

**Constructing the Military Landscape:
The Board of Ordnance Maps and Plans of Scotland,
1689–1815**

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Abstract

This thesis examines the mapping of eighteenth-century Scotland in relation to the British state's imperatives to know the spaces of the nation. It examines the idea of the 'military landscape'—that conjunction of forts, roads, and barracks—represented and constructed by the military engineers, surveyors, and draughtsmen of the Board of Ordnance between 1689 and 1815. In total, 940 maps constitute the Board of Ordnance 'archive' housed mainly in the National Library of Scotland, the British Library, the National Archives (Kew), and the Royal Library at Windsor.

The study of the Board of Ordnance military maps of Scotland is considered in relation to the epistemological foundations of map making in the Enlightenment, particular focus being paid to the relations between government institutions and military cartography. The thesis considers how political and military power was embodied in the engineers' maps and plans. It explores the extent to which the Scottish landscape—especially the Highlands—was an unknown territory demanding intellectual and material civilisation in cartographic form.

In its main chapters on forts, movement, and battles, the thesis is organised to reflect the purpose behind the creation of military maps. It includes representations of military activities that consistently had recourse to mapping—fortifying, intelligence, reconnaissance, marching, encamping, and battle—and explains why military maps were conceived thus and how they were used. Fortification cartography dominates the representation of Scottish military landscapes: 73% of the archive constitutes maps, plans, sections, and views of forts, barracks, and coastal batteries; 22% maps associated with military movement; and 5% battle maps. By examining the different genres of military mapping, the thesis offers an evaluation of the Board's endeavours to rationalise and to codify military cartography in order to bring it in line with wider European practices. This review of the nature and extent of military mapping of eighteenth-century Scotland reveals the practice to be a result of institutional imperatives to assert territorial control rather than simply a cartographic enterprise. In (re)constructing the military landscape, the thesis extends current knowledge of military mapping in eighteenth-century Scotland and provides for the first time a substantive examination of the Board of Ordnance as an agency of state and cartographic authority.

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To my parents and my sister, Elaine, thank you for your encouragement.

Declaration

I hereby declare that the thesis has been composed by me, that the work is my own, and that it has not been submitted for any other degree or professional qualification.

Carolyn J. Anderson

November 2009

A Note on Referencing, Spellings, and Use of Dates

Three notes concerning the thesis are important to state. The first is in reference to my referencing. Primary unpublished sources relating to written documents rather than to maps are provided with some contextual detail if this has not already been supplied in the text. The parent document is then to be found in the bibliography. Secondary sources are by author and date only, and are to be found in full in the bibliography. Map references, where they relate to the re-assembled archive, are to be found in full in Volume 2 of this thesis. The second note concerns spellings. Where I have taken a quote from a primary source, I have retained the original spelling and only used *sic* in the first instance of misspelling in relation to current, accepted forms. Thirdly, dates: pre-1752, the civil or legal year began on 25 March and some of the Board of Ordnance documents—maps and texts—record both the Old Style and New Style years, for example, 1714/15. In such cases, I have rectified the dates to match the New Style (1715 here).

A Note on Volume 2

Volume 2, an “Index of Maps and Supplementary Appendices”, individually references the maps that have formed the basis of this study. The volume provides a full bibliography of the maps. The pagination of volume 2 starts from one rather than following on from this volume and begins with a chapter explaining the format of the entries, by institution.

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Abbreviations

Archive Institutions

AL	Admiralty Library
BL	The British Library
NAS	The National Archives of Scotland
NLS	National Library of Scotland
NRAS	The National Register of Archives for Scotland
RLW	Royal Library, Windsor Castle
TNA	The (British) National Archives, Kew

Documents and Maps

Add. Ms	Additional Manuscripts
BO	Board of Ordnance
CP	Copyist
DM	Draughtsman
DR	Drawing Room
Eng.	Engineer
K.Top	King's Topographical Collection
IGF	Inspector General of Fortifications
MPD 1	Public Record Office: Maps and plans extracted to flat storage from records of the Treasury and Treasury Solicitor
MPF 1	Public Record Office: Maps and plans extracted to flat storage from various series of records of the State Paper Office
MPH 1	Public Record Office: Maps and plans extracted to flat storage from various series of records of the War Office
MPHH 1	Public Record Office: Maps and plans extracted to extra large flat storage from various series of records of the War Office
MR 1	Public Record Office: Maps and plans extracted to rolled storage from various series of records
MS/Ms	manuscript
NMM	National Maritime Museum
RMA	Royal Military Academy, Woolwich

RME	Royal Military Engineer
RMSD	Royal Military Surveyors and Draughtsmen
SP	State Papers for Scotland
T	Treasury Papers
WO	War Office (documents which have descended from the War Office)

CHAPTER 1

Introduction

Constructing the Military Landscape: the Board of Ordnance Maps and Plans of Scotland, 1689–1815

The Plan's describ'd, the Seas and Shores survey'd;
Let's now the Treasures of the Land Invade;
Traverse their Hills, and all their Vales descry,
And spread their just Description to the Eye.¹

Introduction

This thesis examines the military mapping of Scotland in the 'long' eighteenth century. Specifically, the thesis provides an in-depth study of the maps and plans produced by the engineers and draughtsmen of the Board of Ordnance and several associated surveyors. The manuscript maps and associated material relating to their production in the work of the Board are a legacy of state activities in Scotland, when map makers were charged with planning, constructing, and recording landscapes of and for military action—a conjunction of forts, barracks, batteries, roads, and battlefields. The maps particularly represent the state's endeavours to control internal unrest, to defend against external attack, and to plan for a future Scotland.

Discussion and examination of these maps—their place in the Enlightenment, their role as representations of military landscapes, and their role in government—is here considered in relation to recent work in the history of cartography on mapping in the Enlightenment and with reference to events in Scotland which underlie the maps and their related documents and which help explain their production at all and their nature, chronology, and type. It is my contention that the maps be understood as documents of power, authority, and access, and were used, in the period in question, as tools of national political administration.

To place this study in context, it is important to consider the place of mapping in the Enlightenment. Mapping was one of the primary means (the others being measurement and

¹ Defoe 1706, p. 21.

text) by which geographers and state authorities sought to understand the world through reasoned description in the ‘Age of Reason’. Eighteenth-century geography has been described by one modern scholar of the history of cartography as ‘essentially cartography or nothing if not mapping’.² Geography was a way of ‘seeing and knowing the world’ which sought ‘to represent, to classify and to order’ that world. Mapping as a related ordered practice would lead to the expansion of geographical and political knowledge.³ Knowledge enshrined in the map was power—‘to govern territories, one must know them’.⁴

The rhetorical and persuasive power of maps and of mapping in the eighteenth century owed partly to their increased scientific status with their claims of accuracy. The map was perceived as a rational construction, an intellectual and discursive space ruled by geometry, symmetry, and the requirements of territorial knowledge.⁵ Geographers and others saw the map as an ‘intellectual tool’ by which large and disparate masses of information could be amalgamated into coherent and comprehensive texts.⁶ In the same sense as books, maps and, often, their associated memoirs, offered an ‘enlightening potential’:⁷ ‘Geography was to the earth what the *Encyclopédie* was to human knowledge. Just as the *Encyclopédie* sought to define and describe all human knowledge in an orderly textual manner and then to express this in graphic form as a tree of understanding, geography sought in text and map to define and describe the world’.⁸

Another reason for the authority of maps lay in their status as an image: an opaque medium that materialised the landscape of a particular place or social world. Because maps are images with historically specific codes, images bound by rules which govern their modes of social production, exchange, and use, maps have a political power in the social worlds in which they are produced and so require interpretation that is mindful of that context.⁹

This study considers the ‘scientific rhetoric’ of the Board of Ordnance map makers, their ‘objective’ and ‘scientific’ forms of knowledge creation, and the epistemological foundations to their map making in the Enlightenment. The study is not solely concerned with the technological aspects of map production and the ideals of mapping. I also explore the cultural and social significance of military mapping since ‘even ‘scientific’ maps are a

² Godlewska 1999, p. 21. The term *cartography* was first used in the late eighteenth century in relation to a project to create a comprehensive geographical archive (Edney 2009). In 1839, the Viscount of Santarém applied the word to the study of early maps and, thereafter, it was applied to all aspects of map making (Harley 1987, p. 12).

³ Withers 1995, p. 138.

⁴ Edney 1997, p. 1.

⁵ Jacob 2006, pp. xiii and 2.

⁶ Edney 1999, p. 189.

⁷ Withers 2007, p. 4.

⁸ Godlewska 1999, p. 27.

⁹ Harley 1988a, p. 278; 1989a, p. 2; Jacob 2006, pp. 2 and 10.

product not only of “the rules of the order of geometry and reason” but also of the “norms and values of the order of social [...] tradition”¹⁰. To do this, the study allies examination of the maps of the Board of Ordnance with interrogation of the related manuscript and primary published sources. In combination, this allows us to understand why the state should seek to map the country as a military space in the ways it did but also to highlight how, by whom, and with what variations in type of map and in type of cartographic activity these processes were undertaken.

Through the Board of Ordnance, Scotland offers an important opportunity for considering the place of military mapping as a form of geographical knowledge in the Enlightenment given the significant archive of material on the militarised landscape and the social, intellectual and practical networks that directed the making of these landscape sources. As I hope to show, eighteenth-century Scotland was, in military mapping terms, distinguished by cartographic practices that resulted in different constructions of space. Fortification cartography reflected the British state’s need to secure its medieval defences, to establish a military presence, and to provide accommodation for its troops in the Highlands engaged in dealing with the threat of Jacobite insurgency. Topographic and route surveys reflected substantial military developments: in the strategic location of new barracks in touch one with the other with the construction of a military road system through the Highlands. The map-based and artistic representation of battles and campaign maps also forms an important part of the archive under consideration here, not least because it illustrates ‘lost landscapes’ and helps illustrate the political consequences of military action.

By examining different genres of military mapping, the thesis offers an evaluation of the Board of Ordnance’s endeavours to rationalise and to codify military cartography. The work in Scotland is discussed in relation to wider European practices. Overall, it is my contention that the nature and extent of military mapping of eighteenth-century Scotland may be seen as the result of institutional imperatives to assert territorial control rather than be seen simply as a singular cartographic enterprise. By examining sources which help us to construct the military landscape, the thesis extends current knowledge of military mapping in eighteenth-century Scotland and provides for the first time a substantive examination of the Board of Ordnance as an agency of state and cartographic authority.

¹⁰ Harley 1989a, p. 2.

The Board of Ordnance and the Military Mapping of Scotland, 1689–1815

The Board of Ordnance was constituted in 1597 as a ministry of defence responsible for supplying the Army and Navy with armaments and munitions and the maintenance of sovereign forts and castles. In 1683, the Board—formed by a Lieutenant-General, Surveyor-General, Clerk of Deliveries, and Storekeeper with the support of a Clerk of the Ordnance all presided over by the Master-General—and its Office of Ordnance were reconstituted as a civilian department. From this date, the power of the Board increased greatly and the Office grew substantially. The construction and maintenance of fortifications and barracks, the control of armament factories, the supply of munitions and subsistence stores, and land surveying all came under the jurisdiction of the Board of Ordnance. The technical and military establishments of the Artillery, Engineers, and Ordnance Field Trains were commanded by the Master-General and administrated by the Board of Ordnance. Furthermore, an Academy founded in 1741 for the military education and instruction of these specialist officers was supervised by the Board. By the beginning of the nineteenth century, the Board of Ordnance was the second largest Department of State, next only to the Treasury.¹¹

With the growth of the Office of Ordnance in the late seventeenth century, clearer distinction was made between the functions of the civil officers and the military officers of the Ordnance. Responsibilities and developments in specialist roles, for example, in civilian draughtsmanship and military engineering, became more acute as cartography emerged as a particular tool of government. Although cartographic concerns represented a small sector of the Board's total responsibilities, they nevertheless were important in advancing the map-mindedness of the military and the military nature of mapping in eighteenth-century Britain. My analysis of the Board of Ordnance is focused on its cartographic authority and involves, for the first time, a combined study of how this department of state structured the military establishment of engineers, rationalised their working methods in relation to mapping, and recognised the importance of a central repository for military maps and cartographic reproduction that was only accessible to state personnel. Military maps and plans of eighteenth-century Scotland form the basis of my study to examine the cartographic scope of the Board of Ordnance.

The extant archive is substantial, numbering 940 manuscript maps, plans, and views of the military landscapes of Scotland compiled between 1689 and 1815. The archive is today divided among several repositories: the National Library of Scotland with 402 maps, the British Library (288 divided between the map library (219) and manuscripts (69)), the

¹¹ TNA Military Record Information 66; Tomlinson 1979; Marshall 1980; Stewart 1996.

(British) National Archives at Kew (177), the Royal Library at Windsor Castle (40), the Admiralty Library at Portsmouth (19), and the National Archives of Scotland (14).

The collection of military maps at the National Archives at Kew was passed on, and continues to be so, by the War Office. The principal collection at the National Library of Scotland was a donation which came to the Library in the 1930s from a government department descended from the Board of Ordnance.¹² The Wade Collection (17 plans on 14 sheets) was purchased from the Royal Scottish Geographical Society in 1992 and relates to the building of forts, barracks, and roads in the Highlands during Field-Marshal George Wade's tenure as Commander-in-Chief in Scotland from 1724 to 1740.

In the 60 years of his reign (1760–1820), George III built-up 'one of the finest libraries ever created by one man'.¹³ In addition to the collections of paintings, drawings, scientific instruments and the 'King's Library' of printed books, the library also included an extensive geographical collection. This comprised manuscript and printed maps and views, a few estate maps, military plans, maritime charts, and 'topographical ephemera'. The entire geographical collection was divided into three constituent parts after 1811, divisions that remain today: the King's Topographical Collection—the largest element of the assembled geographical collection—now held in the British Library; the King's Military Collection, now known as the 'Cumberland Collection', in the Royal Library, Windsor Castle; and the Maritime Collection now largely within the British Library with some items in the Admiralty Library in Portsmouth.¹⁴

The incorporation of the Duke of Cumberland's library into George III's geographical collection and their subsequent separation into the three collections of topographical, military, and maritime, resulted in Cumberland's Scottish collection being split. When the maps were divided between military and general interest, for example, some works of William Roy including his 'Plan of Culloden House and the adjacent country' remained with the King's Topographical Collection presented to the British Museum.¹⁵ Other holdings retained in the Topographical Collection reflect Cumberland's appreciation of landscape art and his status as an amateur antiquarian: for example, Scottish landscapes by Paul and Thomas Sandby and views of Scottish castles by John Elphinstone,¹⁶ and plans of Roman antiquities in Britain by William Roy.¹⁷

¹² These are distinguished by a 'broad arrow' stamped in red on the face of the map with 'B.O' for Board of Ordnance or 'I.G.F.' for Inspector General of Fortifications alongside. See London 1954.

¹³ Miller 1973, p. 125.

¹⁴ Barber 2005, pp. 263–289, esp. pp. 263 and 284.

¹⁵ BL Maps K.Top.50.44.1, 'Culloden House' showing the 'Tract of Artillery'; Hodson (1988), p. 8.

¹⁶ For example, Thomas Sandby: BL Maps K.Top.49.23.b. (Glamis Castle), RLW 14724 (Fort Augustus); Paul Sandby: BL Maps K.Top.49.54.1.c. (Drumlanrig); John Elphinstone: BL Maps

This study has involved re-assembling all the cartographic material to form a conceptually united archive—a union-archive—that has collective significance as a ‘centre of interpretation’.¹⁸ In practical terms, it has involved interrogating across different holdings in order to deconstruct the archive. Deconstruction can reveal how map makers conceived the military landscapes of eighteenth-century Scotland and what those landscapes were—today, some are lost and some were never built. Deconstruction is also reflexive and allows for an exploration of why the maps were made, who co-ordinated their making, and consequently the authority of institutions and sites of power through the process of acquiring geographical knowledge. Deconstruction relies on context—historical, political, social, economic, and so on—and knowing the provenance of the union-archive is part of the context.

Despite the size of today’s map archive, it is possible that numbers of manuscript maps have been lost. It is impossible to know how many. Attempts to rationalise the Office of Ordnance included setting up a log book—a ‘Register of Draughts’—in the Tower of London Drawing Room to record maps deposited by engineers stationed at divisional outposts.¹⁹ Although not authorised until 1752, many entries relate to records from the first half of the eighteenth century; thereafter, the register was intermittently maintained until 1812.²⁰ A comparison of the ‘Register’ with today’s archive indicates that maps are missing and, also, that several extant maps were never recorded. This question of ‘losses’ is considered in chapter 4.

Evidence suggests that maps were sometimes kept by their compilers or military-political recipients and may, today, remain in private collections or be lost if they were not later deposited with either the War Department or the British Library. In the course of this PhD, I made several attempts to include private collections in my search of military maps and met with mixed success. Enquiries made at the Goodwood Estate, the seat of the Duke of Richmond and former Master-Generals of the Ordnance, drew a blank, as did an enquiry

K.Top.48.22. (Edinburgh, Dumbarton, Stirling and Blackness Castles), Maps K.Top.49.23.a.3–6 (Glamis Castle), Maps K.Top. 49.74.c. and K.Top.49.73. (Edinburgh Castle), Maps K.Top.49.86. (Palace of Falkland), Maps K.Top.50.37.1.a–e (Fort William environs), and Maps K.Top.50.96.f.1. (Stirling Castle).

¹⁷ BL Maps K.Top.49.54.2–3, Maps K.Top.50.79.2.a–b, Maps K.Top.50.79.3. and Maps K.Top.50.83.3. A complete set of antiquarian plans was presented as a volume to George III in 1774 by William Roy, now BL King’s MS 247–248. See also National Library of Scotland: <http://www.nls.uk/maps/roy/antiquities/index.html>

¹⁸ Osborne 1999, p. 52.

¹⁹ TNA WO 55/2281.

²⁰ Marshall 1980, p. 22.

to the Duke of Buccleuch (the Earl of Dalkeith).²¹ A plan and a narrative of the Duke of Argyll's command of the army at the Battle of Sheriffmuir on 13 November 1715 in the Douglas Home papers have gone missing.²² Papers from Raynham Hall, the seat of the Marquess of Townshend, are now at the British Library, and include plans of the Shetlands, Firth of Forth, Leith and Edinburgh Castle.²³ The Hardwicke Papers in the British Library also include maps of the Battle of Culloden sketched by Joseph Yorke, *Aide-de-Camp* to the Duke of Cumberland.²⁴ The papers belonging to the Dundas family of Arniston include a plan of south-east Midlothian, centred on Arniston, by General William Roy, 1755 and presented then to 'Lord President Dundas'.²⁵ In addition to the national repositories listed above, I have also made enquiries at the Highland Council Archives at Inverness, the Cairns Mitchell Collection at Glasgow City Archives, and at the Department of Maps and Plans at the National Library of France without being able to add to today's archive.

This map archive is supported by textual correlates, the majority of which are housed in the National Archives at Kew. These are mainly the work of the Board of Ordnance and include minutes, correspondence, reports, estimates, warrants, bills, personnel lists, and establishment structures. Many original items' references for the eighteenth century are incomplete, as we shall see. But interrogation of these papers in association with the maps allows detailed insight into the activities of the Board of Ordnance and explication of the cartographic 'production' of military landscapes in eighteenth-century Scotland.

It is important, too, to state what this thesis is not. It is not, primarily, a study of the 'Military Survey', that work of military cartography in eighteenth-century Scotland which has to date been the main focus of research on military mapping in that country. The 'Military Survey' was never the main concern of the Board of Ordnance. For this reason, it forms a minor part of this study.

The dates of my study—1689 to 1815—are significant for several reasons. 1689 marked the beginning of Jacobitism in Scotland, when John Graham of Claverhouse, Viscount of Dundee, raised James Stuart's standard at Dundee Law and the clans gathered in an attempt, the first of many, to restore James VII of Scotland and II of England, and

²¹ Patrick Cadell reported that there were 'no military maps of Scotland in his [the Duke of Buccleuch's] collection'.

²² NRAS859/Box 197/Bundle 2, according to the NRAS now lost. The narrative, if found, would provide almost daily accounts of Argyll's proceedings from the 14 September 1715 and to March 1716, including the battle illustrated by a plan.

²³ BL Additional Ms. 50008 B.

²⁴ BL Additional Ms. 35354 and 35889

²⁵ NRAS0077. The Roy map does not have a shelfmark or document reference but it is listed under 'Plans' as 'Excerpt from survey of Scotland presented to Lord President Dundas by General Roy, 1755'. The plan was omitted from the most recent survey of the Dundas estate (NRAS3246); but it is included in the earlier survey (which exists in paper records, done in 1961).

descendants of the House of Stuart, to the throne. This rising prompted a concern to map Scotland in an attempt to know the nation, the better to govern it. The Act of Union between England and Scotland in 1707 placed the Scottish Ordnance Office under the Board of Ordnance's jurisdiction. In 1708, when the London government were alerted to a planned French invasion, the Board confessed that 'We beg leave to inform Your Majesty that Wee [sic] have as yet no Draughts of the Castles of Edinburgh, Sterling and Inverlocky, nor any Estimates of the Charge of putting them in a posture of Defence'. The Board conceived that such work 'may be perform'd in less time, and at less charge, under the Direction and Conduct of ye Master and Officers of the Ordnance there, who Wee presume are already apprized of what is needfull [sic] to be done, to put those Castles in a posture of Defence, and can soon make Estimates what the Charge thereof will amount to'.²⁶ Thereafter, maps and plans produced by John Slezer and Theodore Dury—principal engineers in Scotland—were sent to London for consideration by the Board, many pre-dating the Union. The Jacobite Rebellions of 1715 and 1745, the rising of 1719, and the abortive invasions of 1708 and 1744 only heightened the government's anxiety over Scotland and led to a renewal of the Board of Ordnance's mission to map the military landscape. This near continuous state of warfare produced 'the first improvements in [Scotland's] geography' in the mapping of fortifications, their environs, roads, and route ways throughout the Highlands.²⁷

Wars with America and France towards the end of the eighteenth and the start of the nineteenth centuries caused a reawakening of cartographic interest in Scotland after a period of relative quiet in military and mapping terms. With the main threat no longer from the Highlands, cartographic attention turned away from the interior and was directed, instead, to the eastern seaboard, Shetland and Orkney Islands, and to the Firth of Clyde where the engineers sought to erect gun-batteries to protect shipping and Scotland's harbours. With the threat to Scotland subsiding with Napoleon's defeat and abdication in 1815 and the signing of the Treaty of Paris—a peace treaty between Great Britain, Austria, Prussia, and Russia, and France—the Board's focus on Scotland subsided and the principal role of the Chief Engineer there was to recruit troops for the Corp of Military Artificers at Woolwich. The gradual decline in military activity from the early nineteenth century seemed an obvious point to draw my study to a close.

²⁶ TNA WO 55/344, pp. 266–267, 15 April 1708.

²⁷ Roy 1785, p. 385.

The Structure of the Thesis

This study is divided into six main chapters and offers a thematic examination of ‘the archive’ rather than a chronological one. In undertaking a study of these maps that was sympathetic to their social and political context, there were opportunities to organise the material in several ways: biographically by map maker, geographically by place, and chronologically by date. But by looking at the nature of the social dimensions of maps, their use as well as their making becomes important. In Scotland, the use of military maps was both pragmatic from the point of view of engineering works—the (re)construction and recording of landscapes of military activity—and politically symbolic, that is, the maps were deeply invested in conceptions of power. To thus treat them thematically reveals their functions in a range of military activities, principally fortification, movement, and battle. The use of these maps in the representation, construction, and contestation of military landscapes reveals relationships between the maps themselves, the institution and its conception of cartographic practise, the changing technologies of warfare and mapping, and the changing spatial and temporal patterns of state engagement with questions of defensible territory.

In chapter 2, “Maps and Mapping in the Enlightenment”, the study begins by reviewing the historiography of map making in the Enlightenment and the methodologies used by modern scholars for examining the cartography of this period. The chapter begins by reviewing changing traditions of scholarship in the history of cartography. As documents in the wider history of human thought, maps need to be considered as a social product: ‘the principal concern of the history of cartography is the study of the map in human terms’.²⁸ Studies have shown that cartography’s progress is not simply chronological and technical improvement is not the sole measurement of map’s betterment. Neither is the map a surrogate of space nor a mirror to nature. The chapter reviews how Enlightenment contemporaries understood their work and its relationship to that of earlier cartographers. The premise of some modern scholars that the history of cartography can be explained as essentially a ‘progressive trajectory’ of objectivity, technical advancement, and scientific development since the Renaissance, is ‘rooted in the project of Enlightenment’.²⁹ More recent modern scholars, who now place maps in their time, read mapping not as a linear paradigm, but as complex, social, and uneven. Modern analyses of maps look at the constructive and communicative processes at work in a map within its cultural and political context. Using deconstructivist approaches, scholarship has addressed the internal and external power of the map and its expression as an instrument of aid for state and military activity. I

²⁸ Harley 1987, p. 1.

²⁹ Harley 1991, quoted in Wood and Fels 2008, p. 189.

draw upon these notions in situating my study, contextually, conceptually, and methodologically. The final part of chapter 2 considers Brian Harley's classification of the maps of the American Revolutionary War as a model by which to look at the functions of military maps in eighteenth-century Scotland.

Chapter 3, "The Board of Ordnance", analyses the relations between the institution and its procedures for cartographic practice. The focus is the Board of Ordnance's rationalisation of state cartography as a response to the increasing 'map mindedness' of military and political commanders. This process began with the development of distinct civil and military branches of the Ordnance which, in turn, prompted cartographic roles: that of the civilian draughtsmen based in the Tower of London Drawing Room and the military engineers posted to divisions in Britain and to her overseas dependencies. The cartographic duties of the engineers were defined in 1683 in 'Rules Orders and Instruction for the future Government of the Office of the Ordnance' and remained largely unaltered for this period of study.³⁰ In recognition of the importance of military science in matters of warfare, the Royal Military Academy was established in 1741 at Woolwich. The Academy provided junior cadets with the necessary instruction in geometry, measurement, and art to be able to represent and to construct (and destroy) military landscapes. Chapter 3 further discusses how the professional education and instruction of the engineers and draughtsmen helped fix mapping as the embodiment of European military science and the map as one conceptual basis of Enlightenment ideology towards effective management of space.

Chapter 4 describes "The Chronology and Geography of the Military Maps of Scotland, 1689–1815". Of particular concern are the characteristics of the archive rather than the detailed map content *per se*. In the first part of the chapter, the purpose of the maps in relation to state imperatives is explored. General William Roy remarked that 'accurate surveys of a country are universally admitted to be [...] the best means of forming judicious plans of defence [...]. Hence it happens, that if a country has not actually been surveyed, or is but little known, a state of warfare generally produces the first improvements in its geography'.³¹ Reliable information about the geography of Scotland was essential for the British state to exercise territorial control and to counter insurgency incited by Jacobite rebellions. Board of Ordnance maps provided data useful for the defence of the nation and represented territorial features of political and military importance.³² The maps compiled by the Ordnance engineers and draughtsmen represented a highly iconic rendition of Scottish territory, as a theatre of war and a space of military manoeuvre. Part of this chapter explores

³⁰ BL Additional Ms King's 70, pp. 1–78.

³¹ Roy 1785, p. 385.

³² Edney 1997.

what the Enlightenment archive of Scotland's military landscape might have looked like and tries to account for map losses.

The second part of chapter 4 looks at how the maps were produced, at methods of survey and the technologies available to the engineers in Scotland. Triangulation had yet to play a major part in the mapping of Scotland but its principles of mathematical measurement and sketching by eye were common to the surveying methodologies employed. The question that follows map construction is map use and who found these maps of Scotland's military landscape useful. Because military maps were concerned with the imperatives of the state—state secrets for the eyes of governing authorities—they were not concerned with communicating information of general interest. Their focus was well-defined, their audience likewise. The nature of the distribution of these maps is explained here. In commissioning maps, the state was acknowledging the value of an enlightenment way of seeing the nation, one based on measurement and survey.

The fifth chapter, "Fortification Cartography: The Art of Design", examines one of the best defined genres of military cartography for Scotland in this period. Where chapter 3 outlines the institutional rationalisation of cartography, this chapter firstly examines how fortification cartography was further rationalised at compilation and design stages to produce conventions of design, scale, and colour that were recognised by the agencies and institutions who made and used the maps. This codification of military mapping is looked at in detail in order to understand the military mapping of Scotland in light of European military culture, and contemporary educational theory and operational practice in cartography.³³ The second and third parts of this chapter describe the changing spatial and temporal variations in the mapping of fortified places. What is revealed is an adaptation of fortification type by time in relation to different political threats. Different political and military imperatives at different times gave rise to different constructions and representations of fortified space. In some cases, moreover, where the fortifications were planned but not built, we are left with intended spaces of military order.

Chapter 6, "The Cartography of Military Movement", describes the changes in mapping technologies coincident with the changing nature of warfare and the government's evolving approach to the problem of Jacobite insurrection. The initial building of barracks and garrison forts failed to subdue outbreaks of disaffection and Jacobite dissent and, in the process, exposed the static nature of military planning in Scotland. New measures to police the Highlands, to more effectively connect the Highland forts with each other and the lowland castles, and to speed up the movement of munitions and stores generated a need for

³³ Harley 1978.

different, more explicit, cartographical materials—for surveys and descriptions—of Scotland. This prompted extensive surveys of route ways through the Highlands—of roads, lochs, and rivers—as well as the construction and detailed mapping of military roads. This is the background to the Military Survey, 1747–1755. Having been exposed to ‘the daily want of proper maps of North Britain’, William Augustus, the Duke of Cumberland, commissioned a Military Survey of Scotland.³⁴ In its making, ‘the courses of all the Rivers and their Branches; of all the principal Roads; and of the Lakes, Sea and Fresh were followed, and measured; as well as such other intermediate and cross Lines as were found necessary for the filling up of the Country’.³⁵ The Survey, however, was never put to military use (unless by David Watson, its director).

As important as land routes were to the army, Scotland’s extensive coastline and inland waterways also offered opportunities for the rapid movement of troops and supplies, and strategic sites for establishing fortifications to which building materials could be transported by boat. Maps to facilitate military movement in whatever form—coastal charts and inland waterways, military roads, and topographical maps—provided political and military commanders with access to parts of Scotland that were otherwise known only locally.

Despite attempts to establish order and bring submission to the Highlands through fortification and road construction, the threat of Jacobitism continued throughout the period. The Williamite and Hanoverian governments were faced with risings in Scotland in 1689 and 1719, rebellion in 1715 and 1745, and aborted foreign invasions in 1708 and 1744. The operations mounted by supporters of the exiled Stuarts culminated in a number of battles with these sovereign armies, namely, Sheriffmuir in 1715, Glenshiel (1719), Prestonpans (1745), and Falkirk and Culloden (1746).

Chapter 7 looks at “The Cartography of Conflict”. The maps illustrate events before, during, and after battle. By considering each battle in turn, we can observe the emergence of a style of battle cartography that became commonplace during the eighteenth century, one that created abstract formation-maps depicting the order of battle of the opposing armies within or without the context of battlefield topography. I also contend that the use of pictorial as well as abstract symbols on any one map was a deliberate ploy by the map maker to inject a greater sense of ordered victory and disordered defeat than it was a reflection of battle cartography in transition. This prompts me to consider the attendant purpose of battle maps and to project the meaning of their cartographic illustration beyond the battle action

³⁴ Quoted in Hewitt forthcoming.

³⁵ NAS RH1/2/523, ‘Memorandum and answers by General David Dundas’, p. 3.

itself. Battle maps were a form of propaganda in the eighteenth century. Popular with both Jacobite and Hanoverian authorities, battle maps were one genre of military mapping the public was privileged to see. Manuscript maps were produced to report on events and then published as news maps accompanied by written narratives of events. Map illustrations with texts were a successful means of imparting information that had other uses beyond propaganda. Battle maps were used as evidence in court-marshals, as pedagogic devices in military academies, as the basis of official military reports, and as commemorations of heroic leadership with dedications made to military commanders. Most of these uses are considered in this chapter.

A final concluding chapter summarises the arguments advanced in this thesis. The chapter begins with a summary of each chapter and an overview of today's union-archive: its scope and value in reconstructing the military landscape of a Scotland long past. Through this archive, a greater understanding of cartographic processes and the undeniable influence of a cartographic authority on national mapping has been reached. A rationalisation of state cartography accentuated the usefulness of mapping in specific military and political objectives directed towards Scotland in the eighteenth century. Political situations in Scotland were the primary cause of changing cartographic modes. As the government responded to the nature of internal warfare and its changes over time and space, the map-minded military engineers reflected and represented these in their maps and plans of Scotland's changing military landscape. The chapter concludes with a review of the limitations of the study and, in identifying these, makes suggestions for further research.

The second volume provides a union-archive listing of the maps, essentially an index of the military maps and plans of eighteenth-century Scotland. It is organised to provide multiple search routes for viewing the maps and plans through a descriptive index, a chronological index, an alphabetical index of map makers, and concordances. A summary chapter and introduction offers a rationalisation of the union-archive including principles of inclusion and exclusion, and a description of each index and how it is laid out in the volume.

CHAPTER 2

Maps and Mapping in the Enlightenment: an Historiographical and Methodological Review

Introduction

This chapter reviews the epistemological foundations of map making in the Enlightenment. My concern is to examine how maps were seen in the Enlightenment in order to provide a background to the more detailed scrutiny of the Board of Ordnance maps of Scotland. To do this, I review something of how eighteenth-century figures understood the map and how modern scholars have interpreted Enlightenment mapping.

In order to place Enlightenment mapping in wider context the chapter begins by reviewing changing traditions of scholarship in the history of cartography. In adopting new approaches, the history of cartography has progressed from studying the technical and practical history of the map artefact to a ‘principal concern’, that of ‘the study of the map in human terms’.³⁶ Three universal lines of enquiry summarise the foci of modern studies: the role of a map within the social group that produced it; the ways in which the map reflects the specific historical period to which it belongs; and the policies or projects that may have been behind its creation.³⁷ When we turn to cartography in the European Enlightenment and apply these lines of enquiry, the distinction may be made between the history of cartography in the Enlightenment as contemporaries then understood their work and its relationship to that of earlier cartographers, and the work of modern scholars looking at Enlightenment cartography as one episode of cartographic history.³⁸

Enlightenment scholars’ conceptions of maps and the process of map making are considered in the second section of this chapter. Geography, in the eighteenth century, was concerned with classifying and ordering the world and knowledge of the world.³⁹ Thus, Enlightenment map making was fundamentally a practical affair concerned with expanding geographical knowledge about the world and its representation in graphical and textual form.⁴⁰ Geographical data was accumulated through practices of reconnaissance and

³⁶ Harley 1987, p. 1.

³⁷ Buisseret 2003; Casti 2005, p. 2.

³⁸ Withers forthcoming. Although the term *mapping* is historically more apt for describing both the theory and practices of map making and survey during the Enlightenment (Withers 2003, p. 18), *cartography* will often be used in association with map making as a process.

³⁹ Withers 1996.

⁴⁰ Withers 2003.

mapping, resulting in a comprehensive archive deemed to be Enlightenment scholars' most successful form of knowledge creation whereby the geographical complexity of the world was put to order through the map.⁴¹ Although the map was widely regarded as the 'epitome of encyclopaedic knowledge' and the idea of mapping as a metaphor appeared throughout the Enlightenment—Diderot and d'Alambert, for example, referred to their *Encyclopédie* as a 'map of the world'—both were more widely understood in association with mathematical accuracy and scientific representation.⁴² Map making was considered by Enlightenment scholars as 'an empirical, objective, and unproblematic *science*' and maps, therefore, as true and accurate representations of geographical reality—mirrors of the world.⁴³ 'Scientific maps', as a progressive, measurable, repeatable, and objective process of knowledge building were assumed to be synonymous with the growth of science itself.⁴⁴ Early maps were studied primarily as historical documents to reconstruct geographies of the past and to allow scholars to make claims of technological progress. Such intellectual predilections set the study of early maps apart from the social implications of their making and firmly established an empiricist conception of maps.

The last section in this chapter returns to the work of modern scholars of cartography and the methods they have employed to consider the purpose of mapping and maps not as mimetic devices but rather ideological expressions and symbols of political power.⁴⁵ By studying maps in their historical context it becomes easier to identify cultural and sociological influences on map making.⁴⁶ Changing methodologies since the 1970s now allows for a more holistic approach to the interpretation of maps and their social role in a particular period of history. By moving beyond the positivist, technical aspects of map construction and notions of objectivity it becomes possible to reconsider the purpose of maps as visual communicators of geographical knowledge within a cultural and political context.⁴⁷ The dual nature of a map—as a social product and as a means of communication (both a medium and an image)—thus provides an epistemological framework for the study of its historical significance. Three approaches are discussed in this chapter: semiotics; iconography; and deconstruction.

By conducting a semiological analysis of the military maps of the Board of Ordnance the purpose behind the creation of the maps rather than just their content can be

⁴¹ Edney 1999; Withers 2002.

⁴² Edney 1999, p. 173; Withers 2003, p. 18.

⁴³ Edney 1994b, p. 101, original emphasis.

⁴⁴ Turnbull 1996, p. 6.

⁴⁵ For example: Konvitz 1987, Harley 1988a, Buisseret 1992, Godlewska 1995, and Edney 1999.

⁴⁶ Jacob 1996; 2006.

⁴⁷ Barnes and Duncan 1992.

explored. A theory of cartographic semiosis on its own, however, is not sufficient to interpret fully the military maps of eighteenth-century Scotland. Cartographic semiosis can show that maps can convey complex information, but this information is the product of iconization. 'Icon', in this case, refers to a semiotic figure (a sign) that is capable of producing information and processing it in a communicative sense. Although iconology is challenged by semiotics, a semiotic analysis of the 'iconography' can show that the concepts they represent acquire meaning through context.⁴⁸ Brian Harley in particular was concerned with 'deconstructing' the map as a 'text'.⁴⁹ He argued that social factors influence the production of maps and that these factors can be read within the finished map. Through analysis of a map's cartographic language using semiotics and iconography and deconstruction, it is possible, I suggest, to explore the social discourse of military maps in the context of political power in the eighteenth century.

In the final section, I consider a taxonomic model—Harley's classification of the maps of the American Revolutionary War—as an approach to collating and analysing the archive of military maps of eighteenth-century Scotland.⁵⁰

Themes in the History of Cartography

'Since the 1930s the history of cartography has been slowly emerging as a subject with its own scholarly identity'.⁵¹ Scholars have published general histories of cartography; the international journal *Imago Mundi* was founded by Leo Bagrow in 1935 with the aim of devoting itself to the history of cartography; and there has been a growth in the autonomy of cartography with concomitant repercussions on the history of cartography:

The distinction must be made between cartography as the ancient art and science of making maps in a practical sense (and its products) and cartography as an organized method by which maps are studied, investigated, and analyzed.⁵²

In considering the development of the history of cartography as a distinct subject area, traditional studies have been dominated by an empiricism that assumes maps are accurate, objective statements of geographical fact.⁵³ Blakemore and Harley identified a number of dominant ideas that channelled scholarly and specialised contributions to the

⁴⁸ Casti 2005.

⁴⁹ Harley 1989b.

⁵⁰ Harley 1978.

⁵¹ Harley 1987, p. 23.

⁵² Harley 1987, p. 30.

⁵³ Edney 1996.

history of cartography, in particular the ‘Darwinian paradigm’.⁵⁴ Its basic premise was a linear progression of cartographic history: ‘as civilization improves so map-making also progresses’.⁵⁵ This concept encouraged a view that cartography’s progress was simply chronological and, furthermore, technical improvement was the sole measurement of maps’ betterment. Goode, for example, wrote about ‘the map as a record of progress in geography’.⁵⁶ Bagrow’s *History of Cartography* drew a clear distinction between what he perceived as cartography’s supposed ‘artistic phase’ and its progression to a ‘scientific phase’. His narrative ended in the second half of the eighteenth century, at the point he saw as ‘where maps ceased to be works of art, the products of individual minds, and where craftsmanship was finally superseded by specialised science and the machine’.⁵⁷ Crone subsequently wrote that ‘the history of cartography is largely that of the increase in the accuracy with which [...] elements of distance and direction are determined and [...] the comprehensiveness of the map content’ remains satisfactory’.⁵⁸

Whilst the scientific development of mapping was one fundamental theme in the history of cartography, another was the presumed association between the map and its mimetic capacity. Robinson and Petchenik stated ‘that the map is actually a diminutive reproduction of the real space to which it refers’ and, as such, a surrogate of space or a mirror of nature.⁵⁹ Harley placed the responsibility for promoting this illusion of cartographic objectivity—the mirroring accurately some aspect of ‘reality’—down to two influences. The first, that of the attitude of scholars towards cartography and the second, that of the cartographers’ view of the nature of their own craft. In the first instance, scholars ‘failed to question the inner logic, the rhetoric, and the style of the map in the same way [they] would question the syntax of the written word’ and thus failed to see mapping as a discourse in its own right. In the second, cartographers convinced us that maps were objective and truthful, a technological solution to the representation of territory. ‘The result was an elevation of the map so that we were often mesmerised by its mimetic power’.⁶⁰

Neither the study of the scientific development of mapping nor the map’s mimetic capacity fully addressed the importance of maps in human terms. As documents in the wider history of human thought, maps needed to be considered as a social product. Harley stated that ‘by 1980 the history of cartography was at a crossroads. The divergence [...] was also

⁵⁴ Two further intellectual frameworks were ‘old-is-beautiful’ and ‘nationalist’.

⁵⁵ Blakemore and Harley 1980, pp. 17–23.

⁵⁶ Goode 1927, pp. 1–14.

⁵⁷ Bagrow and Skelton 1985, p. 22. Leo Bagrow’s text was first published in 1943 as *Die Geschichte der Kartographie*.

⁵⁸ Crone 1953, p. xi.

⁵⁹ Robinson and Petchenik 1976, p. 86.

⁶⁰ Harley 1989a, pp. 82–84.

between its traditional work in the interpretation of the content of early maps as documents and its more recently clarified aims to study maps as artefacts in their own right and as a graphic language that has functioned as a force for change in history'.⁶¹ The traditional, descriptive practices of map analysis that focused on accuracy and the truthful or objective depiction of geographical knowledge were challenged by a critical and analytical approach to the study of the 'new' nature of maps. Modern studies in the history of cartography began to look at the nature of the social dimensions of maps which depended as much upon their use as their making.⁶² Edney has referred to this as a way to 'de-naturalise' the map, 'to break through the shell of objectivity with which our culture has surrounded the map in order to expose and then study the map for what it is: a human practice'.⁶³ Theoretical contributions were a way of accessing not only the map artefacts, but the culture within which they were produced and used—a complex of economic, social, political, intellectual, and artistic contexts, as well as the established scientific context.⁶⁴

Cartographic scholars' engagement with alternative theoretical approaches in the history of cartography recognised that a 'general theory of cartography' was an essential aid to understanding the history of maps: 'we must have a deeper understanding of the characteristics and processes by which the map acquires meaning from its maker and evokes meaning in its user'.⁶⁵ One such theoretical approach—geosophy—identified maps as sources for exploring forms and structures of geographical knowledge in past societies that are culturally, historically, and socially distinct, and thus essential tools for the modern reconstruction of past geographical knowledge. Central to this theory was the *meaning* that cartographic information had for contemporary viewers—the nature of the message being communicated through maps to a receptive audience.⁶⁶ The centrality of meaning led cartographic scholars to question how geographical conceptions were not only created in maps, but also to explore the ways in which they were interpreted—how the contemporary user read the map:

Maps are a graphic language to be decoded. They are a construction of reality, images laden with intentions and consequences that can be studied in

⁶¹ Harley 1987, p. 39.

⁶² Harley 1987, 1988a and b, 2001b; Belyea 1992; Pickles 1992; Wood 1992; Edney 1996 etc.; Jacob 1996, 2006.

⁶³ Edney 1996, p. 188.

⁶⁴ Edney 1996; Jacob 1996.

⁶⁵ Robinson and Petchenik 1976, p. xi.

⁶⁶ Edney 2005, pp. 34–36; Cosgrove 2007. In this context, Matthew Edney appropriates the contemporary term 'geosophy'. For the original context of geosophy, see J. K. Wright 1947.

the societies of their time. Like books, they are also the products of both individual minds and the wider cultural values in particular societies.⁶⁷

The focus in the study of the history of cartography began to move away from the positivist approach of analysing the physical characteristics of the map—the forms and content of maps that allows them to be ‘surrogates of space’—and the technical aspects of their construction. The focus turned, rather, to include consideration of the map as the ‘medium of communication’ between the map maker and the map user: ‘theories of mapping as a cognitive science that involves communication from mapmaker to map user’, thus ‘stressing the nature of cartography as a process rather than maps as a product’.⁶⁸

Analytical emphasis was placed on the characteristics of the communication process: how people look at, read, and use maps.⁶⁹ Cartographic communication was initially perceived as a ‘general communication system’ where the source message is encoded, transmitted, received and decoded back into the same meaning as the original message. The efficiency of the message transmission is modified and information loss occurs due to various interferences: by processes of selection and interpretation in both the source (the map maker) and the destination (the map user); by ‘noise’ in the general system; by varying conceptions of the ‘real world’ by the maker and by the user; and by methods of coding the message—encoding by the maker, decoding by the user.⁷⁰ The fundamental aim of cartography was to reduce any loss of information at each stage in the communication process: ‘the proper purpose of cartography was to impart geographical information to a reader in as effective and as correct a manner as possible’.⁷¹

Harley was a leading advocate of exploring the discourse of maps by alternative epistemologies. He continued to assert the need for ‘appropriate theory’ for reconfiguring the historical study and practice of cartography. Influenced both by the ‘geosophical’ tradition and the cartographic communication model, he looked beyond geography and cartography and turned to language instead.⁷² ‘Maps as language offers the most appropriate *underlying structure* for the history of cartography. It is a structure which lies beneath both the form and content of maps, and deeper than the tangible artefact and visible image’.⁷³ By combining

⁶⁷ Harley 2001b, p. 36.

⁶⁸ Harley 1987, p. 34.

⁶⁹ Several models of cartographic communication have been proposed, not least Arthur Robinson and Barbara Petchenik’s Venn diagram depicting overlapping sets of geographical information: the map maker’s conceptions of the world; the map user’s conceptions; and the information content of a particular map (Robinson and Petchenik 1976).

⁷⁰ Robinson and Petchenik 1976.

⁷¹ MacEachren 1995, p. 4, quoted in Edney 2005, p. 38.

⁷² Edney 2005, pp. 48–59; Cosgrove 2007, p. 207.

⁷³ Blakemore and Harley 1980, p. 87, original emphasis.

elements of cartography's communication models, the speech model of structural linguistics, and semiotics, Harley presented an underlying theoretical structure for cartographic history, the 'linguistic model' or *maps as language*, whereby map reading is an active activity and that map making and map use take place within a shared cultural context.⁷⁴

This move towards the study of a map as a social product laid the foundations for a new discourse, that of a social theory: '[o]ur task is to search for the social forces that have structured cartography and to locate the presence of power—and its effects—in all map knowledge'.⁷⁵ Harley adopted a metaphorical technique, the 'deconstruction' of the map as a 'text' (rather than its earlier metaphor as a 'mirror'), drawing upon the idea of discourse and the work of social theorists such as Michel Foucault and Jacques Derrida to emphasise how maps work in society as a form of power-knowledge.⁷⁶ In considering the interpretive act of deconstructing the map, Harley aimed to revise the way maps are viewed in geographical culture: 'to challenge the epistemological myth (created by cartographers) of the cumulative progress of an objective science always producing better delineations of reality; to redefine the social importance of maps [and] the power of cartographic representation [in] building order into our world; [finally,] a deconstructive turn of mind may allow geographical cartography to take a fuller place in the interdisciplinary study of text and knowledge'.⁷⁷ As a socially constructed form of knowledge linked to the interrogation of power, Harley applied three concepts to trace the connection between cartography and ideology: maps as a kind of language, an approach derived indirectly from the semiotics of graphics; another from Erwin Panofsky's art-historical methodology of iconography to provide analysis of the cultural meanings read into maps; and a third perspective gained from the sociology of knowledge.⁷⁸ These will be considered in more detail in the third section of this chapter.

Since Harley's call for recognition of the textuality of maps and a rethinking of past cartographic practices, other cartographic scholars have applied several new approaches to the history of cartography. Christian Jacob has been concerned, firstly, with the map artefact, its various elements of cartographic composition—'the topographical, geographical and cosmographical outlines' seen as 'lines and forms of a map, its toponyms, its title and frame, its architectural setting'—and the various ways the map's function can be seen and read. The map's functions vary from one historical period to the next and from one society to another. This variation highlighted for Jacob a second objective in the history of cartography: to

⁷⁴ Blakemore and Harley 1980, pp. 89–91; Edney 2005, p. 66.

⁷⁵ Harley 1989a, p. 2.

⁷⁶ Harley 1989a; Withers forthcoming.

⁷⁷ Harley 1989a, p. 15.

⁷⁸ Harley 1988a.

explore the sociological aspects of maps by researching the social and professional status of map makers, their links to institutions, and the state authority concerned with co-ordinating mapping projects and using maps. The sociology of maps redefined the focus from map accuracy to map efficiency.⁷⁹ In this way, the map is less an object than a function—‘an instance of social mediation that lends itself to numerous interactive situations’, for example, construction work, project design, operations upon terrain, teaching, and conversation.⁸⁰ A map, in this case, provides an image of how the world might be, and even when its circulation is restricted or monopolised, the map is still a social object, a strategic instrument of power.⁸¹

To address the substance of this thesis for a moment, there are many instances in the mapping by military engineers of eighteenth-century Scotland where, on the one hand, maps conveyed a pragmatic function of construction and, on the other, a political function for establishing social order. George Wade’s construction of military roads from the mid-1720s, for example, generated linear maps of route ways, from Stirling to Fort William and to Inverness. In addition to representing the modernising of Scotland through the expansion of its communication network, to military and political elites, the maps were primarily tools of access for sending soldiers into the Highlands in order to police them. Duncan Forbes, the Lord Advocate of Scotland, wrote:

In coming from Perth I chose the Highland road, By Blair in Atholl, [...] and in my journey had great Relief [...] I was not a little surprised at the Regularity and success of the work [...] the road is] now as Smooth as the Road from London to Hampstead, and in a little time will be passable by an Army with its Artillery, notwithstanding the abrupt Declivity of some of the Mountains. [...] In short this Project which compleats [sic] the intention of Disarming the Highlands is so far from being ill Received ... by the Wisest of them [Highlanders], it is looked upon as a sort of satisfaction for the Loss of their Weapons, since it gives the Troops access to come wherever there is Occasion to Defend them, So well has Mr Wade known how to Guile the Pill that Deprives them of the power of hurting the Government.⁸²

Edney has been similarly concerned with examining a map’s form and function as a manifestation of the requirements of different social organisations for graphic representations of the world. Maps are, accordingly, ‘artifactual manifestations of different

⁷⁹ Belyea 1993, p. 73; Jacob 1996, p. 192; Jacob 2006.

⁸⁰ Casti 2005, p. 4; Jacob 2006.

⁸¹ Jacob 2006, p. 362.

⁸² TNA SP 54/19/41, ff. 141–142, letter written to Lord Townshend, 23 August 1728.

cartographic *modes*'.⁸³ Edney defined 'modes' as cultural, social, and technological relations, each thoroughly enmeshed with the specificity of these relations determining a particular cartographic practice. Cultural relations play a central role in the construction of human knowledge spaces, in our perception and reading of space, and thus govern cartographic conventions: '[w]e see the earth's surface in terms of the cartographic convention we are familiar with: [the discourse] constitutes its own object'.⁸⁴ Social relations reside within a given culture and equate to sociological aspects of cartography. The various social requirements for geographic information define map scale.⁸⁵ Technological relations govern the creation of the map artefact and include methods of survey and compilation.

The cartographic mode is therefore a combination of a map's form and function, the manipulation and representation of geographical information, and the reason for the map in the first place.⁸⁶ A study of the map artefact is one aspect of the 'history of communication about space' that can reveal the cultural, social, and technological relations of its mode.⁸⁷ Drawing upon Rundstrom, Edney considered that 'process cartography situates the map artefact within the mapmaking process, *and* it places [all] mapmaking process[es] within the context of intracultural and intercultural dialogues'.⁸⁸ The importance of this concept is evident, for example, in the established mode of 'mathematical cosmography' which dominated eighteenth-century European cartography, in the subsequent 'cartographisation of the military', and in the military mapping of Scotland.⁸⁹ The 'Military Survey of Scotland' (1747–1755), for example, was an act of political and military surveillance by the Board of Ordnance and its military engineers, extending from the limited disciplinary units of the garrisons and forts in parts of Scotland to the Gaelic-speaking Highlands and, eventually, to the physical extent of the nation.⁹⁰ Seeing cartography in light of Rundstrom's 'process' thus 'allows us to see that *acts* empower artifacts', and that the practice itself (the process) is encompassed by the various cultural, social, and technological relations of its mode.⁹¹

If we turn now to cartography in the European Enlightenment and apply these lines of enquiry, it is possible to consider how Enlightenment contemporaries understood their

⁸³ Edney 1993, pp. 57–65, esp. p. 57.

⁸⁴ Belyea 1992, p. 6; Edney 1993, p. 57.

⁸⁵ Edney 1993.

⁸⁶ Edney 1993.

⁸⁷ Harley 1987, p. 1; Edney 1993.

⁸⁸ Rundstrom 1991, p. 6, quoted in Edney 1993, p. 58.

⁸⁹ Forbes 1980; Edney 1994; Edney 1999.

⁹⁰ Widmalm 1990; Withers 2007.

⁹¹ Rundstrom 1991, p. 7, quoted in Edney 1993, p. 58.

work and its relationship to that of earlier cartographers as distinct from the work of modern scholars looking at Enlightenment cartography as one episode in the history of cartography.⁹²

Enlightenment Mapping

In Europe, by the mid-seventeenth century, maps were essential to a wide variety of professions. Amounting to what may be considered a ‘revolution in the European way of “seeing” the world’, there were several causes for this new map consciousness.⁹³ In the first instance, the Renaissance gave rise to an admiration for antiquity, perhaps akin to Blakemore and Harley’s relatively modern review of scholarships of the ‘old-is-beautiful’ paradigm, where popular interest in early maps was directly proportional to their age.⁹⁴ The Renaissance was itself distinguished by new and different maps. Artistic developments encouraged delineations of rural and urban scenes and, consequently, maps of country and town. Landowners began commissioning estate plans. The rise of the modern territorial state encouraged an appreciation of the possible role of maps. The advent of the printing press greatly increased the numbers of printed maps. Not least, the establishment of mercantile classes and a quickening of economic activity created a demand for maps.⁹⁵

Three formal cartographic modes had evolved: maritime charting, small-scale mapping of the world and its regions (chorography), and large-scale land surveying. Each mode was distinct in terms of its scale of inquiry, cartographic conventions, social institutions, technologies, and content.⁹⁶ Four interrelated groups of practitioners engaged in these modes: mariners, intellectual geographers, commercial publishers, and land measurers. As new generations of European state bureaucrats became more cartographically literate than the previous one, large-scale surveying of their territories for the acquisition of basic geographical information became an increasing practice, such as Christopher Saxton’s mapping of England completed in 1579 and Jean Dominique Cassini’s national map survey of France started in 1681. From about 1660, a fifth group of professional geographer-cartographers—military and state surveyors—was established in many European states, earlier in some. These military specialists—‘engineers’—began to emerge in the 1530s in England, and later in France, Brandenburg-Prussia, and Spain. Initially concerned with constructing new fortifications and drawing plans, they increasingly became involved in

⁹² Withers forthcoming.

⁹³ Buisseret 1992, p. 1.

⁹⁴ Blakemore and Harley 1980, p. 23.

⁹⁵ Buisseret 1992; Edney 1993.

⁹⁶ Edney 1998.

more extensive state mapping projects. In France, for example, large-scale regional surveys were made of Picardy, Champagne, Provence and Brittany by 1610, later to be engraved by the map-publisher Christophe Tassin in the 1630s.⁹⁷ From the seventeenth to the early twentieth centuries, property mapping extended from private realms to state-sponsored surveys. Cadastral mapping was used by the state to generate revenue from property taxes and to record information relating to individual land parcels.⁹⁸

A fourth mode—geodesy—evolved as a cartographic practice from the merging of the scales of chorography and the techniques of land surveying or topography. In its use in determining the shape of the earth, geodesy was linked to astronomy, mathematics, and natural philosophy, and practiced by natural philosophers increasingly in touch one with another as part of developing narratives of cosmopolitan exchange.⁹⁹ Although geodetic surveys rarely produced maps other than abstract triangulation diagrams, geodesy had intellectual and scientific significance for the European Enlightenment.¹⁰⁰ By the early eighteenth century, these four modes had gradually converged into one, unified ‘mathematical cosmography’—the conceptual fusion of astronomy, geography, and geodesy.¹⁰¹ The map was the point of fusion for mathematical cosmography; it became a ‘technology of relative spatial knowledge’, whereby the geographical complexity of the world was, in its representation, put to order.¹⁰²

Mathematical cosmography’s intellectual foundations can be demonstrated, in part, by the search for longitude at sea and the linking of Paris and Greenwich geodetically. Solutions proposed for determining longitude, a terrestrial phenomena, required astronomical methods for its determination, thus unifying two sub-divisions of mathematical cosmography: terrestrial astronomy and celestial astronomy. Between 1784 and 1790, with the collaboration of the British and French governments, and the construction of high-quality chronometers to measure time differences directly rather than indirectly through astronomical events, longitude was finally established. The effort to link Greenwich and Paris geodetically required more extensive preparation and intensive collaboration than any previous bilateral scientific or cartographic venture.¹⁰³ The measurement of longitude set a

⁹⁷ Buisseret 2003.

⁹⁸ Kain and Baigent 1992.

⁹⁹ Withers 2002.

¹⁰⁰ Edney 1993, p. 61; 1994. see J. K. Wright 1947.

¹⁰¹ Forbes 1980; Edney 1994. In 1753, Philippe Buache presented three charts to the Paris Académie Royale des Sciences containing detailed classifications of historical, physical, and mathematical-astronomical geography. By renaming Buache’s general geography to ‘cosmography’, ‘mathematical cosmography’ could then be applied to the area of conceptual overlap between the charts.

¹⁰² Edney 1999; Withers 2007, p. 101.

¹⁰³ Konvitz 1987.

new standard for accuracy by increasing the efficiency and reliability of surveying, underpinning the Enlightenment's move to a 'universal science of measurement and order'.¹⁰⁴ By adhering to the Enlightenment epistemology that accurate measurement was necessary for factual descriptions of space, mathematical cosmography was firmly established as part of the broader geographical realm of knowledge.¹⁰⁵ In this context, a French proposal in about 1790 for a *cartographie universelle*, presents, perhaps for the first time, the use of the term 'cartography' in connection with the concept of a comprehensive geographical archive.¹⁰⁶

French geodesists and astronomers of the Académie Royale des Sciences were credited with one of the most important and distinct innovations in cartography in eighteenth-century Europe, the completion of the first geodetic matrix in 1744. Data was fixed to this mathematical frame in order to construct a reliable survey of France—the first 'Cassini survey'—from which detailed maps of small areas could be made.¹⁰⁷ The Cassini survey reconciled geographical observations by using triangulation: a distance of about 5 miles (British) was measured from which, using a theodolite, a third point visible from both ends of the base line was sited and distances measured using trigonometry. This process was repeated across the ground to be mapped, producing a series of triangles of known dimensions within which the topography was determined by eye and sketched in. Triangulation and topographic "in-filling"—'the mathematization *and* artistic depiction of space'—is a definitive feature of Enlightenment mapping.¹⁰⁸

The premise then that the history of cartography had essentially been the history of scientific development was aptly described by Harley as 'rooted in the project of the Enlightenment':

The dominant view of modern Western cartography since the Renaissance has been that of a technological discipline set on a progressive trajectory. Claiming to produce a correct relational model of terrain, maps are seen as the epitome of representational modernism, rooted in the project of the Enlightenment, and offering to banish subjectivity from the image. Cartographers have thus promoted a standard scientific model of their

¹⁰⁴ Harley 1988b, p. 65; Widmalm 1990.

¹⁰⁵ Harley 1987.

¹⁰⁶ Edney 2009, p. 42. The neologism was widely adopted from the start of the nineteenth century.

¹⁰⁷ Konvitz 1987.

¹⁰⁸ Withers 2007, p. 102.

discipline, one in which it is claimed that a mirror of nature can be projected through geometry and measurement.¹⁰⁹

At the same time as offering this historiographical review of the history of cartography, Harley proposed several reasons why early maps were examined in the eighteenth century.¹¹⁰ Maps were valued as useful contemporary tools by lawyers, politicians and others as sources of information as well as ‘monuments of antiquity’; consequently, throughout the sixteenth, seventeenth, and eighteenth centuries, preserving and collecting maps of earlier periods was a widespread practice.¹¹¹ Map and chart makers used early maps to compare the state of geographical knowledge and science in their own age with that of the past. In the Enlightenment, this engendered a belief in the accuracy of measurement as the ‘sine qua non of cartographic progress’.¹¹² In the practice of map making, emphasis was placed on the ‘instrumentality of knowledge’: on mathematical accuracy, original survey, and increased attention to precise and accurate scientific instruments, especially at sea.¹¹³ The result was to be more detailed cartographic representation and evidence of explorations and discoveries and, at an academic level, a resource for the study of history and classical geography. The increase in geographic knowledge represented in cartography from the fifteenth to the seventeenth centuries meant that by the eighteenth century there were fewer ‘blank spots’ to fill in on the map of the world. Consequently, the focus shifted from discovery and description to accuracy and precision.¹¹⁴

Yet maps were seldom contemplated and analysed as artefacts. The methods by which they were constructed and drawn were not considered, and study of their form and cartographic expression as a mode of communication had not come into being: ‘the history of cartography had yet to be born as a subject we would recognize today’.¹¹⁵ The Enlightenment concern was with acquiring national knowledge through geography and mapping, and the Enlightenment view of the cartographic past was influenced by a self-imposed emphasis on more precise and accurate representations of geographical reality. Even at the start of the long eighteenth century, geographers were criticising the cartographic works of their predecessors. In Scotland, for example, Sir Robert Sibbald, Geographer Royal to Charles II in 1682, was instructed to produce a geographical description of Scotland that

¹⁰⁹ Harley 1991 quoted in Wood and Fels 2008, p. 189. Harley’s description of his intentions sent to his publisher at Johns Hopkins University Press, dated 25 November 1991, for *The New Nature of Maps: Essays in the History of Cartography*, published in 2001; Turnbull 1996.

¹¹⁰ Harley 1987.

¹¹¹ Harley 1987, p. 7.

¹¹² Harley 1987, p. 10.

¹¹³ Horkheimer and Adorno 1972, quoted in Godlewska 1995, p. 6.

¹¹⁴ Headrick 2000, p. vi.

¹¹⁵ Harley 1987, p. 12.

combined historical data with the results of contemporary survey. Historical data, in this instance, was to come from earlier works by the Dutch map makers Willem and Joan Blaeu. Sibbald was dismissive of their work, despite the ‘great uses of *Geographical Descriptions*’:

many complained that there was so little done, as to the Description of our Countrey: For the *theater of Scotland* published by *Blaeu*, for all its bulk (except it be the Description of some few shires by the learned *Gordon of Straloch*, and some sheets of his of the *Scotia Antiqua*) containeth little more than what *Buchanan* wrote, and some few Scrapes out of *Cambden*, who is no friend to us in what he writeth.

Sibbald was keen to have new maps for his national enterprise.¹¹⁶

Although there was an emphasis placed on precision, accuracy and original survey, Enlightenment geographers could still be critical of contemporary mapping endeavours. The antiquarian-topographer Richard Gough in his *British Topography* (1780), for example, was highly critical of ‘modern makers’ of maps despite their assertions that ‘their maps are framed from *actual new surveys*’.¹¹⁷ Claims made by Enlightenment geographers as to their maps’ accuracy were often rhetorical, denied by the maps themselves, and were made for reasons to do with market competition and to attain greater credibility and social status.¹¹⁸ According to Gough, ‘there is scarce a single one which does not abound with faults: and a set of correct maps remains to be hoped for from the undertakers of surveys of counties’. Gough followed this criticism of British county mapping with a judgment on contemporary national surveys in which he accorded England primacy: ‘if England did not teach other nations the art of making or engraving maps, she is preceded by very few’.¹¹⁹

Enlightenment cartographers, as well as being dismissive of their predecessors with claims that their maps were unreliable, and critical of their contemporaries, both local and national, were equally dependent upon science and direct observation to confirm progress. John Blair, in his dissertation on the *Rise and Progress of Geography* (1768), for example, considered improvements in geography synonymous with mapping: ‘early Geographers being destitute of mathematical instruments and of astronomical Observations’ created maps that were ‘little more than rude Outlines and topographical Sketches’.¹²⁰ Although his narrative invoked a linear progression—a ‘Darwinian paradigm’¹²¹—of geographic and

¹¹⁶ Withers 2002, p. 49.

