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Military-related dimensions in the topographic mapping of Ireland during the twentieth century

Dr. Arnold Horner
Glenageary, Co. Dublin, Ireland

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Abstract: This article traces the development of military mapping in Ireland during the early and middle twentieth century. Particular attention is given to the evolution of precise systems for the identification of location, the use of maps for training and for military manoeuvres, the use of maps during the 1920-21 War of Independence, and the development of 1:20,000 scale maps for military requirements. Artillery training maps at this scale were produced for the British Army during World War I, and the 1:20,000 scale was again explored by the Irish military during the late 1920s and in the 1930s. Features of these maps were the use of closely spaced contours, a grid system to specify locations, and partial or complete metrication of heights and distances. Proposals for a 1:20,000 scale map series made by the Irish authorities were followed by subsequent technical assessment. Several experimental and innovative map sheets were published, possibly partly as a result of military training exercises, during the 1930s. Their modern design and influence from British and French cartographic traditions has attracted attention. However, the impact of World War II curtailed the further development of the 1:20,000 series. The postwar focus was on modernising the triangulation framework, creating an appropriate Irish grid and then re-organising map scales to 'rounded' numbers suitable for the metric system and comparable to most other European countries. The survey organisations in both Dublin and Belfast participated in these developments, but it was in Northern Ireland that a new phase of military mapping was precipitated by the 'Troubles' that began in the late 1960s and which lasted some three decades. That mapping included a special 1:20,000 map series that was never formally published and, for the main urban centres, 'religious areas' maps together with specially adapted 1:2500 maps.

Key Words: *Military and topographic mapping, Ordnance Survey, Locational grids on map, History of Cartography in Ireland, Twentieth-century map history*

*arnold.horner@ucd.ie (Corresponding Author)

Emerging civil and military contexts in late nineteenth century topographic mapping

The major changes in personal mobility that emerged during the decades around 1900 stimulated a re-assessment of the character and effectiveness of small-scale topographic maps (those maps with scales of 1:50,000, 1:100,000 etc. or less) in the United Kingdom which, as it was then constituted, included Ireland. The popularity of the bicycle from the 1880s followed by a growing usage of motorised vehicles from around the1890s contributed to new approaches to recreation that led to countryside exploration, and this in turn led to an increased use of small-scale maps as route-finders, with increased expectations of their utility. In 1892 two committees were appointed to examine the mapping of the Ordnance Survey in relation to future needs: a Board of Agriculture Committee under Sir John Dorington, and a War Office Committee, under Sir T.D. Baker (Hellyer and Oliver, 2004, pp.4-5). The former set out a new agenda for small-scale mapping (Collier, 2013; Mumford, 1980, pp.185 -208) and recommended that the one-inch (1:63,360) scale maps should be revised every fifteen years, independently of the revisions to larger-scale maps. The latter was chiefly responsible for recommending that the 'one-inch' should be improved for military purposes by including new information on roads, railways, landmarks such as church steeples, as well as post and telegraph facilities.

A series of military requirements had developed during the second half of the nineteenth century as the military had (rather slowly) come to appreciate the potential of small-scale topographic maps (Collier, 2013; Nicholson, 1988). These requirements crystallised in the maps used on the western front during the first World War, 1914-18, and continued further in various post-war adaptations. As well as route-finding, particular military needs were clarity in the representation of terrain, and a capacity for accurate location-finding, for example that potential targets could be precisely identified. Terrain representation demanded attention to issues of contouring and contour intervals, the use of spot heights and the effectiveness of hachures. The need for precision in location-finding was a continuing military objective which led to the creation of national grid reference frameworks in the mid-twentieth century and which has led further to the more recent development of GPS systems and the introduction in 2001 of the Irish Transverse Mercator projection (ITM).

The following article explores some of the changing characteristics of small-scale mapping with particular reference to how military considerations influenced maps and mapping in Ireland over the century from c.1890 to the late twentieth-century 'digital revolution' and the onset of GPS -based locational technology. As such the present article expands on earlier studies including the general observations of Monmonier (2015) and Altić (2023), on the history of military mapping and the outline by Collier (2013) on the impact of the military map on UK mapping in the twentieth century. The discussion relates especially to maps and mapping in a terrestrial context; little attention is given to naval or aerial maps and mapping. The article particularly seeks to build on earlier historical studies of Irish Ordnance Survey maps (Andrews, 1974, 1975; Prunty, 2004),

and on the very detailed critiques that have been painstakingly assembled by Hellyer and Oliver (2004, 2022, 2023) of (a) UK 'one-inch' military mapping, (b) 'intermediate-scale maps' (especially those around the 1:20,000 scale), and (c) smaller-scale maps (mostly those at 1:100,000 and 1:250,000 or similar). Some of the articles published over a forty-year period in *Sheetlines*, the journal of the Charles Close Society for the Study of Ordnance Survey Maps, have also proved invaluable, as has an introductory overview of the scope of military mapping in Ireland by Prunty (2004, pp. 83-96). It has been possible to examine relevant maps either online or first-hand using the resources of a range of archival repositories, including Military Archives, Dublin, and the Map Library at Trinity College, Dublin.

Manoeuvres maps

Many maps, plans and drawings were compiled by the British military in Ireland during the decades leading to partition in 1921 and the subsequent creation of Saorstát Eireann and Northern Ireland. Surviving material now in Military Archives, Dublin, suggests that many of these documents were for routine administrative purposes, describing such matters as the acquisition of property or alterations to the lay-out of barracks. Other documents related to the various training exercises or 'manoeuvres' that were undertaken to test in the field the operational capabilities of the various army divisions; these tests usually involved a large swathe of countryside as opposing sides acted out 'war games' by seeking to capture or outflank each other. Originating in England during the late eighteenth century and usually held on an annual basis, military manoeuvres were part of late nineteenth-century and early twentieth-century life in many European countries, being a particular feature for areas accessible from major military facilities such as Aldershot east of Salisbury Plain or the Curragh Camp in Co. Kildare. These were activities that, at least in England, attracted considerable public attention, to such extent that the larger manoeuvres exercises could be described as 'something of a spectator sport' (Hellyer and Oliver, 2004, 6). This dimension was also evident in Ireland, to judge from the very detailed narrative of the exercises held in Queen's County (now Laois) and Kildare during summer 1893, where it was recorded that (Manoeuvres, 1893, p.439)

> *It may be mentioned that the 15th August, being observed as a holiday, numbers of the country folk came to witness the manoeuvres, and in trying to gain admission to the camps broke fences, claims for which were submitted against the troops.*

In the case of Ireland, other references to manoeuvres include a passing comment on their occurrence at Kilbride (presumably Co. Wicklow) in summer 1853, a note on the proposed manoeuvres involving 12,000 troops near Blessington during autumn 1873 (*The London Journal*, 57, 24 May 1873), and the reporting at some length in the [London] *Times* of the exercises held near Ballyporeen, Co. Tipperary, during August, 1901. The reports in the *Times* of August 10, 15 and 17, 1901 were complemented by a sketch map to allow readers appreciate the movements of the opposing Red and Blue forces.

Two sketch maps, both at the scale of one inch to a mile, were also used in the article describing the manoeuvres of 1893. One showed the immediate vicinity of the Curragh camp, the area where the September manoeuvres were held. The other covered a more extensive area between the Curragh and the Great Heath of Maryborough some twenty miles to the west. A particular interest of the latter map is that it is crossed by a grid with lines at one-mile intervals. Each square on the grid can be identified as A2, H12, etc. from the letters and numbers that are marked along the margins, with A to S (omitting 'I') on the horizontal, and 1 to 14 on the vertical, margins. This 'alphanumeric' system provides a method for identifying different parts of the map area and was only then coming into a more general usage by the military.

At least for the larger exercises, more formal special 'manoeuvres maps' were on occasion printed by the Ordnance Survey. It is not known precisely when the manoeuvres maps based on the OS originated but they appear to have been in use in England from as early as the 1870s. They were certainly produced for locations in Ireland at least from the mid-1890s (Table 1). These maps abstracted and sometimes re-combined sections of standard small and medium-scale Ordnance Survey map sheets to provide a compact coverage to the area of country over which the exercises were expected to take place. Many of the resulting map sheets appear to have been simply reproductions of the OS content but, in some instances, the maps also featured amendments, for example boundary lines, defining the limits of the manoeuvres area and also the core 'prohibited area', that were additional to those appearing on the standard published OS map.

If military requirements had limited impact on the content of most manoeuvres maps, they were significant in another respect, that of sheet size. When they began to appear in the 1850s, Irish one-inch maps were issued as small 'quarter sheets' that covered the island in 205 maps; the planned publication of the scale in 59 'full' (and hence much larger) sheets did not transpire. With a small number of exceptions, combined and large sheets were 'almost entirely' products of the coloured mapping that developed from the one-inch revision of 1898-1901. From 1902, sheets relating to some coastal areas, sheets with small areas of land, sheets around the main cities (and also Killarney) and sheets in areas where the military (and perhaps also the navy) found it desirable, began to be combined to afford more synoptic perspectives on particular districts (Hellyer, 1995). With army manoeuvres on occasion taking place across extensive tracts, the military had a particular requirement for combined sheets, to such extent that the first Irish 'fully coloured' one-inch large sheet district map was that for the Curragh area in 1903 (Hellyer, 1995; Fig.2 below). This map was followed by two versions of a Dublin district map in 1904 and by a map of the Maryborough-Carlow area in 1905; in each case a military origin appears to have been instrumental (Hellyer, 1995).

A decade earlier, and at another scale, a manoeuvres map, at two inches to one mile, was created in 1895 for the district around the Curragh military camp in Co. Kildare (Andrews, 1974, p.58). Four years later, in August1899, two manoeuvres maps were issued to cover a district that took in a large midlands area extending between Naas in the north-east and Thurles in the south-west. Printed at the Ordnance Survey in Southampton,

Fig. 1. OS 1:63,360 Sheet 176, Fermoy area, 'fully coloured' version, revised in 1899, published 1901, printed 1904. Whereas earlier versions of the revised one-inch give latitude and longitude data along the margins, the 'fully coloured' version has alphanumeric' data which was the style by then in use for grids on manoeuvres maps (Reduced in size from the original)

these maps were used in playing out a scenario whereby 'Blue' forces advancing from Galway and Cork were confronted by 'Red' forces defending the Curragh and Dublin (Irish Manoeuvres Orders, 1899). One map was a hill-shaded quarter-inch map extracted from the 1887 version of the 'Railway' map of Ireland. Printed in black monochrome, this map offered a general view of the entire manoeuvres district, but its utility was limited by the prominence of the hill-shading, which arguably limited its intelligibility, and by the lack of any facility for specifying location with precision.

