killybegs, in charge of a large party of surveyors, where we had very hard work in the mountains, not much pay and very spare diet. We would have fared much worse but for the old war ship *Andromeda* being sent to Killybegs Harbour with meal for the starving peasantry!

Your obedient servant,  
John Shearer

(The Sapper, June 1901).

## ***Letters***

The fortieth anniversary stories in *Sheetlines* 119 prompted me to recall my ‘coming out’ and how I joined CCS. It was not until 1981 that I had what I shall call my first “major map experience”. I was in London attending a pension seminar in Piccadilly and at lunchtime wanting to escape the actuarial fug, I wondered outside and found a street market that was next to the Royal Academy. Among the stalls was a second-hand bookseller and on his stall were some “old” Ordnance Survey maps. I was fascinated and I purchased a copy of a Sixth edition one inch map of Southend-on-Sea sheet 162 for £1.00. Strange to say it had not really occurred to me that there were “old” OS maps since all mine had been purchased new. I should have realised that a clue was in the name of the Seventh series that had so recently been replaced by the new metric mapping. After that, “old” maps were to be seen everywhere. In antique centres, in second-hand bookshops, at book-fairs, maps were there screaming ‘buy me, buy me’. This I duly did as I was now well and truly hooked. About a couple of years later I was talking to a second-hand bookseller who also dealt in second-hand maps and he told me that there was a society specifically for lovers of OS maps. This was my second “major map experience”. Well I cannot tell you what this revelation meant to me. I joined the society at once and I came out. I was not ashamed who knew my secret - my love of Ordnance Survey maps. I could hold my head up high again.

***Mike Cottrell***

Any idea why the tract of country west of Berwick-upon-Tweed was chosen as the cover background for *Sheetlines* 119? I know there’s a good view of Berwick to the east from Halidon Hill, but the map extract centres on the boggy ground north-west of Halidon Hill (towards present-day Mordington) where in 1333 the Scottish force trying to relieve Berwick was put to flight by the English. A decisive action in what is generally called the Second War of Scottish Independence. What am I, from a Scottish standpoint, to make of this implicit English triumphalism?

***Andrew S Cook***

**Editor’s Footnote:** I shall plead the Fifth Amendment.

Congratulations on a fantastic 40th anniversary special number of *Sheetlines*. The contribution by Mike Parker I think sums up the Society for me.

The Society means a lot personally because it was members of the Society who, I suspect inadvertently, began my journey out of a dark time in my life nearly 30 years ago when I attended what turned out to be the inaugural ‘Shap’ meeting in October 1993. It was while walking with David Archer, Alison Brown, Steve Simpson and Nick Krebs between the separated carriageways of the M6 during a stunning autumn sunset that I realised that I really did want to continue to work with maps, although at that stage in my recovery from despair I had no idea how. I resolved then that if other ‘Shap’ meetings happened I would always be there which I believe I have.

This feeling of wanting to reconnect with maps was confirmed the following month when I made it down from my family home in Northumberland to York for the National Railway Museum visit and knew that, as I looked at the small CCS group bunched on the 'up' platform, my standing on the 'down' was going the wrong way but that facing 'London' was an Everest I could not tackle...then. I suppose too that's one of the reasons why I feel an affinity to the East Coast Main Line and York in particular; that, hundreds of other trips 'home' and our marriage at the National Railway Museum of course!

**David Watt**

I enjoyed the 11 November Zoom meeting on mapping errors and omissions, mostly on OS maps but others as well. Thanks to Dave Watt and Gerry Zierler for organising, hosting and managing it.

We discussed hill-shading towards the end of the session. As someone who lived in the Antipodes until our late-1990s move to Britain in my late 40s, I have always been intrigued by the fact that OS illumination for hill-shading is from the north-west. This has seemed counter-intuitive when the sun is in the southern sky in the Northern Hemisphere (a fact that it took this Antipodean a little while to get accustomed to when doing field work). But the sun sets in the north-west and that phenomenon is more pronounced the further north you are. And of course, north of the Arctic Circle, the sun never sets, making a daily passage above the horizon through the full 360° of the compass.

