Sheetlines

The Journal of
THE CHARLES CLOSE SOCIETY
for the Study of Ordnance Survey Maps

Number 132 **April 2025**

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The 2025 AGM will take place on Saturday 10 May at the Tiffin School, London Road, Kingston-upon-Thames (Grid Ref TQ186694). There is ample parking, reached via the London Road entrance; access to the lecture hall, map market and other facilities is on the level. Coffee will be served from 1030. At 1100 there will be a talk by Ifan Shepherd: *Close encounters with cartographic 'big data': The first edition Ordnance Survey six-inch map*. Formal business will commence at 1200.

Agenda

1. Apologies for absence
2. Minutes of 2024 AGM
3. Matters arising
4. Officers' Reports:

a. Chairman
b. Secretary
c. Treasurer
d. Membership secretary

5. Reports from subcommittees:

a. Publications
b. Archives

6. Election of Officers and Committee for the coming year.
7. Appointment of independent examiner
8. Any other business.

Lunch (£15) will follow: beef lasagne OR vegetarian quiche, along with salad and garlic bread, followed by apple and blackberry crumble with custard, or fruit salad. Tea and coffee will be available.

At 1400, the ever-popular map market will be held, closing at 1545.

Those intending to come are asked to email Anne Taylor (aemt2@cam.ac.uk). Those wishing to book lunch need to contact Anne by 1 May indicating their choice for each course; they should also bring £15 cash to pay on arrival. Anyone who has difficulty with email may contact the Hon Sec.

Those wishing to sell at the map market should contact John King (all3kings75@btinternet.com) indicating the number of linear feet they would like.

CCS map meetings planned for April to August 2025

Wednesday 16 April 8pm online. Talk by Rob Wheeler and Richard Oliver : 'Land Valuation mapping of 1911-12: a wasted year?'

Following the introduction in Lloyd George's budget of 1909 of a duty on the increase in the value of land, a Valuation Office was set up to establish a baseline for values, and almost all OS effort was diverted to supporting this. The maps that resulted are little known and are not easy to use. The talk will describe what was done for the Lincoln local office and broadly how it fitted in with what was going on elsewhere.

The Zoom invitation for this talk will appear in the CCS Newsletter nearer the time.

Thursday 24 April 7.30pm: Illustrated talk by Gerry Zierler, John King and John Davies: 'Mapping Camden: the borough as depicted on maps through the ages'

Every map tells a story, and the speakers look at a variety of maps, from the familiar to the secret, depicting Camden and surroundings through the ages. Camden History Society, Camden Local Studies and Archives Centre, Holborn Library, 32-38 Theobalds Road, London WC1X 8PA. Admission: free to Camden History Society members, non-members £2 at the door.

Saturday 10 May 11am: Talk by Ifan Shepherd on the forthcoming CCS book: 'Three Kingdoms, 116 Counties and 17,000 sheets: the First Edition Six-inch Map of the United Kingdom', by Ifan Shepherd and Steve Chilton.

CCS AGM, Tiffin School, Kingstson-Upon-Thames.

August (date and time tbc): New central London walk by John King: 'On and off The Strand: a partly cartographic meander'.

Another enjoyable CCS show-and-tell meeting in London

The fourth in a series of live CCS meetings took place in February at the The Woodman pub in Highgate. Fifteen members met in the large private area (known to the unmapped as the Rod Stewart room) to show or just listen and discuss maps, once again with a London theme.

The choice of London maps was enormous. Railways and transport always proves popular, with a wide range of age, scarcity and coverage. Breath was taken away by a previously unfamiliar and beautiful small framed map of London by a W Snow, dating from about 1813, just 4 inches in circumference, shown by David Gaylard. No sooner had he left after lunch when Peter Barber arrived with an edition of the very same unusual map. Much satisfying research ensued!

Marian Biskupski satisfied a lot of OS, railway and local historians with the splendid sheet VII.13 of the 1895 1:1056 map, showing the greater King's Cross area railway lands in exquisite detail, some of it in colour.

Ian Byrne treated us to an historical London foretaste of his massive collection of Shell road maps, the subject of a planned CCS online talk on Shell maps in general.

John Davies entertained with TfL maps both good and (very) bad, and some excellent provincial bus maps, as were featured in his 2024 online requiem for the rise and demise of the bus map.

Stuart Dennison also demonstrated London transport, with LGOC and General bus maps of the 1910s, comparing pre-War clarity with apparent confusion post-WW1. He also treated us to a comparison of George Dow's with Harry Beck's LNER and postwar LTE line diagrams.

Steve Gilbert, visiting all the way from Keighley, brought a touch of fresh air with him with some postwar Irish OS one-inch sheets of Killarney: always a joy to see again.

John King opened with the unusual LSE 1929 London poverty map, and then showed the entire LPTB London transport planning map (from which the CCS Watford area Map from the Past was taken). Responding to a new CCS member Matthew Plummer's request, John also talked us through the saga of the protracted 2024 revised map introduction with new Overground line names, on the perhaps now misnamed TfL 'Underground' map, now very cluttered.

Alan Fair reminded us of the comparative clarity of the BR-style London Connections map from the 1970s. Phil Tyler showed two beautiful early national railway maps: the first edition of the Railway Clearing House map c1869, and a private railway map of 1877.

Jeremy Harrison repeated his earlier fascinating shows of A3 colour internet printouts, this time of the numerous US, SA and NZ towns sharing the name 'London' and available online through UK websites.

We also welcomed John Gordon and Edward Cousins. Gerry Zierler wrapped up the meeting for remaining members at 3.30 with a *pot pourri* of local and London small maps with an unusual transport twist.

Gerry Zierler

Society Newsletter

Just to remind Members that the Society produces and sends out by email a Newsletter every three to four weeks containing all the latest Society and related mapping news and events. It's the best way for the Society to keep you informed of updates and news as soon as possible, (as *Sheetlines* is only published every four months).

If you're not currently subscribed to the Newsletter and want to be, please send your name, email address and membership number to the Membership Secretary at memsec@charlesclosesociety.org. If you are subscribed but don't always get around to opening and reading it, we encourage you to do so, to keep up to date with Society news and events that might be of interest.

Ashley Lawrence, Webmaster

Ordnance Survey camps and cairns of 19th century northern Ireland : 2 Slieve Donard, Sawel and Vicars Carn

Peter Wilson and Frances Wilson

Following on from the previous article in this short series we now consider the evidence for 19th century OS camps and cairns on another three summits in the north of Ireland. Of these, Slieve Donard provided the OS with the opportunity to link the Irish triangulation with that of Great Britain (i.e. southern Scotland, the Lake District and North Wales) and the Isle of Man. The observation of Scafell in the Lake District at a distance of 179 km (111 miles) was the longest recorded side of a triangle measured in these early years. Sawel and Vicars Carn were no less important stations; their interior and elevated locations in the northern part of Ireland proved them to be suitable sites and enabled the cross-country triangulation to proceed to completion.

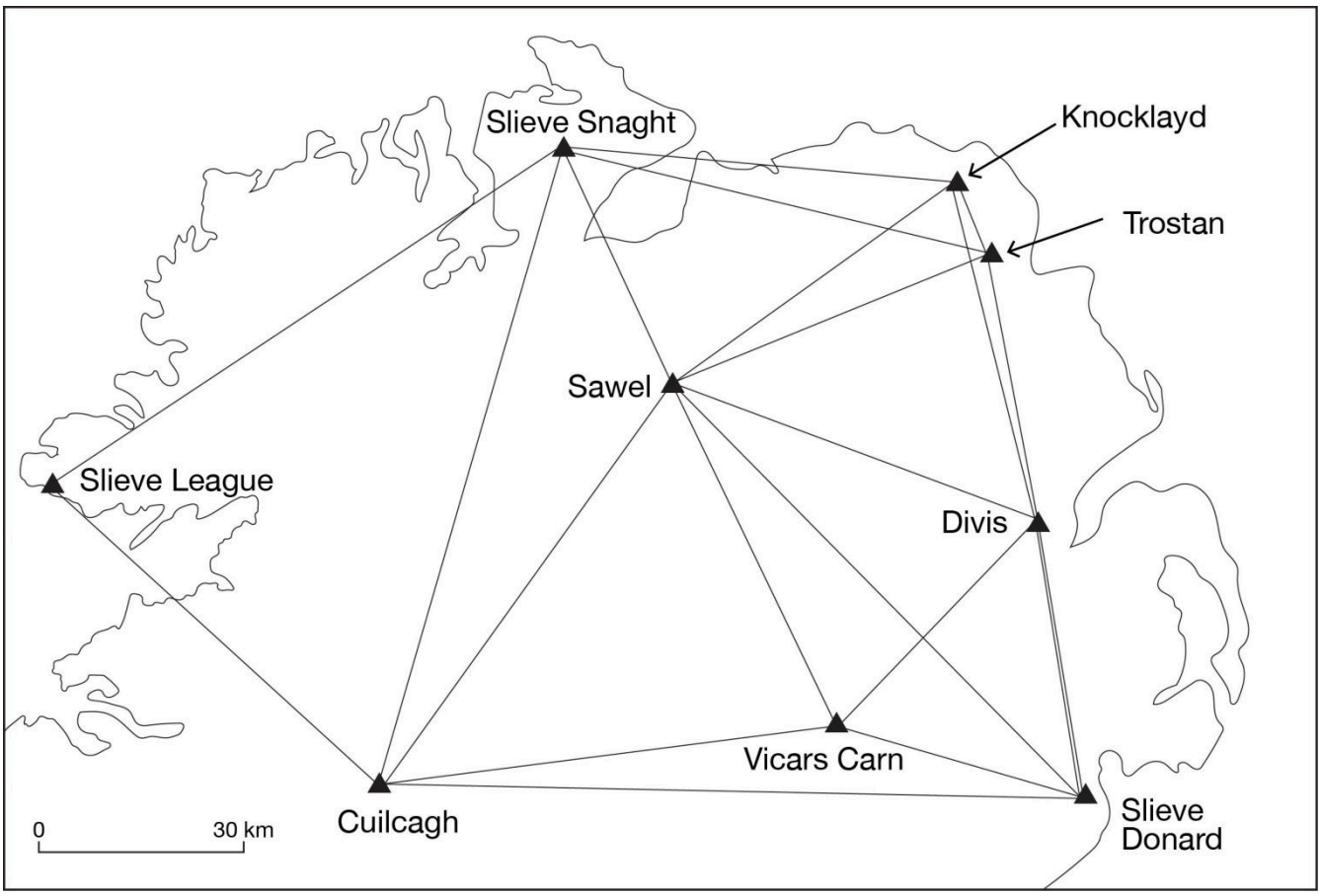


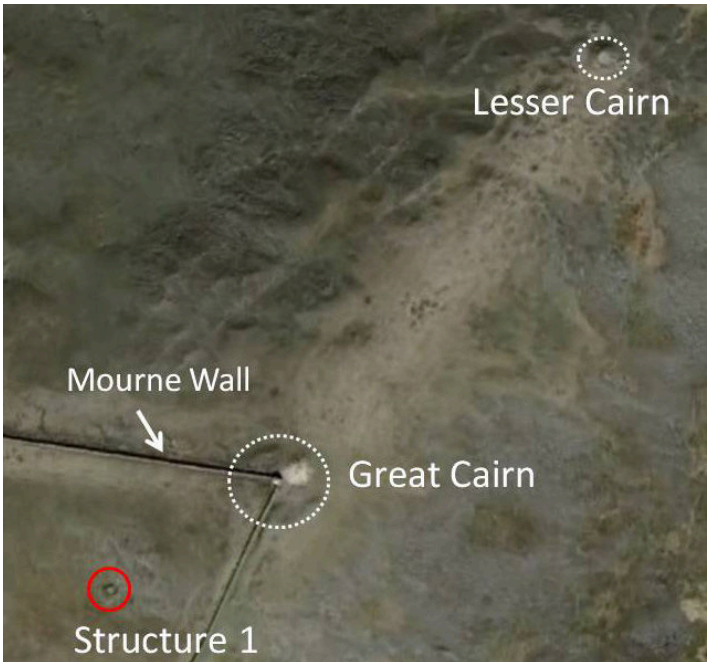
Figure 1. Locations of summits in the north of Ireland used as survey stations for the Principal Triangulation 1824-32. Surveyed lines to stations in Scotland, the Isle of Man, northern England and the rest of Ireland are omitted for clarity.

Slieve Donard

The Mountains of Mourne rise steeply above the coastal town of Newcastle in Co.Down and the summit of Slieve Donard (Grid ref. J 358 277, *Figure 1*) forms the highest ground in Northern Ireland. The 1:25,000 OS map gives its height as follows: 849m (Living Rock), 853m (Trig Pillar). The 4-m difference is

accounted for by the pillar being on top of a stone tower at an angle in the Mourne Wall (of which more later).

The triangulation data given in Clarke & James (1858, p.152)[1] relate to the period 19 August – 18 December 1845, but the station description gives 1846 and it is said to be "....on top of the highest of the Mourne mountains,...." and "....marked by a hole bored in the centre of a square stone, measuring 3.5 by 3.5 feet, and by a pile of stones built over it." However, these dates and the description probably refer to a re-visit by the OS in the 1840s (Close, 1926, p.125; Andrews, 2002, p.96).[2,3] The initial measurements from Slieve Donard were made in 1826 (Close, 1926, p.127-128)[2]. Although the dates of the summit encampment are not given by Close, Hewitt (2011)[4] relates the story of Colby's thwarted attempt to observe Scafell Pike in the Lake District from the summit of Slieve Donard in August of that year. Also, a letter from Portlock to Thomas Larcom dated 12 October 1826, suggests the OS party were still in residence at the summit at that time. Piecing together some contemporary accounts of the triangulation work, it would seem that it was undertaken between late July and late November 1826 (Moore, 2012).[5]



The cairn that marks the highest point of Slieve Donard (i.e. the Living Rock of the 1:25,000 OS map) is regarded as the remnants of a Neolithic passage tomb and is known as the Great Cairn in order to distinguish it from the so-called Lesser Cairn *c.* 350m to the north and at the slightly lower altitude of *c.* 825m (*Figure 2*; Moore, 2012)[5]. Both cairn sites were used for triangulation measurements but the Great Cairn was dismantled on Colby's orders so that a suitable platform could be prepared for the 3-ft-theodolite (Andrews, 2002)[3].

Figure 2. Google Earth image of the summit area of Slieve Donard showing the Great and Lesser cairns, Structure 1, and the early 20th-century Mourne Wall. The triangulation pillar is on top of the stone tower at the angle in the wall. ©Google Earth.

1 AR Clarke & H James *Account of the observations and calculations of the Principal Triangulation; and of the figure, dimensions and mean specific gravity, of the Earth as derived therefrom.* Eyre & Spottiswoode, London, 1858.

2 C Close, *The early years of the Ordnance Survey.* David & Charles, Newton Abbot, 1969.

3 JH Andrews, *A paper landscape: the Ordnance Survey in nineteenth-century Ireland.* Four Courts Press, Dublin, 2002.

4 R Hewitt, *Map of a nation.* Granta, London, 2011.

5 S Moore, *The archaeology of Slieve Donard: a cultural biography of Ulster's highest mountain.* Down County Museum, Downpatrick, 2012.

So, Slieve Donard suffered the humiliation of having its summit cairn *destroyed* by the OS in contrast to other summits whose archaeological cairns were utilised for survey work or, if no cairn was present, had a cairn constructed.

Details of the OS camp on Slieve Donard are rather sparse but it appears to have consisted of tents and marquees located a short distance south of the Great Cairn (Moore, 2012)[5]. More recently, Lilley (2018)[6] has suggested that a sub-circular stone structure near to the summit (*Figure 2*) may be associated with the 1826 encampment. This structure is actually one of a pair situated *c.*140m south-west of the Great Cairn at the foot of a steep bank of boulders. Only one of these structures shows up on *Figure 2* but two structures are evident on the ground. The one to the right of centre in *Figure 3A* is that circled on *Figure 2* (Structure 1). The other structure is to the left of centre in *Figure 3A* (Structure 2).

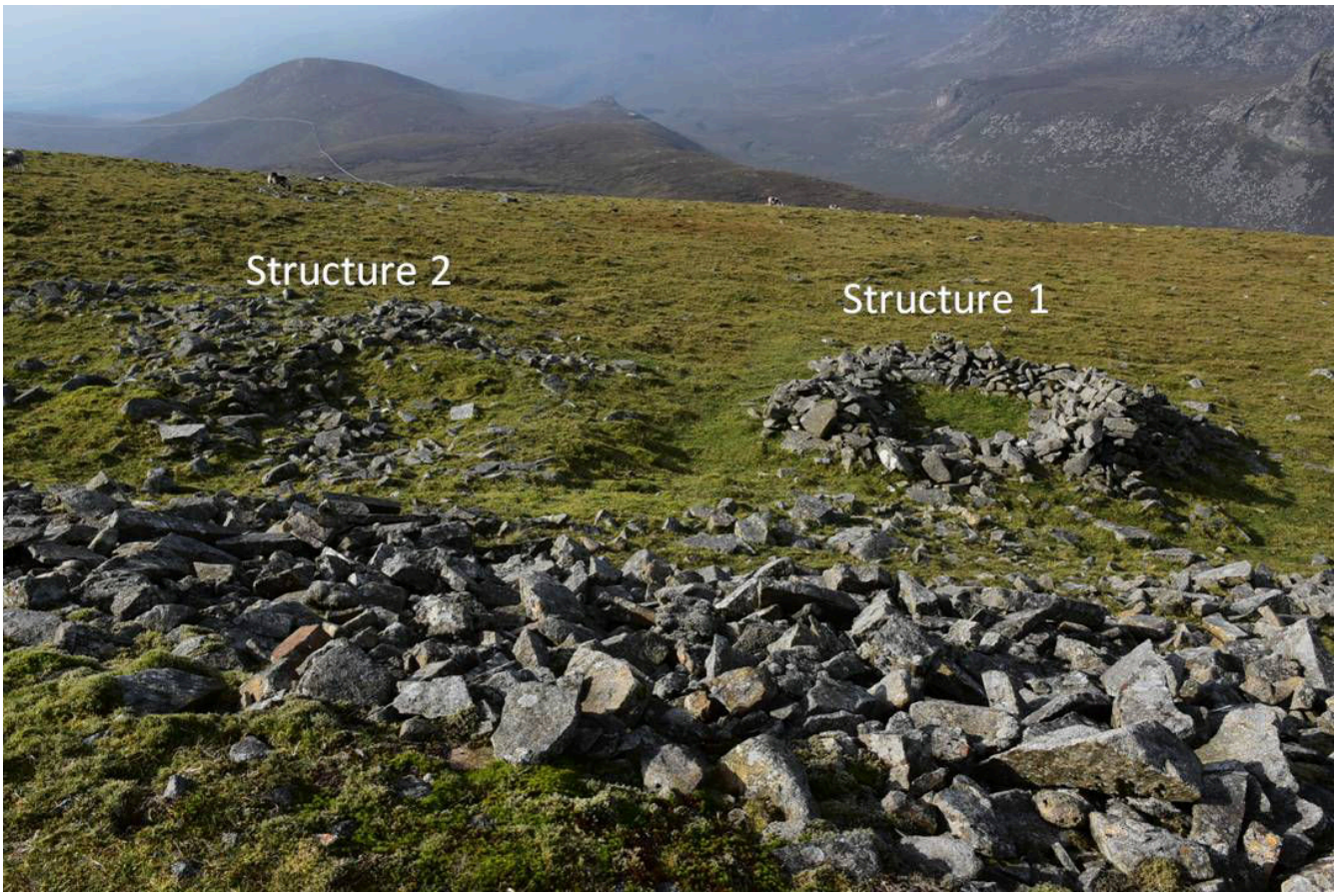


Figure 3A. Remnants of the two stone structures on Slieve Donard.