¹¹⁷ Gough 1780, p. 108.

¹¹⁸ Withers forthcoming.

¹¹⁹ Gough 1780, p. 108.

¹²⁰ Blair 1784, pp. 4 and 39. This work was published originally as the preliminary dissertation in the 1768 edition of the author’s ‘Chronology and history of the world’.

¹²¹ See Blakemore and Harley 1980, pp. 17–23.

cartographic history, Blair's conclusion is more circumspect than many and, in addition, highlighted the Eurocentric focus of Enlightenment cartography—a 'nationalist paradigm':¹²²

I must, however, observe upon the whole, that Geography is a Science even still many Stages removed from Perfection. The Maps of America, and the Eastern Parts of Asia, though they have been of late two of the great Theatres of War and Commerce, are perhaps more unfinished than any of the rest. Every new Map that is published of these countries, seems to blast all those that went before them, and it will require perhaps the Experience of half a Century to come, before a sufficient Number of Observations shall be made to verify the Situations of their most considerable Towns, Coasts and Rivers, so as to approach the Accuracy with which the Maps of the different Kingdoms of Europe are now executed.¹²³

By the end of the Enlightenment, recognition of the progress of geographical, and in particular national, knowledge was directly associated with the improved nature of mapping. In introduction to his *Atlas of Scotland* (1832), John Thomson acknowledged the maps of predecessors, notably Timothy Pont, Joan Blaeu, John Adair and Sir Robert Sibbald in the seventeenth century, who he believed were responsible for the improved understanding of the mapping of Scotland.¹²⁴ Thomson also acknowledged the benefits of the work of a host of map makers in the eighteenth century, including Murdoch Mackenzie, Alexander Bryce, military engineers including John Elphinstone, and David Watson, William Roy and junior engineers assigned to the Military Survey of Scotland, John Ainslie, numerous county surveyors and Aaron Arrowsmith and his 1807 *Map of Scotland*. Using the 'Military Survey of Scotland' and other material, Arrowsmith, according to Thomson 'constructed one of the best Maps of Scotland extant' which was 'justly celebrated'.¹²⁵

'Enlightenment map makers and geographers thus understood theirs to be a period in which cartography (and geography) was an advance upon their predecessors'.¹²⁶

Geographers were developing the tools, the 'information systems', and the vocabulary to describe the earth with increasing accuracy, precision and consistency.¹²⁷ The science of mapping was advancing: in solution to the longitude problem; in the confirmation of the

¹²² See Blakemore and Harley 1980, p. 26: 'In its formative phases in the eighteenth and nineteenth centuries the history of cartography was a subject rooted primarily in Europe'.

¹²³ Blair 1784, pp. 183–184.

¹²⁴ Withers 2002.

¹²⁵ Thomson 1832, p. iii.

¹²⁶ Withers forthcoming.

¹²⁷ Headrick 2000, p. 4.

(Newtonian) shape of the earth; in the increasingly accurate measurement of the earth; and in the technology and the scope of surveying.¹²⁸ Allied with improved instruments of survey and techniques of mapping, was the assumption that the world could be accurately measured and described. In its representation, the geographer's essential task was to reveal the earth through a 'pseudo-landscape of a map or text'.¹²⁹

Certainty and faith in a map's representation could only come from knowing the character and quality of its data and the circumstances of its construction. Geographical memoirs were published in order to validate geographical knowledge and the skill of the cartographer, to distinguish between simply unambiguous and *certain* geographical knowledge.¹³⁰ The increasing quality and comprehensiveness of geographical data were held by contemporaries to epitomise the progress of human knowledge.¹³¹

Understanding why the map became a dominant archetype of human knowledge and the focus of state patronage in the eighteenth century thus becomes easier when its 'enlightenment' attributes are considered together. European Enlightenment maps, according to Burnett, 'constitute[d] a distinctive system for apprehending the lineaments of the natural world': a map was 'a field for the collation of diverse measurements, a framework for ordering nature, a means of nesting multiple scales of representation, an intersection of mathematics, astronomy, chronometry, precision instruments, and a host of craft practices'.¹³² State patronage was essential to mapping, to initiate and to fund state surveys. As the power of European Enlightenment states intensified and as they increasingly sought to exert control over territories, those states sought to intensify the coverage and detail of their regional mapping. As Edney has it, 'to govern territories, one must know them'.¹³³ By the end of the eighteenth century, maps as a corpus of geographical knowledge were integral to the hegemony of Europe's ruling elites—the key to disciplinary power and the primary instrument of the social, economic, political, and physical restructuring of a country.¹³⁴

With this summary context in mind, let me turn to those questions of method by which modern scholars have sought to interpret Enlightenment maps.

¹²⁸ Widmalm 1990; Godlewska 1999.

¹²⁹ Godlewska 1999, p. 22.

¹³⁰ Edney 1999, p. 187.

¹³¹ Edney 1994b, p. 105.

¹³² Burnett 1999, p. 775.

¹³³ Edney 1997, p. 1.

¹³⁴ Godlewska 1995; Headrick 2000.

Questions of Method

As the first section on map history noted, modern investigation of the map has moved beyond the positivist histories of cartography—of exploring the technical aspects and the so-called ‘reality’ of maps—to embrace a whole range of interpretative approaches that aim to look at both the constructive and communicative processes at work in a map. In turning to methods of language, literature, and art, the focus, according to Casti, has shifted from ‘how much reality is reproduced’ to ‘what the map communicates with regard to the significance and meaning of territory’.¹³⁵

My aim in this section is to consider the methods available to analyse the military maps of eighteenth-century Scotland. Three interpretative approaches—semiotics, iconography, and deconstruction—are outlined below. To differing degrees, each has contributed to a holistic method of critical interpretation. Semiotic studies—of signs or symbols comprising systems of communication (pragmatics, semantics, syntactics)—argue for meaning to be understood in the context of the map itself. Iconography—the analysis of the themes and subjects associated with specific symbols (icons, emblems)—attempts to explain the meanings inherent within maps from the signs used and, in its broadest context, considers the sociological aspects of a map’s production—map maker, institution, and government. Post-modernist deconstruction extends the application of semiotics and, drawing on Harley’s approach, argues that social factors influencing the production of maps can be read within the finished map. Each method has some limitations in scope, hence the need to follow more than one approach and to combine them. In addition, each approach relies on another to draw out the purpose of particular maps within their specific cultural and political context.

At the end of this section, I consider a taxonomic model—Harley’s classification of the maps of the American Revolutionary War—as an approach to collate and to analyse a large archive of military mapping cartographic records. As a heuristic device, the model suggests categories and terms to describe a group of maps that are united in purpose, time, and place.¹³⁶ Harley’s theoretical framework included five themes: map availability; how contemporaries viewed maps; the education of users; the operational suitability of particular maps for specific purposes; and documented cases of maps being used in decisions related to geographical questions. The military mapping of Scotland, although not fitting entirely into this framework, does display some similarities to it due to ‘one remarkable general characteristic of military cartography[:] the extent to which different armies took a common

¹³⁵ Casti 2005, p. 2.

¹³⁶ Harley 1978.

approach to the making and use of maps [thus] maps reflected not differences in national origins but affinities in eighteenth-century military organization and practice'.¹³⁷ As I show, my framework also includes five themes: the role of the institution in cartographic practice; the education of map makers and map users; the codification of military maps; the particular function of military maps; and their use. My approach examines how political and military power was embodied in the engineers' maps and plans in the process of satisfying institutional imperatives to assert territorial control: much more than a 'simple' exercise in cartography.

Semiotics

The application of a linguistic model relies on two assumptions: (1) that language possesses a definable structure; and (2) through the mechanism of that structure, language plays a functional role in society. Harley defined three different kinds of studies for interpreting geographical knowledge in past societies: static, genetic, and dynamic. When applied to evidentiary sources, the studies equated to map content, map making, and map use respectively.¹³⁸ In order to establish fully the historical significance, Harley turned to the lower-level semiotic structure of the linguistic model and looked at the basic unit of language—its signs.¹³⁹

Semiology, the general science of signs, was first postulated by Ferdinand de Saussure in his posthumous *Course in General Linguistics* (1916). The 'sign' always consists of two parts: the signified which is the meaning, significance, concept or the object; and the signifier—the sound, image, or gesture attached to the signified. These are always integrated into each other and only distinguishable at the analytical level. In order to create a sign, the signifier has to be assigned to the signified by a 'code'—'a set of conventionalized ways of making meaning that are specific to particular groups of people'—and related to an object, the sign's referent; in our case, a map.¹⁴⁰ The sign is thus an *event* that occurs in a specific historical and social circumstance and is defined by a finite number of cultural codes.

Every map is at once a synthesis of signs and a sign in itself: an instrument of depiction—of objects, events, places—and an instrument of persuasion—about these, its makers and itself. Like any other sign, it is the product of codes: conventions that prescribe relations of content and expression in a

¹³⁷ Harley 1978, p. 45.

¹³⁸ Harley 1982.

¹³⁹ Edney 2005.

¹⁴⁰ Rose 2001, pp. 69–88, esp. p. 88.

given semiotic circumstance. The codes that underwrite the map are as numerous as its motives, and as thoroughly naturalized within the culture that generates and exploits them.¹⁴¹

Semiotics is centrally concerned with reception, and it is the selection and combination of these codes that leads to specific interpretations.¹⁴² Roland Barthes claimed that a semiotic investigation ‘will not teach us what meaning must be definitively attributed to a work; it will not provide or even discover meaning but will describe the logic according to which meanings are engendered’.¹⁴³

Different social groups establish symbolic control of physical space through denomination. Denominational analysis addresses two issues: the symbolisation of a given place, and suggestions as to how that place should be perceived and experienced in society. The meaning and significance of any denominational analysis depends on the type of designator (code) being used. It is the designators of denomination that imbue the map with the two fundamental needs implicit in the intellectual appropriation of the world: description and conceptualisation. In *describing* the world, a map is a practical representation of physical space through the action of direct observation of reality; a map *recounts* the world applying categories of representation/interpretation to indicate how the world functions. What distinguishes cartography, however, from all other textual and visual means of communication is the fact that the map is a *denominative projection*—it conveys the meaning(s) enclosed within the designator.¹⁴⁴ In this respect, the map is itself a denotative (factual) sign, ‘a sign in itself’ as noted by Wood and Fels.¹⁴⁵ The signified and the signifier conjoin at the first-order semiological system; the sign can then be appropriated by ‘myth’ to be the signifier in the second-order semiological system.

‘Myth is not defined by the object of its message, but by the way in which it utters this message: there are no formal limits to myth, there are no ‘substantial’ ones’.¹⁴⁶ The map is therefore defined by its intention rather than its content where ‘myth’ constitutes, in Barthes’ words, ‘the naturalization of the cultural’:

This is why myth is experienced as innocent speech: not because its intentions are hidden—if they were hidden they could not be efficacious—but because they are naturalized. In fact, what allows the reader to consume myth innocently is that he does not see it as a semiological system but as an

¹⁴¹ Wood and Fels 1986, p. 54.

¹⁴² Bal and Bryson 1991.

¹⁴³ Barthes 1966, p. 63, quoted in Bal and Bryson 1991, p. 184.

¹⁴⁴ Casti 2000 and 2005.

¹⁴⁵ Wood and Fels 1986, p. 54.

¹⁴⁶ Barthes 1973, p. 117, quoted in Rose 2001, p. 90.

inductive one. Where there is only an equivalence, he sees a kind of causal process: the signifier and the signified have, in his eyes, a natural relationship. This confusion can be expressed otherwise: any semiological system is a system of values; now the myth consumer takes the signification for a system of facts: myth is read as a factual system, whereas it is but a semiological system.¹⁴⁷

As such, myth is a form of ideology. This serves the purpose of highlighting the importance of the role of the map within the process of territorialisation: “seized’ by myth to be the signifier, the map becomes an instrument capable of generating new discourses of territory’.¹⁴⁸

Iconography

How valuable a good map is, in which one views the world as
from another world thanks to the art of drawing.¹⁴⁹

In *Landscape and Power*, Mitchell urged that we consider landscape not as an object to be seen, ‘but as a process by which social and subjective identities are formed’; landscape, he writes, must be understood as a physical and ‘multisensory’ medium ‘in which cultural meanings and values are encoded’.¹⁵⁰ Daniels and Cosgrove remarked that ‘a landscape is a cultural image, a pictorial way of representing, structuring or symbolising surroundings’.¹⁵¹ When interpreting landscape as a ‘cultural image’ or cultural symbol through linguistic or structuralist approaches, the landscape can be likened to a text and, therefore, its interpretation to ‘reading’. A map, as a medium that materialises landscape, is classed as a graphic image.¹⁵² In its materialisation, the map re-constructs the space it represents and thus becomes an instrument of communication. By deconstructing the cartographical image using Erwin Panofsky’s concepts of *iconography* and *iconology*, for example, the literal and intrinsic levels of meaning in maps can be communicated. Iconography/ology is thus concerned with the meaning of an image rather than its form, by setting it in its historical and spatial context, and by analysing the ideas implicated in its imagery.¹⁵³

Panofsky distinguished three levels of meaning in art (specifically, Renaissance art) which he presented through an analogy with three phases of the interpretation of an instance

¹⁴⁷ Barthes 1972, p. 131, quoted in Wood and Fels 1986, p. 63.

¹⁴⁸ Casti 2000, p. 29.

¹⁴⁹ Hoogstraten 1678, p. 7, quoted in Alpers 1987, p. 74.

¹⁵⁰ Mitchell 1994, pp. 1 and 14.

¹⁵¹ Daniels and Cosgrove 1988, p. 1.

¹⁵² Eckert 1908; Mitchell 1984; Jacob 2006.

¹⁵³ Panofsky 1955; Daniels and Cosgrove 1988.

of communicative behaviour. The first two levels are iconographic in nature, where iconography is ‘that branch of the history of art which concerns itself with the subject matter or meaning of works of art, as opposed to their form’.¹⁵⁴ The *primary* or *natural* level recognises *factual* or *expressional* meaning by identifying pure forms: the identification of certain configurations with objects known from experience (factual); and awareness of psychological nuances of these facts (expressional). ‘Pure forms’ can be known as *motifs* and, in the practice of interpretation, are recognised as pre-iconographic descriptions. The *secondary* or *conventional* level has *intelligible* meaning, established by connecting motifs, and their composites, with themes or concepts. ‘Motifs’ recognised as carriers of a secondary or conventional meaning are defined as *images*. This second level of interpretation becomes the iconographic description. Both natural and conventional meanings are observable; historically they reflect styles (conventions) and types (constructions) respectively.

The third level, the *intrinsic* meaning or content, can often highlight the influence of social and political power in the hidden rules of the image. Panofsky used the term ‘iconology’ for such a study, where the meaning of a work of art is discerned by ‘ascertaining those underlying principles which reveal the basic attitude of a nation, a period, a class, a religious or philosophical persuasion—qualified by one personality and condensed into one work’. Panofsky imposed a methodological distinction between iconography and iconology: pre-iconography and iconography are descriptive processes, and iconology is a matter of synthesis.¹⁵⁵ Unlike the first two levels of meaning, the *intrinsic* meaning is ‘essential’ rather than ‘phenomenal’ and calls for a hermeneutic approach.¹⁵⁶ A hermeneutical approach thus elaborates on the idea of the map as a tool of intervention between society and territory and, as such, the map plays a crucial role. Maps are therefore taken as agents of society, representing geographical knowledge as cartographic knowledge that then allows actions to be performed on territories.¹⁵⁷

Semiotic analysis and map iconography

‘Humans do not reflect on the world, they construct it by means of symbols’.¹⁵⁸ The history of cartography, through its progressive study of cartography as a process of communication, maps as language, and its modern interpretive approach of semiotics has gone beyond the traditional division between art and science. Studying the map as an image gives rise to the

¹⁵⁴ Panofsky 1955, p. 51.

¹⁵⁵ Panofsky 1955, p. 55; Hasenmueller 1978; Daniels and Cosgrove 1988.

¹⁵⁶ Pickles 1992: Hermeneutics refers to the methodology and theory of interpretation behind textual analysis.

¹⁵⁷ Casti 2005.

¹⁵⁸ Molino 1989, p. 32, quoted in Jacob 2006, p. 29.

question: ‘what role does the graphic signifier play in the production of a ‘semiotic effect’ that will ultimately allow the geographical identification of a set of drawn lines?’¹⁵⁹

Aesthetics and semiotics work towards a theory that aims to satisfy both the need to discriminate artistic signs and to identify the principles that unite them.¹⁶⁰ A map usually reflects the aesthetic conventions—‘its codes of figuration, its repertory of motifs, and its chromatic palette’—of a specific time and of a specific cultural environment. Tony Campbell when looking at *Early Maps*, for example, explained that ‘just as the design of maps developed with time, so did the style in which the colouring was applied to them by hand. The distinctive palettes of each age and country help interpret the engraving beneath’.¹⁶¹ At the same time, the map appears to be a specific production on account of its different techniques and levels of representation of figurative codes and their different meanings, in a particular context.¹⁶²

The map is a means of organising and codifying knowledge: ‘the map is an icon of knowledge’.¹⁶³ It is in the process of reading a map that the map acts as an iconic sign—an image, a denotative sign—in this process the map user can imagine the terrain shown on the map. On a comparative level, the iconographic ‘image’ has many characteristics of the semiotic ‘sign’, and the meanings articulated in the ‘image’ behave much like the messages conveyed through the use of the linguistic ‘code’. Iconography, then, has a generally ‘semiotic’ character, is restricted to that which is knowable—‘every culture weaves its world out of image and symbol’—and is an invaluable method for the establishment of dates, provenance and, occasionally, authenticity.¹⁶⁴ Iconology, on the other hand, parallels semiology not by methods and concepts but by assumptions—it is conceived as an ‘iconography turned interpretative’—and is a method of interpretation which arises from synthesis, or ‘synthetic intuition’, rather than analysis. Iconology shares with semiotics both a concern for the intrinsic meaning in a cultural image, and a conviction that it is accessible to analysis by searching out analogies between social, cultural, and political experiences of an era.¹⁶⁵ As a language sign, the map is first of all a symbol—a symbol of the work of the map-maker, a symbol of geographic knowledge, a symbol of a social and cultural era. It is the interpretation of all these elements that imbues the map with symbolical values, that is, changing modes of perceiving and representing space, not just conventions—the ‘iconology’

¹⁵⁹ Jacob 2006, p. 103.

¹⁶⁰ Mitchell 1986.

¹⁶¹ Campbell 1981, p. 7.

¹⁶² Jacob 2006.

¹⁶³ Jacob 2006, p. xix.

¹⁶⁴ Panofsky 1955, p. 57; Hasenmueller 1978; Daniels and Cosgrove 1988.

¹⁶⁵ Panofsky 1955; Hasenmueller 1978.

as opposed to the ‘iconography’.¹⁶⁶ ‘It is often on this symbolic level that political power is most effectively reproduced, communicated, and expressed through maps’.¹⁶⁷

Deconstruction

A map is deconstructed ‘in order to follow the logic of each of its levels or representation’.¹⁶⁸ In promoting a deconstructionist approach, Harley was advocating an exploration of varying, often conflicting, discourses in cartography to search for alternative meanings. He did not reject the importance of map production techniques, only the idea that cartography could be reduced to the study of these techniques without considering the influence of social factors on them.¹⁶⁹ Harley called for scholars to ‘read between the lines of the map [...] and through its tropes to discover the silences and contradictions that challenge the apparent honesty of the image’.¹⁷⁰ In the eighteenth century, the rhetoric of maps was their ‘scientific’ nature and their capacity to ‘order and classify’ the world. Advances in instrumentation and technology increasingly improved the detail and planimetric accuracy of map content. Accuracy became a metaphor for utility and ruling elites adopted the map as an effective tool with which to impose social order. The metaphor thus changed. Precision and accuracy in rendition became the new talismans of power and its exercise.¹⁷¹

Power, it is argued, is manifest as ‘internal’ and ‘external’ to cartography. External power comes from the ruling elites, the monarch or minister of the Crown, and state institutions who employ power to initiate national surveys and mapping programmes for administrative or military purposes. A power external to cartography is thus a centralised, legitimised tool in the formulation of policy and in the process of social order. Internal power is strongly linked to knowledge and to the process of making a map and standardisation—compilation, generalisation, classification, formation into hierarchies and so on—which a specific society accepts as ‘normal’.¹⁷² Maps are therefore subject to and become a source of power gained by geographical knowledge:

Both in the selectivity of their content and in their signs and styles of representation maps are a way of conceiving, articulating, and structuring the human world which is biased towards, promoted by, and exerts influence upon particular sets of social relations. By accepting such premises it

¹⁶⁶ Panofsky 1955; Daniels and Cosgrove 1988; Komedchikov 2005.

¹⁶⁷ Harley 1988, p. 279.

¹⁶⁸ Jacob 2006, p. 8.

¹⁶⁹ Casti 2005.

¹⁷⁰ Harley 1989, p. 3.

¹⁷¹ Harley 1989.

¹⁷² Harley 1988a; 1989b; 2001a.

becomes easier to see how appropriate they are to manipulation by the powerful in society.¹⁷³

A Taxonomic Model

What characterised Scotland's military mapping between 1689 and 1815 is, I suggest, typical of wider practices in European nations and their overseas colonies. The work of the *ingénieurs géographes*, for example, in France and then Egypt where mapping was used as a form of intellectual conquest and reproduced as part of the *Description de l'Égypte*, has been well documented by Anne Godlewska.¹⁷⁴ David Buisseret and Émilie d'Orgeix have likewise described the provincial practices and theories of the French military engineers in the late seventeenth century.¹⁷⁵ Josef Konvitz and Matthew Edney, in turn, have identified the development of triangulation and mapping in France and India as a form of national knowledge and imperial conquest.¹⁷⁶ Themes that reflect national similarities include the instruction and education of military engineers and draughtsmen and, to an extent, the move towards a rationalisation and standardisation of cartographic procedures in the process of serving the state.

In considering the spread of cartographical ideas between the armies of the American Revolution, Brian Harley described how the maps reflected 'affinities in eighteenth-century military organization and practice' and that 'whoever the participants, there were important similarities in the roles maps played in the various engagements of the war'.¹⁷⁷ Harley's approach to the study of Revolutionary-era mapping and the environment of the map user can offer a methodological model for a preliminary study of the archive of the maps and plans of Scotland.

Harley constructed an analytical classification of the Revolutionary maps which related to their contemporary uses rather than to their cartographic or internal characteristics; the latter are often observed and measured in evaluations of historical maps.¹⁷⁸ His objective was to study the similarities between maps of a particular period but of different geographical provenance, a practice he considered a form of 'comparative cartography'.¹⁷⁹

¹⁷³ Harley 1988a, p. 278.

¹⁷⁴ Godlewska 1988, 1995, and 1999.

¹⁷⁵ Buisseret 1992, 1999, and 2003; Orgeix 1999 and 2008.

¹⁷⁶ Konvitz 1982 and 1987; Edney 1993 and 1997.

¹⁷⁷ Harley 1978, p. 45.

¹⁷⁸ For Scotland, for example, several studies have been made on the topographic and planimetric accuracy of the 'Military Survey of Scotland'. See: Whittington and Alexander Gibson (1986); Mallett (1987); and for comments on the questionable value of geometric accuracy testing on historical maps, see Fleet and Kowal (2007).

¹⁷⁹ Harley 1968, pp. 65–66.

But unlike traditional methods of comparing variations in a series of related maps (carto-bibliography) or a comparative analysis of outlines or place names (toponymy), this was an analytical taxonomy that allowed statistical and other generalisations to be made about a considerable number and diversity of military maps.¹⁸⁰ As a 'basic taxonomic principle', he recognised that 'sub-division must be designed with a specific purpose in mind'.¹⁸¹ The objective classification he devised therefore aimed to 'penetrate and sub-divide the particular historical process with which we assume certain maps were associated and, in which process, it is hoped to diagnose their role'.¹⁸² It looked at the relationship between map forms and attributes with the range of military activities associated with the same maps. It thus considered the function of different maps in association with the principal realms of eighteenth-century military activity: fortification, movement, and battle.¹⁸³ Figure 2.1 summarises the salient components of Harley's classification of maps of the American Revolutionary War.

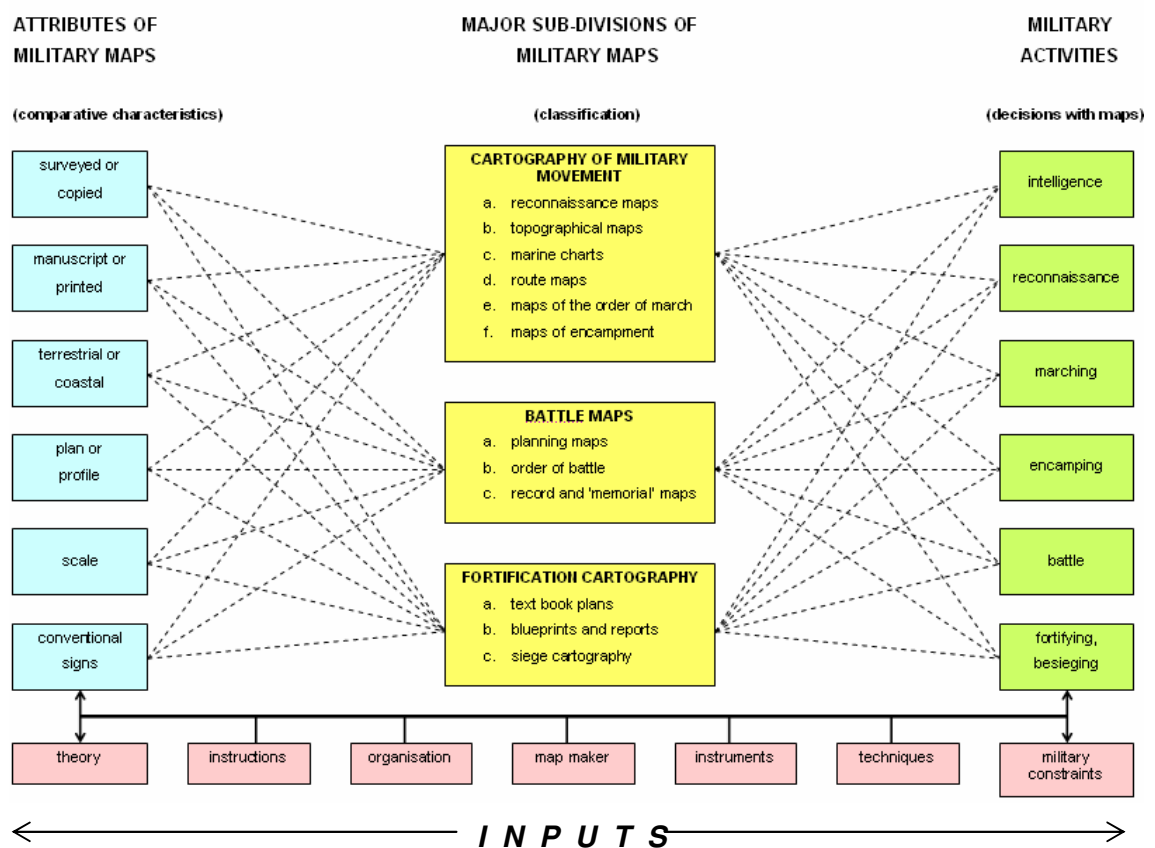


Figure 2.1 The connections between the attributes and uses of three major classes of military maps.¹⁸⁴

¹⁸⁰ Blakemore and Harley 1980, p. 41; Edney 2005.

¹⁸¹ Harley 1976, p. 50; 1978, p. 2.

¹⁸² Harley 1976, p. 51.

¹⁸³ Harley 1978, p. 4.

¹⁸⁴ Harley 1976, p. 52; 1978, p. 4.

By examining the scope of military cartography overall, Harley proposed a study of a whole ‘map culture’ (practiced by British, French, American, and German map makers). His taxonomic model provides a template by which to study this European—British, French, German, and Dutch—‘map culture’ at work in Scotland. My purpose, however, is not to establish the character of the similarities in map making among different nations. It is, rather, to establish the character of the military mapping of Scotland. My concern is to study the production, purpose, and operational use of maps in military context in eighteenth-century Scotland. Three arguments present themselves. The first, that military map making in and of Scotland reflected a national standard, one that was achieved, in part, by field experience but increasingly through instruction and education. Secondly, that changing state imperatives in Scotland demanded distinct cartographic practices (modes) that created different kinds of spatial knowledge at different times and that these reflected changing technologies and social purposes. Finally, that the maps played a role in military and in political enterprises in Scotland.

The application of Harley’s schema to the manuscript maps of Scotland is an entryway to their further study, a preliminary means to rationalise the archive as a whole. Such organisation provides an opportunity to explore the ‘sociological aspect’ of military mapping, where ‘the focus is on the production of maps and the use of maps’ and allows for ‘a shift from concern with map accuracy to map efficiency’.¹⁸⁵ In classifying the maps, the use of content analysis is a way of understanding the symbolic quality of the map itself. In this sense, the map remains part of the wider cultural context in which it was made and used.¹⁸⁶ The reliability of analysing and classifying cartographic records according to their assumed usage is, however, difficult. The same map—especially an eighteenth-century topographical map—was most probably used for more than one purpose. It then becomes necessary to find evidence of its primary usage to retain taxonomic integrity.

Conclusion

Maps are no longer what they were once assumed to be: ‘accurate, transparent media through which reality may be represented and understood’.¹⁸⁷ Modern studies in the history of cartography are examining the map as a visual language. Instead of providing a ‘transparent window on the world’, a map is now regarded as an opaque device, a sign that presents a

¹⁸⁵ Jacob 1996, p. 192.

¹⁸⁶ Rose 2001.

¹⁸⁷ Mitchell 1986, p. 8.

deceptive appearance of naturalness and transparency. As such, map historians are looking at maps as artefacts, as constructions, as a complex language, and as a process of ideological mystification founded in a society's visual culture.¹⁸⁸ This review has considered a range of works that show map history to be now more concerned with the social, human, and political context of maps than with their form and the idea of the map as a window on the past.

This chapter has also outlined several methodological approaches that focus on the concept of social power and its representation. Referring back to historiographies of current popular debate amongst scholars in the history of cartography, namely the role of a map, the ways in which it reflects an historical period and the external influences on its creation—all associated with a particular cultural and social group—this study addresses each of these lines of enquiry.¹⁸⁹ My research will examine how the structure of social power in the Board of Ordnance influenced the production of knowledge, its mode of representation in military maps of Scotland, and ultimately the appropriation of maps by the state for establishing its social order in eighteenth-century Scotland. Adopting Campbell's call to 'rid ourselves of false expectations about the maps of earlier centuries' brought about by their comparison with maps of today, this study attempts to understand the military maps of Scotland as Enlightenment contemporaries understood military mapping.¹⁹⁰ In chapter three I review the Board of Ordnance and its conceptions of cartography before turning to the military maps of Scotland and a review of their nature, purpose, construction, and reception.

¹⁸⁸ Harley 1992; Jacob 2006.

¹⁸⁹ Buisseret 2003; Casti 2005.

¹⁹⁰ Campbell 1981, p. 9.

CHAPTER 3

The Board of Ordnance: Analysing an Institution for Military Mapping

Introduction

The nature of relations between institutions and cartographic practice vary. They can be enabling and constraining and they can define the social ideology of mapping.¹⁹¹ My concern here is to review the nature of the relations between the Board of Ordnance, a British department of state, and cartography during the late seventeenth and eighteenth centuries. In Britain, this was a period significant for the expansion of military map making, when military engineers, surveyors, and draughtsmen employed by the Board of Ordnance were responsible for mapping the country and its overseas dependencies. It was, for Skelton, a time when ‘the extent to which the mapping of the land surface of the globe was accelerated and enriched by the military surveyor’.¹⁹²

Britain offers a particular opportunity to explore the general trend in the European expansion of military cartography during the eighteenth century. Just as changes in the art of war—the so-called ‘military revolution’—influenced military tactics in continental Europe, Britain’s involvement in overseas wars caused a profound change in its militaristic practices and education at home. Four distinctive features characterised the changes in modern European warfare. There was a revolution in tactics as weaponry evolved to become more mobile, quicker-firing, and more accurate at longer range. There was a growth in the size of armies. New strategies were devised to train—or drill—these armies and to bring them into action. Finally, war had a noticeable impact on different societies, on their economies and political structures in particular.¹⁹³ For Buisseret and Widmalm, the impact of these changes produced changes in the nature of mapping.¹⁹⁴ Advances in firepower transformed the conduct of both offensive and defensive operations, modified the art of fortification and, initially, slowed the pace of warfare. In response, armies acquired new specialists: the artillery emerged as a separate unit to the cavalry and infantry; engineers emerged to design and to construct new types of fortifications and siege works. With the transition in the seventeenth century to more mobile strategies, battles overcame sieges as the decisive

¹⁹¹ Edney 1993, Edney 1994b.

¹⁹² Skelton 1970, pp. 77–78.

¹⁹³ Parker 1988, pp. 1–2.

¹⁹⁴ Widmalm 1990; Buisseret 2003.

element in war and every place became a potential theatre of warfare. Only then did the *fortificateur* develop into the *ingénieur-géographe* as European states demanded ‘knowledge of the whole geography’ and began to sponsor large-scale topographical maps of territories and military surveys in preparation for battle.¹⁹⁵

Military officers in the field were increasingly expected to be cartographically literate, to understand the use of maps for military purposes and eventually to provide the necessary expertise to lead state mapping projects.¹⁹⁶ Surveyors marched alongside soldiers, initially mapping for reconnaissance, a well-founded practice of the geographical engineers of the armies of France (*les ingénieurs géographes*). With the establishment of state institutions and military academies, the responsibilities of these men expanded along with their education to include the surveying and construction of fortifications, towns and barracks, the building of roads and bridges, the depiction of military action, and the systematic surveying of national territories.¹⁹⁷ The outcome was the growing domination of map making by military personnel, a move Edney calls less the ‘militarisation of cartography’ and more the ‘cartographisation of the military’, the increasing ‘map-mindedness’ of senior army officials that allowed the use of maps and the practice of mapping for military purposes.¹⁹⁸

My concern in this chapter is to understand the Board of Ordnance’s conception of cartography and to outline why it constructed maps of Scotland. This chapter reviews the institutional structure of the Board of Ordnance in relation to its cartographic responsibilities in the period 1683 to 1800 in order to gauge the nature and extent of military mapping not just as a cartographic enterprise but as the result of institutional imperatives and organisational structure. My aim is to situate military maps contextually by examining how the Board of Ordnance worked, to look at the evolution of the Board’s operational practices in relation to map making and related tasks, and to consider the place of theoretical teachings of ‘military science’. Particular attention is paid to the civil and military branches of the Board of Ordnance associated with map making: respectively, the draughtsmen in the Drawing Room at the Tower of London and the military engineers either based at Divisional outposts or in the Royal Military Academy at Woolwich.

I begin by describing the central agency—the Board of Ordnance—that comprehensively co-ordinated and controlled British military mapping in the eighteenth century. The description outlines the cartographic responsibilities of the engineers and the

¹⁹⁵ Skelton 1970, p. 77; Widmalm 1990, p. 201.

¹⁹⁶ Edney 1994a.

¹⁹⁷ Harley 1978; Duffy 1996; Edney 1997; Godlewska 1999.

¹⁹⁸ Edney 1994a, pp. 14–20, *esp.* p. 19.

expansion of the Corps of Engineers in response to territorial imperatives and, increasingly, the cartographisation of the British military. As more maps were generated for state purposes, the need arose for a secure repository, one that offered the Board and military personnel access to maps as well as a means to produce them. The evolution of a Drawing Room at the Tower of London (headquarters of the Board and the Office of Ordnance) as a centre for carto-reproduction is described. In both establishments—the military engineering corps and the civil Drawing Room—emphasis was placed on training in the military sciences and draughtsmanship to make the highly detailed maps necessary for military operations. The remainder of the chapter considers the professional education and instruction of the engineers and the draughtsmen, portraying mapping as the embodiment of European military science and the map as the conceptual basis of Enlightenment ideology.

The Board of Ordnance

The origins of the Board of Ordnance can be traced to the fourteenth century when the Privy Wardrobe began to act as an itinerant armoury for the royal forces campaigning in Wales. By 1485, an Office of Ordnance was established; distinct and separate from the Wardrobe, it grew substantially during the reign of Henry VIII. In 1597, a Board of Ordnance was constituted and endowed with the responsibility for the upkeep and repair of forts and castles in addition to armaments and munitions. By 1683, the Board assumed the form which was to be preserved, largely unaltered, into the nineteenth century. The Master-General presided over a Board consisting of himself, four Principal Officers—the Lieutenant-General, Surveyor-General, Clerk of Deliveries, and Storekeeper—and a Clerk of the Ordnance (see Fig 3.1). The Board, together with its clerks and the staff of the Ordnance Office in the Tower of London (the headquarters), was a civil establishment but was depended upon by the Army and Navy for the supply of munitions and other stores. It additionally supplied technical assistance in artillery and engineering, including the organisation of artillery trains and the maintenance of garrisons and coastal defences, and was responsible for providing military officers to staff these services.¹⁹⁹

The late seventeenth and early eighteenth centuries saw an unprecedented growth in British military forces, a consequence of two prolonged wars—the Nine Years War under William III (1689–1697) and the War of the Spanish Succession (1702–1713)—and a failed insurrection in Scotland to restore the exiled Stuart line in 1715–1716. The Office of Ordnance experienced corresponding growth, causing the Board to instigate clearer

¹⁹⁹ TNA Military Record Information 66; Tomlinson 1979; Marshall 1980; Stewart 1996.

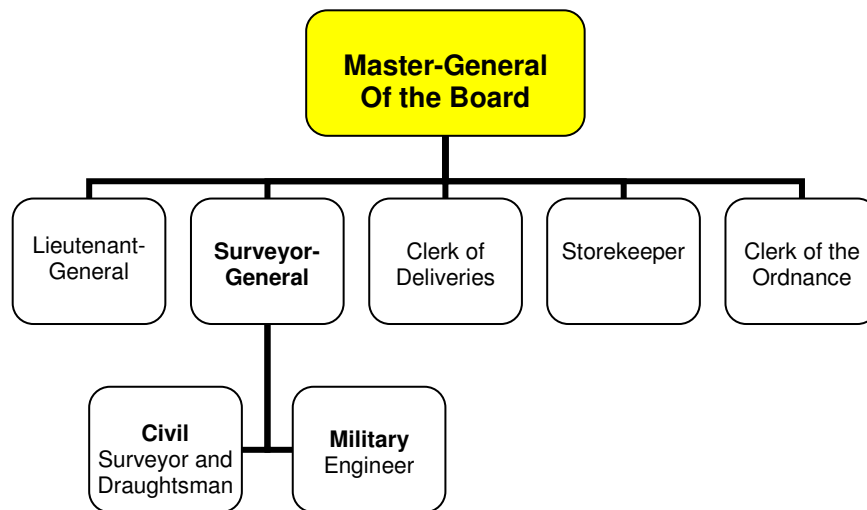


Figure 3.1. Structure of the Board of Ordnance in the eighteenth century.

definition between the functions of its civil and military officers. By the early eighteenth century, distinct military and civil branches of the service had emerged.²⁰⁰ The increased responsibilities and developments in specialist roles and activities among the personnel of the Office provide a link to the military's increasing awareness and practical use of maps in the eighteenth century. Cartographic concerns came to represent a small, but nevertheless important, sector of the Board's total responsibilities in the defence of the realm, the most consistent aspects of which were connected with military engineering.²⁰¹

The Military Establishment: the Engineers

The need for an efficient office to supply and support the Army and Navy gave rise, in 1683, to the issuing of a warrant 'Rules Orders and Instructions for the future Government of the Office of the Ordnance'.²⁰² Before then, the responsibility of the Ordnance Office for the construction of military works had never been clearly defined. From 1683, these responsibilities were laid out in detail and the establishment of engineers, their salaries and duties was fixed. The establishment at this time comprised a Principal, Second, and Third Engineer, and two Ordinary Engineers to be 'bred up in the Art and Knowledge of

²⁰⁰ Tomlinson 1979.

²⁰¹ Marshall 1980.

²⁰² BL Add. MS King's 70, 'Rules Orders and Instructions for the future Government of the Office of the Ordnance', 1683, pp. 1–78.

Fortifications'.²⁰³ They were answerable to the Surveyor-General, then Sir Bernard de Gomme.²⁰⁴

The Surveyor-General, in addition to a duty to 'survey all Stores and Provisions of War', was charged with moderating labourers, artificers and workmen, and with examining the qualifications and abilities of all prospective engineers who were expected to be 'well skilled in all Parts of the Mathematicks [sic], more particularly in Stereometry, Altemetry and Geodasia, [...] in all manner of Foundations, in the Scantlings of all Timber and Stone, and of their several Natures'.²⁰⁵ When any new building work, or reconstruction and restoration of existing fortifications was required, the Surveyor-General was 'to compute and calculate the Charge thereof,' taking proposals to the Master-General of the Ordnance or the Principal Officer of the Crown for approval and payment.²⁰⁶

The duties of the 'under Ministers' were equally well-defined. The Principal Engineer was charged with the role of map making—a new prerequisite of Ordnance administration. He was to take 'Surveys of Land, [...] to draw and design the Situation of any Place in their due Prospects, Uprights and Perspective'. He was to have a thorough knowledge of both civil and military architecture in order 'to keep perfect Draughts of every the Fortifications, Forts and Fortresses of Our Kingdoms, their Situation, Figure and Profile, and to know the Importance of every one of them, where their Strength or Weakness lyes [sic]'. The Principal and subordinate engineers were to represent to the Board the necessary materials to be used, to instruct the 'Overseer or Clerk of the Cheque' and the master workmen in their respective jobs, to supervise the building and design of fortifications, and to conduct sieging operations:

In time of Action or when there is Intention of forming or laying a Siege against any Place, he is to have a Draught or ground Plot of the Place, if possible, if not to take a careful View of its Situation as near as he can, and thereof to make a Draught and to see where the Attack or Attacks are most advantagiously [sic] to be made, how the Circumvalation and the Contravalation (if need be) is to be laid out and designed, and to direct and see the breaking of the Ground, planting of Batteries, making of Platforms, conducting of Trenches and Mines, and to leave such Engineers and

²⁰³ BL Add. MS King's 70, p. 77. The annual salary for the Principal Engineer was £300, Second Engineer £250, Third Engineer £150, and each ordinary Engineer received £100.

²⁰⁴ Sir Bernard de Gomme (1620–1685) originated from Flanders. After the Restoration in 1660, he became the King's Chief Engineer (1661) responsible for the castles and fortifications in England and Wales. In 1682 he was promoted to Surveyor-General of the Ordnance.

²⁰⁵ BL Add. MS King's 70, p. 52.

²⁰⁶ BL Add. MS King's 70, p. 11.

Conductors as will be necessary to see them carryed on and executed; to be constantly moving from one Attack to another to see that all possible Expedition be made.²⁰⁷

The engineers were to visit existing fortifications and their maps, when sent to the Board, were to be accompanied by written reports which included descriptions of the state and the situation of the military establishments, validations of the geographical knowledge represented in the maps with explanations of how the data was arranged, or detailed descriptions of the materials and their costs for any new works proposed to be done. Talbot Edwards' 1710 'Report of Fort William in North Brittain [sic] Concerning the Place it Stands', for example, raised concerns for the fort's situation, defined its military utility, and described its state of disrepair.

Its situation as appears by the Plan [see Fig 3.2],²⁰⁸ is not the moste advantageous, being at the foot of a Mountaine, which (as Capt oBryen sayes) Discovers within less than Musquett Shott, Every part in the Forte, and therefore he proposes an other Place about a Myle from this. In answer to which Capt Dure has wrott a Large Memorial shewing whey this present Forte was built where it now is.

[A]s to its use, I finde by the aforesaid Report is for keeping a Garrison there to awe the Highlanders, who besides riseing in Armes or triviall Quarrells amonge them selves often make incursion and Roberies on the lowe lands, as makes it necessary to keep some Dissiplined Men at hand there. This Forte for defending it self is indeed but a very ill figure and whats proposed to Help is by those Engineers who have been there is to strengthen the out side with a Counterscarpe Pallizadoes, Mynes Redoubts Places of Armes and Coffers, which in their proper Place are good things to lengthen time in taking a Fortress.

A subsequent report by Theodore Dury estimated the cost of each of these structural works, the total coming to £715.²⁰⁹

²⁰⁷ BL Add. MS King's 70, pp. 52–55.

²⁰⁸ Possibly a reference to Johnson's plan of 1710 or to one of Theodore Dury's plans showing Fort William in situ: either BL Maps K.Top.50.40. 'Fort William in Lochquaber', c.1696 or TNA MPF 1/241 'Fort William and Maryburgh at Inverlochie in Lochquaber', September 1696.

²⁰⁹ TNA WO 55/319, pp. 129–131, 2 February 1709/10 [1710]; TNA WO 55/345, p. 254, 17 March 1711.



Figure 3.2 Part of a ‘Plan of Fort William with the country adjacent’, by Robert Johnson in 1710. The fort is at a scale of 1: 2,400 (200 feet to an inch) and the adjacent country at 1: 63,360 (1 mile to an inch). Although the focus of the plan was clearly Fort William where Johnson was ‘Overseer of Works’, the surrounding topography is crudely executed but locationally relatively correct. Ms 1646 Z.02/24a (Reproduced by permission of the Trustees of the National Library of Scotland).

Although the ‘Rules’ were amended in 1686 by James II (VII of Scotland), the duties of the engineers remained largely unaltered and, thereafter, were approved by every sovereign from William III to George II.²¹⁰ One significant change, however, was the size of the military establishment. Overseas wars, local insurrection, and concerns for the defence of the country gave rise to several episodes of expansion among the Ordnance military personnel, in particular the engineers. In 1699, William III approved a permanent addition to the military establishment of six Ordinary Engineers and four Sub Engineers.²¹¹ After the Union of England and Scotland in 1707, the Scottish Ordnance Office, known as the ‘North Britain Establishment’,²¹² came under the administration and financial moderation of the London Office of Ordnance—Scotland was now considered ‘a Charge properly belonging to

²¹⁰ BL Add. MS King’s 70, pp. 81–177.

²¹¹ BL Add. MS King’s 70, p. 102.

²¹² Scotland was referred to as ‘North Britain’ in all the Board of Ordnance minutes and correspondence in the years after the Union. From 1700, the Ordnance Office had separated the country into ‘Divisions’ to make the supply of stores and the repair of buildings and fortifications easier to administrate. The North Britain Establishment made up part of the Third (North Britain and Hull) and the whole of the Fourth Division.

this Office'.²¹³ Scotland already had its own engineers—John Slezer and Theodore Dury—but the Board chose to ignore their status of 'chief engineers' and did little to encourage their service.²¹⁴ Dury's work, for example, was referred to Second Engineer Talbot Edwards and Brigadier Lewis Petit.²¹⁵ Dury's treatment by the Board was an example of eighteenth-century social order and scientific elitism.²¹⁶ As a 'military' engineer, let alone 'Their Majesties Cheef Ingeneer in Scotland',²¹⁷ he was discriminated against in rank and pay after the Union. By royal warrant dated 3 December 1727, Dury was eventually awarded the rank of 'Engineer' and an annual allowance of £77.15s.²¹⁸ His salary was little more than a Sub Engineer's pay of £73, much less than the Third Engineer's pay of £200, and still less than those of equivalent rank who received £100.²¹⁹

In 1714, Brigadier Michael Richards was promoted to Surveyor-General of the Ordnance which paved the way for further expansion of military personnel and ultimately to the founding of the Corps of Engineers.²²⁰ In the February before his promotion, whilst Chief Engineer of Britain, Richards described the state of the Establishments of Gunners, Artillery and Engineers as 'defective and require[d] to be new modelled':

The Old or present Establishment is of very long Standing when Towns were not so strong as they now are, nor were the artillerys [sic] in any comparison like to what are now in use, either for attack or deffence of Places so that few people were ever employed and those did not only make a great mistry of their proffesion but were encouraged to it by the Princes that employed them insomuch that the Engeneers, Firemasters, and Gunners, were independent of each other, and as their Artillerys were so small, no wonder their sieges were so tedious.²²¹

²¹³ TNA WO 55/345, p. 71, 6 October 1709.

²¹⁴ Slezer, originally from the Low Countries, was commissioned as Chief Engineer of Scotland in 1671. In the revolution of 1688, as commander of the Scottish artillery train, he fought against the supporters of William, Prince of Orange. After the defeat of the Jacobite forces at Killiecrankie on 27 July 1689, he declared an oath of fidelity to William III, procuring a commission as 'captain of the Artillery Company and Surveyor of Magazines' (Cavers 1993; Millar and Glozier 2004).

²¹⁵ TNA WO 55/319, pp. 122–126, 10 January 1709 [1710] and WO 55/345 with a warrant for Talbot Edwards to go to Scotland to review the fortifications, pp. 129–130, 11 May 1710 and various of his subsequent reports. Between 1714 and 1717 Lewis Petit was regularly called upon to offer his advice and assistance in matters of defence. See TNA WO 55/346 and Fleet 2007.

²¹⁶ Edney 1994b.

²¹⁷ BL Maps K.Top.50.40 'Plan of Fort William in Lochquaber', 1696, signed thus by Dury.

²¹⁸ TNA WO 55/349, pp. 74–75, 3 December 1727.

²¹⁹ TNA WO 54/200, pp. 13–14.

²²⁰ TNA WO 47/27, p. 94, 6 December 1714, warrant for Richards' promotion and for the ensuing vacancy of Chief Engineer to be filled by John Armstrong who was to 'sitt & act at ye Board as a Principal Officer of ye Ordnance'.

²²¹ BL Add. MS Stowe 477, 1 February 1714, p. 48.

The timely expansion of the Office of Ordnance in parallel with increased army activities during the Jacobite uprisings of 1715, prompted the Master-General of the Ordnance, the Duke of Marlborough,²²² to reconsider Richards' proposals for rationalising the military establishment. His aim was to adopt a regimental structure akin to those of the continental European armies:

Wherefore the great acquirements of France obliged them to break through their old inactive Establishments and to form a Regimentall one, and so has many other nations as Prussia, Saxony, Venice etc. This also put the Hollanders on reforming, whose necessitys obliged them to hire people at any rate from other countrys, untill the credit of Monsr. Coehorn, had influence to put them on the present foot which has so deservedly got them such reputation no[t] withstanding the loss of great numbers, the which nothing could have supplied but a vigorous and communicative discipline, which soon laid open that which had so misteriously been kept Secrett amongst a few.²²³

On 26 May 1716 a 'Regimental Establishment of 4 Companys [sic] of Gunners with proper Officers, Consisting of 379 persons & 29 Engineers' was implemented by royal warrant.²²⁴ On 22 August 1717, an 'Establishment of 29 Engineers' was confirmed by Order of Council (see Table 3.1).²²⁵

The abandonment of the Old and its substitution with a New Establishment was a slow process. An old post could only be abolished on the death of the incumbent or his employment elsewhere. In 1741, for example, the number of military engineers in the new establishment totalled seventeen with four still in the old establishment waiting to be "sunk".²²⁶ A full complement of twenty-nine engineers was finally achieved in 1745.²²⁷ By this time, Engineers in Ordinary were stationed at various fortifications around Britain, employed in making 'actual Surveys, Planns [sic] etc.', and in advising on building work. Practitioner Engineers were distributed amongst the garrisons to acquire a general military education and to apply their knowledge of engineering on works in-progress. Such had been Richards' recommendation as early as 1714:

²²² The Duke of Marlborough was appointed Master-General of the Ordnance by Patent from George I, dated 4 October 1714

²²³ BL Add. MS Stowe 477, 1 February 1714, p. 48.

²²⁴ TNA WO 49/228, p. 1.

²²⁵ TNA WO 49/228, p. 19.

²²⁶ TNA WO 54/207, pp. 9–10. The establishment of engineers comprised a Chief, Director and Sub-Director, 3 Engineers in Ordinary, 2 Engineers Extraordinary, 5 Sub Engineers and 4 Practitioner Engineers.

²²⁷ TNA WO 54/209, pp. 10–12.

	<i>Per Annum</i>		
	<i>£</i>	<i>s</i>	<i>d</i>
1 Chief Engineer	501	17	6
2 Directors at £365 each	730	00	0
2 Sub Directors at £273.15s each	547	10	0
6 Engineers in Ordinary at £182.10s each	1095	00	0
6 Engineers Extraordinary at £109.10s each	657	00	0
6 Sub Engineers at £73 each	438	00	0
6 Practitioner Engineers at £54.15s each	328	10	0
29	£ 4297	17	0

Table 3.1 The ‘Establishment of 29 Engineers’, Office of Ordnance 1717. In ‘Miscellaneous accounts and financial papers: relative to Ordnance Establishments’, TNA WO 49/228

They [continental European armies] also preserve the same discipline and in the same manner in time of peace, by distributing their companys in their severall Guarrisons, [...] whereby employing them in their Magazines and on their Fortifications, they are of great use to the Service and Improvement to themselves.²²⁸

The whole of Scotland was treated as if one garrison. In 1750, for example, with the exception of the engineers involved in the Military Survey of Scotland, William Skinner and John Hardesty were responsible for engineering works at all the Scottish forts.²²⁹

From 1 January 1756, by warrant of George III, the establishment was increased by eight Practitioner Engineers, twenty-nine being ‘much to[o] small to answer the Several Purposes Our Service doth, and may, from time to time, require’.²³⁰ In 1756, a third engineer—Thomas Walker—was stationed in Scotland but the number of overseers reduced from six to four.²³¹ Between 1756 and 1759, the establishment of engineers increased to forty-nine and, in 1759, to sixty-one to cope with demands in the foreign garrisons (Minorca, Gibraltar, Annapolis, Rattan, Jamaica, India, and West Africa), home fortifications, and new enterprises in America (Newfoundland, Georgia, South Carolina, and Louisburg). A ‘scheme’ was submitted to regulate these dispersed establishments into one ‘Corps of

²²⁸ BL Add. MS Stowe 477, 1 February 1714, pp. 48–49.

²²⁹ TNA WO 47/35, p. 358, 5 May 1750.

²³⁰ TNA WO 55/355, p. 260, 16 December 1755.

²³¹ TNA WO 47/47, p. 601, 1 June 1756.

Engineers’ and to bring their pay in line with officers of equivalent rank in the army.²³² On 25 April 1787, the Corps was distinguished with the name of the Corps of Royal Engineers, of similar status to that of the Royal Regiment of Artillery.²³³

One further change to the Corps of Royal Engineers needs to be mentioned here. In 1802, the office and title of ‘Chief Engineer’ was discontinued. A senior officer in the Corps, however, was still to perform the duties previously entrusted to the Chief Engineer, to be performed under ‘the Style & Title of Inspector General of Fortifications & Works’. Maps in the surviving archive that have descended from the Board of Ordnance are distinguished by a ‘broad arrow’ stamped in red on the face of the map.²³⁴ Accompanying this logo is either the Board of Ordnance’s stamp (B.O) or the Inspector General of Fortifications’ stamp (I.G.F.).

The Civil Establishment: the Draughtsmen of the Tower of London

The Duke of Marlborough’s tenure as Master-General of the Ordnance (1714–1722) was a period of substantial reform for the Ordnance. The resulting measures saw the creation of the Royal Regiment of Artillery by royal warrant dated 26 May 1716, a new establishment of Engineers (22 August 1717), and the emergence of a new Ordnance establishment—the Drawing Room—at the Tower of London.²³⁵

The origin of the Drawing Room is obscure. It may have been in existence as a repository and storage depot for fortification plans since 1683. Crucial in its ensuing evolution was the instruction in the 1683 ‘Rules’ to ‘cause the Draughts or Designs thereof to be left in the Office of Our Ordnance, there to remain for the Use and Information of Our said Master General and Principal Officers of Our Ordnance as Occasion shall require’.²³⁶ In January 1694, the Ordnance engaged its first permanent draughtsman. Lucas Boitout was charged with the sole task of ‘Making, Draughting, and preparing such Plans, or Draughts [...] as shall bee Required and Directed By the Master General [...] or Principal Officers’. Where Boitout worked and where the draughts and designs were stored in the Tower of London at this time is not clear, although in March 1687, a joiner—William Damsell— was paid £34 for two large walnut map cases which were placed in the Withdrawing Room of the Office of Ordnance in Cold Harbour (see Fig 3.3).²³⁷

²³² TNA WO 47/53, pp. 241–242, 23 February 1759; p. 275, 6 March 1759.

²³³ TNA WO 55/1058.

²³⁴ London 1954. The symbol originated in medieval times when one of Richard II’s archers used arrowheads on his seal. It appears to have come into more general use as a symbol of government at least by the fourteenth century and as a mark of government property by the seventeenth century.

²³⁵ Porter 1889, p. 143; TNA WO 49/228, p. 19.

²³⁶ BL Add. MS King’s 70, p. 53.

²³⁷ Parnell 1995, p. 93.

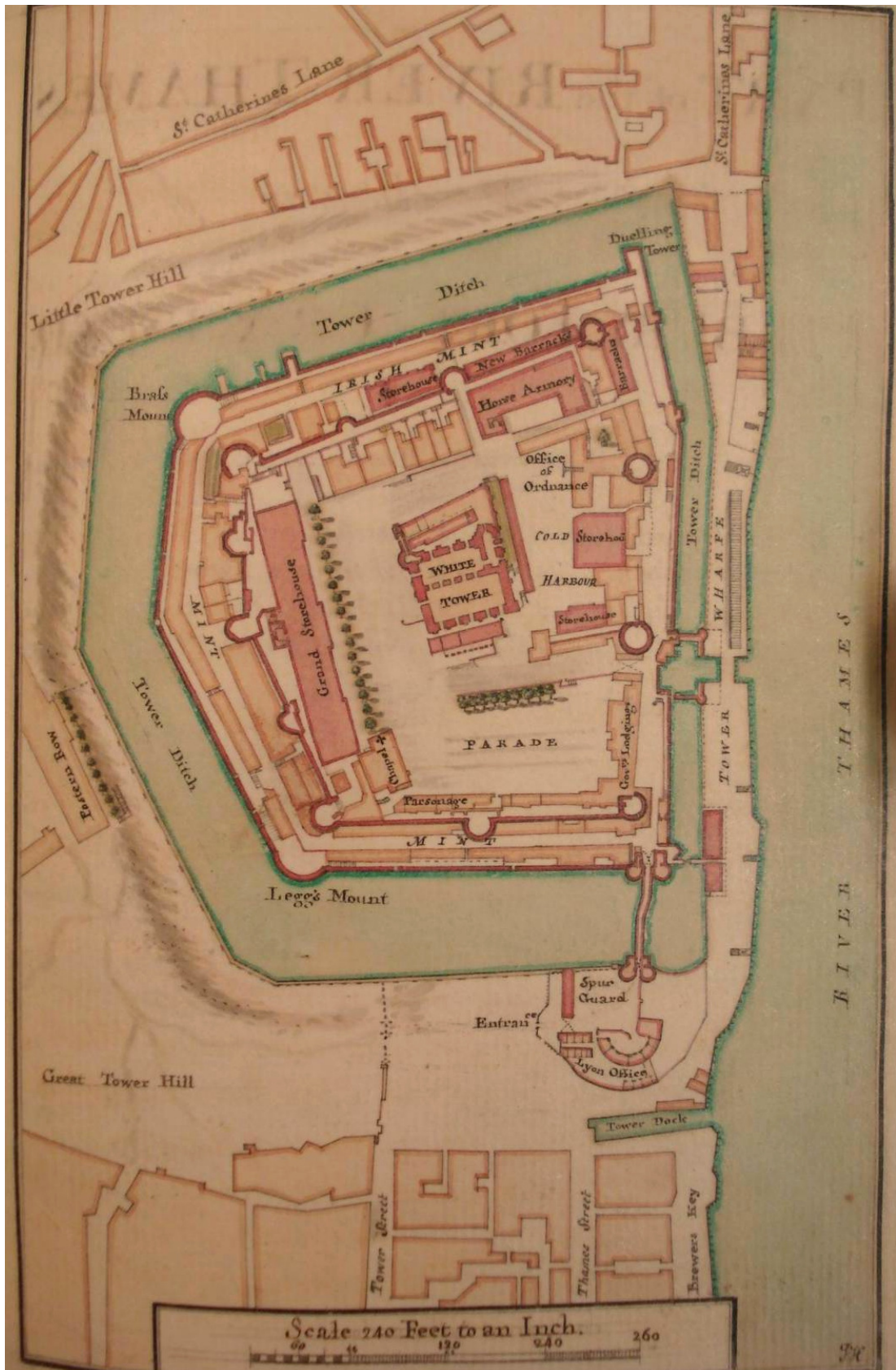


Figure 3.3 'The Tower of London', by Joseph Heath, c.1750, in a bound volume of 'Plans of Fortifications'. Add. MS 22875, folio 69 (Courtesy of the Trustees of the British Library).

Michael Richards was again a primary instigator of reforms within the civil establishment. In November 1711, in his role as Chief Engineer, Richards submitted to the Board a lengthy proposal for ‘making a Collection of all plans, Projects, Profiles, Estimates etc. of all the Fortifications in great Brittain [sic] or any other [of] her Majesty’s Dominions’. Richards’ document contained his ideas for ‘methodising the same’:

- Firstly That there be a Book to paste all plans, profiles, &c into, whether projects or surveys.
- 2^{dly} Another Book wherein shall be entered, ye Explanations of all Planns, & Profiles, whether projected or otherwise with all Estimates, orders and Journals, referring to ye forementioned Draughts &c.
- 3^{dly} That where the planns &c are too large to be placd in a Book, that they be placed in Roles with Labels to em.
- 4^{thly} That there shall be such Books for every particular Capital Fortification & ye dependances thereon or for every District as shall be ascertaind or appointed.
- 5^{ly} In order to put this work on such a foot as it may go on regularly, & be as completely usefull as the nature of it will admitt of, considering this is the first beginning. It is proposd to have two setts of the foregoing Books to each District.
- 6^{ly} That one sett contains all that may be collected from the beginning of Her Majesty’s Reign to this time, with what can be gatherd of sertianty from the persons that have been in ye performance of ye several workes with in their time.
- 7^{ly} And the other sett to contain all that can be recoverd or collected from the Books & Records in the Office ever since the Restoration to ye beginning of Her Majesty’s Reigne.
- 8^{ly} For making ye first [...] mentond sett as perfect as it may be that all Draughts of Planns, Profiles &c in ye Office of any Fort, Fortification, Worke &c, done or proposd to be done be forthwith carefully looked out & laid apart by themselves, & that if any such Draughts remaine with his G. ye D of Marlborough, ye Rt hon^{bl} ye Ld Gen^l Or any other of ye Principal Officers of Her Majesty’s Ordnance that they be descord to lett the same be copyd & ye Originals to be returnd to them again.

- 9^{ly} For recovery of such Draughts as may compose the last sett proposd, containing as that can be recoverd, beside what is in ye Office, from ye Restoration to the beginning of Her Majesty's Reigne, Whether it may not be proper to offer a valuable consideration in ye publick News papers, for all such Draughts as shal be produc'd & appear to be authentick, or whether ye particular Heirs or Executors of such as have bore Office in ye Ordnance should be sent to, either to desire ye favour of Copying such Draughts or buying ye Same.
- 10^{ly} For keeping ye Journal. That wherever any worke from hence forward shal be carried on, ye person having ye care these of, shal keep a Journal to ye Purport following import, shewing ye Nature of ye soil found from place to place. How the foundation is securd. Of what materials every worke is erected upon such foundations [...] the whole to have References both to ye proper Plans & Profiles, that thereby the difference & alterations may be seen between the execution & ye projected Planns & Profiles. That copys of such Journals [...] be transmitted to the Office.

Richards recommended that one person be appointed to record and document all these activities associated with the Ordnance's building programme, that he be attended by a permanent draughtsman and assisted by engineers awaiting active duty at a Divisional outpost.²³⁸ Richards continued by outlining the advantages of adopting such methods: organising plans and profiles in relation to written reports and estimates would make them easily accessible, more comprehensive and, with time and frequent use, the system more rational; by archiving surveys the need to make new ones could be avoided; and engineers could quickly access information on any defects or difficulties that had occurred in previous construction work. Richards was an experienced engineer who had seen active service in Flanders, Newfoundland, and Spain.²³⁹ His proposal concluded that 'in some foreign parts [...] this method is said to be used, Such Registers are kept in every Garrison, & is intended for the better information of the Governour [sic], the use of every worke is explained'.²⁴⁰ In response, on 15 April 1712, the Board appointed Robert Whitehand as 'Draughtsman [...] Constantly to attend the Office'.²⁴¹ It may have been Whitehand's appointment and

²³⁸ BL Add. MS Stowe 477, pp. 6–8.