In Britain during the waking (and walking) hours of most of the population, the sun is lowest and casting the longest shadows as it approaches sunset. In effect, illumination at around sunset is approximately from the north-west. I wonder if this is what was on the OS's mind when they decided on the direction of illumination for hill-shading. The most pronounced shading of hills is in the early morning or late afternoon.

Exam question: Those who register the hills in shade are more likely to be out and about in the late afternoon than in the early morning, and so shading from the north-west is a perfectly reasonable approach to this cartographic technique. Discuss.

**Paul Bishop**

I was interested in Peter Haigh's letter (*Sheetlines* 119, 64) about the temporary Northallerton Moveable or Bogie Bridge (**see Editor's footnote, below**). My husband Euan and I are members of the North Eastern Railway Association (<http://www.ner.org.uk> ) and I felt that in our large collection of books and articles there might be some more information. Euan took up the challenge with relish and unearthed a variety of references to the wartime bridge.

Sadly we found no other photos and no OS map references although that is probably not surprising as many wartime features were omitted from current mapping at that time. However the following list details our finds.

The Journal of the North Eastern Railway Association provides the most information:

North Eastern Express Vol 31 Nov 1992 No 128 P 77/78 'The Northallerton Wartime Avoiding Line Part 1' by John McCrickard including a plan of the Northallerton Avoiding Line.

North Eastern Express Vol 32 Feb 1993 No 129 P10-12 'The Northallerton Wartime Avoiding Line Part 2' by John McCrickard including a plan of the signalling needed.

By Rail to Victory by Norman Crump (the source of Peter Haigh's information) P44 and P91, photo opposite P20.

The Wensleydale Branch - A new history by Stanley C Jenkins. No photo or map but mentioned on P 65.

Railways in the Yorkshire Dales by K Hoole. Photo 4 is the same one seen in 'By Rail to Victory'.

A History of the LNER - 3 The Last Years 1939-48. Photo 6 is the same one seen in 'By Rail to Victory'.

Backtrack Sept/Oct 1991 'Northallerton' by Chris Davies P198/199 No photo but diagrams showing 'wartime link' on pages 198 and 200.

***Philippa Corrie***



*Moveable bridge at Northallerton.*

*Photograph from 'By Rail to Victory – the Story of the LNER in Wartime'*

**Editor's Footnote:** the letter referred to was wrongly attributed to Peter Haigh. Its author was in fact David Watt. Apologies to both for my cack-handedness.

In the article 'The Armistice was not the end of the war', (*Sheetlines* 114) John L Cruickshank includes the comment "while both GSGS and OS seem to have avoided direct involvement in the North Russian Intervention".

OS had direct involvement sending three of their more experienced men. All three were OS men before and after WW1. The following extract is from *The History of the Corps of Royal Engineers Volume VII – Survey in North Russia*: *'On the formation of the expeditionary force destined for the North Russia Front, three NCOs were selected from the 19th Survey Company and embarked in June 1918, to undertake mapping and survey work, but from first to last no regular officer was posted.*