Structure 1 is a sub-circular dry-stone wall with interior dimensions of *c.* 3.5x3m and a maximum wall height of *c.* 1.5m. The entrance into the structure is no longer obvious but may have been at the eastern end where wall height is at a minimum (<1m). Since it was constructed the wall may have collapsed and spread somewhat, but the absence of surface stone within

6 K Lilley, Surveying the surveyors: the landscape legacies of the Ordnance Survey. *British Archaeology* March-April,2018.

the structure and around the exterior suggests that it was never much higher than it is at present (*Figure 3B*). As such it is unlikely to have been a hut, rather it probably served as a protective surround for a tent with the low point of the wall facilitating entry to the tent. The location of the structure – on the windward side of the mountain – creates an element of doubt as to whether we can associate it with the OS. But if the structure is not part of the 1826 encampment it could still be OS-related by having been constructed in 1845-46 in connection with the re-survey work of that time.

Figure 3B. Close-up view of Structure 1.

Structure 2 (*Figure 3A*) is less obvious, the walls are substantially lower and appear to have collapsed and spread significantly more than those of Structure 1. Furthermore, one section of wall is now grass-covered. Nevertheless, the dimensions are similar to those of Structure 1. A possibility is that Structure 2 dates from 1826 and was cannibalised for the construction of Structure 1 in 1846.

Another origin for one or both of the structures is that they are linked with the building of the Mourne Wall – a 22-mile dry-stone wall crossing 15 summits and built between 1904 and 1922 to define the catchment boundary of the Silent Valley and Ben Crom reservoirs. It is said that some of the wall builders slept under canvas beside the wall in order to avoid the long daily walks from their homes to the mountain tops (Moore, 2012; Kirk, 2002)[5,7].

7 D Kirk, *The Mountains of Mourne: a celebration of a place apart*. Appletree Press, Belfast, 2002.

Figure 4. The triangulation pillar on Slieve Donard. The conical cap of the tower was removed to provide a flat surface for the pillar. The remains of the Great Cairn topped by the modern walkers cairn is to the right.

Some of these men could have built Structures 1 and 2, or they could have re-used the OS sites. Interestingly, these structures are the only such features in the Mournes known to the authors. Some other structures, such as the circular wind shelters near the Lesser Cairn are undoubtedly modern (Kirk, 2002)[7]. It is perhaps significant that Structures 1 and 2 lie a short distance from the summit and the wall. They are unlikely to be hill-walker related and the wall builders would surely have taken advantage of the shelter provided by the wall for their bivouacs. That takes us back to the OS triangulation team. Slieve Donard also hosts a triangulation pillar on top of the stone tower at the angle of the Mourne Wall (*Figures 2 and 4*). This dates from the re-triangulation of Northern Ireland in the 1950s. The original pillar was built on the ground in the angle of the wall but it was then realised that the wall blocked the view to the north and east! The only alternative was to remove the conical cap from the tower and place the pillar there. This was done and very few people can actually reach it. The flush bracket is OSNIBM 3087.

Sawel

The Sperrin Mountains extend for over 30km east-west across the central part of Northern Ireland. Individual summits are either rounded or plateau-like, and most have a healthy cover of thick, and usually very wet, peat. Sawel Mountain (678m OD, Grid ref. C 618 973, *Figure 1*) is the highest summit and was chosen to be one of the Principal Triangulation stations.

Clarke & James (1858)[1] state "…. its summit is round and covered with bog to the depth of 6 feet. The sub-stratum is mica slate, varying much in hardness. A centre stone, 3 feet long, 2.75 feet wide, and nearly 1 foot thick, and marked with a hole, rests between the tops of the frameposts, is wedged tightly with stones, and further secured by mortar; on this was erected a staff, and around it a pile of stones and turf 15 feet high and of rather greater diameter, was built." The OS party, headed by Portlock, occupied the summit from 24 August until 20 September 1827. During this time bearings were obtained on 19 stations.

The nature of the Sawel camp is referred to by Portlock (1869)[8] in his memoir of Colby – "It was thus that he (Colby) appeared on Sawell (*sic*), a mountain in a wild district of the county of Derry, early on a most gloomy

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8 JE Portlock, *Memoir of the life of Major-General Colby*. Seeley, Jackson & Halliday, London, 1869.

morning, which had followed a night in which the wind had raged with almost unexampled fury, overturning in dire confusion the tents of the men though protected by walls of turf, whilst the rain deluged them and obliging the author to dismount the great instrument (i.e. the 3-ft theodolite), amidst the crash of all around, and in darkness only broken by the flickering light of a lamp, and remove it, step by step, at each lull of the storm, to the shelter of the cook-house lower down."

From this we learn that the camp consisted of tents surrounded by low walls of turf (peat) for added protection. However, we have been unable to locate any traces of these turf walls and assume they degraded over time. In contrast, the summit cairn on which sits the 'modern' triangulation pillar (*Figure 5*) is likely to be the one constructed by Portlock's team, although prior to the addition of the pillar the cairn had undergone a degree of collapse and spreading. It may also have been lowered somewhat to create a flat and stable surface for the pillar. The flush bracket on the pillar is OSNIBM 2080.

Figure 5.The triangulation pillar on Sawel sitting on a low cairn of boulders and peat that is probably the remnants of the 1827 OS cairn.

Vicars Carn

In contrast to the other summits dealt with in this series, Vicars Carn (248m OD, Grid ref. H 914 397, *Figure 1*) is at a considerably lower elevation and is in pasture land *c.* 6km south of the city of Armagh. Moreover it is the easiest summit to access today because a minor road with convenient parking passes within 20m of the station.

The station is recorded by Clarke & James (1858)[1] as follows – "….on the summit of a large carn (i.e. cairn) of small stones known by this name (Vicars Carn). It is about 24 feet in diameter at the top, and its height above the general surface is about 10 feet. The station is a little to the south-south-west

of the present centre of the carn; and the centre stone, which has a well-cut hole, is 6 feet below the surface of the top of the carn, and rests on a bed of small stones."

Vicars Carn is listed in the Sites and Monuments Record Northern Ireland[9] as the remnants of a likely Neolithic passage tomb that was rather badly damaged as a consequence of excavations prior to the OS encampment of 1827. Even so, the description in Clarke & James (1858)[1] indicates that the OS also disturbed the cairn in order to place their centre stone.

Portlock, his team and the 3-ft theodolite were only at the site from 17 to 22 July 1827. They obviously had good weather and visibility and were able to obtain multiple bearings on 15 other stations. The site of their encampment is not known but immediately south of the cairn are the ruins of a stone hut (*figure 6*). This is not mentioned in the details in the Sites and Monument Record and its origin is unknown. At present a link to the OS cannot be excluded although we feel it is unlikely to be related given the short time that they were at the station. The flush bracket on the triangulation pillar is OSNIBM 2065.

Figure 6. Vicars Carn with triangulation pillar. In the foreground are the remains of a small stone hut.

Endpiece

As with the summit stations dealt with in part 1 of this series, our investigations at the three sites considered here indicate that there is still much to learn about the camps and cairns established by the OS during the Principal Triangulation of Ireland. Sadly, the continuing, if inadvertent, degradation of the structures by visitors is resulting in the gradual loss of important information relating to this period of Irish OS history.

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9 Sites and Monuments Record Northern Ireland, SMR number: SM7-ARM-016-028, Vicars Carn.

The 1st edition of the 1:2500 in Glamorganshire and Monmouthshire

R C Wheeler

In *Sheetlines* 121, I presented an analysis of a large sample of 1st-edition 25-inch sheets of Suffolk, greatly aided by information on a collection of ordinary sales copies: the picture one obtains from just looking at copyright-deposit copies and Record Maps from the end of the edition's life can be deficient. I thought it likely that most of the conclusions were applicable to other counties being worked on at the same time, but I was aware that differences do sometimes occur across county boundaries so was reluctant to proclaim the universal applicability of any conclusions. I have recently had the opportunity to examine a couple of dozen sheets bought by South Wales water undertakings in the years around 1890 and these offered an opportunity to test the applicability of my Suffolk conclusions.

Gratifyingly, the appendices on changes to marginalia from 1884 and on the 'Coloured' stamps[1] are confirmed, although the dates of the S Wales specimens mean that the changes of the mid-1890s were not tested. One of the statements can be tightened up: I had stated that the change of county name and 'sheet' to capitals occurred 'by 1892'. Glamorgan 12.1 provides an 1891 example.

For a greater proportion of the S Wales sheets (4 out of 25), the zinc plate was retained for re-use rather than being cleaned off after printing. Two of these were by no means urban but were in valleys where the spread of industry made for a good likelihood of future sales. Whereas in Suffolk silent reprints (sometimes recognisable by being not quite facsimiles) were being made, the S Wales specimens bore the note "Reprinted in [date]" bottom left, the dates encountered being from 1884 to 1891. This is in contrast to the "Re-zincographed & printed in [date]" applicable to those sheets where the plate had been cleaned off. Re-zincographed sheets have their marginalia updated to the current standard; reprinted sheets may or may not have updated marginalia. It is possible that sheets with updated marginalia have had an unacknowledged re-zincographing, a practice I have observed in other counties.

What makes the S Wales exercise interesting is that the publication dates extend a few years further back than the Suffolk sample. This introduces three new issues: single prices, the 'surveyed by' imprint, and old-style administrative boundaries.

Taking prices first, the stating of prices for both coloured and uncoloured sheets (even when the two prices were the same) started in 1881. Prior to that, a single price was given, being the price for coloured sheets. All the specimens in this collection were coloured. Indeed, uncoloured sheets of this era are rarely encountered. Were they even available except by special arrangement? There seems to have been a general re-pricing in the 1870s,

1 *Sheetlines* 121, 28.

which may be associated with the abandonment of publication by parishes. Prior to this, almost all sheets were priced at 2s 6d, only the urban areas, where hand-colouring will have added considerably to the cost, were more expensive.[2] The purchaser lost out if the sheet he needed was at the edge of the parish and was mostly blank; on the other hand, the hand-colouring in rural areas was thrown in for free. After the change, he could expect the full 1½ sq miles of mapping, but had to pay extra for the hand-colouring except on sheets that were almost unpopulated. I would encourage any reader with an uncoloured specimen printed before 1881 to tell me what price it bears.

Next, the imprint borne on these sheets before 1880 was "Surveyed 187x by [name]. Levelled by [name]. The altitudes … &c / Zincographed under the superintendence of Lt Col Parsons, RE, FRS, at … Major General J Cameron, RE, CB, FRS." Inconveniently, there is no publication date. If the sheet was subsequently re-zincographed that will give us a publication date - how reliable a date is not known; but even where such a re-zincographed version exists it may be difficult to track down. One can narrow the range from other details: Cameron was Director from Aug 1875 to his death at the end of June 1878, but he was promoted Lieutenant General on 1 Oct 1877. His FRS and CB are no help, predating his appointment; and poor Parsons received no advancement at all during the decade. Nevertheless, Aug 1875 to Sep 1877 is a useful result. No doubt there are other sheets with an imprint post-dating Cameron's promotion, or post-dating his death.[3]

The third difference from Suffolk concerns administrative boundaries. Suffolk had been started (so far as its new meridian was concerned) after the policy change in 1879, so showed 'new-style' boundaries: basically civil parishes. Both Glamorganshire and Monmouthshire had been started before 1879 and continued to show 'old-style' boundaries: hundreds, ancient (ecclesiastical) parishes, and townships. It was not practicable to change the set of boundaries part-way across the county.

Actually, the difference was not as striking as this general description would suggest, because both counties had a lot of parishes which were single townships.[4] Moreover, each hundred name appears just once on the maps in

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2 This is apparent from the index diagrams on the old-style Books of Reference available on the NLS website: for example Peterhead (1869).

3 Richard Oliver observed that marginalia were not always updated immediately: there is a printing of New Series sheet 286 with a publication date of July 1878 which still bears his name. So perhaps the date range above should have read Aug 1875 to *Oct* 1877.

4 The Historic Boundaries of Wales project has stated that township boundaries ceased to be surveyed after 1872 and has suggested that this is the cause of the patchy coverage of Glamorgan townships. But townships that were autonomous units for Poor Law purposes - which seems to have been usual in Glamorgan - became civil parishes and were shown on the 2nd edition; and comparison of editions in a sample area seems to indicate that parishes that are shown on the 1st edition without townships were indeed undivided parishes.

about the middle of the hundred and each parish name just once about the middle of the parish.[5] Consequently the big administrative names that are such a distinctive feature of the old-style maps appear on quite a small proportion of the sheets. Often, the most practical test for whether a sheet is old-style or not is to look for a hundred name in the margin.

Why is such a test necessary if the whole of a county was either old-style or new-style? Because at some date which seems to be about 1890, the embarrassment of the Survey that its maps were still showing units of no administrative significance overcame its desire for uniformity, and when sheets were re-zincographed, hundreds and ancient parishes might be left off. The only example of this in the collection examined was of 1892 and it was easier to demonstrate the phenomenon using a pair of specimens on the NLS website. The older one has a parish name and the hundred name on the sheet; the newer omits both.

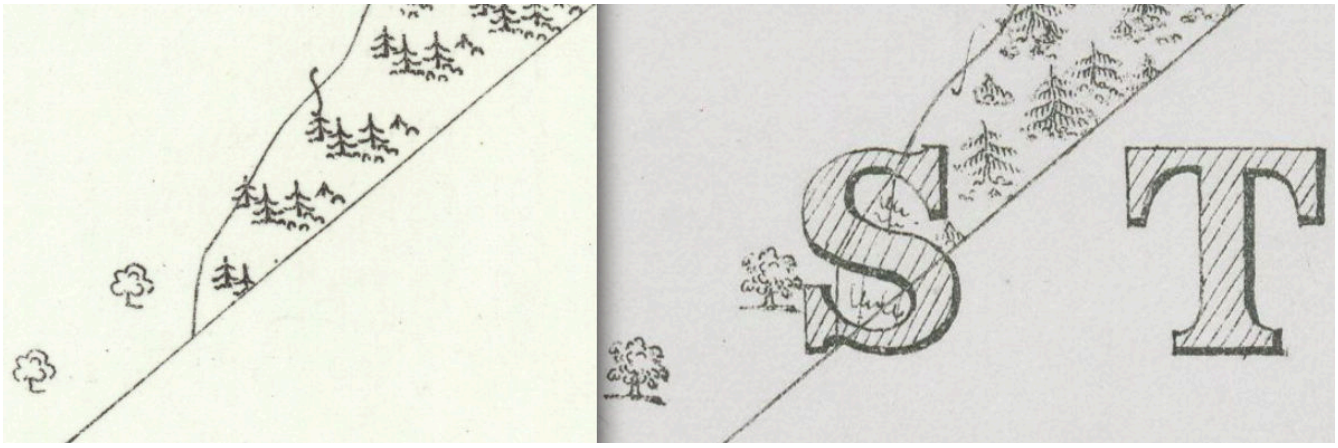


Figure 1. Wiltshire 11.2: as first produced on the right; as reprinted 1894 on the left. [Courtesy of NLS]

The extract at *Figure 1* shows just two letters from the hundred name, one impinging on a small wood. Despite the very prominent name in the older version one can follow the line of the edge of the wood: it has a sharp corner where it emerges from the middle of the 'S' and continues due south. The newer version has a more rounded corner and south of it is aligned a little west of south. The quality of the tracing on re-zincographed sheets seems to deteriorate in the 1890s, and I suspect the older version is more accurate, even though both tracings will have been made from the same fair drawing. The 6-inch map seems to confirm my belief although, being engraved, may be subject to errors of its own.

5 This aspect of the specification suggests that the Survey was still anticipating that purchasers might want to mount all the sheets for a parish as a giant wall-map. Mounting all the sheets of a hundred together would seem a prodigious undertaking but the practice may have been motivated with the six-inch in mind, produced from 1880 by photographic reduction of the 25-inch - albeit with a certain amount of deletion and re-drawing.

This naturally leads on to some consideration of the *content* of the S Wales sheets. The instructions for surveyors applied of course across the whole country, but what they encountered on the ground might lead to local guidance being given by Divisional officers which might not be the same everywhere. Spoil disposal at many pits took the form of plateaux rather than heaps. *Figure 2* shows a couple of examples. The whole of each plateau is covered by a number of parallel tramlines so that spoil can be dumped and spread out to either side. In due course it must have become necessary to shift the rails to a raised part and fill in the cuttings where they had been. By the 20th century, I suspect these tramway lines might have been categorised as 'temporary' and omitted from the map.