²³⁹ Vetch and Hebbert 2004.

²⁴⁰ BL Add. MS Stowe 477, p. 9.

²⁴¹ Parnell 1995, p. 94 (TNA WO 50/6, f. 112).

Richards's 'methodising' that truly marked the first stage in the evolution of a Drawing Room.

Andrews Jelfe, a masonry contractor and architect, assisted and subsequently replaced Whitehand. Between 1 July 1716 and 29 March 1719, Jelfe was employed by the Ordnance to make several 'Draughts for the use of the Office'.²⁴² On 16 June 1719, he was appointed Architect to the Civil Establishment by order of the Board, almost a year after his appointment was first placed before the King in Council, on 1 July 1718.²⁴³ In conjunction with his architectural role, Jelfe was made 'Clerk of the Works and Director for building the barracks' in Scotland in place of James Smith. In this capacity, he was supported by the civil and military officers of the Ordnance as well as the Army.²⁴⁴ Clement Lemprière was the next draughtsman to be engaged by the Office of Ordnance. An Ordnance minute of 16 April 1717 indicates that Lemprière was paid £17.4s.0d for the sixteen weeks he was employed in 'drawing planns [sic] etc. at the Tower', between 23 December 1716 and 13 April 1717, 'at a Guinea a week'.²⁴⁵ One of his earliest surviving plans is that of the annexed building along the east wall of the White Tower, the 'Store House' (shown on Fig 3.3). A north-south section of the annex shows the upper floor set out as a Drawing Room with presses and shelves, and a Record Office in the southern third.²⁴⁶ The Drawing Room can therefore be confirmed as an 'active force in military cartography' from at least 1717.²⁴⁷

Lemprière's talent for map making was exemplary. His obituary in *The Gentleman's Magazine* justly described him as 'an ingenious gentleman, draughtsman to the office of Ordnance, and Capt. Of a marching Reg. of foot'.²⁴⁸ He continued as senior draughtsman at the Tower on £100 a year until at least 1743.²⁴⁹ From about 1727 he was assisted by John Peter Desmaretz who succeeded him as senior draughtsman.²⁵⁰ In this early period, draughtsmen working for the civil branch as clerks to the Surveyor-General were able to obtain commissions in the military; Desmaretz, for example, was promoted to Chief Engineer in Ordinary in 1743, on £60 a year.²⁵¹ By Order of the Board dated 23 November

²⁴² Parnell 1995, p. 94; Hewlings 2004.

²⁴³ TNA WO 54/199. An order for payment of a gratuity of £50, dated 20 March 1719, for his 'extra Service in making Draughts & attending the Surveyor General for upwards of a twelve Months past' confirms his take-up of this post in the Civil branch (TNA WO 47/32, p. 109).

²⁴⁴ TNA WO 47/32, p. 87; WO 55/347, p. 124, 6 March 1719 although he was already performing the duties of Overseer in February 1719.

²⁴⁵ TNA WO 47/30, p. 105.

²⁴⁶ TNA WORK 31/124, Clement Lemprière, 1717.

²⁴⁷ Marshall 1980, p. 21.

²⁴⁸ *Gentleman's Magazine* Vol. 16 July 1746, p. 383.

²⁴⁹ TNA WO 54/200, p. 8 to WO 54/208, p. 7.

²⁵⁰ TNA WO 54/200, p. 8; WO 54/209, p. 7.

²⁵¹ TNA WO 54/208, p. 4.

1750, Desmaretz was henceforth ‘stiled [sic] Clerk of the Fortifications’.²⁵² Under Lemprière and Desmaretz, the Drawing Room gained a reputation as a source of skilled military cartographers, establishing a cartographic style through the predominant practice of copying maps and plans.

The Drawing Room was always a centre of carto-reproduction. On 13 April 1721, Richard Barton was employed to begin ‘Copying, Contracting, and Reducing Draughts’ on a salary of 2s a day.²⁵³ Lieutenant John Henri Bastide, part of the Military Establishment, was paid 4s a day for ‘Copping [sic] of Plans etc. in the Drawing Room in the White Tower’ from 22 June 1725 to 8 March 1726.²⁵⁴ Copying was the most important part of a draughtsman’s training, as well as an official requirement of the Ordnance, and was fundamental in establishing a consistent cartographic style founded on Lemprière’s and the early Drawing Room draughtsmen. Drawing Room apprentices were instructed in drawing, drafting, and copying of fortification plans and topographic maps by the senior draughtsman and drawing master and elementary mathematics by the mathematics master. The art of cartographic drawing comprised copying a standard range of plans until a suitable level of proficiency was reached.²⁵⁵

The speed of copying varied with the draughtsman’s experience and the complexity of the map he was using. There are very few records of reproduction speeds with which to make comparisons. James Miller made a copy of William Skinner’s ‘Plan of Fort Augustus’ in 1776 (original survey 1747), and noted that it was ‘begun & finished in 8 Days’.²⁵⁶ A treatise translated by J. Dinsdale describes several ‘Methods to copy all Sorts of Designs’; the second method was certainly used by Ordnance draughtsmen:

The *First* is to apply to the Glass that Design we would copy, and fix on it for this Purpose the white Paper with fine Pins, or Sliding-pincers; then the Light passing through the Glass, shews all the Traits of the Original, which are drawn upon the white Paper with a Black-lead Pencil, by bearing very lightly, to the end that when the Copy is finished we may rub out the Traces of the Pencil [...] This Method is better for Charts; for the Appendage of a Plan [...] and for the Plans and Profiles of Works.

The second Method is, to prick the Original, with a fine Needle, after fixing it up-on the white Paper with proper Pins, or Sliding-pincers.

²⁵² TNA WO 54/210, pp. 4–5.

²⁵³ Parnell 1995, p. 95.

²⁵⁴ TNA WO 47/21A, p. 138.

²⁵⁵ John Muller transferred from the Drawing Room where he was the mathematical instructor to the Royal Military Academy at Woolwich in 1741. Harley 1978, p. 58.

²⁵⁶ NLS MS 1647 Z.02/65b.

You are to understand you must prick the Extremities of the Lines of the Plan; afterwards they apply the black-lead Pencil to the Copy, but very lightly, for the Reason mentioned before; lastly, they draw these Lines with Carmine, or *China* Ink as is most convenient; but to facilitate our perceiving the Points, we must redden one of the Sides of the Paper, on which we design, with fine red Chalk.

This second Method is very exact, and proper for Plans, Profiles, Sections, etc. But it is not proper for Charts [...] Besides, it is pretty difficult to prick all the Points, as well as to examine or put the Plan or Profile to the Pencil: notwithstanding those who have the Practice of pricking, spare themselves sometimes the Trouble of applying the Design to black Lead, by drawing at once all the Lines with Carmine, or China Ink, as is agreeable, without mistaking one Point for another, excepting very rarely; but the most sure way is always to use the Pencil.²⁵⁷

In 1752, the Drawing Room was formally established as a department of the Ordnance and regulated by fixing the number of draughtsmen—a Master Draughtsman, an Assistant, and fourteen subordinate draughtsmen organised into five classes—as well as their pay, conduct, and means of promotion. When a vacancy arose, the most deserving draughtsman was promoted with a corresponding increase in salary, and a new draughtsman was recruited into the lowest, 5th Class.²⁵⁸ Attendance was six days a week, from 9–1 and 3–6 between 1 April and 30 September, and 10–3 for the remainder of the year, with the hours extended when the work load required it.

The Master Draughtsman or his Assistant kept a daily register of the maps, plans, and drawings belonging to the Drawing Room.²⁵⁹ Items sent to the Drawing Room were classified according to geographical area and listed in a large folio volume, the ‘Register of Draughts’.²⁶⁰ The ‘Register’ was not authorised until the enactment of regulations in 1752 although, until then, cartographic material appears to have been systematically recorded.²⁶¹ John Lambertus Romer, for example, when principal engineer in Scotland from 1720 ‘laid a list of the Planns [sic] & Estimates and other papers relating [to North Britain], being 20 in number, which the Board ordered to be entered in the Book for that Division’.²⁶² Thereafter, the register was intermittently maintained until about 1812. In the Master-General’s 1758

²⁵⁷ Dinsdale 1748, pp. 48–50.

²⁵⁸ TNA WO 47/40, pp. 96a–96, 5 August 1752.

²⁵⁹ TNA WO 47/39, pp. 363–365, 23 April 1752.

²⁶⁰ TNA WO 55/2281.

²⁶¹ Marshall 1980, p. 22.

²⁶² TNA WO 47/33, p. 311, 13 December 1720.

orders regulating the Corps of Engineers, it was stipulated that the Chief Engineer was to have ‘free Access to all Plans Surveys and Estimates on Designs lodged in the Drawing Room’. He was further empowered to remove such items as he required in exchange of a receipt, although any copies that he wished made had to be authorised by the Master-General or Board of Ordnance.²⁶³

The demand for skilled map makers greatly increased during wartime. The Seven Years’ War (1756–1763) saw the number of draughtsmen entering the Drawing Room increase to twenty-eight. In the second year of the American Revolutionary War (1775–1783) the number rose to thirty-six. To meet the demand for trained surveyors, George Townshend, Master-General of the Ordnance, created a technical school at the Drawing Room in 1775 believing it more capable of supplying superior training to officers. The school was in direct competition with the Royal Military Academy at Woolwich; a consequence of Townshend’s disillusionment with the Academy ‘to furnish the supply of officers we want’.²⁶⁴ Reuben Burrow (1747–1792) was appointed mathematical master in 1776 having previously been mathematics teacher at the Royal Military Academy.²⁶⁵ His resignation six years later was instigated by the demise of the Tower school when a warrant was issued on the 4 September 1782 ‘for reducing the Establishment of the Drawing-Room’ on the grounds that it seemed ‘ill calculated for instruction, and might be considerably reduced without any inconvenience to our service’. The establishment was reduced to a Chief Draughtsman, an assistant, and five draughtsmen ‘to attend the Drawing-Room [...] and never to be employed elsewhere except upon very extraordinary occasions’. Six draughtsmen were to be attached to foreign stations, a further six to attend engineers on service in Britain, and four to join the cadets for instruction at the Royal Military Academy. Of the eight remaining draughtsmen, two were to attend upon the King, one the Master-General, one the Lieutenant-General, one the Chief Engineer, then one each to Portsmouth, Plymouth and Chatham. The final twelve became Cadets in the Royal Regiment of Artillery.²⁶⁶

In 1787, a new position was created in the Drawing Room—that of Chief Surveying Draughtsman—to introduce field survey methods, only to be suppressed in 1794 when the

²⁶³ TNA WO 47/51, p. 250, 10 March 1758.

²⁶⁴ Harley 1978, p. 58; Marshall 1980, pp. 23–25.

²⁶⁵ Burrow assisted Nevil Maskelyne, Astronomer Royal at Greenwich, in surveying Shiehallion for gravitational measurements, a Royal Society expedition. Afterwards, Maskelyne obscured Burrow’s scientific and intellectual contribution to the expedition; an act which consciously maintained an ideology of social order amongst scientific practitioners (Edney 1994b).

²⁶⁶ Jones 1851, p. 39.

Master-General decided that there should be only one ‘Chief’ in the Drawing Room.²⁶⁷ The introduction of field surveying methods did, however, add a new dimension to the skills of the draughtsmen, to the extent that a draughtsman in the 1st Class was despatched periodically to the Woolwich Academy to teach Gentlemen Cadets surveying and plan drawing.²⁶⁸ On 3 December 1800, the personnel of the Tower of London Drawing Room were given military commissions in the newly established ‘Corps of Royal Military Surveyors and Draughtsmen’.²⁶⁹ Table 3.2 shows the composition of the Corps in 1801. The Tower of London Drawing Room was the headquarters of the Corps, which was under the command of the Chief Engineer. In addition, the draughtsmen wore a uniform resembling the one worn by the Engineers and Royal Military Artificers (see Fig 3.4).

	<i>Per Diem</i>	
	<i>s</i>	<i>d</i>
Chief Surveyor & Draftsman	15	0
First Assistant Surveyor & Draftsman	12	0
Second Assistant Surveyor & Draftsman	10	0
First Class – 8 Surveyors & Draftsmen	7	6
Second Class 16 Surveyors & Draftsmen	5	0
Third Class 8 Surveyors & Draftsmen	4	0
Besides 6 Cadet Surveyors & Draftsmen	2	0

Table 3.2 The new ‘Establishment of the Corps of Royal Military Surveyors & Draftsmen’, 1801. In ‘Ordnance Regulations’: BL Additional Ms. 41994.

²⁶⁷ TNA WO 47/2359, pp. 302–304, 30 May 1787.

²⁶⁸ TNA WO 47/2365, p. 795.

²⁶⁹ BL Additional Ms. 41994, ‘Ordnance Regulations’ (1764–1811), 28 January 1801, p. 64–66.



Figure 3.4. ‘A Tower Draughtsman and a Gentleman Attendant’, by Thomas Strange Seccombe (1840–1899), in an ‘Album of Drawings of the Royal Military Academy, Woolwich’. (The Royal Collection © 2009 Her Majesty Queen Elizabeth II).

Military Education and Enlightenment Ideology

In 1779, Charles Vallancey, Director of Engineers in Ireland, wrote an essay on military surveys that advocated a topographical education for military officers.²⁷⁰ His argument centred on ‘the great advantages attending a knowledge in this branch of the military science’. Maps were the means by which a General became ‘acquainted with the nature of the ground he [was] to march through’ and chose the most suitable sites for encampments and for engagements with the enemy. Map making was ‘military art’ or, more precisely, the ‘art of depicting with a soldier’s eye’ to provide the necessary topographical information. Vallancey reiterated, however, that:

²⁷⁰ Vallancey 1779; see Marshall 1981.

It must not be imagined (says Folard) that this art can be acquired by length of service alone; the capacity of most military men is erroneously judged on this false evidence. Length of service will indeed perfect the soldier, but service without a thorough knowledge of the principles of his business will be of little use to him. War is a science and like all other sciences can only be acquired by the study of its principles and theorems.²⁷¹

Vallancey was a one-time pupil of the Royal Military Academy at Woolwich where he received an education in ‘military science’. In *An universal military dictionary*, the author—Captain George Smith, an Inspector of the Royal Military Academy—observed that ‘[m]ost artists may join practice to theory, and make one perfect by the help of the other. [...] Of learning of every kind, theory is the completion; in the study of the military science, [however,] it is only the introduction’.²⁷² For an engineer to provide topographical information affecting the movement and subsistence of troops and military tactics, he had to be expert in the art of sketching and reconnoitring a country. He had to know geography and history in order to locate military structures; arithmetic, geometry, and perspective to know how to design and build fortifications; and ballistics and hydraulics to ensure their protection and adequate supply of water.²⁷³ The instruction offered by the Academy was aimed at providing an engineer with all these skills. A principal aim behind the training was to develop an engineer’s ability to analyse the landscape geographically and to give structure to his thinking; to survey territories and to produce maps. This was an Enlightenment intellectual ideology based on rational thought in the form of experience, observation, and measurement with the specific aim of ordering and systemising the physical and human worlds.²⁷⁴ Surveying enabled the application of these rational methods and the map provided the medium on which to put to order the geographical complexity of the world.²⁷⁵ A review of the instruction at the Royal Military Academy gives some insight into the place of cartography in ‘military science’.

Royal Military Academy, Woolwich

The value of a military education, one based on formal training rather than experience acquired through length of service, was officially recognised by the British state in 1741 with the establishment of the Royal Military Academy at Woolwich (see Fig 3.5).

²⁷¹ Vallancey 1779 quoted in Marshall 1981, pp. 5–7.

²⁷² Smith 1779, p. i.

²⁷³ Bousquet-Bressolier 2008.

²⁷⁴ Edney 1994a.

²⁷⁵ Withers 2002, p. 47.



Figure 3.5 'Tower Place at Woolwich' [The Warren], by Joseph Heath, c.1750, in a bound volume of 'Plans of Fortifications'. 'This Place is also the head Quarters of the Royal Regiment of Artillery, and where a Royal Academy is established'. Add. MS 22875, folio 88. (Courtesy of the Trustees of the British Library).

It would conduce to the good of Our Service, if an Academy or School was Instituted, Endowed, and Supported for Instructing the raw and unexperienced [sic] People belonging to the Military Branch of this Office, in the several parts of Mathematicks necessary to qualify them for the Service of the Artillery, and the business of Engineers.²⁷⁶

Until then many military map makers gained cartographic experience through years of active service, either as engineers of the state, overseers to works, or as land stewards. Others were foreign émigrés—notably John Slezer, Theodore Dury, Lewis Petit, John Henri Bastide, John Dumaresq, John Lambertus Romer—engineers expert in fortifications revealing ‘that which had so misteriously [sic] been kept Secrett amongst a few’ in the service of the Ordnance and in so doing, playing key roles in the defence of the British realm.²⁷⁷ The main centres of innovation in military cartography in the seventeenth and eighteenth centuries were in mainland Europe not in Britain.²⁷⁸ Continental cartographic practices thus travelled with the engineers from France and the Low Countries to be worked out in the theoretical teachings of the Masters of the Drawing Room and the Academy.

The Academy, under the inspection of the Board of Ordnance, was attended by young gentlemen—sons of the nobility and military officers—twelve years and older although not admitted over the age of sixteen.²⁷⁹ To qualify for admission, a prospective cadet had to understand ‘not only reading and writing, but should be likewise advanced in Arithmetic as far as the Rule of Three’.²⁸⁰ The curriculum, revised and extended as each new Master-General of the Ordnance took office, was principally concerned with a broad military training, and surveying and map making were often taught as integral parts of other subjects. Nevertheless, the Academy did much to entrench drawing and to promote map making as part of military culture. From the outset, a strong emphasis was placed on mathematics.

The purpose of the Academy was to formally introduce European ‘military science’ to ‘young Gentlemen Cadets’ in Great Britain, ‘to qualify them for Officers of Artillery & Engineers’.²⁸¹ To this end, John Muller, a German mathematician and engineer, was transferred from the Drawing Room in the Tower of London where he was a mathematical

²⁷⁶ TNA WO 55/351, pp. 65–66, 30 April 1741, royal warrant addressed to John, Duke of Montagu, Master-General of the Ordnance.

²⁷⁷ BL Add. MS Stowe 477, 1 February 1714, p. 48.

²⁷⁸ Harley 1978; Godlewska 1999.

²⁷⁹ TNA WO 55/351, p. 103, 18 November 1741. The Master-General was responsible for appointing a Master of the Academy and assistants, and supplying instruments, books and ‘other necessaries as may be proper for the use thereof’. Sandby 1777, p. 20.

²⁸⁰ Jones 1851, p. 22. The ‘Rule of Three’ is a cross-multiplication used to determine an unknown variable if three other values are given.

²⁸¹ BL Add. MS 22875, f. 88.

instructor, to the Academy.²⁸² Although Muller was appointed Deputy Head,²⁸³ he was in effect, the Chief Master, performing all Martin Folkes's teaching and administrative duties until he officially became Chief Master upon Folkes's death in 1754.²⁸⁴ In 1764, 'Chief Master' was re-designated 'Professor of Fortification and Artillery'.²⁸⁵

Muller was not the only foreign teacher to be employed at the Academy. On 6 December 1744, Gamaliel Massiot was appointed Drawing-Master, and in November 1777, Isaac Landmann, an experienced French staff officer, private tutor to French nobility, and formerly of the Ecole Royale Militaire in Paris where he taught projectiles and fortifications, was appointed Professor of Fortification and Artillery.²⁸⁶ Following the end of the Seven Years' War in 1763, British-French relations improved to the extent that in 1766, the Lieutenant-Governor of the Academy, James Pattison went to visit the School of Artillery at La Terre and the Ecole Royale Militaire at Paris 'in Order to be informed concerning its Government, Regulations and Police'. Pattison reported to the Board how he had made himself 'master of the whole establishment, civil and military' and in executing his commission, had procured and collated a 'Collection of all the Rules & Orders in force relative to the Education, Discipline, and Aconomy [sic] of that Academy' which were to be used, if deemed necessary, 'for the improvement of the Military Academy of this kingdom'.²⁸⁷

Changes in the syllabus and structure of the Academy would suggest that some of these continental European practices were adopted. In the original 1741 'Rules and Orders' for the Academy's educational practice, the Chief Master, in addition to lectures in theory, instructed in pure and applied mathematics—trigonometry, conic sections, practical geometry and mechanics—'applied to raising and transporting great burthens'; mensuration and levelling, and its application to 'the bringing of water or the draining of morasses'; and lastly, 'Fortification in all its parts, with the manner of attacking and defending places, the use, conduct, and direction of Mines, with the doctrine of Projectiles so as to apply them to

²⁸² TNA WO 54/207, p. 14.

²⁸³ Salaries for the Establishment of the Royal Academy at Woolwich are given for 1760 in TNA WO 54/214, p. 93, where John Muller is listed as the Chief Master, then Professor of Fortification and Artillery in 1764. 'Records of the Royal Military Academy' 1764, p. 4 and 1776, p. 4 approved and fixed the Academy Establishment for these respective dates, the position of Chief Master—re-named Lieutenant Governor—and Professor of Fortifications and Artillery being retained on annual salaries of £200.

²⁸⁴ Chichester 2004.

²⁸⁵ Jones 1851, p. 13.

²⁸⁶ Jones 1851, p. 31. Jones lists Gamaliel Massiot as Gabriel Massiot (p. 1); TNA WO 54/210 (p. 55), WO 54/211 (p. 51), and WO 54/213 (p. 31) refer to Gamaliel Massiot as the Drawing Master, on an annual salary of £54.15s.0d.

²⁸⁷ TNA WO 47/67, p. 118, 4 March 1766; WO 47/67, p. 439, 13 June 1766, Lt. Col. Pattison was paid a gratuity of £80 to cover his expenses; Jones 1851, p. 18, Letter Book of 11 February 1766.

Gunnery’. The second Master taught arithmetic, the principles of algebra, and geometry. This theoretical instruction was put to practical use during the summer months. A mock fortification or polygon, built near the Academy at Woolwich, was ‘attacked every other Summer [...] with all the form and regularity that is used in a real siege; [...] the whole attack to be traced by the Engineers’. During the summer when there was no attack, the fortification was to be repaired by the engineer and artillery cadets. They were employed in ‘first tracing out, erecting, and preparing the front of the Polygon, in order to their becoming expert and perfect in all matters relating to the practice both of Defensive and Offensive Fortification’.²⁸⁸ Surveying and map drawing were not specified as part of the educational requirements of the gentlemen cadets in these formative years although, by ‘first tracing out’ the mock fortification, the military engineers were learning the art of geometric surveying, an integral part of fortification cartography.

In a subsequent series of ‘Rules and Orders’ by John Manners, Marquis of Granby, who acceded to the post of Master-General of the Ordnance by patent on 30 April 1763,²⁸⁹ the curriculum was itemised in detail, specifying both subjects and books to be used to teach ‘the Principles of the Art of War, and the Sciences on which they are founded’.²⁹⁰ The curriculum’s similarity to the principles established in 1697 by Vauban for future engineers is a further testament to the continental European influences in the instruction of British engineers.²⁹¹ Vauban expected engineers to be proficient and examined ‘not only about Geometry and measuring but also on all the other essential aspects of Mathematics such as Trigonometry, Mechanics, Arithmetic, Geography, Civil Architecture and even drawing’.²⁹²

Manners’s specifications specifically itemised training in cartographic practices—in surveying and drawing. The cadets were instructed in French, the international language of

²⁸⁸ Jones 1851, pp. 2–4.

²⁸⁹ TNA WO 54/214, p. 1.

²⁹⁰ ‘Records of the Royal Military Academy’ 1764, pp. 5–8; see also ‘Records’ 1776, p. 17. For each of these principal subjects, standard texts were used to teach the cadets: David Gregory’s *Treatise of Practical Geometry* (first edition, 1745); Vauban’s *New Method of Fortification* (fifth edition, 1748); John Muller and Fortifications—see main body of text; Nicholas Saunderson’s *Select Parts of Professor Saunderson’s Elements of Algebra* (1756); Thomas Simpson’s *Elements of Geometry* (second edition, 1760); William Hawney’s *Complete Measurer* (eleventh edition, 1763); John Joshua Kirby’s *Dr. Brook Taylor’s Method of Perspective Made Easy* (1765); John Lodge Cowley’s *Theory of Perspective Demonstrated* (‘invented, and now published for the use of the Royal Academy at Woolwich’, 1766); Thomas Salmon’s *New Geographical and Historical Grammar* (twelfth edition, 1766); and Joseph Harris’s *Description and Use of the Globes* (ninth edition, 1763).

²⁹¹ Sébastien le Prestre (1633–1707), Marquis de Vauban, was the foremost military engineer of the seventeenth century and Louis XIV of France’s general adviser on fortifications.

²⁹² Vauban’s text has been used in several works: ‘non seulement en ce qui regarde la Géométrie et le toisé mais aussi sur toutes les autres parties des Mathématiques les plus nécessaires; telles que sont la Trigonométrie, les Mécaniques, l’Arithmétique, la Géographie, l’Architecture civile et meme le dessein’. This quote comes from Goulon 1754, pp. 200–201 as quoted in Bousquet-Bressolier 2008, p. 16.

military science ‘both as to speaking it fluently and writing it with accuracy’ and four groups of interrelated subjects: fortification and artillery; mathematics and geography; drawing; classics, writing, and common arithmetic. The Professor of Fortification and Artillery taught ‘Practical Geometry and Mathematicks’ and the ‘Arts of Surveying and Levelling’, in addition to the ‘Science of Fortification in all its Parts’ which included the rudiments of Military Architecture and ‘particularly the Method of making Plans, Elevations and Sections of Powder Magazines, Guard Rooms, Barracks, Storehouses, and other Buildings that may be necessary in fortified Towns’. The Professor of Mathematics taught pure and applied mathematics, specifically trigonometry and geometry, and the theory of perspective.²⁹³ These subjects were fundamental to the understanding of fortification and all its parts—in plan and profile or vertical section—and to land surveying and topographical mapping. He also instructed in ‘Geography, and the Use of the Globes’, for which John Lodge Cowley, Professor of Mathematics, found himself in ‘great want of a good Geographical Atlas, as likewise a pair of Globes of about 1 [foot] or 16 Inches Diameter’.²⁹⁴

Muller’s treatises on fortification did much to introduce continental European practices in theory to the Academy cadets, in both military architecture and cartography. His publications included: *A Treatise Containing the Elementary Part of Fortification* (‘for the Use of the Royal Academy of Artillery at Woolwich’, second edition, 1756), *The Attac [sic] and Defence of Fortified Places* (for ‘all concerned in the Art of War, by Land or Sea’, 1747), *A Treatise of Artillery* (1757), and a translation of M. le Chevalier de Clairac’s *The Field Engineer* (1759). As a man of the Enlightenment, Muller (and other engineers) made use of publishing to promote himself within his area of specialty as well as offering a valuable learning resource. He was lauded by a contemporary as ‘the scholastic father of all the great engineers which this country employed for forty years’.²⁹⁵ His texts included translations and remarks on ‘the Construction of the most celebrated Authors, particularly of Marshal de Vauban and Baron Coehorn’, and outlined in detail the various parts of fortification structures.²⁹⁶ In his section on ‘regular Fortification’, Muller distinguished the two parts of the ‘art of fortification’. The first—theoretical—was concerned with ‘tracing the plans and profiles of a fortification on paper, with scales and compasses’; the second part considered the practical process of ‘forming a project of a fortification, according to the

²⁹³ ‘Records of the Royal Military Academy’ 1764, pp. 6–8.

²⁹⁴ TNA WO 47/68, p. 245, 12 December 1766.

²⁹⁵ Chichester 2004.

²⁹⁶ Menno van Coehoorn (1641–1704), was a Dutch soldier and military engineer responsible for the reconstruction of several fortresses in the Low Countries. He was a contemporary of Vauban and often described as the ‘Dutch Vauban’.

nature of the ground, [...] to trace it on the ground, [...] together with all the military buildings, such as magazines, storehouses, bridges, etc.²⁹⁷

The Drawing Master was required to teach the artistic depiction of space—the topographic ‘in-filling’ of the mathematical framework taught by the Professors of Fortifications and Mathematics. His duty, in part, was to teach the cadets the skill of taking views through which they would be able ‘to break ground, and forms the eye to the knowledge of it’.²⁹⁸ On 22 August 1768, the same year that he became a Royal Academician, Paul Sandby was appointed Chief Drawing Master at the Academy in place of Gamaliel Massiot who was made his junior.²⁹⁹ Sandby had been one of the principal draughtsmen on the ‘Military Survey of Scotland’ (1747–1755), a role that fully qualified him for teaching cadets to sketch the military landscape and understand topography for military action.³⁰⁰ Cadets took classes on Tuesday, Thursday, and Saturday mornings in ‘Landscapes and Perspectives’.³⁰¹ During these classes, Sandby taught the methods of ‘Sketching Ground, the Taking of Views, the Drawing of Civil Architecture, and the Practice of Perspective’, highlighting the importance of the process of drawing as much as the usefulness of the final image.³⁰² Such lessons taught the cadets that when drawing from nature to observe the ‘effect of Light and Shade’ and, by copying existing drawings, become conversant with ‘Aerial Perspective’.³⁰³

By teaching the ‘best Method of describing the various Kinds of Ground, with its Inequalities, as necessary for the drawing of Plans; [and] the taking of Views from Nature’, Sandby was inculcating the *coup d’œil militaire*—a French term adopted by military personnel to describe ‘the art of depicting with a soldier’s eye’ the nature of the ground for military operations: marches, encampments, and battles.³⁰⁴ It was, when combined with their skills in surveying, the process in which observation and measurement came together—the art and science of topographic mapping.

In 1772, the structure of the Academy was regulated into an Upper and a Lower or Under Academy, each comprising four classes, the 4th Class being the most advanced.³⁰⁵ The second Drawing Master taught the Under Academy the ‘first Rudiments of Drawing, in

²⁹⁷ Muller 1756, esp. p. 19.

²⁹⁸ Jones 1851, p. 46, details of the ‘course of studies’ for cadets, 11 February 1792.

²⁹⁹ TNA WO 47/73, p. 37, 27 January 1769.

³⁰⁰ NRAS RH1/2/523(1b), p. 2; TNA WO 26/21, p. 364, 1749.

³⁰¹ ‘Records of the Royal Military Academy’ 1764, p. 6; Jones 1851, p. 17.

³⁰² ‘Records of the Royal Military Academy’ 1764, p. 8.

³⁰³ Jones 1851, p. 46.

³⁰⁴ ‘Records of the Royal Military Academy’ 1776, p. 19; Vallancey 1779, quoted in Marshall 1981, p. 7.

³⁰⁵ Jones 1851, pp. 22–23.

black Lead and Indian Ink; copying Landscapes; military Embellishments, and the Elements of Perspective'.³⁰⁶ Sandby instructed the Upper Academy. He taught landscape drawing in Indian Ink and colour, introducing into his designs 'every kind of Military Buildings, such as old Castles, Square and Round Towers' and taught the art of representing these and modern fortifications in perspective.³⁰⁷ It was in such lessons that the theory and practice of surveying and drawing came together. In taking views around Woolwich and elsewhere, Sandby taught the cadets the experiential act of drawing—'to break ground'—thus forming 'the eye to the knowledge of it'.³⁰⁸

The Academy Masters recognised that drawing was 'an accomplishment which depends in great measure upon genius' and it was not expected that every cadet would become 'an expert draftsman'.³⁰⁹ Vallancey in his *Essay on Military-Surveys* was quick to point out that 'few surveyors are masters of the art of drawing'.³¹⁰ Progression from the Under to the Upper Academy was, however, dependent on prowess, itself as much determined by attentiveness to classes as to ability. Sandby reported that several of the cadets were 'not sufficiently instructed, or attentive enough to profit by his lessons'; since they were liable to hold back the more diligent students, they were to remain in the Under Academy on the mornings that he taught.³¹¹ Drawing was not the only subject to experience academic challenges. 'Historical Geography, with the use of the Globes', was to be taught to cadets who were 'not very conversant in Geometry'.³¹²

The study of Historical Geography, or the 'Science of Geography', was a means to teach the cadets how to read maps: 'What would be the science of war, unassisted by plans? [...] the graphic descriptions of the Historian, would be almost useless in the study of the art of war, if the narrations of the latter were not illustrated by plans'.³¹³ It brought together a study of the theatres of warfare and the nature of the ground. In the introduction to his *Military Antiquities*, William Roy suggested that 'The nature of a country will always, in a great degree, determine the general principles upon which every war there must be conducted. [...] Hence it will appear evident, that what, with regard to situation, was an advantageous post when the Romans were carrying on their military operations in Britain,

³⁰⁶ 'Records of the Royal Military Academy' 1776, p. 19.

³⁰⁷ Jones 1851, pp. 22, 28.

³⁰⁸ *Ibid.*, p. 46.

³⁰⁹ *Ibid.*, p. 63, an extract from Orders dated 3 October 1797.

³¹⁰ Vallancey 1779, quoted in Marshall 1981, p. 3.

³¹¹ Jones 1851, p. 38, letter from the Lieutenant-Governor to the Academy Inspector, 11 November 1781.

³¹² Jones 1851, p. 38, 18 August 1781.

³¹³ Jackson 1838, p. xi.

must, in all essential respects, continue to be a good one now'.³¹⁴ In 1699, the Chevalier de Villemain wrote in *The Perfect Warrior* that 'young gentlemen destined for war', in addition to studying geometry, fortification, and geography, should 'above all' study history: 'The latter will furnish a thousand pieces of information and will provide them with the means of training their mind about the deeds of Great Men and instruct them on everything concerning the military profession'.³¹⁵ John Pleydell's³¹⁶ translation of a Prussian officer's *Essay on Field Fortification* became a key text at the Academy, and was concerned with the study of maps and plans in order to understand 'such draughts perfectly', and to assess their usefulness in planning an army's route of march 'with all its different movements, positions, and encampments'.³¹⁷ Geography was instructed using William Faden's *General Atlas* and Aaron Arrowsmith's large *Map of the World* on a Mercator projection.³¹⁸

One issue from the very conception of the Academy was discipline and attendance. The regulations or official descriptions of how the Academy was supposed to operate and the reality did not always coincide. In 1750, Muller compiled a list of the 'Qualifications, Industry and Capacity of the Gentlemen Cadets' for the Board of Ordnance. In his opening remarks, Muller acknowledged that 'the Institution of the Royal Academy of Artillery for the Education of Military Gentlemen is of great importance to the Nation in regard to its Military Achievements' but that the 'great abuses committed and the neglect of attendance by the Gentlemen Cadets to the Respective Masters' was threatening the Academy's success. Muller reported some of his pupils as 'Idle and Spoiled', 'Indolent', 'the most Idle of all and good for nothing at all', 'lunatic', and 'mad'. There were, however, some he described as 'a good genius [sic]', 'a tolerable genius for Mathematicks [sic]', 'a good notion in drawing', and 'a great Genius [sic] for Mathematicks [sic] and Algebra and but middling in drawing'.³¹⁹

In order to review progress, the cadets took a general examination. The first was sat on 5 June 1765. Thirty-five cadets, aged between 14 and 19 years with attendances between 4 months and 5 years, were examined on the whole syllabus (see Table 3.3).³²⁰ An examination gave the Board of Ordnance some indication of the Academy's overall effectiveness in training cadets in aspects of military science. For this study, the syllabus

³¹⁴ Roy 1793, p. i.

³¹⁵ Bousquet-Bressolier 2008, p. 19.

³¹⁶ John Pleydell was employed as a draughtsman on the 'Military Survey of Scotland' (1747–1755) with Paul Sandby (and Charles Tarrant) before obtaining a commission in a Regiment of Foot.

³¹⁷ Pleydell 1768, pp. ix–x.

³¹⁸ TNA WO 47/2366, 13 December 1795.

³¹⁹ TNA WO 47/35, pp.502–506, 19 June 1750.

³²⁰ Jones 1851, p. 17, Books of the Academy 5 June 1765.

provides a neat summary of subjects considered appropriate for inclusion in the military sciences and finally the place of cartography within the whole.

	<i>Under the Professor of Fortification and Artillery</i>	<i>C A D E T S</i>	<i>Under the Professor of Mathematics and Geography</i>	<i>C A D E T S</i>	<i>Under the Drawing-Master</i>	<i>C A D E T S</i>	<i>Under the Master of Classics, Writing, and Common Arithmetic</i>	<i>C A D E T S</i>
1 st Class	Drawing lines and constructing Artillery	9	Single Equations, Algebra	6	Landscapes, in black lead	18	Multiplication, Division, and Reduction	5
2 nd Class	Beginning to shade and break ground	9	Quadratic Equations	4	Landscapes	6	The Golden Rule and Practice	6
3 rd Class	Shading, breaking ground, and beginning the attack of places	9	Geometry	3	Landscapes and Perspectives	7	Square and Cube Root	4
4 th Class	Attack and defence of places, and constructing Artillery	8	Trigonometry, Mensuration, and Conic Sections	2	Landscapes and Perspectives	4	Fractions	5

Table 3.3 The earliest recorded public examination of Gentlemen Cadets of the Royal Military Academy took place on 5th June 1765, in the presence of the Marquis of Granby, the Master-General, and the Lieutenant-General and Principal Officers of the Board of Ordnance.

Conclusion

If, following Harley, ‘even ‘scientific’ maps are a product not only of “the rules of the order of geometry and reason” but also of the “norms and values of the order of social [...] tradition”’,³²¹ then it becomes important to look at the state institution—the Board of Ordnance—that structured military cartography in eighteenth-century Britain and to identify the operational activities employed in its rationalisation of cartography as a state enterprise. This chapter has provided a summary of the evolution of the civil and military establishments of the Board of Ordnance. Although separate establishments, their cartographic tasks were inter-linked in answering the state’s imperative to know the spaces

³²¹ Harley 1989, p. 2.

of the nation, in planning and in constructing the military landscape. This review has highlighted the growing recognition of cartography and its importance in national governance in the eighteenth century: in the rationalisation of institutional structure; in the acquisition of specialists—engineers and draughtsmen; in the importance placed on education and the teaching of the military sciences; in the instruction in methods of survey and compilation; and, finally, in the practical use of maps for military action.

In providing an overview of the instruction and education of the Academy cadets and the training of the Tower draughtsmen, three overarching factors in the development of British military cartography in the eighteenth century have been defined. The first relates to the transference of continental European cartographic practices to Britain. This occurred in three ways: through the employment of émigré engineers (a usual practice in the seventeenth century), through instruction, and through engineers travelling to the continent to improve their knowledge of the art of fortification.³²² Foreign Masters were employed in the Drawing Room and the Military Academy, and translations of theoretical treatises advocating the ‘military science’ of engineers such as Vauban and Coehoorn were compulsory texts for the students. The second was the development of a style of military mapping and can best be seen in the use of colour, scales, and in the adoption of certain types of representations (plans, profiles, views and perspectives). The dissemination of this ‘cartographic codification’ through textbooks used in the Academy as well as on working copies of maps and plans did much to establish rules of practice for engineers and draughtsmen alike. This is explored in more detail in chapter five.

The third and last factor relates to the standardisation of the maps and the reports that were expected to accompany them. Engineers employed in mapping the military landscape had to draw on knowledge and experience from a variety of disciplines, not least mathematics, architecture, landscape painting, quantitative surveying, and structural engineering. It was important, then, for their maps and accompanying reports to have a clarity of expression, to meet certain standards, and to adopt consistent specifications: to become a common cartographic literature, one that was ‘familiar’ to both producers and receivers, and could be easily read and interpreted by a distant government for developing strategic military and political policies.

This last factor, in particular, may be considered the stimulus for surveying and drawing instruction at the Royal Military Academy and the emphasis placed on copying as a method of learning in the Drawing Room of the Tower of London. Cadets, entering the

³²² TNA WO 47/42, p. 68, Captain William Eyres (Engineer Extraordinary) request to travel, 3 August 1753, and the Board’s request to be frequently informed of his whereabouts ‘to send their Commands to him at any time if they should have occasion’.

Board of Ordnance through the Royal Military Academy and the Drawing Room, were taught from a young age the military sciences. As table 3.3—the examination timetable for Gentlemen Cadets of the Royal Military Academy— shows, methods for reading and for measuring the landscape through observation and surveying took precedence from the start of a cadet’s education. Such instructions were necessary for representing and for acting upon the landscape.

Cartographic proficiency was thus based on qualities of mathematical accuracy and observation of the ground. It is with these ideas and practices in mind that we now turn to the military mapping of eighteenth-century Scotland, the engineers’ representation of the military landscape, and the use of the maps for military and political purposes. Chapter 4 examines the surviving Board of Ordnance archive of military maps and plans of eighteenth-century Scotland.

CHAPTER 4

The Chronology and Geography of the Military Maps of Scotland, 1689–1815

Introduction

Having considered the relationship between the Board of Ordnance and military mapping in its broadest sense, this chapter examines the military cartography of eighteenth-century Scotland. Of particular concern here are the characteristics of the archive rather than map content *per se*. Here, I use the term ‘the archive’ to mean the 940 Board of Ordnance manuscript maps and plans compiled between 1689 and 1815 that survive today and that have been conceptually re-assembled and interrogated across different holdings to reconstruct the military landscape of eighteenth-century Scotland. They form the focus of this study. In this chapter, my aim is to describe this archive through three different but related perspectives.

In the first I explore the purpose of military maps of Scotland. This study will show that by commissioning maps of Scotland, the Board’s purpose in doing so was not a neutral or unproblematic process of geographical knowledge acquisition but rather an act of political territorialism. To begin with, the Board was not interested in a complete representation of Scotland—‘the perfect, totalizing knowledge archive’³²³—rather, its focus was to (re)construct and to represent discrete military landscapes, namely fortifications, route ways, and battlefields (see Fig 4.1). The archive includes representations of military activities that consistently had recourse to mapping—fortifying, reconnaissance, intelligence, marching, encamping, and battle. These representations reflected the Government’s military imperatives at a time when Jacobitism and overseas states challenged British hegemony. The archive is therefore a legacy of the activities of the Board of Ordnance in planning, constructing, and in recording the Scottish landscapes of military action. The surviving archive is, however, incomplete. Maps recorded in the Drawing Room’s ‘Register of Draughts’ are missing; either permanently lost, hidden in private collections, or unintentionally missed in my search of map repositories.³²⁴ In addition, the ‘Register’ does not account for all the maps made by military engineers, as evidenced by the surviving archive, and so the question of ‘losses’ will be addressed in the final part of this section.

³²³ Edney 1997, p. 25.

³²⁴ TNA WO 55/2281.



Figure 4.1. The distribution of military landscapes in Scotland, 1689–1815

The second perspective examines the maps' construction. I begin by reviewing methods of survey which includes some consideration of the technologies available to the engineers in Scotland. While, in France, a collaboration of state and science resulted in a mathematically rigorous framework—a geodetic matrix—of the country and the production of its first national map by 1744 (the second, more detailed and more accurate, by 1788),

engineers in Scotland ‘carried on with instruments of the common, or even inferior kind’ to produce unconnected maps of Scotland’s military landscapes.³²⁵ This is not to imply that the mapping of Scotland ignored the Enlightenment’s emphasis on the ‘instrumentality of knowledge’: on mathematical accuracy, original survey, and increased attention to precise and accurate scientific instruments.³²⁶ The situation was quite the converse. Engineers in Scotland made requisitions for instruments and claims of mathematical accuracy in their cartographic representations. In addition, they followed the maxim that ‘in Military Maps nothing should ever be represented at Guess or Random, & that the space of one quarter of a mile truly [sic] laid down, is far more usefull than an Imperfect and loose Representation of an entire Country’.³²⁷

This raises the question of which contemporary users found these maps of particular events ‘useful’? The final section addresses this issue by looking at the circulation of the military maps of Scotland; principally, the dissemination of cartographic records from field survey to various duplications and, occasionally, publication.

Conflict and Cartography: Classifying the Military Maps of Scotland

On 8 April 1689, four days after the accession of William of Orange and Mary Stuart to the throne of Great Britain, John Graham of Claverhouse, Viscount of Dundee, rode out of Edinburgh to begin the first Jacobite Rising and a period of political polarization in Britain that lasted for the next sixty years. Despite an unexpected victory for Dundee’s forces against the Williamite army at Killiecrankie on 27 July, the rebel army’s progress was checked at the ‘battle’ of Dunkeld shortly afterwards. Nevertheless, it was due to the initial defeat of the English army that Jacobitism took hold among the clans and thereafter, a bitter war of raid and counter-raid ensued in and around the Highlands.³²⁸

Counter-insurgency measures were invoked by successive Stuart and Hanoverian monarchs and their governments but with mixed success. Initial measures included building up government forces in the old fortresses of Scotland, principally at Edinburgh, Stirling, and Dumbarton Castles, and at hastily-built Fort William. Concerns to know the condition of

³²⁵ Roy 1785, p. 386. Between 1680 and 1744 in France, the first ‘Cassini survey’ was drawn over a mathematical frame supplied by the geodesists and astronomers of the Académie Royale des Sciences (Konvitz 1987).

³²⁶ Horkheimer and Adorno 1972, quoted in Godlewska 1995, p. 6.

³²⁷ TNA WO 30/115, pp. 199–203, David Watson’s ‘Orders and Instructions to be Observed [...] in Reconnaitting, Examining, Describing, Representing and Reporting, any Country, District, or particular Spot of Ground’ [n.d., pre-1761].

³²⁸ On the causes of Jacobitism see, for example, Petrie 1958; Kidd 1993; Szechi 1994; Lenman 1995; Macinnes 1999.

Scotland's fortifications prompted the Board of Ordnance to assign engineers 'to make Draughts and Estimates of what Works would be needfull [sic] to be done effectually to secure' North Britain.³²⁹ But the Jacobite's unconventional—guerrilla—warfare provoked a military expansion into the Highlands that saw not only the design and construction of more fortifications but methods to improve the mobility of the British army. With these came a change in the mapping technologies as engineers were commissioned to reconnoitre the Highlands, choose sites for new military establishments, and ensure effective communication between them and with the principal lowland garrisons. This section reviews the changing focus of the military engineers in mapping Scotland, providing an analysis of the chronology and the geography of the military maps of Scotland and the imperatives behind their making.

Timeline

Figure 4.2 provides a chronology of events relating to the military mapping of Scotland between 1689 and 1815. The chart shows key military mapping projects and principal engineers in Scotland in relation to the monarchy, the Board of Ordnance, and wars involving Britain which often distracted attention from Scotland. A few 'cause and effects' can be read from this chart; the first has already been mentioned, the Glorious Revolution of 1688, the Battle of Killiecrankie in 1689, and the subsequent mapping of Scotland's medieval castles. Following the 1715 rebellion and the Battle of Sheriffmuir, engineering attention turned to the construction of detached, enclosed, self-defensible barrack complexes in the Highlands. Their design was of particular concern to the engineers overseeing their construction and to Andrews Jelfe, Director of barrack building in Scotland.³³⁰ The location of two of the barrack forts (Kiliwhimen and Inversnaid), although chosen with some reference to reconnaissance and intelligence activity on the part of Brigadier Lewis Petit (engineer to the Board of Ordnance) and General Carpenter (Commander-in-Chief of the British forces in Scotland), was later challenged by George Wade who completed a thorough reconnaissance of the Highlands in 1724 by order of George I.

Wade's arrival in Scotland in 1724 saw a change in cartographic concerns to coincide with changes in the Hanoverian army's handling of Jacobite insurrection. Wade gathered intelligence on the Highland Clans, those for and against government, and described in detail 'the greatest and most unciviliz'd parts' of Scotland through which he

³²⁹ TNA WO 55/344, p. 263.

³³⁰ The four engineers appointed as overseers of the new 'barrack forts' were Robert Douglas, Thomas Gordon, John Dumaresq, and John Henri Bastide (TNA WO 47/31, p. 125).

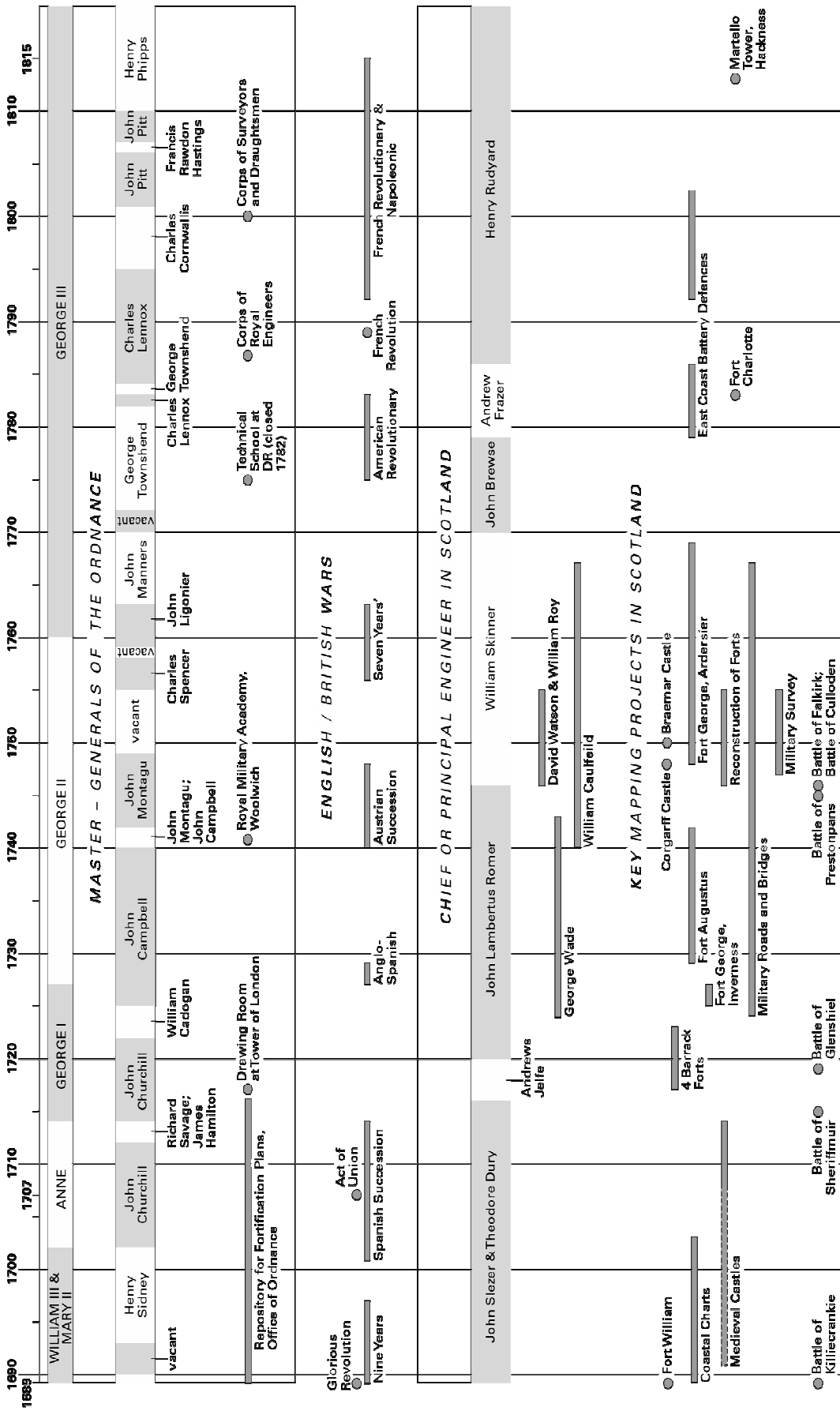


Figure 4.2 Chronology of events



Figure 4.3 'A Description of the Highlands of Scotland. The Situation of the several Clans and the Number of Men able to bear Arms, as also ye Forts [Fort William, Fort Augustus, and Fort George] lately Erected and Roads of Communication or Military Ways carried on by his Majesty's command, with the Seats of the most considerable Nobility in the Low Country', by Clement Lemprière, 1731. Maps K.Top.48.12. (Courtesy of the Trustees of the British Library).

travelled.³³¹ In 1731, Clement Lemprière ‘put to order’ Wade’s geographical knowledge of Scotland; his map—‘A Description of the Highlands of Scotland’—formed an image of the data collected and reported to the king (see Fig 4.3).³³² This map’s utility lay in its political-military representation of fortifications—in locating the principal government garrisons, highlighted in red by Lemprière, in relation to the disposition, loyalties, and strengths of the various clans—and in its depiction of military roads built between them since 1725 under Wade’s supervision (see Fig 4.4). Wade proposed a scheme for ‘Establishing Order [...] and reducing the Highlands to a more due Submission’ which included forming Companies of local Highlanders who knew the mountains, could speak ‘the Language of the Country’, and could enforce the Disarming Act.³³³

Highland Companies and regular troops were to be quartered in the garrisons marked by Lemprière, including the medieval castles of Edinburgh, Stirling, Dumbarton, and Inverness, the most recent forts—Fort William and Fort Augustus—and the barrack forts of Bernera, Inversnaid, Kiliwhimen, and Ruthven (see Fig 4.1). There was widespread approval for Wade’s scheme although one anonymous dissenter claimed the proposal was too concerned with defence and called for more aggressive measures to be taken by the government to subjugate the Highlanders:

The General’s Scheme is in so far approved by every Person, but in the Memorialists humble opinion, the same being only defensive against those Villanous [sic] Disturbers of the Peace and no wise offensive, it will turn out to make a sufficient (but only a palliating) cure. It is just the same as skinning over a flesh wound while rottenness is at the Bone the same will daly break out afresh, until the wound be searched to the Bottom, and the Virulent Distemper be eaten out by Corrosives. As this is the State of an Human Body, it is the very same in the Body Politic; when such in-grained villany and wickedness by long habit is once so deeply rooted in the Hearts (as well

³³¹ BL King’s 100, ff. 1–54, esp. f. 2. Report on Wade’s journey taken in pursuance of royal instructions dated 3 July, 1724.

³³² Two copies exist: NLS Acc.11104. Map Rol.a.42 and BL Maps K.Top.48.12. Lemprière was employed in the Drawing Room of the Tower of London from 1716 and continued there as senior draughtsman until he retired in 1743 (TNA WO 47/30, p. 105; TNA WO 54/200, p. 8 to WO 54/208, p. 7).

³³³ BL King’s 100, ff. 15–16. In 1716, following the 1715 Rebellion, Parliament passed the Disarming Act ‘for the more effectual Securing the Peace of the Highlands in Scotland’. The Act was poorly executed with the clans in support of the government relinquishing their arms and those disaffected retaining theirs to the extent that they became ‘Domestick Incendiarys [sic]’, ready to rise in support of the Pretender (f. 9).

as inclinations) of so numerous a Set of People there is an absolute necessity of making an offensive as well as Defensive War against them.³³⁴



Figure 4.4 Part of ‘A Description of the Highlands of Scotland [showing] ye Forts lately Erected and Roads of Communication or Military Ways carried on by his Majesty's command’, by Clement Lemprière, 1731. Maps K.Top.48.12. (Courtesy of the Trustees of the British Library).

Wade’s activities were at a time when the London Government was concerned to know more about the geography of Scotland, when acts of reconnaissance resulted in relatively small-scale maps of the Highlands showing ‘the Several Lakes, Rivers, and Roads’,³³⁵ when linear surveys were made of proposed military roads,³³⁶ and when large-

³³⁴ NAS RH2/5/12 ‘Mitchell Papers’ 1724–1785: ‘Memorial anent the Thieving and Depredations in the Highlands of Scotland and the Countries bordering thereon’, f. 55.

³³⁵ For example, Joseph Avery’s ‘exact Survey [...] between Inverness and Fort William’ of which there are three copies: survive: BL Maps K.Top.50.1, Maps K.Top.50.2, and NLS MS 1648 Z.03/21 (BL Maps K.Top.50.1 looks to be a neat copy of NLS MS 1648 Z.03/21). Another copy drawn in 1742 at a scale of 1: 55,440 included similar detail of the lochs but is more concerned to show the new roads and is more highly coloured: TNA MR 1/496.

³³⁶ For example, George Wade’s sketch and description of the proposed roads from Callander to Fort William: NLS Acc.10497 Wade.58m.; Joseph Avery’s ‘A Plan of the Country where the New Intended Road is to be made from the Barrack at Ruthven in Badenath to Invercall in Brae Marr’, 1735: NLS Acc.10497 Wade.58b.

scale maps of new fortification schemes and reconstructions of old abounded.³³⁷ The arrival in 1740 of William Caulfeild ensured schemes to improve communications, to build new and repair old roads, continued. Military commanders in Scotland and the Board of Ordnance were keen to have maps of the new route ways to plan military strategies and to supply munitions and provisions to the several garrisons. Fort Augustus—‘a modern fortification’—was eventually completed in 1742 and, thereafter, fortifications were maintained, strengthened, and in some cases extended.³³⁸

In the wake of the 1745 Rebellion and the defeat of the Jacobite Army at the Battle of Culloden, the Hanoverian Army instigated a period of systematic suppression of the disloyal Jacobites. At the same time, military engineers and draughtsmen of the Board of Ordnance conducted a Military Survey of Scotland. The map, a landmark in military map making, was an act of political surveillance and an example of cartography’s power to exert territorial control.³³⁹ The Survey was directed by David Watson, Quarter-Master General of the Hanoverian Army, and his assistant, William Roy, between 1747 and 1755. Watson placed the inspiration for its undertaking as ‘the sole motive of restoring quiet’ in the Highlands.³⁴⁰ In the same context, Skelton explained that ‘the mapping of the Highlands, and subsequently of the Lowlands’ by the military engineers of the British state ‘was a phase or instrument of the military occupation’.³⁴¹ Hodson has written that the Survey’s true purpose was ‘to gather geographical information, and to express it in written and cartographic form so that a commander could make decisions, for example, about the capacity of routes and adjacent terrain to carry heavy artillery. It was never intended that the map should be perfect in its representation of the positions of features relative to each other’.³⁴²

Roy himself described the unfinished manuscript as rather a ‘magnificent military sketch, than a very accurate map of a country’ but, although an ‘imperfect work’, it still possessed ‘considerable merit, and perfectly answered the purpose for which it was originally intended’.³⁴³ In its endeavour, it was defined by Hugh Debbeig, one of the Survey’s contributing engineers, as ‘the greatest work of this sort ever performed by British Subjects and perhaps for the fine Representations of the Country not to equal in the

³³⁷ For example, John Lambertus Romer’s 1728 ‘Plan of part of the town of Inverness with a project for Barracks on Castle Hill’: NLS Acc.10497 Wade.58j; ‘A plan of the intended Fortress with the Situation of Killiwhymen’, by Romer [1729]: NLS Acc.10497 Wade.58h.

³³⁸ NLS MS 1647 Z.02/63 ‘The Plan of Fort Augustus, in the Highlands of Scotland (a modern fortification)’, by John Lambertus Romer, 1742.

³³⁹ Widmalm 1990.

³⁴⁰ NRAS 3246, Vol. 35, letter number 34 from David Watson to Robert (Robin) Dundas of Arniston, Fort Augustus, July 1746.

³⁴¹ Skelton 1967, p. 5.

³⁴² Hodson 2007, p. 15.

³⁴³ Roy 1785, pp. 386–387.

World'.³⁴⁴ The map is a snapshot of mid-eighteenth century Scotland and was intended as a political tool in the civilizing of the Highlands. For the Highlands, and northern Scotland in particular, it is the only relatively large-scale topographical map in existence for the eighteenth century. But for the intervention of the Seven Years' War (1756–1763) between Britain and France, the variable accuracy and the nature and quantity of information conveyed by the Military Survey would have been adjusted over time. This was not lost on Roy, who later remarked that 'It would, however, have been completed, and many of its imperfections no doubt remedied' because

if a country has not actually been surveyed, or is but little known, a state of warfare generally produces the first improvements in its geography: for in the various movements of armies in the field, especially if the theatre of war be extensive, each individual officer has repeated opportunities of contributing, according to his situation, more or less towards its perfection; and these observations being ultimately collected, a map is sent forth into the world, considerably improved indeed, but which, being still defective, points out the necessity of something more accurate being undertaken, when times and circumstances may favour the design.³⁴⁵

The Highland fortifications which the Board of Ordnance and the Government had invested so much time and money in over the preceding sixty years, fell easily under Jacobite sieges during the 'Forty-Five. Fort William alone successfully resisted the rebel attack. Fort Augustus, the focal point of the military presence in the Highlands, lasted two days of attack before a shell fired from Kiliwhimen (an abandoned Hanoverian barrack) half-a-mile away hit and detonated the exposed powder magazine.³⁴⁶ Before his commission on the Duke of Cumberland's 'Surveying Scheme'—the 'Military Survey'—Watson assisted General William Skinner, Director of Engineers, with rebuilding the fortifications razed during the 'Forty-Five.³⁴⁷ Forts in remote parts of the country including Castle Duart, Castle Tioram, and Fort Augustus were strengthened. Outworks about the barracks of Inversnaid

³⁴⁴ TNA CO 325/1, f. 199 verso, 1776; Hugh Debbeig made this comment when proposing a scheme for a 'General Military Survey of the Great Ports and Harbours on the said Coast of America'. Debbeig, advanced this opinion, along with a resumé of his services and experience as an engineer in his 'most humble hopes' they would 'be deemed sufficient' for him to be chosen as director of the new scheme.

³⁴⁵ Roy 1785, pp. 385–387.

³⁴⁶ TNA SP 54/29/27, ff. 219–220, a report or information relating to the siege of Fort Augustus, by James Hart, a soldier in General Guise's Regiment, 26 March 1746.

³⁴⁷ BL Additional Ms. 17499, pp. 130–131: a letter from David Watson to William Skinner, 7 June 1748, in which he wrote how 'the Surveying Scheme, [...] has given me Infinite Pain'.

and Bernera were ‘repair’d with very little cost’ and ‘put to Immediate use’.³⁴⁸ The Crown purchased the lands about Corgarff and Braemar and the castles remodelled as barracks.³⁴⁹ The Board requested that Skinner travel to Inverness to ‘make a Survey of the old Fort near that place called Olivers Fort [...] and report to us how far they may Serve towards the Rebuilding the same’.³⁵⁰ After completing the survey and drawing several plans of the remains of Oliver’s Fort and the projected fort, Skinner rejected the site and proposed a new fortification—Fort George at Ardersier Point—which took over 23 years to complete, funds for the works stopped by the Board in September 1770.³⁵¹

The military road system was greatly extended in this period to facilitate the increasing mobility of the army. Caulfeild and his engineers were responsible for building about 608 miles of roads with another 223 miles in progress. These included the roads from Dumbarton to Inveraray, Stirling to Fort William, and Coupar Angus to Fort George at Ardersier by way of Braemar and Tomintoul (see Fig 4.1). The engineers, who were expected to be ‘thoroughly acquainted with the Country and its several Passes & Rivers’, were to ‘every Season make an exact Plan of the Road carried on under their Inspection ... Which Plan they will give only to the General Officer Comanding [sic] in North Britain & to the Board of Ordnance’.³⁵²

By 1770, the forts and many of the roads in Scotland had been thoroughly mapped by the engineers and draughtsmen of the Ordnance. These maps formed an archive of discrete military landscapes rather than the ‘totalizing knowledge archive’ advocated by Enlightenment scholars and by military commanders alike.³⁵³ Even the ‘Military Survey’ did not answer that desirable framework, its representation of space was constructed from measured linear surveys and artistic in-filling—a definitive feature of Enlightenment mapping.³⁵⁴

John Brewse’s tenure as Chief Engineer in Scotland (1770–1779) coincided with a relatively quiet period in both military and mapping terms. The most pressing surveys were of fortifications in need of repair due to storm damage.³⁵⁵ His successor, Andrew Frazer,

³⁴⁸ BL Additional Ms. 17499, p. 11, a letter from the Office of Ordnance to William Skinner, 21 March 1747.

³⁴⁹ TNA WO 47/34, f. 59, 1749.

³⁵⁰ TNA WO 47/34, f. 9, 1749.

³⁵¹ TNA WO 47/76, p. 72, Surveyor-General minutes for July–Dec 1770.

³⁵² TNA WO 26/21, pp. 359–360, 1749.

³⁵³ Edney 1997, p. 25.

³⁵⁴ Withers 2007, p. 102.