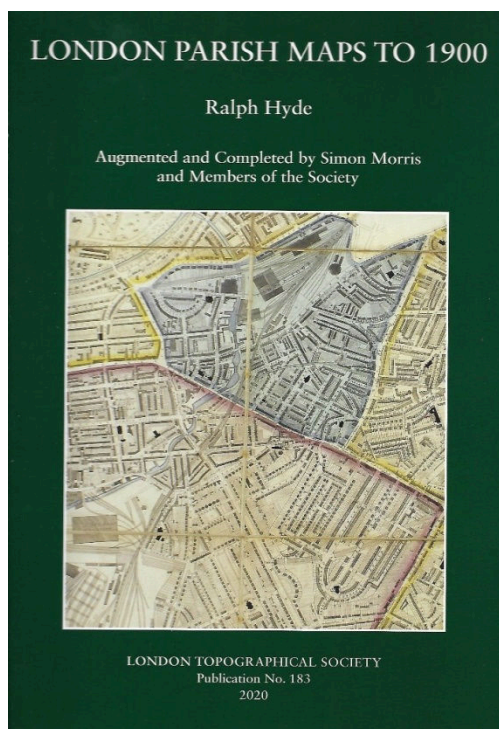
*The maps available were the Russian 10-verst series, very uneven in accuracy and at too small a scale to be of much tactical value. Two Ellam duplicators and three sets of drawing instruments completed the outfit. Naturally, the force was confronted with possible opposition from coast batteries and local garrisons, and the voyage was occupied in producing such maps as could be compiled, and in the transliteration of place names. On disembarkation plans for defence, for billeting and for future advance were put in hand. Sergeant-Major Wilde, who was in command, presently discovered local plans from the railway, forestry, and river navigation offices, and in doing so found both instruments and Russian surveyors who were incorporated in the force. Whilst Sergeant-Major Wilde and Sergeant Matheison trained and led the three mapping sections thus formed, Sergeant Bristow took over the main map office. The work included production of maps of defended localities at 6 in. and 2 in. to the mile, minor triangulations with beacon poles frozen into holes in ice or snow, the measurement of bases on frozen rivers, and many compass routes to connect, and to advance, the various columns and outposts.'*

From my own research: **Sergeant Major Walter Edmund Wilde MSM RE.** On 1 January 1914 Sapper Wilde was employed on the Ordnance Survey, seconded to the Colonial Survey in Northern Rhodesia. He was first mobilised to France on the 12 October 1914. In the 1939 Register Walter is recorded as Chief Superintendent, Publication, Ordnance Survey. Walter was awarded the Meritorious Service Medal (MSM) "in recognition of valuable services rendered with the Forces in Northern Russia." Walter's Father George, and brothers Albert and Ivor all served as Royal Engineers on the Ordnance Survey. Ivor was killed in WW1 and is remembered on the Ordnance Survey War Memorial; Albert was one of the principle observers for the Primary Retriangulation.

**Acting Company Sergeant Major George William Matheson DCM MID RE.** On 1 January 1914 Sapper Matheson was employed on the Ordnance Survey. He was first mobilised to France on 12 October 1914. In the 1939 Register George is recorded as a Civil Servant, Ordnance Survey. George was awarded the Distinguished Conduct Medal (DCM) "for conspicuous gallantry" and was Mentioned in Despatches (MID).

**Sergeant Walter Thomas Bristow RE.** On 1 January 1914 Sapper Bristow was employed on the Ordnance Survey. He was first mobilised to France on 9 November 1914. In the 1939 Register Walter is recorded as Superintendent, Triangulation Branch, Ordnance Survey.

**Clive Boocock**



**London parish maps to 1900: a catalogue of maps of London parishes within the original London County Council area, *Ralph Hyde, augmented and completed by Simon Morris and Members of the Society, London Topographical Society Publication No. 183 (2020): A4, hardback, pp x, 470, illus., maps: ISBN 978-0-902087-70-5.***<sup>1</sup>

Ralph Hyde (1939-2015) was Keeper of Maps and Prints at the Guildhall Library from 1975 to 1999, and a leading writer on London topography and maps, including several contributions to the London Topographical Society's series. The volume most closely related to the present one is his *Ward Maps of the City of London* (LTS 154, 1999), which catalogued all 110 known maps, and illustrated a representative sample – at least one per ward – mainly in monochrome, across 84 pages. The

present volume is several times heavier, several times bulkier, and has many hands involved: they include Peter Barber, with an essay on 'Parish Maps of London', and biographical notes and supplementary material, including a useful note on process, by Lawrence Worms. There are 477 catalogue entries. There are also more mentions of my name than I have ever seen outside one of my own works: I will return to that.