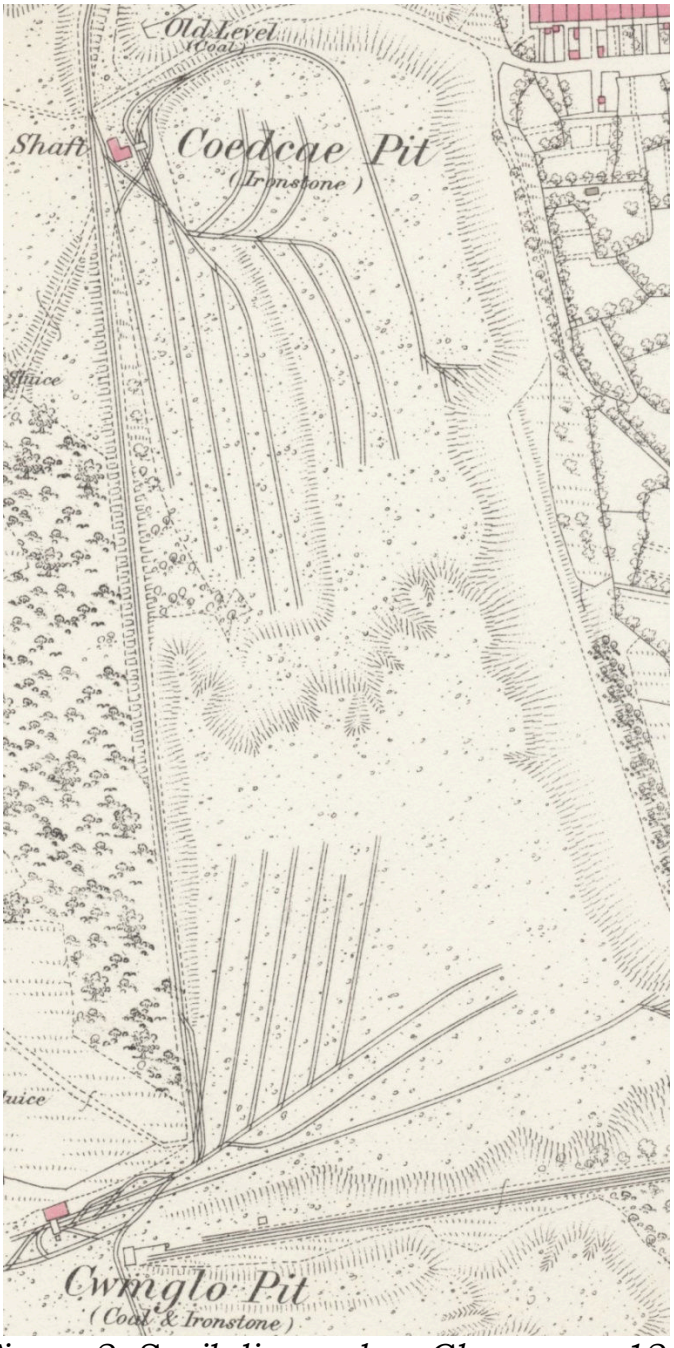


Figure 2. Spoil disposal on Glamorgan 12.5

Figure 3 shows another tramway at an ironworks. The spacing of the rails indicates it is narrow-gauge, though measurement suggests a gauge in excess of 3 ft, which seems unlikely. The contents of the tramway wagons are being tipped into standard-gauge wagons using this complex fan of tracks. It is not easy to see how it all worked. Fortunately it comes within the area of the Merthyr Tydfil 1:500. The 25-inch will have been litho-traced from a reduction of the 1:500 and one can see from *Figure 4* how a certain amount of simplification was built into the process: south of the smithy the 1:500 has

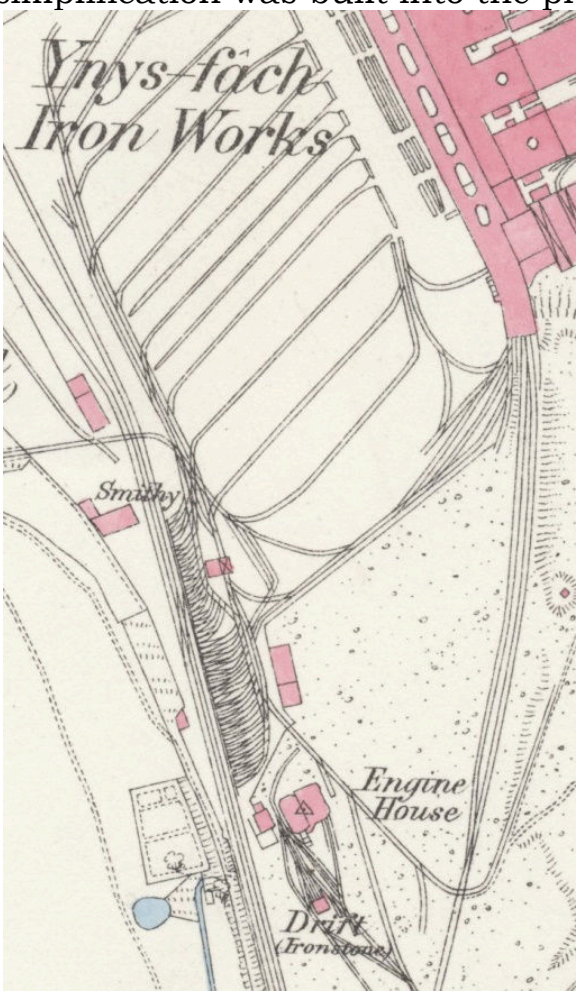
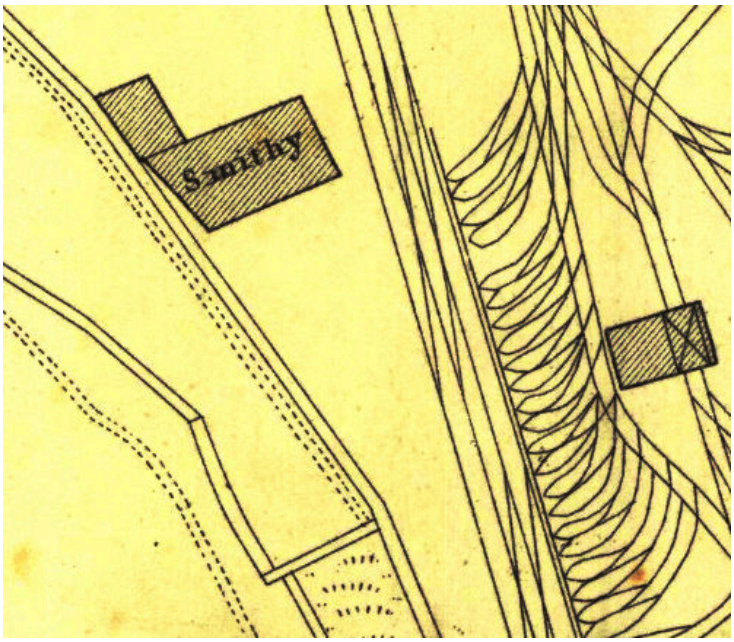


Figure 3 (left). Tipping arrangements on Glamorgan 12.5
Figure 4 (below). An extract from the corresponding 1:500 - Glam 12.5.2. [Courtesy of NLS]



two lines for a wall and two lines for a road; the tracer has simplified this to one line for the wall and one broken line for the far side of the road. Less creditably, the tracer has omitted the standard-gauge crossover next to the smithy, while retaining the one further south. Turning to the tipping arrangements shown on the 1:500, these are consistent but highly singular. Each diverging track leads to a pair of mouchette shapes which share a common line for about eight feet. One can picture what would happen in a dreamlike way. The horse pulls the tramway wagon round the loop. In the process, the right hand wheels move ahead of the left-hand wheel; the wagon pirouettes, discharging its load into the truck below; and it continues with the right-hand wheel now on the left-hand rail and vice-versa. But this can

scarcely work with more than one axle, so are these single-axle trucks, like a farm cart?

Whatever the draughtsman was trying to depict at 1:500, the tracer was utterly baffled: the 25-inch merely shows a Y-shaped divergence. And none of this reaches the six-inch at all: the detail is just too fine. The unfortunate consequence is that anyone relying on the six-inch has no idea that anything is being transferred from tramway wagons to the standard-gauge line at this point.

Let us move - sadly, perhaps - from pirouetting carts to the accuracy of hand-colouring. It seems likely that, for rural areas at least, each time a batch of a particular sheet needed to be coloured, a *model* was prepared by reference to the fair drawing and carefully checked; and then the colourists would do a series of smaller batches, limited by the amount of working space where maps could be spread out. Let us focus on the boy - for this was low-grade work - doing carmine. He looks at a small area of the model - a street, perhaps, or a farm with its sundry outbuildings. He notes which buildings he needs to colour. He the applies colour to those, doing in turn all the copies spread out. He then goes back to the model and takes the next small area, and so forth until the whole area of the model is covered. If he mis-remembers which buildings are to be coloured, this mistake is liable to be made on every sheet in the small batch. It follows that if we want to measure reliability in colouring, we should not compare two specimens from the same batch, because they might well exhibit the same error. In contrast, two specimens from different batches – i.e. done in different months - should provide a reliable test.

Conveniently, the S Wales collection included three pairs of duplicate sheets, and in each case the colouring had been done at different dates. Two of the pairs exhibited a couple of discrepancies. An example is shown in *Figure 5*, where (5b) is from a re-zincographing. Note the different styles of tree stamps used. Note the change in proportions of the SW outbuilding of Aber-nant-clydwaun; that was the sort of thing that tracers were particularly liable to distort. But the real purpose of the comparison is the building in parcel 802, coloured in (5a), uncoloured in (5b). *Figure 6* shows a different sort of error. A little NW of '576' are two small buildings - perhaps for animals - each with an adjacent pen. In (6a) the buildings lie south of the pens, in (6b) north of the pens.

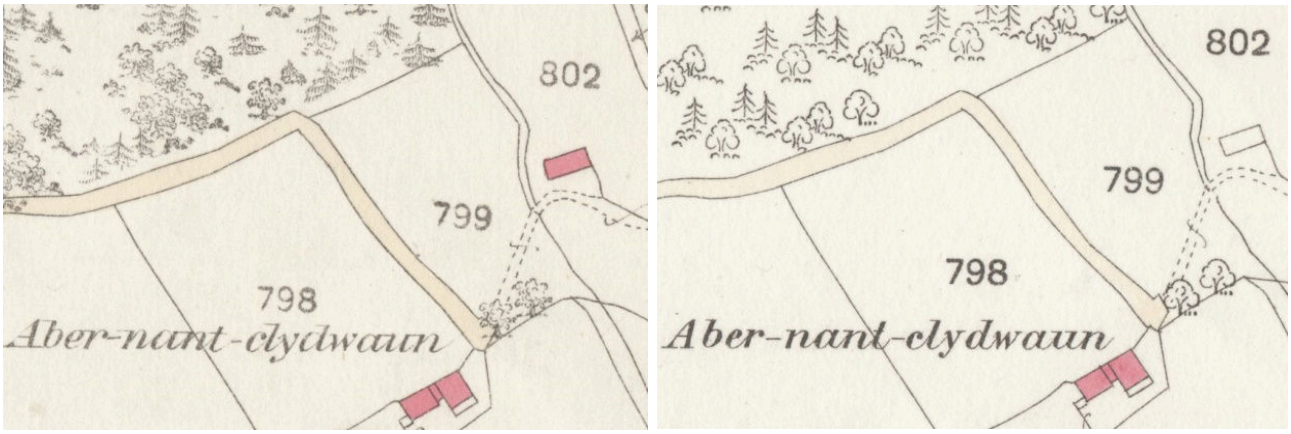


Figure 5. Two states of Glamorgan 34.8

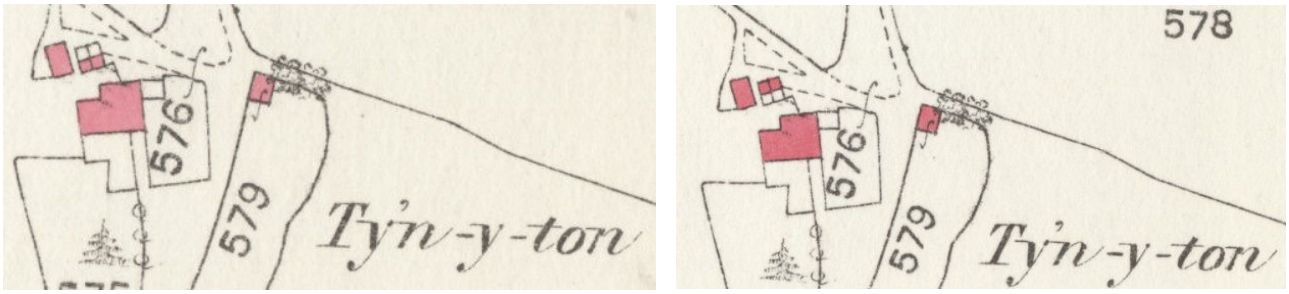


Figure 6. Glamorgan 34.4: specimens from two colouring batches of the initial zincograph.

The sheets in question are quite rural, each having about 50 buildings - defined as a carmine-tinted structure, possibly with internal divisions. Thus we seem to have an error rate of some 1 or 2 percent. This is low enough for users to proceed on the assumption that colouring is correct, unless they have reason for believing the contrary, in which case they should find another specimen, preferably with a different colouring date, as a check.

Finally, how should one describe one of these sheets? Because these S Wales sheets seem to be described completely by the marginalia, it seems that, apart from the sheet number, just five dates are needed - many of which will have blank entries:

a. date of publication (and first zincographing)
b. date of re-zincographing
c. date of reprinting
d. date of helio or other photographic reproduction, and
e. date of colouring.

(c) will normally only apply to sheets where the zinc plate was retained, so will only be found in conjunction with (b) in cases (if there are any) where an initial decision not to retain the plate was reversed after a subsequent zincographing. (d) is inapplicable for all the sheets in the collection examined but almost certainly occurred later on. With (e) it will be necessary to distinguish between a blank because the sheet is uncoloured and a blank from the period when stamping of coloured maps was suspended, about Oct 82 to Sep 83.

Such a scheme is likely to be quite generally applicable to 25-inch sheets from 1875 onwards, with the caveat that it may not capture all the characteristics of a map. *Figure 1* provides a good example. The later specimen offers us a publication date and a reprint date (1894), but it is quite evident that it has been re-zincographed. So do we have a change of terminology so that what in earlier years would be described as 're-zincographed & printed' is now just 'reprinted'? Or was there an intermediate zincographing whose plate was retained and reprinted in 1894? I am inclined to suppose the former, having observed that in Leicestershire the tree stamps we see in *Figure 1* only appeared in 1894. But this is less than absolute proof: I am conscious that changes in tree stamps did not take place simultaneously across the country.

William Yolland's notable contribution to the Ordnance Survey 1841-1852

David L Walker

Michael Cory's thorough and readable article on the Lough Foyle baseline (*Sheetlines* 130) was nicely complemented by Karen Rann's delightful insight into early contouring on the other side of the Inishowen Peninsula. But Michael Cory unsurprisingly skips William Yolland's lengthy account within his Lough Foyle paper of 'the various methods of computation followed on the Ordnance Survey.' [1]

Yolland's account is crucial in providing a full description of his basis for calculations after 1845 of the latitude and longitude of the principle [*sic*] and secondary points of the triangulation; of some Scottish initial points for the county meridians; and of the corners of Ordnance Survey one-inch maps and six-inch plans. Importantly, it also includes his surprisingly forthright account of mistakes made in earlier years.

The initial triangulation of England, Wales and Southern Scotland was related to nine different meridians, which resulted in the fragmented network shown in Figure 1.[2] This was unified as a result of the innovations managed by Yolland in the 1840s. These created a single network, related to Airy's figure of the earth, that remained in use for another century. This provided the basis for AR Clarke's adjusted network, but this was not adopted for the survey.

This article summarises and illustrates the significant and enduring changes managed by Yolland over this period. It is documented from the substantial but incomplete records that survive in The National Archives, and takes account of other research by members of the Charles Close Society. [3]

Doubts within the Ordnance in the 1830s

Thomas Colby, intent on overtaking the French, seemed ready to ignore the figure of the earth based on the French and Indian baselines published by William Lambton in 1818; the defect in Ordnance latitudes found by John Tiarks in 1824; doubts over any reliance on observations of Polaris expressed by Captain Kater in 1828; and further work on the figure of the earth published by Professor George Airy in 1830.

However, Lt Hastings Murphy of the Ordnance apparently decided in 1830 (with the knowledge of Captain Robe) to recalculate latitudes and longitudes provided to the Admiralty to accord with Lambton's figure of the earth. On this basis he provided three positions near the Scottish border that differed by about 30 seconds in longitude from those published for the Ordnance in 1811. On the other side of the country, Captain Henderson was working on his

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1 Capt William Yolland, *An Account of the Measurement of the Lough Foyle Base in Ireland,* Ordnance Survey, 1847. His account of 'the various methods of computation' is at pp 144-151 and Appendices XII and XIII.

2 David L Walker, *A Fresh Look at the initial Ordnance triangulation etc, Sheetlines* 117, April 2020, 9-22

3 The writer's assistance from *Projections and Origins collected writings of Brian Adams* (CCS 2006) and *The Ordnance Survey in the Nineteenth Century* by Richard Oliver (CCS 2014) is too broad to footnote adequately.

triangulation of the Irish Sea, and in 1836 he provided positions for Criffell and Bengairn that were calculated on Airy's figure of the earth.