The second 1899 map, at the scale of one inch to one mile, covered a more restricted core district for the manoeuvres – an area taking in the southern part of Queen's County (now Laois) and reaching from Maryborough and Stradbally in the north-east to Johnstown (Co. Tipperary) in the south-west. Much more readable and also offering a system for specifying location, this map was able to take account of the new edition of the OS one-inch maps of Ireland, then in progress (Andrews, 1974, pp.34-41). Some versions of the second and third editions of the one-inch maps – those known as 'outline', 'administrative' and 'hills' – appear to feature margins graduated with latitude and longitude data as a matter of course (for readily-accessible examples of maps in these versions see National Library of Scotland, as accessed 25.10.25). In some contrast, the 'fully coloured' version

(Fig. 1, the variety most widely available as a folded map in the early twentieth century) was distinguished by having the 'alphanumeric' locational system described earlier.

The 1899 manoeuvres map had the letters A to W (excluding the letter 'I') on the vertical margins and the numbers (1 to 19) on the horizontal margins. The 'alphanumeric' system was only then becoming a standard feature of the 'fully coloured' versions of OS maps. As already stated, the system facilitated the drawing of grid lines across the map and hence, for each particular map sheet, provided a means of fixing locations to a fairly precise level – at the very least to a particular square on the map. A further distinguishing feature of this 1899 map is an inset at top left that shows the manoeuvres area at the much smaller scale of ten miles to the inch (1:633,360). The inset map had the value of providing a summary view of the area.

Table 1. Some Irish examples of military manoeuvres maps, in use 1895-1914

1895	Curragh area, Manoeuvre map	Further details not known	Two-inch
1896	Kilkenny and Tipperary Manoeuvre Map		Two-inch
1899	Queen's County, Tipperary Manoeuvre maps	Fully coloured, hill-shaded, with alphanumerics on margins. Inset at top left of part of ten-mile to one inch map. (Private owner) Hill-shaded, with Cloghan in NW, Newtownbarry (Bunclody) in SE, Naas in NE, Thurles in SW. No alphanumerics on margins. (NLI)	One-inch Quarter- Inch
[1903]	Training map, Curragh District	Parts of Sheets 110,111,119, 120, 128, 129 (extract in Fig. 2) (Author's collection).	One-inch
1904	'Manoeuvre map 1904, Dublin district'	Parts of Sheets101, 102, 111, 112, 120, 121 (TCD Map Library), with alphanumerics on margins. Two versions known of this map (Hellyer, 1995)	One-inch
1905	'No. A356 3rd Cavalry Brigade Training Map'	Compiled at, and published from, the 3rd Cavalry Brigade Office Curragh Camp, May 1905'. 'From Sheets 7,8, 10,11 [covering most of midlands Ireland]. Issued to all non-commissioned officers. With detailed notes on the reverse on cavalry-related issues, including map-reading. (TCD Map Library)	Quarter-inch
1905	'Combined Field Firing Operations', Glen Imaal, Co. Wicklow	Introductory booklet contains 'Panorama sketch of Glen Imaal, looking E[ast],from Leitrim Bank'. Maps only known from references in the booklet.	One-inch, Three-inch
1906	Manoeuvre map, Ireland, 1906	Parts of Sheets 118, 119, 127, 128, 136, 137	One-inch
1910	Manoeuvre map 1910, Ireland	Parts of Sheets 10,11,13,14 [Covering large section of south-east Ireland with extensive area within 'boundary of manoeuvres' and a smaller 'prohibited area' near Abbeyleix and Durrow] (TCD Map Library)	Quarter-inch

1911	'Manoeuvre map, Ireland, 1911'/ Kilworth, Co. Cork	Parts of Sheets 165 (Mitchelstown) &c	One-inch
1912	do. But 1912		
1913	'Irish Command, Exercise Map, 1913'		One-inch
1913	'No. A124 3rd Cavalry Brigade Training Map'	'From Sheets 7,8, 10,11 [covering east midlands Ireland]. 3rd CB was based at the Curragh on eve of WW1	Quarter-inch
1913	'Ireland: 6th Divisional Training Map'	Part of the 6th Division was based at Kilworth, near Fermoy. Possibly related to an advance copy half-inch sheet 22, published by OS in 1916	Half-inch

Sources: Trinity College Dublin Map Library, Charles Close Society archive, private collection.

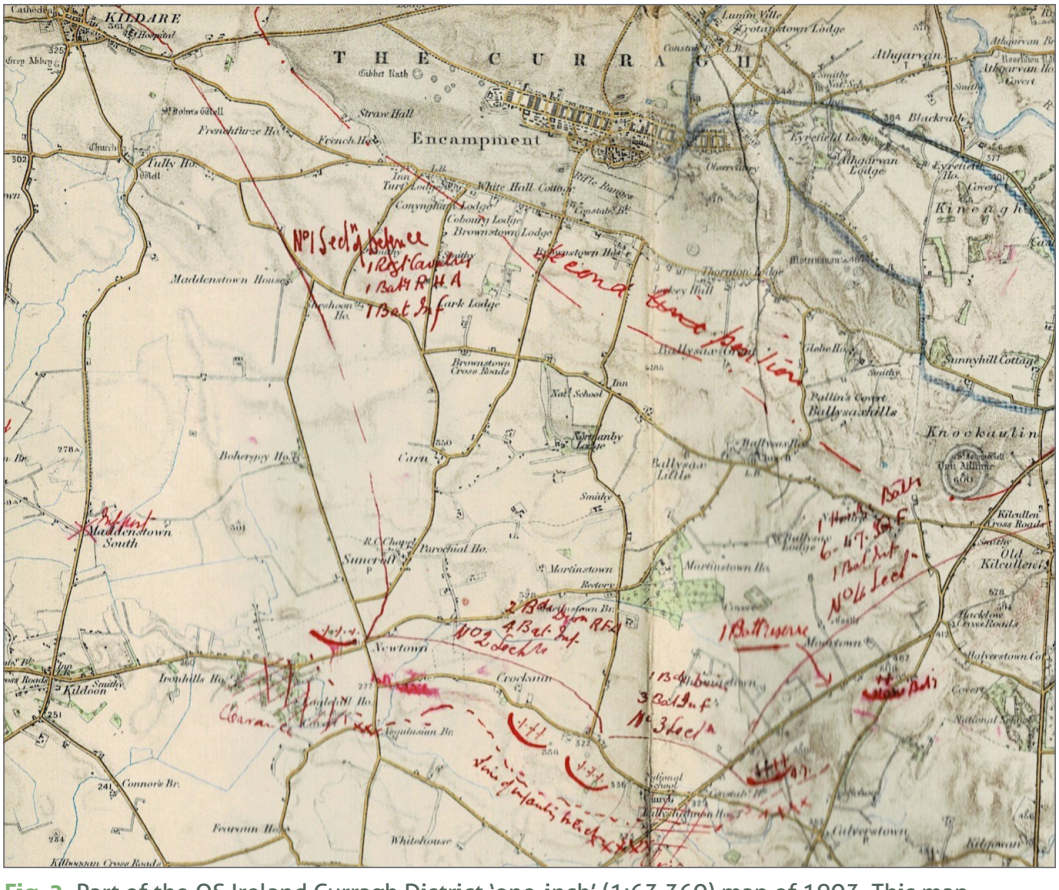


Fig. 2. Part of the OS Ireland Curragh District 'one-inch' (1:63,360) map of 1903. This map combined sections from six of the recently-revised standard size 'one-inch' maps to create a single large sheet suitable for army training. The map lacks contours. The section of the map shown here has been annotated in red ink in preparation for an army exercise. (Source: Author's copy).

Later manoeuvres maps included Rush, Co. Dublin and Glen [of] Imaal, Co. Wicklow (both 1905), as well as further coverage of both the Curragh and Kilworth districts and involved scales that were both larger and smaller than the one-inch scale. The 'Combined Field Firing Operations' at the Glen of Imaal in 1905 featured maps at the three-inch (1:21,120) and also at the one-inch scale; in addition, the manoeuvres manual contained a panoramic sketch map showing the glen from the east (Combined Field Firing Operations, 1905). Other maps were now being identified as 'training maps', a description that may suggest that the map had a function going beyond a single manoeuvres exercise. Such maps included that issued in 1905 to every non-commissioned officer and "trained 'duty' man" belonging to the 3rd Cavalry Brigade, based at the Curragh Camp. This was a quarter-inch map (1:253,344) which took in a large part of eastern Ireland and which was accompanied by a small booklet that acted as a manual with short discussions on topics relevant to diverse aspects of the cavalry lifestyle. A section on 'map reading' offered much commonsense advice and the exhortation to 'never lose an opportunity of using your Map. Carry it when you go out bicycling as well as on all Military work outside the Barracks'. The use of the quarter-inch scale was also justified:

> *A Map on a large scale is much easier to follow than a small scale one. For this reason you will prefer the 1 inch to 1 mile Ordnance Survey Map to this; but remember that on service we shall hardly ever be able to use a larger scale Map than ¼ inch to a mile. For one thing, think of the number of sheets we should have to carry about.* This 3rd Cavalry Brigade Training Map occupies no less the 56 different sheets of the 1 inch to 1 mile Ordnance Survey….. *and yet we should move right across it from North to South in four moderate marches. [Italics on original printing].*

In 1913, maps were issued at three scales: (a) 'Irish Command, Exercise Map, 1913' (one-inch), (b) 'No. A124 3rd Cavalry Brigade Training Map' (quarter-inch, drawn from sheets 7, 8, 10, 11), and (c) 'Ireland: 6th Divisional Training Map' (the newly produced half-inch, taking in parts of four half-inch sheets) (Hellyer and Oliver, 2023, p.225). Part of the 6th Division featured in (c) was based at Kilworth Camp near Mitchelstown, Co. Cork.

The half-inch map scale has the particular interest that its development, first in England and Wales (where coverage was completed by 1908), and from 1911-1918 in Ireland, was undertaken with the explicit encouragement of the [British] War Office. This scale (which was to be widely used as the standard topographic map scale in Ireland during much of the twentieth century) offered coverage of larger areas and could be more readily updated than the principal alternative, the one-inch scale. The half-inch had been widely used during the Boer War (1899-1902) and was supported by the influential OS Director, Sir Charles Close (Hellyer and Oliver, 2004, pp.5-7; Hellyer and Oliver, 2023, esp. p.42). It was produced in both layered and hill-shaded versions (Fig. 3); like the coloured one-inch initiated a few years earlier, it was furnished with alphanumeric margins, in this instance related to a division of the map at two-inch intervals (Hellyer and Oliver, 2023, p. 213). An uncoloured 'Training Map' (price 6d. on poorish paper, also produced for places in England) was also available: an example dating from the early

1910s of Sheet 21 (north Cork/ east Kerry) in the Trinity College Dublin Map Library has had a red grid added by hand – presumably as part of some sort of desk-based training exercise.