³⁵⁵ TNA WO 47/81. From January to June 1773, for example, Brewse reported and had repaired damage to Fort William, Fort Augustus, Edinburgh Castle, Stirling Castle, Dumbarton Castle, Blackness Castle, Inversnaid Barracks, Braemar Castle, Corgarff Castle, Castle Duart, Bernera Barracks, and Fort George.

faced an altogether different scenario. War with America soon followed by war with France, raised concerns for Scotland's security once again. The engineer's focus and therefore mapping imperatives, shifted from Scotland's interior to the coast, to the eastern seaboard, the Orkney and Shetland Islands, and the Firth of Clyde. Again, the hub of map commissions was fortification, this time in the design and construction of coastal gun batteries at Banff, Peterhead, Arbroath, Montrose, Dunbar, and Greenock; in the resurrection of the seventeenth-century citadel Fort Charlotte at Lerwick in the Shetland Isles; and finally, the construction of a Martello Tower at Hackness, Orkney Islands in 1813. Responsibility for road construction had already devolved to the Highland Commission for Roads and Bridges. Military reports in the early nineteenth century, however, still concerned themselves with planning routes for the march of the army through Scotland and with encampments. A report 'relative to the Routes by which the Troops may march Southwards from Inverness and Fort George' written by Brigadier General Dirom, Deputy QMG, in 1808, included reference to a new map—'enlarged and considerably improved'—of Scotland.³⁵⁶ This map, unfortunately, does not appear to have survived. Towards the end of the eighteenth and beginning of the nineteenth century, inland fortifications were merely maintained. Henry Rudyard's (Chief Engineer of Scotland from 1786) principal task was to recruit troops in Scotland for the Corp of Military Artificers at Woolwich. The Corp was later to see service overseas during the Napoleonic War.³⁵⁷

This analysis of the timeline for the military mapping of Scotland from 1689 to 1815 has shown links between map making and political and military imperatives to secure and to govern Scotland. The maps not only functioned in Scotland, they functioned in London too. They allowed a distant government to visualise and to know parts of Scotland so they could impose remotely their social order. The timeline has placed the military mapping of Scotland firmly at the centre of Enlightenment scholars' epistemological framework: to acquire geographical knowledge through the practices of reconnaissance and survey and to order the data through maps which then became tools in the act of political territorialism. What the timeline fails to convey is the proportion of different mapping technologies at each phase of Scotland's changing military landscape and imposition of social order. Before addressing this, I first discuss why a particular classification of maps—fortification, movement, and battle—have been assigned to this study.

³⁵⁶ TNA WO 30/61, f. 1 of the report, 14 June 1808; TNA WO 30/61, doc. 22, letter to accompany the report, 5 October 1808.

³⁵⁷ TNA WO 47/113 and 47/114, 1789.

Sub-divisions of military maps

Brian Harley’s theoretical classification of maps of the American Revolutionary War was proposed in chapter two as a suitable methodological model for a way of classifying and ordering the substantive archive of maps of Scotland. In the same way as America’s Revolutionary maps, Scotland’s military maps can be classified according to their contemporary uses rather than to their cartographic or internal characteristics. My review of the timeline of cartographic events in Scotland during the eighteenth century necessarily brought about some discussion of types of military maps—namely fortification plans, route maps, and battle maps—because they reflected the military activities at play at the time. It is therefore possible to offer an analytical classification of the military maps of Scotland based on the role they played in the period 1689 to 1815. This is offered in figure 4.5.

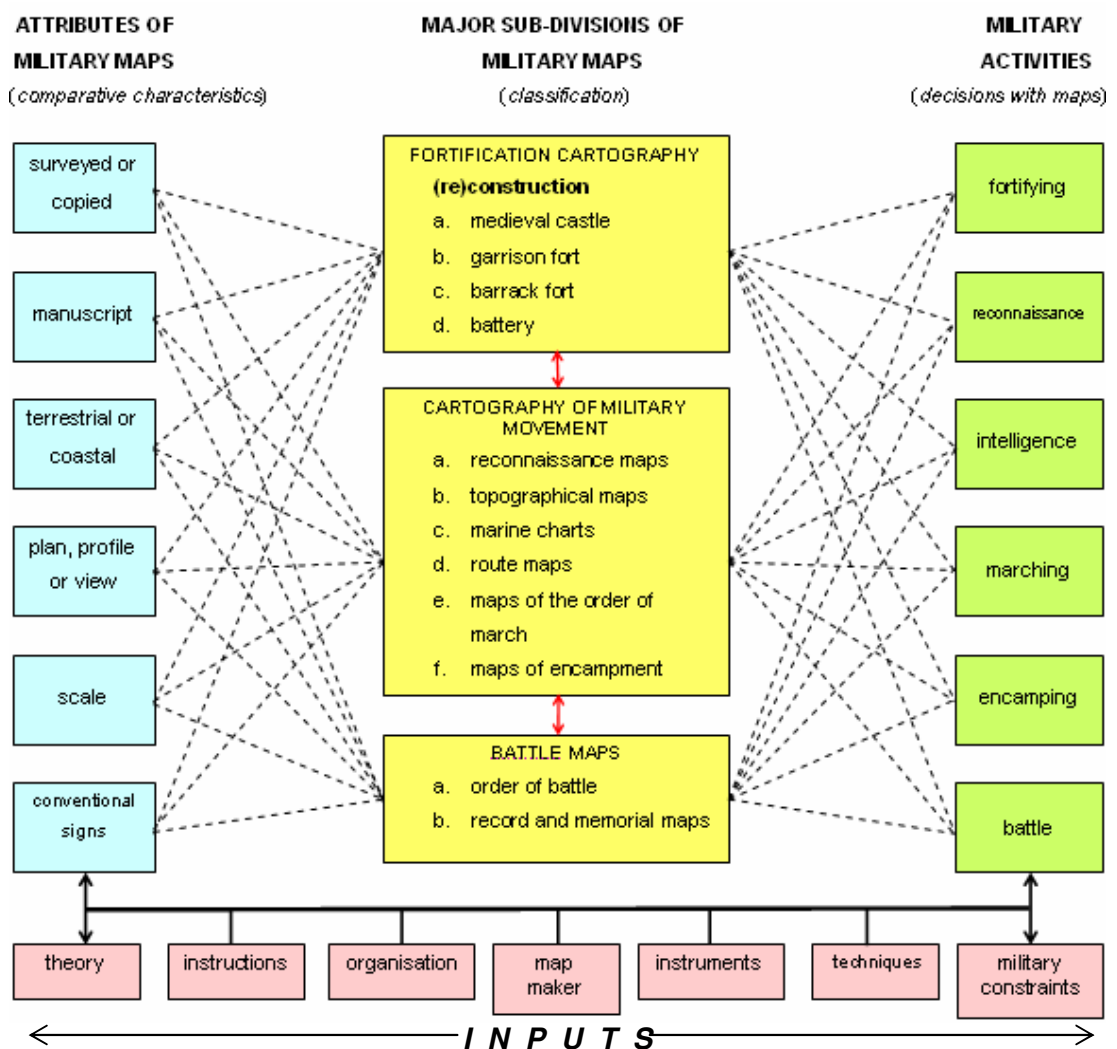


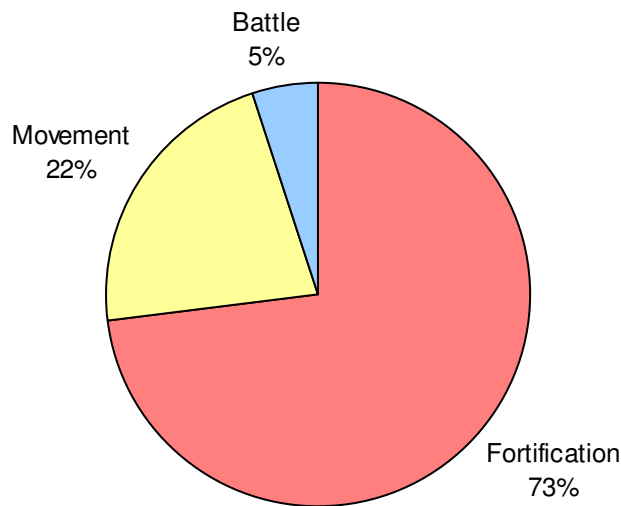
Figure 4.5 An analytical classification of military maps of Scotland

The principal realms of eighteenth-century military activity were fortification, movement, and battle. At this level, Scotland was no different to other European nations, the period of study showing evidence of all three principal military activities and, in the process, revealing ‘a cartographic *genre* which is truly international [...] the plans exhibit sufficient common traits of technique and design to be logically intelligible in the light of diffusion of a basic style by a highly mobile and professional group of map makers’.³⁵⁸ Evidence of these activities can be shown from three perspectives associated with the cartographic work of the Board of Ordnance engineers. First, the forms and attributes of maps associated with a particular activity are similar enough to be grouped together. Each of the principal activities (fortification, movement, and battle) was characterised by a method of survey, by a form of cartographic representation, scale, and use of conventional symbols. Second, these different types of map are described in Board of Ordnance minutes and other state documents relating to particular events and activities in Scotland. Military engineers were involved in most if not all the activities that had recourse to mapping—fortifying, reconnaissance, intelligence, marching, encamping, and battle. Lastly, there is evidence that maps of a similar nature were referred to by the Board of Ordnance or an engineer in Scotland when making decisions pertaining to specific military actions. The last most strongly conveys both the pragmatic nature of these maps—their use in fortification and road construction, for example—and their ideological role in helping sustain power relations in Scotland. The ‘inputs’ represent recurrent factors that impinged on the making of military maps; some have been addressed in chapter three, others are discussed later in this chapter.

Figure 4.6 shows the cartographic proportion for each type of principal military activity in Scotland, 1689 to 1815. Copies of maps and plans made substantially later than the original compilations, often for training rather than territorial purposes, are not included here because they can distort the connection between military activities and mapping.³⁵⁹ Figure 4.7, a series of pie charts, complement figure 4.6 by illustrating the shifting proportions of different categories of maps per decade. The nature of the changing proportions and quantities of maps is described in more detail with figure 4.8 illustrating the chronology of military maps of Scotland.

³⁵⁸ Harley 1968, pp. 65–66, original emphasis.

³⁵⁹ Approximately 10% of the archive.



Total = 847 maps including those without a date of compilation

Figure 4.6 Military maps of Scotland, 1689–1815, by type of principal military activity

Fortification cartography dominates the representation of military landscapes. In nearly all instances, the maps, plans, and sections relating to fortifications were of value for showing large-scale (re)construction works of which there were four main types in Scotland: medieval castles, garrison forts, barrack forts, and coastal gun-batteries. These cartographic representations and associated written commentaries provide comprehensive details of the attributes and form consistently associated with these four sub-divisions of fortification cartography. In addition, contemporary military treatises support this further sub-division with discussions of regular and irregular fortification. Chapter five looks at fortification cartography in greater detail and describes the codification of the maps.

Maps associated with military movement are more diverse in nature and include route or road maps, marine charts and surveys of inland waterways, and topographic maps. Each of these three categories is a composite of several military activities: reconnaissance, intelligence, marching and encamping, and planning and recording military works—roads and bridges—in preparation for military action. For so many military activities, maps of military movement account for what seems to be a relatively small part of the archive considering the degree to which Scotland and, in particular, the Highlands, was an unknown territory at the start of the eighteenth century. Their small proportion in the archive is possibly due to losses or to their then contemporary distribution that saw them go to military commanders rather than to the Board of Ordnance, and to the fact that fewer contemporary copies appear to have been made. In design, they are linked more by function than by form. The military command and the London government needed smaller-scale maps of parts of

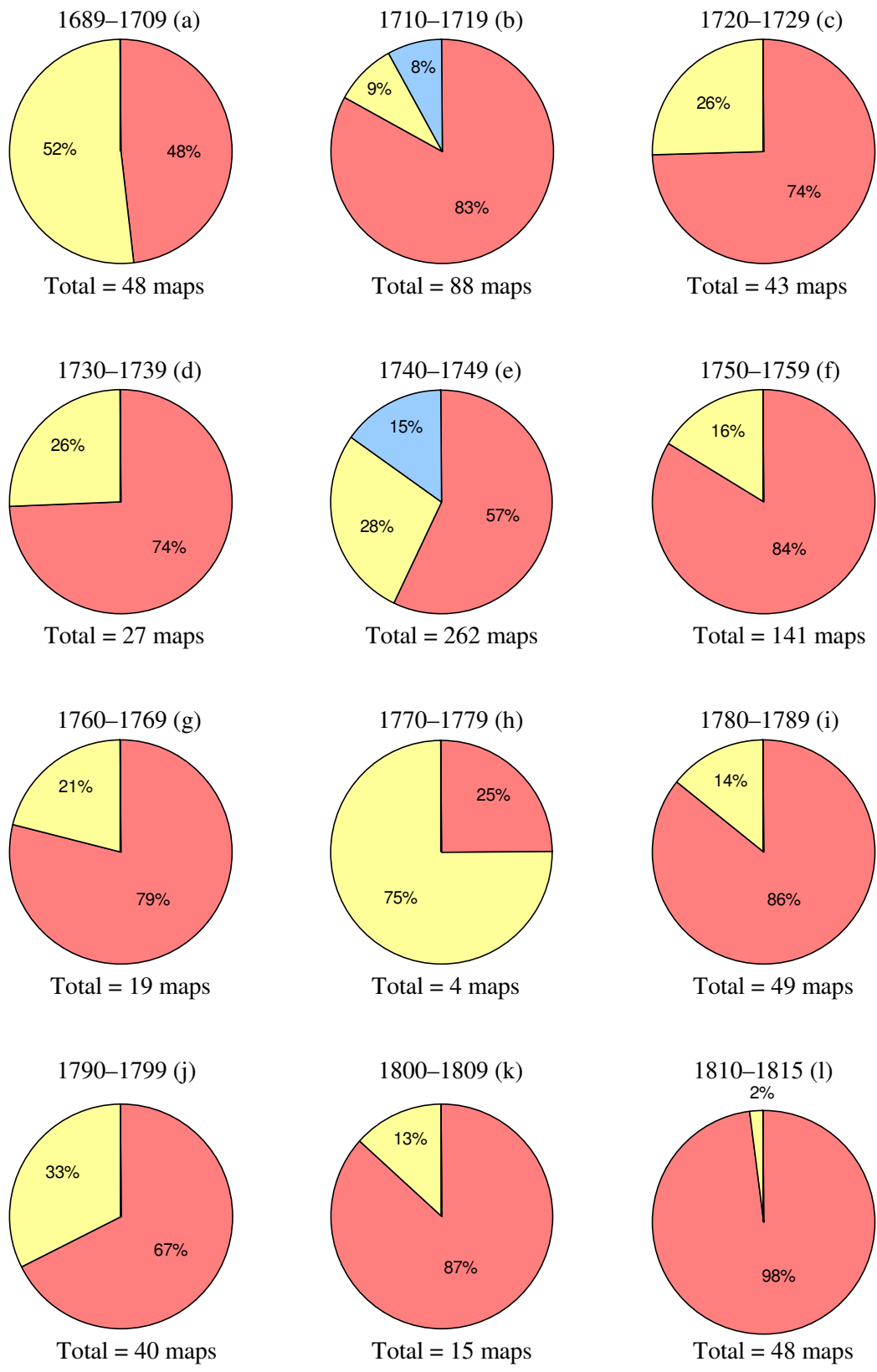


Figure 4.7 Shifting categories of military maps per decade

Scotland in order to form strategies to move troops quickly and with ease in times of action, to police the Highlands and, logistically, to provide munitions and supplies to the various garrisons. Chapter six looks at the cartography of military movement and the attributes of different types of maps and charts.

Battle maps account for the smallest portion of the archive despite the fact that by the eighteenth century, they were a well-established cartographic form of military narrative.³⁶⁰ Cartographers produced images that reflected the ideology of heroic victory. This is pertinent to Scotland; relatively few maps were made of the Jacobite victories at the Battles of Prestonpans and Falkirk in comparison to the multitude of maps of Culloden, a significant Hanoverian victory. Battle maps of Scotland include plans of the order of battle and record or memorial maps. The final form of the maps depended on the role they played in the military engagement and were often retrospective records of events. Most show formal troop dispositions at various stages of a campaign. Chapter seven reviews the surviving corpus of maps depicting battles between Hanoverian and Jacobite armies.

Analysing and classifying cartographic records according to their assumed usage is not always straightforward. A modern reading of a map will not always correctly identify their original function. Military movement, in particular, is a difficult category to define given how disparate some of the material is. Another reading could as easily group coastal charts with coastal gun-batteries and route maps depicting an army's march and their encampments with battle plans if a battle was the culmination of the troop movements. Chapters five, six, and seven will elaborate upon my rationale for sub-dividing the military maps of Scotland as shown in figure 4.5. Whilst recognising that maps could have multiple uses even if they were compiled with other intentions, let me here consider the major sub-divisions of military maps of Scotland in the surviving archive.

Proportional representation

Changing technologies of European warfare and the Jacobite tendency towards a form of guerrilla warfare prompted changing mapping technologies in Scotland—from fortification plans to route maps and topographical surveys. There was not, however, a complete shift from one technology to another, from representations of static siege and besieging tactics in the late seventeenth early eighteenth centuries to more mobile strategies and the representation of armies on the move, of encampments and of battles in the mid to late eighteenth century. This is illustrated in figure 4.8. This graph shows the number of

³⁶⁰ Buisseret 2003.

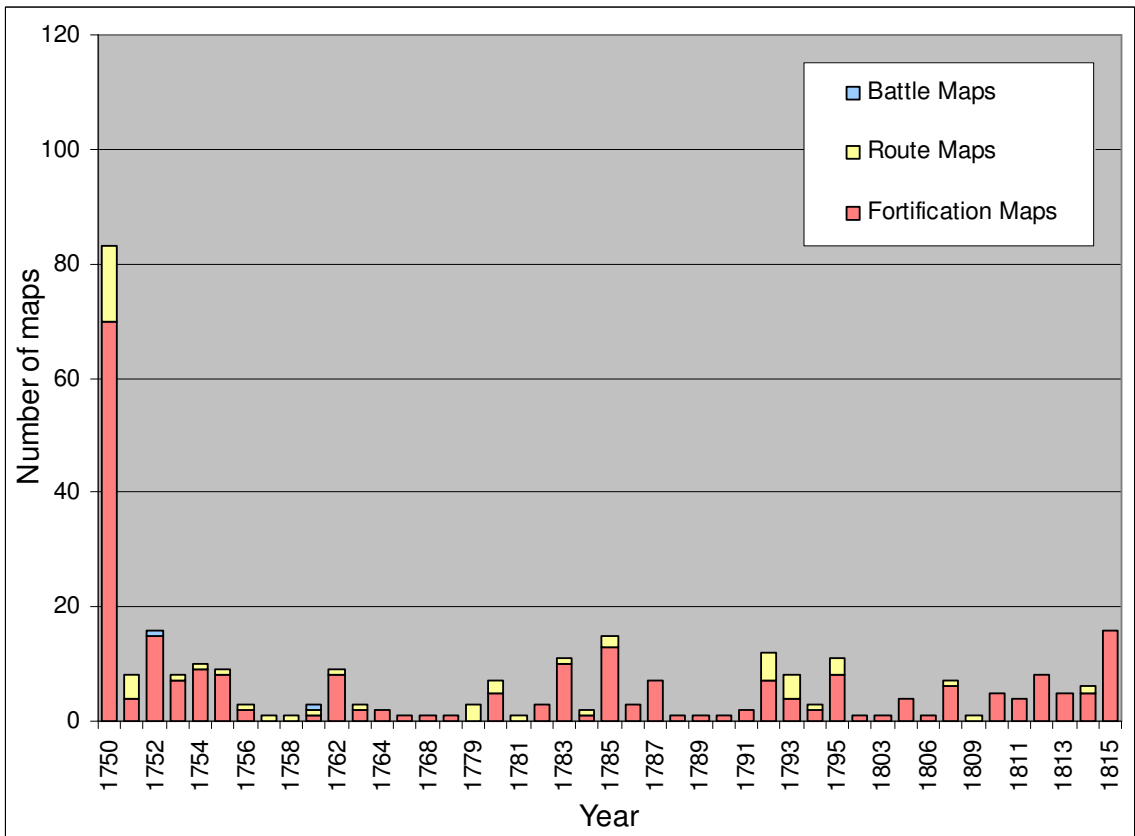
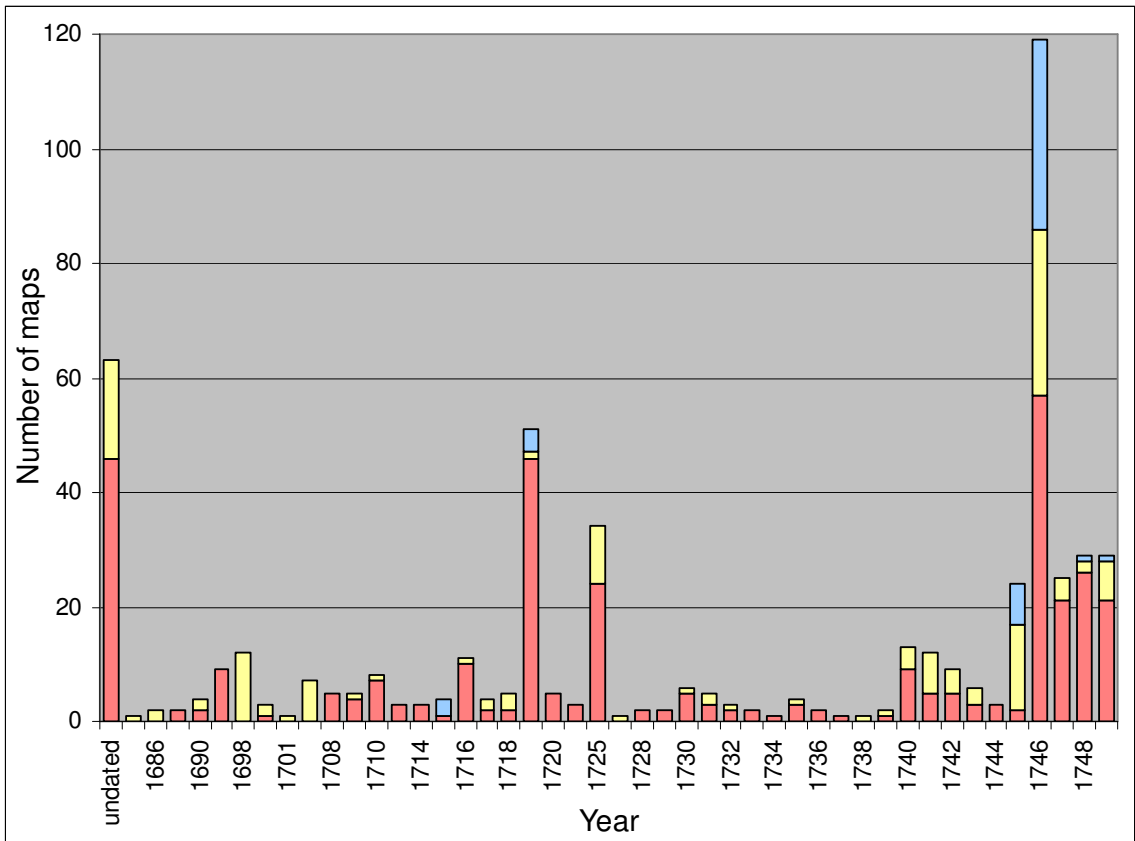


Figure 4.8 The chronology of military maps of Scotland, from 1689 to 1815

manuscript maps compiled annually, from 1685 through 1815,³⁶¹ including contemporary copies.³⁶² Additionally, the graph shows further sub-division into the principal military activities associated with each map.

Figure 4.8 shows primarily, the quantitative variation in the annual output of maps representing Scotland's military landscapes. What it does not show are any losses that might have occurred between the creation of the material and today's extant archive. Such losses, if quantifiable, would modify the figure, perhaps considerably. I return to this point later in this chapter. For now, if figure 4.8 is considered in conjunction with figure 4.7, the shifting categories of maps per decade, a way of exploring the temporal variations in cartographic practices in Scotland in relation to different military activities is offered. What is immediately obvious is that maps concerned with fortification dominate the output for the whole period; that route maps appear to be products of exigency rather than a transition to more mobile strategies of warfare; and that battle maps were purely products of the event, records of the occasion with no demand for a continuing representation.

The first substantive period, from 1685 through 1718, records a low, sporadic output of maps, principally concerned with fortification. The maps reflect the state's need to secure its medieval defences, to establish an effective military presence, and provision of accommodation for the increasing number of troops in the Highlands. The Scottish fortifications that were inherited by the Board of Ordnance comprised castles and towers which had either ceased to be defensively effective due to their medieval structures—notably Fort George at Inverness, and the castles of Edinburgh, Stirling, Dumbarton, Blackness, Glengarry, Tioram, Duart, and Eilean Donan—or Cromwellian citadels lying in ruins from the 1660 Restoration (see Fig 4.1).³⁶³ The state had recourse to strengthen existing medieval

³⁶¹ 1685 rather than 1689 is chosen as the 'start' date in order to accommodate John Adair's county maps and coastal charts, manuscript copies of which form part of the Board of Ordnance and King's Topographical collections.

³⁶² The 'Military Survey of Scotland' is only represented in the graph once for each of its current British Library shelfmarks despite its multiple means of archival storage: BL Maps K.Top.25.1a. the original protraction of northern Scotland, north of Edinburgh and Glasgow, mounted as 84 rolls of irregular size and shape. Maps K.Top.25.1b. the fair copy of northern Scotland; originally 12 rolls but now combined with the 10 rolls of the original protraction of southern Scotland (Maps K.Top.25.1c.) and remounted as 38 sheets of unequal size. BL Maps K.Top.25.1d. originally in 5 rolls but remounted as a single roll between 1829 and 1844. BL Maps K.Top.25.1e. or Maps 175.t.3. twenty-one sheets, originally mounted as a single roll but since 1935, preserved in separate sheets.

³⁶³ Cromwell's New Model Army of the 1650s similarly had to counter uprisings by Scottish royalists. See Tait, 1965, p. 9: George Monck, first duke of Albemarle (1608–1670), was commander-in-chief of all the forces in Scotland between 1654 and 1659. His subjugation included sending troops into the Highlands and building imposing citadels at Ayr, Leith, Inverness, Inverlochy, and St. Johnston at Perth to be, according to Monck 'a great deale of benefitt to your highnesse, besides the securitie of the place and the advantage wee may have by laying the fewer men there, if any troubles should bee'.

fortifications, to put them into a suitable ‘posture of defence’, whether that was a ‘project for Fortifying [...] to resist an Attack in form with Great Artillery’ or ‘for preventing an Insult’.³⁶⁴ Route maps produced in 1685–1686 and 1698–1703 refer to John Adair’s charts of the eastern seaboard and manuscript copies of his *Description of the Sea-Coast and Islands of Scotland*, printed in 1703. The extent to which these charts were used by the Board of Ordnance cannot be ascertained but some carry the Ordnance stamp which either denotes their territorial utility or a contemporary training exercise. Terrestrial route maps were compiled in 1717–1718 in preparation for the four new barrack forts to be built in the Highlands. Engineers John Dumaresq and John Henri Bastide were concerned to gauge the communications between them, from Inversnaid on Loch Lomond to Ruthven of Badenoch via Loch Tay and Blair Atholl, Kiliwhimen at the southern end of Loch Ness to Fort William.³⁶⁵ Battle maps in 1715 and 1719 coincide with the battles of Sheriffmuir and Glenshiel respectively.

The first peak, in 1719, relates to the cartographic works of Andrews Jelfe in his role as Director of barrack building in Scotland and his design of the four new barrack forts. The second peak heralds Wade’s arrival in Scotland and reflects an attempt to open-up and dominate the Highlands on the part of the London Government through road and fortification construction. The following years record a low output of cartographic records as construction work became the main concern of the military engineers that saw two new garrison forts completed, Fort George at Inverness and Fort Augustus in the centre of the Great Glen. 1740 saw the start of more concerted attempts by the political and military commanders to address the adoption of mobile warfare tactics and reflected a need to know Scotland as a whole. Initially, topographical maps were compiled but these covered the lowlands and had limited extension into the Highlands. This was pertinent to affairs that followed, when the 1745 Rebellion identified how limited the state’s geographical knowledge of Scotland truly was and, in the wake of the Battle of Culloden in 1746, the Military Survey of Scotland was commissioned by the Board of Ordnance under a command issued by the Duke of Cumberland and a period of substantial fortification reconstruction and road building began.

In 1755, many of the engineers in Scotland were called away to review the defences of the south coast of England or sent abroad to see action in the Seven Years’ War. In Scotland itself, work continued on Fort George at Ardersier producing a ‘paper-trail’ of

³⁶⁴ TNA WO 55/346, pp. 74–77. ‘In obedience to your Lordships Commands Wee lay before your Lordship a particular account of what has been done to the Fortifications in North Britain since 1708 [and] That which would compleat [sic] the finishing the same’. The estimates, provided by Theodore Dury in 1714, relate to Edinburgh, Stirling, and Dumbarton castles, and Fort William.

³⁶⁵ NLS MS 1648 Z.03/13a–b, MS 1648 Z.03/14a–c, BL Maps K.Top.48.58. and Maps K.Top.48.58.a.

plans charting its construction. The small peaks of fortification activity in 1783 and 1785 relate to Fort Charlotte and the redirection of government defence works, not only from terrestrial to coastal but from the subjugation of the nation to its protection and concerted efforts to defend against an overseas invasion. The end of the period of study saw a host of east coast battery defences erected and improvements in their communications with the interior. This period is discussed in chapter 5.

In representing discrete military landscapes the engineers of the Board of Ordnance reflected the state's imposition of control and governance on Scotland, less in a desire to unite England and Scotland but more to subjugate and impose their social order on the nation. In a proposal contained in a manuscript paper on 'Some Observations concerning the Highlands of Scotland', an anonymous author emphasised 'the Benefit [which] must arise from protecting the Highlands by Regular Troops' and 'acquiring a perfect knowledge of the Country[:] two very essential Articles, & hitherto little known [sic]'.³⁶⁶ The 'Benefit', in the first instance, favoured the government: an improved geographical knowledge of Scotland allowed for acts of political territorialism in order to sustain power relations. In the second instance, the 'Benefit' of improved geographical knowledge aided, in addition to the military, also a cultural, legal, and an industrial opening-up of the Highlands. In the next section, I consider where gaps may have arisen in this developing geographical knowledge, due more to questions of loss than to the rationalisation of mapping projects.

The Board of Ordnance archive: questions of loss

However we analyse the extant archive of military maps of Scotland—by production, reception, application etc.—a recurring issue is the extent to which the current categories and proportions of military cartographies—fortification, movement, and battle—were the same in the eighteenth century. A re-assembling of the cartographic work of the Board of Ordnance, chronologically and geographically, is necessarily only partial due to the losses of original material over time. This section considers questions of loss.

In ascertaining the survival (rate) of manuscript maps, Board of Ordnance textual correlates offer some, although rather general, answers. In rationalising the civilian and military offices of the Ordnance and their cartographic practice, some attempt was made to log map production and acquisition. The Tower Drawing Room's 'Register of Draughts' systematically recorded maps deposited by engineers stationed in divisional outposts, including North Britain.³⁶⁷ Although not authorised until 1752, many entries relate to records

³⁶⁶ BL Additional Ms. 35890, ff. 158–159, September 1747.

³⁶⁷ TNA WO 55/2281.

from the first half of the eighteenth century; thereafter, the register was intermittently maintained until 1812.³⁶⁸ A review of this listing in relation to the current collections indicates that maps are now missing but, also, that several surviving maps were never recorded. The register logs 152 maps of Scotland between 1708 and 1786 (excluding one plan dated 1684 which falls outside the period of research) falling considerably short of the 940 maps in today's archive. Even accounting for copies made during training exercises and those lodged out with the Office of Ordnance (in a royal library or with the Admiralty), the register still fails to account for nearly 30% of the maps.³⁶⁹ Coincidentally, the register lists an additional 32 maps which have not been found, the assumption being that they have not survived.

There is some evidence to suggest that engineers retained the maps rather than lodged them with the Office of Ordnance. A recognised practice, especially in France amongst the Quarter-Master Generals, was to take possession of a predecessor's maps when they took over command. Such practice indicated a continuity of service as well as the fact that papers were not considered the personal possessions of the officeholder.³⁷⁰ The latter consideration was certainly the opinion of the Board of Ordnance, who, on several occasions demanded the return of maps and plans. In 1758, for example, the Board ordered 'that all the Books, Papers, Plans and Draughts in the possession of Mr Dugal Campbell deceased either as Clerk of the Works or as Engineer be demanded of his Executors'.³⁷¹ John Adair's son was sent a letter to 'acquaint him the Board are informed that the Surveys of Scotland are in his possession, that the said Surveys being the property of the Crown and Ordered to be lodged in the Office of Ordnance, he is desired to deliver the same to the Board'.³⁷² In 1771, Skinner presented 'to the Board a Book containing Plans, Sections, and Elevations of the Works and Buildings of Fort George in North Britain' which was logged in the 'Office Records'.³⁷³ This is accounted for in the 'Register': folio 17, entry 59 'Book of Plans Sections & Elevations of Fort George Designed & executed by Gen^l. Skinner'.³⁷⁴ Additionally, Skinner collected a considerable number of maps and plans that were either compiled by him or were drawn by other engineers and draughtsmen including David

³⁶⁸ Marshall 1980, p. 22.

³⁶⁹ Estimated by including Board of Ordnance maps from NLS, NAS, and TNA with their contemporary copies but excluding copies made later as part of training exercises.

³⁷⁰ Cénat 2008.

³⁷¹ TNA WO 47/51, p. 240, 7 March 1758. Between 1742 and 1746, Dugal Campbell made plans of Culloden (RLW 730026 and 730027), Fort William (NLS MS 1646 Z.02/28a-c, MS 1646 Z.02/30a-b), Edinburgh Castle (NLS MS 1645 Z.02/04a, MS 1645 Z.02/05b-c, MS 1645 Z.02/06a), and Stirling (BL K.Top.50.95).

³⁷² TNA WO 47/63, p. 245, 11 April 1764.

³⁷³ TNA WO 47/77, p. 396, 1 May 1771.

³⁷⁴ TNA WO 55/2281, f. 17.

Watson, Charles Tarrant, and Paul Sandby to name but a few. These eventually descended to Lieutenant Monier Skinner in 1872, never having been recorded by the Office of Ordnance.³⁷⁵

Military map making was one way for officers to be noticed and so obtain promotion.³⁷⁶ In 1755, for example, Tarrant obtained a commission as a Practitioner Engineer and, in 1759, was promoted to Sub Engineer and made a Lieutenant.³⁷⁷ Eighteenth-century Britain's preoccupation with social connection and patronage must allow us to assume that Skinner, with his colonelcy and influential position as Chief Engineer, assisted Tarrant in his commission and promotion. It may be that some of Tarrant's maps found in Skinner's personal collection were presented to him—copied by Tarrant as a form of dedication rather than as working documents. Thomas Sandby was similarly fortuitous in his patron—William Augustus, the Duke of Cumberland. Cumberland's appreciation of landscape art and his status as an amateur antiquarian was well known and reflected in his collections of Scottish landscapes by Paul and Thomas Sandby, views of Scottish castles by John Elphinstone, and his acquisition of a series of plans of Roman antiquities in Britain by William Roy.³⁷⁸ Although many descended into the King's Topographical Collection and others remain in the Royal Collection at Windsor to be accounted for in the modern archive, these examples suggest that similar instances of patronage mean that military maps of Scotland remain in private collections. My research explored some of the obvious possible sources of these, such as the Goodwood Estate for the Duke of Richmond's papers, the Townshend papers, and the Duke of Buccleuch, but I found no military maps of eighteenth-century Scotland.

Reports written by engineers and military commanders and minutes relating to Ordnance business make reference to maps for which no maps have been found. Lt General Vyse when reporting on the security of the east coast of Scotland in 1803, for example,

³⁷⁵ Several form BL's Additional Ms. 33231 collection. In the Master-General's 1758 orders regulating the Corps of Engineers, it was stipulated that the Chief Engineer was to have 'free Access to all Plans Surveys and Estimates on Designs lodged in the Drawing Room'. He was further empowered to remove such items as he required in exchange of a receipt (TNA WO 47/51, p. 250, 10 March 1758.).

³⁷⁶ Edney 1994b.

³⁷⁷ TNA WO 54/213, p. 14; WO 54/214, pp. 17–21.

³⁷⁸ For example, Thomas Sandby: BL Maps K.Top.49.23.b. (Glamis Castle), RLW 14724 (Fort Augustus); Paul Sandby: BL Maps K.Top.49.54.1.c. (Drumlanrig); John Elphinstone: BL Maps K.Top.48.22. (Edinburgh, Dumbarton, Stirling and Blackness Castles), Maps K.Top.49.23.a.3–6 (Glamis Castle), Maps K.Top. 49.74.c. and K.Top.49.73. (Edinburgh Castle), Maps K.Top.49.86. (Palace of Falkland), Maps K.Top.50.37.1.a–e (Fort William environs), and Maps K.Top.50.96.f.1. (Stirling Castle). William Roy: BL Maps K.Top.49.54.2–3, Maps K.Top.50.79.2.a–b, Maps K.Top.50.79.3. and Maps K.Top.50.83.3. A complete set of antiquarian plans was presented as a volume to George III in 1774 by William Roy, now BL King's MS 247–248. See also O'Donoghue 1977 and NLS: <http://www.nls.uk/maps/roy/antiquities/index.html>

provided the Lord Advocate with two enclosures: the first, a sketch of the coast from Edinburgh to Dunglass ‘made out for your information’; the second, a copy of a report from Captain Evatt relating to his survey of the coast.³⁷⁹ There is no evidence of the sketch in the surviving archive. In 1808, a report ‘relative to the Routes by which Troops may march Southwards from Inverness and Fort George’ was written by Brigadier General Dirom, Deputy Quarter Master General in North Britain.³⁸⁰ With the report was a map—‘enlarged and considerably improved by Major Johnston [Assistant QMG], who has taken great pains to make it correct and satisfactory’.³⁸¹ This has not been traced.

The archive holds no plans or sections of bridges, yet at least 40 were built during Wade’s command and many more under the direction of Caulfeild.³⁸² Roads, similarly, are relatively minimally represented. Caulfeild was responsible for overseeing over 600 miles of road construction. In 1766, for example, he co-ordinated the repair of

the Road from Dumblain to Crief, thence by Tay Bridge to Dalnacardock, and by Blair of Atholl to Dunkield ninety three miles by Detachments from His Majesty’s Fifth Regiment of Foot; and from Fort William to Fort Augustus and Inverness and over the Coryarick to Garvamore and Dalnacardock One hundred and twenty two Miles by a Detachment from the 12th Regiment, and from Inverness by Ruthven to Dalwhinny 55 Miles by a Detachment from the First Regiment in all Two Hundred and Seventy Miles.³⁸³

Between 1740 and 1767, only twenty road maps survive despite his orders to keep a cartographic record of every season’s construction progress. Perhaps this simply proves that roads under repair were not mapped, although this infers a different practice to that applied to fortification. Alternatively, it may hint at a variable survival rate of maps since, as working documents, many would have been exposed to the elements during the buildings of forts and roads. In the next section, I look at the methods by which geographical knowledge of Scotland was acquired through survey and mapping

³⁷⁹ TNA WO 30/66, f. 141, 16 June 1803.

³⁸⁰ TNA WO 30/61, f. 1 of the report, 14 June 1808.

³⁸¹ TNA WO 30/61, doc. 22, letter to accompany the report, 5 October 1808.

³⁸² For example, four bridges were built between Trinafour and Dalnacardoch (TNA T 1/457/294–295, a memorial by James Fitter agent to Caulfeild, 19 June 1767).

³⁸³ TNA T 1/457/294–295, f. 296 verso, 24 February 1767.

Methods of Survey

The methods of obtaining and recording geographical knowledge—maps and written descriptions—varied slightly for each of the sub-divisions of military cartography, of fortification, movement, and battle. Each method was united, however, by the military engineers and their use of mathematics coupled with a sense of design and skill in drawing. In fortification, for example, geometry and arithmetic were needed to calculate proportions, quantities and costs, and design and drawing for providing plans, elevations and bird's-eye views of the landscape.³⁸⁴ Together, their practical application combined methods of survey and compilation to produce scaled representations of geographical reality. Paul Sandby's representation of Dumbarton Castle (see Fig 4.9), for example, combined a plan of the rocky, undulating citadel, and two topographical views on one sheet.³⁸⁵ Placed adjacent in this way, they provided a multiple perspective on the form and situation of the castle. The views provided information on the features less readily discernible from the plan above, particularly relief which, although indicated by Sandby's characteristic shading and hachured style, failed to show relative heights. Surveyors and draughtsmen were therefore dependent on instruments to measure vertical heights and angular distances between features to provide accurate representations of military landscapes. In its construction, a map was, therefore, understood to be both mathematical and pictorial.

Vision was (and still is) a privileged means of knowing the world to be mapped—'to break ground' thus forming 'the eye to the knowledge of it'—but a demand for greater accuracy and objectivity in land surveying and mapping gave rise to a gradual shift towards the consistent use of measuring instruments to extend the scope of the human eye.³⁸⁶

Requisitions for surveying instruments became progressively more common after 1750. In 1758, for example, Colonel John Henri Bastide ordered 'three Pocket Surveying Compasses with Sights and Staffs' from George Adams, mathematical instrument maker to the Office of Ordnance.³⁸⁷ In 1764, Captain Hugh Debbeig 'transmitted to the Board a Demand of Mathematical Instruments' that included 'a Theodolite compleat [sic] with a Spirit Level of 10 Inches, A Protractor, A Scale of equal parts fitted as a Beam compass, two plain Tables

³⁸⁴ Hale 1977.

³⁸⁵ Bonehill and Daniels 2009.

³⁸⁶ Jones 1851, pp. 45–46, details of the 'course of studies' for cadets, 11 February 1792. Edney 1997; Cosgrove 2008.

³⁸⁷ TNA WO 47/51, p. 21, 8 January 1758.



Figure 4.9 'Plan of the Castle of Dunbarton', by [Paul Sandby], c.1747. MS 1649 Z.03/57
(Reproduced by permission of the Trustees of the National Library of Scotland)

compleat [sic] with Rack Work and Parallel Rules to the Index [and] Measuring Chains of 50 feet [and] 100'.³⁸⁸

By the second half of the eighteenth century, technologies in instrument making had progressed significantly.³⁸⁹ The accuracy of angular measurements under field conditions became increasingly refined, encouraged by the demands of the surveyors, military and civil, and by patronage of the sciences which allowed for experimentation and testing of 'precision' instruments.³⁹⁰ In 1769, for example, William Skinner and Allen Pollock, respectively Chief Engineer in Scotland and Professor of Fortifications and Mathematics at the Royal Military Academy,³⁹¹ were involved in testing an 'Instrument for taking Heights and distances' invented by 'Mr Page late a Gentleman Cadet'. After testing the instrument on Blackheath, Skinner reported to the Board that 'it will answer the purposes he proposes to an exactness sufficient for any occasion in the field'.³⁹²

Fortification surveys

On the maps themselves, references to techniques of surveying and any practical application of instrumentation are rare and are equally scarce in the related correspondence between the engineers and the Board of Ordnance. For Harley, 'the sparseness [...] does not mean that the methods employed were especially esoteric: it could equally mean they were sufficiently commonplace to make their repetition in standard accounts, or on the face of every plan, largely superfluous'.³⁹³ Skinner's report to the Board when ordered to 'repair to Inverness with speed' to 'make a Survey of the old Fort near that place called Olivers Fort', offers one of the very few allusions to methods of survey. On reaching Inverness, Skinner advised the Board that 'As soon as the Weather permitts [sic], [I shall] begin a Survey of the old

³⁸⁸ TNA WO 47/64, pp. 77–78. Hugh Debbeig was a graduate of the Royal Military Academy and assisted William Roy on the Military Survey of Scotland (1747–1755) as a junior engineer. In 1758, Debbeig sailed to Halifax, Nova Scotia, and on arrival became assistant quartermaster-general under Major-General James Wolfe. These surveying instruments were requisitioned for the North Eastern Division of North America where he was responsible for supervising the defences of St John's although in 1764 he was again in Scotland (Kopperman 2004).

³⁸⁹ Widmalm 1990. On 1 January 1758, for example, a warrant was made out to George Adams 'for 24 Perpendiculars of the New Pattern' (TNA WO 47/51, p. 1).

³⁹⁰ For the Paris-Greenwich Triangulation, for example, the Royal Society of London petitioned King George III to finance the geodetic survey and 'A generous and beneficent MONARCH, whose knowledge and love of the sciences are sufficiently evinced by the protection which HE constantly affords them, and under which auspices they are seen daily to flourish, soon supplied the funds that were judged necessary'; Miller 1956, p. 99. George III financed the Jesse Ramsden theodolite and the Board of Ordnance supported the project with manpower.

³⁹¹ In September 1766, John Muller was superannuated and Allen Pollack became Professor of Fortifications and Artillery at the Royal Military Academy at Woolwich (Jones 1851).

³⁹² TNA WO 47/73, pp. 30–31, 36, and 87.

³⁹³ Harley 1978, p. 8.

Remains [...] in order to make my designe's and shall Employ a few men to pen the angles that I may fix its present Situation, and try if any of the Remains of its former Foundations are to be traced'.³⁹⁴ Figure 4.10 is the outcome of Skinner's surveying endeavours: a plan showing the remains of Oliver's Fort.



Figure 4.10 Olivers Fort from William Skinner's 'Plan of Inverness and Olivers Fort, with the Ground Adjacent. No.1.', 1747. Maps K.Top.50.9.b. (Courtesy of the Trustees of the British Library)

Surveying methods were described in detail in military treatises printed and distributed from the beginning of the eighteenth century. The purpose of such instructional texts was to standardise the working methods of the military engineers and, in the process, to establish rules of graphic design with the aim of obtaining a uniform representation, at

³⁹⁴ BL Additional Ms. 17499, p. 5, 16 January 1747.

different scales, of the state's military territories.³⁹⁵ They described the instruments and techniques to be adopted by the engineers engaged in surveying, provided instruction for the most useful scales, forms of representation, and colours to be applied when preparing plans and, overall, prescribed the codification of military mapping, one that would 'avoid', for example, 'the confusion that haphazardly colouring plans with all sorts of colours could cause'.³⁹⁶ As theoretical texts, they were highly valued, and an understanding of their principles was a prerequisite for a prospective Ordnance engineer, one who was to be engaged, for example, in the practical part of fortification:

William Bontein having Signified by letter [...] That in 1744 he applied to the late Master General to be a Cadet but there being no Vacancy, with his Graces approbation he went to Enfield where he had gone through a regular course of the Mathematics, The Theory of Gunnery & constructed M: Vauban's different methods and read several other Books of Fortification and learnt the military Exercises to fit him for the Ordnance Service.³⁹⁷

Successive professors of fortification and artillery at the Royal Military Academy wrote treatises on fortification that outlined to varying extents the procedures of surveying and drawing plans.³⁹⁸ Muller and Landmann provided instruction for 'tracing the plans and profiles of a fortification on paper, with scales and compasses' and students were given exercises in copying '68 Plates' of large-scale 'Plans, Sections, and Geometrical Elevations' contained in Landmann's *Course of Fortification*.³⁹⁹ To follow, the students were instructed on how to implement the practical element of engineering by 'forming a project of a fortification, according to the nature of the ground, [...] to trace it on the ground, [...] together with all the military buildings, such as magazines, storehouses, bridges, etc.' using either a plane table or theodolite.⁴⁰⁰ A plane table was easier to use but in practice less precise:

When a plain table is used, the plan must be drawn on a large scale, at least of 30 fathoms to an inch, which is fastened with sealing wax to the table, so as to lay quite smooth and even; then by means of a ruler with sights, the

³⁹⁵ The main centres of innovation in military cartography were located on mainland Europe rather than in Britain; see Godlewska 1999. For the rationalisation of the production of large scale maps by Vauban, see Warmoes 2008.

³⁹⁶ Vauban 1680, translated from Sanger 1999, pp. 50–51.

³⁹⁷ TNA WO 47/38, p. 5, 10 July 1751.

³⁹⁸ John Muller *A Treatise Containing the Elementary Part of Fortification* (second edition, 1756), *A Treatise Containing the Practical Part of Fortification* (1755); Isaac Landmann *The Principles of Fortification, reduced into Questions and Answers, for the use of the Royal Military Academy at Woolwich* (1796).

³⁹⁹ Muller 1756, p. 19; Jones 1851, p. 45.

⁴⁰⁰ Muller 1756, p. 19.

angles are laid down on the ground, and the lengths of the lines measured by a chain and rod: But when the theodolite is used, the lines and angles must be found by trigonometry, in the manner given in our *Elements of mathematics*.⁴⁰¹

Topographical and route surveys

Some of the most detailed methodologies of surveying in eighteenth-century Scotland come from documents relating to the ‘Military Survey’ (1747–1755). Engineers adopted a similar method for both route and topographical surveys: that of measured traverses with distances and direction recorded and then mapped. The Survey, although carried out at a time of relative peace in Scotland, was the work of rapid reconnaissance rather than a thoroughly measured topographical survey.⁴⁰² Its production combined scientific measurement and aesthetic portrayal, a definitive feature of Enlightenment mapping.⁴⁰³ As with route surveys, the surveyors worked along sets of traverses using theodolites and chains. The theodolites were fairly simple (see Fig 4.11): a graduated circle of seven inches in diameter with a magnetic ‘needle box’ and alidade for measuring angles, made by Benjamin Cole. The iron chains for measuring distance were 45 or 50 feet.⁴⁰⁴ With these ‘common’ instruments, ‘the courses of all rivers and numerous streams were followed and measured; also all the roads and the many lakes of salt-water and fresh’.⁴⁰⁵ Other points were fixed by the intersections of bearings taken from traverse stations, and the remaining landscape features—towns and settlements, enclosures and woodland, and relief—were sketched in by eye.

Regiments under General Churchill’s command were to provide men to assist David Watson, Quarter-Master General to the army in Scotland, and his assistant engineers in carrying out the Military Survey.⁴⁰⁶ In an interview with the map maker Aaron Arrowsmith,

⁴⁰¹ Muller 1755, p. 150. Theodolites were also quite expensive: George Adams reported that ‘the Price of a ten inch Theodolite with a vertical Arch will be about £25 and Protractor of 10 Inches diameter [...] £4 but if the Theodolite be 8 inches the price is 20 Guineas’ (TNA WO 47/73, p. 214, 27 April 1769).

⁴⁰² In his treatise on military surveying, Charles Vallancey contrasted the procedures required for peacetime topographical mapping with wartime reconnaissance mapping. Of the former, Vallancey remarked that ‘a military survey of a country made in time of peace, the angles taken with an instrument and the distances measured with a chain, is of more laborious nature. Being performed at leisure, the omission of any material point would be unpardonable. Here the features of the country are to be carefully depicted and described’ (Vallancey 1779, quoted in Marshall 1981, p. 5).

⁴⁰³ Withers 2007.

⁴⁰⁴ NAS RH1/2/523, p. 1; answers by General David Dundas regarding General Roy’s Survey of Scotland in period 1747–1755, dated 12 January 1806.

⁴⁰⁵ Gardiner 1977, p. 441.

⁴⁰⁶ TNA WO 26/21, p. 364, 1749; General Churchill’s orders to the Regiments ‘to give Colonel Watson such men as he shall want for carrying on his Survey’.



Figure 4.11 The ‘plain’ theodolite (circumferentor) used on the ‘Military Survey of Scotland’⁴⁰⁷



Figure 4.12 Part of a watercolour of a surveying party at the eastern end of Loch Rannoch, by Paul Sandby, 1749. Maps K.Top.50.83.2. (Courtesy of the Trustees of the British Library)

David Dundas recalled how the surveying personnel were placed in groups, in which ‘each Surveyor was attended by a non Commissioned Officer and 6 Soldiers as assistants; One carried the Instrument; Two measured with the Chain; Two for the fore, and back stations;

⁴⁰⁷ Adams 1791, Plate XV, Figure 4, referred to in O’Donoghue 1977, p. 10.

[and] One as Batman'.⁴⁰⁸ Each group surveyed its 'allotted portion' of the country, with William Roy, Deputy Quarter-Master General, being 'the principal Distributor of the whole'.⁴⁰⁹ Figure 4.12 shows a contemporary sketch by Paul Sandby of a surveying party at work at the eastern end of Loch Rannoch. Surveying took place during the summer months. In the autumn, the surveyors returned to the Ordnance Drawing Room in Edinburgh Castle and, through the winter, the separate traverses were collated into a single map, known as the 'original protraction'.

Watson defined which landscape features were to be recorded in a military survey, the specifications clearly intended to provide in map form the essential information required by armed patrols sent out into the Highlands. In a set of 'Orders and Instructions to be Observed by [his] Assistants, in Reconnaîtring [sic], Examining, Describing, Representing and Reporting, any Country, District, or particular Spot of Ground', Watson focused on military functionality from the outset.⁴¹⁰ He explained that:

As the Encampments, Marches, and every possible movement proper for an Army to make in the Field, entirely depend on a just and thorough knowledge of the Country, the greatest care & Exactness should be observed in Examining minutely the Face of that Country.

It was important for a surveyor to record, for example, the land use and the nature of the terrain, whether it was impassable or capable of being traversed by foot or by horse; to be exact in describing the location and size of settlements; to mark all rivers and lakes, where they could be forded, how high the banks were, as 'the nature of any River or water [...] are allways [sic] of the greatest Consequence to Troops in Time of Service'; and to show hills or high ground. Watson explicitly instructed that the state of the roads, their widths and distances between destinations, should be recorded. An engineer was:

Carefully to follow the Line of the principal Roads in their several Boundarys and Turnings, marking the Breadth, and at every half miles distance minutely expressing every Variation or change that happens in the Road, if narrow, hollow, the Depth of the hollow, broken an[d] impassible,

⁴⁰⁸ NAS RH1/2/523, pp. 3–4. In 1805, Aaron Arrowsmith, who was compiling a map of Scotland, rediscovered the Military Survey and investigated its history. He contacted General David Dundas, and some of the other surveyors involved in its original compilation, and described the work in his 'Memoir relative to the construction of a Map of Scotland' (Arrowsmith 1807).

⁴⁰⁹ NAS RH1/2/523, p. 1.

⁴¹⁰ TNA WO 30/115, pp. 199–204. Although the document is undated, it was probably written sometime after 1749 to guide the junior engineers during their work in Scotland (or possibly after 1755 when Watson and his assistants were posted to the south of England to reconnoitre potential invasion routes).

leading through or near any wood or cover, and how far it may continue thro' or close to that cover.⁴¹¹



Figure 4.13 Part of a copy of a ‘Survey of Part of the Road from Sterling to Fort William; Made by the Party of Genl. Pultneys Regiment in 1749’—‘Eight Miles and Forty Five Yards’—surveyed and drawn by George Morrison in 1749. MS 1649 Z.03/39b (Reproduced by permission of the Trustees of the National Library of Scotland)

Almost identical methods were used for route surveys and resulted in ‘long and thin’ images (see Fig 4.13). In his ‘Appendix containing practical observations on Surveying’, Roy provided explicit instructions for completing a survey of roads. In the first instance,

⁴¹¹ TNA WO 30/115, pp. 199–204.

three rather than six men were assigned to an engineer: two to work the chain, the third to carry the theodolite between stations where he was to ‘plant the instrument Horizontally so that the plummet hanging from the Center [sic] of the Instrument may be exactly over the hole where the Stick stood’. If placed correctly, this would save time for the engineer ‘as he then would have nothing to do when he got to the station but to make his observation’. ‘Station Sticks’ were cut from hedges and were 5 or 6 feet long, as straight as possible. The bark was scraped off about a foot from the ground to allow the engineer to read the bottom of the stick and take observations. Roy advised that the sticks be labelled—‘Surveying the Roads’—to prevent people from removing them, not realising their purpose. The chain was checked every morning and any kinks removed. It was also important to ‘very carefully measure the Chain [...] with the ten foot Rod laid out in a Right Line on the Ground’. The chain was firmly fixed at either end with 10 or 12 inch ‘Screwdrivers’. It was left to the three attendees to align and fix the chains while the engineer made notes in his field book.⁴¹²

Watson’s instructions advised that ‘In Reconnoitring to avoid ever trusting any to the memory, but constantly to sketch and mark Memorandums’.⁴¹³ Dundas explained that each surveyor on the Military survey had kept a field- and sketchbook: ‘in the first he noted the angles and measurement of his Stations and the Intersections made from each, with observations. In the second [...] he delineated his Stations and the face of the Country on each side’.⁴¹⁴ Roy recommended the surveyors start on the last page of the notebook, at the bottom of the page and to work upwards ‘by which means your Book always runs as you go on in the Survey’ (see Fig 4.14).⁴¹⁵

By 1785, instructions for carrying out small-scale topographic surveys were more prevalent, based on the technique of triangulation with the surveyor making use of a standard chain and theodolite to create a series of triangles using trigonometrical computations.⁴¹⁶ Roy advocated that a distance of ‘not less than a [British] mile or a mile and a half’ was measured using a standard chain (45 or 50 feet), from which, using a ‘large theodelet [sic]’, a third point visible from both ends of the base line could be sited and distances measured using trigonometry. This process was repeated across the ground to be mapped, producing a series of triangles within which the ‘filling in [...] the interior part of the great triangles [...] may generally be taken by the eye’ and sketched in.⁴¹⁷ By the time such instructions were

⁴¹² TNA WO 30/115, pp. 183–185.

⁴¹³ TNA WO 30/115, p. 202; Watson’s instructions ‘To make Remarks &c on the Spot’.

⁴¹⁴ NAS RH1/2/523, p. 4. The whereabouts of these notebooks, if indeed they still exist, is unknown.

⁴¹⁵ TNA WO 30/115 [B], p. 185.

⁴¹⁶ TNA WO 30/54 and WO 30/115: William Roy’s ‘Instruction for the Engineers involved in the Survey of England’, 1785.

⁴¹⁷ TNA WO 30/54, pp. 85–87, 1785.

circulating, little if any topographical mapping of Scotland was underway, the engineers' attention having turned back to fortification surveys with the advent of the American and French wars.

Field Book

		Sea	
from	9	1600	12
	12	1440	—
		1350	14
	11	1260	10
		900	9
	12	017	6
	10	670	—
		206	6
	12	107	—
		100	14
		W. A. 15 for 0 3 ^d	
	10	1690	12
		1605	14
Coh	16	1216	—
Barn	16	1114	—
		1025	10
		1004	10
	12	914	0
	16	700	—
		300	25
	6	250	—
		240	17
	14	0	3
		W. 16. 14 Direction of a Road	
		E. 45. 15 Close	
		E. 179. 27 for 0 3 ^d	
		E. 22. 12 a Church	

1st beginning at End of Road leading from — to —
2^d Feb 7 1705

Figure 4.14 An example of a surveyor's Field Book, by William Roy, 1785. WO 30/115 [B] (Courtesy of The National Archives, Kew)

Coastal surveys

Few detailed methods of coastal surveying are recounted in the Board of Ordnance minutes or state documents of the time. As with terrestrial surveys, the assumption was that the surveyor would already know what he was doing and so there was little need to provide methodological details. A 'Survey of the Shoars [sic] & Bays on both sides of the Frith of Forth in North Brittain' taken in 1714 does, however, provide some information on the surveying of parts of Scotland's eastern seaboard in the late seventeenth and eighteenth

centuries.⁴¹⁸ The surveyors measured the coastline in similar fashion to taking a route or linear survey, by chaining and using a sea compass to take the bearings of all the headlands and to determine their exact latitude. They noted ‘the severall [sic] heads, Bays, harbours, Rocks, & Depths of Water’ and ‘more particularly sett [them] down in a Mapp’.⁴¹⁹ Navigational hazards—submerged rocks and shoals—were vitally important to include. William Roy recommended that ‘Particular Sea Ports of Consequence [...] will require a scale of about six Inches to a mile’ when mapped.⁴²⁰ In 1813, for example, Lt. Philip Skene of the Royal Engineers surveyed and compiled a detailed plan of the coastline of Long Hope Sound with soundings and rock outcrops and showing the position of the Martello Tower Battery at Hackness, Orkney, and two smaller towers with their gun ranges (see fig 4.15).



Figure 4.15 ‘Plan of Long Hope Sound’, by Philip Skene, 1813. Scale 1: 10,560. MPH 1/620/12 (Courtesy of The National Archives, Kew)

Towards the middle of the eighteenth century, hydrographical surveying in Britain advanced in step with the improvement in land survey techniques. Triangulation replaced coastal traverses. A base was measured along the shore line and then the positions of the

⁴¹⁸ BL Additional Ms. 31149, ff. 155–159, a report on the Scottish Harbours, 1714, lodged in the political papers of Lord Strafford relating to the pacification of the North.

⁴¹⁹ BL Additional Ms. 31149, f. 156.

⁴²⁰ TNA WO 30/115 [B], p. 180, ‘General Instructions for the Officers of Engineers employed in Surveying’.

headlands, rocks, soundings, etc. fixed by intersection; a protracted but accurate method, often supplemented by soundings. This technique was first employed and subsequently described in detail by Murdoch Mackenzie senior who began his survey of the Orkney Islands in 1742. After the publication of eight maps of the Orkneys and Lewis Islands, Mackenzie was commissioned by the Admiralty to chart the west coast of Britain and all the coasts of Ireland.⁴²¹

Battlefield surveys

Battle maps and plans were probably the least scientific and most artistic cartographic depictions completed by the military engineers in eighteenth-century Scotland. Only plans of the 'order of battle' would have been drawn and used in the field of battle (although these not always). They were, generally, simple schematic drawings to show the relative positions of the military units, lacking topographical detail and scale, and were more often drawn by staff officers than by military engineers.⁴²² Artistic portrayals of battles were essentially drawn as a commemoration of the event and were neat composites of sketches made by an eye-witness rather than instrumental surveys of a battlefield. Thomas Sandby entered the Drawing Room in 1743 and was already considered 'a competent topographical draughtsman with a special bent for perspective' by the time he joined the Duke of Cumberland's staff in April 1746, in time for the Battle of Culloden.⁴²³ Sandby drew a plan and a sketch of the battle after the event, possibly with an eye to future publication.⁴²⁴ Both images portray a snapshot of the battle: the topography of the battlefield, the strategic positioning of the military units, and an impression of Hanoverian military discipline. The sketch was a more painterly depiction than the plan, but the plan provided a fuller geographical narrative by including textual information on the positioning and command of the Hanoverian Army, the composition of the Jacobite Army, and the number of wounded or dead from each (see fig 4.16).

⁴²¹ Crone 1978; Headrick 2000.

⁴²² Joseph Yorke, *Aide-de-Camp* to the Duke of Cumberland, drew several 'Orders of Battle' at Culloden in his 'Orderly Book' (BL Additional Ms. 36257, ff. 75 and 100).

⁴²³ Oppé 1947, p. 4. TNA WO 54/208, p. 18. His annual salary was £45.12s.6d.

⁴²⁴ RLW 17177: 'Plan of the Battle of Culloden'; and 14722: 'A Sketch of the Field of Battle at Culloden'.

Drawing Room was also established at Edinburgh Castle.⁴²⁷ When and where it was established is unknown. It may even have been set up—informally—as early as 1671 when John Slezer was commissioned as Chief Engineer of Scotland.⁴²⁸ An Ordnance Drawing Room at Edinburgh Castle was certainly in commission by 1750 when surveyors on the Military Survey of Scotland returned every winter to collate their field notes and sketches and assist in the drawing of the original protractors.⁴²⁹ Tabraham has speculated that the room was located in the storekeeper's pavilion attached to the governor's house, built below Foog's Gate in 1742. In 1811, the pavilion was converted into a new Ordnance Office which hints at its former part-use.⁴³⁰ Another temporary Drawing Room may have been established at Fort George, Ardersier, whilst it was being built. The annual abstract of works in North Britain and their associated costs included, for Fort George, an account 'Reserved for Engineers Travelling &c Overseers Pay and Stationary [sic]'.⁴³¹

One of the principal tasks of a draughtsman was to make copies of maps to be distributed to military and political commanders. Charles Tarrant, for example, was recommended by Desmaretz (senior draughtsman at the Tower Drawing Room) as 'a proper person' to fulfil the Director of Engineers for North Britain, William Skinner's request for a 'Person to Assist him in Copying Plans and helping in several Surveys that are or may be wanted in Scotland'.⁴³² Tarrant was engaged to compile original plans as well as to copy plans of other Scottish fortifications at the behest of Skinner: 'I desire you will tell Mr Tarrant, I expect the plans and profils [sic] I order'd him of Edinburgh &c are all finish'd, likewise those left him to Copy as he has had Six Months to do them in'.⁴³³

Figure 4.17 is an attempt to generalise some of the stages and stemma in the compilation and contemporary circulation of multiple copies of military maps of eighteenth-century Scotland. The whole stems from an original field survey during which notes and sketches were made. These geographical descriptions were collated either into a rough draft or, if the field sketches were competent enough, a fair copy. Finished copies were thereafter made, the original remaining with the engineer or sent to the Chief Engineer of Scotland. In most instances, copies were identical to the original if one allows for differences in the draughtsmen's styles. Sometimes only part of the original plan was copied and then the

⁴²⁷ The Board of Ordnance approved several orders from Skinner for 'Stationary [sic] Wares [...] for drawing Plans and making out the Accounts for the North British Division', to be sent to Edinburgh and later to Fort George, Ardersier (TNA WO 47/42, p. 255, 6 November 1753).

⁴²⁸ Cavers 1993; Millar and Glozier 2004.

⁴²⁹ NAS RH1/2/523.