When Captain FW Beechey RN, an experienced hydrographer, sought a proper explanation of the differences between Henderson's figures and those published in 1811, Captain Robe RE had to respond that *'he must not communicate Col Colby's formula'* for the length of a degree and the ellipticity of the earth.[4]

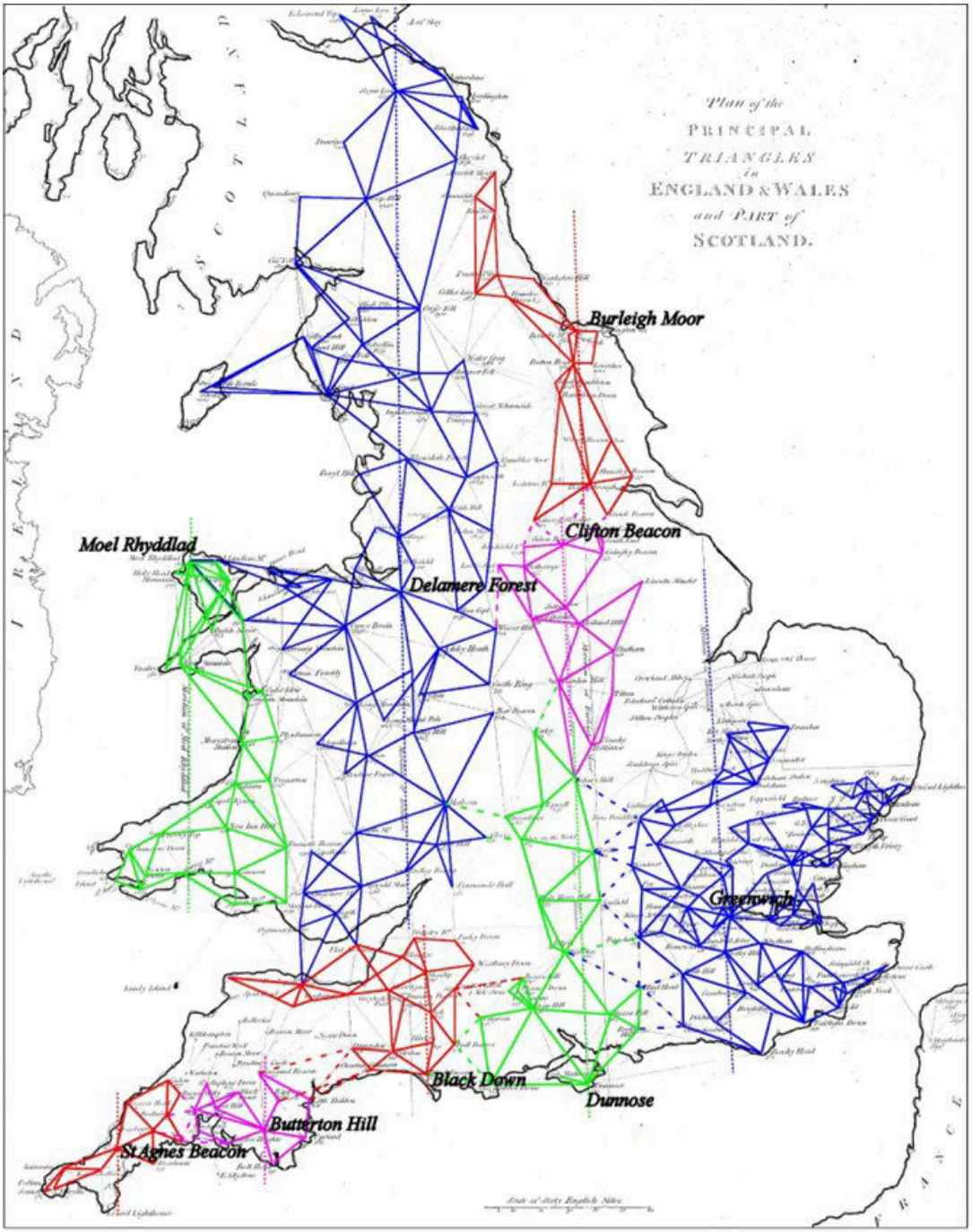


Figure 1. The initial triangulation as completed by 1811(Faden Volume III Plate I)

4 David L Walker, *The Ordnance Survey and Airy's figure of the earth*, *Sheetlines* 119, December 2020, 6-17.

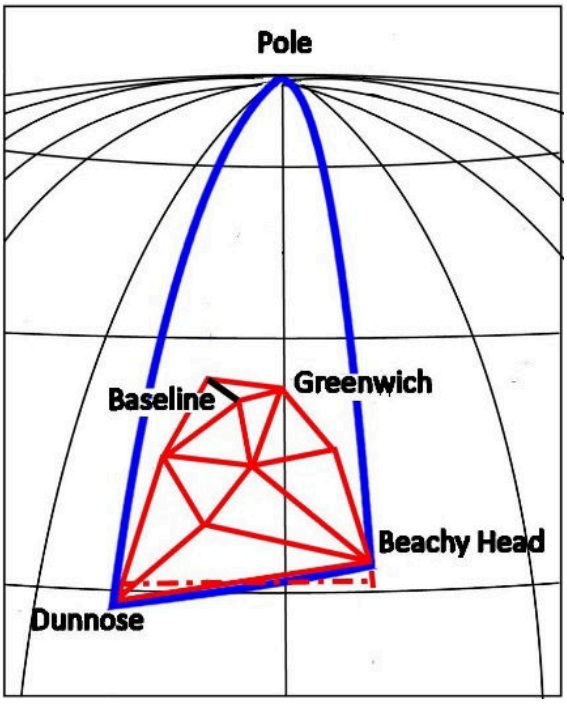
Perhaps it was Beechey's challenge that led Colby in 1841 to seek advice from Airy, by then Astronomer Royal, on the calculation of latitude and longitude based on a unified spheroidal model of the earth, instead of the separate meridians used previously. Airy tested his model against a circuit of the Scottish triangulation, largely observed by Colby, and he later collaborated with Yolland's mathematical team, enabling them first to test and then in 1847 to publish their slightly different version of Airy's spheroidal calculation.

As this article mentions Thomas Colby's failings (like William Mudge's) in not taking account of very relevant external advice, it is only fair to highlight his tenacity in the field, his endurance in dealing with the Treasury and his loyal support of William Yolland.

Yolland's indictment of the past, published in 1847

It was immediately after Colby's retirement in 1847 that Yolland's 'exhibit' of the various methods of trigonometrical computation, including his new model, was published within his account of Lough Foyle baseline. This timing avoided intervention by either Thomas Colby or his successor, Lewis Hall, but it unfortunately may have reduced attention to Yolland's spheroidal model, which was crucial to the future of the trigonometrical survey.

Remarkably, this 'exhibit' included a stringent critique of parts of the previous Ordnance triangulation. After a silence necessary for as long as he reported to Colby, Yolland's promptness in 1847 in publishing his account of previous mistakes perhaps reflected his built-up frustration as well as a wish to clear the slate for the future. To understand this critique, it is useful first to note how the length of a degree of longitude was estimated in 1795.



Having measured the distance between Dunnose and Beachy Head by triangulation, William Mudge and Isaac Dalby estimated the difference in longitude between these points from observations of the pole star, as in *figure 2*. But others expressed doubts over this approach.

John Playfair in 1798 warned that irregularities of up to 10 or 12 seconds in the gravitational attraction on a plumbline could arise from variations in underground strata as well as the surface terrain, and Captain Kater in 1828, discussing unavoidable inaccuracies in making observations of the pole star, concluded such observations 'for the purpose of determining the length of a perpendicular degree in our latitude, are wholly unworthy of credit.' [5]

Figure 2 Illustration of Longitude calculation based on Phil Trans Roy Soc 1795 Tab XLV figure 3

5 David L Walker, *The Ordnance Survey and Airy's figure of the earth*, *Sheetlines* 119, December 2020, 6-17.

Yolland's crucial criticism in 1847 was that the calculations for the trigonometrical survey had been made to depend entirely on elements derived from the work itself. No attempt had been made to combine these with the results of similar operations in other countries to determine a figure of the earth.

Moreover, tables of the lengths of degrees on and perpendicular to the meridian were calculated for all other latitudes from the number of fathoms in a degree on the meridian only 'for a certain latitude' and from the number of fathoms in a degree perpendicular to the meridian only 'for a certain latitude'.

Yolland's culminating indictment of the past was that '*Unfortunately for the accuracy which might reasonably be expected from the results furnished by a Trigonometrical Survey, executed with very superior instruments and great skill, the length of a degree perpendicular to the meridian was mainly determined by the reciprocal Azimuthal observations made at Dunnose and Beachy Head stations.*' He explained that the more important errors resulted from inaccuracy in the Azimuthal bearings [by reference to the pole star] and/or gravitational deflection of either or both of the plumb lines required. Also, instead of using all the observations of Polaris, as only some had been selected, '*The principle of selection in this case had probably done more damage than in any other.*'

His devastating conclusion was that all Longitudes calculated by the Survey [since 1795] '*being dependant [*sic*] on the length of a degree perpendicular to the meridian largely in error, are in defect about 1/300 part of their distance East or West of Greenwich.'*

Yolland seizes the initiative in the 1840s

Seymour's 'official' history of the Ordnance states that '*Clarke completed the work begun by Yolland, perfecting the methods that were used and directing the computations. The adjusted geodetic network was known as the Principal Triangulation, a term taken from Clarke's eight-hundred-page quarto volume … published in 1858.'* This tends to create the misleading impression that after 1858 the topographical survey was based on Clarke's adjusted network, although it is qualified by the statement that *'The work of improving and strengthening the primary triangulation continued under Yolland during the 1840s and was eventually completed in 1852.*

The spheroidal calculation model published by Yolland has been explained in several different sources and apparently it was slightly modified over subsequent years. The model as it was used in 1847 and recorded in TNA OS 2/647 is analysed in the Appendix and is shown there in figure 18 for the calculation of the latitude and longitude of Ben Lawers from Hartfell.

This model was put to use from about 1845 for the several stages of calculation that preceded the publication of Ordnance maps and plans, including:

1. re-calculation of the latitudes and longitudes previously adopted for the principle [sic] points of the triangulation, using updated observations and on the basis of Airy's figure of the earth;

2. calculation on the same basis of other county origins, and of secondary points, including coastal points for the Admiralty Hydrographer[6] and for astronomical observatories; and
3. calculation of the latitudes and longitudes of Ordnance sheet corners.

Whereas these latitudes and longitudes were calculated on the spheroidal model of the earth, local trig points, also recorded in the volumes catalogued in TNA section OS 2, continued to be calculated by plane trigonometry and projected on the rectangular spheroidal or Cassini co-ordinates used in previous years.

Much of this work survives in the national archives. However, this writer's hope of finding every step in this process was frustrated, partly by the random loss of files resulting from the wartime bombing of the records at Southampton, but more by the selection of records for preservation in slices chosen 'horizontally' rather than 'vertically'. For example, voluminous records have been kept of the calculation of sheet corners, but no-one seems to have considered the preservation of a sample of field calculation books.

Nevertheless, the catalogue index to the National Archives at Kew is magnificent. It brings together that which is available and, importantly, indicates what is not available. This article also draws upon the British Library, the UKHO archive at Taunton and the RGO records from Greenwich now held in Cambridge. It illustrates only a small proportion of the work managed by Yolland in the 1840s, and perhaps others will be ready to remedy this writer's mistakes and ignorance of other sources.

The Cart changes place with the Horse

For fifty years the Ordnance first calculated the position of their trigonometrical stations in 'rectangular spheroidal' or 'Cassini' co-ordinates on great circles of the earth, and from these they afterwards calculated and tabulated their latitudes and longitudes. But this order was reversed around 1845. Before and after, the procedures compare as follows:

Before about 1845	**After about 1845**
1. Triangulation from south to north related to about nine meridians on nine origins.	1. Triangulation over a single network related to the Salisbury and Lough Foyle baselines.
2. Positions calculated at vertices of plane triangles on segments of nine irregular polyhedra.	2. Positions calculated at vertices of spheroidal triangles on the surface of a single spheroid.
3. Lengths of degrees of latitude calculated entirely from observations made in 1795.	3. Lengths of degrees of latitude and longitude calculated from Airy's figure of the earth.
4. Positions calculated as Cassini co-ordinates,	4. Positions calculated as latitudes and longitudes,
and 5. later converted to latitudes and longitudes.	and 5. then converted to Cassini co-ordinates.
6. Six inch topography adopted Cassini sheetlines.	6. Six inch topography adopted Cassini sheetlines.
7. No indication of latitude and longitude.	7. Sheetline graticule shows latitude and longitude.

6 *UKHO, LP1857 Y contains Yolland's letters; those from the Admiralty Hydrographer are in UKHO, LB 10 to LB 14.*

Yolland's Principle [sic] Points

The completion in 1852 of Yolland's work '*of improving and strengthening the primary triangulation'* was marked by his removal to Ireland. Fittingly, it was also marked by the exhibition of his updated triangulation of Great Britain and Ireland (figure 5) at the Great Exhibition of 1851.

So far as we know, only two (slightly different) copies of this diagram survive, in the British Library and the National Library of Scotland.[7] Perhaps because of its similar title, it has more than once been confused with the more numerous copies of AR Clarke's diagram of his Principal Triangulation published in 1858.

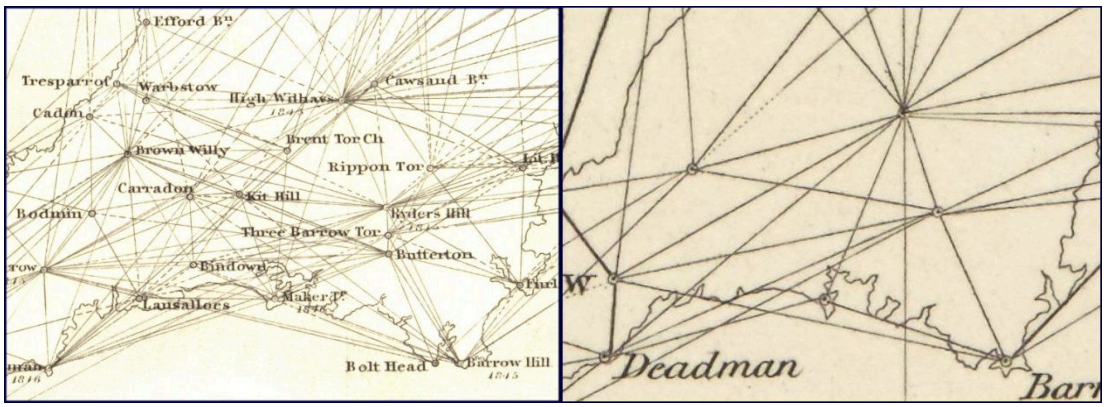


Figure 3 (left). Part of Yolland's triangulation diagram 1851.
Figure 4 (rt). Part of Clarke's triangulation diagram 1858.

In 1858, Clarke's refinement of Yolland's triangulation combined 'all' observed bearings using least squares analysis to satisfy all geometrical relations of the figure, although he chose to exclude bearings from a number of stations in some parts of the country as shown in figures 3 and 4.

In TNA OS 2/647 points included in the 1851 diagram were at first described as 'principle points', accidentally providing a distinction from AR Clarke's Principal Triangulation published in 1858. TNA OS 2/647 includes pages of calculations to test alternative models of spheroidal trigonometry and to build reference tables for the application of Yolland's model. With TNA OS 2/648, it also includes re-calculation of the positions of many triangulation points. The random survival of the calculations of the positions of Yolland's 'principle points' arises from the random survival of the Ordnance records preserved in the National Archives (now more of these at Harrogate than at Kew). However, confirmation that the Ordnance continued for a century to rely upon the calculations initiated by Yolland's team, unaffected by Clarke's magnificent but frustrated exercise in least squares analysis, comes from TNA OS 2/616.

Overleaf : *Figure 5 'Diagram shewing the Principal Triangulation of the Ordnance Survey of Great Britain and Ireland',previously undated, British Library, Maps 1105(15) and National Library of Scotland, Map.Area.C16(144).*

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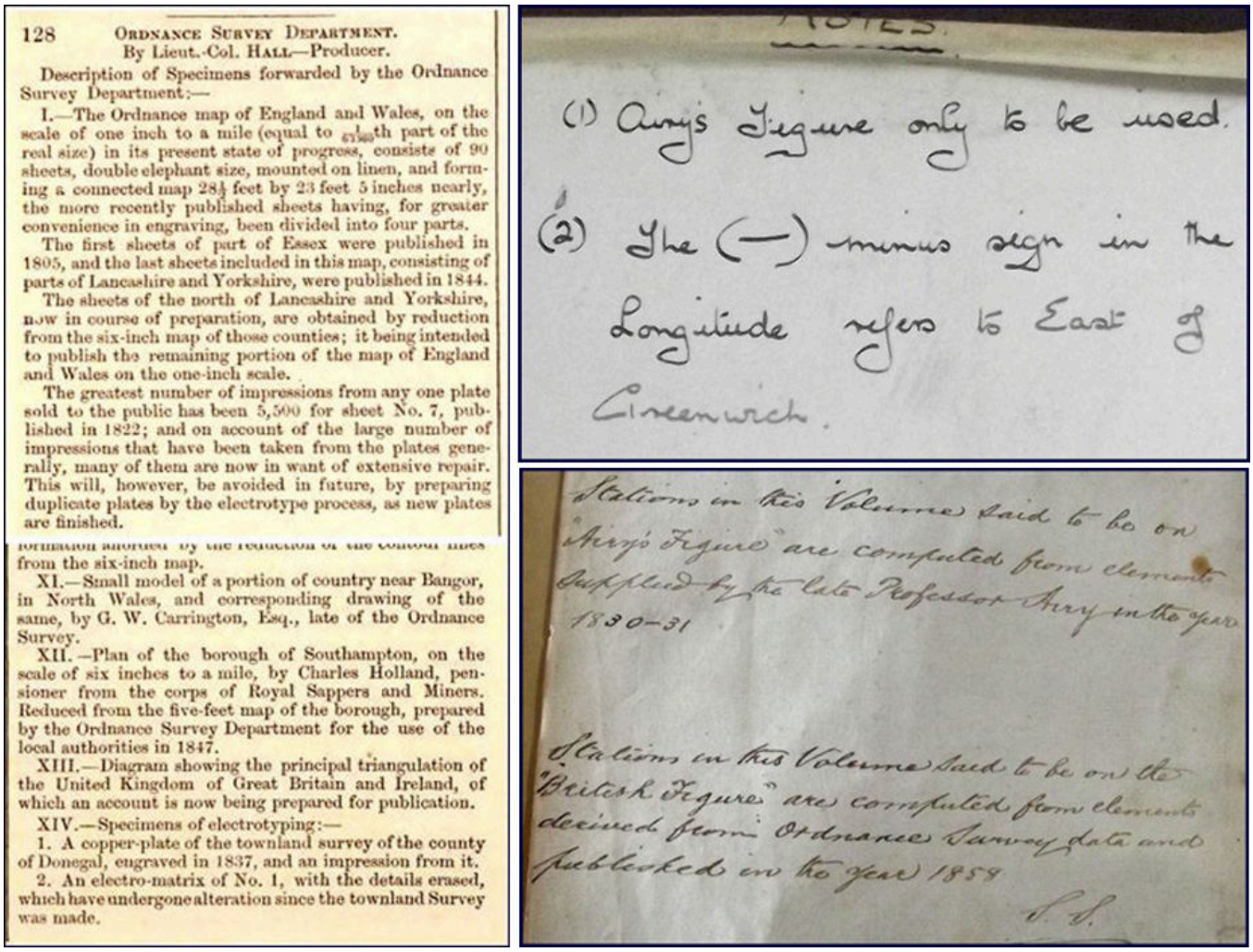
7 David L Walker, *The Ordnance Triangulation shown at the Great Exhibition of 1851*, *Sheetlines* 129, April 2024, 42 and Item XIII in Figure 6 (extract of the Official catalogue) from the Smithsonian Institution's website.



128 ORDNANCE SURVEY DEPARTMENT.
By Lieut.-Col. HALL—Producer.

Description of Specimens forwarded by the Ordnance Survey Department:—

I.—The Ordnance map of England and Wales, on the scale of one inch to a mile (equal to $\frac{1}{63360}$th part of the real size) in its present state of progress, consists of 99 sheets, double elephant size, mounted on linen, and forming a connected map 28½ feet by 23 feet 5 inches nearly, the more recently published sheets having, for greater convenience in engraving, been divided into four parts.

The first sheets of part of Essex were published in 1805, and the last sheets included in this map, consisting of parts of Lancashire and Yorkshire, were published in 1844.

The sheets of the north of Lancashire and Yorkshire, now in course of preparation, are obtained by reduction from the six-inch map of those counties; it being intended to publish the remaining portion of the map of England and Wales on the one-inch scale.

The greatest number of impressions from any one plate sold to the public has been 5,500 for sheet No. 7, published in 1822; and on account of the large number of impressions that have been taken from the plates generally, many of them are now in want of extensive repair. This will, however, be avoided in future, by preparing duplicate plates by the electrotype process, as new plates are finished.

formation shortly by the reduction of the contour lines from the six-inch map.

XI.—Small model of a portion of country near Bangor, in North Wales, and corresponding drawing of the same, by G. W. Carrington, Esq., late of the Ordnance Survey.