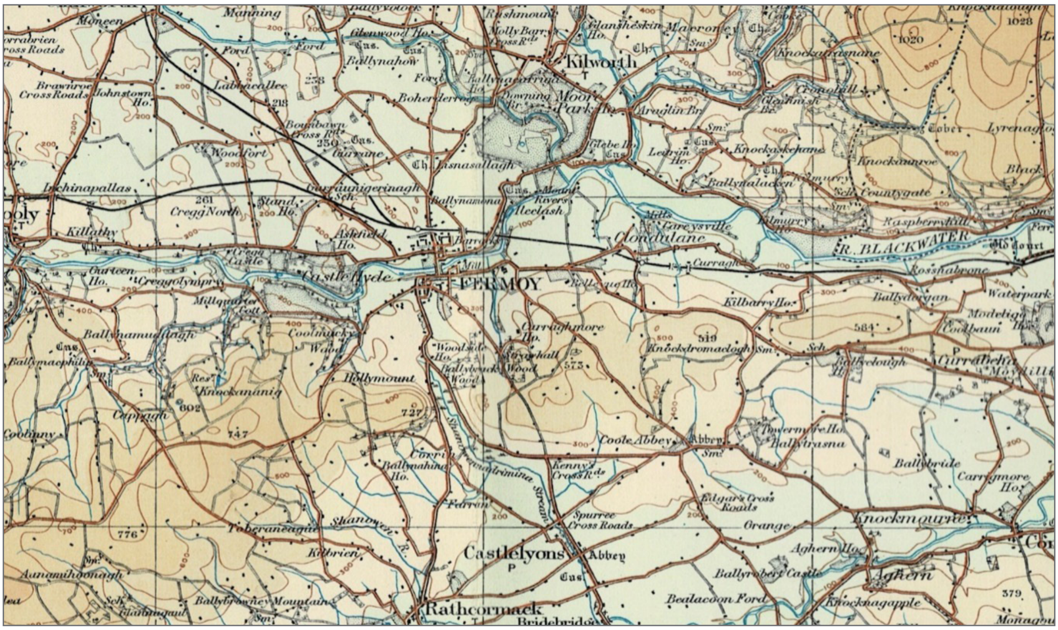


Fig. 3. Part of the 'layered' version of the OS Ireland 'half-inch' (1:126, 720) Sheet 22, published in 1916. This map incorporated an alpha-numeric grid with squares at two-mile intervals. The area shown corresponds to the area included on the Fermoy artillery training map of 1917, discussed below. (Source: author's copy).

The impact of the First World War, 1914-18

With the advent of war in 1914, there came an urgent, unavoidable, need to develop the capabilities of maps to give convenient and precise locational information. An initial improvement, evident on the Kilworth manoeuvres map of 1912, was to overprint a squaring system across the map. Another early wartime initiative was the printing for military purposes only of a 'provisional edition' of some or all of the Irish one-inch small-sheet (205 in set) series with the outline in black and contours in red; very few of these maps survive and as a specifically military map it was not sold or widely circulated (Hellyer and Oliver, 2004, p.47, p.175).

The British Expeditionary Force of autumn 1914 had gone to France and Belgium anticipating a short, mobile war. The largest-scale of map with which the force was equipped was 1:80,000 – in other words a scale intermediate between the one-inch and the half-inch (Hellyer and Oliver, 2022, p.21). But the reality that quickly developed was a prolonged war featuring trenches and fronts that were stable or near-stable over long periods. The trenches demanded larger-scale maps that would allow much more

detail to be included to a higher degree of accuracy. At the same time, maps extending across much more extensive tracts were needed for other purposes. Heavy artillery, set behind the front line and capable of firing and striking targets over quite long distances (10km was common), was vital to support the front, as was the information gathered from balloons and reconnaissance aircraft ranging behind enemy lines. With the target now possibly too far away to be visible, maps were needed that would allow the precise locations of enemy heavy weaponry and other more remote resources to be pin-pointed with precision.

Maps were thus required at a variety of scales that as far as possible offered significant local detail and a sense of the terrain. To be really useful maps also needed to display contours, if possible drawn at close intervals, and to feature some sort of precise grid-square system that would assist the artillery to identify their targets (Oliver, 1995). With appropriate maps, the war of attrition, much of it involving relentlessly moving back and forth over short distances, could be more readily fought.

1:20,000 scale artillery training maps

Even for training purposes at sites within the UK, the limitations of the existing OS medium-scale and other map series were all too apparent

> *The alpha-numeric referencing system used on the standard one-inch and half-inch enabled location within a two-inch square, which was useful for place-names, but useless to 'pin-point' references to features such as road junctions or corners of woods … (Hellyer and Oliver, 2004, p.8).*

As well as having limited precision for identifying location, the alpha-numeric system was terminally limited by being specific to individual map sheets and to individual map scales; in other words, the same map reference (say A2) could be given for different sheets from the same map series, whilst the size of an A2 square might vary with map scale. The system had some value but was also a conduit for confusion at a level that could not work in a military context. Gunners, pilots, strategists and many others aspired to a system that could specify a location in a concise, unique way.

In response to such circumstances, a new series of large-scale maps with a standardised system of squaring or grid was introduced into the army training programmes followed at many military facilities within the then-UK (Chasseaud, 1984a, b). This was the 1:20,000 'artillery training map' which was photo-reduced from the existing six-inch map series and had coloured contours. The maps were printed by the Ordnance Survey, with standard sheets covering areas of 17,500 by 10,550 yards (effectively 16 by 10 km). Although covering small areas, these maps could display much detail. With contours shown in brown and usually drawn or 'interpolated' (i.e. estimated) at an innovative interval of five metres, the local terrain could be effectively highlighted.

The artillery training map also features an early attempt to develop a more precise map referencing system by refining the alpha-numeric system to give a hierarchy of different

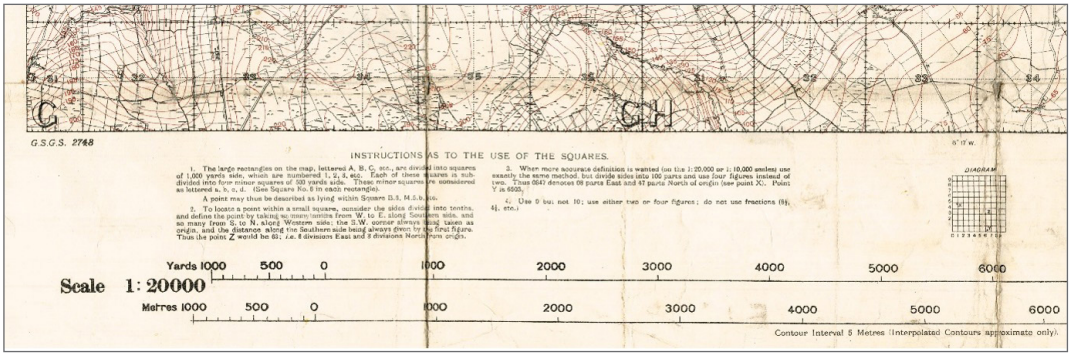


Fig. 4. Features of the Artillery Training Map of 1917-18. As well as displaying scales expressed in both yards and metres, the lower margin area includes 'instructions for the use of the squares'. Notice the tiny graduation marks set along the grid lines. A somewhat complex system of sub-division allows the large squares to be progressively sub-divided to give a location that, if required, could be accurate to within ten yards. (Source: GSCS 2748 Fermoy, author's copy).

sizes of map squares that focused in on a particular location within the framework of a 6000-yard square (Fig. 4). The system, which appears to have been both complex and confusing (Hellyer and Oliver, 2023, p.74) lasted only until the end of World War I, after which it was replaced by a system, already in use by the French military, that in the UK involved (1) the replacement of the squaring system by a metric grid and (2) the creation of a 'national sheetline system' to supersede a locational system that could only relate to individual sheets (Hellyer and Oliver, 2022, pp.21-23). This latter system, which is evident in the 1930s 1:20,000 Irish maps described below, was to be the subject of debate over nearly two decades but led eventually to radical changes in topographic map projections and to the creation of the Irish Grid, which was introduced in the mid-1950s. All these changes followed from the first tentative attempts to create greater locational precision early in World War I.

Records on their production are somewhat sketchy but a total of 196 artillery training maps, including around a dozen for locations in Ireland, appear to have to have been created during the period 1914-18. The Irish maps included maps covering places with strong military associations, namely Dublin (2 sheets, both exceptionally printed not at Southampton but at the Phoenix Park), north and south, Athlone, Ballincollig, Caher, Dundalk, Fermoy, the Glen of Imaal, Kildare and Kilkenny (as listed in Hellyer and Oliver, 2022, pp.176-180). The list, as currently known, does not identify any barracks in Ulster or across most of Connacht. According to the map historians Roger Hellyer and Richard Oliver (2004, p.8), these maps were not placed on sale, 'and though presumably considerable numbers were printed, very few have survived'. The only repositories known to have significant, nearly complete, collections are the British Library and the Imperial War Museum, both in the UK.

A copy of the Fermoy artillery training map which has been examined is backstamped "'C' Company, 7th Officer Cadet Battalion", who were based at Kilworth Camp, south of Mitchelstown and also close to Fermoy, during the later stages of World War I. This

map was printed by the Ordnance Survey in November 1917 and reprinted in 1918; it is identified as part of War Office GSGS [Geographical Section General Staff] 2748, the map series to which most of the wartime and early post-war 1:20,000 maps were assigned (Hellyer and Oliver, 2022, pp.175-181).

The Fermoy map, which takes in an area of roughly three miles (5km) around the town of Fermoy, includes Kilworth to the north, Castlelyons to the south and Ballyhooly to the west. Included too is the Moore Park Demesne, north-east of Fermoy, which had been purchased by the War Department around 1900. Its great house, once the seat of Lord Mountcashell, was destroyed in an accidental fire in 1908. The 38th Brigade, Royal Field Artillery, appears to have been stationed at Fermoy in July 1914.[1] Kilworth Camp itself, which lies further north, is excluded as is the area of the rifle ranges on the southern slopes of the Kilworth Mountains.