⁴³⁰ Tabraham 2007.

⁴³¹ TNA WO 47/49, pp. 479–480, 13 May 1757.

⁴³² BL Add. MS 17500, p. 40, 3 May 1750; TNA WO 47/35, pp. 337–338, 5 May 1750.

⁴³³ BL Additional Ms. 17500, p. 211, 20 April 1750 [1751].

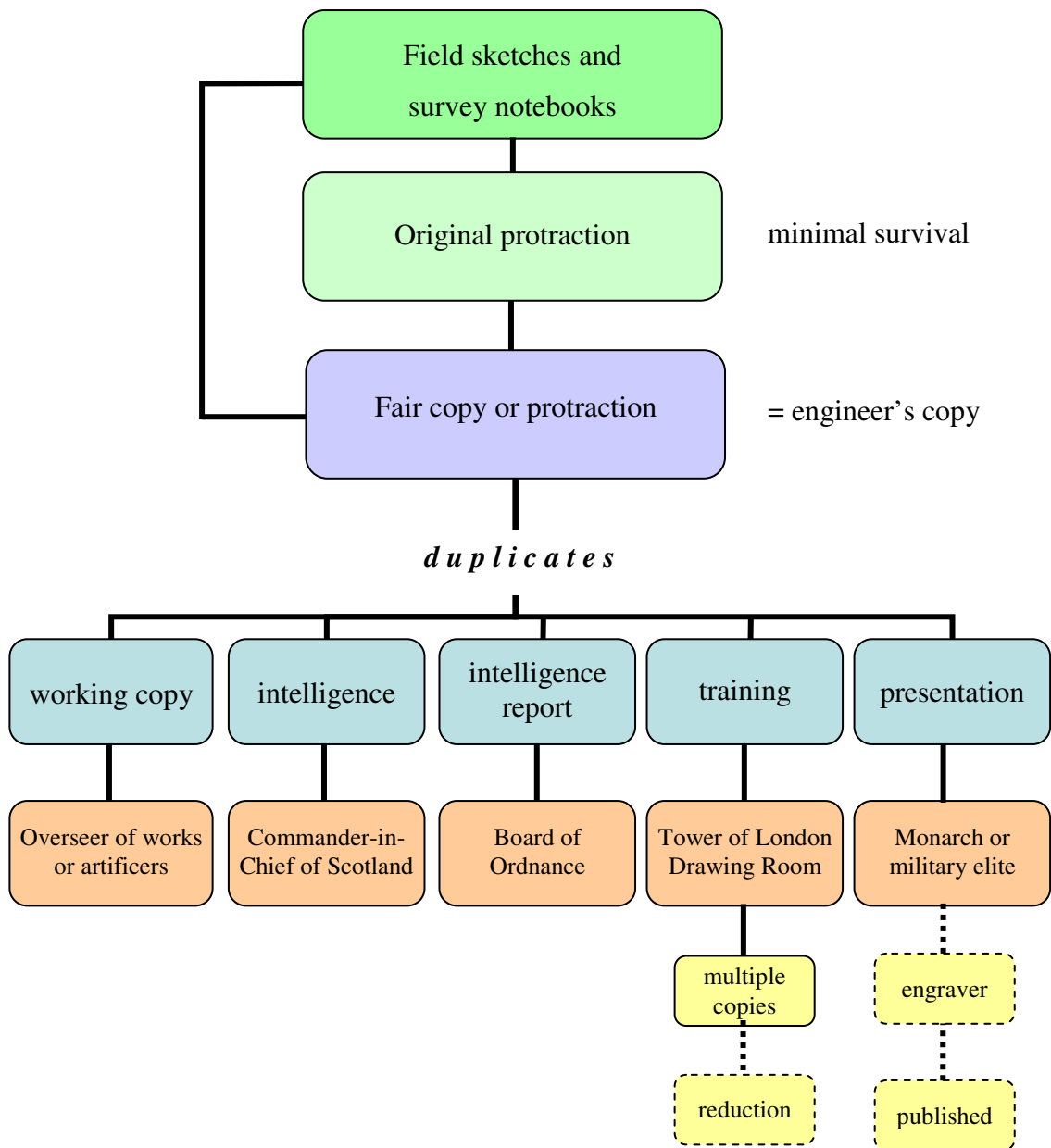


Figure 4.17 Stemma demonstrating the cartographic stages of military maps and their contemporary circulation. Pecked lines indicate exceptions to the rule.

content modified. Maps of Corgarff Castle, for example, include plans and elevations of the ‘Old’ layout alongside plans and elevations of its repair in 1749. The ‘old’ representations were probably copied from earlier plans showing the castle in 1748 ‘as it stands at present’.⁴³⁴ Such plans were variously circulated, but one of the recipients was the overseer in charge of the repairs at the fort or the artificers employed on the works.

⁴³⁴ NLS MS.1649 Z.03/37d ‘Old plan of Corgarff Castle and repairs’, 1749; MS 1649 Z.03/37b Plan of Corgarff Castle as it stands at present, by David Watson, 1748.

Although copying maps and their subsequent circulation was a common event in the genealogy of military maps, both were strictly controlled. When Tarrant was given permission in 1765 to copy plans of Portsmouth, Tilbury, Sheerness Fort, Landguard Fort, Purfleet, Fort George and Edinburgh Castle, he was to make the copies in the Tower Drawing Room and warned that ‘they must not be taken from thence’.⁴³⁵ Caulfeild instructed the engineers surveying the roads to submit their completed plans ‘only to the General Officer Comanding [sic] in North Britain & to the Board of Ordnance’.⁴³⁶ Other plans were included in official reports sent to the Board of Ordnance. The Board, for any given event, reviewed all the plans and associated costs and was ultimately responsible for deciding whether a defence project should be proceeded with or not. David Watson, for example, sent plans either to Skinner as Chief Engineer or directly to the Board.⁴³⁷ Such explicit practice concerning the circulation of military maps reflected the territorial imperatives of the state. The maps were state secrets for the eyes of governing authorities alone; they were not concerned with communicating information of general interest to a civilian population. Only on very rare occasions were military maps of Scotland published. Of the few that were engraved and printed, almost all were maps of battles and were published to meet the public’s demands for cartographical journalism and news of heroic victories. Such maps reflected the ideology of conquest and were able to serve propagandistic purposes.⁴³⁸

In the early 1750s, Tarrant produced a suite of plans of Scottish fortresses, drawn using Indian Ink and colour washes. Two sets of these plans have survived. The first appear in a presentation volume (the recipient not identified).⁴³⁹ It was common practice in the early modern period to dedicate maps of military and political importance to a monarch or military elite. Figure 4.18 is an elaborate frontispiece to several views of Glamis Castle drawn by John Elphinstone in 1746 and dedicated to the Duke of Cumberland. A significant part of George III’s geographical collection was received through presentations deemed appropriate acquisitions for a ruler’s working library. Maps were highly valued aesthetic artefacts but they also reflected the king’s interest in military topography. As a future king, George had

⁴³⁵ TNA WO 47/65, p. 301, 10 May 1765.

⁴³⁶ TNA WO 26/21, pp. 358–360.

⁴³⁷ NLS MS 1645 Z.02/07a ‘An Exact Plan of a Part of Edinr. Castle, showing the Situation of the Powder Magazine &c.’, ‘Receivd with Col. David Watson's Letter dated from Edinburgh 30 apr. 1747’. William Skinner’s cartographic collection—many of the maps and plans drawn by other engineers and draughtsmen—was ‘Handed over to Lieut Monier Skinner RL Engineers by his father in 1872’

⁴³⁸ Godlewska, Létourneau and Schauerte 2005; Luijk 2008.

⁴³⁹ BL Additional Ms. 22875 ‘Plans of Fortifications’ by Charles Tarrant and Joseph Heath (some of the British and dependency plans are initialled J. H.). Joseph Heath and Charles Tarrant were in the Drawing Room at the Tower of London together (WO 47/35, Jan-June 1750; WO 54/210 ‘Establishment’ list for 1748).



Figure 4.18 Frontispiece: ‘To His Royal Highness Prince William Duke of Cumberland &c. &c. The Drawings of the Castle of Glamiss [Glamis] &c. are humbly Dedicated By His Royal Highness's most obedient & most dutiful Humble Servant John Elphinstone, P. Engineer’, 1746. In the background, a battle is being fought [Culloden?] and to the right of the Duke’s portrait, two Highland noblemen beseech him. Maps K.Top.49.23.a.1. (Courtesy of the Trustees of the British Library)

been trained in military fortification and architectural drawing, and his enduring interest in these areas was noted by a contemporary in about 1770: ‘topography is one of the King’s favourite studies: he copies every capital chart, takes models of all celebrated fortifications, knows the soundings of the chief harbours in Europe and the strong and weak sides of most of the fortified towns’.⁴⁴⁰ Tarrant’s plans are held in a gilt-tooled binding with silver clasps. Sixteen relate to Scotland. The remainder are depictions of forts in Great Britain and its dependencies—the British Channel, the Mediterranean, and North America—with notes of their establishments and armouries. Although unsigned, they can be attributed to Tarrant from their characteristic style. The second set of plans is encased in a plain binding that appears to be a reference copy for a cadet in the Drawing Room.⁴⁴¹ Unlike the ‘presentation’ copy, all these plans are either signed or initialled by Tarrant. They may result from a training exercise that included reducing existing plans.

Despite the fact that copies of maps were dispersed during the eighteenth century and again in their subsequent movement in and between archival collections, these

⁴⁴⁰ Quoted in Barber 2003, p. 158.

⁴⁴¹ TNA WO 78/6012. This plainly-bound, slim volume was received by TNA from the War Office in April 2005. On the inside front cover is the inscription ‘John Angell Tower 1750’.

manuscript military maps are united in their source and their interdependent use. That use was, to varying degrees and at varying times, pragmatic, pedagogic, aesthetic, decisive and directive. And in all, copies permitted geographical information to be transmitted through time and space from a point of origin—a field survey of an event—to interested audiences.

Conclusion

The extant archive of Board of Ordnance maps and plans of Scotland, c.1689–1815, provides a vital record for the interrogation of military cartography in Scotland. Engineers were commissioned by the Board of Ordnance to map and report on Scotland's military landscape, the precise aim of the maps being to provide data useful in defence and attack, and to represent territorial features that might be of political and military importance.

This chapter has analysed the surviving map archive and, using Harley's 1978 methodological model, has offered some statistical generalisations about the numbers and diversity of military maps. The archive has shown that, as with many European states at this time, the principal realms of military activity were fortification, movement, and battle. Of the 940 surviving cartographic records of Scotland's eighteenth-century military activities, 73% are maps, plans, section, elevations, and views of fortifications; 22% are concerned with planning or carrying out acts of military movement; and 5% record battlefield events.

Rather than deal with numbers alone, we need to remember the political reasons for the state commissioning maps in the first place. The proportions provided above, for any one time and in any one space, varied. At a particular time and in a particular space, the military and political concerns of the state determined the military activity and therefore its representation. I have shown, for example, that initial imperatives at the end of the seventeenth century were directed towards repairing the medieval castles at Edinburgh, Stirling, Inverness, Blackness, and Dumbarton, and for establishing a garrison in the Highlands, at Fort William, in order to overawe the populace. Following continued acts of dissent in the wake of the 1715 and 1719 uprisings, which were themselves cartographically depicted, George Wade's assessment of affairs in Scotland identified the need for more mobile strategies of warfare. From the mid-1720s, military mapping practices in Scotland no longer looked solely at fortification. Instead, surveys were made and maps compiled to connect the forts one with the other by means of roads and by making use of Scotland's many inland waterways and extensive coastline for troop movements and for distributing stores.

Fortification cartography continued, however, to dominate military mapping practices throughout the eighteenth century. First, cartographic concerns were concentrated in Scotland's interior and then, when the threat to British hegemony was greater from outside the country, engineers were redirected to the coast, the eastern seaboard especially. Although these imperatives sustained fortification cartography, they also prompted cartographies of military movement. The nation's defence depended on the quick movement of troops and this required roads suitable for man and machinery to use for access to remote parts of Scotland. Maps were drawn to plan routes and to record the conceptual spread of military access. Events during and just after the 1745 Rebellion, however, emphasised the discrete nature, until this time, of the military mapping of Scotland. Military commanders in Scotland found they lacked maps at appropriate scales to plan the campaign of 'Forty-Five. In its wake, the first military survey of Scotland was made in an attempt to open-up the nation to military and political politics. Despite the Military Survey never fulfilling its intended role, its conception and the other military maps of Scotland signified to acts of political territorialism on the part of the British government. The maps represented key symbols of military interest: forts and castles represented defence against attack; distances marked on roads indicated troop movements; barracks, housing for troops posted for defence, attack, or subjugation.

In the process of surveying and mapping Scotland, this chapter has shown how the engineers did more than just record the landscape: they also changed the Scottish landscape. Through the various mathematical and technological practices of surveying, the engineers produced 'blueprints' from which they reconstructed and restored medieval fortresses, designed and constructed new fortifications, and planned and built roads and bridges. In this sense, the government of Scotland can be considered to be associated with the geometrical organisation of space. Mapping by state engineers made these maps of Scotland indispensable tools in the acquisition of national knowledge, in the formulation of military policy, and in the processes of military control, administration and development.

Military engineering and its cartographic representation for political authority and military domination can best be examined in the next three chapters which consider fortification, movement, and battle. In each of these realms of military activity, the state's use of engineers to observe, to measure, and to map the military landscape was a way of knowing the land in order to govern it.

CHAPTER 5

Fortification Cartography: the Art of Design

Fortification, or Military Architecture, is an Art, which teaches Men to fortifie [sic] themselves with Ramparts, Parapets, Moats, Covert Ways and *Glacis*'s, to the end the Enemy may not be able to attack any part without great loss of his Men; and that the small Number of Soldiers which defend the Place may be thereof able to hold out for some Time.⁴⁴²

The main skill then in all Military Architecture is fitting a Design to the Situation, with regard also to all such works as may be already built and that the Stronge [sic] part be made to oppose where there is most danger, else a place may be little better for what is done.⁴⁴³

Introduction

Changes in the nature of warfare in early modern Europe, in particular revolutionary developments in attack strategy, saw a corresponding revolution in the design of fortifications.⁴⁴⁴ In Scotland, the impact of the evolution of gunpowder artillery and the use of mines led to a transformation in the architecture of defensive structures: in the strengthening of medieval castles, in the construction of bastioned fortresses, citadels and 'barrack forts', and in the development of deeper defences extending into open country. Military engineers at work in eighteenth-century Scotland quickly learnt to mould what they borrowed from continental European conceptions to their own requirements in re-shaping and in representing the nation's fortresses. The construction of new fortifications and the restoration of old ones required accurately surveyed topographical site plans. The result is that fortification cartography forms one of the best defined genres of military cartography for this period.⁴⁴⁵

Designs for forts, fortifications, barracks and buildings rationalised the ways in which works were both conceived and put into practice.⁴⁴⁶ Rationalisation occurred at three

⁴⁴² Vauban 1702, p. 61.

⁴⁴³ Talbot Edwards, Second Engineer to the Ordnance: TNA WO 55/319 p. 122.

⁴⁴⁴ Hale 1977; Parker 1988; Pollak 1991; Duffy 1996.

⁴⁴⁵ Harley 1978; Marshall 1980.

⁴⁴⁶ Picon 1992.

different levels. The first was that of training: through instruction in the military sciences, including practices associated with cartography, taught at the Royal Military Academy. Not all the engineers who saw service in Scotland received formal training, particularly before the Academy was established in 1741. John Romer, for example, learnt the skills of an engineer from his father—Wolfgang William Romer—a Dutch military engineer who served under William, prince of Orange, and accompanied him to England in 1688. Wolfgang Romer was overseer of the works at Albany, New York, and Portsmouth, where he was assisted by his son. In 1710, John Romer served in Ireland then, from 1715, he was engineer at Sheerness, Tilbury, Gravesend, and Portsmouth before being posted to Scotland in 1720.⁴⁴⁷ Other engineers were sent to continental Europe to study the ‘Art of Fortification’.⁴⁴⁸

The second level of rationalisation was concerned with the practical part of fortification: the construction of works, from conception of the architectural form to the realisation of building, and the quantities and costs of materials. By the eighteenth century, the planning and cartographic recording of fortifications was an established practice, in Europe especially, with designs of forts conforming to one of several regular shapes—such as the star, triangle, or square—or in the case of Scotland, irregular to account for variations in the local topography. George Wade, when considering the site for a new fort at Inverness in 1727, chose a hill ‘on the South-side of the River Ness, near the place where it falls into the East Sea’. The topography caused the new Fort George to be ‘irregular as are all the other Castles and Forts in Scotland, which are generally built upon Eminences incapable by their situation to admit of regular Works’ (see Fig 5.1).⁴⁴⁹

The third level was the territory. Through surveys made using standard eighteenth-century instruments—including the plane table and alidade, theodolite, compass, and chain—and designs executed at relatively large fortification scales, an engineer structured space. Coincidentally, he represented the territorial imperatives of the British state. For

⁴⁴⁷ Morgan 2004. John Lambertus Romer (*b.* 1680, *d.* in or after 1751). For his posting to Scotland, see TNA WO 47/33, p. 88, 13 February 1720

⁴⁴⁸ TNA WO 54/66, 31 March 1708, a warrant for Talbot Edwards and Peter Carles to travel ‘into foreign parts to perfect themselves in the Art of Fortification & the Mathematiques [sic] as may render them capable to serve her Majesty as Engineers’; also WO 54/67, 31 March 1709; WO 54/68, 31 March 1710, a warrant for Peter Carles and John O’Bryan; WO 54/69, 31 March 1711, and WO 54/70, 31 March 1712, for Peter Carles and James Moore. I am grateful to Chris Fleet for these references. Even after the Academy became established, engineers went abroad ‘to improve themselves in their Profession’. In 1750, for example, Dugal Campbell, Sub-Director of Engineers, wrote to the Board to request ‘leave to go abroad to visit the Fortifications in Flanders and Germany to make what Observations he could in his Business which he had not opportunities of doing at home’ (TNA WO 47/35, p. 468. 15 June 1750; WO 54/210, pp. 21–25, Officers and Attendants belonging to the Military Branch of the Office of Ordnance).

⁴⁴⁹ BL Additional Ms. King’s 103, ff. 18–19.



Figure 5.1 Part of ‘A plan of part of the town of Inverness with a project for Barracks on Castle Hill Secured with lines of Defence’, by John Lambertus Romer [and George Wade], 1728, showing the irregularly-shaped Fort George (south is to the top of the sheet). Acc.10497 Wade.58j (Reproduced by permission of the Trustees of the National Library of Scotland).

Mukerji, ‘The intelligence of engineering is not just pragmatic, but also deeply invested in social, legal, and moral conceptions of power’.⁴⁵⁰ State-sponsored mapping was understood as a legitimate tool of government.

This chapter examines the second and third levels of rationalisation: the drawing-up of fortification plans, construction, and the territory. I explore the use of maps in the service of the government, emphasising the utility of cartography in state building projects and its use of the geometrical foundations of military architecture to measure and structure space.⁴⁵¹ This involves a study of the mapping process at the compilation and design stage as well as a study of the aesthetics and semiotics of the finished map.⁴⁵² The chapter is in three sections. The first appraises the work of the military engineers and their endeavours to rationalise and

⁴⁵⁰ Mukerji 2003, p. 657.

⁴⁵¹ Pollak 1991; Picon 1992; Kagan and Schmidt 2007.

⁴⁵² Jacob 2006; Cosgrove 2008.

codify fortification cartography. A study of the conventions applied to maps and map making allows for a review of how the Scottish military landscape was figuratively portrayed in fortification maps. The second section describes the archive with reference to spatial and temporal variations in the mapping of fortified places. This review of the nature of the cartographic records reveals a changing typology in the mapping and construction of fortified spaces in Scotland between 1689 and 1815, the characteristics of which I describe in greater detail in the third section.

A Codification of Scottish Fortification Cartography

Conventions of cartographic design and scale

An essential component of military cartography was the types of representation used in their design.⁴⁵³ Engineers had to design fortifications to consider not only their mathematical and scientific conception but their location and strategies of defence and attack. Certain ‘conventions’ of design were popularised in the seventeenth and eighteenth centuries—the horizontal section or plan, the vertical section or profile, and the perspective, axonometric, or bird’s-eye view—and were of fundamental importance to the military engineer.⁴⁵⁴ The scientific definition of plan, section, and perspective view enabled an engineer to visualise a fortification before building, to check its dimensions, accuracy, and strategic planning, and to document existing fortifications for reconstruction and restoration purposes. In 1710, for example, Talbot Edwards was commissioned by the Board of Ordnance to review proposals by Theodore Dury and John O’Bryan for fortifying Edinburgh Castle.⁴⁵⁵ Dury submitted plans for improving the security of the castle’s entrance with a hornwork (see Fig 5.2). O’Bryan objected to these works on the basis that the ‘designe [sic] was found too broad for the Hill intended to be built upon, and too Short to leave room for standing of the old Countergarde to the Castle gate’.⁴⁵⁶ Edwards’s initial report was based on an analysis of each

⁴⁵³ Buisseret 2003.

⁴⁵⁴ These are definitions of the three means of representation in military architecture: ‘In building, the term *ichnography* may be used, when by design is only meant the plan of a building, or a flat figure drawn on paper; when some side or face of the building is raised from the ground, we may use the term *orthography*; and when both front and sides are seen in perspective, we may call it *scenography*’ (Smith 1779).

⁴⁵⁵ TNA WO 55/345 pp. 113–116, 18 March 1709/10 [1710], a summary report by the Board of Ordnance to Queen Anne and the Privy Council on the defences of Edinburgh Castle which include the Duke of Marlborough’s orders to send O’Bryan to Scotland to ‘make Draughts & report his Opinion’ of the works proposed by Dury. Both O’Bryan’s and Dury’s proposals were then sent to Talbot Edwards ‘whom We [the Board] humbly conceive to be the ablest Engineer We have’.

⁴⁵⁶ TNA WO 55/319 pp. 122–126, 10 January 1709 [1710] ‘A Report concerning the Fortifying Edinburgh Castle’, esp. p. 122.

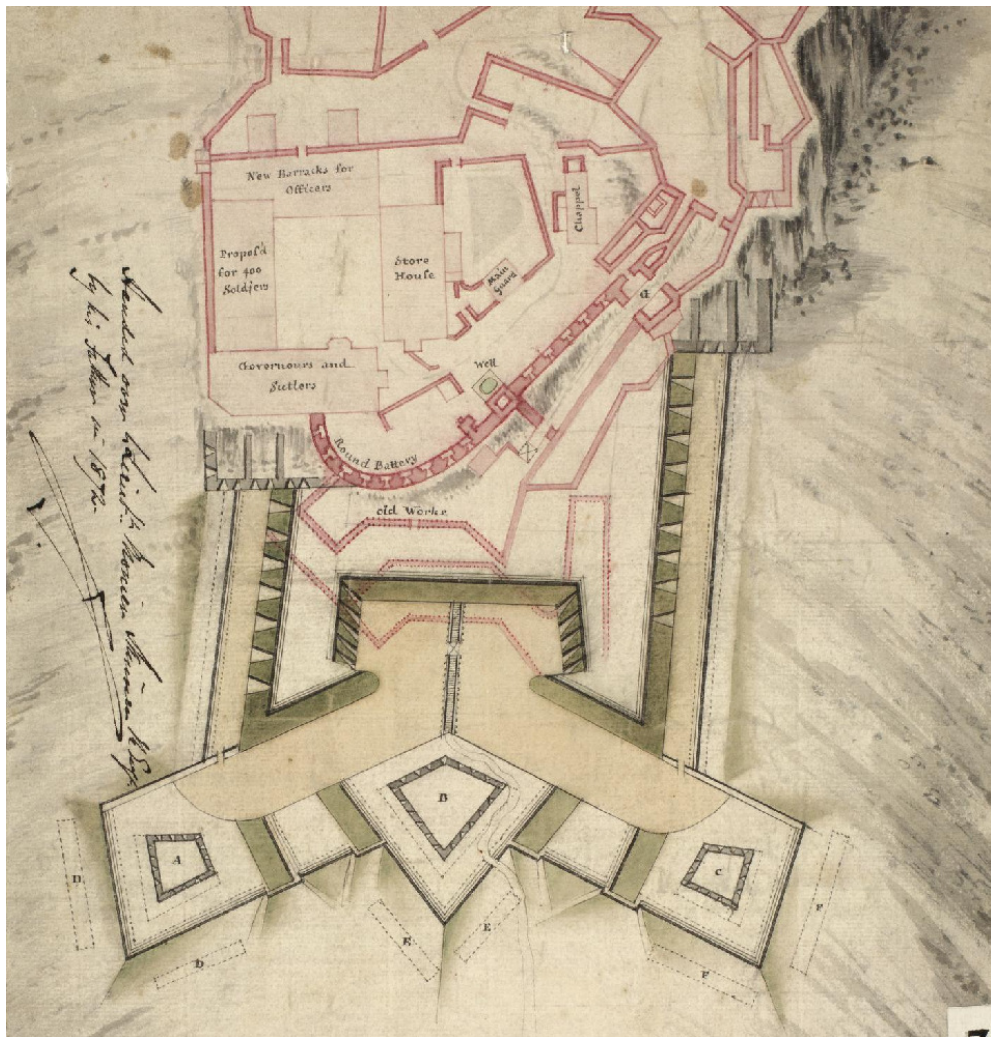


Figure 5.2 Part of a 'Plan of the Works proposed to be made at the Castle of Edinburgh', by Theodore Dury, 1709. MS 1649 Z.03/58b (Reproduced Courtesy of the Trustees of the National Library of Scotland)

engineer's plans and, in justifying his modification of Dury's designs, for example, Edwards explained to the Board that:

The Hill going up Westwardly from the Town seeing by the Draughts, the most likely place for an Attacque [sic] against the Castle, the Dispute as I have before Observed to your Honours, is how the same should be fortify'd for better securing the Entrance. *The main skill then in all Military Architecture is fitting a Design to the Situation*, with regard also to all such works as may be already built and that the Stronge part be made to oppose where there is most danger, else a place may be little better for what is done.⁴⁵⁷

⁴⁵⁷ TNA WO 55/319 p. 122, emphasis added.

A drawing of a fortress, one based on survey and measurement, could thus resolve in advance a problem implicit in a design and permit the possibility of planning and executing fortifications on any site.⁴⁵⁸

The plan was the most abstract representation—a result of the use of accurate scales—and responsible for placing each part of a building, fortification or settlement in precise relationship to the others. The practical utility of this made ‘the plan’ the most popular form of representation. The archive of Scotland’s fortification cartography comprises just over three hundred manuscripts representing the military landscape in plan only; a further two hundred and twenty items provide multiple perspectives, showing a vertical section, profile or elevation on the same sheet as a plan; and about seventy-five manuscripts show sections, profiles or perspective views only.⁴⁵⁹ The advantage of proportional plans and profiles, especially the latter, to an engineer was in the measurements they allowed to be attached to them.

In representing the Scottish fortifications, the military engineers adopted a practice similar to that used in France since the sixteenth century and extensively rationalised by Vauban in the seventeenth, one based on the hierarchical organisation of cartographic representation through the use of different scales.⁴⁶⁰ When Vauban established rules of design to be used by the engineers, he revised the scale of plans and maps. He directed that ‘L’échelle des Plans des Places fortifiées sera d’un pouce de Roy pour cent toises [approx. 1 inch to 100 toises or 600 feet or 1: 7,200], & pour les cartes, le mesme pounce de Roy pour quatre cens toises [approx. 1 inch to 400 toises or 2400 feet or 1: 28,800]’. The scale used on plans was further adapted for representing small fortifications:

Lorsque les Ingénieurs leveront des Plans particuliers des grandes ou petites Citadelles ou Chasteaux, pour en rendre les mesures plus sensibles ils donneront aux Plans des grandes Citadelles ou Chasteaux un pounce pour vingt cinq toises [1 inch to 25 toises or 150 feet or 1: 1,800] & aux plans des

⁴⁵⁸ Pollak 1991.

⁴⁵⁹ This roughly equates to nearly 45% of the fortification cartography being representations in plan only; c.32% in plan and section, profile or perspective; and c.11% in vertical profile only; the remainder including scenographic and landscape views.

⁴⁶⁰ The cartographic representations of forts in France in the sixteenth century, for example, consisted of a chorographic plan of the surroundings of the fort (drawn up at a distance of between 1500 and 800 toises around the town to show the surrounding topography), a central plan (drawn up at a distance of 350 toises around the fort to show the built up enclosure and the perimeter of the ‘attack zone’), as well as individual plans giving details of the different buildings and military structures making up the fort (Warmoes 2008, p. 56). See also Émilie D’Orgeix 1999, pp. 36–42, on the atlases of the French provinces of Picardy, Champagne, Brugundy and Provence.

petites un pounce de Roy pour dix toises [1 inch to 10 toises or 60 feet or 1:720].⁴⁶¹

French maps were generally considered ‘logical in treatment, brilliant in design, and clear in presentation’.⁴⁶²



Figure 5.3 ‘A Plan of Fort Augustus with the adjacent Lands, Abraham Daubant, 1750, at 1: 2,400 (200 feet to an inch). MS 1647 Z.02/67a
(Reproduced by permission of the Trustees of the National Library of Scotland)

Engineers in Scotland did much to emulate French practice. They popularised three main types of fortification map. The first was a topographical plan of a fort’s situation, drawn at a scale between 200 and 500 feet to an inch or smaller (1: 2,400 to 1: 6,000). This plan was designed to show the immediate environs of the fort. Any roads, settlements, existing military establishments and fortifications were mapped, as well as land use including woodlands, scrub, morasses, and fields, soil types and land ownership (see Fig 5.3). Often included on such plans was a ‘Red prickt line’ to circumscribe the land to be invested by the Crown.⁴⁶³ This was usually a distance of 2 miles surrounding the fort, ‘to be taken in to prevent the making of any Cover near the said fort’.⁴⁶⁴

⁴⁶¹ Warmoes 2008, p. 58.

⁴⁶² Tooley 1949, p. 2.

⁴⁶³ NLS MS 1647 Z.03/06d ‘Plan of the Fort Barrack of Bernera in Glen Elg’, [by John Henri Bastide] in c.1719. Plans of Fort George at Ardersier, for example, show a two mile delineation: BL Maps

The second was a more detailed large-scale plan of the fort itself—the *trace* or ground plan—showing the enceinte, or main perimeter of the ‘attack zone’, and the parts of the fortification including any long straight walls of the curtain, the angular bastions, near diamond-shaped ravelins, covered way, place of arms, and deep defences such as the glacis (see Fig 5.4).⁴⁶⁵ Scales of these plans fell between 40 and 100 feet to an inch (1: 480 to 1: 1,200), or sometimes smaller if part of the adjacent ground was shown.

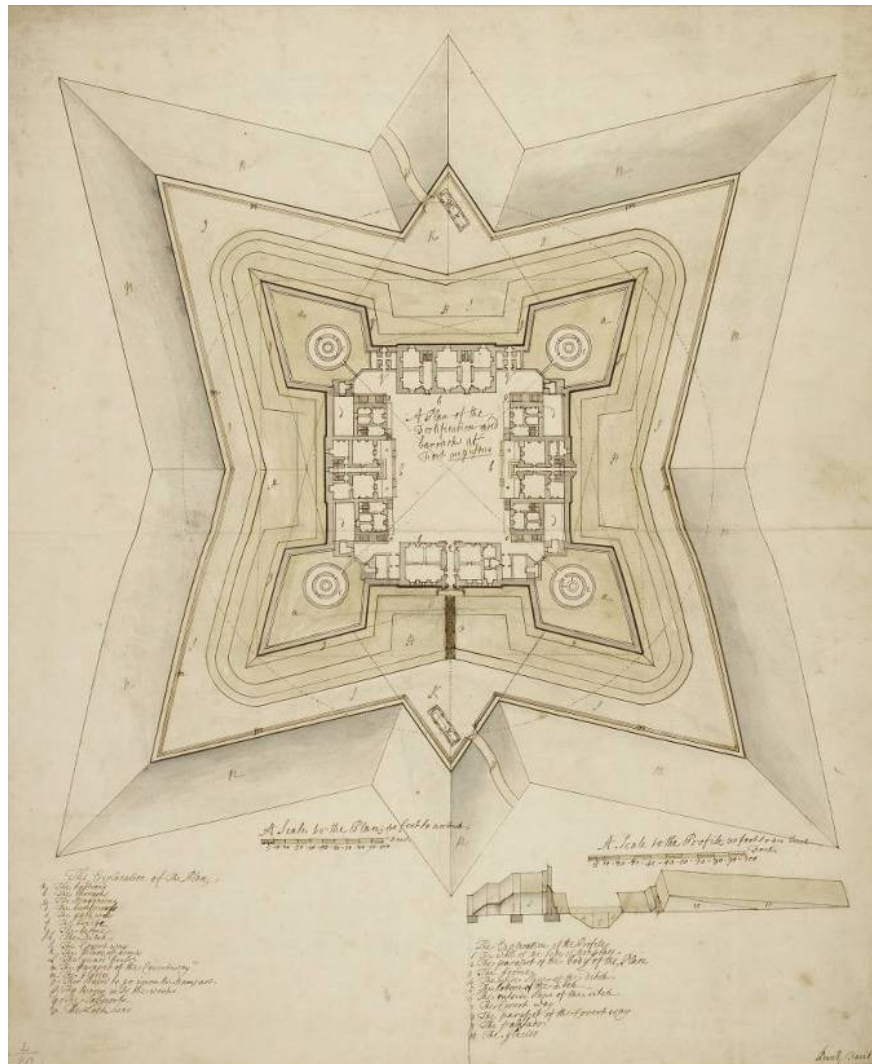


Figure 5.4 ‘A Plan of the Fortification and Barracks at Fort Augustus; with a profile’, by Powell, [post-1742] at 1: 480 (40 feet to an inch). Maps K.Top.50.20. (Courtesy of the Trustees of the British Library).

K.Top.50.25. and Maps K.Top.50.26 ‘A Plan of the Point of Arderseer and Two Miles of Ground round it with ye Number of Acres Contain’d therein Expressing the Different Soils and Person’s Possessions’, William Skinner, 1750, at 1: 6000 (500 feet to an inch).

⁴⁶⁴ BL Additional Ms. 17499, p. 123, instructions from the Board of Ordnance to Skinner concerning the ‘purchase of a Parcel of Land’ round the projected fort at Arderseer point, 24 May 1748.

⁴⁶⁵ Duffy 1985.

The third type of map was generally at the largest scale, between 2 and 40 feet to an inch (1: 24 to 1: 480) and represented plans of the individual fortress buildings such as barracks, powder magazines, storehouses, and gun batteries. These plans were frequently accompanied, or even replaced, by a cross-section, vertical profile or elevation, and gave particular attention to the inclusion of measurements of elevation. Such measurements, when combined with data on distances, could inform an artillery officer of the best position for gun emplacements in order to command the surrounding territory. They were of equal importance to the engineer for designing barracks and estimating the capacity to accommodate soldiers in each room, storey and, ultimately, the size of the garrison, and to calculate the storage capacity of powder magazines and storerooms to service that garrison. The cross-section with the ground plan of Fort Augustus (see Fig 5.4) is at a scale of 30 feet to an inch (1: 360) and sets out the relationship between the outer defences: the ditches, covered way, parapets, palisades, and glacis. Figure 5.5 provides detailed sections and elevations at 20 feet to an inch (1: 240) of barrack buildings drawn in relation to the defences as well as showing the building foundations. In most maps, as the level of detail increased, an alpha-key or explanation was provided to explain the different parts of the fortification.

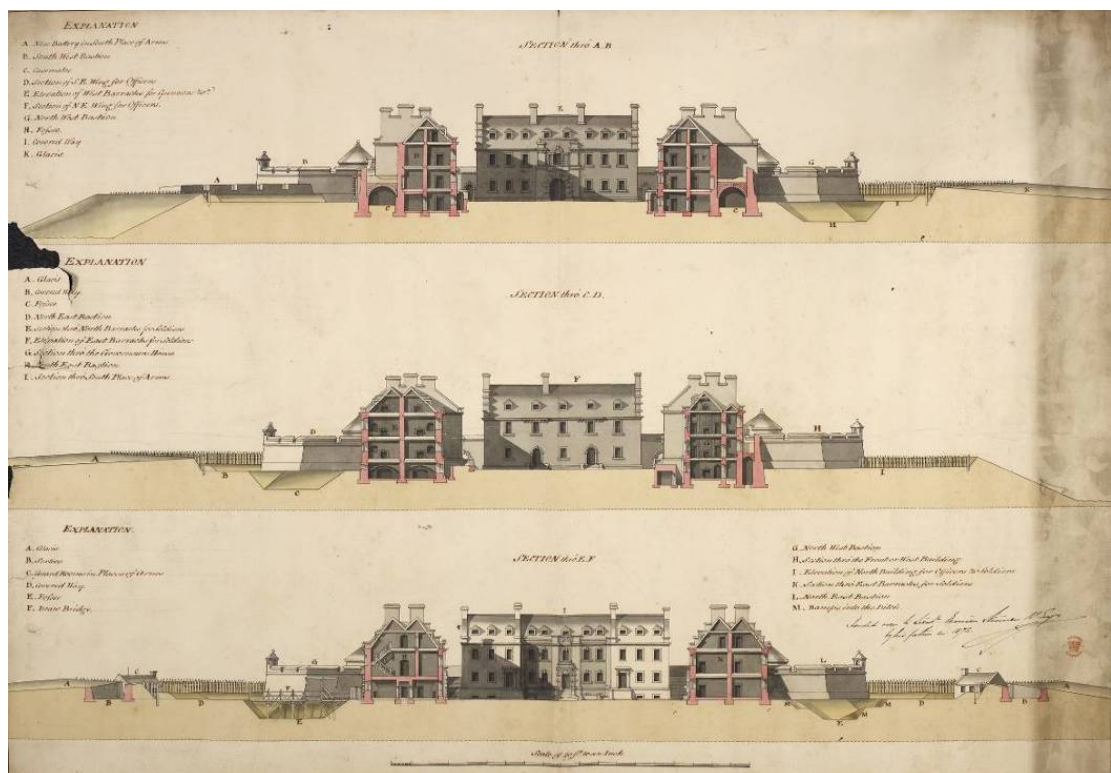


Figure 5.5 'Section thro' A.B; C.D; E.F' [Fort Augustus], [by William Skinner] between 1746 and 1749, at 1: 240 (20 feet to an inch). Additional Ms. 33231 D5 (Courtesy of the Trustees of the British Library)

Military maps of Scotland do not conform exactly to the French model. Although clearly forming a representational hierarchy and offering clarity in content and presentation, the numerical values for their associated scales differ from equivalent French fortification maps. There was relatively little guidance about scales in the military treatises to regulate the work of the British engineers. For a plane table survey of a fort, Muller recommended a 'large scale, at least 30 fathoms to an inch' (180 feet or 1: 2,160).⁴⁶⁶ The most explicit description of the hierarchical scales to be used in eighteenth-century representations was included in unpublished instructions to British engineers issued in about 1740:

The following Measures for the Geometrical Scales are certainly the most useful, being applicable to all sorts of Practice and being aliquot parts each of the other, the Plans Surveyed to any one of them may be readily enlarged or contracted as occasion shall require:—

- 1st. A Scale of 1600 Feet to an Inch [1: 19,200] for the General Map of a Coast or small Island, &c.
- 2nd. A Scale of 800 Feet to an Inch [1: 9,600] for the Plan of a Town and parts adjacent.
- 3rd. A Scale of 400 Feet to an Inch [1: 4,800] for a particular Plan of a Town or Settlement.
- 4th. A Scale of 200 Feet to an Inch [1: 2,400] to Survey the same by.
- 5th. A Scale of 100 Feet to an Inch [1: 1,200] for a particular Plan of a Fort Battery or the like.
- 6th. A Scale of 10 Feet to an Inch [1: 120] for a Magazine or particular Building, Sections, or Profils [sic] of the same.
- 7th. A Scale of 5 Feet to an Inch [1: 60] for a Draw-Bridge, Gun Carriage, or any other Carpenter's Work.⁴⁶⁷

As late as 1791, the Master-General of the Ordnance issued a directive to the Chief Royal Engineer at the various military stations, both at home and abroad. They were directed:

to transmit to the Board Plans of the works, buildings & Lands belonging to the Ordnance at each Place describing the Boundaries of such Lands and the names of the Proprietors of the Lands adjoining thereto the Plans to be upon the Scale of Twenty feet to an Inch [1: 240] provided each plan can be contained on two large Sheets of drawing Paper but if not, the Lands or

⁴⁶⁶ Muller 1755, p. 150.

⁴⁶⁷ Porter 1889, p. 150. These instructions were included in some notes belonging to Major William Eyres of the Royal Engineers. Eyres first appears in the Military Branch 'Establishment' records in 1745, as a Practitioner Engineer on £54 15s (TNA WO 54/209, pp. 10–12).

Works are to be described on such a Scale as will bring them into that compass and in such cases they must be accompanied with separate plans of the Buildings upon the Scale of 20 feet to an Inch with References to the General Plan whereon they are expressed upon a smaller Scale.⁴⁶⁸

The extent to which the maps and plans of Scottish fortifications conformed to a conventional approach to scales is indicated in the histogram, figure 5.6, showing fortification scale incidences in the archive collections: a) before the 1740 directive on ‘Geometrical Scales’ was issued; and b) after the directive was released.⁴⁶⁹ Included on this chart are markers for the recommended French (blue vertical lines), British (red vertical lines) fortification scales, and the additional 1791 directive (green vertical line). The similarity in the incidence of scales before and after 1740 indicates that the instructions of 1740 manifested established practices rather than constituted new reform. Analysis reveals, however, a much wider scatter of scales than the seven values given in the 1740 instructions, with significant coincidences only occurring with the fourth (200 feet or 1: 2400), fifth (100 feet or 1: 1200), and sixth (10 feet or 1: 120) fortification scales and with the 1791 directive. Likewise, correlation with French scales is minimal. In practice then, there was much greater variation than in theory.

There may be many reasons why the engineers in Scotland did not consistently follow the 1740 instructions once they were issued. One, for example, may be explained by an underlying trend that conforms to Muller’s recommendation in his *Treatise*. He suggested that ‘when a plan of a fortification is to be drawn, which is to be executed, it will be convenient to have a scale divided into equal parts: as for example, an inch divided into 20, 25, 30, 35, 40, 45, 50, 55, 60 [feet]’; profiles were to be drawn on a scale of thirty feet to an inch (1: 360). Muller continued: ‘any other scale will do, which may be greater or less, according as it is thought most convenient’.⁴⁷⁰ This offered a choice of scale. Scales remained ‘aliquot parts each of the other’ and could easily be enlarged or reduced by a draughtsman. Another reason may relate to the instruments available to the engineers. Many of the scales have a direct relationship with the 50- and 100-foot chain, standard surveying instruments for the British engineers, and prescribed with the 1740 instructions: ‘a Chain of One Hundred Links, each Link one Foot in length, is the most proper to be used with the

⁴⁶⁸ TNA WO 47/118, pp. 576–577, 6 December 1791.

⁴⁶⁹ 105 of the 677 fortification plans in the archive have no reference to scale and are not included in the histogram.

⁴⁷⁰ Muller 1756, pp. 13–14.

above Scales'. If a chain was not available, scales were to be calculated in paces where 100 feet was equivalent to '20 Geometrical Paces, or 40 Common Paces'.⁴⁷¹

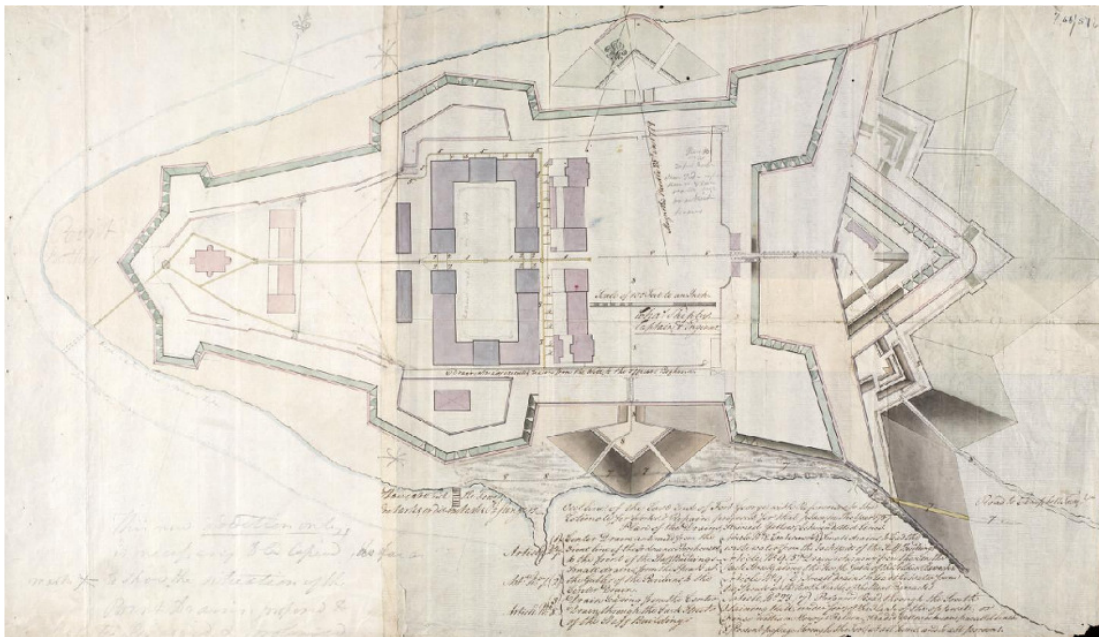


Figure 5.7 'Outline of the East End of Fort George with References to the Estimate for Works & Repairs proposed for that place, in the year 1787', by Sir Charles Shipley, at 1: 1,200 (100 feet to an inch). MS 1650 Z.46/57i (Reproduced by permission of the Trustees of the National Library of Scotland)

The graph shows a distinct skew towards large-scale maps, between the 5th and 7th fortification scales (1: 1,200 and 1: 60). A large number of fortification maps relate to the repair of Scotland's military establishments (see Fig 5.7). Once a fort was designed 'to fit the situation' and built, the main responsibility of the engineer was to periodically inspect it, to assess its state of repair, and to maintain it in good defensive order. Maps within this scale range therefore represent both the construction and reconstruction of the nation's forts. In 1787, for example, the Board

Ordered that four letters from Captain Rudyard Royal Engineer
Commanding in North Britain dated 27th January, 12th March, 6th April & 5th
May inclosed [sic] several Estimates for Repairs &c in Scotland be
transmitted to the Committee of Royal Engineers at the Tower and that they
be desired to report their Opinion fully thereon.⁴⁷²

The first of these letters from Rudyard concerned the repair of the North Place of Arms at Fort George, Ardersier, which involved forming 'a New project and Estimate agreeable to a

⁴⁷¹ Porter 1889, p. 150.

⁴⁷² TNA WO 47/109, p. 881, 24 May 1787.

plan [...] and that until the same were received nothing further could be done towards the said Repairs'.⁴⁷³

Painterly presentation: colour conventions

Colours used in the maps and plans of Scottish forts similarly suggest standardisation of graphic representation. Over three-quarters of the maps of fortification cartography of Scotland include some colour,⁴⁷⁴ ranging from small 'patches' of carmine to depict masonry in elevations of buildings (see, for example, the sections through the barracks at Fort Augustus, Fig 5.5), colour used to outline fortification and building perimeters with no colour in-fill (generally when a plan was unfinished),⁴⁷⁵ to full-colour maps. In practice, the fundamental colour specifications adopted by the British engineers matched those formulated by Vauban:

The engineer at the end of the year will produce a plan large enough to allow all its elements to be clearly distinguished with all the characteristic features that need to go with it: on which he will be sure to give a red wash to all completed stone-faced structures; Indian Ink or grey if they are simply earth or turf; distinguishing the parapet from the terreplein by a darker layer where it begins. Where it does not yet exist the wash should be uniform, but note that as the structure progresses and nears completion, so should the wash be intensified to match the colour of those on finished structures.

Vauban explained that proposed works not yet completed should be given a yellow wash, and that parts of the former outline of the fort encompassed within the new design should be represented by dots. 'This rule must be followed exactly to avoid the confusion that haphazardly colouring plans with all sorts of colours could cause if the meaning of one were mistaken for that of another'.⁴⁷⁶

⁴⁷³ TNA WO 47/109, p. 88, instruction from the Committee of Engineers to Captain Rudyard dated 19 January 1787.

⁴⁷⁴ For the archive, the ratio of colour maps to maps drawn with Indian Ink only is approximately 3:1.

⁴⁷⁵ See, for example, BL Additional Ms. 33231 E 'Survey of Inverness', 1750.

⁴⁷⁶ Vauban 1680, quoted in Sanger 1999, pp. 50–51: 'L'ingénieur fera à la fin de l'année un plan assez grand pour que toutes les pieces qui le composent y puissent être clairement distinguées avec les particularités qui le seront achevées si les ouvrages qu'elles représentent sont revêtus de muraille: et d'encre de Chine ou de grisaille si c'est simplement de terre ou de gazon; distinguant le parapet du terre-plein par une couche plus forte aux endroits où il sera commence. Mais là où il n'y en aura point encore, le lavis sera tout uni, avec cette remarque que plus l'ouvrage sera avancé et près de sa perfection, plus il faudra aussi fortifier ledit lavis at approcher sa couleur de celles des ouvrages parfaits'. 'Ceci est une loi qu'il faudra suivre exactement pour éviter la confusion que le coloris des plans diversifiées indifféremment de toutes sortes de couleurs pourrait causer en prenant la signification de l'un pour celle de l'autre'. Also see Isabelle Warmoes 2008, pp. 55–66.

The basic colours on Scottish fortification maps conformed to Muller’s suggested conventions. ‘It is necessary’ wrote Muller ‘to use colours in order to distinguish every particular part, and separate, as it were, the one from the other, so as to make their differences more sensible. The first and most necessary thing required in drawing, is *Indian Ink*’.⁴⁷⁷ Indian Ink was used to draw the outlines of most works and, when colours were unavailable, a black wash was used to represent sections of masonry. Thereafter, six different colours were used to identify the different parts of a fortification (see Fig 5.8). Masonry constructions were represented in carmine (red), elevations in a paler red wash, and projected or incomplete works were washed in gamboge yellow. Turf-covered parapets and the glacis were represented in green. Dry ditches and the profiles of earthworks were washed in a pale, yellow-brown umber, while wet ditches, rivers, and seas were coloured with a verdigris (sea-green) wash. Indigo was used to represent iron or roofs of buildings covered with slate. ‘Pale’ black ink was used for hill shading. To create the impression of valleys and hills (3-D) in the shading, a draughtsman assumed light entered the top left hand corner of the plan (many plans followed Vauban’s practice of taking ‘left’ and ‘right’ to mean those directions as they were seen from the fortress not the countryside).⁴⁷⁸

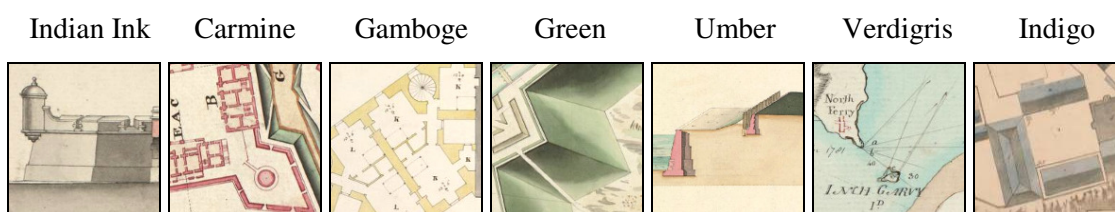


Figure 5.8 Colour conventions represented in fortification plans of Scotland.⁴⁷⁹
 (Images Courtesy of the Trustees of the National Library of Scotland and the British Library)

Small-scale plans showing a fort’s immediate environs often matched the graphic codes of representation applied to topographic maps and route surveys, with some features deliberately imitating nature (see Fig 5.3 Fort Augustus): ‘to represent cultivated fields, one used washes of green or red finely streaked with brown; for rocks, one used Chinese ink mixed with carmine, although one then had to imitate the effects of erosion by adding veins and fissures; the representation of forests and vines, of sand and water, was equally realistic’.⁴⁸⁰ Relief was shown as “molehills”, “centipedes”, or hachured lines which, by their

⁴⁷⁷ Muller 1756, pp. 14–15, original emphasis.

⁴⁷⁸ Harley 1978, p. 12.

⁴⁷⁹ Carmine: NLS MS 1647 Z.02/66c, MS 1649 Z.03/37d, MS 1649 Z.03/55; Gamboge: MS 1647 Z.02/81d; Green: MS 1646 Z.02/48b; Indian Ink: MS 1646 Z.02/34b, MS 1646 Z.02/29b, MS 1649 Z.03/57; Indigo: BL K.Top.49.73; Umber: MS 1646 Z.02/48c; Verdigris: MS 1649 Z.03/47a.

⁴⁸⁰ Picon 1992, p. 219.

thickness, closeness, and length, represented the direction and shape of slopes; their positions were correct even if no elevations were given.⁴⁸¹ These graphic codes displayed an artistic convention in depicting military landscapes.

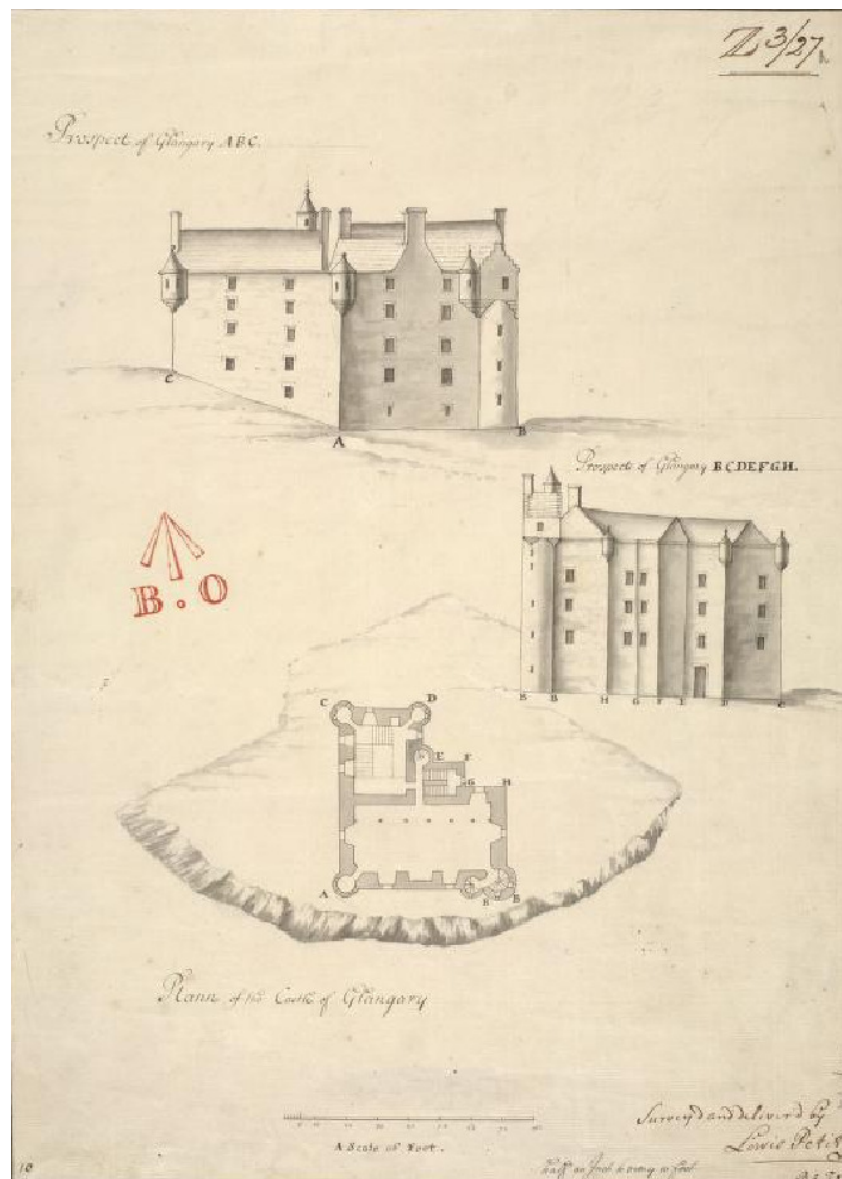


Figure 5.9 'Plan and Prospects of the Castle of Glangary' [Glengarry or Invergarry], by Lewis Petit [1714]. MS 1648 Z.03/27a. (Courtesy of the Trustees of the National Library of Scotland)

The extent to which the maps and plans consistently conformed to standard practices did vary, however, often as a consequence of the conditions under which the plans were commissioned and drawn. Earlier plans of the Scottish forts were often (but not always) drawn only in Indian Ink (see Fig 5.9). The compelling reason for their execution may have

⁴⁸¹ Crone 1978; Headrick 2000, p. 117.

afforded the engineers little time to draft more aesthetically pleasing plans. For example, Brigadier Lewis Petit, a French military engineer employed by the Board of Ordnance, was in Scotland for a total of 65 days.⁴⁸² During this time, he visited and (sometime between c.1713–1716) completed plans and sections of a new storehouse and barracks at Fort William,⁴⁸³ and plans and prospects of the medieval castles posing as outposts to Fort William—Glengarry (see Fig 5.9), Castle Tioram, Castle Duart, and Eilean Donan.⁴⁸⁴ Petit’s plans were relatively plain, drafted in pen and ink with a grey watercolour wash, quite unlike some of the highly-coloured plans produced by other military engineers and draughtsmen. The reason for a particular drawing style being favoured at any one time is open to conjecture. A style could reflect the limited time at an engineer’s disposal; his lack of equipment; or his greater expertise as an engineer than a draughtsman—Vallancey, in his *Essay on Military-Surveys*, pointed out that ‘few surveyors are masters of the art of drawing’.⁴⁸⁵ Simple executions such as Petit’s do, however, emphasise the utilitarian nature of graphic representations. His use of a multi-perspective display provided essential military information at a glance—the establishment’s form, layout, and situation. The fort’s plan and profiles were keyed to each other with the use of an alpha-code. As records of the military landscape, the maps were designed to impart information about the state of the forts and what was necessary to be done for their immediate defence against a local uprising or invasion.

Petit illustrates a ‘snapshot’ of existing fortifications. New proposals, works in-progress or with more explicit promotional roles, and ‘memorial’ maps often reflected a greater tendency towards colour, aesthetic considerations, and landscape views, resulting in a greater pictorial appearance.⁴⁸⁶ Plans of Fort George at Ardersier, for example, were generally highly coloured and recorded building progress as well as the project’s conception (see Fig 5.10). Detailed plans and sections were drawn at least twice yearly by William

⁴⁸² TNA WO 47/28, p. 3, 4 January 1714/5 [1715]: ‘That a Bill be allowed & Debenture made out to Brigadier Lewis Petit Engineer for £62.10.0, being £32.10 for his travelling charges to Fort William in North Britain, from ye 21st of September 1714 to ye 24th November following, being 65 days at [£½] a day, & 330 for Extra Expences [sic] in going post thither, and back again to London’. Also see TNA WO 47/20A, 4 January 1715. For a detailed account of Lewis Petit and his plans of Scottish fortifications, see Fleet 2007.

⁴⁸³ NLS MS 1646 Z.02/25a [Plan of the Storehouse, Fort William]; MS 1646 Z.02/25b [Plans of the Soldiers’ Barracks, Fort William]; MS 1646 Z.02/32a ‘A Draught of the long Soldjers Barrack already built at Fort William’.

⁴⁸⁴ NLA MS 1648 Z.03/27a [Glengarry]; MS 1648 Z.03/25a [Tioram]; MS 1648 Z.03/28c [Duart]; and MS 1648 Z.03/26a (Eilean Donan).

⁴⁸⁵ Vallancey 1779, quoted in Marshall 1981, p. 3.

⁴⁸⁶ Fleet 2007, p. 334.

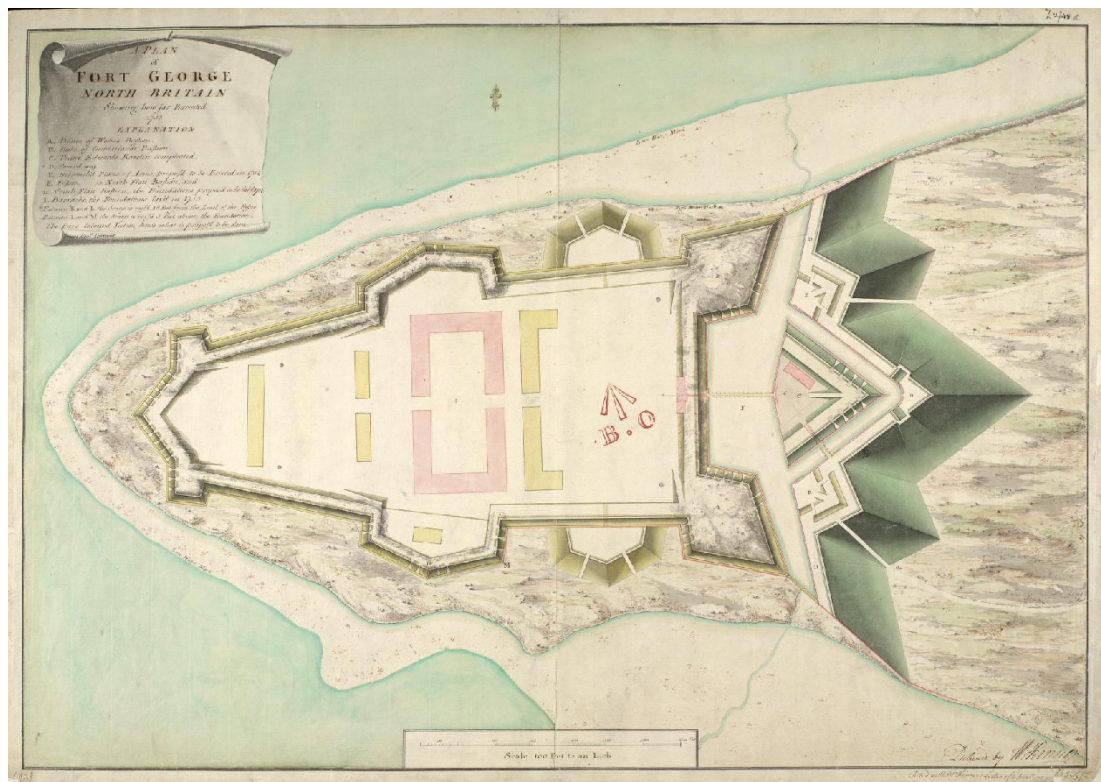


Figure 5.10 ‘A Plan of Fort George, North Britain, shewing how far executed 1753’, by William Skinner (Engineer) and Charles Tarrant (Draughtsman). MS 1646 Z.02/48a (Courtesy of the Trustees of the National Library of Scotland)

Skinner and Charles Tarrant.⁴⁸⁷ With no imminent threat of attack and the advantages brought about by being in one location for an extended period of time, cartographic facilities could be established not unlike those at the Tower of London and Edinburgh Castle.⁴⁸⁸ Occasionally the use of a particular colour was explained rather than inferred from established conventions. On the plan of Fort George (see Fig 5.10), it was noted that ‘The Part colourd [sic] Yellow, shews what is propos’d to be done’; the Indian Ink, carmine and green presented to the Board what had already been built. A plan of the town and castle of Stirling showing the bridge over the Forth, for example, included a statement that ‘the Houses Colourd [sic] Yellow, obstruct the Command of the Castle and ought to be purchas’d

⁴⁸⁷ BL Add. MS 17500, p. 40, 3 May 1750; TNA WO 47/35, pp. 337–338, 5 May 1750. Tarrant was employed as a draughtsman on the Military Survey of Scotland before working with Skinner on plans of Fort George at Ardersier. See Ewart and Gallagher (forthcoming).

⁴⁸⁸ A drawing office was established at Edinburgh Castle, probably by the Scottish Office of Ordnance in the seventeenth century, although there is very limited, direct reference made to one. It is known that the draughtsmen involved with the Military Survey of Scotland spent the winters at the Castle ‘where the work was laid down and finished’ (NAS RH1/2/523, p. 4), and in 1756 David Dundas, Practitioner Engineer, was ‘employed at Edinburgh by order of his Royal Highness the Duke in reducing the Survey of Scotland’ (TNA WO 47/47, 56).

by the Government and taken down'.⁴⁸⁹ It is a reminder of the purpose of these maps, 'beyond scientific instrument and artistic image', of the political and military intent behind their production.⁴⁹⁰

With this codification in mind, I now turn to the representation and construction of Scotland's fortifications in the eighteenth century. The review takes account of the pragmatics of an engineer's design—the practical part of fortification—and also considers the political purpose behind a fort's location, design, and construction. The section begins with a description of the archive before considering the types of fortifications in Scotland and their spatial and temporal relationship.