XII.—Plan of the borough of Southampton, on the scale of six inches to a mile, by Charles Holland, pensioner from the corps of Royal Sappers and Miners. Reduced from the five-feet map of the borough, prepared by the Ordnance Survey Department for the use of the local authorities in 1847.

XIII.—Diagram showing the principal triangulation of the United Kingdom of Great Britain and Ireland, of which an account is now being prepared for publication.

XIV.—Specimens of electrotyping:—

1. A copper-plate of the townland survey of the county of Donegal, engraved in 1837, and an impression from it.
2. An electro-matrix of No. 1, with the details erased, which have undergone alteration since the townland Survey was made.

NOTES.

(1) Airy's Figure only to be used.

(2) The (—) minus sign in the Longitude refers to East of Greenwich.

Stations in this Volume said to be on "Airy's Figure" are computed from elements supplied by the late Professor Airy in the year 1830-31

Stations in this Volume said to be on the "British Figure" are computed from elements derived from Ordnance Survey data and published in the year 1858

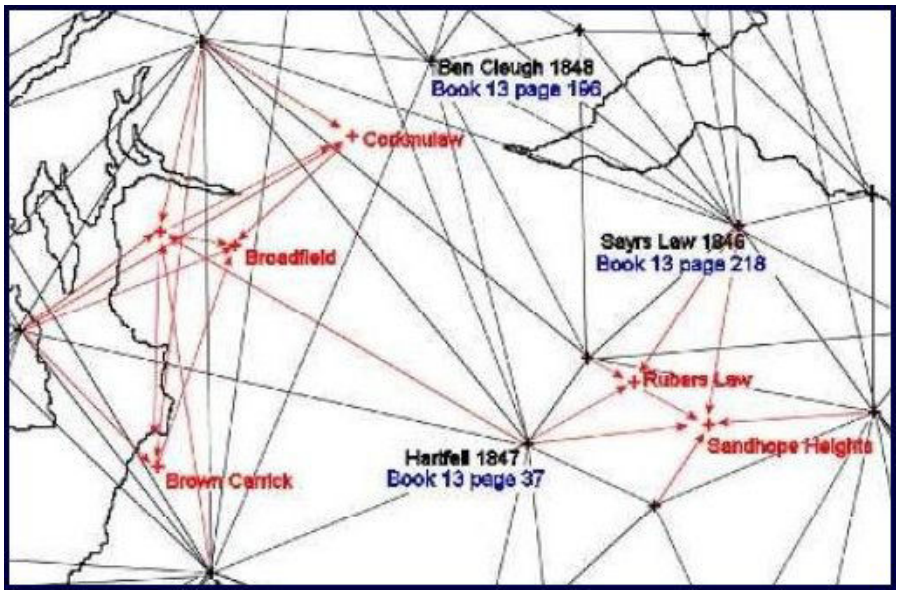
Figure 6 (left). Extract from Official descriptive and illustrated catalogue, Great Exhibition of 1851, Volume 1, 341-342. Figure 7 (top right). Note within TNA OS 2/616. Figure 8 (bottom right). Note attached to the cover of TNA OS 2/616.

As shown in *figure 7*, this well-worn listing of the latitude and longitude of Ordnance Survey stations includes one list calculated by Yolland and his successors from Airy's figure of the earth published in 1830, and another list calculated from AR Clarke's adjusted figure completed (too late) in 1858. The note inside the cover (figure 8) presumably reflected a disinclination to recalculate and adjust the use of existing reference tables already based on Airy's figure.

County Origins and Secondary Points

It is difficult to find any logical order within the 'Projection Books' in OS 2 and the order of their contents mainly seems to reflect the priority of the work as it came in, and the persons to whom it was allocated. The catalogue description for TNA OS 2/648 (Projection Book Number 16) is particularly variegated, covering the Latitudes and Longitudes of six-inch sheet corners of ten counties of England and Scotland; Latitudes and Longitudes of the Minor Points of England; Latitudes and Longitudes of the Initial Points of Scotland; Latitudes and longitudes of one-inch sheets in England and Scotland; and Co-ordinates of the Principal Points of Scotland.

To find the composition of the Minor Points of England we still need someone to work through this book (after taking care to order it from Harrogate a week beforehand). The Initial Points (or County Origins) of the six inch plans are more familiar, from Brian Adams' *Projections and Origins*.



Unlike OS 2/647, latitudes and longitudes of some initial points in southern Scotland were calculated from four or five 'principle' points and simply averaged. This is shown at Rubers Law, for example, in OS 2/648 page 244. Although averaging was to the distaste of one later commentator, it was presumably felt not unreasonable to average results already within a range of a few thousandths of a second, and these figures survived within Scottish county origins.

Figure 9 (above). Scottish county origins calculated in TNA OS 2/648 (Projection Book No 16 dated 1856)

Latitudes and Longitudes of Sheet Corners

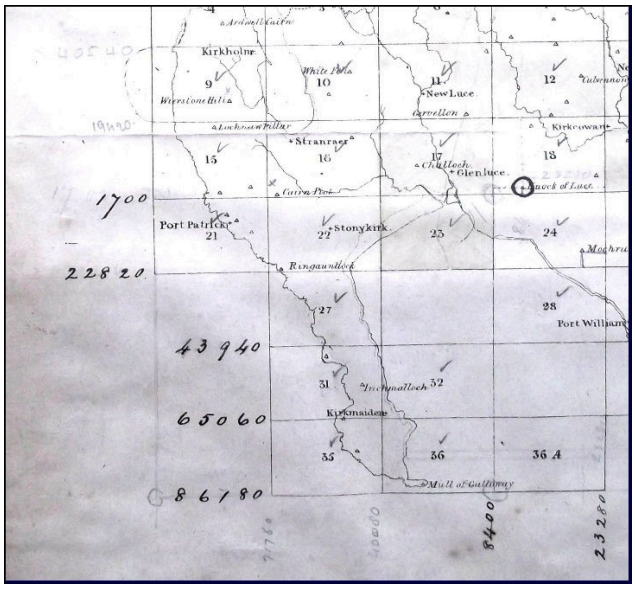
Their correspondence demonstrates that Captain Yolland, as he then was, enjoyed a very cordial relationship with George Airy, the Astronomer Royal.[8] However, 'it had long been urged as a complaint' by Airy and others that latitudes and longitudes were absent from Ordnance maps. Becoming confident after 1845 of the methodology to put this right, Yolland tackled the margins of the six inch series, starting with Yorkshire and Lancashire in England and Wigtownshire in Scotland. Wigtownshire provides a convenient example as the documents are clearly dated in 1846 (and it is a much smaller county).

The Knock of Luce provided the county origin and its central meridian. After the county boundary had been clearly identified, on the coast and inland, the layout of the 6 inch sheets would have been decided to best advantage, and slightly adjusted to place Knock of Luce at a round number of feet from its own sheet boundaries, as in figures 10 and 11.

The latitude and longitude of each sheet corner was calculated in turn, employing Yolland's methodology, using its distance and azimuth from Knock of Luce calculated by Pythagoras and tangent respectively. Thus, for example, the relative co-ordinates of the NW corner of sheet 11 are 40,540 ft north and 71,760 ft north respectively, equal to a distance of 82,419.6 ft and azimuth of

8 Correspondence with Col. Yolland, *Papers of George Airy,* RGO 6/416 & 417, Cambridge University Library.

60 degrees 32 min 10.4 secs from Knock of Luce, and these figures were used in the following calculation, shown in *figure 12*. The outcome for this particular sheet corner is shown in *figure 13*.



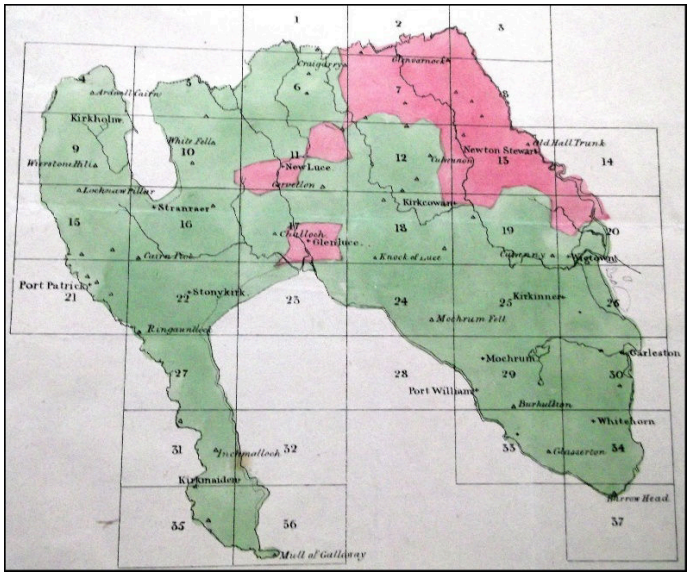
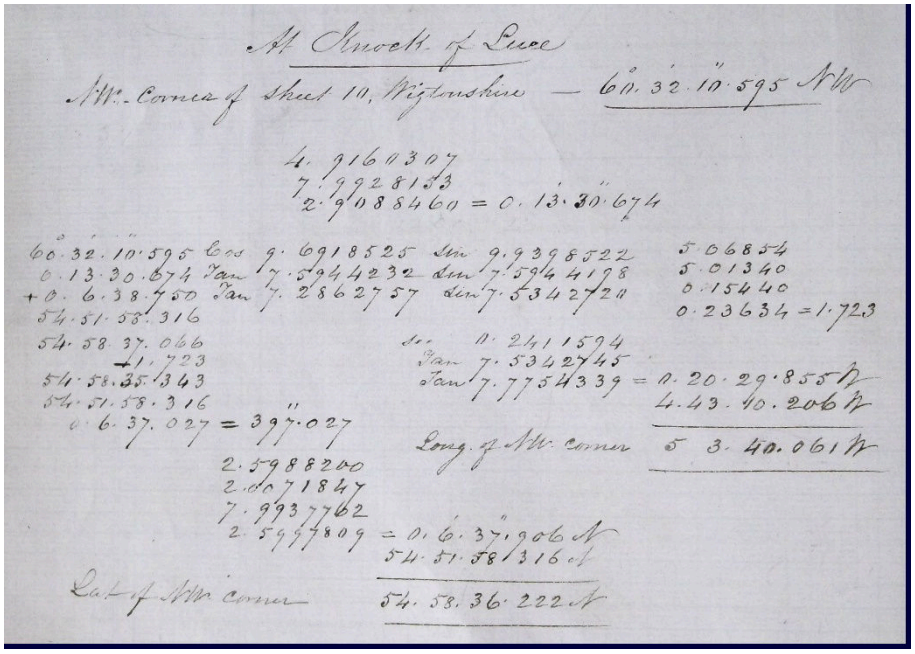


Figure 10 (left). [part of] Index (undated) showing the state of the Ordnance Survey in Wigtonshire, from OS 2/683. Sheet 36A, if used, would have contained Great Scare Rock (shown on NLS website Admiralty Chart 1971 publ 1846).

Figure 11(right). Index (same title but dated 5 Dec 1846), from OS 2/683 County Sheet Book Wigtownshire 1845-1846.



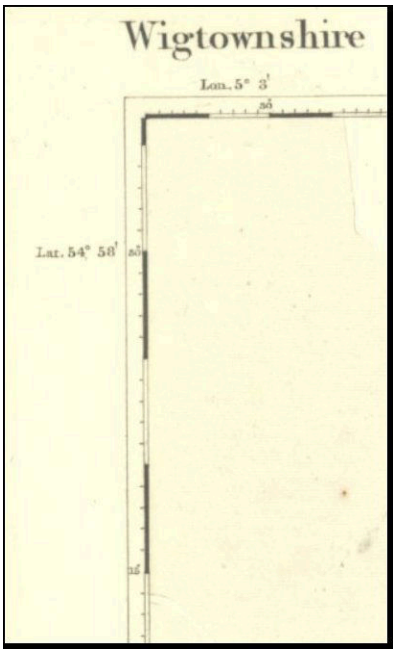
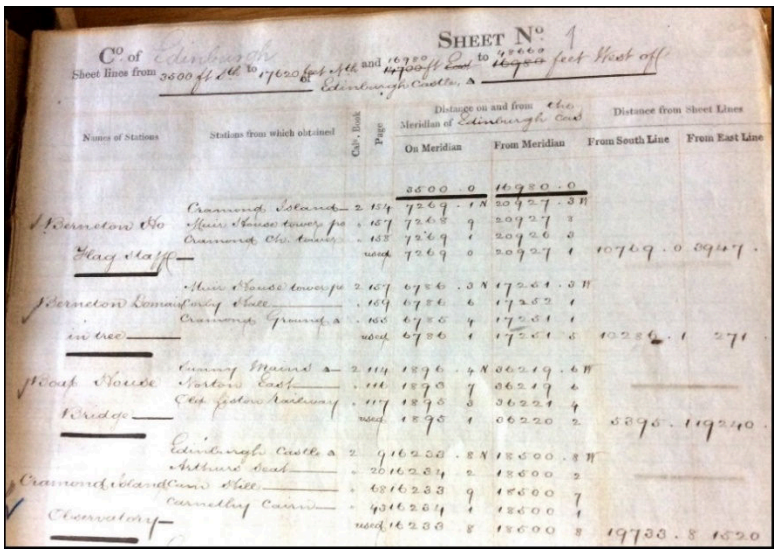


Figure 12 (left). Calculation sheet for Wigtownshire Sheet 10 NW corner. Figure 13 (right). NW corner Sheet 10 (from NLS)

Co-ordinates of Local Points

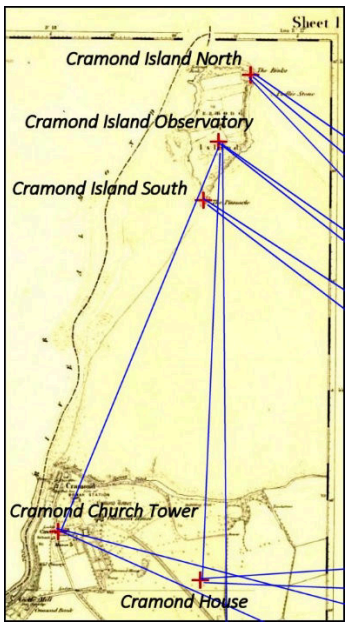
Under the revised procedure adopted after 1845, the positions of principal and all other points to be used to define local trig points were converted from latitude and longitude to 'rectangular spheroidal' or 'Cassini' co-ordinates. This

procedure used the extensive conversion tables that were later published in *Methods and Processes*[9] and was documented eg in OS 2/648.


SHEET No. 1

This meant no change was required in the plotting of local trig points for the topographical survey. These were calculated as if on a plane surface, and plotted on rectangular spheroidal or Cassini sheetlines. Field books showing how local observations were calculated as the sides and angles of local triangles are hard to find, but a final stage is indicated in this example for Cramond Island, that some readers will have observed on the approach to Edinburgh Airport (*Figure 14 (left). From TNA OS 2/674 County Sheet Book Edinburghshire.*

A lower part of the page shown in *figure 14* lists the additional points shown in *figure 15*, and the points from which these were measured are shown in *figure 16*. But this routine is disappointing in revealing only one side of the lowest order triangles of the trigonometrical survey. If these depended on narrow angles (which is unclear), this may have been because Edinburghshire Sheet 1 made an isolated start within its part of the topographical survey.



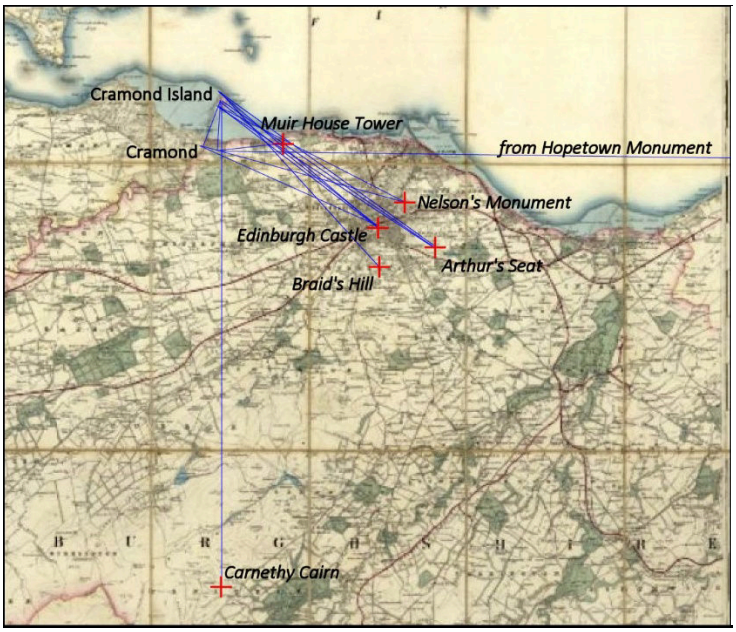


Figure 15 (far left). Cramond Island trig points.
Figure 16 (left). Trig points from which Cramond Island was observed.

9 Ordnance Survey, *Account of the Methods and Processes adopted for the production of the maps of the Ordnance Survey of the United Kingdom,* 1875. This is informative, but confidence is weakened by statements that 'all the north and south edges of the [six inch] sheets are by construction parallel to the meridian of the county' and 'for calculation of the triangulation all observed bearings were combined using least squares'.

Conclusions and Acknowledgements

Alongside the work outlined above, William Yolland fostered the Survey's relations with the Astronomer Royal, George Airy, and the Admiralty Hydrographer, Francis Beaufort. Also notable was his publication of past and current work, including that covered by the Appendix.

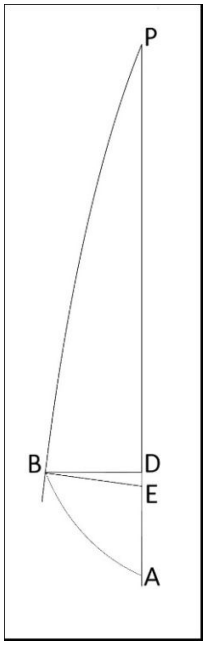
In 1854 Major Yolland became an inspector of railways and from 1877 was personally effective as Chief Inspector of Railways until his death in 1885. His distinguished career is recorded in the Dictionary of National Biography, unlike that of his nemesis, Lewis Hall.

The writer warmly thanks Rob Wheeler, Chris Fleet at the NLS, Anne Taylor at the CUL, and the staff of The National Archives for their assistance and encouragement.

Appendix

Yolland's method for point to point calculation of latitudes and longitude

In 1847 Yolland explained this new procedure in the six steps summarised below.[10] Early applications of the procedure appear, for example, in TNA OS 2/647, and its use from Hartfell in Dumfriesshire to Ben Lawers in Perthshire is illustrated in figure 18.



In Yolland's explanation and in figure 17, P is the earth's pole and A a point of known latitude and longitude on a longitudinal meridian PA. The aim is to determine the latitude and longitude of point B on the meridian PB, having observed the azimuthal bearing PAB of B from A, and having calculated the distance AB by triangulation from a measured baseline.