The derivation of the map from the six-inch is immediately apparent in the representation of field boundaries and in the degree of the detail shown for the town of Fermoy (population of Fermoy Urban District Electoral Division: 6863 in 1911). The extent to which the map has been metricated is prominent, both in the grid of 1km squares and in the detailed contouring, shown at 5 metre intervals by brown lines. No matter how fondly imperial measurement might be regarded, some degree of metrication was critical for effective coordination between allies in a European war theatre. To help those unfamiliar with metricated maps, the marginal information includes tables for the conversion of metres to feet, scales in both modes, and instructions on how to give grid references.

Map usage during the struggles of 1919-23

The Fermoy artillery training map presumably was presumably a useful component of the resources offered to troops in Fermoy and Kilworth as they received their final training before leaving for the trenches of the Western Front. Within an immediate Irish context, however, neither it nor the annual pre-war manoeuvres can have offered much preparation for the conflict of 1919-23. The War of Independence and the subsequent Civil War were characterised by small-scale, fast flowing operations for which the medium-scale half-inch and one-inch maps, depicting larger tracts of territory, were much better suited.

These were the type of maps to which the extended series of articles on map reading that appeared in the journal of the Irish Volunteers, *An t-Óglach,* during 1920-21 were mainly orientated. As the index and records of the Bureau of Military History (BMH) at Military Archives, Dublin, demonstrate, a wide variety of maps were in use by the anti-British forces during the War of Independence. Maps ranged from informal sketch maps to the formal published maps of the Ordnance Survey. In rural areas it is evident that both one-inch and half-inch maps were used in the plotting and analysis of engagements. For example, it was the one-inch and half-inch maps that the redoubtable IRA training and

[1] https://www.longlongtrail.co.uk/army/other-aspects-of-order-of-battle/army-units-stationed-in-ireland-in-july-1914/

intelligence chief, Ernie O'Malley, pored over as he plotted ambushes on crown forces in County Tipperary and elsewhere (O'Malley, 2002, pp.163-8 and *passim*). Referring to the anti-British IRA (Irish Republican Army) volunteers in south Tipperary, he observed (pp.163-4) that

> *We distributed one-inch contoured maps … The officers had now in concentrated form the extent and conditions of these areas … I set map problems for them: I tried to make them believe a map was one of the most important military aids.*

Elsewhere, while in north Cork, (p.346), he relates how as a reprisal 'we selected six houses and castles [for destruction] from the half-inch map'. In Galway, it was a half-inch map that IRA Vice-Commandant George Staunton used; he refers to the map being employed for a lot of 'plotting and planning' in, for example, the attack on Gortmore Barracks near Oughterard (BMH, Witness Statement, p.453). Perhaps most famously, an annotated half-inch map (now in the National Library of Ireland) was used by the pro-government General Prout to track down (and mortally wound) the anti-government 'IRA' leader, Liam Lynch, in 1923 (Liam Lynch Papers, ND). In Dublin, however, various deponents to the BMH testify to the use of what were presumably large-scale street maps.

North of the newly-created inter-state border, a bloody sectarian conflict flared in Belfast during 1920-22. In 1921, at the height of the conflict, a special Ordnance Survey map of Belfast was produced at the six-inch scale (Nicholson, 1996, p.33). The base map was a composite of second edition six-inch sheets dating to 1901-02, and so was twenty years out of date and consequently lacking more recent streets. As constituted in 1921, the map appears to have been specifically for the security forces and was not on general sale. Features shown included military road-blocks, police district boundaries and police barracks, and the general disposition of the security forces. The map identified flashpoint areas and had an alphanumerical squaring system to facilitate location. As described by Nicholson (1996, p.33), predominantly Catholic areas were distinguished by 'a wash of Nationalist green'. A new updated six-inch map of Belfast was issued in 1923 and served as the basis for a town map in 1933.

Significance of the artillery training maps and the use of the 1:20,000 scale

In much of the UK as it was after 1921, the artillery training maps of 1914-18 became a core component of a new map series favoured for military purposes: GSGS 2748. In the newly formed Saorstát Éireann, an early initiative was the production of a map of the Curragh district – possibly to accompany the army manoeuvres of 1926. This map, which was to be reprinted in 1935, had distinctive brown layering to identify relief. However, it was not until the late 1920s/ early 1930s that further attention was given to the military potential of the 1:20,000 scale (Andrews, 1975; Hellyer and Oliver, 2022; Horner, 2024). A reflective paper by Major Niall MacNeill (1929) can be recognised as an early attempt to recognise the future mapping needs of the 26-county state. One of his principal proposals

was the creation of a map series at the scale of 1:20,000. Such a scale could have both civilian and (particularly) military value as it offered a level of detail well beyond that of the one-inch map but nonetheless avoided the problem that the six-inch scale posed in showing only a very limited area on a single map sheet.

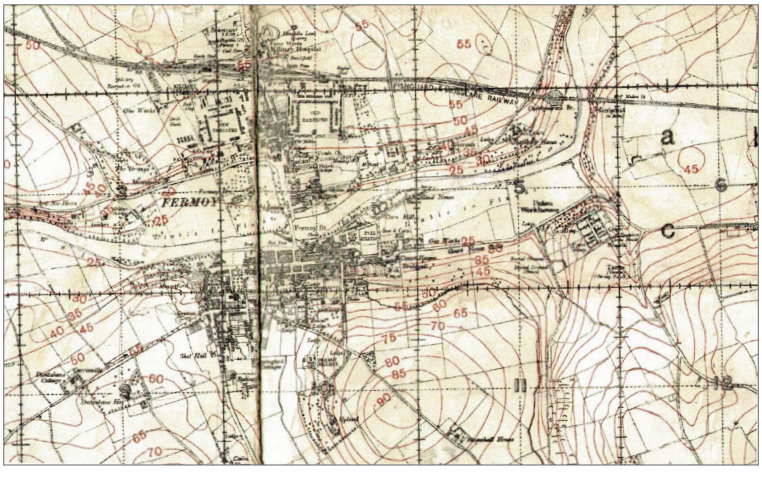
Whereas MacNeill explored the possible content of the map, attention as to how it might be organised across the island of Ireland came a year later in an exploratory technical memorandum by Captain James Flynn and Lieut. Hugh O'Neill (1930). They proposed the adoption of a standard metric grid and set out how the six-inch sheets laid out on a Cassini projection might be fed into a much more robust Transverse Mercator Projection which would allow Ireland to be covered in 513 map sheets, with each sheet covering the relatively small area of 18 x 12 km (Higley, 2022). Their discussion refers to two experimental sheets, of Athlone and Drogheda, neither of which appear to have survived.

During the 1930s, eight map sheets were formally published at the 1:20,000 scale. A military involvement is explicitly acknowledged in a marginal credit which describes the maps as having been 'compiled, printed and published by the Ordnance Survey, Saorstát Eireann, with the assistance of the Field Survey Company, Corps of Engineers'. The areas involved covered Dublin city and suburbs, which was produced in several versions (issued in 1931,1933 and 1934 (the last named being designated Sheet 265B), the area around the Curragh Camp (Sheet 296) and, most extensively, a southern group taking in part of east Cork/ west Waterford (Sheets 432-3, 450-453) including the area around Fermoy and the Kilworth army camp. As the areas covered encompass or are all near to places with military barracks, it may be suggested that their compilation was perhaps partly related to a series of military training exercises.

Undoubtedly, however, the main factor was the availability of recently-surveyed large-scale (1:2500) mapping from which, as acknowledged on the map sheets, the 1:20,000 map content could be reduced. In the case of the 'southern' map sheets, for example, 1:2500 mapping had been undertaken in Co. Waterford in 1923, Co. Cork in 1931 and Co. Tipperary in 1902. Four 1:20,000 map sheets, relating to areas in Co. Cork, appeared in 1934-5 and were reprinted in 1939; two others, relating to the Lismore and Dungarvan areas of west Waterford, were issued only in 1939. Intriguingly, the 1934-5 issue was metricated with a grid at one kilometre intervals, a contour interval of five metres and spot and trigonometrical heights in metres. In contrast, in the 1939 version, the height data were in feet, with a contour interval of 20 feet; another change was the portrayal of trees and other vegetation in green. The reversion to feet for height data was perhaps to ensure that, in what had by then become 'the Emergency' in 26-county Ireland, the 1:20,000 maps could be readily linked to the data on other OSI map scales.

The five-colour1:20,000 map series was regarded as clearly-designed and innovative, both at the time and by a small number of later commentators. Noticed briefly by Andrews (1975, p.298) in his 'postscript' to his seminal book on the Ordnance Survey in Ireland, *A paper landscape*, he considers the map as being 'of considerable interest for its disregard of almost every cartographic tradition inherited from 1922'. More recently the map has had

a much more detailed assessment and contextualisation from Hellyer and Oliver (2022, pp. 151-3, 204-5, 414-5). In their view (p.153), the series 'certainly owed something to the British and French 1:20,000s, although it was more radical than either'. They add that 'this was an uncompromisingly contemporary-looking map, one that could be taken as emblematic of Ireland's wish to be a modern, forward-looking European nation'.