The Archive of Fortification Cartography Described

Between 1689 and 1815, the military engineers and draughtsmen of the Board of Ordnance made considerable use of horizontal plans, vertical sections, and perspective drawings to design and to document the Scottish fortifications. These maps represented the engineers' preparations for the practical part of fortification: (re)construction.

When a fortress is to be built, to choose such a situation as will answer the intent in the best manner, to adapt the works properly, and to use no more than are necessary, to make from their plans and profils [sic] an estimate of the quantity of masonry requisite, and of the earth to be removed, to trace the plan on the ground, to lay the foundation in any kind of soil, to compleat the walls, ramparts, and all the military buildings, such as draw-bridges, town-gates, powder-magazines, barracks, store-houses, casemates, and sally-ports; these are the subjects of Practical Fortification.⁴⁹¹

Six hundred and seventy-seven manuscript maps of Scottish fortifications survive today among the deposits in the national repositories of Great Britain.⁴⁹² Some are supplemented by written reports or 'military itineraries'. Together, map and text described a fort's situation and shape, detailed any associated building costs, and served to enhance the British state's political authority over territory.

Figure 5.11 shows the distribution of the fortifications represented in the maps. It shows the eighteenth-century forts collectively—from the first Jacobite rising of 1689 to the end of the Napoleonic Wars in Europe in 1815—rather than a single snapshot of one

⁴⁸⁹ TNA MPH 1/204, endorsed by William Skinner in 1746 with two copies done in 1760 and 1761.

⁴⁹⁰ Cosgrove 2008, p. 158.

⁴⁹¹ Muller 1755, p. v.

⁴⁹² This accounts for 72% of the archive of Board of Ordnance military maps and plans.

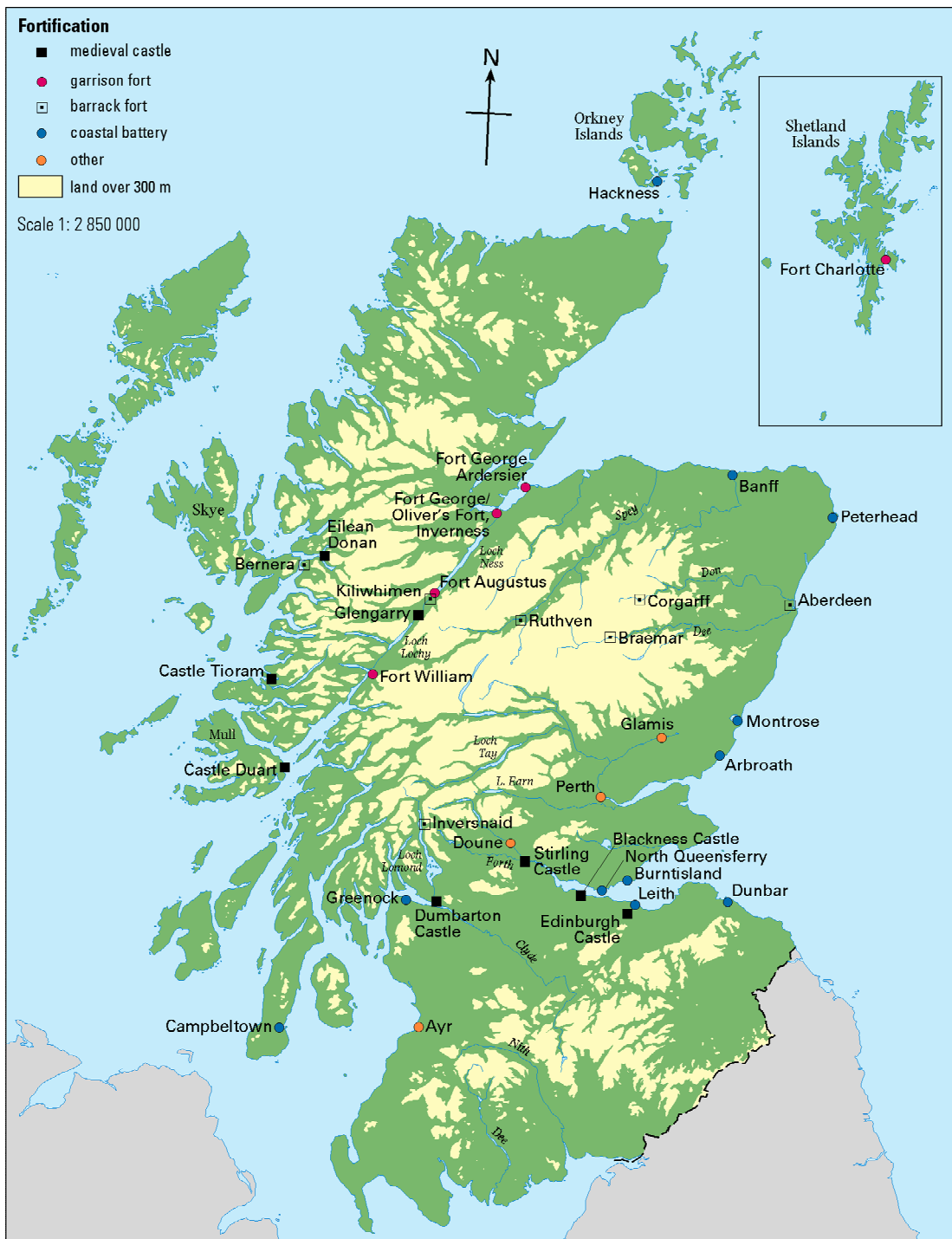


Figure 5.11 The distribution of military fortifications in Scotland, 1689–1815

moment. The government's principal concerns during this period were twofold: first, to command the Highland passes to prevent Jacobite rebels from 'descending into the lowlands',⁴⁹³ and second, to secure the coastline from overseas invasion by a foreign power.

⁴⁹³ BL Additional Ms. King's 103, f. 18.

Figure 5.11 highlights the strategic location of the forts in relation to topography and to these political imperatives: the lowland area between the Firths of Forth and Clyde where the medieval castles were situated and could prevent the southerly advance of an opposing army; along the Great Glen where garrison forts were re-established or built from new to form a line of defence across the Highlands; the medieval outposts forming a west-coast guard and the gun-batteries an east-coast one; and the barrack forts built in the upper valleys of major rivers, from which regular troops could march to patrol the Highlands.

This section is concerned with describing the mapping of these military establishments—in essence, a classification of the fortification cartography of Scotland—in order to offer further typologies of these fortifications. The meaning of such mapping lay in knowing—and in testing—the capacity of the state to wage a war of attrition in Scotland, to measure the spaces of the nation, and to accommodate troops, arms, munitions, and provisions for that purpose.⁴⁹⁴ The classification adopted in this chapter therefore addresses the two main concerns of the British government in establishing fortified places in Scotland: defence and accommodation.

Types and proportions of fortification mapping of Scotland

After the first Jacobite rising of 1689, the English government, concerned for its security and traditional hegemony within the British Isles, was compelled to recognise that the only way to put down a rebellion in the Highlands was to maintain strong garrisons in the glens themselves.⁴⁹⁵ In December 1690, Sir Martin Beckman,⁴⁹⁶ Chief Engineer to the Office of Ordnance, proposed that land-based fortifications be built to contend with ‘trouble at home’ and coastal fortifications to deter foreign invasion.⁴⁹⁷ He advised the Board that ‘no Monarch, Prince or State has been, nor can be, safe in their government without tenable fortifications for their magazines and security for their respective seaports’. Parliament and the people were, however, suspicious of any military establishment that could potentially reinforce the power of the monarch and challenge parliamentary rule. In persuading Parliament, and in support of Beckman, the Board endorsed the efficacy of fortifications; they were ‘without question to be admitted of [...] especially at this time when the misguided multitude are so much disposed of mischief, and the malice of disloyal and

⁴⁹⁴ Ogborn 1998; Dixon and Withers 2009.

⁴⁹⁵ Szechi 1994.

⁴⁹⁶ Beckman was appointed Engineer to the Ordnance in 1670, becoming Chief Engineer from 1677 under Bernard de Gomme whom he succeeded in 1685. In April 1685 he was sent to Scotland to direct work on the defences of Stirling in anticipation of an uprising.

⁴⁹⁷ TNA WO 44/100, p. 19, 10 December 1690, quoted in Barker 1985, p. 106.

ambitious persons so industriously contriving the disturbance of His Majesty's Government'.⁴⁹⁸

From 1690, substantial developments in the military architecture of Scotland were to testify to the government's political and military beliefs in the effectiveness of fortified places as a means of securing territory.⁴⁹⁹ Existing fortifications were strengthened; new forts and barracks were built in response to Jacobite risings; and coastal gun-batteries were constructed to defend against overseas attacks. Maps were drawn for the purpose of fortifying rather than besieging, for fitting a fort to a situation, for measuring capacities, and for reporting on the state of repair of a particular military establishment at a critical moment.⁵⁰⁰ Matters concerning the situation, size, strength and strategy behind the design of a fort, therefore, merely altered the content rather than the function of the group of maps associated with eighteenth-century Scottish fortifications.

These maps have much in common besides their function. As institutional prerequisites in the design and construction of fortifications, their forms of representation (plan, section, and perspective drawing), their styles of graphic design (colours, symbols, use of alphanumeric codes), and their scales took on certain common characteristics. This rationalisation of fortification cartography has already been discussed. The fact that the representation of fortifications was, more or less, standardised means that we may also think differently of the types of fortress depicted in the map archive. There are four main types: (a) medieval castles; (b) garrison forts; (c) barrack forts; and (d) coastal batteries. A fifth, rather ill-defined group ('other') can be identified which includes picturesque representations of fortified places, often dedicated to a monarch or military elite, drawn for their ornamental and antiquarian properties in addition to their contemporaneous military utility.

Although this comparison and classification of fortification types is formed on my interpretation of the map archive, a number of key eighteenth-century factors provide critical evidence to support it. First, the maps show some distinction in the design and form of forts that allows them to be grouped into these types. Second, these different typologies and their maps are described in Board of Ordnance minutes and other state documents relating to that institution's approach to fortification and the architectural practices of the military engineers. Third, political imperatives at different times gave rise to different constructions of fortified

⁴⁹⁸ TNA WO 44/100, p. 19, 10 December 1690, quoted in Barker 1985, p. 106.

⁴⁹⁹ See, for example, Ewart and Gallagher (forthcoming).

⁵⁰⁰ There is little surviving cartographic evidence of extensive city defences—a second type of fortification scheme—the most notable being representations of the Jacobite retrenchments around Perth built during the rebel's occupation of the town between September 1715 and January 1716 (NLS MS 1647 Z.03/01d by Lewis Petit and copies MS 1647 Z.03/02a–c by William Horneck, drawn in 1716), and a plan of the environs of Edinburgh and Leith drawn by Captain J. F. Birch in 1807 showing proposed positions for redoubts and defensive towers (TNA MPH 1/246).

space; a direct reflection and consequence of military, economic, and political power. All were planned by and represented in the military engineers' maps of Scotland, even though military and financial constraints may have prevented some from being built.

Figure 5.12 shows the cartographic proportion of each type within all fortified places in Scotland, averaged between 1689 through 1815. What are not included in this diagram are copies of maps and plans made substantially later than the original compilations, often for training rather than territorial purposes.⁵⁰¹ There is evidence, too, that contemporary duplicates were made to distribute geographical and military information to the government, the Board of Ordnance, the engineers and to the artificers contracted to work on the fortifications. In 1719, for example, the 'Draughts & Particulars' of the barracks to be built at Bernera and Ruthven were to be made available to any artificers wishing to tender for building work. James Campbell, Storekeeper at Edinburgh Castle, was sent a letter 'with enclosed Draughts and Estimates of the abovesaid Buildings of which he is to give copies to such persons as desire it'.⁵⁰²

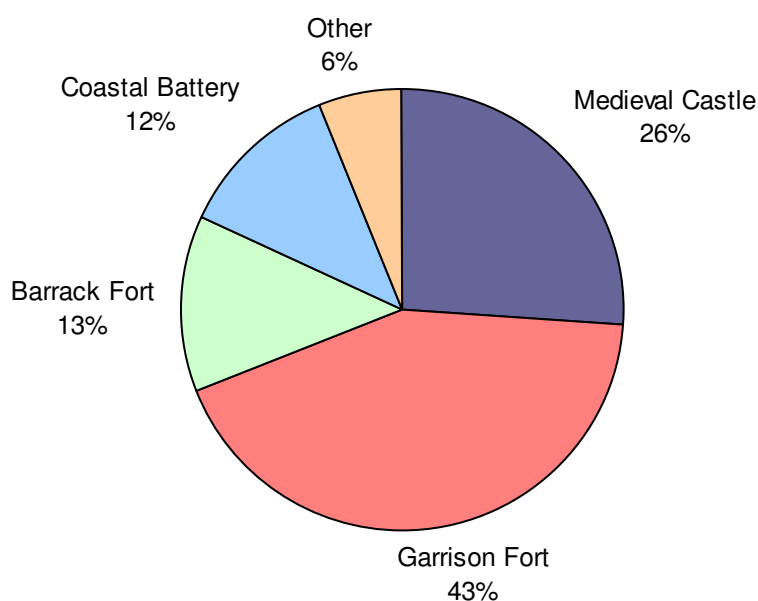


Figure 5.12 Fortification cartography by type of fortress (including contemporary copies), 1689–1815

Figure 5.12 offers an averaged result for the entire period of study, implying that representations of garrison forts—Fort William, Fort Augustus, Fort George at Inverness, and Fort George at Ardersier (the Great Glen 'chain')—dominated the archive. There was, however, considerably more variation over time as the bar graph in figure 5.13 shows. The

⁵⁰¹ Copies of this nature account for about 10% of the archive.

⁵⁰² TNA WO 47/32, pp. 41–42, 31 January 1719.

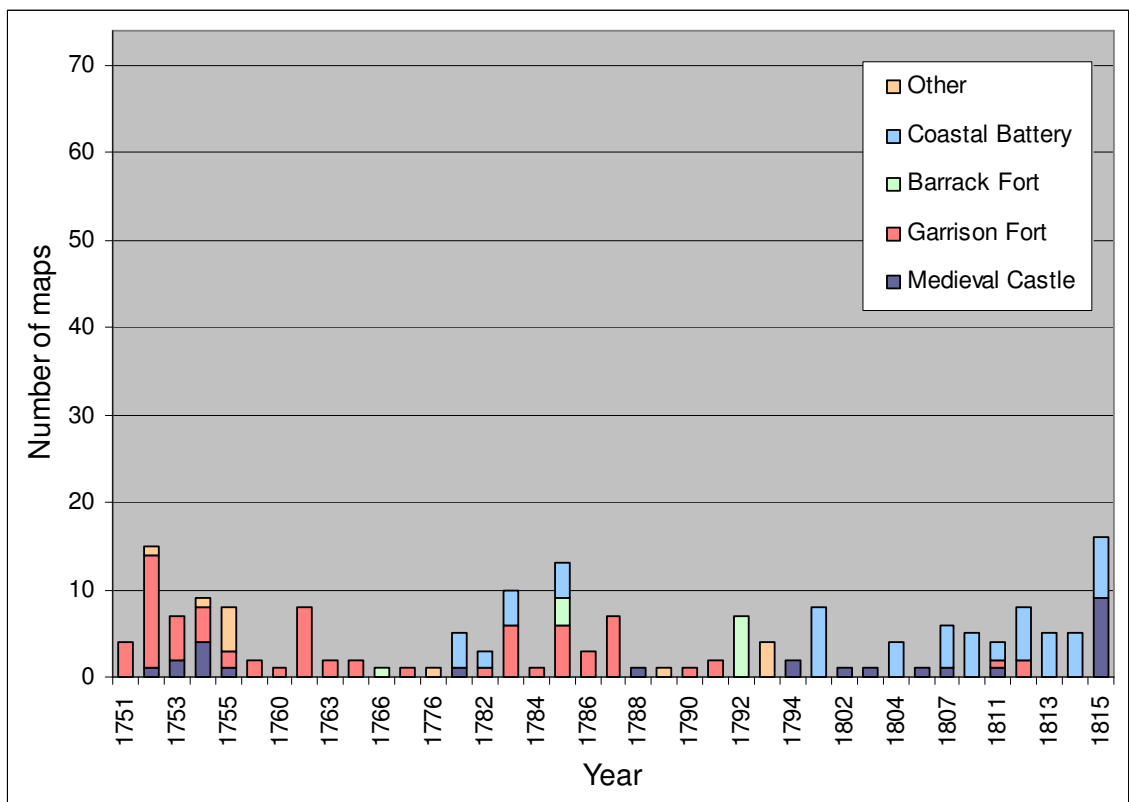
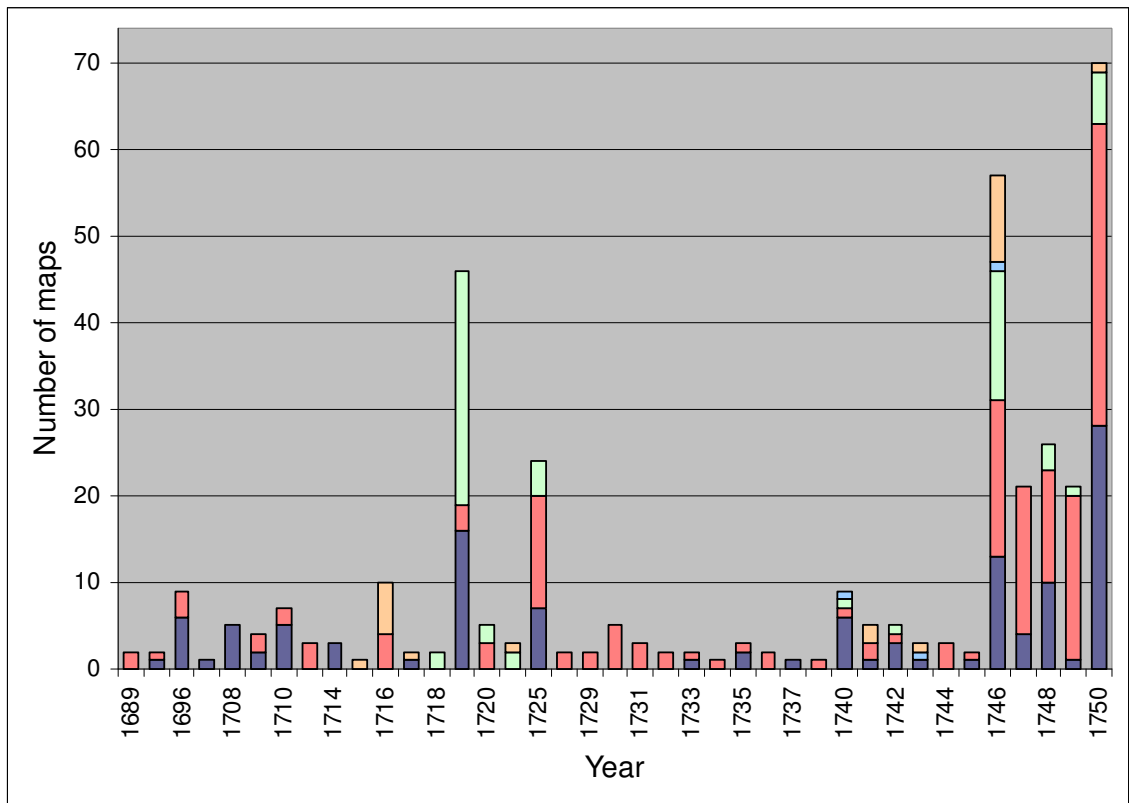
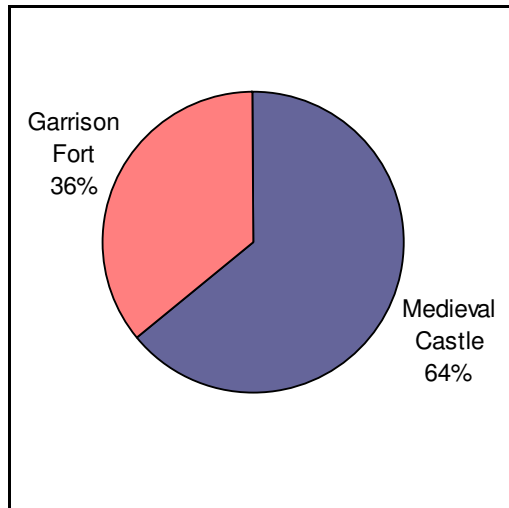


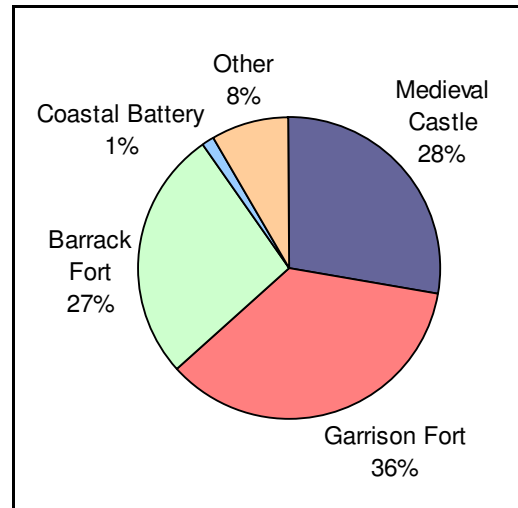
Figure 5.13 Frequency distribution chart of the fortification cartography of Scotland, 1689–1815

graph illustrates the annual quantitative variation in the output of fortification cartography for Scotland between 1689 through 1815 and, again, only includes contemporary copies. The pattern demonstrates that there was an almost continuous if somewhat irregular trend in the output of fortification cartography. Rather than discuss the annual output of fortification maps, I have chosen to illustrate four phases of building activity: the later Stuart period, 1689–1714; the early Hanoverian period, 1715–1745; the mid Hanoverian period, 1746–1779; and the late Hanoverian period, 1780–1815. The periods relate to the underlying events of Jacobite rebellion in 1715, 1719, and 1745–46 and are distinguished by changing typologies of fortification. These are illustrated in the four charts in figure 5.14. These charts offer a way of exploring the temporal variations in cartographic practices in Scotland in relation to the different types of fortification (re)construction. Each period is dominated by a different type of fortification that was designed and drawn by the military engineers and draughtsmen, and approved by political and military commanders as suitable military establishments from which to overawe a dissenting Scottish population. The periods are further distinguished by a changing geography of fortification (re)construction. This is illustrated in the four maps in figure 5.15. Together, figures 5.14 and 5.15 highlight the quantitative and qualitative correlation between map and fortification.

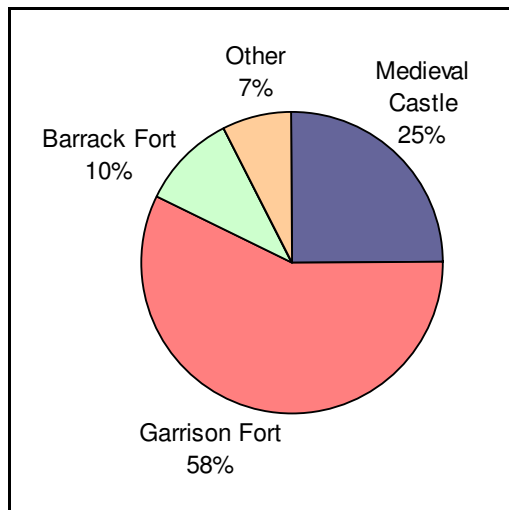
1689–1714 (a)



1715–1745 (b)



1746–1779 (c)



1780–1815 (d)

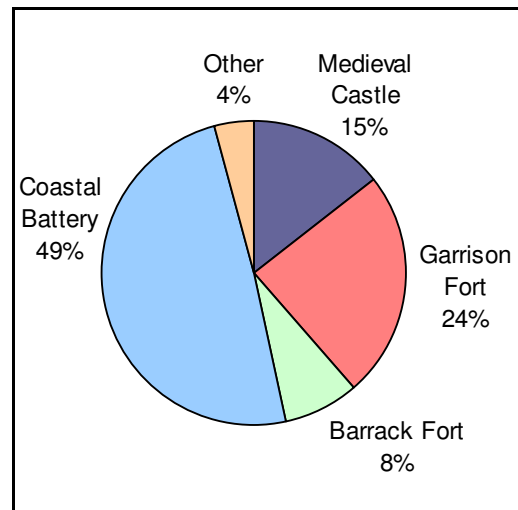
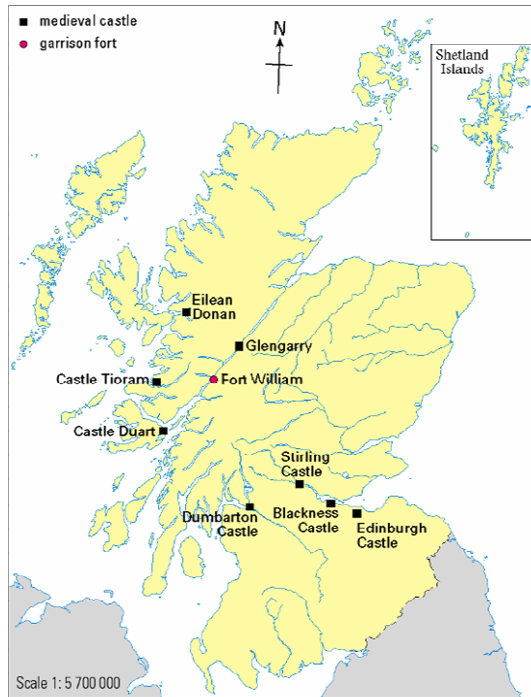
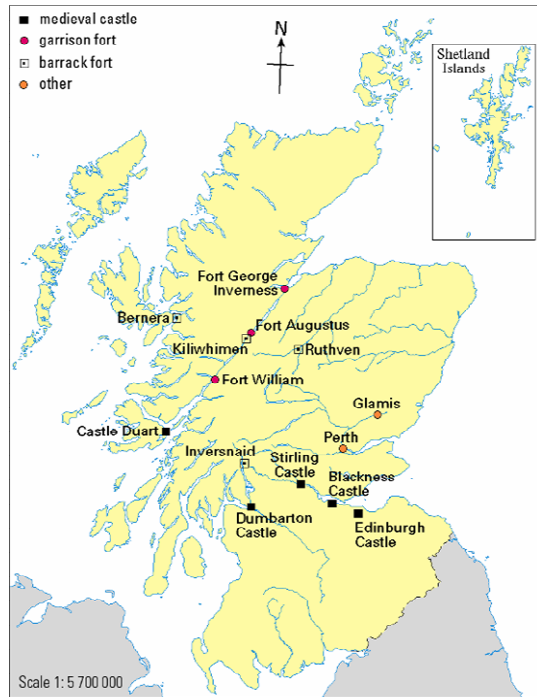


Figure 5.14 a–d Cartographic representations of types of Scottish fortification in relation to phases of building activity: (a) 1689–1714, (b) 1715–1745, (c) 1746–1779, and (d) 1780–1815.

1689–1714 (a)



1715–1745 (b)



1746–1779 (c)



1780–1815 (d)



Figure 5.15 a–d Distribution of Scotland's fortification cartography in relation to phases of building activity: (a) 1689–1714, (b) 1715–1745, (c) 1746–1779, and (d) 1780–1815.

The later Stuart period, 1689–1714

The first phase, 1689 to 1714, reflected the state's need to secure its medieval defences in the lowlands and to establish a military presence in the most disaffected part of the Highlands, to the south and west of the Great Glen (see Fig 5.14(a) and Fig 5.15(a)). The Scottish fortifications inherited by the Board of Ordnance comprised castles and towers which had ceased to be defensively effective due to their medieval structures—most notably the medieval castles of Inverness, Edinburgh, Stirling, Dumbarton, and Blackness⁵⁰³—and the medieval military outposts—Castle Duart on Mull, Castle Tioram in Moidart, Eilean Donan near Skye, and Glengarry Castle in the Great Glen.⁵⁰⁴ During the reign of William III and the later Stuarts, the decision was made to keep updating the medieval castles to accommodate the English army rather than build new fortresses. This was as much to do with keeping costs down as it was in recognition of the prime locations of the castles. Stirling, for example, was of great military utility due to its strategic position. In his report to accompany a series of revised plans of the castle, Talbot Edwards remarked:

there seems to be two great uses in Fortifying it vizt, by Comanding [sic] the most Considerable Pass from South to North in that part of the Kingdome over the River Forth, which by its turnings about the Ground near the Castle, makes also a very Convenient Place for a Camp of 10 or 12000 Men Situated in a narrow part of North Brittain between 2 Rivers the Forth and Clyde which by the Map seems not above 16 Myles a sunder. This being the advantage of Situation.⁵⁰⁵

By the beginning of the eighteenth century, military maps of Scotland's forts were scarce. When concerns were raised for the security of North Britain in 1708, the London Ordnance Office realised they held no record of the defensive state of the Scottish

⁵⁰³ Hereafter, with the exception of one map—NLS MS 1647 Z.02/77 'Inverness A Survey of the Castle Anno 1719', by Andrews Jelfe—all maps of Fort George at Inverness show characteristics complicit with 'Garrison Forts'. When John Romer surveyed the old castle in 1725, he found that 'the Mansion House on Castle hill at Inverness, cannot conveniently be converted into Barracks, by reason of the insufficiency of the walls, having observed that the same are decayed'. Rather than committing a 'Crazy Repair', Romer proposed a new barrack project 'in the nature of a Citadel' that was eventually completed as a garrison fort: Fort George on Castle Hill (TNA MPH 1/31 'Plan of Inverness with a Project for New Barracks situated on Castle Hill', by John Romer, in 1725).

⁵⁰⁴ In absolute terms, only four plans drawn by Lewis Petit between 1714 and 1717—NLS MS 1648 Z.03/25a (Castle Tioram), MS 1648 Z.03/26a (Eilean Donan Castle), MS 1648 Z.03/27a (Glengarry Castle), and MS 1648 Z.03/28a (Castle Duart)—and Paul Sandby's draught of David Watson's 1748 survey of Castle Tioram and Castle Duart—NLS MS 1648 Z.03/28e—contribute to this group of medieval 'outposts' to Fort William, a 'garrison fort'. Their orthodox form characterises them as 'medieval castles' rather than 'garrison forts', their means of government.

⁵⁰⁵ TNA WO 55/319, p. 127, report dated 18 February 1710.

fortifications.⁵⁰⁶ The Board was forced to admit to the Privy Council ‘that Wee [sic] have as yet no Draughts of the Castles of Edinburgh, Sterling and Inverlocky, nor any Estimates of the Charge of putting them in a posture of Defence’. Maps of Scotland’s forts in the formative years of the Union were surveyed and compiled by engineers in the former Scottish Ordnance Office—by John Slezer and Theodore Dury—who, the Board ‘humbly conceive[d]’, could ‘in less time, and at less charge’ appraise what was needed to be done ‘to put those Castles in a posture of Defence, and can soon make Estimates what the Charge thereof will amount to’.⁵⁰⁷ Initial defensive works to Edinburgh and Stirling Castles, and to Fort William, were proposed by Dury, Chief Engineer in Scotland at this time.⁵⁰⁸

No two castles were alike: their situations made them irregular in form, different in size, and in various states of repair. The majority of the early maps of the medieval castles were drawn to reflect the state of their defences and to accompany proposals for putting the castles into a suitable ‘posture of defence’. Many of the initial proposals ‘for fortifying [...] to resist an Attack in form with Great Artillery’ proved to be too expensive and proposals were resubmitted ‘for Fortifying [...] for preventing an insult’.⁵⁰⁹ Maps of the medieval castles comprised large-scale plans and sections, centred on the fortresses themselves, parts of their defences, and their buildings for the purpose of augmenting the capacity of each to accommodate troops and stores by enlarging the barracks, storehouses and powder magazines.

Fort William was the only ‘new’ construction and accounts for 36% of the archive in this first phase (a 100% of garrison forts). The new fort was built at Lochaber, the centre of Jacobite disaffection, as a show of strength following the 1689 uprising. Built over the foundations of Inverlochey Citadel at the mouth of the River Nevis, it was named Fort William in honour of the new king and as a reminder to the populace of new government. It took only eleven days to build under the direction of Major General Mackay.⁵¹⁰ The fort retained the shape of the Cromwellian citadel, an irregular pentagon with a three-pointed bastion at the south-east and four two-pointed demi-bastions at the other corners, but in

⁵⁰⁶ TNA WO 55/2281. The earliest plans of Scottish fortifications recorded in the ‘Register of Draughts’ date from 1708 (Dumbarton) and 1709 (Dumbarton and Leith). Recorded plans of Edinburgh, Stirling and Fort William (Inverlochey) post-date 1712, although Slezer’s and Theodore Dury’s earlier plans (1689–1709) did eventually come into the Board of Ordnance’s possession.

⁵⁰⁷ TNA WO 55/344, pp. 266–267, 15 April 1708.

⁵⁰⁸ Theodore Dury joined John Slezer as ‘their Majesties’ Cheef Ingeneer in Scotland’ in c.1690. See BL K.Top.50.8, K.Top.50.39 and K.Top.50.40.

⁵⁰⁹ TNA WO 55/346, pp. 74–77. ‘In obedience to your Lordships Commands Wee lay before your Lordship a particular account of what has been done to the Fortifications in North Britain since 1708 [and] That which would compleat [sic] the finishing the same’. The estimates, provided by Theodore Dury in 1714, relate to Edinburgh, Stirling, and Dumbarton castles, and Fort William.

⁵¹⁰ Hugh Mackay (*d.* 1692) was appointed commander-in-chief of William’s army in Scotland after the 1688 Revolution.

reality was little more than an earthwork with a palisade on top. The main gateway was mid-way along the south front protected by a detached triangular earthwork or ravelin, with another entrance, a sally port, through the north wall beside the north-west demi-bastion leading out to the River Nevis. The river and Loch Linnhe provided natural defences against ground attack from the north and west, and a covered way and glacis were built to protect the south and east flanks.⁵¹¹ Work continued on Fort William for the remainder of the seventeenth and early part of the eighteenth century to make it a permanent fortification. Once the earthen ramparts and bastions were faced with stone, attention turned to transforming the garrison buildings into permanent structures. Plans for barracks and storehouses were drawn in the first phase so that the building work could be carried out in the second phase. Before any of this could take place, however, the threat of rebel attacks caused General Maitland, Governor of Fort William, to express his concerns for the safety of the garrison: ‘We are in great danger of being surprised by the Highland Clans, they being all ready to rise and they expect the Pretender to land every day’.⁵¹² At the end of August, Maitland beseeched the Board:

I wish some Engineer may be sent here to see this place. We are busy dressing the Parapetts [sic], planting Pallisadoes and doing all We can to make ye best of a badd bargain. I advance the money, who pays me I know not. Once more I intreat you gett an Engineer sent, to see this place and the Out Posts.⁵¹³

The early Hanoverian period, 1715–1745

The second phase, from 1715 to 1745, represented substantial military developments, in the building of barrack forts in the Highlands and fortified garrisons along the Great Glen and in securing the medieval castles neglected by George I’s Hanoverian government (see Fig 5.14(b) and Fig 5.15(b)). Edinburgh Castle by 1724, for example, was rendered ‘Expos’d to the same Attempt as was made on’t in the Year 1715, there being nothing Effectually done since that Time for the Security of that Important Place, on which depends not only the safety of the City, but all that part of the Kingdome [sic]’.⁵¹⁴ Fort William, Edinburgh and Stirling Castles underwent near continuous repair during this period.

The Hanoverian accession in 1714 coincided with a time of unprecedented popular unrest by Jacobites. From this time, military maps of Scotland’s fortifications were produced

⁵¹¹ BL Maps K.Top.50.39.; Maps K.Top.50.40.; TNA MPF 1/241. Tabraham and Grove 1995.

⁵¹² Fleet 2007, p. 332.

⁵¹³ TNA WO 55/346, p. 137 ‘Extract of a Letter from Fort William’, dated 30 August 1714.

⁵¹⁴ BL Additional Ms King’s 100, f. 18, 1724.

almost annually until the late 1750s (see Fig 5.13). Engineers sent to Scotland complied with the Board of Ordnance's orthodox approach when planning and constructing the fortifications. For each fort, the engineer was 'to consider well its situation, make proper plans, sections, and Elevations of the adjacent Ground within the reach of Cannon shot' and was to 'make plans and Profils [sic] for constructing the new Intended Fort together with an Estimate of the Expence thereof'.⁵¹⁵ Maps and plans in this second phase were pragmatic outcomes of the state's resolve to build fortresses spurred on by the desire to govern the territory.

Lingering occurrences of widespread and often violent demonstrations of Jacobite disaffection towards the Hanoverian government following the 1715 rebellion fixed a resolution to establish an effective military presence in the Highlands. The result was that '4 Barracks should be built in Scotland, at such places as may be most proper, to prevent the Robberies & Depradations [sic] of the Highlanders'.⁵¹⁶ The four sites—at Bernera in Glenelg, Kiliwhimen in the Great Glen, Ruthven in Badenoch, and Inversnaid near the shores of Loch Lomond—were chosen for strategic purposes, to keep a network of military communications open across the Highlands, and as a show of political retribution for transgressions made by the clans against the government.⁵¹⁷ The design of these 'barrack forts' was of particular concern to the military engineers and is reflected in the number of large-scale ground plans made, a large number drawn by Andrews Jelfe, Director of barrack building in Scotland.

In response to a memorial written by Simon Fraser, Lord Lovat, in 1724 to George I concerning the state of the Highlands, George Wade was sent to gather intelligence and reconnoitre the country.⁵¹⁸ Of considerable concern to the government was news that efforts to disarm the clans after the rebellion in 1715 had 'been so ill Executed, that the Clans the most disaffected to Your Majestys Government, remain better Arm'd than Ever, and Consequently more in a capacity [...] to be used as Tools, or Instruments to any Foreign Power or Domestick [sic] Incendiarys [sic] who may attempt to disturb the Peace of Your Majestys Reign'.⁵¹⁹ Wade's scheme for establishing order in the Highlands included building

⁵¹⁵ BL Additional Ms. 17499, pp. 2–3, 31 December 1746, orders for William Skinner's survey of Oliver's Fort near Inverness. For the report and estimate, see BL Maps K.Top.50.9.a and for 'remarks and observations', see BL Additional Ms. 17499, pp. 23–24. For maps, see BL Maps K.Top.50.9.b–i; NLS MS 1647 Z.02/82a and 82b.

⁵¹⁶ TNA WO 47/30, p. 247, 2 October 1717.

⁵¹⁷ TNA WO 47/30, p. 229, 26 August 1717; WO 55/346, pp. 361–362.

⁵¹⁸ Burt 1822, Vol 2, 'Memorial [...] by Simon Lord Lovat, 1724'. 'The author of the following letters [...] is commonly understood to have been Captain [Edmund] Burt, an officer of engineers, who, about 1730, was sent into Scotland as a contractor' (Vol 1, p. xv).

⁵¹⁹ Burt 1822, f. 9.

two new fortifications. The first was a new barrack at Inverness. The old castle had been hastily refortified in 1719 after intelligence revealed that the Jacobites were intent on taking the town and, if successful, opening up the east coast for their advance. Work on the castle made it ‘safe against any thing but Cannon’, and a battery, if supported by the building of another, ‘would command the bridge, the Hill & all the Roads both to the Town & Castle’. Money was not forthcoming to finish off the repairs, however, the Board having exceeded, ‘in considerable sums’, the amount given to them by Parliament and had been refused more money for fortifications in Scotland that year.⁵²⁰ By 1724, the castle was in a state of decay and no longer effective as a fortification. Wade, however, recognised the strategic importance of having a barrack on the same site which was

within half Musket Shot of the Bridge of Inverness, and consequently Commands that Pass which is the only Communication between the North and South Highlands for the space of near 30 English Miles as far as Kiliwhimen; And is therefore [...] a place of Importance for preventing the northern Highlanders from descending into the Low Country in times of Rebellion.⁵²¹

The second fortification proposed by Wade was a redoubt at the west end of Loch Ness near Kiliwhimen ‘which is the Central part of the Highlands a Considerable Pass, equally distant from Fort William and Inverness, and where a Body of 1000 Men may be drawn together from those Garrisons in 24 hours to Suppress any Insurrection of the Highlands’.⁵²² Instead of a redoubt, a fort and barracks were considered in its place, with a road linking the new fortification to the old barracks of Kiliwhimen.⁵²³ This was eventually to become Fort Augustus, named in honour of William Augustus, the Duke of Cumberland. Responsibility for designing both fortifications was entrusted to John Lambertus Romer. In 1720, Romer was appointed engineer responsible for ‘carrying on the Barracks & other Works in North Britain’, replacing Andrews Jelfe.⁵²⁴

⁵²⁰ TNA WO 55/347, pp. 183–187, 25 July and 7 August 1719.

⁵²¹ BL Additional Ms. King’s 103, f. 18.

⁵²² BL Additional Ms. King’s 100, f. 17.

⁵²³ BL Additional Ms. King’s 101, f. 20. Although Wade mentions ‘a Fort [...] and a Barrack’ in his reports, it is unlikely that NLS Acc.10497 Wade.58k and 58n [Plan of Fort and Barracks – Killiwhymen?] is actually of Kiliwhimen (or an early plan of Fort Augustus) as catalogued and suggested by Tabraham and Groves 1995. The plan and elevation of the barrack already built (in Indian ink with a grey wash) matches Ruthven in Badenoch with a single-pile of barracks and two rooms on each floor (compare with NLS MS 1648 Z.03/18a). The topography of the ‘Fort and Barracks’ also matches the line of the hill on which Ruthven was built (see NLS MS 1648 Z.03/19a).

⁵²⁴ TNA WO 47/33, p. 88, 13 February 1720.

The mid Hanoverian period, 1746–1779

A significant increase in mapping activity occurred in 1746. This marks the start of a third and rather disjointed phase in terms of mapping and fort (re)construction (see Fig 5.14(c) and Fig 5.15(c)). Between 1746 and 1755 many of the Highland forts were refortified following extensive damage inflicted by the Jacobite army during the rebellion of 'Forty-Five. With the addition of a road building programme that saw the forts linked by an extensive network of military roads, the Scottish mainland was in effect an occupied country. Overlapping this period, beginning in 1750 and continuing until 1769, a reasonably high number of maps can be attributed to the 'paper-trail' of plans charting the construction of Fort George at Ardersier, built as the principal garrison for the Hanoverian army in the aftermath of the defeat of the Jacobite's at Culloden. 1750 was also the year that Charles Tarrant produced two volumes of plans of the Scottish fortifications, one as a presentation volume,⁵²⁵ the other, a reference copy for a cadet in the Drawing Room.⁵²⁶

Maps of the garrison forts—Fort William, Fort Augustus, Fort George and Oliver's Fort at Inverness, and Fort George at Ardersier—dominate this third phase (58% of the archive). Fort William, the only Highland fort to withstand a Jacobite siege during the late uprising, and Fort Augustus, destroyed by an explosion when an enemy mortar hit the powder magazine, both underwent considerable repair and expansion to quarter more troops tasked with hunting down Jacobite loyalists. Lord Albemarle, the Commander-in-Chief of the forces in Scotland from 1746, wrote of the restoration work that:

The scheme your Grace [the Duke of Newcastle] is pleased to send me, for erecting other Forts or stations in different Parts of the Country may be put to very good use for His Majesty's Service, in preventing the Incursions or Depredations of the Highlanders, But how to carry on the building of Five, or Six of those Forts sufficient to contain Ten, or Twelve Companies Each at the same time that the Fort at Inverness is erecting and those of Fort Augustus & Fort William repairing with Numbers of Hands & at a vast Expence [sic], I am at a loss how to execute; And in my Opinion it is rather the Work of Years, than of one Summer. However, as this Plan may be of

⁵²⁵ BL Additional Ms. 22875 'Plans of Fortifications' by Charles Tarrant and Joseph Heath (some of the British and dependency plans are initialled J. H.). This volume includes sixteen plans of military establishments in Scotland, the rest are of Great Britain and its dependencies—the British Channel, the Mediterranean, and North America. It is not known who it was intended for. Joseph Heath and Charles Tarrant were in the Drawing Room at the Tower of London together (WO 47/35, Jan-June 1750; WO 54/210 'Establishment' list for 1748.

⁵²⁶ TNA WO 78/6012. This plainy-bound, slim volume was received by TNA from the War Office in April 2005. On the inside front cover is the inscription 'John Angell Tower 1750'.

infinite Service, as I said before, it will be proper to look out for Places, fit for their Erection; that their Names & Situation, may be transmitted to His Majesty for His approbation.

Albemarle's act of pacifying the Highlands provided the opportunity to reconnoitre the country and thus 'to look out for Places' to establish military garrisons. In order to successfully complete, on behalf of the government, punitive strategies and a longer-term aim to impose rule on Scotland, Albemarle felt 'it would be proper that the Board should send Orders to Mr Skinner to obey such directions as may be sent to him, by the General Commanding in Chief here'—Albemarle himself.⁵²⁷ Reconstructions of fortifications and commissions for maps and plans proceeded unhindered by financial restrictions under this brief period of military command of the engineers. There was also an injection of cartographic personnel. The Quarter-Master General, David Watson, and Paul Sandby chief draughtsman on the Military Survey, assisted Skinner in surveying suitable locations and structures for establishing military detachments in the Highlands.

Fort Augustus, reported as 'having been Demolished and the Guns Ammunition and other Stores taken away by the Rebels [sic] in 1745', was restored and in good order by May 1750.⁵²⁸ Also by this time, the medieval castles of Corgarff and Braemar, ordered by the Duke of Cumberland to be put into 'a Condition fitt [sic] to accommodate His Majesty's Forces', had been repaired and converted into barracks.⁵²⁹ The Office of Ordnance had compulsorily possessed the castles, not for crimes committed by their owners but on account of a report by the Duke of Montagu, Master-General of the Ordnance, stating that it was 'necessary for the Tranquillity of that part of the Kingdom that the said Four Castles [Tarbat and Tioram being the other two] should be [taken] Possession of [and to] cause them to be repaired, refitted, converted and supplied [sic] Barrack Bedding, Furniture and Utensils'.⁵³⁰ In January 1749, David Watson surveyed the grounds around Braemar and Corgarff and 'sett [sic] off the Acres he thought necessary for the Service of both Garrisons'.⁵³¹

Repairs were also made to the four barrack forts—Inversnaid, Kiliwhimen, Bernera, and Ruthven—'at very little cost'.⁵³² Work on the medieval castles during this third phase

⁵²⁷ TNA WO 55/352[B], p. 352. 'Extract of a Letter from the Earl of Albemarle to the Duke of Newcastle', Edinburgh. 2 February 1746/7 [1747].

⁵²⁸ TNA 55/353, p. 356, 5 May 1750, a letter from the Board of Ordnance to the Lords Justices.

⁵²⁹ TNA WO 55/353, pp. 146–147 and 356, 21 July 1748 and 5 May 1750 respectively. Corgarff was to accommodate an officer and forty men; Braemar, an officer and fifty men.

⁵³⁰ TNA WO 55/353, pp. 146–147, 21 July 1748. Both Castle Tarbat and Tioram were each to accommodate an officer and thirty-four men.

⁵³¹ TNA WO 47/34, f. 8 verso, 27 January 1748 [1749]. For maps of Corgarff, see: NLA MS 1649 Z.03/35a and 35b (copy) and BL Maps K.Top.49.14.a.; for Braemar, see: NLS MS 1649 Z.03/32c and BL Maps K.Top.49.13.2.a.

⁵³² TNA WO 55/352[B], p. 352.

comprised new plans and constructions of powder magazines, barracks, and storehouses. The government's concern was to increase the capacities of the each of their garrisons to be effective in preventing a southerly advance should the Jacobites rise again. Although the output of fortification cartography became more sporadic after 1755 (see Fig 5.13), there was continued need for a military presence in the Highlands to counter crime by Jacobite exiles in the hills, and for engineers to maintain the forts and manage the road-building. Along with better roads and more bridges, relative stability began to pervade the Highlands. Improvements in agriculture, new industries, and new social relationships and ways of doing business with the Lowlands and beyond replaced rebellion and fortification.⁵³³

William Skinner, Chief Engineer in Scotland, surveyed the vestige of a Cromwellian pentagonal citadel at Inverness, Oliver's Fort, as a possible location for a new fort. Lewis Marcell, an Ordnance engineer, also surveyed and compiled a set of plans for a new fort to be 'Done exactly upon the Old Lines of Olivers Fort'.⁵³⁴ The fort, however, was never built. Instead, Skinner proposed a new site and a new design: Fort George at Ardersier Point, a lengthy building programme that far exceeded the original estimated cost of £92,673 19s 1d.⁵³⁵ With the backing of the Board of Ordnance and the Duke of Cumberland, by now in Flanders, the Crown invested the land 'a circumference of two miles round the Fort' which would 'prevent making any cover thereabouts' and surveyors were sent 'without loss of time to measure & value the ground'.⁵³⁶ Fort George took 23 years to build and would have taken longer if the Board had not cut off funds in September 1770.⁵³⁷

The late Hanoverian period, 1780–1815

With the decline of the Jacobite threat in the second half of the eighteenth century, Fort George at Ardersier became part of a chain of coastal defences. It is these coastal defences—the gun batteries in the main along the east coast of Scotland and the fortified garrison of

⁵³³ Hook and Ross 1995.

⁵³⁴ NLS MS 1647 Z.02/83a. See also NLS MS 1647 Z.02/83b, MS 1647 Z.02/79b and 79c, MS 1647 Z.02/80a and 80b, and MS 1647 Z.02/81a–e. William Skinner, in 1747, also surveyed and mapped Oliver's Fort, the Board of Ordnance having ordered him to 'consider well its situation, make proper plans, sections, and Elevations of the adjacent Ground within the reach of Cannon shot [...] and report to us how far they may Serve towards the Rebuilding the same' (BL Additional Ms. 17499, p. 2, 31 December 1746). For the report and estimate, see BL Maps K.Top.50.9.a and for 'remarks and observations', see BL Additional Ms. 17499, pp. 23–24. For maps, see BL Maps K.Top.50.9.b–i; NLS MS 1647 Z.02/82a and 82b.

⁵³⁵ Ewart and Gallagher forthcoming.

⁵³⁶ TNA WO SP 87/24/93, f. 258, a letter dated 29 April 1748, from Cumberland to the Duke of Newcastle.

⁵³⁷ TNA WO 47/76, p. 72, 3 September 1770.

Fort Charlotte near Lerwick in the Shetland Islands—that give rise to a fluctuating output of maps in the final phase between 1780 and 1815 (see Fig 5.14(d) and Fig 5.15(d)).

Plans and profiles of coastal gun batteries—along the east coast at Dunbar, Leith, North Queensferry, Arbroath, Montrose, Peterhead and Banff; on the west at Campbeltown; and the Firth of Clyde at Greenock—account for the greatest output in fortification cartography for this final phase (49%). Gun batteries became the focus of attention, particularly after 1794, when there was heightened concern of an enemy landing on Britain's coast. When reviewing the defence of Scotland in 1797, Henry Dundas remarked that the batteries would 'countenance against any small predatory Landings, which may be attempted on any of the different extended Coasts of Scotland, and against which if they escape the vigilance of our Navy'.⁵³⁸ Maps were drawn to determine the best location of a battery and profiles to calculate the height of the seaward palisade to form an effective coastal defence structure. Profiles showed positions in which guns were to be mounted and so particular attention was accorded to measurements of elevation, of the seaward palisade and height of the stone platform above a powder magazine. In considering the design of a battery, the engineer had to ensure that the parapet was of sufficient height to protect the gunners behind it from being fired upon from the top of a ship's mast. Likewise, the batteries had to be protected on the landward side with additional outworks in case the enemy made a surprise attack on foot.⁵³⁹

Many of the plans contributing to the cartographic records of garrison forts in this phase relate to Fort Charlotte at Lerwick on the Shetland Islands and date from 1783. Fort Charlotte was repaired and re-equipped to protect the Sound of Bressay which prompted detailed charting of that coastline as well as designs of the fort, its barracks and powder magazine.⁵⁴⁰ The perceived threat of Napoleonic invasion occasioned the construction of a Martello Tower at Hackness, on Scapa Flow in Orkney, in 1813. Although few of the Scottish fortifications conformed to a regular design, the tower was a complete break-away from the bastioned fortification. The round structure, however, was resistant to cannon fire and sturdy enough to act as a platform for artillery pieces. Several were built along the south coast of England in preparation for Napoleonic invasion.

In describing the changing quantitative output of Scottish fortification cartography, there has been a coincident changing qualitative description. The four maps in figure 5.15

⁵³⁸ TNA WO 30/66, f. 121, 7 March 1797, Henry Dundas on the Defence of Scotland,

⁵³⁹ Muller 1756.

⁵⁴⁰ For example, NLS MS.1649 Z.03/48a: Plan of Fort Charlotte in 1781 [with section in 1783]; NLS MS 1649 Z.03/43a–b. TNA WO 47/98, pp. 5–6 (entry 696), notification from the Board that 'Fort Charlotte should be put in a complete state of defence', 3 July 1781.

show the evolving geographical distribution of the fortifications and how the British state's 'knowledge' of Scotland shifted and expanded, albeit for very discrete areas. After the first phase when the lowland medieval castles and Fort William to the south of the Great Glen and the castles to the west were surveyed, the second phase established the Great Glen 'chain' of fortifications intended to act as a barrier to Jacobite descent into the Lowlands. The second phase also saw the first exploration of military surveyors into the mountainous Highland region to the east of the Glen. This area became thoroughly described in the third phase through a period of reconnoitring for suitable new military establishments to act as garrisons for the troops establishing a new social order in the Highlands. In contrast, the fourth phase shows an almost complete abandonment of focus on the Highlands as political and military imperatives turned to the coasts of Scotland, to the east especially. Where the interior was concerned, the pattern of fortification had almost returned to that of the first phase but with the aim of defending the Scottish populace rather than subjugating it.

The final section of this chapter describes the main characteristics of these different typologies of fortification cartography but in relation to their united military functions: capacity and defence. In the process of analysing the maps associated with these functions, it becomes clear how maps can define and allow categorisation of Scotland's forts into medieval castles, garrison forts, barrack forts, and coastal gun-batteries. At the same time, a shifting political strategy is displayed through cartographic representations that visually enhanced state power and authority beyond the material constructions themselves.

Capacity to Wage War: Design, Construction, and Regulation

The surviving archive of the fortification cartography of eighteenth-century Scotland is dominated by representations of six fortifications: Fort George at Ardersier, Fort George at Inverness, Fort Augustus, Fort William, and Stirling and Edinburgh Castles (see Fig 5.16). Between them, they account for nearly 60% of the archive of fortification maps. A large proportion of these maps is concerned with the capacity of the establishments: of barracks, storehouses, and powder magazines. They are also concerned with their security including the form and strength of the enceinte and the location of the fort, the latter at several scales. The first was at a regional level to establish the fort's encompassing military utility. Fort Augustus, for example, was located in the centre of the Highlands, strategically positioned to command Fort William and Inverness; for overseeing the barrack forts of Inversnaid, Ruthven, Bernera, and Kiliwhimen and coordinating troop patrols; and a site from which to quickly 'assemble a body of 1000 Men to March to any part of that Country for preventing

or suppressing Insurrections’.⁵⁴¹ The second was at a local level. Situating a fort took into consideration its proximity to a fresh water supply, how vulnerable it was to attack and, importantly for political reasons, its proximity to an area of government disaffection. Fort William, for example, was well situated in relation to the first and third factors but not the second. The fort, according to O’Bryan in 1710, ‘as appears by the Plan, is not the moste [sic] advantageous, being at the foot of a Mountaine [sic]’, and every part of the fort was ‘within less than Musquett Shott [sic]’.⁵⁴²

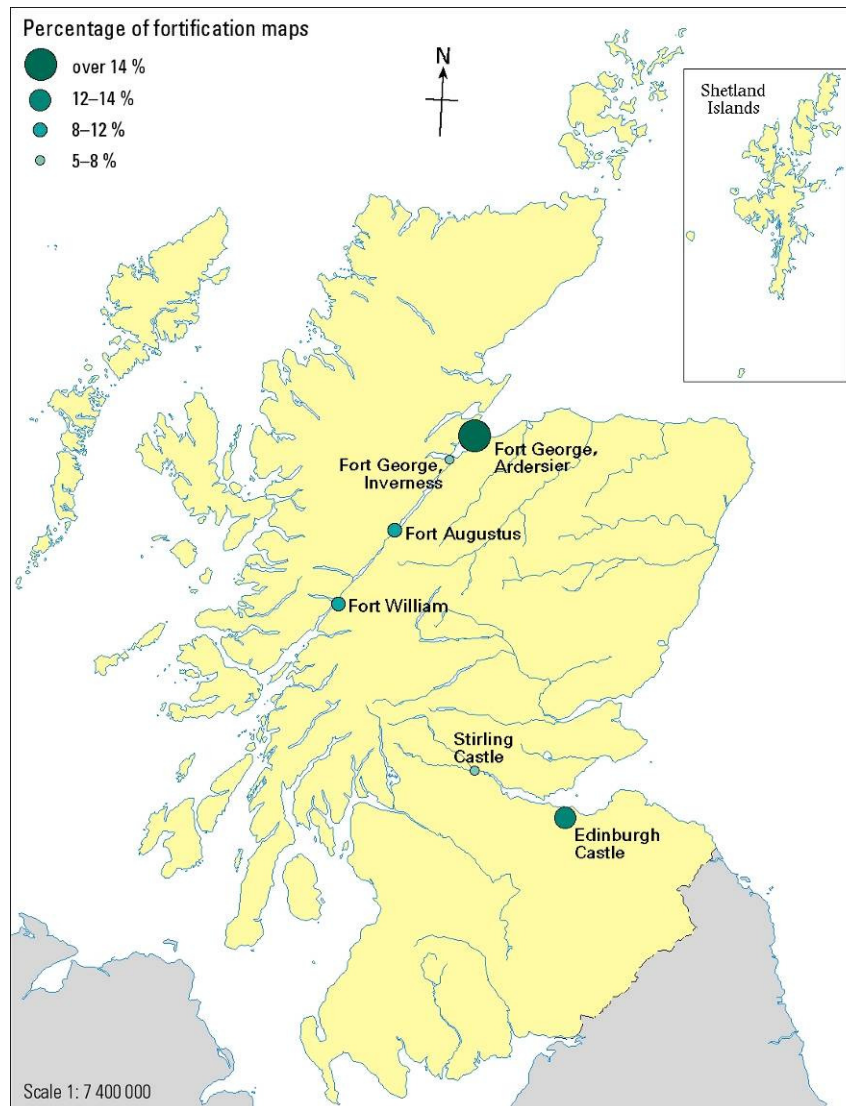


Figure 5.16. The main foci of military fortification cartography, 1689–1815

⁵⁴¹ BL Additional Ms. King’s 103, ff. 19–20, 1727.

⁵⁴² TNA WO 55/319, p. 129 ‘A Report of Fort William in North Brittain [sic] Conserving [sic] the Place it Stands in and the usefulness [sic] of a small Magazin [sic] there’, written by Talbot Edwards on 2 February 1709/10 [1710].

This section examines representations of the capacity of the state to wage a war of attrition in Scotland by reviewing the art of fortification: the design and construction of different types of defensive establishments; the regulation of barrack building; and the means to accommodate the expansion of military personnel, stores, and munitions. It further examines the ways in which cartographic knowledge and social power intersected ideologically.

'For preventing an insult': maps of medieval castles

Since the principal lowland castles—Edinburgh, Stirling, and Dumbarton—were already strategically situated on volcanic outcrops, the engineers' concerns turned to updating their defences to contend with 'modern' warfare methods. For Edinburgh (taken as a representative of the type of work performed on these lowland castles) this involved strengthening the approach and entrance to the castle, considered to be the castle's most vulnerable part and therefore most likely to be the focus of an enemy attack. Work included cutting away at the rocks on the north and south sides of Castle Hill which Talbot Edwards considered 'to be a greater strengthening to the place, than a Moat, and Cover'd way [...] Experience shewing [sic], it is easier passing over such Barriers than High Rocks and precipices'. By narrowing the access to the castle from the direction of town, by keeping some form of horn work—'min'd within and without'—with some retrenchments, and a 40 foot wide moat, Edwards believed 'these advantages will much Lengthen time, and cost an Enemy dear, before they can come to the main Gate of the Castle where is the Last Retreat as my Designe [sic] shewes'.⁵⁴³ Edwards did not adopt conventional graphic codes in his design (see Fig 5.17). He did, however, explain his use of colours: 'a) The Horn work b) The Ravelling c) The Cover'd waie, all coulored with light Green. The yellow are Retrenchments, cutt off from ye Horn Work'.

Another area vulnerable to attack was the wall at the west end of the castle which was curved making it impossible to defend from inside the fort:

It being a General Rule in all Fortifications that no part of a Fortress where accessible [sic] & may be attacked, but the same sh^d be discover'd from within the place, that the Garrison may fire upon any that may lodge under

⁵⁴³ TNA WO 55/319, pp. 123–125, Talbot Edwards' 'Report concerning the Fortifying Edinburgh Castle', 10 January 1710.

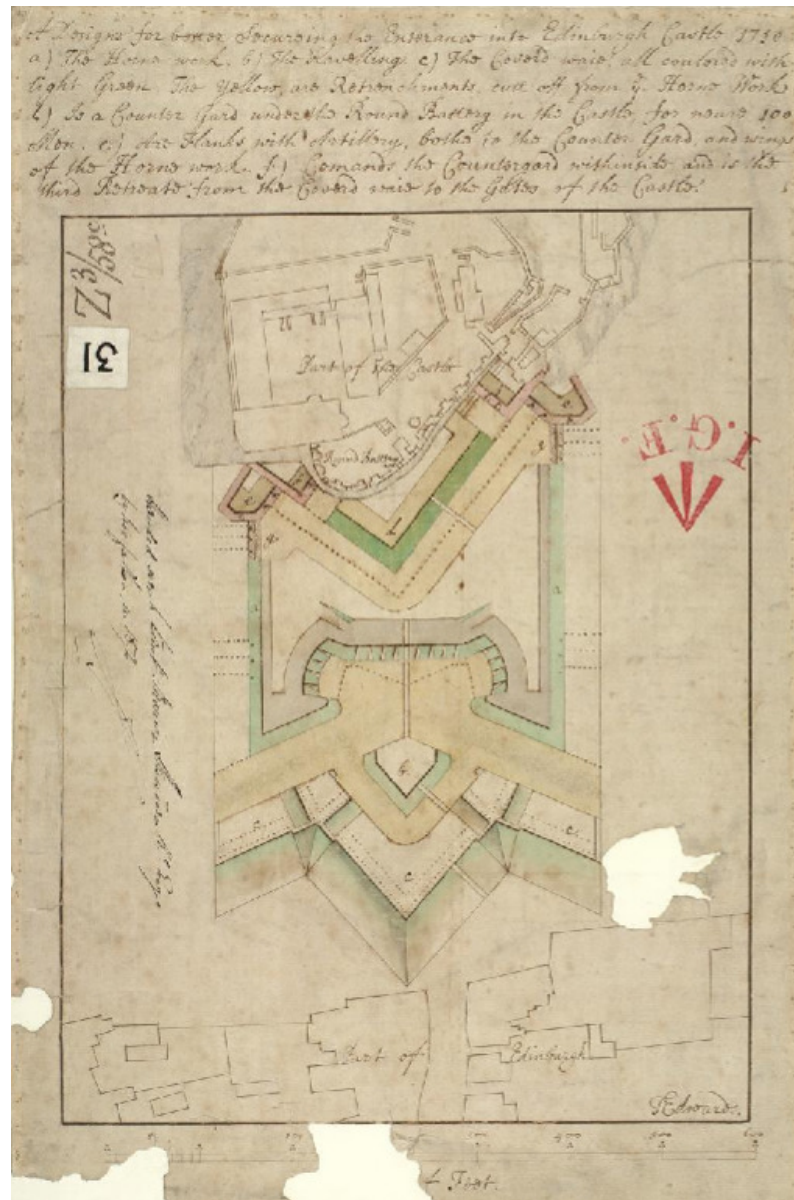


Figure 5.17 ‘A Design for better Securing the Entrance into Edinburgh Castle 1710’, by Talbot Edwards. MS 1649 Z.03/58c (Courtesy of the Trustees of the National Library of Scotland)

ye outside of Walls: Otherways where none can see, there will be danger of Surprize or Mining.⁵⁴⁴

On an inspection of the castle in 1727, Wade had found the parapet walls ‘so ruinous that the Soldiers after Shutting of the Gates had found a ways to ascend and descend to, and from the Town of Edinburgh’. As an experiment, Wade ordered ‘Four soldiers (some of them with their Arms on their Shoulders) [...] to try if they could ascend the Rock and get over the

⁵⁴⁴ NLS MS 1646 Z.02/23a, this observation was made concerning a design for the entrance of Stirling Castle ‘this Design having no Flank to clear the Gate & Entrance [...] is therefore very improper’. In similar vein, the wall at the west end of Edinburgh Castle had no flank.