All triangles are spherical triangles unless otherwise stated. BD is an arc of the great circle through B that intersects the meridian PA at 90 degrees at D whereas BE is an arc of the parallel of latitude through B that intersects the meridian PA at E.

Figure 17 Sector of the earth's spheroid as adopted for Yolland's calculation procedure.

1. Step 1 was to convert AB to seconds of arc using any approximate radius of the earth and solve ABD as a spherical triangle right-angled at D to calculate arcs AD and DB.
2. Then the co-latitude of point D = arc PA (co-latitude of A) less arc AD.
3. Then solve the right-angled spherical triangle PDB to find arc PB, the co-latitude of B or E, and the difference of longitude BPD on the approximate sphere.
4. Take AE in seconds (in latitudes A and B), convert to feet using the approximate radius, and convert feet to seconds on the meridian using Yolland's Table II Appendix XIII for mean latitude of A and B (and hence true difference of latitude on the assumed figure of the earth).
5. Compute BE in seconds (= P*sin DP), convert this to feet with assumed approximate radius, and to seconds of longitude using spheroidal radius of parallel for latitude B (or E).
6. Find PAB+PBA from tan ((PAB+PBA)/2) = cos((PA-PB)/2) times cot (APB/2)/cos((PA+PB)/2) and the azimuth of A from B by subtracting the angle PAB.

This procedure was empirical, the approximate radius being introduced after trying out variations of Airy's suggested procedure until finding one (suggested by one of his team) that returned to the same point after completing a circuit of the triangulation.

Figure 18 shows their calculation of the position of Ben Lawers relative to Hart Fell, annotated in red by the present writer to match the six steps. His notes in *figure 19* nearly,

10 *Yolland, Wm., Account of the measurement of Lough Foyle Base, Ordnance Survey, 1847, 148.*

but not entirely, explain the figures in *figure 18*. From later records it emerges that Yolland and others could not resist making minor adjustments. Nevertheless, the writer hopes that these notes may provide a useful starting point for anyone wishing to take this further.

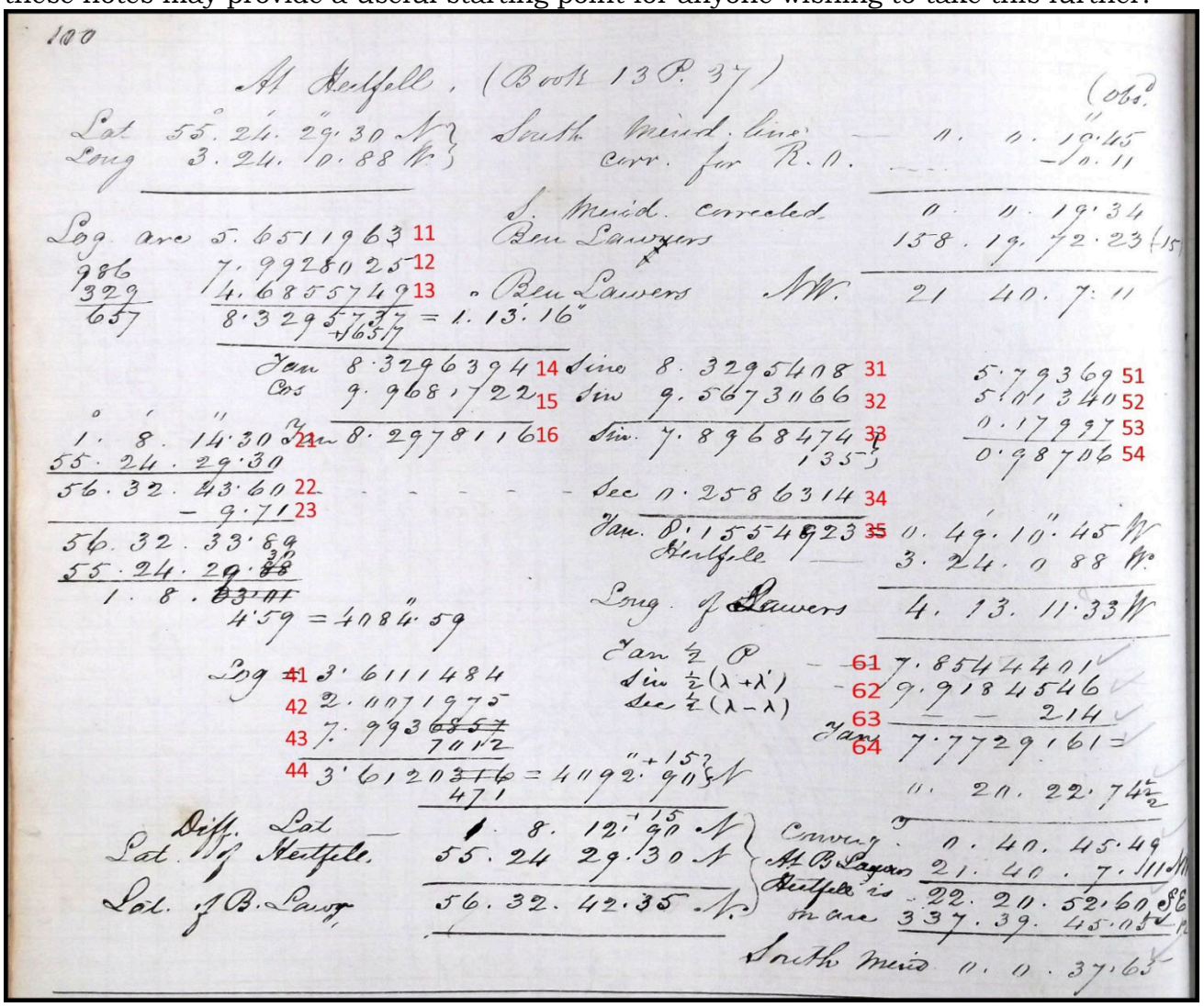


Figure 18. Hartfell to Ben Lawers from TNA OS 2/647, 100.

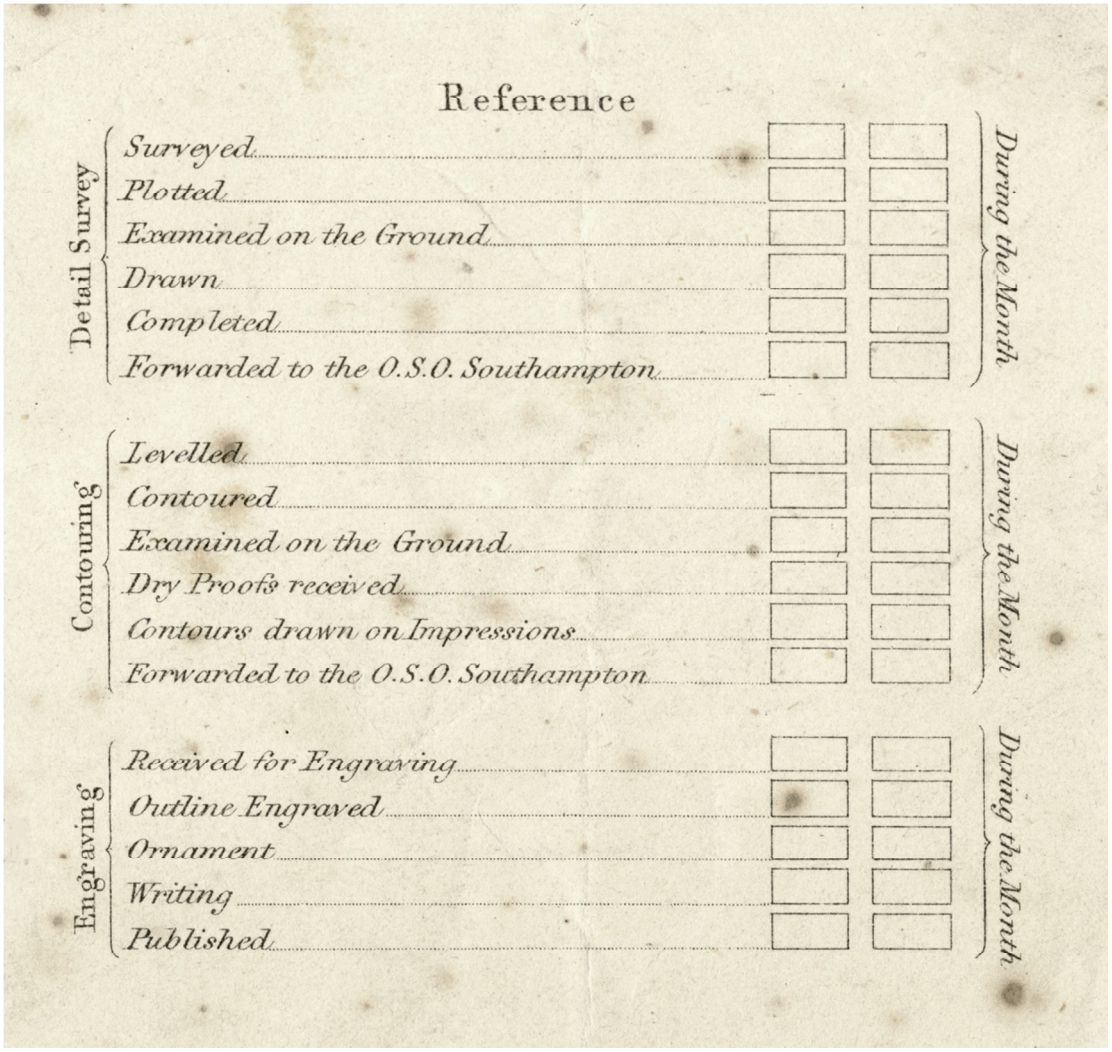
11	log arc AB in ft	447,915.7	Hart Fell to Ben Lawers	31	log sin arc AB*		1°.13'.25.54
12	ft to secs perp to meridian, Lough Foyle,Table II.			32	log sin angle BAD*		azimuth 21°.40'. 7.11"
13	log arc AB in seconds			33	log sin arc BD*		
14	log tan arc AB*		*actually log +10	34	log sec		initial latitude of B
15	log cos angle DAB*		azimuth A to B	35	log tan BPD*		0°.49'.10.45"
16	1°.08'.14.30"	*tan arcDB=tan arcAB.cos angleBAD*		51	step 5		not yet matched
21	AD (initial estimate)		1°.08' 14.30	52	step 5 (cont'd)		not yet matched
22	initial latitude of B (Ben Lawers) on approx radius			53	log tan initial latitude of B (Ben Lawers)		
23	DE (in seconds)		DE from line 54	54	log DE in seconds		to line 23
41	AE initial est	4084.59"		61	=(line35)/2	tangent	0°.24'.35.2"
42	complement/line 12, excludes approximate radius.			62		sine	34°.01'.24"
43	ft to secs on the meridian, Lough Foyle, Table II.			63		secant	0°.34'.7"
44	AE corrected	4093.05"		64		tangent	0°.20'.22.746"

Figure 19. Notes on Figure 18 (Hartfell to Ben Lawers)

The Mid-Victorian 'County Series' production process

Fraser Donachie

I was browsing a map dealer's website recently, hoping to find an engraved 1st edition 1:2500 plan for Glasgow[1], when suddenly something caught my eye. It was a rather mundane-looking index sheet for Essex but I could see that in the bottom right hand corner there was a tabulation of production activities under the heading 'Reference' – see *Figure 1 below*.



I'd never seen this before, so I purchased the index without hesitation. The sheet is titled 'Index Shewing the State of the Ordnance Survey of the County of Essex'. The sheet includes a map of the county at four miles to the inch (1:253,440), 6-inch sheet lines, outlines of parishes (generally with their

1 I wish! A small number of engraved 1:2500 plans were published for e.g. London, Portsmouth and Glasgow between the mid-1850s and the mid-late 1860s. Engraving was, however, not pursued for the majority of the 1:2500 plans that were often produced in small print runs. Lithography was also initially employed but this was very soon overtaken by the use of zincography. Nearly all 1:2500 plans are therefore zincographed or, later, photo-zincographed.

names) and sheet lines for the 1-inch New Series. Dating the index is not straightforward. Whilst it depicts the Colne Valley Railway, opened in 1864, it may date to c.1870.

Having shared *Figure 1* with Richard Oliver and Rob Wheeler, it soon became clear that this is a working index and an artefact of the map production process. It was most likely used at the Division Office serving Essex to track the progress of six-inch map production, as the listed activities are unique to that scale. *Figure 1* suggests that there may have been one working index per six-inch map, as the reporting timescale is 'During the month'. The left-hand boxes could record the start month and the right-hand boxes could record the month of completion. Tracking overall progress for the county across multiple sheets could be achieved by marking or colouring in each rectangle.

Division Offices could be permanent in nature, located in large county towns or cities. They could also be transitory, as the survey work moved from county to county. The OS Annual Reports for 1871/2/3/4 list a Division Office in Brentwood, which is consistent with the survey dates of Essex six-inch maps, so perhaps the Essex index started its life there.

In *Sheetlines* 29 (p27 [p66 on the scans]), Richard Oliver identified a working index for the South Eastern Counties that includes a 'Reference' tabulation similar to *Figure 1* but encompassing six-inch and 1:2500 activities. In *Sheetlines* 31 (p54), Roger Hellyer described two further examples held at the University Library in Edinburgh (presumably still there). The first is for Argyllshire and Bute-shire showing six-inch sheet lines and the second is for the Shetland and Orkney Islands and provides a detailed 'Reference' section that lists the methods and processes being conducted for one-inch, six-inch and 1:2500 production. Roger reproduced this extensive listing in his article and I make no apology for reproducing it again in *Table 1 (below)*.

General Activity	**Specific Activity**
Triangulation	Poled
	Observed
	Computed Trig[onometrical] Distances
	Computed Mer[idianal] Distances
Boundaries	Perambulated
	Sketch Maps Drawn
	Completed
Detail Survey	Surveyed, but Trig. Distances not received
	Trig. Distances received, but not Surveyed
	Surveyed
	Detail Plotted
	Detail Examined on the Ground
	Fair Plans drawn (whether computed or not)
	Finally Examined on the Ground by the Officer

General Activity	Specific Activity
	Forwarded to the Levelling Division
Levelling & Contouring	Town Levelled 1:500 Scale
	Levelled 1:2500 Scale
	Levels inserted on Plans
	Plans forwarded to O.S.O. Southampton
	Six Inch Photos received
	Contoured
	Contours examined
	Six Inch Dry Proofs received
	Six Inch Dry Proofs Contours inserted on
	Six Inch Dry Proofs forwarded to O.S.O. Southampton
Hill Sketching &c.	Hills Sketched
	Hills Examined
	Hills Drawn for Engravers
	Hills Forwarded
Publication 1:2500 Scale	Plans received
	Examined
	Sent to Detail Division with Remarks
	Zincographing
	Notified to Store
	Published
Publication Six Inch Scale	M.S. Plans reduced to Six Inch Scale by Photography
	Photographs forwarded for Engraving
	Outline Engraved
	Writing Engraved
	Ornament Engraved
	Hedgerows & Levels
	Contours Engraved
	Large Names & Areas Engraved
	Punching & Ruling
	Published
Publication One Inch Scale	Six Inch Photos reduced & drawn
	Traced for Engraving
	Transferred & forwarded for Engraving
	Outline Engraved
	Writing Engraved
	Ornament Engraved
	Contours Engraved
	Sent for Electrotyping
	Published in Outline with Contours
	Hill Drawings received for Engraving
	Hills Engraved
	Published with Hills.

Table 1.Production Steps From Shetland & Orkney Islands Index

The activities listed in *Table 1* are those conducted either in the field or at the Division Office. In the case of the Shetland & Orkney Islands, the Division Office was most probably located at Ness House, Inverness, see *Figure 2*.

Figure 2. Ness House Division Office on Inverness-shire XII.1

Whilst *Table 1* forms a very useful summary of the production process, I personally wanted a more visual representation in the form of a 'swim lane' diagram that would summarise the production activities, identify the 'outputs' or work products of those activities, where they were performed and the relationships between them. As my interest leans primarily towards large-scale mapping, I decided to start by creating a diagram for the 'County Series' focused on a date of c.1870 when Sir Henry James was in charge. As well as *Table 1*, I've based the diagram on the following references:

1. Lt. General Sir Henry James & Col. Duncan A Johnston. *Account of the Methods and Processes Adopted for the Production of the Maps of the Ordnance Survey of the United Kingdom; drawn up by officers of Royal Engineers, &c.* H.M. Stationary Office. First edition 1875. Second edition 1902.
2. Mumford, Ian. *The Maps of the Ordnance Survey: a mid-Victorian View.* London, The Charles Close Society: 1995. This reproduces a series of articles describing production methods and processes written by Captain H. Riall Sankey R.E. for the *Engineering* journal published in 1888. Whilst later than c.1870, the detailed descriptions complement the 'official' treatise above.

It is not the intention of this brief article to set out the complete production methods and processes (that would take up a whole issue of *Sheetlines*). In the absence of a web-hosted copy of Ref. 1, the interested reader should consult Ref. 2. Suffice it to say that the process can be grossly summarised as i) demarcation of civil divisions i.e. boundary definition, ii)

detail survey conducted by the Trigonometrical Division, iii) levelling conducted by the Levelling Division, iv) contouring [2] and v) production at OS Office Southampton.[3] In order to draw the process diagram, I consulted a copy of the second edition of Ref. 1 that provides detailed descriptions for all the key production steps.[4] There is good agreement between the steps shown in *Table 1* and the explanations offered in both references.[5] The resulting diagram is a kind of 'map' of map production that I hope appeals to the CCS membership. It is intended to be an *aide-memoire* to summarise the overall process. It is designed to be printed on an A3 sheet (just!) and so it is best viewed on the Society website.[6] Nevertheless, the 'thumbnail' images across two pages at the conclusion of this paper will hopefully give an impression of the layout and content.

The diagram reflects the activities for Scotland, England and Wales. For completeness the activities performed at Phoenix Park, Dublin, should also be mentioned. At the time of interest, c.1870, the work at Phoenix Park was focused on revision of town plans, six-inch maps and one-inch maps, there being no 1:2500 survey in Ireland. The Dublin office therefore included the activities of copper plate engraving, electrotyping and intaglio printing. Dublin had also adopted zincography in 1861 to produce town plans and, as at Southampton, could also undertake lithography.

The resulting diagram can be extended in various ways e.g. by exploring earlier and later time datums and including revision and reprinting.[7] I'm not sure that I have the tenacity for that at present, but I do plan to add the one-inch process to the current diagram. Ideally, the diagram would be made 'interactive' on a website so that clicking on any of the boxes would navigate to a description of the activity or work product. It could also include examples

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2 Contouring was usually applied to 6-inch sheets, although contours had also been applied to military editions of the 1:2500 plans in the 1850s.