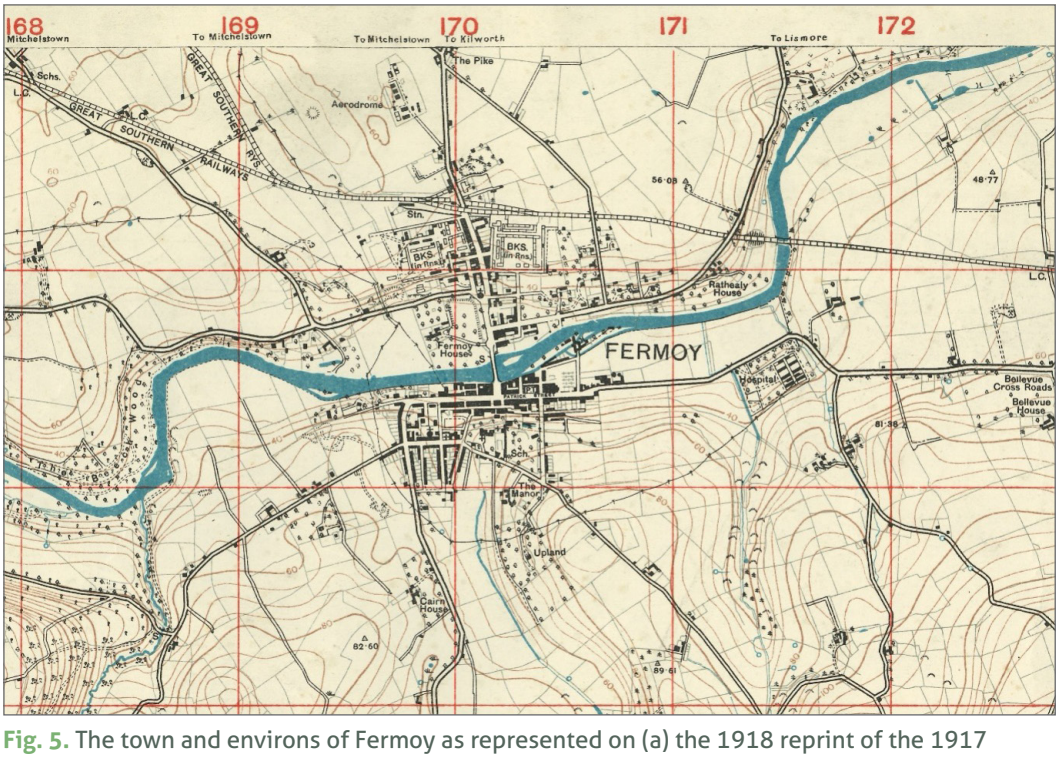


Fig. 5. The town and environs of Fermoy as represented on (a) the 1918 reprint of the 1917 artillery training map, and (b) the 1934 1:20,000 scale map of the Ordnance Survey of Ireland. Sources: (a) author's copy, and (b) Map Library, Trinity College, Dublin.

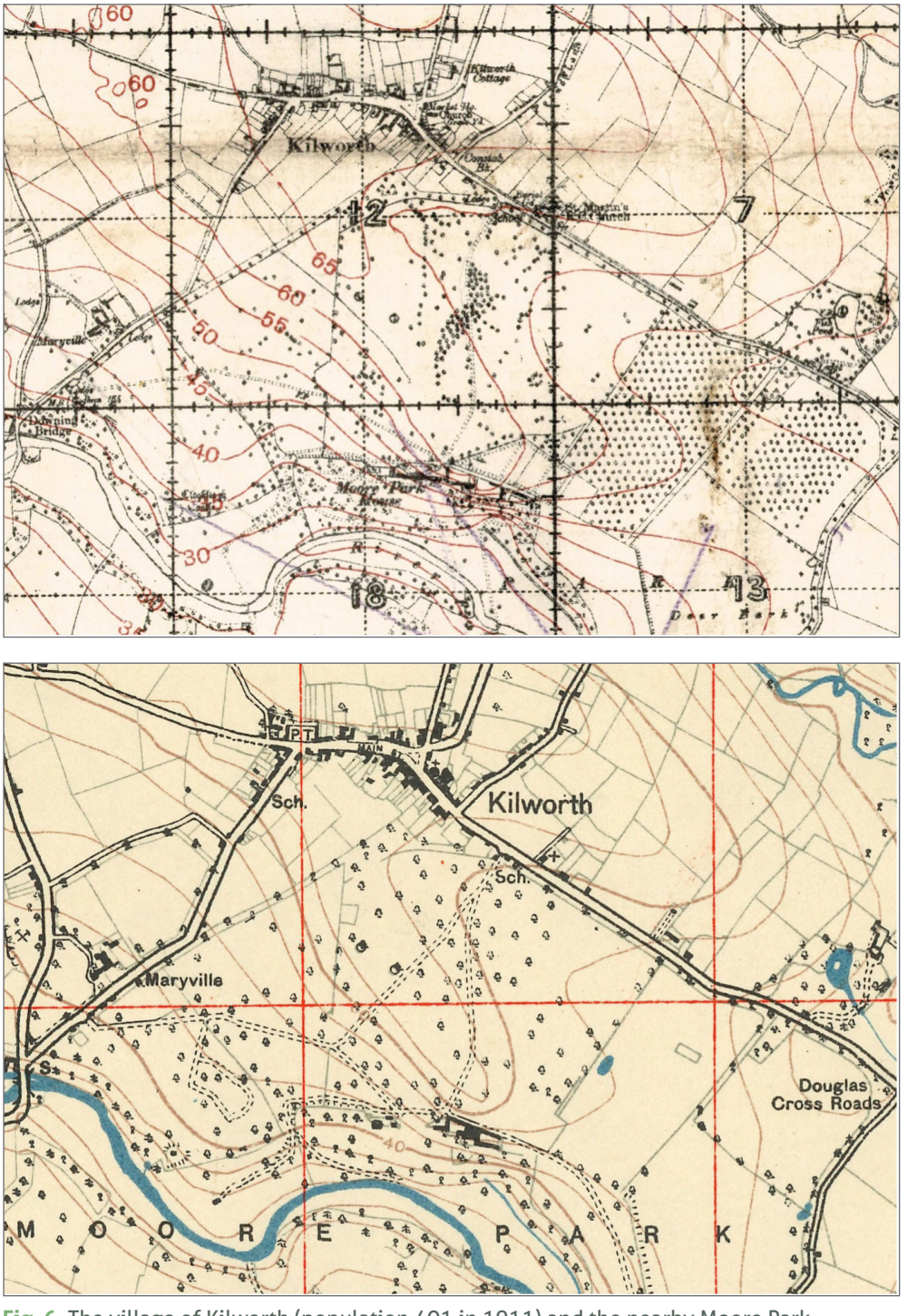


Fig. 6. The village of Kilworth (population 401 in 1911) and the nearby Moore Park demesne as represented on (a) the 1918 reprint of the 1917 artillery training map, and (b) the 1934 1:20,000 scale map of the Ordnance Survey of Ireland. Sources: (a) author's copy, and (b) Map Library, Trinity College, Dublin.

In any comparison of the Fermoy artillery training map of 1917 with the 1930s 1:20,000 scale maps, particularly sheet 451 Fermoy, a significant degree of continuity in content is evident – as might perhaps be anticipated for two maps separated by a period of less than two decades (Figs. 5,6). In the Fermoy town area, for example, only a few changes are apparent: the old and new barracks are now in ruins as a result of Civil War activity, and a small aerodrome has been established north of the town. The population has reduced significantly (Fermoy Urban had 4510 inhabitants in 1936, compared to 6863 in 1911), but the basic urban morphology and the built content of nearby places such as Kilworth (where the population had also greatly reduced, to 181 in 1936) is little different. It is the style of the map that has changed. The six-inch origins of the 1917 map are seen in the representation of buildings and in the lettering style.

As already indicated, the 1917 map is a reduced six-inch with contours and grid-lines added. In contrast, although its contouring looks similar, the freshness of the 1930s map is evident in its greater use of colour, its cleaner, sans serif lettering and in a more generalised representation and reduced labelling of buildings. In addition, as already noticed, the map has a major innovation in having a grid system that related to a countrywide framework. This is a custom-made 1:20,000 map. Yet the map series, for all its potential, was overtaken by events. The outbreak of war across much of Europe in 1939 curtailed further publication and forced Irish attention to focus on more immediate cartographic needs and expedients.

The challenges of World War II for grids and projections

With the advent of the 1939 war some of the shortcomings, and also the immediate requirements, of mapping across Europe came into sharp focus. Some of the developments affecting Ireland have been described elsewhere (Horner, 2024). The authorities in Ireland, the UK and Germany all moved to create versions of existing small-scale maps in formats that would facilitate anticipated military needs. In the German case (not considered further in this discussion), the 1:50,000 and 1:100,000 maps adapted from British and Irish topographic base-maps featured the technically-advanced Gauss-Krüger projection and grid that during the early stages of the war was being belatedly extended to the maps used by the German armies in all parts of Europe (Cruickshank, 2004; Snyder, 1993). For maps produced by the authorities in Ireland and the UK, the most basic change was to have the one-inch map printed on larger-sized sheets that covered larger tracts of countryside. In addition to the long-established one-inch coverage in 205 sheets, a 55-sheet coverage of Ireland was now being produced by the Irish OS whilst the UK authorities developed a 76-sheet series GSGS 4136. Several editions of these map series were produced during those war years 1940-43 when it was possible Ireland might become a theatre of conflict.

Perhaps tellingly, however, it was the smaller half-inch scale, which was also in several editions, that may have had the greatest utility. Not only did each of its 25 sheets cover

much greater extents of countryside, its availability, clearly contoured and with coloured layers to denote altitude bands, made it especially attractive for the interpretation of terrain. On the military editions issued during 1940-43, it was furnished with a 5000-yard countrywide grid that superseded the alphanumeric system then in use on the civilian version. Significantly it is a partly-coloured version of half-inch Sheet 22 ('Cork & Lismore') that records the deployment of the Red and Blue forces pitted against each other in the Blackwater valley area in 1942 during what has been described as the largest manoeuvres held in the history of the state – with upwards of 20,000 troops participating (in Gibney and Kennedy, 2019; see Fig. 7).