The parish map was effectively 'discovered' as a genre by Ralph Hyde, and he published an article on those that had come to light – no doubt initially as an offshoot of his work on maps of London of 1851-1900 – in 1976.<sup>2</sup> He accumulated a considerable collection of notes, which at one time were accessible 'behind the counter' at the Guildhall Library, if you asked the right person. They included descriptions of maps that he had seen in various libraries and church vestries, and notes from vestry and other local authority minutes, which often tantalisingly indicated the existence of surveys that now seem to be lost. All this material has now been drawn together, augmented by a research team of thirteen, and is extensively illustrated. Some of the maps that Ralph found have not been traced and their present whereabouts is 'unknown': some of these are in libraries and archives, and one hopes it isn't 'unknowns' professionally known to municipal dustpersons or ratcatchers, or the sticky-fingered.

So far, so good: this volume is a definite addition to the literature. However, it falls some way short of the perfect and, though the original notes may have been edited and augmented, there is still a degree of inconsistency, leading to some frustration. One is in the very title, with its terminal date of 1900. This perhaps reflects the pioneering cartobibliographic work of Sir George Fordham, and can

<sup>1</sup> Price to non-members at time of writing £48: for ordering see [www.londontopsoc.org](http://www.londontopsoc.org).

<sup>2</sup> Ralph Hyde, *Printed maps of Victorian London 1851-1900*, Folkestone: Dawson, 1975; Ralph Hyde, 'The "Act to Regulate Parochial Assessments", 1836, and its contribution to the mapping of London', *Guildhall Studies in London History* 11 (1976), 54-68.

have some value as reflecting the virtual extinction of the county map and the individual urban or estate survey by that time, but the latest 'parish map' included here is that of All Hallows, Lombard Street, of June 1914, and there are six others of the City of London of after 1900. 1900 may make some sense outside the City because of the Act of 1899 that replaced the vestries by London boroughs, though they, too, were responsible for the production of maps. All the same, a cut-off in practical terms of 1914 for the City and 1900 elsewhere seems reasonable: they are still 'parish maps'. The possibility is mentioned (p.13) of a supplementary volume covering the maps in the extended Greater London area that came into being in 1965, which would certainly be welcome; another such might be of the 'borough maps', forerunners of which appear here – that of Hackney of 1864 (No. 182) is about the earliest – for the whole of Greater London. The latest map may be the extract from OS London sheet V.7 on p.197, which was revised in 1914, published in 1916 and copied in 1922 for the Survey of London, but seems to be misidentified here as of the previous revision, of 1893-4.

Another problem is one of definition, as between 'manuscript' and 'printed'; one might add between 'local' and 'non-local'. Manuscript mapping in its strict sense means anything produced entirely by hand, though this may occasionally include hand-typing of text and symbols; in a looser sense it can mean printed mapping with manual additions. These in turn can be simply enhancement, for example picking out municipal boundaries in hand-colour, or they can be more substantial, such as updating, or the addition of detail not within the specification of the original map, for example the addition of underground detail to standard Ordnance Survey mapping. Maps such as numbers 369 (pp 364-5) and 395 (pp 384-5) are simply standard OS sheets cut up and coloured: if mentioned at all, such maps surely need 'small print', or a suffix identification; they are not 'parish maps', even if these examples were used for 'parish purposes', and simply confuse the issue. Many of the later maps here are adaptations of what started as the *Weekly Dispatch* map in 1861, with the curious scale of 9.375 inches to one mile (1:6732), but was soon taken over by G.W. Bacon (Hyde, *Victorian maps*, number 73), Stanford's six-inch Library Map of 1862 (itself a fleshing-out for the Metropolitan Board of Works of the OS 1:1056 skeleton survey of 1848-50: Hyde 91), and Bacon's four-inch map of c.1876 (Hyde 160), and it would have been useful if there had been some standardised phrasing to cover this. (It would also be useful if some attempt could be made to connect these offshoots with the states recorded in *Victorian maps*: is there any connection between parent map revision and parish offshoot?) As it is, the four-inch map is noted as having distance circles radiating from Charing Cross on number 267 (p.271), but not on no.310 (pp 316-7). 153, the Vestry Map of St Pancras of 1880, is another example where the true origins are not acknowledged. Number 406 (p.363) is acknowledged as from the Library Map, but the 'Hyde number' isn't given. Whilst these are arguably the sort of thing more likely to be noticed by the pedantic or eccentric minority, such as this reviewer, who start on page 1 and carry on *seriatim* to page 464 (I confess to shirking the indexes), it is difficult to excuse the persistent use of '1:2534' for the Ordnance Survey 1:2500, on the basis that it is 'the 25-inch map'. 25-inch is a colloquialism: if it was true the representative fraction would be 1:2534.4. I have encountered a great variety of scales, some a lot stranger than 1:6732, but never one that could be rendered as 1:2534.4. One expects better: to mix metaphors, it is the icing on the cake of cumulative untidiness.