3 Could I be the first person to suggest that this city's name should be changed to Southmapton?

4 The second edition can be slightly misleading. The distinction between methods used in 1875 and updated methods used by 1902 is generally made clear, but this is not always the case.

5 There is a discrepancy between the ordering of 6-inch engraving activities when comparing the Essex workflow of *Figure 1* to that of the Shetland & Orkney Islands workflow in *Table 1* with respect to Writing and Ornament. References 1 and 2 place Writing before Ornament, so this is the ordering adopted on the *aide-memoire* diagram. It is conceivable that the ordering on the Essex index was a mistake, made when compiling the sheet. With slight irony, it turns out that the Shetland & Orkney Islands 6-inch sheets were in fact zincographed rather than engraved, proving that deviations from the 'standard' process can always be encountered.

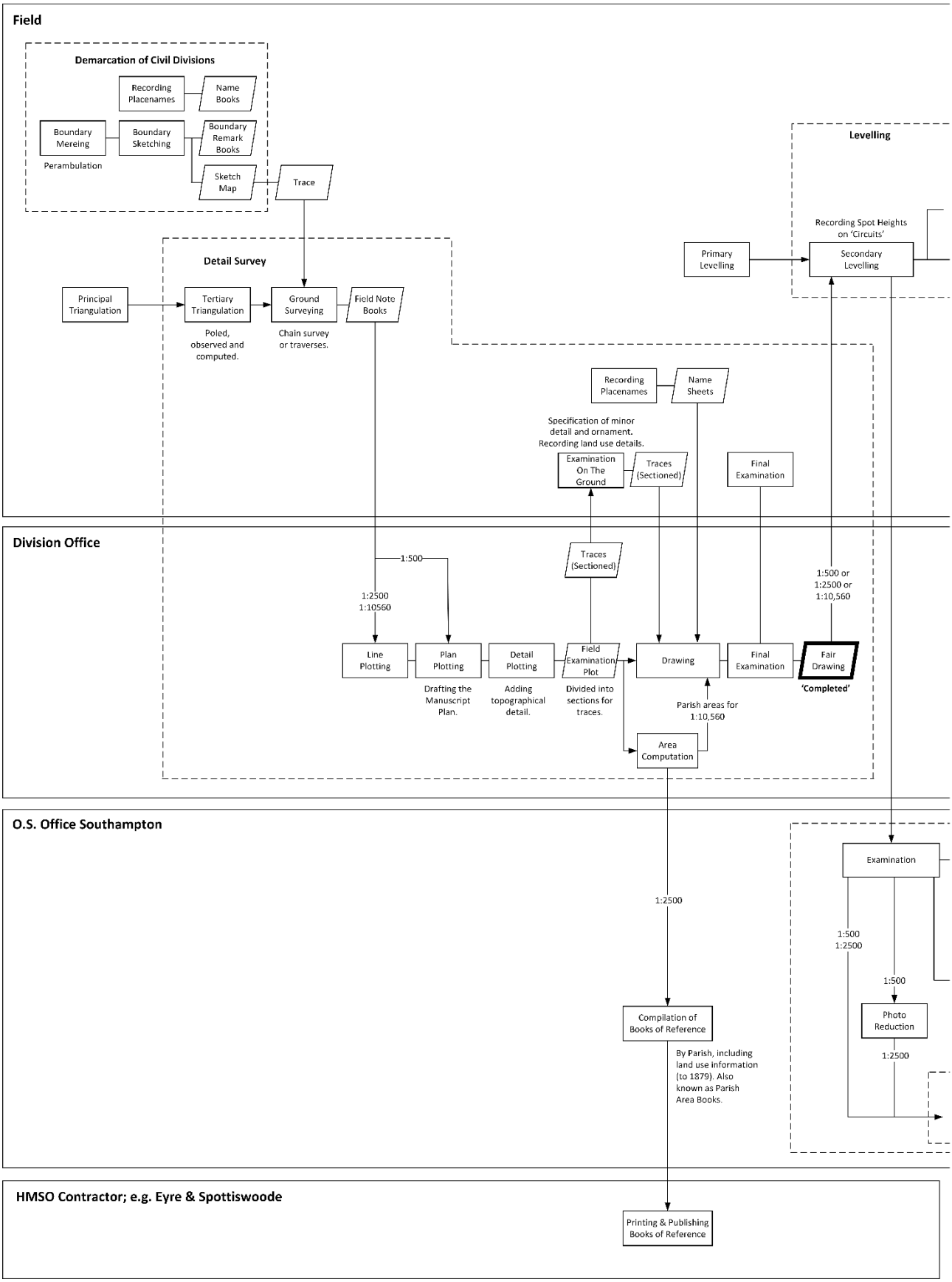
6 https://ccs-web.s3.eu-west-2.amazonaws.com/county-series-production-process.pdf

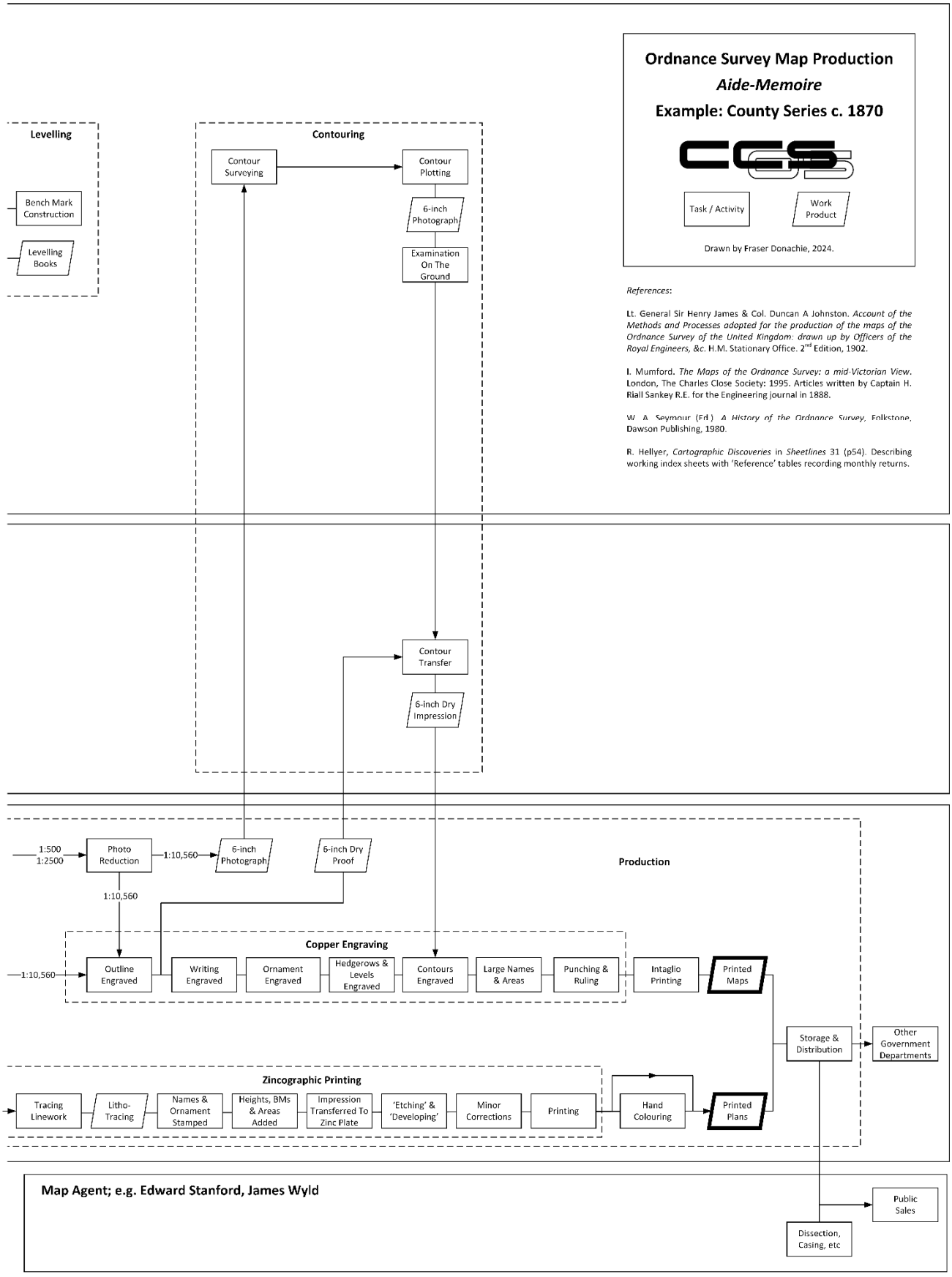
7 See, for instance, 'Reprints of the First Edition 1:2500' in *Sheetlines* 119 and '25-inch Revision' in *Sheetlines* 126, both by Rob Wheeler.

of the work products, such as Name Books, etc by linking to scanned images held in e.g. libraries.

The publication of the first edition of Ref. 1, in 1875, was aimed at conveying the hard-won knowledge of map production methods to other map producers, especially those abroad and in the 'Empire'. Ref. 1 demonstrates that the OS were pioneers in what we now refer to as systems engineering. Wikipedia defines this as "an interdisciplinary field of engineering and engineering management that focuses on how to design, integrate, and manage complex systems over their life cycles". Whilst the product of the OS was not a 'system' *per se*, it was an exceedingly complex and valuable 'data product' that flowed from its production processes. The success of the OS was therefore founded on establishing effective and efficient processes and adopting strict standards; principals now used by all successful engineering organisations.

It is interesting to speculate if Sir Henry James or any of his colleagues created something similar to the process diagram, perhaps pinning it up on the office wall to show to new recruits. Perhaps not. But, in any event, I'm sure that the publication of Ref. 1 would have given him great satisfaction and that copies would have been liberally distributed to his staff.


Field
Demarcation of Civil Divisions
Recording Placenames
Name Books
Boundary Mereing
Boundary Sketching
Boundary Remark Books
Perambulation
Sketch Map
Trace
Levelling
Recording Spot Heights on 'Circuits'
Primary Levelling
Secondary Levelling
Detail Survey
Principal Triangulation
Tertiary Triangulation
Ground Surveying
Field Note Books
Poled, observed and computed.
Chain survey or traverses.
Recording Placenames
Name Sheets
Specification of minor detail and ornament. Recording land use details.
Examination On The Ground
Traces (Sectioned)
Final Examination
Division Office
Traces (Sectioned)
1:500
1:2500
1:10560
1:500 or 1:2500 or 1:10,560
Line Plotting
Plan Plotting
Detail Plotting
Field Examination Plot
Drawing
Final Examination
Fair Drawing
'Completed'
Drafting the Manuscript Plan.
Adding topographical detail.
Divided into sections for traces.
Parish areas for 1:10,560
Area Computation
O.S. Office Southampton
Examination
1:2500
1:500
1:2500
1:500
Photo Reduction
1:2500
Compilation of Books of Reference
By Parish, including land use information (to 1879). Also known as Parish Area Books.
HMSO Contractor; e.g. Eyre & Spottiswoode
Printing & Publishing Books of Reference


Ordnance Survey Map Production
Aide-Memoire
Example: County Series c. 1870
Task / Activity
Work Product
Drawn by Fraser Donachie, 2024.
References:
Lt. General Sir Henry James & Col. Duncan A Johnston. Account of the Methods and Processes adopted for the production of the maps of the Ordnance Survey of the United Kingdom: drawn up by Officers of the Royal Engineers, &c. H.M. Stationary Office. 2nd Edition, 1902.
I. Mumford. The Maps of the Ordnance Survey: a mid-Victorian View. London, The Charles Close Society: 1995. Articles written by Captain H. Riall Sankey R.E. for the Engineering journal in 1888.
W. A. Seymour (Ed.) A History of the Ordnance Survey, Folkstone, Dawson Publishing, 1980.
R. Hellyer, Cartographic Discoveries in Sheetlines 31 (p54). Describing working index sheets with 'Reference' tables recording monthly returns.
Levelling
Bench Mark Construction
Levelling Books
Contouring
Contour Surveying
Contour Plotting
6-inch Photograph
Examination On The Ground
Contour Transfer
6-inch Dry Impression
1:500
1:2500
Photo Reduction
1:10,560
6-inch Photograph
6-inch Dry Proof
Production
1:10,560
Copper Engraving
1:10,560
Outline Engraved
Writing Engraved
Ornament Engraved
Hedgerows & Levels Engraved
Contours Engraved
Large Names & Areas
Punching & Ruling
Intaglio Printing
Printed Maps
Storage & Distribution
Other Government Departments
Zincographic Printing
Tracing Linework
Litho-Tracing
Names & Ornament Stamped
Heights, BMs & Areas Added
Impression Transferred To Zinc Plate
'Etching' & 'Developing'
Minor Corrections
Printing
Hand Colouring
Printed Plans
Map Agent; e.g. Edward Stanford, James Wyld
Public Sales
Dissection, Casing, etc

The use of dictionaries in Ordnance Survey Name Books

Nevis Hulme

Ordnance Survey Name Books (OSNBs),[1] or just 'name books', include two types of names. The bulk are distinctive place-names (such as The Moorings, Abhuinn Dhearg or Loch Langabhat) while a smaller number are descriptive (such as School, Corn Mill or Post Office, as opposed to a named example, like Daun's School). There were inconsistencies in how the names were collected, e.g. descriptive names were not always written down despite appearing on maps and the number of descriptive names varied by location or examiner[2] working in an area.

English names were generally not a problem for translation. Either the meaning was obvious, e.g. Rose Cottage, or no thought was given to explaining the meaning, e.g. Flemington Mill. Efforts were made to explain names if they were thought to be Scots, e.g. the first, specific, part of Mavisbank was shown to mean 'thrush'. In other cases, the spelling was disputed and reference made to a dictionary, e.g. 'myre' or 'mire'. In these cases, it was Jamieson's dictionary that was called upon as the source. This was his *Etymological Dictionary of the Scottish Language* (to give it its much-shortened title), published in 1808.

It was generally recognised when place-names originated from Norse. There are some attempts to translate these and, indeed, there are examples of the elements of Norse being given to explain the meaning. An example is seen in *figure 1* from Skye in the hand of Captain J C Macpherson, who had great influence over the representation of Norse names on OS maps. In general, however, Norse names were not translated.

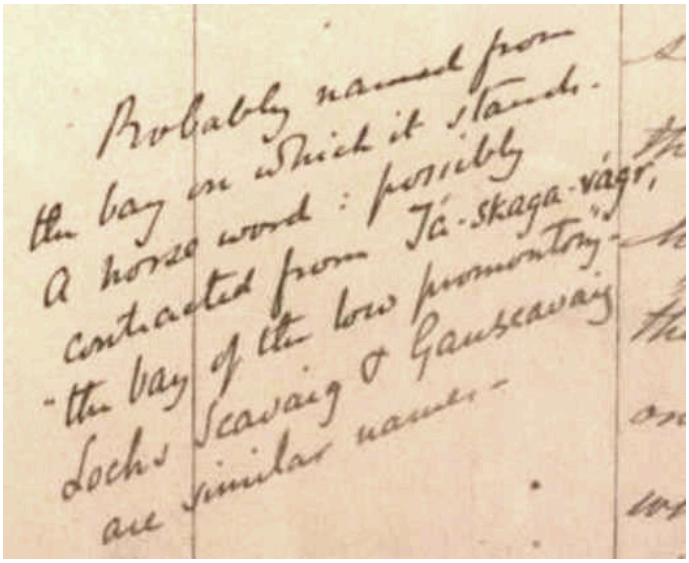


Figure 1 Extract from Inverness-shire (Skye) showing Norse interpretation of Tarskvaig. Crown Copyright. National Records of Scotland, OS1/16/11/167.

1 These can be found by typing 'scotlands places ordnance survey name books' in a search engine.

2 This was the name given to the Sapper, i.e. Royal Engineer (RE) soldier, or Civilian Assistant working in the field.

It is the Gaelic names that make up most translations given in the name books. Most of these are shown without anything other than being preceded by the word 'Meaning' or the abbreviation 'Sig.', for 'Significance' or 'Signifies'. This was because the meaning of these names would have been obvious to at least one of the people involved with the collection and recording of these names. This could have been the authority, or informant, supplying the name; a person supporting the work of the examiners believed to have been used where the informants were non-English speakers; or the examiners themselves, some of whom probably spoke Gaelic.

This left the remainder of the Gaelic names that could not be translated easily. How they were treated depended on the examiner or his (for they were all male) supervisor. Often, the description of the feature ended with 'Meaning not known' or the rather ugly 'Meaning not got.' Another response was just to give no meaning at all.

In the remaining cases, there is an indication that reference was made to a dictionary. These were used to translate names or elements of names that had been recorded and where the meaning was not understood. No fewer than six different Gaelic dictionaries have been identified that were used to work out meanings. The first Ordnance Survey work in Scotland started in 1843 by which time all of the dictionaries found in the name books had been published.

The following lists the dictionaries in chronological order,[3] with how they are named in the name books. The names were usually given in the possessive, with or without an apostrophe, followed by 'dictionary', an abbreviation of this or, sometimes, 'Gaelic dictionary'. For example, the dictionary produced by Armstrong may have been referred to as 'Armstrong's dictionary'.

McFarlane (1815) *New English and Gaelic Vocabulary - Focalair Gaelig agus Beurla.*
OSNB: McFarlane.[4]
Armstrong (1825) *Gaelic Dictionary.*
OSNB: Armstrong.
Highland Society of Scotland (1828) *Dictionarium Scoto-Celticum - A Dictionary of the Gaelic Language I & II.*
OSNB: H.S., Highland Society.
MacLeod and Dewar (1833) *A Dictionary of the Gaelic Language* with many reprints including the 1845 edition with additions by John Mackenzie.
OSNB: McLeod & Dewar, MaLeod & Dewar, McLeod & Diwars[5], MacLeod and Dewar, Dewar & McLeod, Dr. McLeod, McLeod.[6] (and probably others)

3 See https://en.wikipedia.org/wiki/Scottish_Gaelic_dictionaries for more on these dictionaries.

4 Only one use of this early dictionary has been found, in OS1/2/13/64 (Argyll) where it was used to confirm the spelling of the term 'boc' or 'bochd'. The dictionary was noted to be in the possession of R. Stewart, one of the informants for what appeared on the map as Dùn a' Bhuic.

5 This can only be found by inputting 'diwars' in the online search because of the missing apostrophe.

MacAlpine (1832) *Pronouncing Gaelic Dictionary* or the 1845 edition with additions by John MacKenzie.
OSNB: McAlpine, McAlpin.
MacEachan (1842) *Gaelic-English Dictionary*.
OSNB: McEachann, McEachan, MacEachainn, Rev. Mr McEchan.[7]

In addition to these, there is an unspecified Gaelic dictionary. In all the Wigtownshire volumes where this is written, only once is a particular dictionary mentioned, that of Armstrong.