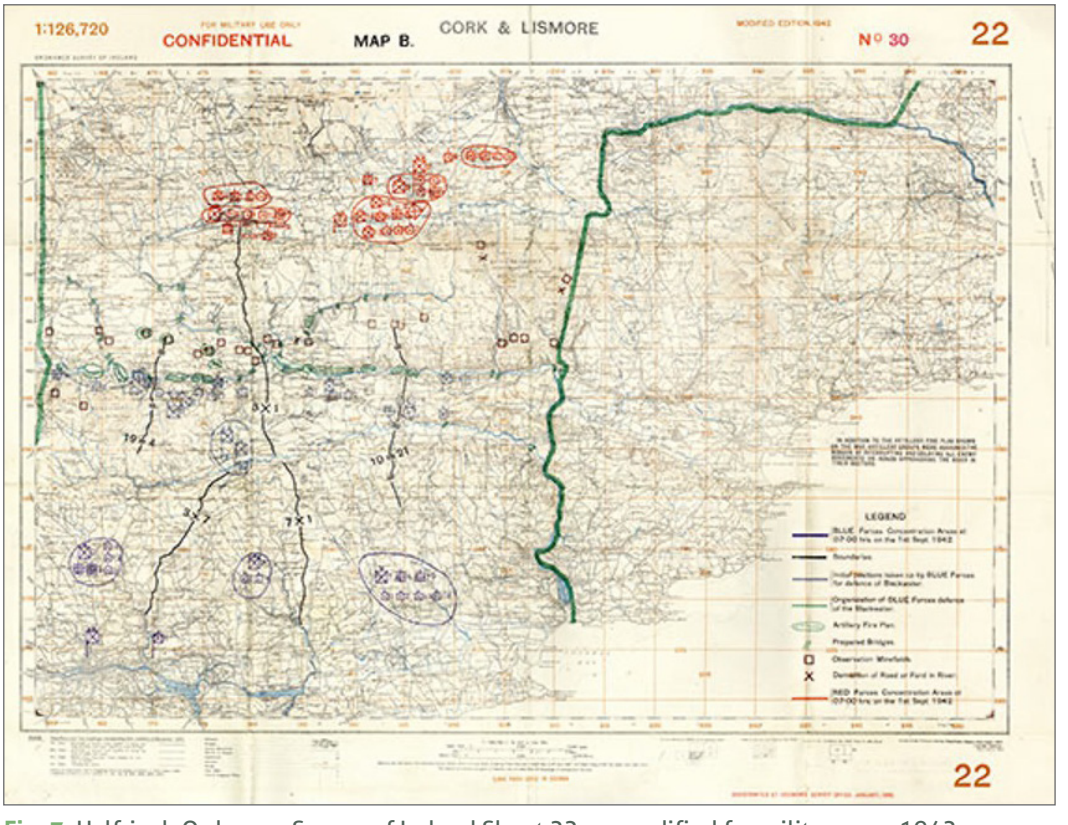


Fig. 7. Half-inch Ordnance Survey of Ireland Sheet 22, as modified for military use, 1942, showing features of the military manoeuvres between Red and Blue forces that were held that year across the Blackwater valley area in east Cork and west Waterford. (Source: Military Archives, Dublin, reprinted in Gibney and Kennedy, 2019).

As well as having the one-inch maps printed on larger-sized sheets, this scale and the half-inch scale (or in the German case 1:50,000, 1:100,000 and 1:200,000 scale.) maps featured grids adjusted to a countrywide as opposed to an individual sheet framework. Such grids were essential for a war that was no longer relatively static – a war that involved long-distance aircraft navigating across countries to bombard targets far behind any 'front line'. To identify these targets, grids had to use conventions, and

relate to a projection framework, that would allow accurate identification of targets. In the UK 'gridded maps' with grids at intervals ranging from 1 kilometre to 5000 or 6000 yards or metres had been part of an ongoing debate during the 1930s – a debate which was brought into sharper focus with the wide-ranging report in 1938 of the Davidson Committee on Ordnance Survey maps (Davidson Committee, 1938). Not only did that committee endorse the concepts of metrication and gridding, that committee pointed to the need for a more fundamental improvement, namely the replacement of the system of projection used to represent the UK on maps. From 1918 onward most mapping in Britain and Ireland had been fixed in relation to the Cassini projection which 'enjoyed the advantage that it was easily calculated and constructed, but the disadvantage that it distorted angles' (Hellyer and Oliver, 2004, p.15). For strikes at long-distance targets, the Cassini system was not fit for purpose whereas, in contrast, the Transverse Mercator (TM) or Gauss Conformal projection had the advantage that it did not distort angles (for a short overview on issues relating to projections and grids, see Hellyer and Oliver, 2023, pp.139-141). With the advent of war, however, it seems that the priority was to create maps with a single, consistent form of gridded system and that, notwithstanding its limitations and to avoid confusion, the Cassini system had to be maintained (Oliver, 1995, pp.40-2).

In consequence, it can be argued that from a military perspective, all the gridded systems in use during the second World War had shortcomings. In the case of UK maps produced for Ireland, the Cassini-based small-scale maps created for Ireland were related to a specifically-created Irish grid – what Hellyer and Oliver have dubbed the 'War Office Irish Grid' (Hellyer and Oliver, 2004, p.50). This strategy allowed for the very rapid production during the critical year of 1940 of three map scales related to Ireland: the 76-sheet one-inch GSGS 4136, produced in several editions up to 1943, the 25-sheet half-inch GSGS 4127, and the reduced-scale 1:25,000 version of the six-inch maps, the 565 sheet GSGS series 3906. It is interesting to speculate on the effectiveness of these rapid creations. Arguably they served their purpose by becoming available quickly but they might also have posed issues had serious conflict developed. For example, the GSGS 4127 half-inch series is scarcely user-friendly as it confusingly features two grids: the original alphanumeric and a new version with the War Office grid-lines in faint blue at 10km intervals (Hellyer and Oliver, 2023, p.225). The monochrome 1:25,000 series is also confusing, in this instance because the small-field networks of large parts of Ireland do not lend themselves to representation at this scale. As is perhaps implied by its longer life and its large printing runs, the GSGS 4136, with its 12-km grid, probably had the greatest utility but this might have only been evident had a land-based conflict developed.

In the case of Irish-produced small-scale military maps, the shortcomings were also all too apparent. Not only were the maps related to a Cassini projection, the grid system was, as already noted, in yards, 5000 yards in the case of the half-inch. Notwithstanding the mid-1930s experimentation with metric contour intervals and metric grids, under the pressures and demands of 1939-40, the Irish authorities seem to have opted for a measurement system with which they could be sure their personnel were familiar.

However, the use of 'imperial measure', already in question during the first World War, would have placed the Irish military at odds with almost all other forces. Complicating the issue further, serious, probably intractable, differences prevailed in the way the grids featured on Irish and British maps were constructed (see Appendix A). As Hellyer and Oliver (2004, p.53) later observed 'had British and Irish troops embarked on joint operations, it would presumably have been necessary to address [the] difference'. As with the UK editions of Irish maps, it was perhaps a fortunate outcome that the utility of the Irish maps was not put to any prolonged, detailed test.

Developments after World War II

The 'Cold War' that soon followed the end of hostilities in 1945 prompted a wide-ranging re-assessment of maps and mapping requirements across Europe. In the 'West', the strategic needs of the new international alliance of NATO promoted a focus on new standards and greater international co-ordination. These trends in turn resulted in the adoption of new grid systems related to a much more general usage of the Transverse Mercator projection, the system that was now widely accepted as the most suitable for identifying locations with pinpoint precision. The ripple effects of this development impacted on 26-county Ireland (even though it was not a member of NATO) and appear to have stimulated a new level of active co-operation between the Dublin-based Ordnance Survey of Ireland and the Ordnance Survey of Northern Ireland. Between 1952 and 1964 the two survey organisations combined to undertake a complex and wide-ranging re-triangulation and new geodetic levelling of Ireland, the first since the 1820s/1830s (Andrews, 1975, pp.297-300). This operation was related to a new mean sea level observed at Malin Head, County Donegal, and was a prerequisite for laying out maps across Ireland in relation to a new Irish grid related to maps using the Transverse Mercator projection (Ordnance Survey, 1991, pp.50-53).

With the mapping framework comprehensively modernised, it became possible to focus further on future mapping requirements. An advisory committee on mapping requirements reported in 1964 and made some far-reaching proposals for a wide-ranging revision of the scales and to some extent the content of Irish maps (Advisory committee, 1964; Andrews, 1975, p.299). As well as metrication of contours, the exceptionally radical proposal was made to adopt 'natural' scales, ranging from 1:1000 through 1:2500, 1:5000, 1:10,000, 1:25,000, 1,50,000 to 1:100,000 or 1:125,000 and 1:250,000. It was recommended that the large-scale mapping programme would be given priority. However, not all of the reviewed scales were subsequently implemented, for example a single sheet of a proposed 7500-sheet 1:5000 map was produced in the mid-1970s (it is noticed in Killen, 1979), but the series was never progressed further. preference instead being given to revision of the 1:2500 and 1:10,000. Another scale, the 1:25,000 (and the similar 1:20,000), was used only for some city plans and for maps of some popular recreation areas. But the approach and policy was clear and was accompanied by an openness to new technology. In terms of a military dimension, it was the accelerating pace

of new technology, most notably the advent of powerful computers, the opportunities for remote sensing offered by aircraft and earth satellites with high-resolution sensors, and the development of locational systems capable of pinpoint accuracy, that increasingly influenced new mapping.

The 1:1000 survey involved the widespread adoption of photogrammetry, whilst the continued expansion of large-scale work during the mid-1970s was facilitated by computer assisted mapping (Walsh, 1978). A decade later, the widespread adoption of satellite-orientated Global Positioning Systems (GPS) created a revolution in locational technology, leaving the traditional triangulation-based methods redundant. In the early 1990s the all-Ireland 89-sheet 1:50,000 'Discovery' series superseded the long outdated one-inch maps and also replaced the half-inch as the standard small or medium-scale topographic map (Kirwan, 2010). Its completion could be accompanied by the assertion that, at least as far as the Republic component (ca. 71 sheets) was concerned, its compilation had been entirely from digital data. In this instance a slow start enabled the Republic to go digital quickly; in some contrast the first tranche of Northern Ireland 1:50,000 maps, which began to be issued over a decade earlier in 1978, was compiled by more conventional methods (Oliver, 1994).

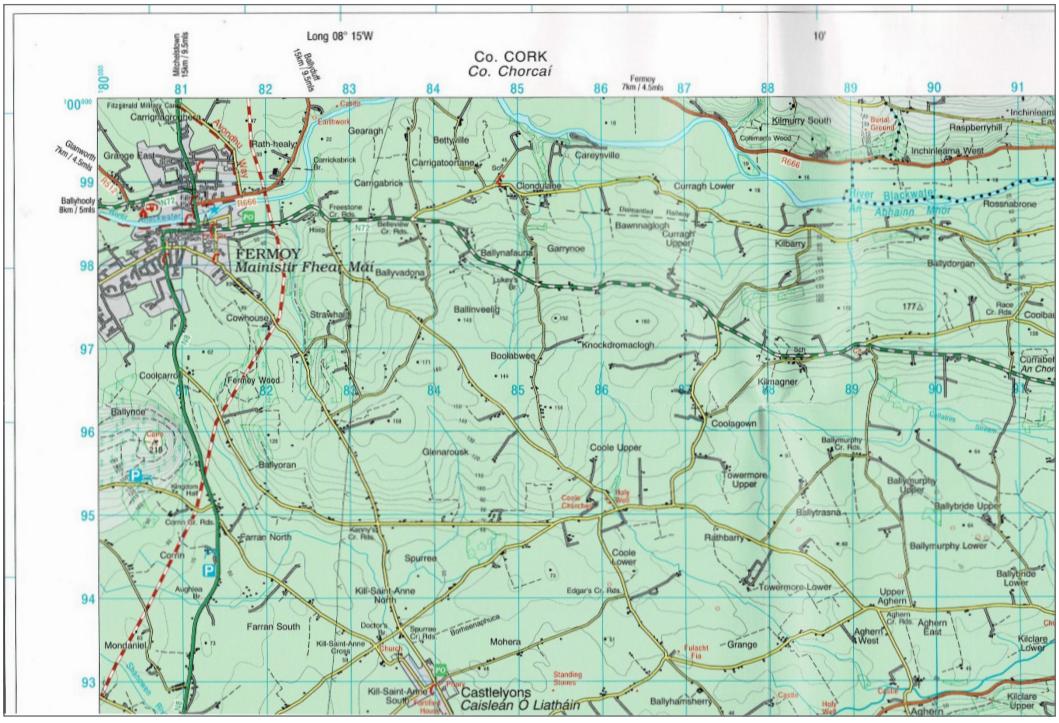


Fig. 8. Part of Sheet 81 of the 3rd (2006) edition of the 1:50,000 map of the Fermoy district. Contours are at ten metre intervals. Irish language versions are given of some placenames. The extract shown takes in the same area as that shown in Fig. 1 for the c.1900 one-inch map.