I mentioned earlier my name: it appears in conjunction with Professor Roger Kain's, in numerous references to our work on tithe maps, published in 1995.<sup>3</sup> Tithe maps can be particularly tricky customers, and some have a not always straightforward relationship with parochial assessment maps: Tooting provides a good example (nos 401-2, pp 389-92). Flattering though it may be to have so many mentions, I wish there had been a little more care: the strange late map of All Hallows the Less of 1891 is in 'Kain and Oliver', where we note that it is to be found at MAF 8/19, rather than IR 30/212. More numerous are references to 'CBTM', our Catalogue of British Town Maps to 1900, which is available online.<sup>4</sup> A few of these references are provided at the end of each entry, with the lists of repositories, but most are in the middle, sometimes noting where our records and those of the *London Parish Maps* augmenters are at odds, which rather holds up the flow. Incidentally, some of these differences may be due to my compensating for engraved maps usually being printed 'wet' on damped paper; on drying the paper shrank, sometimes by up to 2 per cent. Up to about 1887, when a steam press was acquired, enabling printing 'dry', the OS printed 'wet', so that, for example, a five-mile scale on a one-inch map often measures about 4.92 inches. By that time commercial steam-printing was well-established, but for lithography and zincography rather than from intaglio plates, and it is reasonable to assume that any commercial map printed from an engraved plate will have shrunk after printing; the transfer process for placing the original image on copper was effectively 'dry'. Some 'common sense' is needed in ascertaining scales.

The value of the book therefore lies as much or more in the illustrations as in the text. It must be said that some of these are either of the well-used OS, Bacon or Stanford base-maps, or are too reduced to be of much interest, but there is still much of value. This includes some tithe maps, notably the extract from that of Deptford (no.294, pp 300-1), which has a marvellous sense of presence. Some of the originals are faded, and this is reflected in the quality of reproduction: as yet no satisfactory 'cleaning' algorithm seems to be available to counter the effects of paper acidity and varnish. Some are reduced sufficiently to yield plenty of interest with a  $\times 2$  or  $\times 4$  magnifier. The reproduction of maps admittedly gets more difficult the larger the scale of the map and the larger of the original: extracts at about 15 cm or 6 inches square are proven from long experience with textbooks to work with reproducing a representative sample of almost any map at 1:25,000 or smaller, but larger scales are more difficult. Some of the maps illustrated here at a considerable reduction, for example the Ashpitel map of Hackney of 1831 (No.177, pp 184-6) have been reissued either by the LTS or by local boroughs or societies, but several others seem not to have been, for example Daw's map of Kensington of 1846 (No. 265, pp 267-9). Several maps are split across gutters, and there is invariably exactly the right gap: this is an example that others should heed.

All in all, then, there are good things here: but it might have been distinctly better with some extra editing.