Wall, which they perform'd with such Dexterity, That from the common Road they mounted into the Castle in less than five minutes'.⁵⁴⁵ Under orders from Wade, Bucknal, the Fort Major of Edinburgh Castle, directed the building of a new, angled wall (see Fig 5.18). The design included a large buttress and a sentinel box with indications of the work to be completed that year, including the addition of barriers and for the wall to be raised a further 5 feet to secure the upper defences and, later, a new powder magazine. Figure 5.19 is a plan and profile of the wall once work was completed. These defence measures, applied to both Edinburgh and Stirling Castles, proved highly effective. Neither castle fell during the 1745 rebellion despite being under intense siege from the Jacobites. Both towns, however, did. The cartographic focus for the previous forty years had been on the castles rather than the towns. The engineers' purpose: to secure strong forts, to protect the garrison should the town's people turn against them, and to prevent the southerly advance of an opposing army.

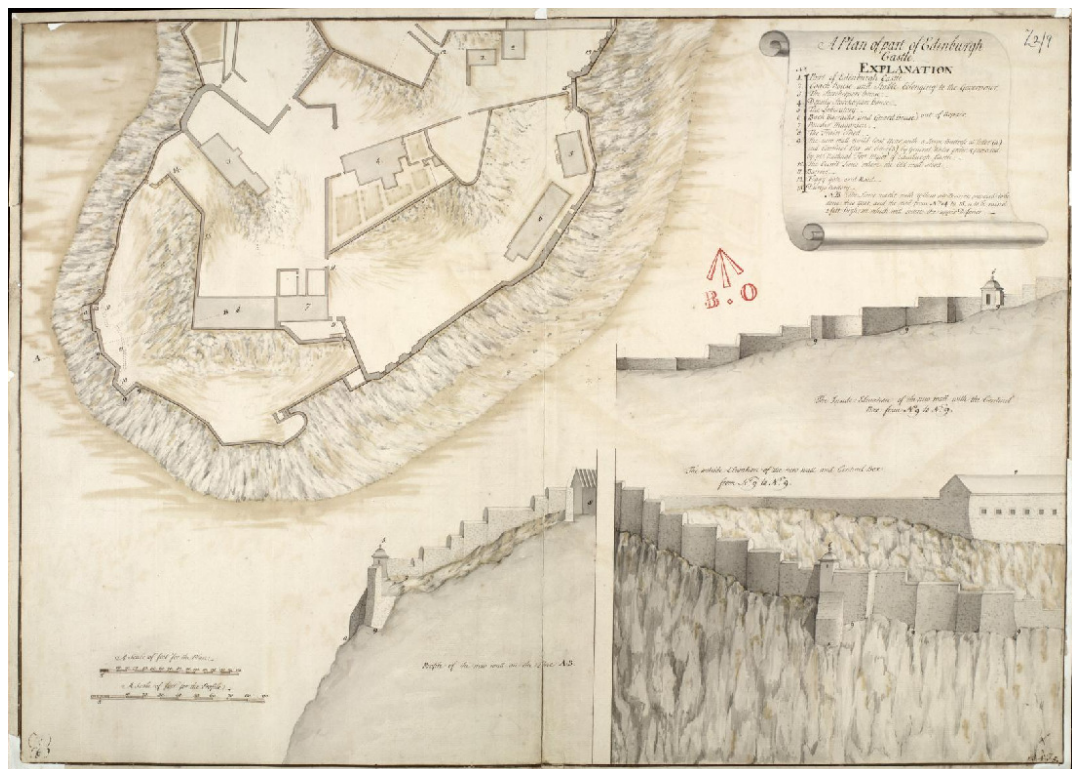


Figure 5.18 'A Plan of part of Edinburgh Castle', by [John] White, c.1735. MS 1645 Z.02/09 (Courtesy of the Trustees of the National Library of Scotland). Another copy at NAS RHP35772.

⁵⁴⁵ BL Additional Ms. King's 103, a report on Wade's journey in the Highlands in 1727, f. 18.



Figure 5.19 ‘A Plan of part of Edinburgh Castle’, 1735. RHP35773
(Courtesy of the National Archives of Scotland)

Measures to counter insurgency following the 1745 uprising included increasing the garrison at Edinburgh Castle. The Long Storehouse was converted into barracks and then in 1750 a new Barrack Hall for a further 270 men was designed by William Skinner.⁵⁴⁶ In 1748 and 1749, a new powder magazine was built at an estimated cost of £1495 18s 10¼d in preparation for the increased military strength of the garrison.⁵⁴⁷ The magazine, built on the site of the old one (number 14 in figure 5.19) was commissioned after a complaint to the Board of Ordnance that ‘the Magazine at Edinburgh was insufficient to contain a proper

⁵⁴⁶ NLS MS 1645 Z.02/08a; MS 1645 Z.02/12a.

⁵⁴⁷ BL Additional Ms. 17499, ‘correspondence of General William Skinner, Director of Engineers in Scotland, with the Board of Ordnance’, 15 April 1748 and 12 May 1749, pp. 108–109 and 245.

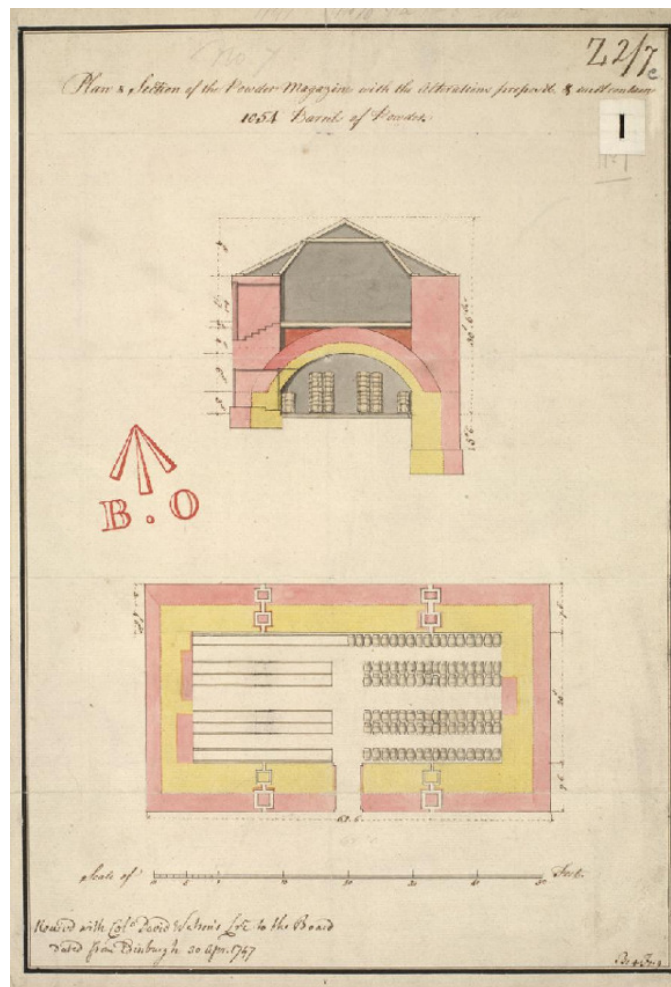


Figure 5.20 'Plan & Section of the Powder Magazine with the alterations propos'd, & will contain 1054 Barrils of Powder', by David Watson, 1747. MS 1645 Z.02/07c (Reproduced by permission of the Trustees of the National Library of Scotland)

Quantity of Powder for the Service of that Garrison'.⁵⁴⁸ The construction of the new magazine increased its capacity from 684 to 1054 barrels by extending the floor area and the span and spring of the arch (see Fig 5.20).⁵⁴⁹ Lord Ker considered the location of the powder magazine to be 'Dangerous', it being 'exposed to the Country from its very foundation from South to North and only two small Guns pointed that way to defend it, the Consequence of which might be fatal in case of Siege'.⁵⁵⁰ Skinner had no such doubts as the design and situation of powder magazines was a matter of particular importance to military engineers, for the powder had to be kept dry as well as protected from enemy fire.⁵⁵¹ According to

⁵⁴⁸ BL Additional Ms. 17499, p. 62, 14 July 1747. See NLS MS 1645 Z.02/07b 'Plan & Section of the Powder Magazine as it is at present', by David Watson in 1747.

⁵⁴⁹ NLS MS 1645 Z.02/07c 'Plan & Section of the Powder Magazine with the alterations propos'd', by David Watson in 1747.

⁵⁵⁰ TNA WO 47/36, pp. 21–22, 20 July 1750.

⁵⁵¹ Duffy 1996.

Skinner it was situated in the best place, being clear of other buildings, on the site of the old magazine and protected from enemy artillery fire by the castle's natural defences—a precipice 'between 2 and 300 feet above the Levell [sic] of the Country so that any Shot fired from a Battery below will be at least on an Angle of 40 Degrees [...] and the thickness of the Magazine Wall on that Side is 5 feet [...] sufficient to Sustain the Arch which is Bomb Proof'.⁵⁵²

Such displays of the pragmatics of engineering were heavily dependent on measurement and accurate designs. Science, however, did not have sole claim to the visual impact of these forms of graphic representation. Military maps often displayed an artistic style that had associations with landscape painting.⁵⁵³ Map making and landscape painting were connected in their concern with line, colour and symbolisation, in their shared problems of content selection and coherent representation on a plane surface, and on decisions about form, composition, framing, and perspective.⁵⁵⁴ Paul Sandby, considered 'a pioneer, instrumental in the emergence of a native school of landscape painting', was also employed as the chief draughtsman on the Military Survey of Scotland.⁵⁵⁵ In addition to work in the drawing room at Edinburgh Castle, Sandby accompanied survey teams into Scotland where he continued to represent artistically features of military importance, such as the pen, wash and watercolour plans and perspective views of Tioram Castle and Castle Duart (see Fig 5.21), surveyed by David Watson in 1748 to assess whether they might be put to use by the Hanoverian Army.⁵⁵⁶

Sandby drew this multi-perspective map to accompany Watson's brief report on the state and cost of repairing the castles. Of Castle Duart situated on the east side of Mull, Watson wrote:

its situation is very strong but the Entrance of the Sound is too broad to be commanded from the Castle; the Walls are sufficient, but the Roof [of] the

⁵⁵² TNA WO 47/36, pp. 109–110, 23 August 1750.

⁵⁵³ Woodward 1987, David Woodward's 'Introduction' to *Art and Cartography* challenged the then common assumption among cartographical historians that with eighteenth-century surveying methods and plain-style maps, cartography had progressed from art to science. A succession of historical essays sought to show how 'art and science have coexisted throughout the history of mapmaking', 1987, p. 2.

⁵⁵⁴ Rees 1980; Cosgrove 2005.

⁵⁵⁵ Bonehill and Daniels 2009, p. 8, NRAS RH1/2/523(1b), p. 2; TNA WO 26/21, p. 364, 1749.

⁵⁵⁶ NLS MS 1648 Z.03/28f 'Report of Castle Tyrrim, Castle Duirt, and the Castle in Island Stalker', by David Watson (Deputy Quartermaster-General of the Ordnance) in 1748. Watson relayed to the Board of Ordnance that the repair of Tioram Castle to 'hold a Party of 50 Men' would cost at least £800. Castle Duart which at the time of Watson's inspection held a Detachment of a 'Subaltern and 20 Men', needed repairs amounting to £800 or to accommodate 150 men, £1500. Castle Stalker, on an islet on Loch Laich, an inlet off Loch Linnhe, was described by Watson as 'an old Square Tower of 40 Feet by 49 [...] the Walls are about 8 feet thick and very sufficient'. If repaired (for £500) it could accommodate 40 men.

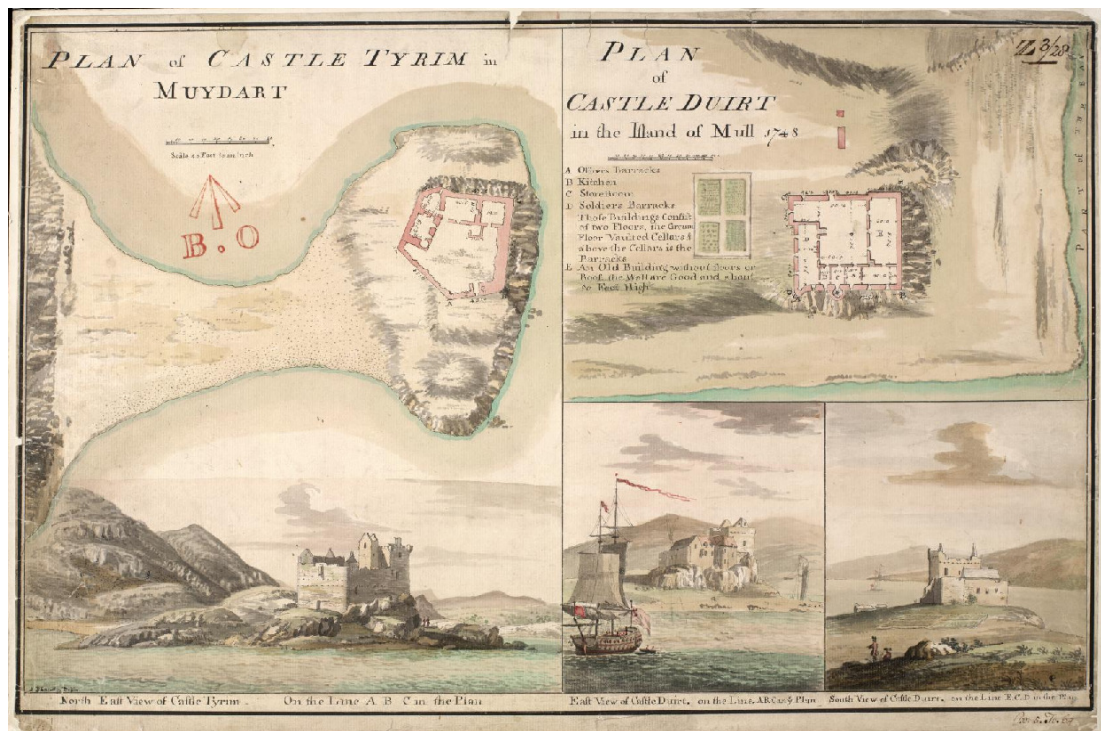


Figure 5.21 ‘Plan of Castle Tyrim in Muydart; Plan of Castle Duint in the Island of Mull’, by David Watson (Engineer) and Paul Sandby (Draughtsman), 1748. MS 1648 Z.03/28e. (Courtesy of the Trustees of the National Library of Scotland)

Barracks where the Party is lodged quite Ruinous. If This Castle was properly repair'd it might accommodate 150 Men, which Repairs would Cost 1500£. The Repairs necessary for quartering the present Detachment which consists of a Subaltern and 20 Men must cost 800£.⁵⁵⁷

The report did not need to be any longer as Sandby’s plans and views, with their inclusion of dimensions, provided a comprehensive visual report. As with his earlier plan of Dumbarton Castle (see Fig 4.8), his use of views provided information that was harder to glean from the plans, particularly the site of the fortresses, their accessibility, and the surrounding relief. The map ‘conveyed information less easily reducible to words’.⁵⁵⁸ Watson’s associate, William Roy, argued that ‘a short description may suffice, since from a plan of this kind, topographically expressed, a much truer notion may be obtained [...] than what, without such assistance, could possibly be conveyed in many words’.⁵⁵⁹ Roy (and Watson) complied with Enlightenment convictions—they placed the map at the privileged centre of the geographical knowledge archive.

⁵⁵⁷ NLS MS.1648 Z.03/28f.

⁵⁵⁸ Bonehill and Daniels 2009, p. 93.

⁵⁵⁹ Roy 1793, pp. 155–156.

From the late-seventeenth century and the formation of a standing army in Britain, the medieval castles of Scotland were adapted to accommodate soldiers. Plans of Edinburgh, Stirling, Blackness, and Dumbarton Castles provide evidence of some of the earliest barrack building or 'lodging' construction in the British Isles.⁵⁶¹ Scotland was an exception. New constitutional arrangements set out in 1688 after the 'Glorious Revolution' established a standing army but an army that was to have no permanent quarters. Instead, the army was to rely on troops being billeted in inns and private houses. Objections to building barracks were founded on ideological arguments: troops quartered in barracks would become distant from the people, over-loyal to their commanders, and a potential threat to parliamentary rule. The very inconvenience of billeting meant people continued to be aware of the troops:

a standing army in quarters will always be more troublesome to the people than a standing army in barracks; but for this very reason I shall always be for keeping our army in quarters, that the people may be sensible of the fetters which are preparing for them.⁵⁶²

In 1717, a king's warrant 'for regulating the Barracks & Barrack Masters' in Scotland was formalised.⁵⁶³ A similar practice had been successfully implemented in Ireland following the suppression of the Jacobites in 1691.⁵⁶⁴ In Scotland, James Smith was made the 'Chief Director' of barrack building until 1719 when Andrews Jelfe was appointed as Architect to the Board of Ordnance and 'Clerk of the Works and Director for building the barracks in Scotland' in his place.⁵⁶⁵ In 1718, Robert Johnson was officially employed as 'Overseer & Barrack Master' of Fort William, and Robert Douglas, Thomas Gordon, John Dumaresq, and John Henri Bastide were appointed overseers of four 'new barrack forts' to be built in the Highlands (see Fig 5.11).⁵⁶⁶

⁵⁶⁰ TNA WO 55/2281, f. 15. The 'Register of Draughts' compiled in the Drawing Room at the Tower of London uses this term to refer to Board of Ordnance plans of Bernera, Kiliwhiman, Inversnaid, and Ruthven Barracks.

⁵⁶¹ TNA MPF 1/243/1, Dury's 1696 plan of Blackness Castle shows two sites for 'logement pour les Soldats de la Garrison'. Slezer's 1696 'Plan of Edenburgh [sic] Castle' (TNA MPF 1/245) also identifies 'Gunnery lodgings', and his 'Plan of Dunbarton [sic] Castle' (TNA MPF 1/244) makes reference to 'lodgings' within the fort complex.

⁵⁶² Lord Pulteney, the former Whig Secretary of State at War, in the 'Debate on Quartering of Soldiers' in *Parliamentary History*, II (1739–41). Pulteney was concerned about the size of the standing army and put forward arguments to reduce it. Quote from Douet 1998, p. 41.

⁵⁶³ TNA WO 47/30, p. 158, 18 June 1717.

⁵⁶⁴ Douet 1998. In 1720, when John Romer was appointed engineer responsible for 'carrying on the Barracks & other Works in North Britain', he was supplied with copies of the Irish Contracts (TNA WO 47/33, p. 88, 13 February 1720). It is not clear whether these are artificers' contracts or whether they relate to the regulation of barrack building in Ireland.

⁵⁶⁵ WO 55/347, p. 124, 6 March 1719. See chapters 3 and 4.

⁵⁶⁶ TNA WO 47/31, pp. 66 and 125.

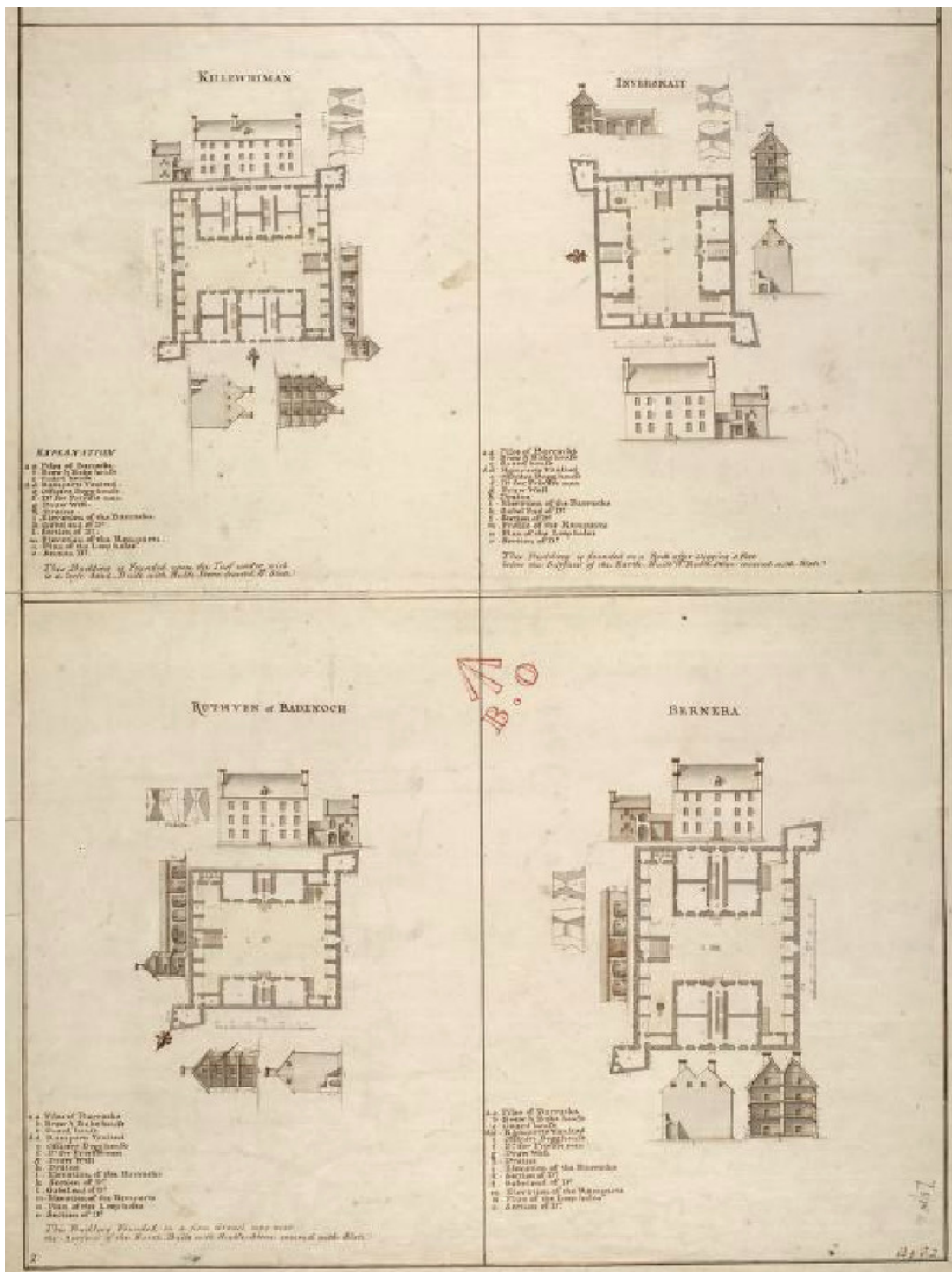


Figure 5.22 'Killewhiman, Inversnait, Ruthven of Badenoch, Bernera', by Andrews Jelfe, 1719. MS 1648 Z.03/18a (Reproduced by permission of the Trustees of the National Library of Scotland)

This regulation of barrack building in Scotland was a direct consequence of the 1715 Jacobite rising. The design of these new 'barrack forts' was reflected in the numerous plans drawn by Andrews Jelfe whose basic design shows a similar—but not identical—

architectural form to each fort (see Fig. 5.22). Each stood as a detached, enclosed, self-defensible barrack complex with bastion-like angle towers at alternate corners from which it was possible to cover the whole of the exterior of the enclosure with flanking musketry fire.⁵⁶⁷ Some of the plans show that consideration was given to adding bastion-towers to the remaining two corners ‘if the Money Answers’, which it appears not to have done.⁵⁶⁸ At some point it was decided to reposition the towers at Bernera, some plans are annotated with a note that the towers were moved ‘from angle g’ although no explanation as to why this was done is given.⁵⁶⁹ They each had two piles of barracks facing across a barrack square with the rear walls forming part of the external defences (see Fig 5.23). As well as providing a means for defending the barracks, the towers accommodated the officers and, on the ground floors, there were guardrooms in one tower and a brew- and bake-house in the other. The barracks accommodated a smaller number of troops (according to Charles Tarrant, c.70 soldiers but this figure is much less than their design implies)⁵⁷⁰ than the garrison forts; the soldiers’ duty was to police the Highlands.

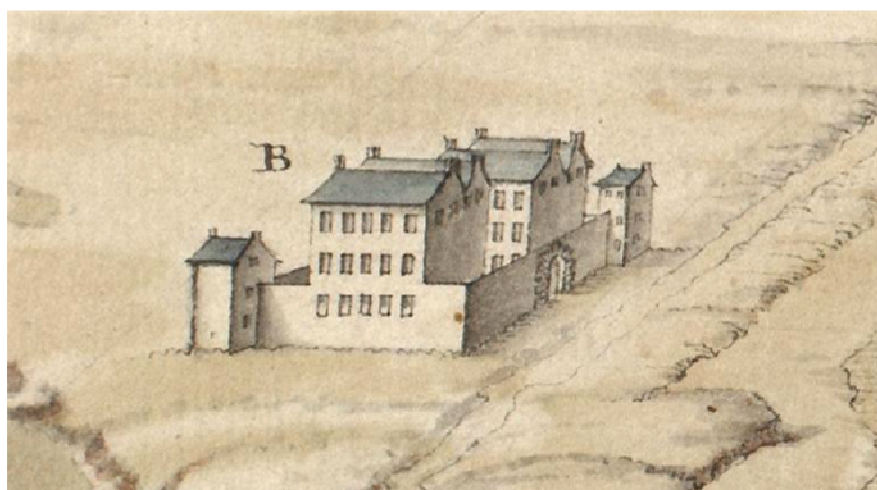


Figure 5.23 ‘A prospect of Bernera Barracks in Glen Elg’ before it was built. Part of MS 1647 Z.03/07a. (Reproduced by permission of the Trustees of the National Library of Scotland)

The construction of the barracks took several years beginning with the protracted process of passing Acts of Parliament for ‘investing the ground in the Crown’ so that no

⁵⁶⁷ Saunders 1998.

⁵⁶⁸ ‘Two Towers left to be built if the Money Answers’, see NLS MS 1647 Z.03/10c (Kiliwhimen); MS 1647 Z.03/05a (Bernera); MS 1648 Z.03/17b (Inversnaid); MS 1648 Z.03/20a (Ruthven).

⁵⁶⁹ NLS MS 1647 Z.03/06b–d. Tabraham and Grove (1995) suggest that the plan was accidentally reversed.

⁵⁷⁰ Charles Tarrant’s plans of Inversnaid and Bernera note an Establishment of a ‘Captain, Subaltern and 70 Men’ in each barrack complex (BL Additional Ms. 22875 ff. 41–42; TNA WO 78/6012 pp. 14–17). Inversnaid and Ruthven could accommodate 120 men; Bernera 240 men; and Kiliwhimen 360 men (see Tabraham and Groves).

civilian buildings could be built within musket shot of the intended barracks.⁵⁷¹ Until the barracks were completed, they were vulnerable to attack, and incidences of workmen being kidnapped were reported to the Board with an appeal for greater security: ‘on ye 8th instant, 8 Masons & Quarriers, were seized & carryed [sic] away from the Barrack building at Innersnaite, by a number of armed men’.⁵⁷² Rumours of rebel attacks effectively stopped work on Inversnaid until soldiers were put in place to protect the workmen.⁵⁷³ Major Thomas Gordon, overseer of the barracks at Inversnaid, was ordered to repair there to ‘put ye same in as good posture of defence as you can’, by adding musket loops in the outer walls of the barrack blocks and to fix palisades in front of a ditch dug around the works. He was required to keep an ‘exact account of the expence [sic] thereof’ and to make it ‘as little as possible’.⁵⁷⁴

Three of the barracks—Inversnaid, Kiliwhimen, and Ruthven in Badenoch—were ready to receive their garrisons in April 1721; Bernera was still to be built.⁵⁷⁵ Inversnaid and Ruthven were single-pile barracks, with two rooms on each of the three floors, large enough to accommodate two companies, or about 120 men. Bernera was a double-piled barrack, creating an ‘M-shaped’ gable, with four rooms per floor to accommodate four companies totalling 240 men. Kiliwhimen was the largest of the four barracks, a double-piled structure with six rooms per floor for 360 men or six companies.⁵⁷⁶ The government’s intention was that the regular troops would be under the command of Highland Officers loyal to the Crown and that each barrack would have a company of thirty guides, again loyal Highlanders ‘Establish’d to Conduct them through the Mountains’.

⁵⁷¹ TNA WO 55/347, p. 117, 11 December 1718 ‘Extract of a letter from Mr James Smith’. The Duke of Gordon owned the land on which Ruthven Barracks was to be built, and the Laird of McCloud (also McLeod and Macleods) ‘a minor’ that of Bernera (ibid, p. 122). The Board requested that these landlords should allow an engineer to survey and mark out the lands to be purchased (ibid, pp. 125–126, 5 March 1719). The cost for building the four barracks was estimated at £9300 in 1717 (TNA WO 47/30, p. 273, 28 October 1717. The Board of Ordnance requested that the Duke of Roxburgh, Principal Secretary of State, laid the estimate before the King). An advertisement was placed in the *London Gazette* and in papers printed in Edinburgh for artificers to tender for work on the barracks; interested parties were allowed to see the plans in order to propose costs which, once agreed by the Board of Ordnance, were binding (TNA WO 47/32, pp. 41–42, 31 January 1719). Fiscal restrictions meant that ‘Those that would do it best & cheapest were entitled to work according to the Tenour [sic] of the Advertisement in the *London Gazette*’ (TNA WO 47/32, pp. 53–54, 10 February 1719).

⁵⁷² TNA WO 47/31, p. 235, 24 August 1718.

⁵⁷³ TNA WO 55/347, pp. 148–149, a letter from the commander of Inversnaid dated 21 April 1719 warned of Jacobites rising in support of the exiled Stuarts. This would eventually lead to the Battle of Sheriffmuir. WO 47/32, pp. 191 and 196, 1 May 1719.

⁵⁷⁴ TNA WO 55/347, pp. 148–149, a letter from Andrew[s] Jelfe to Major Gordon dated 21 April 1719.

⁵⁷⁵ TNA WO 55/347, p. 268, a letter from the Board to Sir George Treby, Secretary at War dated 21 April 1721. Bernera was completed in April 1723 (Tabraham and Grove 1995).

⁵⁷⁶ Company numbers from Tabraham and Groves 1995.

The barracks were never fully garrisoned.⁵⁷⁷ During his reconnaissance of the Highlands in 1724, Wade reported that there were ‘in some but thirty men’. He was also scathing about the effectiveness of the barracks: ‘It is to be wish’d that during the Reign of Your Majesty and Your Successors, no Insurrection may ever happen to Experience whether the Barracks will Effectually [sic] answer the End Propos’d’. His damning comment seems to be directed more at the lack of troops than the design and strength of the fortifications. He clarified that ‘if the Number of Troops they are built to Contain, were constantly Quarter’d in them [...] and proper Provisions laid in for their Support during the Winter Season, They might be of some Use to prevent Insurrections of the Highlanders’, although they would never be strong enough to withstand a siege with heavy artillery.⁵⁷⁸ Wade felt that two of the barracks were built in the wrong positions; presumably one was Kiliwhimen since he proposed to build a new and larger fort—Fort Augustus—‘near the end of Lake Ness’ as well as a ship, the *Highland Galley*, to transport arms, munitions and general provisions to it from Inverness;⁵⁷⁹ the other may have been Inversnaid due to its external supply of fresh water, its distance from Loch Lomond which made it difficult to provision, and due to the fort’s proximity to the surrounding hills.⁵⁸⁰

For establishing a military presence in the Highlands: maps of garrison forts

Garrison forts offered engineers an opportunity to apply their knowledge of the military sciences in order to create a defensive structure capable of both mounting and resisting a forceful attack. The design of garrison forts continued a practice begun in Scotland by Cromwell after 1652, when several citadels—Ayr, Inverness, Inverlochy, Leith, and St. Johnston at Perth—were erected as part of a military scheme intended to control a hostile civil population.⁵⁸¹ Such military fortifications had offered, according to Monck, ‘a great deale [sic] of benefitt to your highnesse, besides the securitie of the place and the advantage

⁵⁷⁷ Charles Tarrant’s plans of Inversnaid and Bernera note an Establishment of a ‘Captain, Subaltern and 70 Men’ in each barrack complex (BL Additional Ms. 22875 ff. 41–42; TNA WO 78/6012 pp. 14–17).

⁵⁷⁸ BL Additional Ms. King’s 100, ff. 11–12.

⁵⁷⁹ BL Additional Ms. King’s 101, f. 20.

⁵⁸⁰ NLS MS 1648 Z.03/15a ‘A Draught of Innersnait, in the Highlands of North Brittain, nere the Head of Loch Lomend with part of the country adjacent’, by John Dumaresq and John Henri Bastide, 1718.

⁵⁸¹ A proposal by Slezer for rebuilding Inverlochie in 1689 included a reminder of how effective the Cromwellian citadel had been: ‘This Fort formerly contributed much to keep the Highlands in Subjection to the Government, and in an intire [sic] Peace amongst themselves’ (BL Maps K.Top.50.37.2 ‘Innerlochic or Obrian Fort, in Lochabor’ showing the fort as originally built by Oliver Cromwell, with the part dismantled by Charles II). Also see Tait 1965.

wee may have by laying the fewer men there, if any troubles should bee'.⁵⁸² As garrisons, they were remarkably successful and although these citadels were deliberately destroyed after the Restoration (a consequence of their success), garrisons with extensive barrack buildings were re-established in Scotland during the eighteenth century in spite of continued and, in Wade's opinion, misguided parliamentary objections to their construction: 'the people of this kingdom have been taught to associate the idea of Barracks and Slavery so closely together [...] though there be no manner of connection between them'.⁵⁸³

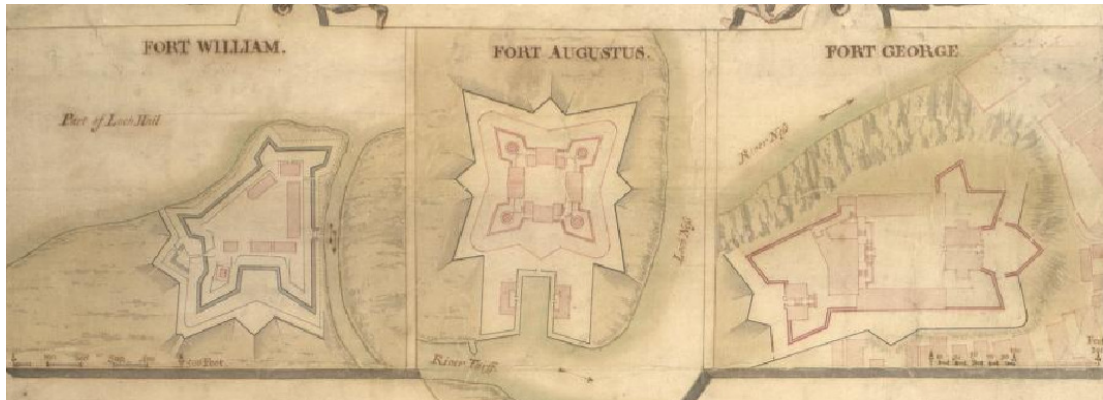


Figure 5.24 An extract from 'A description of the Highlands of Scotland', by Clement Lemprière, 1731. Acc.11104. Map Rol.a.42 (Reproduced by permission of the Trustees of the National Library of Scotland)

Four principal garrison forts were built in Scotland, forming a chain along the Great Glen. These were Fort William, Fort Augustus, Fort George at Inverness, and Fort George at Ardersier (see Fig 5.11). In design they were all different: three—Fort William and the two Fort Georges—were irregular in shape due to the pragmatics of 'fitting a design to the situation'; Fort Augustus alone was regular, a square with angled bastions protruding from each corner (see Fig 5.24). John Romer, when reviewing the old medieval castle at Inverness in 1725 with the purpose of converting it into barracks, found 'the charge will not answer the design, and at the best can be but a Crazy repair not much to be depended upon'. He proposed, instead, three 'Projects (in the nature of a Citadel) according to the situation' (see Fig 5.25). The first project was capable of quartering 400 men, the second and third, 200 men and officers 'with works to secure them from a Surprize, & to be a defence against the Town in case of any disturbance'.⁵⁸⁴

⁵⁸² Thurloe 1742, p. 79. From a letter by General Monck to the Protector, 26 February 1656.

⁵⁸³ Douet 1998, p. 41.

⁵⁸⁴ TNA MPH 1/31, 'Plan of Inverness with a Project for New Barracks situated on Castle Hill' (1).

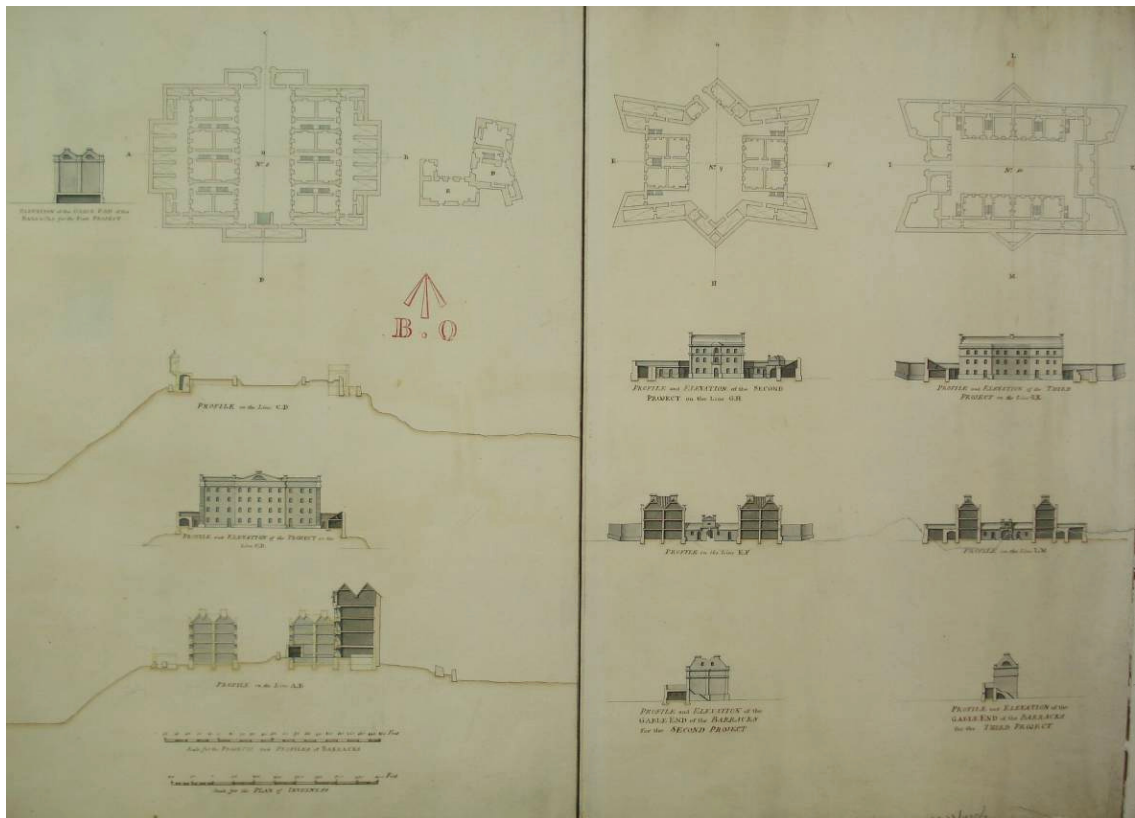


Figure 5.25 (2) [Project for New Barracks situated on Castle Hill continued - Plans, profiles and elevations of barracks: first, second and third projects], by John Lambertus Romer, 1725. MPH 1/31 (Courtesy of The National Archives, Kew)

With the building of more permanent barracks, their planning and architecture became increasingly standardised. Petit's 1714 plan and elevation of the barracks at Fort William, for example, was a relatively common design and style of representation.⁵⁸⁵ Soldiers were accommodated in rows of small rooms built over two or three storeys, each room housing between four and twelve men. The rooms had a fireplace for cooking and heating, a window, and an internal staircase was shared between two or four rooms. Dugal Campbell's 1744 'Plan of the Ground Story of the Long Pile of Barracks at Fort William lately Repaired' shows that this basic design did not change in the intervening thirty years.⁵⁸⁶ Barrack buildings generally conformed to one of two regular designs: the first, 'long piles' of buildings, were set out in a straight line parallel to the enceinte; the second design was dependent on space, with barracks formally arranged around a rectilinear parade ground where troops were assembled and drilled in military manoeuvres (see Fig. 5.26). The latter was the ideal, for it was easier to maintain discipline amongst the soldiers:

⁵⁸⁵ NLS MS 1646 Z.02/32a 'A Draught of the long Soldjers Barrack already built at Fort William'.

⁵⁸⁶ NLS MS 1646 Z.02/28a.

Barracks are built now-a-days in all fortified places, to keep up the discipline, and good order in the garrison: they have been found so useful, that no place is built without them; and experience shews [sic], that those garrisons which have them, are much more quiet, on account of the conveniency which non-commissioned officers have to visit the quarters every evening, and to see the soldiers shut up in their quarters, which cannot be done when they are lodged amongst the inhabitants, where they have the liberty of going out and in whenever they please; besides, when the governor has a mind to make a detachment, or send out a party, he cannot do it, without the knowledge of the whole town: If any alarm happens, the garrison cannot be assembled without great trouble and loss of time; whereas, when there are barracks, every thing necessary for the good of the service may be done with ease.⁵⁸⁷

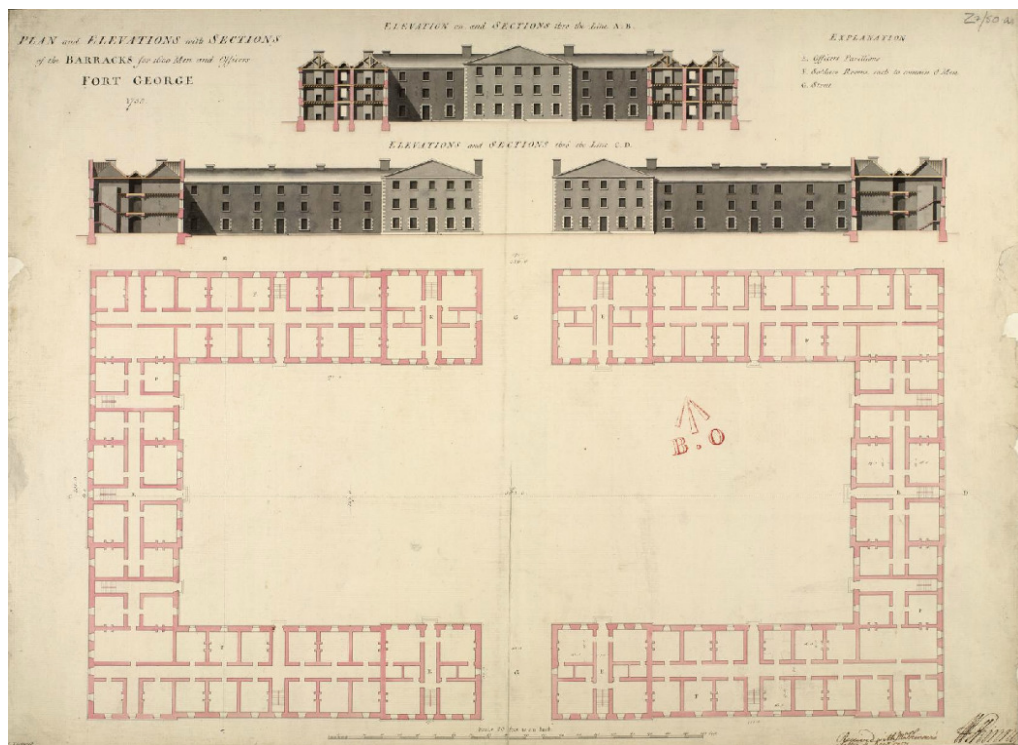


Figure 5.26 'Plan and Elevations with Sections of the Barracks for 1600 Men and Officers Fort George' [Ardersier], by William Skinner (Engineer) and Charles Tarrant (Draughtsman), 1753. MS 1646 Z.02/50a (Reproduced by permission of the Trustees of the National Library of Scotland)

As barrack building became more commonplace in Scotland, and officers and troops could be quartered within the garrison, so social structure was transposed into material

⁵⁸⁷ Muller 1755, p. 222.

structure, in the representation and the rationalisation of space. In practice, this was as much a benefit to the regular troops as it was to the officers. Following Petit's visit to Fort William, and aware that he had made recommendations to the Board for improving the fort, Sir Robert Pollock wrote encouragingly that

it will be indispensably necessary That the Barracks for the officers be instantly Built for [...] so long as they want, They'll take the readiest which they have always been use to do, which reduces the private men to so narrow Bounds that there is no less than sixteen of them huddled [sic] up in a small room bed above bed which necessarily must occasion so great a mortality & sickness among them.⁵⁸⁸

It thus became a common practice for relatively spacious quarters, or 'pavilions', to be built for the officers at either end of the soldiers' barrack rows (see Fig 5.27); and the governor, deputy-governor, fort- or barrack-major, storekeeper and master gunner to have houses (see Fig 5.28).

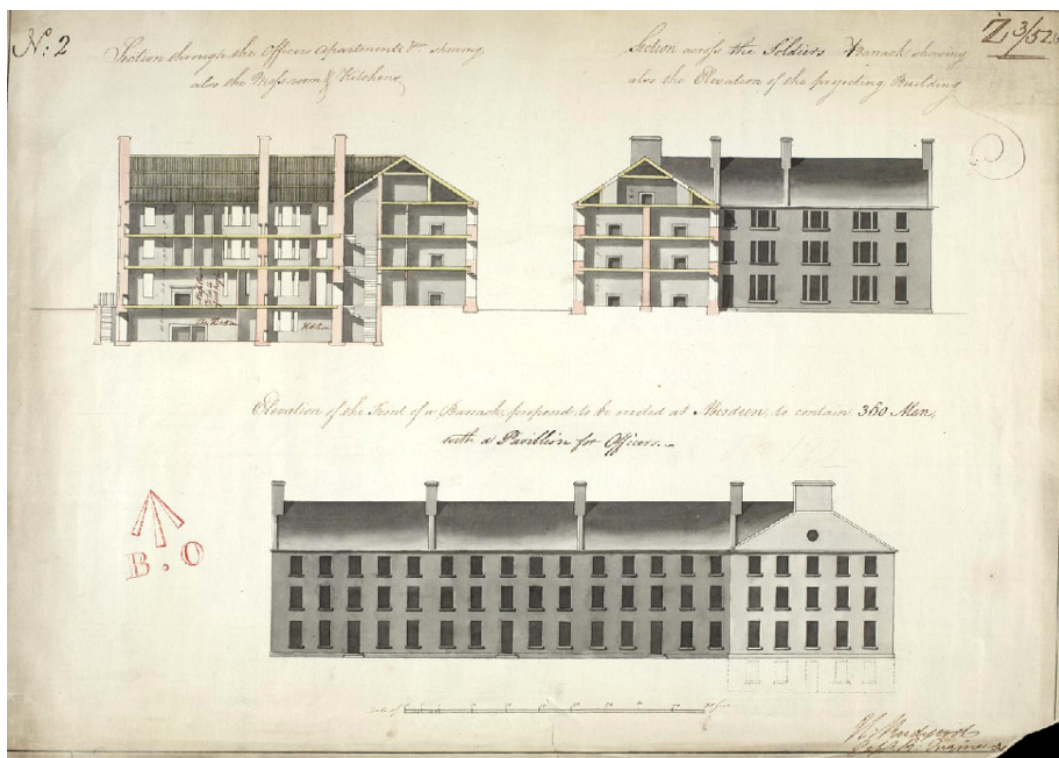


Figure 5.27 'Section and Elevation of a Barrack, proposed to be erected at Aberdeen, to contain 360 Men, with a Pavilion for Officers', by Henry Rudyerd, 1792. MS 1649 Z.03/52b (Reproduced by permission of the Trustees of the National Library of Scotland)

⁵⁸⁸ NAS GD220/5/568/1, ff. 1–2, 'Correspondence of James, 1st Duke of Montrose [Fort William] 7 June to 31 December 1715'. Quoted in a letter from Sir Robert Pollock to the Duke dated 7 June 1715.

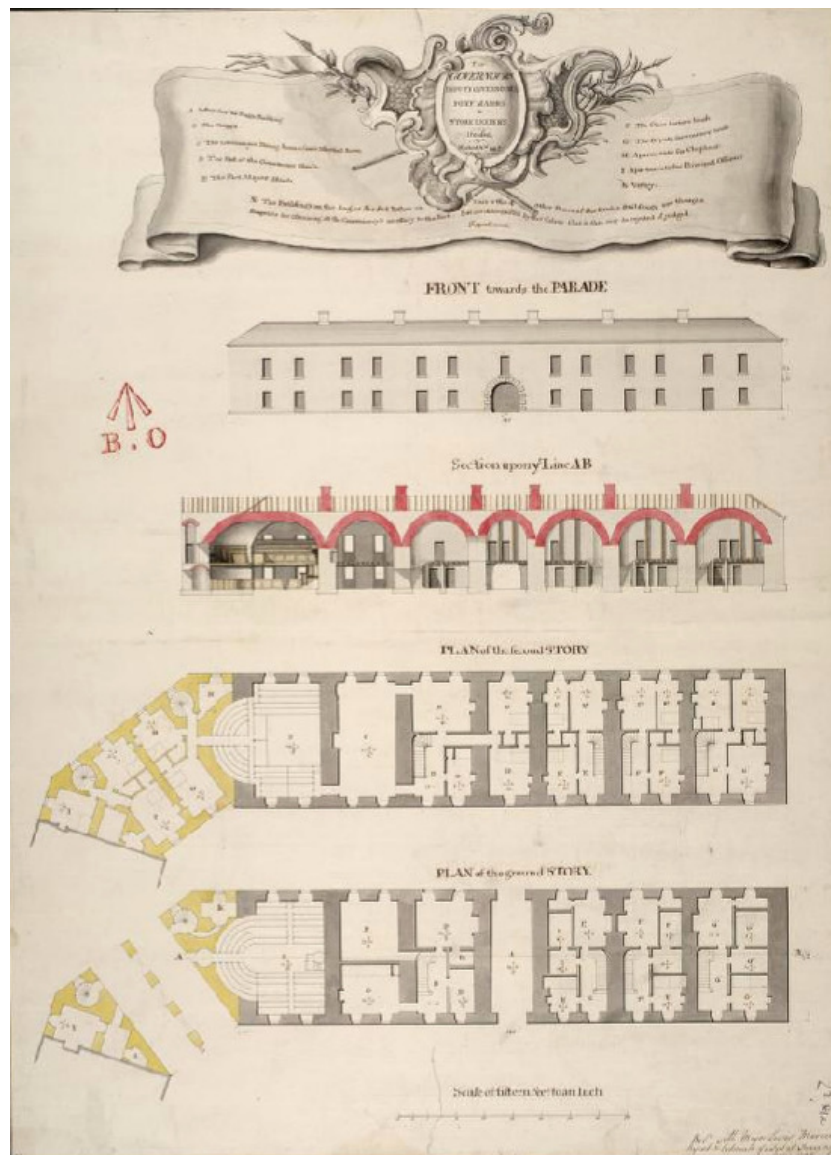


Figure 5.28 ‘The Governors, Deputy Governor’s, Fort Major’s & Storekeeper’s Houses’ at Fort George (Oliver’s Fort), Inverness, by Lewis Marcell, 1746. MS 1647 Z.02/81a (Reproduced by permission of the Trustees of the National Library of Scotland)

Fort George at Ardersier was built in the wake of the 1745 rebellion. The garrison was the largest in Scotland with a capacity to accommodate two regiments made up of 8 Field Officers, 20 Captains, 52 Subalterns and Staff, 2 Quarter-Masters, and 1760 Non-Commissioned Officers and Privates. For the security ‘of this important Fort’, from the start of the nineteenth century Gun Boats were stationed in the Moray Firth to be of use during any attack on land:

since the Fort being situated at the extremity of an Isthmus or neck of Land of very limited dimension [see Fig 5.29], being only about Six Hundred Yards in width, at about One Hundred & Seventy from the Crest of the

Glacis, these Boats could always avail themselves, let the wind blow, from whatever Quarter it would, of enfilading and obstructing the approach of an Enemy on the Land side, whatever might be the Strength of that Enemy, as the Force of the attack must be limited by the Extent of the front of that Ground which they only could occupy.⁵⁸⁹

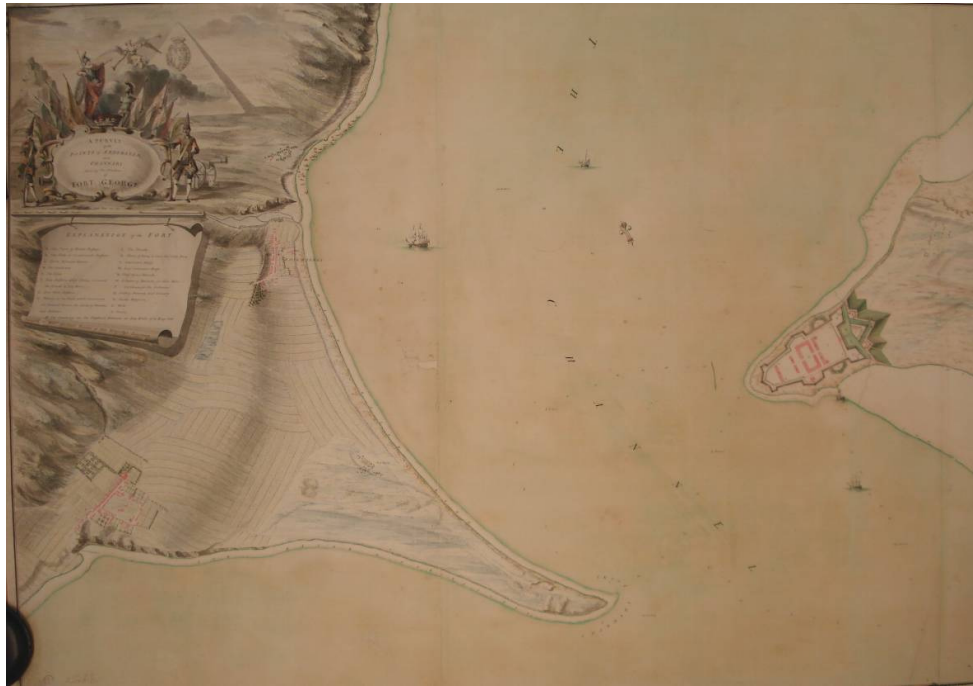


Figure 5.29 'A Survey of the Points of Arderseer and Channary Shewing the Situation of Fort George', by William Skinner and Charles Tarrant, 1752. Maps K.Top.50.23. (Courtesy of the Trustees of the British Library)

In the process of its construction, a great many plans were drawn of the fort and its location. Maps of Fort George alone account for 14% of the surviving archive of fortification cartography (see Fig 5.16). The pattern of construction provides an indication of the priorities of defence.⁵⁹⁰ The greatest perceived threat was always from the land, from rebellion in Scotland. The first line of defence to be erected was the covered way and glacis and the ditch to the rear, protecting the landward approach to the fort. In 1754, attention turned to the Point Battery revealing a shift in defence priorities with the strengthening of the seaward batteries. Skinner, in his design of Fort George, epitomised the art of fortification that had evolved in Britain during the eighteenth century. Fort George was a model of geometric bastion architecture and this was celebrated in a cartouche drawn by Charles

⁵⁸⁹ TNA WO 30/66, ff. 129–130, a report by Lt. Gen. Vyse on various points of defence of North Britain, 16 March 1803.

⁵⁹⁰ Ewart and Gallagher forthcoming.

Tarrant (see Fig 5.30). Tarrant's inclusion of a pyramid and heraldic fanfare signifies to a celebration of Fort George as the largest military fortification built by military engineers in Scotland and, also, as a point of political unity (albeit forced) under Hanoverian rule. The positioning of the Corps of Engineers' crest in place of the 'eye' could offer masonic connotations or further enhancements and warning of the military and political powers established in Scotland: *Honi soit qui mal y pense*—'Evil be to him who evil thinks'.⁵⁹¹ Not everyone was as willing to celebrate the engineering achievement of Fort George. In light of European fortification constructions, by Vauban and Coehorn for example, General James Wolfe, with some reserve, remarked:

When it is finished one may venture to say (without saying much) that it will be the most considerable fortress and the best situated in Great Britain. I fancy Mr Skinner, the architect, thinks it a very good fortification. I dare say he finds it so.⁵⁹²

With the decline of the Jacobite threat, Fort George became part of the coastal defence system established from the 1780s.



Figure 5.30 Title cartouche from 'A Survey of the Points of Arderseer and Channary Shewing the Situation of Fort George', by William Skinner and Charles Tarrant, 1752. Maps K.Top.50.23. (Courtesy of the Trustees of the British Library)

⁵⁹¹ The motto on the engineers' crest.

⁵⁹² Quoted in Ewart and Gallagher forthcoming.

Maps of coastal fortifications

Following the 1715 rebellion, the Board paid some attention to the defensive state of Fort William's military outposts. Government troops occupied Cairnburgh Castle, unusual in that its defences were split between two small islands—Cairn na Burgh More and Cairn na Burgh Beg—at the northern end of the Treshnish Isles to the west of Mull.⁵⁹³ In 1717, Robert Johnson, overseer of the works at Fort William, was charged with making repairs to 'the 2 Cairn burghs' and with leaving the three 3 Pounder guns in place to control access to the inner western seaway.⁵⁹⁴ In the process of doing so, he surveyed the islands and drafted plans of their coastlines—surrounded by 'Rocks 6 Ffathoms in heighth'—and the military establishments—a barracks, two guardhouses, and ports (see Fig 5.31).⁵⁹⁵



Figure 5.31 'A Plan of the Two Carrinburghs drawn on the place', by Robert Johnson, 1717. MS 1648 Z.03/24a (Reproduced by permission of the Trustees of the National Library of Scotland)

In contrast to the relative simplicity of Johnson's charts, John Elphinstone, in 1745, surveyed and compiled a detailed plan of the coast in the vicinity of the harbour at

⁵⁹³ NLS MS 1648 Z.03/23a and b: 'Plan of the Island of Mull with the adjacent islands' [1717 and 1741]

⁵⁹⁴ TNA WO 55/346, p. 254, 26 August 1717, order to the Board from the Duke of Roxburgh. TNA WO 47/30, p. 234, 29 August 1717 and p. 255, 14 October 1717, orders to Robert Johnson from the Board.

⁵⁹⁵ NLS MS 1648 Z.03/24a and b.

Burntisland, Fifeshire (see Fig 5.32).⁵⁹⁶ Burntisland's strategic importance had been recognised in 1715 when Jacobites had held the castle only to abandon it after the British Navy moved into position offshore. Thereafter, a deployment of government troops from Edinburgh maintained a small garrison at the fort to oversee shipping access to the Firth of Forth.⁵⁹⁷ Elphinstone proposed in 1745 that 'with a very Moderate Expende', the fortifications could be reconstructed to their former defensive strength.⁵⁹⁸ In addition, he considered the harbour 'the best [...] from London to Orkney' and that it offered 'the finest place for dry Docks for Men of War of any place in North Britain [sic]'.



Figure 5.32 'A New and Correct Plan of Bruntisland Toun Harbour and Fortifications', by John Elphinstone, 1745. Scale 1: 2,200. Vz 11/53 (Reproduced with permission from the Admiralty Library, Portsmouth).

From 1780, the Board's attention once again turned to matters of coastal rather than inland defences, with 'the protection of the East Coast and principally of the Capital, and its

⁵⁹⁶ Two copies exist: Admiralty Library Vz 11/53 and BL Maps K.Top.49.85.1., with names of headlands, soundings, roads, the layout of the harbour and town with positions of streets and fortifications. A dedication to the Lords Commissioners of the Admiralty of Great Britain is contained in a cartouche showing mythological figures, military items, and two men-of-war.

⁵⁹⁷ TNA SP 54/10/139, a letter from the Duke of Argyll to Lord Townshend, 20 December 1715.

⁵⁹⁸ Admiralty Library Vz 11/53 with a written description of the coast and sailing directions for entering the harbour.

neighbourhood [being] the commanding object'.⁵⁹⁹ This time, however, the Chief Engineer, Andrew Frazer,⁶⁰⁰ worked with the townspeople of Scotland to build battery defences, united in protecting shipping against a common enemy: American privateers. For the defence of Leith, for example, the inhabitants represented that they would construct the proposed works at their own expense and, 'upon the usual Conditions being complied with, & proper Authority's being received, the Board see no objection to the Guns & Stores being supplied, which are found necessary for the Defence of the Place'.⁶⁰¹ Similar agreements were made between the Board and the townspeople of Banff, Montrose, Queensferry, Dunbar and Campbeltown.⁶⁰² In planning the batteries, Frazer produced large-scale charts of small sections of coastline, particularly along the Firth of Forth, to show strategic positioning of the batteries to protect shipping channels (see Fig 5.33).⁶⁰³

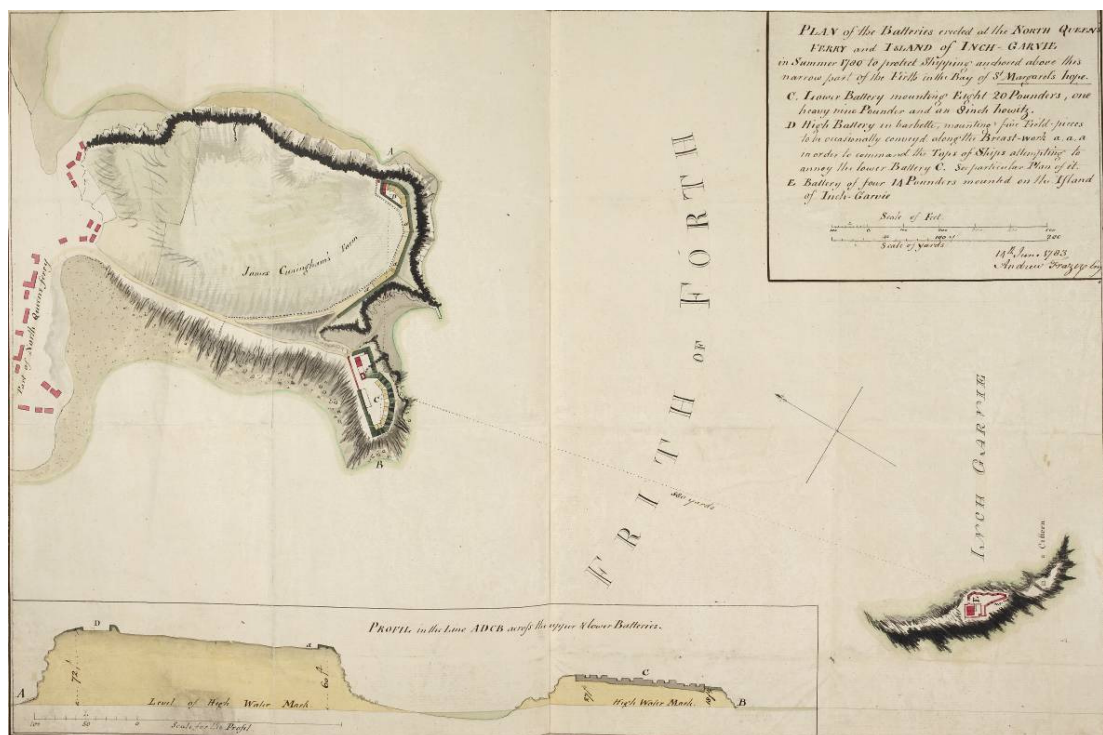


Figure 5.33 'Plan of the Lower Battery erected at the North-Queens Ferry in June 1780 to protect shipping above the narrow Part of the Firth', by Andrew Frazer, 1783. Additional MS. 50008 B, Townshend Papers ff. 9–10. (Courtesy of the Trustees of the British Library)

⁵⁹⁹ TNA WO 30/66, f. 127 verso, a report by Lt. Gen. Vyse on various points of defence of North Britain, 16 March 1803.

⁶⁰⁰ Appointed in May 1779, he arrived in Scotland late June-early July (TNA WO 47/93, pp. 343 and 452, 1 May and 16 June 1779).

⁶⁰¹ TNA WO 47/95, p. 288, 18 April 1780.

⁶⁰² TNA WO 47/95, 288, 18 April 1780; TNA WO 47/96, pp. 95–96, 1 August 1780; TNA WO 47/97, pp. 416, 691, and 656, 3 April to 19 June 1781.

⁶⁰³ TNA MPH 1/563, MPH 1/263, MPH 1/286, BL Add. Ms 50008 B (ff.9–12), with later copies: TNA MPH 1/199, and copies made by Pawlett William Colebrooke in 1782: NLS MS 1649 Z.03/47a and b.