In these developments, the main imperative appears to have been civilian usage; recreation and tourism interests helped drive the demand for modern small-scale maps; planning and development, including the needs of the utility companies, produced a comparable push for accurate, up to date large-scale mapping. The military requirements of a national grid and the capacity to identify locations precisely on a high-quality projection were largely satisfied by the civilian maps. Even the most international of Irish maps, the aeronautical charts and the Irish contribution to the International Map of the World, appear to have been driven primarily by civilian considerations. In the Republic of Ireland, only a very small number of small-scale maps appear to have been produced in the post-1945 period that were not on sale to the general public and that were specially created for the military authorities. These maps included a further version, (1968, labelled Sheet 31A) fully-coloured, of the one-inch map, originally produced in 1926 and reprinted in 1935, of the Curragh District that took in much of County Kildare and west Wicklow and an innovative new edition (1981) of the 1:20,000 map of the area around the Glen of Imaal artillery ranges. The latter modernised the earlier 1943 version (recently reproduced in Delany, 2025) and featured contours at ten metre intervals. (Fig. 9).

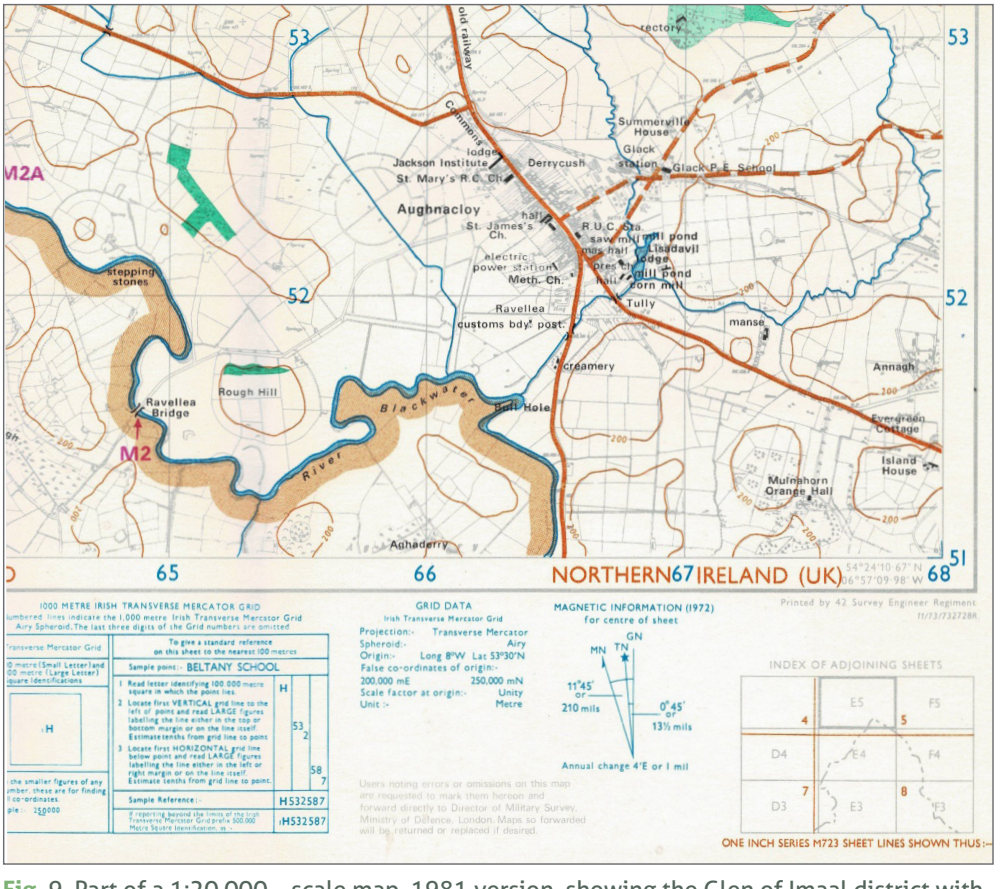


Fig. 9. Part of a 1:20,000 – scale map, 1981 version, showing the Glen of Imaal district with army firing ranges. Compiled for military use and featuring contours at ten-metre intervals. This map modernised an earlier 1943 map of the same area. (Source: Author's copy).

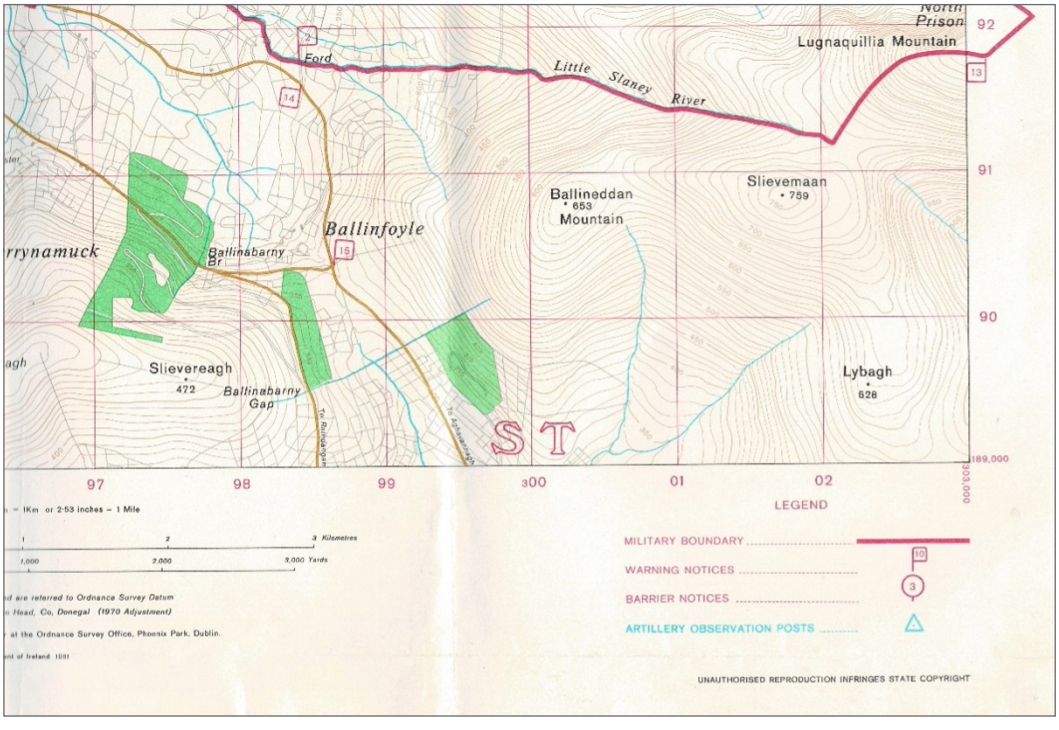


Fig. 10. From a 1:20,000 scale Sheet E5, GSGS 5147, edition 3,1973.' Published by the Directorate of Military Survey', UK. Showing Aughnacloy (population732 in 1971), Co. Tyrone, Northern Ireland. The thick orange line is the inter-state border. Mapping undertaken 1908-37, with new colouring and lettering, addition of woodlands, air photo revisions, and re-gridding to a Transverse Mercator projection, mostly 1971 (Author's copy).

It was in Northern Ireland that much more extensive and specific military needs became evident during the prolonged 'Troubles' that ensued from the late 1960s. During an earlier outbreak of conflict, mainly in border areas, the British army appears to have relied on already existing cartographic resources, the main initiative being to order reprints of a range of one-inch (GSGS 4136) and the sometimes-unintelligible 1:25,000 maps (GSGS 3906), mostly those relating to border areas. However, from 1969 the British army was required to supplement local security forces in a much more extended and systematic way. As personnel with little or no prior knowledge of Northern Ireland were deployed, an immediate challenge was to familiarise them with the cities, towns and countryside that were the theatre of operations. Military needs resulted in the overprinting of some standard small-scale maps, for example the creation of helicopter and police area maps (GSGS 5102 and 5249). Moreover, as the Troubles extended through several decades, particular maps and particular map series appear to have been created in response to military pressures. Small-scale examples given in *Sheetlines* (Anon., 1996, 39) include the creation of a four-sheet 1:100,000 map which, although at one point advertised as

intended for general availability, was restricted to the military into the 1990s. At the 1:50,000 scale, OSNI Sheet 36A, providing a single-sheet perspective on the Carlingford peninsula area, appears to have replaced the more fragmented treatment of Sheets 28 and 29.