**Richard Oliver**

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<sup>3</sup> Roger J.P. Kain and Richard R. Oliver, *The Tithe Maps of England and Wales: a cartographic analysis and county-by-county catalogue*, Cambridge University Press, 1995.

<sup>4</sup> <https://townmaps.history.ac.uk>

## ***Kerry musings***

***David Archer***

Shame on me some might say, but I have never solved a quiz at the back of *Sheetlines*. More than that, I have never attempted to solve one. All I ever do is look at the small pictures, see whether I can recognise anything, and having done so, never return to that page. It is not my sort of thing at all.

Everyone will remember that the quiz topic in the last issue was castles. Well, as usual, I looked at them and was fascinated at how difficult they appeared this time. Far harder than usual, I thought. Where, oh where, does one begin? And then, for some reason, I turned back and read the previous page, naming the solvers of the previous quiz on bus stations and giving some of their comments. I had never done this before, and was not aware that such a page existed, so thoroughly do I read *Sheetlines*. And as with so much concerning the Ordnance Survey, I found it to be something both unexpected and interesting. A whole new world was revealed; an OS subset that I did not know existed. Needless to say, I then went through previous issues and read about earlier quizzes, and the dedicated band of solvers, so many of them, not that their task is ever easy. The reports convey a warm feeling of bonhomie amongst the group, which is strange, as I would assume they all work independently and any group cohesion is created by the reports and comments from the solvers, who obviously enjoy themselves, and come over as a really jolly crowd.

Reading the comments, one realises that many solvers are bursting to tell about themselves, their knowledge of, and enjoyment of maps. Or am I the last to have discovered this excellent feedback? I now have a vision of several tables of solvers sitting at an AGM lunch, enthusiastically discussing how they identified this or that in a recent quiz. I hesitate to continue, as I might embarrass or inhibit them, and no more notes will be sent in with the correct answers, which would make my newly discovered section of the journal far less interesting.

The first quiz appeared in issue 90, April 2011, with seven islands to be identified, accompanied by the first of the setter's humorous headings. However, the compiler missed out on any direct feedback from members as the answers were shown on the opposite page, which must have spoilt it for some, as 'Answers opposite' is irresistible. And that was it. No more. Until issue 103, August 2015, four years later.

When I decided to look at previous quizzes, I took down a couple of boxes of *Sheetlines*, plunged in and selected issue 102, which fell open at John Cole's piece on principal railway stations, and had a page of the familiar small 1:50,000 extracts, but was not a quiz. I wonder whether John's extracts inspired the compiler of the islands quiz and encouraged another offering, which duly arrived in the following issue.

The current format of twenty map extracts, very carefully prepared to seemingly exclude any hint of a clue, took time to arrive, and although the setter might wish to vary the format, as was done in the early days, the extracts are popular.

Though it might be an open secret, I do not know who sets the quiz, but whoever it is has my admiration, especially for their bravery, knowing they are going into battle with CCS members on their home ground. No, battle is the wrong word as the Puzzlemeister and solvers all seem to thoroughly enjoy the challenge. As the

series has developed, the setter constantly tries to keep one step ahead of the solvers, whilst the solvers cannot resist having a dig at the setter. Even conflict is too strong a word, constant nudging is more like it. Promoted to page 4, in issue 104, we were told that the last quiz was rather easy, as many identifying clues had been left showing, so this time most are missing. Sneaky? Not at all. The bus stations report in issue 119, noted some deliberately mis-leading clues, followed in a few days by 'another bumper bag of correct entries' being received, just as when it was noted that many members found the inclusion of a railway station a great help, and they were promptly omitted from the next batch of extracts .... to no avail. Can nothing stop these solvers solving?

Many solvers get help from the structure of the quiz; being in alphabetical order helps tremendously it seems, as does arranging the extracts from north to south, but wily old setter refuses to be outdone, so for the cathedrals quiz, the extracts were geographically arranged. Meaning? Well, by longitude we were eventually told, not National Grid, which would have had Truro and Bangor preceding St David's and Inverness respectively. Crafty. I gave up, never having started. And they loved it.