For completeness[8] of coverage of this topic, there is also reference to a Concise Scottish Dictionary and Ogilvie's Dictionary. In the latter case, it was used as an authority to support the preference of 'Burial Ground' to 'Burying Ground' which had been originally entered in the name book.[9]

Searching name books often brings up unexpected results. The transcriber of two pages in Berwickshire volumes has gone beyond simple transcription and given meanings for terms from an online Gaelic dictionary. It was somewhat surprising to come across this in researching 19th century documents.[10]

The consultation of dictionaries was very likely far greater than the number revealed in this work; it was only when special effort was required that the dictionary used was identified to support what was possibly a contentious suggestion. It is probable that many translations throughout the name books were composed by reference to a dictionary. This is most clearly seen in cases where additional notes[11] have been made after the name book was submitted to the Examination Office of which there are many examples. Exactly which dictionary was used in each case would be difficult to determine since their compliers in the 19th century freely made use of early works and so definitions were often similar. What is clear, however, is that there was not one source issued centrally for the examiners to consult while carrying out their work.

This article has been based on extensive study of the name books but there may remain other references that have not been captured. Without carefully reading every page in all 1830 volumes, no research of the name books can claim to be complete.

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6 The ampersand is found as 'and' in some of these.

7 The full reference, in OS1/1/87/85 (Aberdeenshire), is 'Rev. Mr McEchan of Perthshire's Poket [sic] Dictʸ'. While the dictionary was first published in Perth, Ewen MacEachan was a native of Arisaig in Lochaber, Inverness-shire.

8 The analysis here is based on searches conducted to 21 October 2024 and is dependent on the coverage and accuracy of the transcriptions on the website of Scotland's Places.

9 OS1/28/2/11 (Ross & Cromarty (Mainland)).

10 Searching 'online' revealed twelve entries with that for Orkney (OS1/23/25/34) being bizarre.

11 Comments in red seem to all date from revisions in the 1890s and largely concerned spelling rather than meaning.

The Ordnance Survey of Ireland: some recent literature

Richard Oliver

The official bicentenary of Ordnance Survey activities in Ireland was marked by several events in both parts of the island, and some publications. The most recent of these – the official launch was on 16 December 2024 – is Paul Mulligan's *Irish Ordnance Survey maps: a user's guide*.[1] Since my *Ordnance Survey maps: a concise guide for historians* was published in 1993 I have periodically been asked whether its scope could be extended to include Ireland. A problem with that, particularly for someone such as myself based outside Ireland, is that, for such a putative 'ominbus' volume, there are really three Ordnance Surveys to be considered: that of the United Kingdom up to 1922, and separate bodies then set up for Northern Ireland – since 2008 part of Land & Property Services Northern Ireland – and for what was at first the Free State and since 1949 has been the Republic – and since 1 March 2023 has been part of Tailte Éireann.

These administrative arrangements draw attention to the fundamentally different function of the two Irish departments, which include a substantial cadastral function integral to the functioning of the State, both before and after 1922, such as the Survey in Great Britain only enjoyed for a brief time in the 1910s at the time of Lloyd George's abortive scheme for taxing increases in land values. Thus there would be three groups of practices to be described for the period since 1922, and whilst there are considerable overlaps in procedure and methods between the three surveys, each has its features that are not shared by the other two – and not just in smaller-scale mapping. Thus I have continued to concentrate on Great Britain, though I am told that the *Concise guide* has been found useful in Ireland. And any guide to Irish Ordnance Survey maps needs to be written with at least extensive research in Ireland: only there can most of the background material be found.

Thus I welcome Paul Mulligan's *User's guide*, even though it is not an exact Irish equivalent of the *Concise guide*: most notably, there are no listings of urban and rural revision and survey dates, and those needing a guide to these will need to look in a variety of scattered publications – and often, probably, seek out the maps themselves.[2] On the other hand the *User's guide* includes a list of abbreviations encountered on the maps, a table of map scales (not complete: 1:95,040, 1:100,000 and 1:158,400 have all been used but are omitted), a brief archaeological timeline for Ireland, a chart of placename changes (very useful) and a list of online resources. The object of

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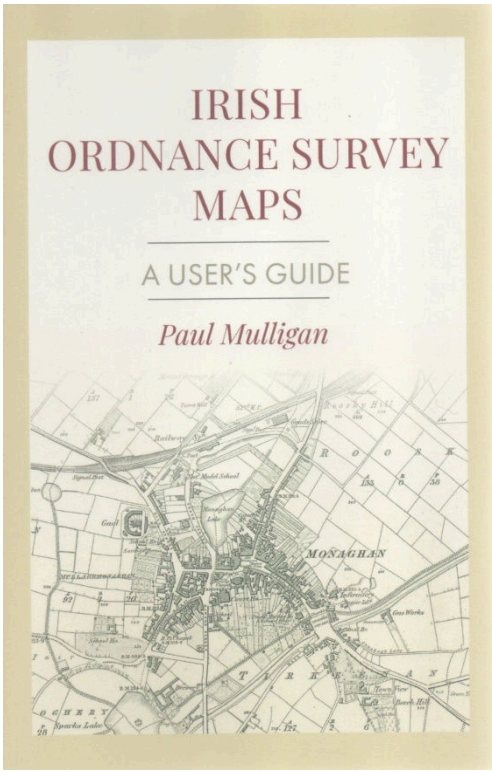
1 Paul Mulligan, *Irish Ordnance Survey maps: a user's guide*, Dublin: Wordwell Press 2024, pp [vi], 237, illus., as paperback (ISBN 978-1-916742-06-2, €25 (plus €15 carriage if ordered in UK from publisher)), and as ebook (ISBN 978-1-916742-16-1).

2 A summary list of 1:10,560 and 1:2500 revision dates and indication of 'incomplete' counties was published in *Sheetlines* 30 (April 1991), but there has been no such guide to urban surveys and revisions which, as in Great Britain, were often not tied to revisions of the surrounding county.

the book is somewhat different from the *Concise guide*, in that it is basically a guide to terminology used on the maps, and whilst occasionally definitions may seem obvious to some ('Cataract: A cascade or waterfall': p.30), this is hugely outweighed by the detailed treatment of antiquities and archaeological features, which reflect the author's professional career.



One of the justifications for the remapping of Ireland embodied in the 1:50,000 *Discovery* and *Discoverer* series is the huge increase in the number of antiquities shown, as compared with the old one-inch map. To my mind these 1:50,000s have a distinct advantage over contemporary British practice in that antiquities are shown in a distinctive reddish colour that is perfectly legible, yet enables one to concentrate on the modern landscape if that is one's focus of interest.

Paul Mulligan has provided students with a very useful guide that fleshes out descriptive names on the map such as Chambered Grave, Dolmen and Rath. Whilst most of us think we know what a Rabbit Warren is, it is useful to have the description amplified by some chronology, and its effect on place names will be a revelation to some. There are also concise definitions of such terms as Military Road in their specifically Irish context, and useful nuggets of information: mail coaches started running in Ireland in 1789 (p.111). Examples of 'unusual' uses are cited, as found on specified maps ranging in date from the 1830s to the 2020s: one such is 'Racking Room' (pp 143-4). (Puzzled? Hint: it's in St James' Brewery in Dublin…) The book is well illustrated, though a magnifier is useful to get the full benefit of some of them, and all are taken from the six-inch or larger scales. Some of the six-inch have been enhanced by contemporary, if unofficial, hand-colouring. Anyone who doubts the effect of the great famine of 1845-9 on the development of the landscape should take a look at figures 33 a and b, but the other illustrations are also 'telling'.

In short, *Irish Ordnance Survey maps: a user's guide* is warmly recommended. I hope that in due course we will have summaries of county and urban survey and revision dates, and at what scales: unlike in Britain, a significant part of the Irish survey's early 'town scale' work remains in manuscript. But perhaps one day it will appear on a website.

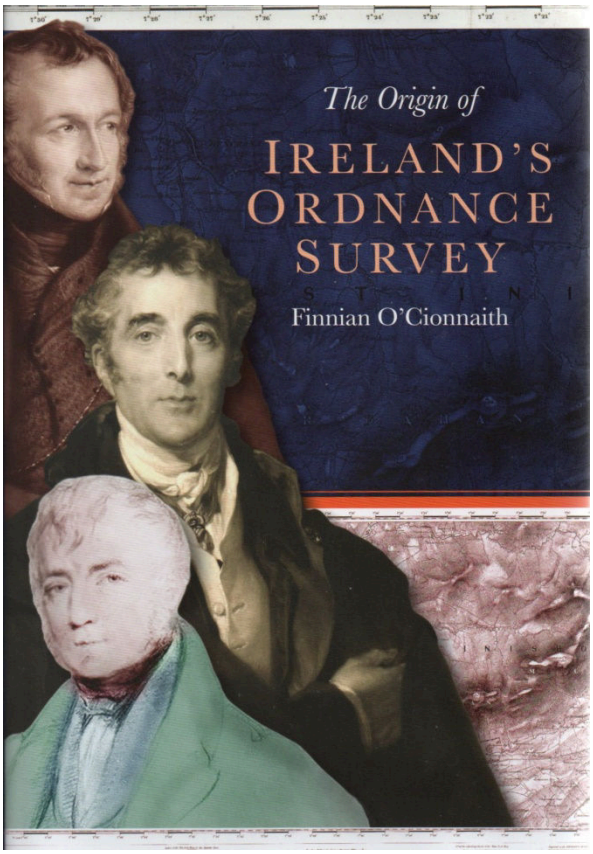
Earlier in 2024 there was published Finnian O'Cionnaith's *The origin of Ireland's Ordnance Survey*, which concentrates largely on the events of and immediately preceding 1824.[3] As such it goes into rather more detail than was

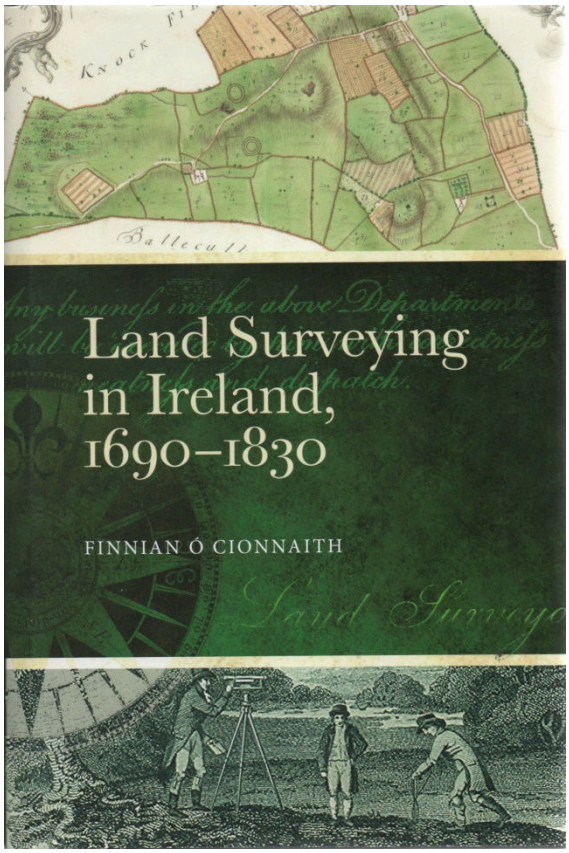
3 Finnian O' Cionnaith, *The origin of Ireland's Ordnance Survey*, Dublin: Four Courts Press, 2024, hardback, ISBN 978-1-80151-122-3: price in UK not available.

possible in John Andrews' *A paper landscape* (1975), particularly on the proceedings of the Select Committee of the House of Commons, chaired by Thomas Spring Rice. This sat between March and June 1824 and has the credit of recommending the six-inch scale, and guiding a survey already decided on by the Duke of Wellington away from the narrow focus of military topography towards the broader and, for many people, more immediate one of facilitating local taxation reform. Here is perhaps a lack of sensational revelation, but plenty of expansive detail that points up the story. It is a sequel to Dr O'Cionnaith's *Land surveying in Ireland, 1690-1830* which, again, covers in more detail ground earlier traversed by John Andrews, in *Plantation acres: an historical study of the Irish land surveyors* (1985).[4] It concentrates particularly on Gabriel Stokes (1682-1768), Robert Gibson (d.1761) and John Longfield (*c.*1775-1833), but covers wider themes, including the training of surveyors. It's worth seeking out.

A large gap in studies of official mapping in Ireland is a detailed account of the development of both survey departments, in Dublin and Belfast, since 1922. I understand that this has not been wholly neglected, but as yet nothing has appeared in print.

John Andrews had the distinction of practically inventing the history of cartography in Ireland. He may no longer be with us, but his discipline is flourishing.





4 Finnian O' Cionnaith, *Land surveying in Ireland, 1690-1830*, Dublin: Four Courts Press, 2022, hardback, ISBN 978-1-80151-014-1: this may now have gone out of print.

Ian Mumford – a ten-year personal retrospective

Roger Hellyer

It is already ten years since Ian Mumford died in March 2015. Many have been the tributes paid to him by members of the professional cartographic world. I want to add a few words about my memories of him, I, who was never a member of the profession but a rank amateur, a theatre musician.

Ian and I had never spoken, though we recognised each other at the occasional map meetings we both attended, until we met one day in 1994 in, of all places, the Library of Congress, Geography and Map Division. I was already at work when he came through the door. He looked around the room to see who was present. He recognised me but could not immediately remember my name, or, I imagine, place where he had seen me before. We quickly established I was British, and a member of the Charles Close Society, and he remembered me as the author of the *Sheetlines* period map articles. Such was his standing in G&M Division (born no doubt during his four years service between 1981 and 1985 as British Liaison Officer (Survey) with the Defense Mapping Agency in Washington) that he asked nobody for permission for what he did next: he took me by the arm and guided me straight through to what in the theatre we would call back stage – areas not open to the public. In Library of Congress terms this would be the cavernous underground rooms where the map cabinets containing millions of maps are housed. He took me directly to two collections in particular, commenting that 'you need to see these'. The first was the group of folios containing the one-inch Old Series sheets which form part of the Hauslab-Liechtenstein collection – all superbly preserved early full sheets, on untrimmed handmade paper. Secondly he took

me to the drawers containing the Library of Congress set of GSGS 3906, the six-inch County Series maps of Great Britain and Ireland, reformatted as national maps, gridded and reduced to scale 1:25,000 for official use throughout the Second World War. This set had been transferred to the Library from the United States Army Map Service.

I recall, several years later during one of my visits to Washington when I was working on the Old Series map, that I asked to see those in the Hauslab collection. I was instructed by Ed Redmond, the librarian on duty, first to go outside the room and wash my hands. Then I was taken to a special table within the reading room and these maps were brought to me there. And it was some twenty years after that, on my most recent visit to Washington, that I was at last ready to examine the Library of Congress set of GSGS 3906, in order to add any new states I found into the cartobibliography I was preparing for the CCS Intermediate Scales publication of 2022. The first librarian that I approached could not find them and insisted they were not held by the library. Though I protested and said that I'd seen them myself several years before, he was not prepared to help me further. In desperation I told another librarian, Michael Klein (since retired) what I had seen when taken to the stacks by Ian Mumford all those years earlier. Michael went and conducted his own search. He found them, I know not where, in drawers containing more than 2,500 sheets.

After working my way through the monumental collection of this map series held by the MOD, I checked the sets owned by the copyright libraries here to find them holding much the same state of each sheet. Only five unrecorded printings emerged, which for a map, some official records claim, of 2,721 sheets, is a very depressing research experience. But in the Library of Congress I found 125 states which were not present in the MOD set. Without Ian Mumford and Michael Klein, none of these would have been recorded.

I retired from the Royal Shakespeare Company in 2002, and turned my energies to making ready for publication the many part-finished cartobibliographies that I had been compiling over the years, in particular to enable me to provide the summary lists of small-scale map series required in David Archer's publication in 1999.[1] So began the series of histories plus cartobibliographies which I wrote jointly with Richard Oliver which have been published by the Society. Both Ian and his colleague Peter Clark played a central role in these endeavours, especially when Richard and I ventured into the realms of the one-inch military map. It was their joint memories that helped produce the organisational chronology of Military Survey and its predecessors to be found at the back of that book. Ian didn't need to help me with gaining access to Tolworth (a freedom of information request did that) and once inside I was able to examine the huge record sets of one-inch maps GSGS 3907, 3908 and 4136 and the quarter-inch equivalents that are now

1 Roger Hellyer, *Ordnance Survey small-scale maps : indexes 1801-1998*, Kerry: David Archer, 1999.

for all to see in the British Library. But Ian made sure that while I was there many of the other interesting items held there were brought to my attention – I remember the catalogues of military maps and especially the manuscript Confidential Catalogue. All these treasures are of course now on open access either in The National Archives or the British Library.

I found myself being invited several times to Ian's home in Chessington to examine the immense collection of papers and maps he had acquired over the years.[2] This metamorphosed into my joining in the weekly visits which Ian made to the British Library as a volunteer consultant, advising Andrew Cook, then Map Archivist in the India Office Records, on, among many other things, the significance of collections of maps transferred from MOD Tolworth (gatherings which my wife Maria irreverently dubbed 'Boys' Club'). At the same time Ian continued his own researches in the library.

The initial purpose for my being there at all was to catalogue the holdings of Brian Adams' library, the important parts of which are now held in the Charles Close Society Archives. Every week Ian brought something of interest from his home to show me (one of which convinced me that my work on the Old Series map would be incomplete without a visit to Vancouver to examine a set of ten (of an original thirteen) atlases held by the University of British Columbia),[3] and we discussed the various projects both of us were working on; then the three of us went out to lunch together. We would then go our separate ways and I would spend the afternoon continuing my journey through the British Library collections of OS maps. Ian carried on making these weekly visits to the British Library until a few years before his death in 2015.

Richard and I have now completed the books we set out to write together. There will be no more,[4] but the quality of what we have achieved is due in no small part to Ian Mumford's knowledge and his willingness to share it with me, a man who has spent his entire working life outside the cartographic community. Thank you, Ian.

Acknowledgments

My thanks to Andrew Cook for his many helpful comments on the writing of this piece, to Barbara Bond, and to David Watt for providing me with the photograph of Ian, which was taken by Elizabeth Manterfield or Anthony Painter at the Tolworth Wake on 8 February 2003.

Roger Hellyer was instrumental, after Ian's death, in assisting Andrew Cook in sorting and listing Ian's vast collection of maps and associated papers for transfer to the CCS Archives in Cambridge.

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2 If you doubt that statement have a look through the Ian Mumford fonds in the CCS Archives.

3 'Ordnance Survey maps – an 1860 time capsule' (CCSA.IM_405_53). These atlases now have a new shelf mark in Rare Books and Special Collections at UBC: G1810.G7 1860.

4 But there is an addenda and corrigenda section on the CCS website, a pdf file to be found under Publications / Books & Monographs. All contributions are welcome – please notify us via the webmaster.

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