Some very distinctive larger-scale map series also emerged, most notably a 1:20,000 series (GSGS 5147) that facilitated rural miliary operations in border areas (Fig. 10) and, for the urban areas of Belfast, Derry and Portadown-Lurgan, the creation of larger-scale religious areas maps (GSGS 5075A, 5160 and, 5248, sometimes (usually in Britain) colloquially referred to as 'tribal areas maps') to help security forces unfamiliar with Northern Ireland to navigate around localities where religious and political allegiances can change very quickly (Horner, 2021, 2023) (Fig.11). A large number of large-scale (1:2500) street maps were also created for the main urban areas and also for all towns

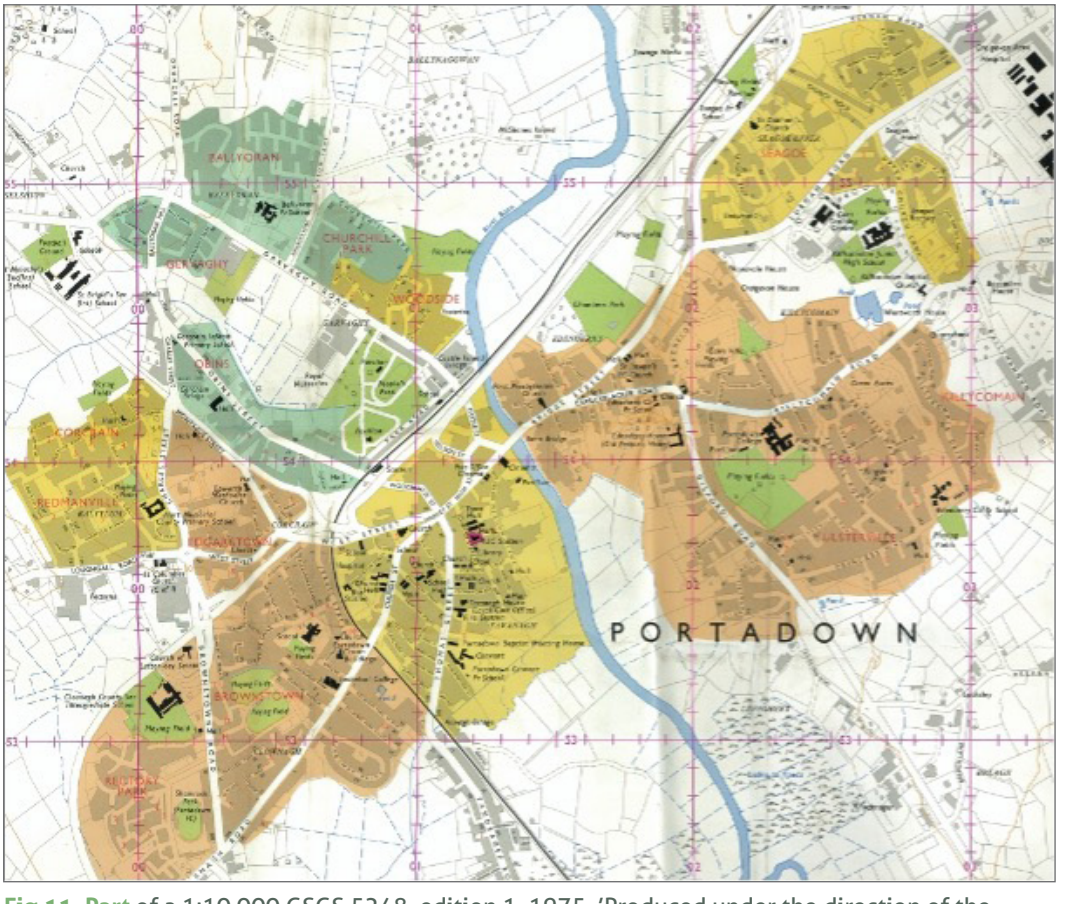


Fig.11. Part of a 1:10,000 GSGS 5248, edition 1, 1975. 'Produced under the direction of the Director of Military Survey', UK. Showing 'Craigavon Religious Areas'. Contours at 10 metre intervals, with a 1 Km grid. The town of Portadown (population in 1971, 22,207) is shown here. Strongly Protestant areas are in orange, strongly Catholic areas are in green, mixed areas are in yellow.

and villages in border areas (GSGS 5080 and 5086). Most of these maps, many of which were initially generated quite hastily and at short notice around 1970, were refined over several 'editions' and were placed on Transverse Mercator projections with metricated heights from the mid-1970s. As the Troubles continued on into the 1990s, however, many innovations came to be introduced, among them methods of identifying location using GPS and of electronic surveillance from drones, and, most strikingly, the increased use of digital data that led to the re-situating of locational data as part of a much more broadly organised field of spatial data handling (Whittington, 1997).

The march of new technology led to a further far-reaching development in 2001, namely the implementation, jointly by both the Ordnance Survey of Ireland and the Ordnance Survey of Northern Ireland, of the Irish Transverse Mercator (ITM) as the official projected coordinate system for Ireland (Greenway, 2003; Prendergast, 2004). It produces less distortion and will eventually supersede the Irish Grid of the 1950s. Related to a new 'false origin' further into the Atlantic, the ITM entails a new, very distinct, series of grid references for locations across Ireland. This system is now being operated, for both military and many civilian requirements, in a global context of increasingly sophisticated geospatial techniques and ever more demanding positional accuracy standards (Abdullah, 2025; Rönsdorf, 2017)

Conclusion

A military dimension is evident in surveying and mapping in Ireland through much of the twentieth century, with a continuing issue being the objective of developing effective methods to pinpoint and specify location as accurately as possible. Early alphanumeric systems applicable to individual map sheets gave way to map referencing related to a countrywide grid and ultimately to locations being identified by GPS and related to the ITM system. The manoeuvres maps of the early decades of the century presumed that military mapping requirements would be in the context of conventional warfare between opposing armies as in World Wars I and II. For this sort of scenario, maps such as the 1:20,000 artillery training maps used in World War I had relevance. However, as early as 1919-23, it was evident that conflicts might be fast-moving and involve small groups of fighters. This sort of pattern was again evident in the Northern Ireland Troubles from 1969. For these conflicts, the issue of pinpointing location continued but the map requirements were very different to those of large-scale warfare. The 1:20,000 map scale was now needed by troops combating small groups and operating across unfamiliar and insecure rural areas. At the same time large-scale maps were needed to respond to violence in urban areas. The closing decades of the twentieth century represented a period when military engagement with mapping and location remained only too significant, but its nature and methods were very different to a hundred years earlier.

Appendix A. The grids used on Irish maps during World War 2 – some evidence from Military Archives, Dublin.

Records at Military Archives, Cathal Brugha Barracks, Dublin, provide a significant testament to the close links, including many exchanges of information, that prevailed between May 1940 and late 1943 – the period during World War 2 during which the '18th British Military Mission, based at Lisburn in Northern Ireland and with a liaison officer in Dublin, provided a primary conduit between British and Irish military authorities (for detail on links see Burke, 2025). Included in these records, particularly in the bundle labelled '18th.mm.006' entitled 'Questionnaires' and considered here, are a small number of files covering various issues relating to the content and characteristics of Irish maps. An inquiry to 'Commander, No. 18 Military Mission', on the subject 'survey data' and inevitably marked 'secret', from Lt Col K.M. Papworth, Royal Engineers, then at Survey Directorate, HQ British Troops in Ireland, Home Forces, is especially interesting for the reaction it generated. Papworth (1897-1987), who was later to become director of the Ordnance Survey of Northern Ireland, offered some low-level and really not very secret data (the Bonne projection and its origin dated back to the 1850s) , as outlined in Table 1, for the [British] 'military grid of maps for Ireland' and sought information (not considered further here) on trigonometrical stations and points in Counties Dublin and Wexford.

Table 1. The 'survey data' relating to the grid used on British military maps of Ireland – as forwarded to Irish military authorities on 15 October 1940.

Figure of Earth	**Airy. Tables for this figure are in 'Notes on Minor Trigonometrical Work of the Ordnance Survey'**
Projection	One-inch series: Bonne. Quarter and half-inch series: Believed to be Bonne
Grid	Cassini Metric
Origin	8°W Longitude. 53° 30' N Latitude
False co-ordinates of Origin	200,000 metres east, 250,000 metres North.
Conversion factors	Feet to metres 0.30479973, Metres to feet 3.28084275

Source: Military Archives, Dublin, 18th.mm.006.

Perhaps rather disingenuously, Papworth added a further query, asking 'Will the Ordnance Survey printing arrangements in Phoenix Park be available for our use in. event of action taking place?' Presumably when no immediate response was given, this enquiry was repeated on 3 November 1940, along with a further request for details of the '5,000-yard Free State grid' and a new enquiry 'Do you know if there are any revised one-inch maps of Eire in existence?' followed by the remark that 'The ones they have now in use are only reproduced copies of our own'.

The actual response letter is not recorded, but the basis for it is evident in an unsigned, typescript note dated12 November 1940 which includes the comment that

Our grid has, of itself, no computational basis. It is simply formed by a system of lines parallel and perpendicular to the meridian of the origin of the small-scale maps of Ireland (8th. W. of Greenwich). The "false" co-ordinates which it gives for the origin of these maps (8^0 W., 53^0 30' N.) are 597,280 feet East, 787, 960 feet North.

Several significant points are embedded in this short paragraph, amongst them what some may see as the irony that, whereas the British used metric data, the Irish, in this instance at least, used the 'imperial measure' of feet. But much more significant is the fact that different 'false origins' had been used for the Irish and British grids and the admission that the Irish grid lacks a true computational basis and that it appears to have been improvised as 'a system of lines parallel and perpendicular to the meridian of the origin'. The issue is not developed further but it does seem to indicate clearly that any liaison between Irish and British forces would have had to face a huge difficulty in the co-ordination of locations specified as grid co-ordinates. By way of example, on an Irish map of the early 1940s the grid reference 321245 identifies a location at or near O'Connell Bridge in the centre of Dublin; in contrast, the same reference on a British-created Irish map of that period would relate to somewhere near Leopardstown racecourse, well south of the main city. The potential for confusion at the international level is obvious, although it may perhaps be added that issues also prevailed within countries: as Oliver (1995) has shown, the evolution of the grid system within the UK was long and tortuous, with conflicting opinions between, and within, civil and military interests.

Contrasts in grid systems appear to have received little further attention until late 1943 when they are reviewed in a letter of 21 October from Major J.E. Nolan, Deputy Assistant Director, Ordnance Survey Office, to Colonel D.J. Lawlor. Referring to a group of six maps covering Ireland he noted the existence of three versions – two British and one American (the evolution of these versions of the quarter-inch during 1940-42 is described in detail in Hellyer and Oliver (2023, 85-87)). These maps were probably at the 1:250,000 scale, which covered Ireland in six sheets, the British versions being a mix of GSGS 3982, issued in 1940, or GSGS 4338, issued in 1942). The grid on each was 10,000 metres and had been computed by the British. This grid was also in use on a 1:500,000 air edition (perhaps GSGS 4072, taking in Ireland in two sheets, first issued in 1940) and as an overprint in blue on a British edition [presumably GSGS 4127] of 'our' half-inch series. However, according to Major Nolan, this grid bore no relation to 'our own 5,000 -yard grid'.

Nothing further seems to follow from this letter, although it does serve yet again to underline the difficulties that might arise in any actual conflict where liaison was needed between different national forces. It is scarcely surprising that developing co-ordinated and more logical grid systems was a major issue for survey departments across Europe in the post-war era.

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