I liked the setter's instruction for the early ferries quiz, *Do you believe in ferries*, 'All you have to do is identify them'. All, one little word, put so mildly it sounds simple, but in my book that was as simple as performing brain surgery on yourself. In the end, there were a couple of hundred plus of the floatables identified, and still they kept arriving, *Ferry good effort*.

The solvers are sticklers for accuracy. 'No way Station Road, Luton could be considered a bus station ...', 'The two at Ramsgate were both coach stations ...'. Surely these comments were directed towards the Ordnance Survey, and not their friendly setter, who did take the blame for labelling Lancaster a small town. Returning to issue 115, I had assumed that the twenty extracts showing cathedrals, must require twenty cathedrals to be named, but no, 22 were intended and then another was spotted. Tee, hee, what fun. I think this shows the setter, wearing an adjudicator's hat, in a very favourable light, as I would not have known whether 22 or 23 cathedrals were meant to be identified, having missed the significance of 'Caths' in the title. The adjudicator also allowed both cathedrals and their towns to the question 'Can you identify these geographically arranged Caths?'. Knowing you are up against solvers who are very knowledgeable about both OS maps and their own specialist interests, it would be impossible to get the better of them, so be easy with the rules and let things go, allow them to show their prowess, '.... Elgin, (the most northerly bus station symbol on a printed map in the world?)', '.... more Aston Martins are sold in Wilmslow than anywhere else'. Would you like to argue with those who consider Mastermind too easy?

Similarly, when a perfectly simple quiz was set asking for 20 bridges to be identified, hands shot up at the front of the class to note that far more than twenty were present, and then went on to name all, provoking a retaliation by small towns being chosen as the next topic, and bewilderingly suggesting that perhaps nobody would get them all. Fat chance. Laying down such a challenge subsequently meant over 50 members were listed in the honours gallery of the next issue. And so it goes on.

The lists of solvers have a core of regulars, whose failure to submit solutions are noticed, and what should not be surprising, is that many names have appeared from the start, showing they could spot a good thing when they saw it. Members are attracted to the quiz for many different reasons, least of all the increasingly spectacular prizes. DV sees it as the only way to get his name mentioned in *Sheetlines*<sup>1</sup>, with someone else using it as a good excuse to get his maps out, whilst 'I am one of the *Disused Stations* website team as well as an OS 7th Series fan so it was a matter of honour to identify all of the stations correctly'. The reports have suggested a wide range of aids used to solve the quizzes, including being a member of ASLEF, but in the end surely it all comes down to easy access to the maps shown as extracts. I know that a lot of members own sets of the Seventh Series and 1:50,000, but find it hard to believe that all those who solve 1:50,000 quizzes own sets. In which case, what access do they have to this series? Or do they make it even more difficult by using the Seventh Series sheets alongside 1:50,000 extracts? It would drive me nuts to have to use a computer screen to view even a single sheet of either series, so how is it done without ending up a jibbering mess? Some have reported solving a quiz by going through their maps in numerical order, sheet by sheet, a feat I consider impossible on a small screen.

I had thought to end this piece with my own quiz offering, maybe paths in public parks. Lovely shapes would appear in the extracts, but it might be difficult to build in any clues so that the quest would not be totally impossible, or is that the same as suggesting that perhaps nobody would get them all. I then thought of four small boxes each with a series of hairpin bends, but finally decided to make it very hard with four boxes, each with a yellow minor road running across it, plus a few contours to make it easier. Of course, this would both go counter to the spirit of the thing, and secondly could still be solved with the sheet by sheet approach. I am sure that everyone could offer suggestions for future quizzes, but it is obviously difficult to be fair, whilst allowing multiple approaches, and for those who do not finish a quiz, to give satisfaction without disappointment. All of which are done admirably.

In a couple of issues, the quiz was referred to as 'a challenge', which rather appeals to me as a more apt term than quiz. These days it seems we crave quizzes. A few years ago, our local paper only had a feeble crossword, whilst now it has about eight pages of things to solve, most with Japanese names. Care should be taken that *Sheetlines* is never overwhelmed with such challenges, or it might get to the stage that a separate quiz supplement is called for. Should we arrive at such a point, please, please never ask me to pit my wits against the solvers in *Sheetlines*, as it would be way above me, though now that I am hooked on the quiz reports I will never again unwrap an issue and start flicking through it from the front. No, in future I will turn straight to the back, and read – Kerry musings.

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1 Sincere apologies to David Vaughan for such a cheap trick, but it does allow him the privilege of his own footnote.

### ***Solution and solvers***

Capturing castles was never easy; you needed a strategy, heavy armaments and persistence. All of which our worthy jousters possess. And having prevailed, they claim they enjoyed the siege.

For Peter Clark's family it was a team effort. His relative Ann Couldrey explains: 'It took many hours, between six of us, over several days, with PKC advising. I think he was amused by the degree and determination with which we tackled this, bolstered by motivation as a mark of respect for him as a founder member.' Other successful raiders include *Peter Wilkinson*: 'My first attempt at one of your puzzles proved addictive.' *Dave Vaughan*: 'Definitely the toughest so far! I would say I had to cheat, though maybe Tom Lehrer would call it research.' *Tony Wood*: 'This was a goodly challenging quiz with much scratching of head, scanning of my Seventh series and lots of web searches.' *Ray Flint*: 'a great puzzle and most entertaining to complete.' Malcolm Stacey: 'An absorbing task as always.' *David Fairbairn*: 'Despite coming from Northumberland, whose website claims it "has more castles than any other county in England", and knowing that Wales is "the castle capital of the world" (according to Wikipedia), several of your locations were very tricky.' *Roger Holden*: 'As always, railways and Youth Hostels were a great help.' *Caroline Wood*: 'A bit trickier than previous ones.' *Paul Waldron*: 'Great fun - please keep doing them.' *Duncan Stewart*: 'This was quite a toughie!'

Peter Addiscott's mind, however, runs on a different track: 'I have established that you are not fans of the GWR Castle Class (only one out 171 locos) nor the Highland Railway Castle Class (none out of the 19).'

Row by row, the castles are: Bamburgh, Brancepeth, Caernarfon, Caerphilly  
 Castle Combe, Castle Hedingham, Chepstow, Clitheroe  
 Colchester, Conisbrough, Corfe Castle, Dunollie  
 Framlingham, Harlech, Lindisfarne, Pontefract  
 Rayleigh, Richmond, Warkworth, Warwick

Congratulations to the winner, David Birch, and the other solvers (or near-solvers; Castle Combe withstood a couple of raiders). In addition to those already mentioned, these were: Martin Buckley, Don Clayton, Bill Hines, Phil Pearson, Michael Spencer and Peter Strugnell. Special mention too to Keith Warman, retired injured in battle.

### ***Pop sheet bingo***



Some parts of the British landscape are instantly recognizable. The Isle of Thanet, for example, seen here on New Popular sheet 173 is unmistakable. For this month's challenge you are asked to identify the map sheets depicted (in random sequence) on the next page. All we want is the sheet number in the New Popular or Scottish Popular series, plus one extra number – how many sheets you looked at to reach your answers (zero if you solved solely from the index diagrams!) Lowest score wins. Answers to the Editor by 30 June for a book prize kindly

donated by David Archer. The map sheet images are reproduced by permission of National Library of Scotland.

This is the final challenge from your present Puzzlemeister, who thanks all solvers for their good humour and persistence, their kind remarks and their entertaining commentary on their quest. Anyone willing to pick up the gauntlet and set a future puzzle should contact the Editor.

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Pop sheet bingo