The beginning of the nineteenth century had also seen the Government's concerns turning to the security of the west coast, to the unprotected state of the Firth of Clyde especially, the river being of 'great importance [...] to the Towns of Glasgow, Paisley, Port Glasgow & Greenock, as well as to the whole of the commerce carried on from those Places to every part of the World'.⁶⁰⁴ Major General Wemyss and Captain Evatt, Royal Engineers, made a survey of the Clyde, from its entrance up to the Port of Greenock, to accompany Evatt's report on the geography of the Clyde and the best position for erecting a battery.⁶⁰⁵ Wemyss and Evatt's plan is missing but one drawn in 1813 by Major [Carmichael-] Smyth may provide a similar representation (see Fig 5.34). The batteries are marked in red and close soundings of the channel have been taken in the vicinity of each. In drawing sections of the battery defences (see Fig 5.35), engineers paid particular attention to vertical measurements: of the seaward and landward palisades to protect the battery from attack, and of the height of the gun platform to achieve the greatest range of fire across the water. In a 'Plan of part of the Firth of Forth Opposite the Queens Ferry' by Andrew Frazer in 1785, for example, Frazer noted that 'From the nearest Gun on the Ness Battery to Inch Garvie'—the narrowest part of the channel—was 756 yards and 2 feet.⁶⁰⁶

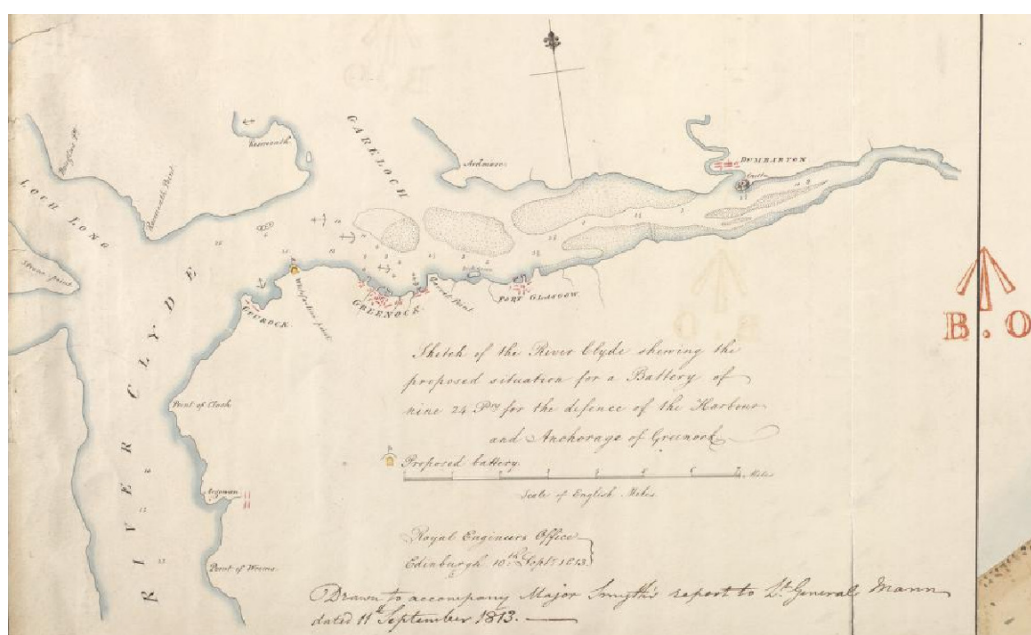


Figure 5.34 'Sketch of the River Clyde shewing the proposed situation for a Battery of nine 26 Prs. for the defence of the Harbour and Anchorage at Greenock', by Major [Carmichael-] Smyth, 1813. Scale c.1: 78,000. MS 1650 Z.46/19 (Reproduced by permission of the Trustees of the National Library of Scotland).

⁶⁰⁴ TNA WO 30/66, ff. 159–160, a letter from Lt. Genl. Vyse on the unprotected state of the River Clyde, Edinburgh 26 July 1803.

⁶⁰⁵ TNA WO 30/61, No. 2, Capt. Evatt's report, Edinburgh, 26 July 1803.

⁶⁰⁶ Several copies at TNA MPH 1/286, MPH 1/286, and MPH 1/199/2.

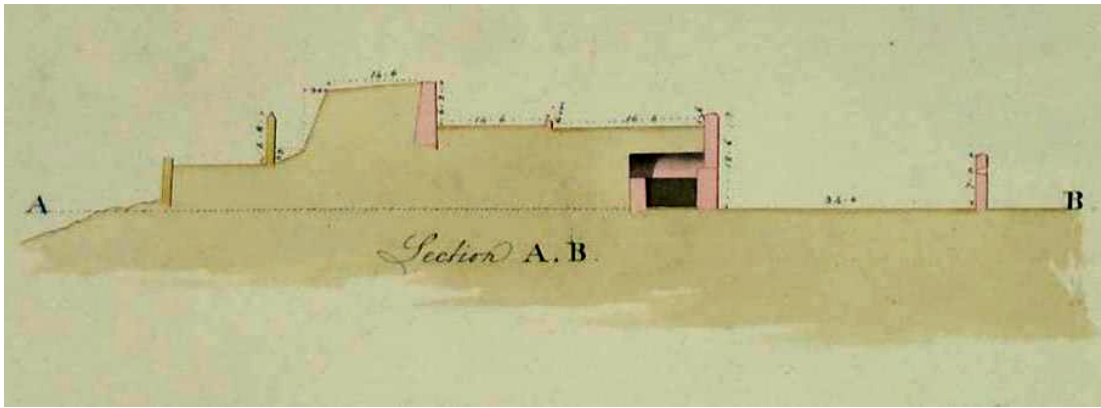


Figure 5.35 (c) 'Section of the Battery along A.B.' by Captain J. Carmichael-Smyth, 1812. MPH 1/199/4. (Courtesy of The National Archives, Kew)

The construction of a Martello Tower at Hackness, Orkney, in 1813 to protect access to Longhope Sound and any convoys assembling offshore from French and American raiders, was an evolution of the battery defence and a complete move away from the bastioned fortification. A tower facilitated a firing arc of 360 degrees. Plans were drawn to show the situation of the tower with lines plotted to show gun ranges at various arcs around it (see Fig 4.14 for Philip Skene's 'Plan of Long Hope Sound').⁶⁰⁷ Figure 5.36 illustrates the upper floor, roof or terreplein of the tower. The central pivot—'d'—was the 'curb' for the rear trucks (wheels) of the gun to rotate 360 degrees. There were also recesses for shrapnel shells, case and round shot, and a drainage system for collecting water from the platform and the parapet to serve the tower. There were two floors below the terreplein. The floor immediately below was a barrack for both officers and men. The ground floor served as the ordnance storerooms and magazine. A foundation or basement contained the cistern and various waste pipes. Figure 5.37 is a section of the Hackness Tower. These towers became popular in several parts of Britain from the time of the Napoleonic wars.

Other: ornamental maps of fortifications

With this expansion of military map making, the state and its ruling elites gained power through the acquisition and control of the geographic information essential for a rapidly developing militarist state. This power was legitimised, in their eyes at least, by the willing submission of loyal servants to perform territorial surveys and compile maps. For military officers, making maps for the state was a means to obtain the notice of superiors and so attain social and economic advancement.⁶⁰⁸ One particular Ordnance engineer—John

⁶⁰⁷ TNA MPH 1/620/12.

⁶⁰⁸ Edney 1994b, pp. 108–112.

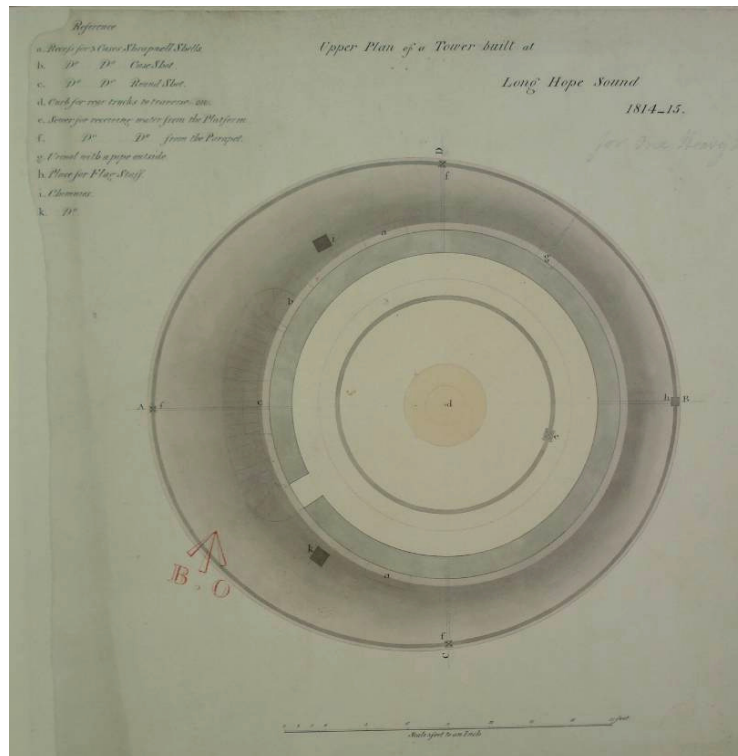


Figure 5.36 'Upper [floor] Plan of a Tower built at Long Hope Sound', copied by Robert Hoddle, Royal Military Surveyor and Draughtsman, in 1815. MPH 1/620/1 (Courtesy of The National Archives, Kew).



Figure 5.37 'Section through A.B. of the Tower built at Long Hope Sound', copied by Robert Hoddle in 1815. MPH 1/620/5 (Courtesy of The National Archives, Kew).

Elphinstone—was prolific in his artistic portrayals of Scottish fortifications in an attempt, presumably, to draw attention to his cartographic and artistic skills.⁶⁰⁹ In 1746, Elphinstone produced a suite of maps of Glamis Castle dedicated to the Duke of Cumberland (see Fig 4.17, Elphinstone’s elaborate frontispiece to these drawings). Illustrating various perspective views, Elphinstone combined measurement and proportion (a basic concept of aesthetics and of mathematics) to create visually stunning representations of the castle (see Fig 5.38).⁶¹⁰ Each part of Elphinstone’s depiction was in scale with every other object in the image due to the application of the laws of linear perspective, and so the image as a whole presented an illusion of depth relative to the viewer, clearly illustrating Glamis Castle’s ‘W-shaped’ plan.⁶¹¹ Glamis Castle attracted attention from other Ordnance draughtsmen, including Thomas Sandby who produced a ‘Prospect of the Front of Castle Glamis’ in 1746.⁶¹² In the depiction of the castle, the military engineer and draughtsman brought together the mathematical and artistic practice of cartography.



Figure 5.38 ‘The front of the Castle of Glamis to the South’, by John Elphinstone, 1746. Maps K.Top.49.23.a.5. (Courtesy of the Trustees of the British Library)

⁶⁰⁹ Elphinstone entered the Military Branch of the Office of Ordnance in 1744 as a Practitioner Engineer (TNA WO 54/209, pp. 10–12). In 1748 he was promoted to Sub Engineer (TNA WO 54/210, pp. 21–25), and by 1752 was next in line for promotion to Engineer Extraordinary (TNA WO 54/211, pp. 25–29).

⁶¹⁰ Rees 1980.

⁶¹¹ See BL Maps K.Top.49.23.a.2. The theory of linear perspective was first proposed by Italian architect-engineers Filippo Brunelleschi (1377–1446) and Leon Battista Alberti (1404–1472) who developed it into a working scheme for artists. See Rees 1980; Cosgrove 1985; and for an alternative discussion on the Albertian picture, the Ptolemaic grid, and ‘the mapping concept’ in Dutch art, see Alpers 1987.

⁶¹² BL Maps K.Top.49.23.b.

Conclusion

The British state's cartographic knowledge of Scotland in the eighteenth century was dominated by discrete representations of military establishments. Plans, views, and sections of fortifications, either under construction or reconstruction, were produced in multiple copies to distribute to military and political leaders as a resource for

governing Scotland, to artificers and other engineers for the practical aspect of fortification—building—and to the Tower of London where the cartographic items were stored and copied during training exercises. Six hundred and seventy-seven manuscript maps of Scottish fortifications can be found in the surviving archive. This equates to 73% of the total remaining archive.

Three main themes are revealed by this study of the archive of fortification cartography. Firstly, that rules of graphic design were established in fortification map making. The maps show uniformity in representation even at different scales and even if compiled at different times during the eighteenth century. Rationalisation and standardisation of cartographic design was a European characteristic of military mapping that became established in the work of the Board of Ordnance during the eighteenth century. It came about in two ways: by the Board's employment of émigré engineers who were well-versed in European practices, and by instruction in surveying, drawing, and in map making. Practical experience and theoretical texts combined to provide a codification of fortification cartography, one that developed different ways of viewing the landscape: vertically by plan; horizontally by section, profile or elevation; and obliquely with a 'bird's-eye'. Practices established a standard range of scales to be used for compiling plans and profiles. And a colour scheme was adopted that identified and separated man-made and natural structures, and different stages of fortification construction. In representing a fort's immediate environs, the engineers often displayed the painterly nature of their work with representations imitating nature in colour and texture. The French engineer, Vauban's (Louis XIV's Commissioner General of Fortifications), style of fortification cartography was influential in providing basic design concepts and influenced the Board of Ordnance engineers' choice of graphics. In representing Scotland's military landscape, the engineers and draughtsmen emulated continental skills, the maps and plans showed a 'logical treatment, brilliant design, and clear presentation'.⁶¹³ Differences, however, can be detected in the military maps of Scotland; most notably in the choice of scales. Engineers in Scotland used a range of scales

⁶¹³ Tooley 1949, p. 2.

that offered a greater degree of flexibility to allow for the different purposes required of the maps and the different styles of Scottish fortifications.

This last point leads into the second theme revealed by this study, that different types of fortifications were designed and built in Scotland. Four principal types have been recognised: medieval castles, garrison forts, barrack forts, and coastal gun-batteries. An initial response to Jacobite rebellion was to strengthen military garrisons in the main lowland medieval castles—Edinburgh, Stirling, Dumbarton, Blackness, and Inverness—which prompted engineers to map them to determine their state of repair. Designs were also adapted to increase the capacities of the castles, to build new barracks and storehouses, and to increase the size of the powder magazines. A need to have a military presence in the Highlands gave rise to two further types of military establishment: garrison forts and barrack forts. Both types were free-standing and both were self-defensible due to their bastioned-structures. Garrison forts were generally larger, some designed over and taking on the shape of ruined Cromwellian citadels, Fort William, for example. Citadels had proved to be militarily and strategically successful in the seventeenth century and it was believed they would be the same in the eighteenth. Garrison forts were built to create a strategic ‘chain’ of defence along the Great Glen. Fort George at Ardersier—the last and largest garrison fort to be built—is the subject matter of a considerable number of fortification maps in the archive; 14% of it.

Barrack forts were built at four strategic sites—Inversnaid, Bernera, Killiwhimen, and Ruthven—with the military intention of maintaining communications and policing more remote parts of the Highlands and islands. They were never meant to have large garrisons but their usefulness was impeded by the small number of troops that were actually posted to each, only 30 men in some. Coastal defences were even smaller, usually garrisoned by an artillery unit to man the battery guns. Designs of gun-batteries were particularly focused on location and the structure’s form in profile. The height of the gun emplacements was important for extending the firing range and the heights of the fore and back palisades were important for protecting the establishment from both land and sea attack.

The final theme is still concerned with these types of Scottish fortifications. This study has shown that fort types changed geographically and chronologically. Political imperatives to quash Jacobite rebellion initially focused on existing medieval castles in the lowlands but with continued popular dissent, a military presence was required in the Highlands. Scotland witnessed an expansion of state troops into the Highlands and, accordingly, the construction of garrison forts to house and to defend them. Initially, this expansion was along the Great Glen and to the west of it. As unrest continued to mount, the

Hanoverian military presence moved into the central Highlands with the construction of barrack forts. In the wake of the 1745 Rebellion, the government resolved to build the new Fort George at Ardersier. In all, this fort took twenty-three years to complete. The subsidence of Jacobitism in the second half of the eighteenth century allowed for a period of consolidation and repair before a final wave of military expansion that saw political and military imperatives transfer from the interior to the coast of Scotland and the construction of gun-batteries to defend against an overseas invasion. This final geographical distribution brought the military and mapping focus almost full-circle, once again directed towards the Scottish lowlands.

Engineers in Scotland displayed an ability to adapt Scottish fortifications to changing methods of warfare (a European 'military revolution'), to design and to construct architectural forms over irregular terrain. In this way, the government's strategic engineering in the location and construction of fortifications gave them a place of power in Scotland, creating a visible political as well as military presence. The military articulation of that political power was represented in the maps and plans of the fortifications of eighteenth-century Scotland.

As the nature of warfare changed during the eighteenth century, tactics became more concentrated on mobility: in the movement of troops and artillery, in the delivery of stores and munitions to remote parts of the country, and in the demand for more frequent intelligence from military outposts. The next chapter looks at the state's response to these more mobile strategies of warfare and methods of connecting these discrete fortification landscapes more effectively. In particular, the chapter address the consequential changes in mapping technologies that developed to accommodate the changing strategies of the British army in Scotland. It examines the cartography of military movement.

CHAPTER 6

The Cartography of Military Movement

Introduction

This chapter examines the cartography of military movement. After the 1715 rebellion, the main military strategy for enforcing Hanoverian rule had been to build barracks at prime locations in the Highlands, to augment the existing garrison forts and medieval castles. Continued disaffection and Highland unruliness, however, exposed a fundamental flaw in the nature of such a policy: it was too static. From about 1715, strategies to suppress insurrection and to repel foreign invasion were no longer solely dependent upon fortification; all began to involve troop movement.

For the British state to deploy the army in North Britain, supply and arm the soldiers, and plan military campaigns in response to aggressive acts against its rule, the government needed more geographical information about Scotland. ‘A correct knowledge of the terrain’ (and thus of maps), according to Frederick the Great, ‘gives one amazing resources in time of adversity’.⁶¹⁴ There were sufficient political and military needs, therefore, for maps and written descriptions of Scotland—topographical maps validated by geographical memoranda—to insure their making. Memorandums or reports were included to describe the state and situation of existing or projected military landscapes. As ‘geographical memoirs’, reports helped validate and clarify the geographical knowledge represented in the maps.⁶¹⁵ Whilst providing instructions for a military survey, Charles Vallancey remarked that ‘however exact the map may be as to distances, or if ever so highly finished and coloured, without a military itinerary annexed to the map, no general can depend on it for his manouvres [sic]’.⁶¹⁶ Maps were, however, acknowledged to be of equal value to ‘itineraries’ in that ‘a literal description without a drawing cannot give a proper idea of the ground’.⁶¹⁷

There was also a pragmatic requirement: to improve the communications between fortified strongholds. In Scotland, military commanders and governors of garrisons found themselves isolated due to the distances between their fortified strongholds and from a lack of good communications. Sir Robert Pollock, governor of Fort William, for example,

⁶¹⁴ Quoted in Harley 1978, p. 30.

⁶¹⁵ Edney 1999, p. 187; Godlewska 1999.

⁶¹⁶ Vallancey 1779, quoted in Marshall 1981, p. 4. ‘Military itinerary’—a French term for a report describing the movement of an army.

⁶¹⁷ Vallancey 1779, quoted in Marshall 1981, p. 4.

reported that the sequestered Jacobite castles of Glengarry, Tioram, and Eilean Donan on the west coast of Scotland were ‘useless [...] That besides their not being tenable for want of water, the distance they were from this place [Fort William] thro a disaffected Country made it impossible either to have Correspondence with or intelligence from them’.⁶¹⁸ Military engineers were thus required to construct roads and build bridges to facilitate communications and troop movements to further the political aims of the British state in eighteenth-century Scotland. In order to fulfil this duty efficiently, an engineer compiled precise maps of roads built or to be built, and provided descriptions of the terrain to be accessed by the army.

The British state’s ultimate objective, in theory at least, was to survey accurately the country so that it could ‘be thoroughly explored and laid open, by establishing military posts in its inmost recesses, and carrying roads of communication to its remotest parts’.⁶¹⁹ To begin with, however, the ambition was smaller and more specific. The military engineers in Scotland concerned themselves with local surveys to plan route ways and to compile large-scale maps of sections of military roads built between the Highland forts. In the Great Glen, for example, between Fort William, Fort Augustus and Fort George at Inverness, ‘a Communication [was] made for their mutual Support’ and represented in ‘An Exact Survey of the Several Lakes, Rivers, and Roads, between Fort William and Inverness’ completed by Joseph Avery between 1725 and 1727.⁶²⁰ Such roads were, primarily, to provide access and to facilitate the speed and ease of troop movements between military establishments.

Although the government resolved to improve the road network through the Highlands for the benefit of military movement, map evidence shows that, in practice, it was only in the second half of the eighteenth century that road engineering projects began in earnest. Such activity broadly parallels the military shift away from static siege warfare and towards mobile armies, and the general expansion of mapping practices in European armies.⁶²¹

As important as land routes were to the army, Scotland’s extensive coastline and inland waterways also offered opportunities for the safe and rapid movement of troops and

⁶¹⁸ TNA SP 54/8/94 ‘State Papers Scotland, Series II’. In NAS GD220/5/568/5, f. 1, ‘Correspondence of James, 1st Duke of Montrose [Fort William] 7 June to 31 December 1715’, Pollock wrote that the outposts to Fort William were a ‘needlesse [sic] charge on ye Government’ which the Board must have taken to heart since the castles received little attention until Watson’s survey in 1748 (NLS MS 1648 Z.03/28f ‘Report of Castle Tyrrim, Castle Duint, and the Castle in Island Stalker’, by David Watson).

⁶¹⁹ Roy 1785, p. 386.

⁶²⁰ BL Additional Ms. King’s 100, f. 17. Wade’s report of his trip to the Highlands in 1724 to gather intelligence for George I. Several copies of Avery’s survey are extant: BL Maps K.Top.50.1., Maps K.Top.50.2., and NLS MS 1648 Z.03/21.

⁶²¹ Buisseret 2003.

supplies, and strategic sites for establishing military fortifications to safeguard ‘the Security of this Coast’.⁶²² Surveys of the coast and lochs were commissioned; non-military coastal charts were appropriated by the Board of Ordnance and the Privy Council for political reference; and marine charts were made for assessing estuarine security and for building battery defences in the most effective military location. As well as facilitating the movement of the British army, charts were also consulted in strategic planning to assess potential enemy movements offshore and to prevent any ‘predatory Landings, which may be attempted on any of the different extended Coasts of Scotland’.⁶²³

This chapter will show that maps were crucial instruments of access to the British army in eighteenth-century Scotland. Troop movement generated a need for explicit cartographical materials—for surveys and descriptions—in order to formalise strategic plans and to achieve, for example, Niccoló Machiavelli’s fifteenth-century ambition for a military commander to be able to ‘paint out the country through which he must march’.⁶²⁴ I examine the cartographies of military movement under three headings—topographic maps, coastal charts, and road maps—of Scotland between c.1689 and 1815.⁶²⁵ An exploration of the production and the use of maps to assist the movement of state troops involve a study of changing technologies. Specifically, the chapter offers an analysis of the strategic reasons that underpinned the shifting application of different mapping technologies in eighteenth-century Scotland.

The chapter is in four sections. The first describes the archive of military movement with reference to its geographical distribution and chronology. The next three consider the changing types of map—coastal charts and inland waterways, military roads, and topographical maps—and the pragmatics of engineering and the ideology of mapping.

The Geography, Chronology, and Typology of Maps of Military Movement

The archive comprises two hundred and two maps primarily concerned with military movement.⁶²⁶ Not all were produced by military engineers; the archive includes civilian

⁶²² TNA WO 30/66, f. 143, Lt. General Vyse’s report on the defence of the coast of Scotland, 16 June 1803.

⁶²³ TNA WO 30/66, f. 120 verso, a letter from Henry Dundas to the Lord Advocate on the Defence of Scotland, 7 March 1797.

⁶²⁴ Buisseret 2003, p. 120.

⁶²⁵ Some of the non-military maps and charts appropriated by the state were surveyed before 1689 but used for military purposes after 1689.

⁶²⁶ This equates to just under 22% of the archive. It should be noted that when counting the Military Survey of Scotland, comprising the fair copy of northern Scotland combined with the original protraction of southern Scotland, the original protraction of northern Scotland, and the three

maps that were used by the state to acquire geographical knowledge. Figure 6.1 shows the contribution the cartography of each subgroup—route or road maps, marine charts and inland waterways, and topographic maps—makes to the archive of ‘military movement’ in Scotland between 1685 and 1815.⁶²⁷

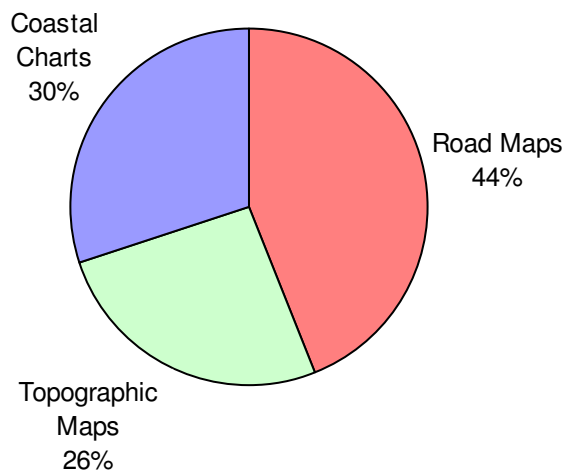


Figure 6.1 Cartography of military movement by subgroup, 1685–1815

Such a classification offers only a first order rationalisation of map output. Each of these three categories is a composite of several military activities: reconnaissance, intelligence, marching and encamping, and planning and recording military works—roads and bridges—in preparation for military action. The military roads of eighteenth-century Scotland (see Fig 6.2) traditionally have been discussed in relation to their building directors: Major-General George Wade and Major William Caulfeild.⁶²⁸ Whilst this is unavoidable in relation to developments in Scotland, by reconsidering military roads in accordance to their cartographic depictions, and the maps in relation to their actual functions as they were originally documented, three subtypes can be recognised. The first is regional or relatively small-scale maps showing either the planning of a route between fortified strongholds or a

reductions, each shelfmark has only been counted once rather than each individual sheet or roll located at that shelfmark. Currently, there are 87 rolls and 59 sheets of the Military Survey in its various forms (before remounting: 113 rolls and 21 sheets).

⁶²⁷ An earlier date of 1685 rather than 1689 has been chosen to accommodate Adair’s county maps and coastal charts, manuscript copies of which form part of the Board of Ordnance and King’s Topographical collections. This date could possibly be even earlier—1682—the year of Adair’s commission to map Scotland.

⁶²⁸ William Caulfeild is often represented in an altered form, as Caulfield. Bulloch (1931) believes him to be the son of Captain Toby Caulfield and grandson of the 1st Viscount Charlemont. But he signs himself ‘Caulfeild’ in personal correspondence from his home at Monesse, 24 October 1732 (NAS RH15/17/25). He will be referred to as Caulfeild throughout. For ‘traditional’ descriptions, see Mathieson 1924; Salmond 1934; Moir 1983; and Taylor 1996.

Similarly, discussion of late seventeenth- and eighteenth-century coastal charts of Scotland have tended to focus on John Adair.⁶²⁹ Although Adair's charts formed a significant collection of cartographic reference material believed to be used by government and military personnel, the existence of these charts most likely deterred commissions for military surveys and drafts of the Scottish coastline. The archive's charts, however, do form a subgroup, an eclectic one made-up of two subtypes: (a) coastal charts covering regional extents; and (b) localised marine charts including inland waterways and firths (estuaries) for movement and eventually battery defences.

Until 1745, the topographical mapping of Scotland was mostly produced by civilian map makers and centred on the Lowland counties and the environs of Aberdeen. Military topographical maps were few in number. Those in possession of the Board of Ordnance were either concentrated around Fort William and Inverness,⁶³⁰ or were representations of Scotland at scales too small to be of military use beyond general intelligence.⁶³¹ The 1745 rebellion revealed to the government and to military commanders that their 'picture' of Scotland was woefully incomplete 'for the want of a proper Survey of the Country'.⁶³² The resolve was taken to complete a military survey of Scotland that would afford 'the best means of forming judicious plans of defence'.⁶³³ Although the 'Military Survey of Scotland' was made by military engineers, it was never used by the Board of Ordnance for its intended purpose.

Figure 6.3 shows the number of road and topographical maps and marine charts produced by the military engineers of the Board of Ordnance or by civilian map makers in the employ of the state, from 1685 to 1815. The graph shows an inconsistent and irregular trend in the output of maps associated with military movement.⁶³⁴ Some obvious peaks correlate to political events in Scotland. The first and second peaks, in 1698 and 1703 respectively, are slightly misleading. The first relates to a collection of undated manuscript coastal charts by John Adair where the sections of the coast depicted were known to have

⁶²⁹ Cash 1907; Inglis 1918; Robinson 1958, 1959; Moore 1985, 2000; Withers 1999.

⁶³⁰ For example, NLS MS 1646 Z.02/24a (figure 6.14), NLS MS 1647 Z.02/76a-c and BL K.Top.50.6.a. 'A General Survey of Inverness, & the Country adjacent to the Foot of Loch-Ness' by John Henri Bastide in 1725 at a scale of 1: 18,000 (1,500 feet to an inch).

⁶³¹ See, for example, figure 5.2 NLS Acc.11104. Map Rol.a.42 and BLK.Top.48.12: Clement Lemprière's 1731 map 'A Description of the Highlands of Scotland. The Situation of the several Clans and the Number of Men able to bear Arms, as also ye Forts [Fort William, Fort Augustus, and Fort George] lately Erected and Roads of Communication or Military Ways carried on by his Majesty's command, with the Seats of the most considerable Nobility in the Low Country', at a scale of 1: 411,840 (6.5 miles to an inch).

⁶³² NAS RH1/2/511, f. 10.

⁶³³ Roy 1785, p. 385, Roy's opening address to the Royal Society of London, 16 June 1785.

⁶³⁴ To a certain extent, the graph may reflect the survival of maps of military movement.

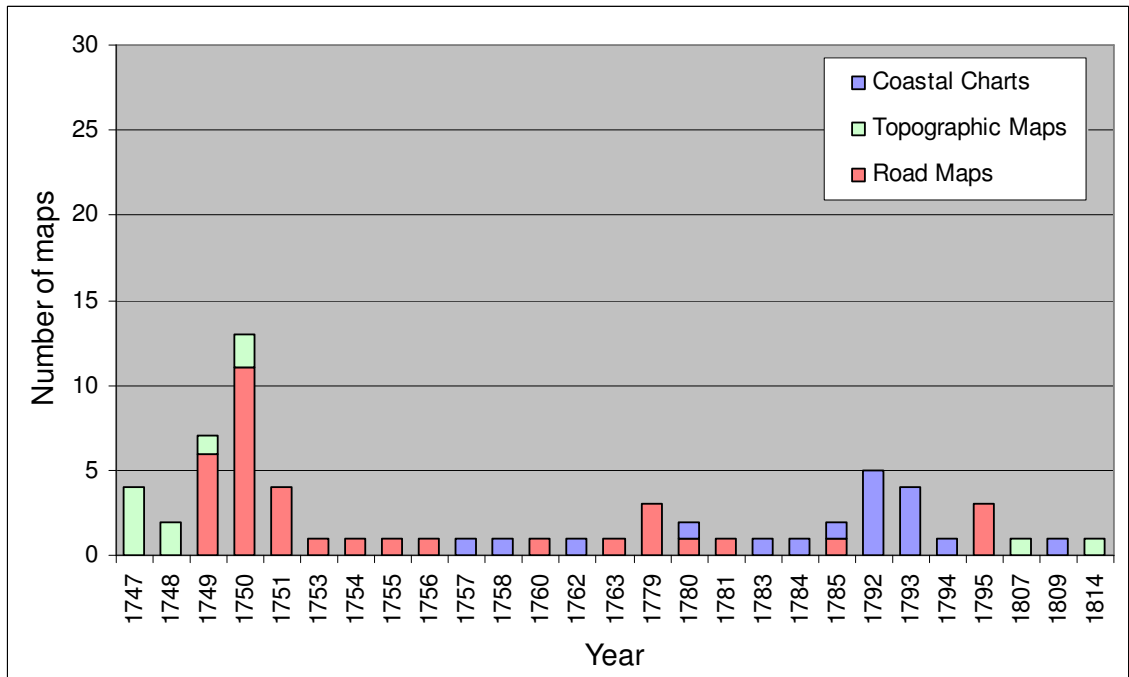
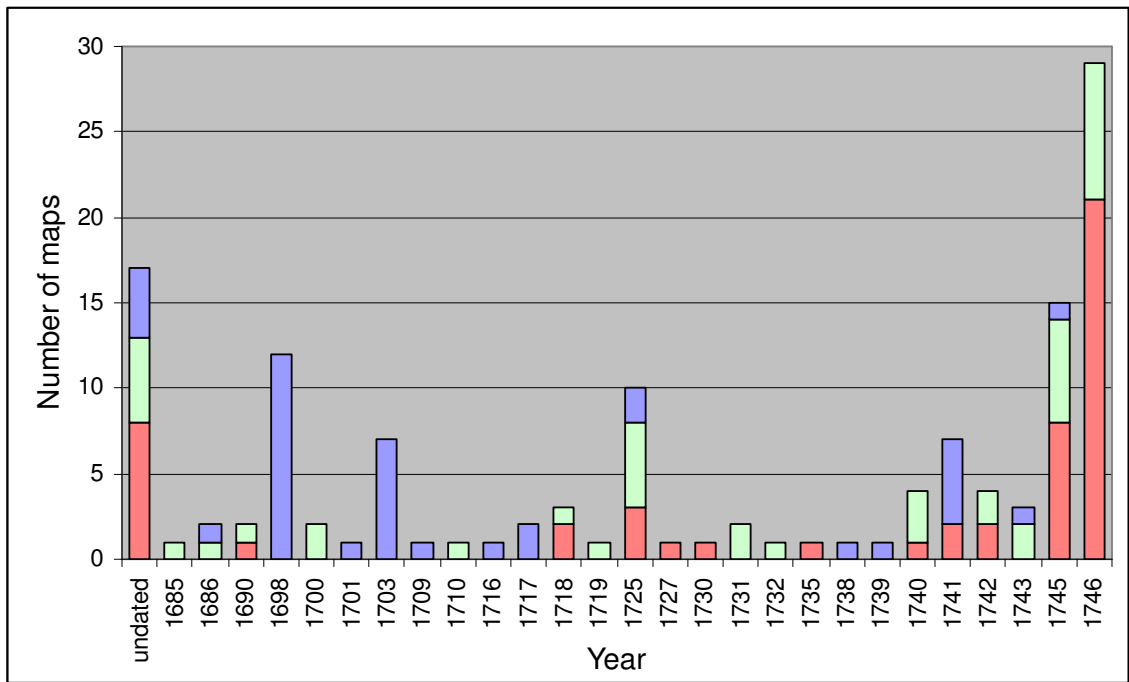


Figure 6.3 Frequency distribution chart of maps of military movement, Scotland 1685–1815

been surveyed between 1686 and 1698, and so are grouped here in the year 1698.⁶³⁵ The second relates to a manuscript volume of six charts (marked with the Board of Ordnance

⁶³⁵ Admiralty Library Oa 03 [1–14], reference number MSS 331. Two are dated: [7] part of Galloway, 1701; [8] the Firth of Clyde with a note ‘The Magnetical Meridian in the year 1686 when Surveyed’. The collection of 14 manuscript charts were bound at the rear of printed volume J. *The Description of*

stamp),⁶³⁶ that is a copy of Adair's *Description of the Sea-Coast and Islands of Scotland*, printed in 1703.

The third peak, in 1725, can be considered the start of a concerted effort by the Hanoverian Government 'towards Establishing Order' in Scotland 'and reducing the Highlands to a more due Submission'.⁶³⁷ From this time, military engineers were 'to carry on the Roads of Communication between the Garrisons and Barracks in the Highlands'. By these roads, soldiers from the loyal Highland Companies could 'pursue, Seize and Secure such Rebels [sic] and attainted Persons as should refuse to submit to the Laws and a due Obedience', and 'perform all other Services which might contribute to civilize the Highlanders; preserve the Peace and Quiet of the Country, and render the Disaffected incapable of disturbing the Tranquility' of Hanoverian rule.⁶³⁸ Such activities were to increase dramatically during and after the 1745 Jacobite rebellion and in its wake the suppression of the Jacobites. This accounts for the fourth peak, from 1740 to 1751. The need to know 'every Corner of the Kingdom' resolved the state to complete a military topographical survey of Scotland that coincided with a systematic expansion of the military road system.⁶³⁹ A low but steady output of maps depict the road-building activities of the engineers from 1749. Towards the end of the eighteenth century, military concerns were once again directed towards the coast and its security, and charts were drawn of sites deemed expedient for coastal batteries.

The three distinct subgroups are discussed below. Although separate in their cartographic form, they are united by their common military function—depicting military movement—and by the events giving rise to their commission, production and use.

Coastal Charts, Firths, and Lochs

From knowledge of the coast of Scotland to its defence

John Adair, mathematician and cartographer, was 'unique among seventeenth-century map-makers in that his exceptional talent was given expression in the production of both land maps and sea charts'.⁶⁴⁰ In 1682, he received a commission from the newly appointed Geographer Royal, Sir Robert Sibbald, to produce the coastal charts for his intended

the Sea-Coast and Islands of Scotland with Large and Exact Maps, for the Use of Seamen: By John Adair, Geographer for the Kingdom. Edinburgh, 1703.

⁶³⁶ NLS MS 1651 Z.69/01.

⁶³⁷ BL Additional Ms. King's 100, f. 15, George Wade's report on the Highlands, 10 November 1724.

⁶³⁸ BL Additional Ms. King's 103, f. 1, Wade's report, 18 October 1727.

⁶³⁹ NRAS 3246, Vol. 36, letter number 7, John Forbes to Lord Advocate, 19 February 1756.

⁶⁴⁰ Robinson 1959, p. 169.

description of Scotland. By August 1692, the Scottish Privy Council recorded that Adair had completed ten sea maps and ten county maps (discussed later). Adair's atlas of the east coast, *The Description of the Sea-Coast and Islands of Scotland with Large and Exact Maps*, was published in 1703, the only published volume in a projected series designed to cover the whole coastline.⁶⁴¹ Manuscript copies of the charts included in the *Description* form part of the Board of Ordnance's collection of maps of Scotland. Now housed in the National Library of Scotland,⁶⁴² these charts depict the eastern seaboard, from Holy Island in England to Aberdeen (see Fig 6.4 orange ribbon).

A further sequence of manuscript charts of sections of the Scottish coast were discovered bound at the back of a printed volume of Adair's *Description*. The volume came to the Hydrographic Office in 1828 as part of the King George III Maritime Collection and now forms part of the Admiralty Library deposit.⁶⁴³ Six of the charts have Adair's name at the end of the title and they all have an endorsement on the verso, in a different hand. They cover parts of the northwest coast and Hebrides, southwest seaboard, northern islands, and Aberdeenshire coast (see Fig 6.4 purple ribbons plus Aberdeen). A map in what was the King's Topographical Collection, now at the British Library, completes the highlighted coastline in figure 6.4 (green ribbon): Adair's 1690 map of the 'Towns (and Adjacent Towns) in the High & Low Roads from Aberdeen to Inverness and includes all the Towns and Havens on the Sea Coast from Aberdeen to Inverness, and to the Frith of Cromarty'.⁶⁴⁴

All the charts with one exception (No. 8, the 'Sea between Irvin & Air & the Isle of Arran') were drawn in Indian Ink and grey wash. At the time of their making, their content was more attuned to navigation than to identifying the strengths and weaknesses of the shore with a view to developing it for military use. Surveys were confined to the coastline and offshore islands, to taking close soundings and anchorages, to recording potential navigational hazards such as shoals and rocks, and to a study of tides and tidal streams.⁶⁴⁵ Land features were mainly restricted to a strip along the coastline (with the exception of the roads between Aberdeen and Inverness) and showed hills in the form of mole-hills bearing little relation to actual relief, navigational landmarks such as isolated summits, settlements, and castles (see Fig 6.5).

⁶⁴¹ Moore 1985; Withers 2002.

⁶⁴² NLS MS 1651 Z.69/01. The volume includes a manuscript copy of a hydrographical chart of the coast of Scotland first published in 1583 by Nicholay D'Aulphinois (Nicolas de Nicolay).

⁶⁴³ Admiralty Library Oa 03 [1-14], reference no. MSS 331.

⁶⁴⁴ BL Maps K.Top.48.65.

⁶⁴⁵ Crone 1978.

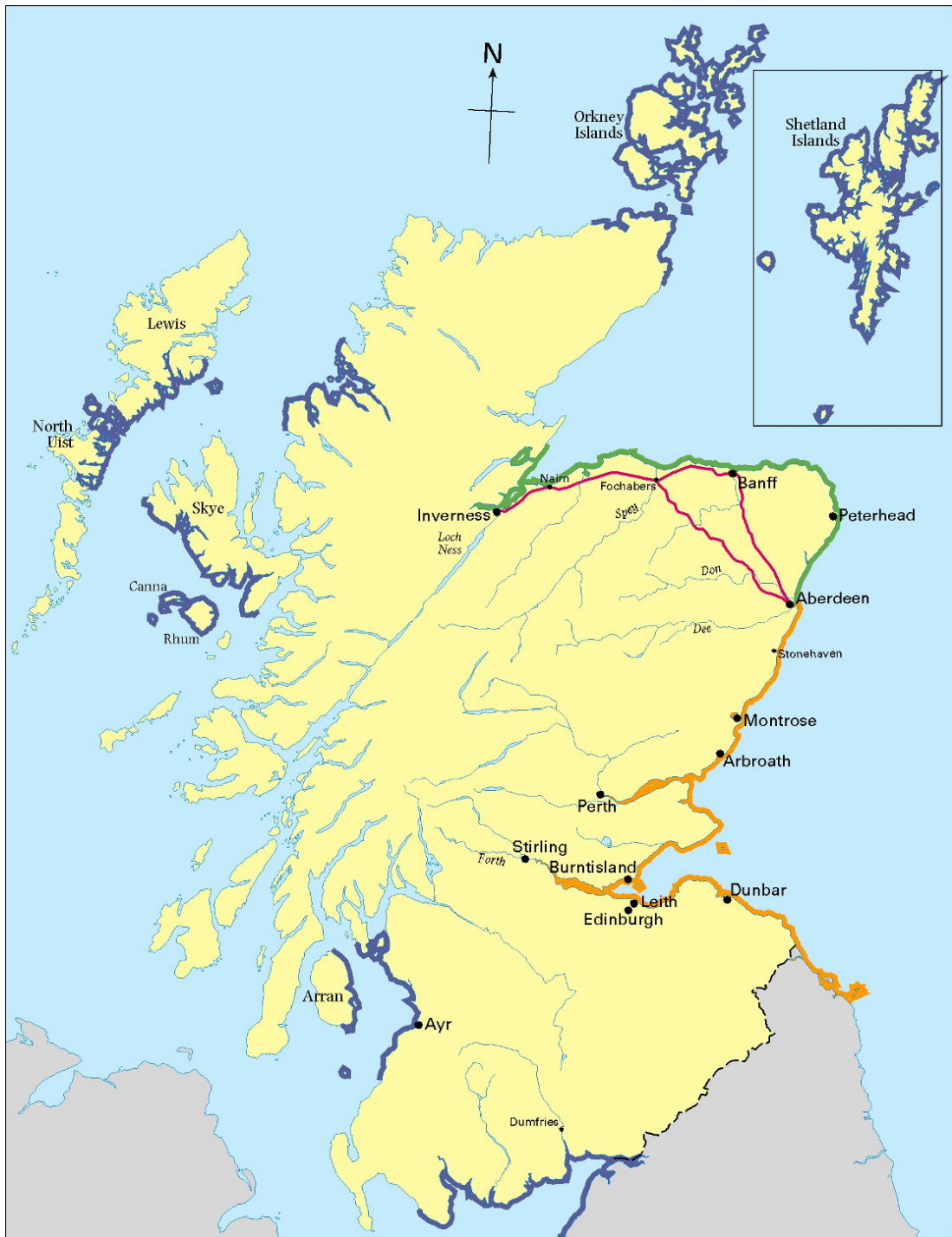


Figure 6.4 Diagram identifying the coastlines covered by John Adair's surviving manuscript charts: orange ribbon represents the NLS collection (MS 1651 Z.69/01); purple represents the Admiralty Library collection (Oa 03 [1–14]); and green BL Maps K.Top.48.65 with the *High & Low Roads* between Aberdeen and Inverness.

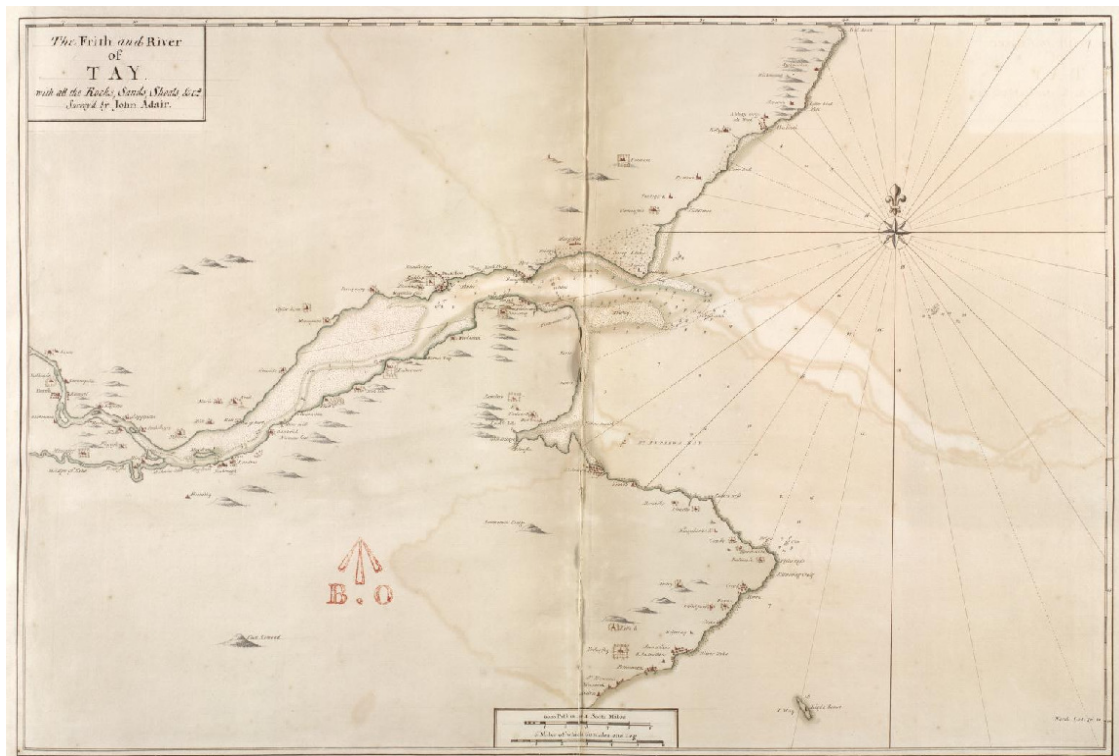


Figure 6.5 ‘The Frith and River of Tay with all the Rocks Sands Shoals, &c.’ [manuscript copy], by John Adair, 1703. MS 1651 Z.69/01 (Reproduced by permission of the Trustees of the National Library of Scotland).

Adair’s charts—manuscript and printed—were potentially not the only ones available to the Board of Ordnance for consultation. In the 1680s, Greenville Collins—a skilled navigator with experience in making draughts of harbours—undertook the first comprehensive survey of the coasts of Britain which resulted in eight detailed charts of Scottish coasts, published in his *Great Britain’s Coasting Pilot* of 1693.⁶⁴⁶ In 1730, Mark Tiddeman compiled a chart of the west coast of Scotland, from Scarba south of Mull to Cape Wrath and including the Outer Hebrides.⁶⁴⁷ The first trigonometrical survey of a British coast was that of the Orkney Islands by Murdoch Mackenzie senior, published in 1750 as *Orcades: or, a Geographic and Hydrographic Survey*. On the basis of this protracted but accurate survey, the Admiralty commissioned Mackenzie to survey the west coast of Britain and all of Ireland.⁶⁴⁸ Unlike seventeenth-century surveys of the French coast, from Dunkirk to La Rochelle, which Vauban subsequently supplemented with military information—‘the third sheet is an old map made by Lavoye on which I have marked all the batteries in the passage, that is the places where they should be built’—there is no evidence that Adair,

⁶⁴⁶ See NLS EMS.b.3.24/1–9.

⁶⁴⁷ NLS Adv.MS.16.1.20, dedicated to the ‘Honorable Sr. Charles Wager’.

⁶⁴⁸ Headrick 2000, pp. 113–115.

Collins, Tiddeman or Mackenzie's charts were used by the government for such explicit defensive purposes.⁶⁴⁹ The fact that manuscript copies of Adair's *Description* carry the stamp of the Board of Ordnance does, however, raise conjecture that these civilian maps were consulted at times when concerns for the security of Scotland were heightened, and hostile landings upon the coast were anticipated. They provided a visual means of access, both by an enemy and by the British Navy, and could establish a 'place of Rendesvous [sic] where they [warships] would be most secure'.⁶⁵⁰

If the charts were used by the Board in matters of movement and coastal defence, and if found sufficient for that purpose, the Board had no recourse to military surveys in their stead. This may account for the dearth of military coastal charts of Scotland until 1717, 1745, and particularly after 1780 when attention turned to specific sections of coastline with the intention of building or reinforcing battery defences. A further conjecture is possible; that any coastal charts of Scotland made by or in conjunction with the Board of Ordnance were deposited with the Admiralty or 'Navy Board' or with their representatives at Trinity House in Leith. In 1714, a report on the Scottish Harbours was completed by associates of the Navy Board who were tasked with 'taking a Survey of the Shoars [sic] & Bays on both sides of the Frith of Forth in North Brittain'; with identifying a site for building, refitting, and repairing government ships; and with planning a wet and dry dock for that purpose. The survey was undertaken by 'Capt. John Brown & Mr Gregory deputed by the Lord Provost of Edinburgh, Mr John Adair & Mr Ja[m]es Smith recommended by the Earle of Marr, and Capt. O'Brian an Engineer and Officer of the Ordnance' who took 'a strict & carefull Survey [...] & prepar'd Draughts of each place', of the headlands, bays, harbours, rocks, and also took soundings, all 'particularly sett down in a Mapp hereof'. In the accompanying report, the surveyors described sites for 'Four Forts' to be built at the entrance to the estuary so that it 'may be defended from being attack'd or enter'd with an Enemy's Fleet'.⁶⁵¹ No survey or maps (the report makes reference to 'No 7', implying several maps were made) relating to this report have been found in the Board of Ordnance or military archives. The report confirms, however, that the Board did concern itself with knowing the coast and with matters of its defence to prevent enemy movements.⁶⁵²

⁶⁴⁹ Desbrière 2008, p. 77: 'la 3e feuille est une vieille carte faite par lavoye sur laquelle j'ay fait marquer toutes les batteries du goulet, c'est à dire les endroits où il les faut faire'.

⁶⁵⁰ TNA WO 30/54, f. 88 verso, 'General Instructions for the Officers of Engineers employed in Surveying', by William Roy, [1785].

⁶⁵¹ BL Additional Ms. 31149, ff. 155–159, a report on the Scottish Harbours, 1714, lodged in the political papers of Lord Strafford relating to the pacification of the North.

⁶⁵² The 'Four Forts' were built at North and South Queensferry, on the island of Inchgarvie, and on the Rock of Bimar. Plans or views exist for all except Bimar but none drawn in 1714. Queensferry: BL Add. Ms 61630 (1709), Add. Ms 50008 B, ff. 9–12 (1783), BL Maps K.Top.49.87.2.b. (n.d.), TNA

When William Roy set out his ‘General Instructions for the Officers of Engineers employed in Surveying’, he suggested that for a survey of the coast a ‘Book of general miscellaneous remarks’ should be kept. Entries should include:

every thing that occurs relative to the nature of the Coast; such as, what parts of it are accessible, and what not, at what distance from the shore ships of war may come to an anchor to cover a debarkation from Boats; and what sort of communications there are leading from the Coast to the interior country, in case an Enemy had made his landing good.⁶⁵³

In 1803, anticipating Napoleon’s invasion, Lt. Gen. Richard Vyse, Commander of the military forces in Scotland, made ‘a very minute examination and inspection of this Coast, from Edinburgh [...] to Dunglass’. Captain Henry Rudyard, Commander of the Royal Engineers in Scotland,⁶⁵⁴ was ordered to repeat the survey and to report his opinion of places ‘an Enemy could easily make a good landing’. Dunbar was found particularly accessible to the enemy due to a number of bays surrounded by high rocks and deep waters which created natural safe harbours. In an earlier inspection of the coastline, Rudyard had reported that:

during the last War, I am informed a very formidable privateer with a small squadron anchored near the Town of Dunbar, and sent an armed Brig within Musket shot to take soundings at the mouth of the Harbour and Piers, which [shows] how accessible the place is to an Enemy’.⁶⁵⁵

To convey to political and military commanders in London the full significance of his and Rudyard’s written reports, Vyse directed the recipients ‘to a Sketch which I have made out for your Information’.⁶⁵⁶ Although the sketch has not been found, Vyse expected map and text to be read together.

At the turn of the eighteenth century, civilian coastal charts provided the Board of Ordnance and Government with geographical knowledge of the Scottish seaboard. These charts were capable of transmitting to those in power a visual image that could be exploited; they provided an opportunity to see and govern from afar. Whether any of the charts were deemed adequate or, in reality, even used for political and military strategic planning

MPH 1/199/3 (1812); Inchgarvie: BL Maps K.Top.49.87.2.a. (1743), Maps K.Top.49.87.2.b. (n.d.), BL Add. Ms 50008 B, ff. 11–12 (1783).

⁶⁵³ TNA WO 30/54, f. 88; fair copy at WO 30/115, pp. 180–181, instructions approved and signed by the Duke of Richmond, Master-General of the Ordnance, 17 July 1785.

⁶⁵⁴ Rudyard took over from Frazer as Chief Engineer in Scotland from 1786 (TNA WO 47/108, July–Dec 1786).

⁶⁵⁵ TNA WO 30/66, f. 152 verso, copy of Captain Henry Rudyard’s earlier report on Dunbar, dated 22 August 1794.

⁶⁵⁶ TNA WO 30/66, f. 141, Lt. Genl. Vyse’s report on part of the coast of Scotland, Edinburgh 16 June 1803.

remains open to conjecture. The fact that such maps existed, however, provides an explanation why so few military engineers were commissioned by the Board to survey and chart the coast. In practice, surveying Scotland's coastline—and at most very specific, small parts of it—only became a priority for engineers in Scotland towards the end of the eighteenth century when internal unrest had largely subsided and wars with America and France were a greater threat. By this time, more extensive coastal charting was carried out under the auspices of the Navy Board at Trinity House.

Inland waterways: firths and lochs

From at least 1716 the value of Scotland's inland waterways as an effective means of movement, defence, and safe harbour for government ships was recognised by the military engineers in Scotland. Movement involved not only troops and stores but building materials. Strategic sites for new fortifications, such as the barrack fort of Bernera in Glen Elg which was chosen for keeping a military communication with the Isle of Skye and as a show of political retribution, was located near to a natural harbour for landing timber for building the barracks, as indicated on Bastide's prospect (see Fig. 6.6).⁶⁵⁷ During the construction of Fort George at Ardersier, oak timber cut to make scantlings was delivered by ship to the shore below the fort.⁶⁵⁸ Stone quarried near the fort was plied along the Murray Firth then carried by cart from the shore to the fosse.⁶⁵⁹

In 1724, during his surveillance of the Highlands, Wade recognised that Loch Ness formed a judicious means of transporting military provisions and troops between Kiliwhimen (later Fort Augustus) and Fort George at Inverness. On first coming to the Highlands, he had caused an 'exact Survey to be taken of the several Lakes and that part of the Country lying between Inverness and Fort William, which extends from the East to the West Sea, in order to render the Communication more practicable'.⁶⁶⁰ The survey was carried out by Joseph Avery in 1725; the map, at a scale of c.1: 71,280 (just over one mile to an inch) included 'the Several Lakes [and] Rivers', as well as 'all Roads & Remarkable places contain'd between

⁶⁵⁷ Maps of Kiliwhimen show a stone quarry (see NLS MS 1647 Z.03/08a) and that sand was taken from Loch Ness for making mortar (see NLS MS 1647 Z.03/09a). A stone quarry was situated to the south east of Inversnaid Barracks, within the boundary of the Crown lands (see NLS MS.1648 Z.03/16a).

⁶⁵⁸ TNA WO 47/64, p. 272, 15 December 1764

⁶⁵⁹ TNA WO 47/39, pp. 93–94, 30 January 1752. Materials continued to be transported to the fort along the Murray Firth for several years. In 1755, the Board of Ordnance requested that Admiralty ships-of-war stationed in the Murray Firth stopped impressing the men bringing the materials to the fort (TNA WO 47/45, p. 429, 7 May 1755).

⁶⁶⁰ BL Additional Ms. King's 101, f. 17, report of Wade's journey in 1725.



Figure 6.6 'A Prospect of that Part of the Land and Sea adjacent to ye Barrack to be Built in Glen Elg', to cover the sea crossing across the Sound of Sleat to the Isle of Skye, with an enlargement of the inset map, by John Henri Bastide, 1720. MS1647 Z.03/07a (Reproduced by permission of the Trustees of the National Library of Scotland)

the said two places'.⁶⁶¹ Loch Ness was found to be 'Navigable for the Largest Vessells [sic]', the survey showing it to be '24 Miles in Length, and a Mile or more in breadth, the Country being Mountainous on both sides' (see Fig 6.7). A 'small Vessell with Oars and Sails' was therefore commissioned 'sufficient to carry a Party of 60 or 80 Soldiers, and Provisions for the Garrison which will be a means to keep the Communication open between [Fort Augustus] and Inverness, and be a safe and ready way of sending Partys [sic] to the Country bordering on the said Lake'.⁶⁶² By January 1726, the ship—the *Highland Galley*—was launched and in-service transporting provisions and ammunition between the garrisons as planned.⁶⁶³

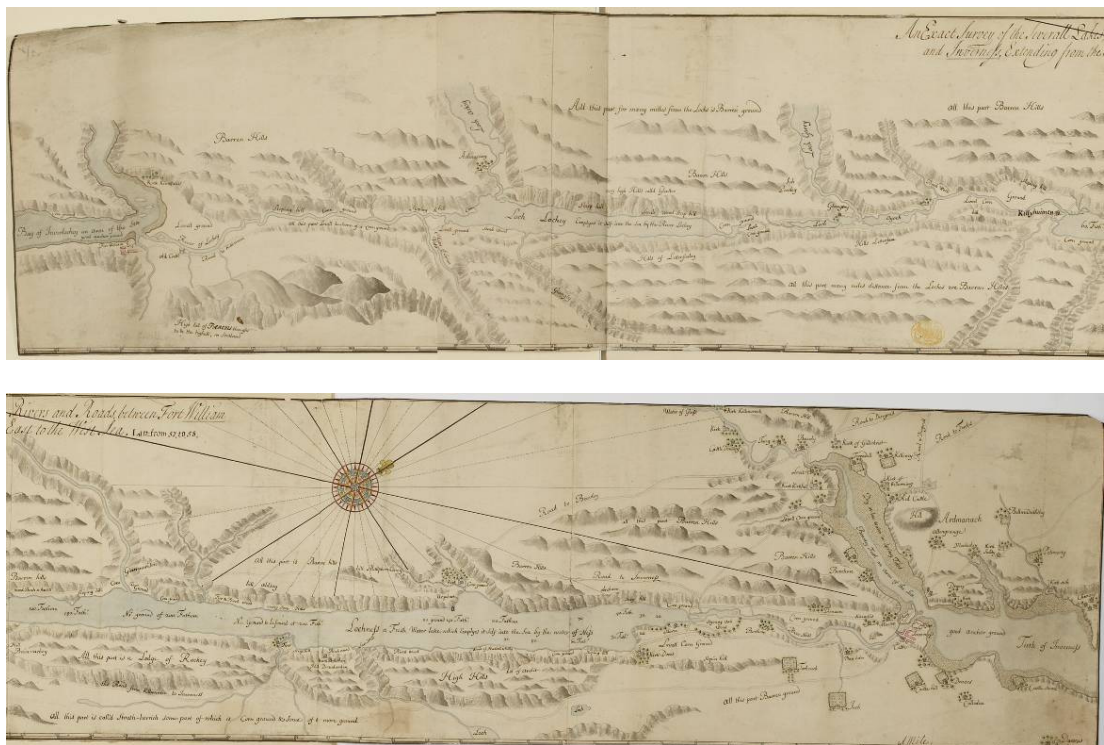


Figure 6.7 'An Exact Survey of the Several Lakes, Rivers, and Roads, between Fort William and Inverness, Extending from the East to the West Sea, latt. from 57° to 58°', by [Joseph Avery], 1725, at 1: 71,280 (1.125 miles to an inch). Maps K.Top.50.1 (Courtesy of the Trustees of the British Library)

Knowing the geography of Scotland's inland waterways was also important for the strategic defence of loch-side fortifications. The importance of Loch Eil in the defence of Fort William, for example, came to light during the Jacobite siege in March 1746. The

⁶⁶¹ Three copies survive: BL Maps K.Top.50.1, Maps K.Top.50.2, and NLS MS 1648 Z.03/21 (BL Maps K.Top.50.1 looks to be a neat copy of NLS MS 1648 Z.03/21). Another copy drawn in 1742 at a scale of 1: 55,440 included similar detail of the lochs but was more concerned to show the new roads and is more highly coloured: TNA MR 1/496.

⁶⁶² BL Additional Ms. King's 100, f. 17, report of Wade's journey in 1724.

⁶⁶³ BL Additional Ms. King's 101, f. 17, the ship's final capacity was for 50 or 60 soldiers.

location of Fort William was a concern from the outset. Major General Mackay who directed its building, expressed his doubts for reusing the site of an old citadel: 'The situation of the old fort did not please me, being commanded from a near hill, but I could not change it, there being none else to fit'.⁶⁶⁴ There were two main advantages, however, for Fort William remaining where it was: the fort was near a fresh water supply (although not within the enceinte itself); and ships carrying stores for the government garrisons could sail up to the mouth of the River Nevis and unload their cargo at the sally port which also meant that ships could be used to relieve the fort if under siege at any time.⁶⁶⁵

A survey of Loch Eil was first commissioned in 1716 by Brigadier Lewis Petit who was reviewing the defences of Fort William by order of the Board of Ordnance. 'Ensigne J[ohn] Hargrave', who Petit deemed to be 'very Capable & deserving of Encouragement',⁶⁶⁶ compiled a map showing detailed soundings and currents, the location of Fort William, as well as an inset map of part of the west coast of Scotland—one of the few 'location maps' included on Board of Ordnance maps. The loch itself was shown in plan whilst the surrounding hills were drawn in perspective.⁶⁶⁷ In 1717, Hargrave compiled a large-scale chart of this survey (see Fig 6.8) at a scale of 1: 8,400 (700 feet to an inch), from Loch Linnhe as far south as Ardgour and Loch Eil as far west as the Corpach, showing 'ye current of Annot to ye current of Argour, giving a true account of all ye Towns, Houses, River, Rivulets, Woods, Trees, Mountains, Glens, Boggs, Arable ground & Passable roads, As likewise ye depth of water & Flowing of ye tide with ye flatts, shoales, Rocks, Sands, & safest places for Anchorage in ye Loch'.⁶⁶⁸

In March 1746 when Fort William was under attack from Jacobite forces, the full extent of its disadvantageous position was revealed. On the landward side, the Hanoverian garrison was overlooked by four rebel batteries positioned on Cow Hill and Sugar Loaf Hill to the south east and east of the fort.⁶⁶⁹ John Elphinstone's plan shows the situation of these batteries (see Fig 6.9). Under almost constant fire—'about half eleven at night they began to fire Shells, & threw by four in the morning 194: six inches shells'—the garrison's main support and safest retreat was by means of a sloop-of-war, the *Baltimore*, captained by

⁶⁶⁴ Quoted in Tabraham and Grove 1995, p. 40.

⁶⁶⁵ TNA WO 55/319, p. 129 'A Report of Fort William in North Brittain [sic] Conserving the Place it Stands in and the usefullness of a small Magazin there', written by Talbot Edwards on 2 February 1709/10 [1710].

⁶⁶⁶ TNA WO 47/30, p. 133, 14 May 1717.

⁶⁶⁷ TNA MPH 1/224 at 1: 28,800 (2,400 feet to an inch).

⁶⁶⁸ TNA MR 1/492 at 1: 8,400 (700 feet to an inch); another copy of the same date at MR 1/495; two unsigned copies drawn in 1741 MR 1/498 (1) and (2); and two further copies (unsigned) BL Maps K.Top.50.3. and Maps K.Top.50.4. drawn in 1725 at scales of 1: 25,200 (2,100 feet to an inch).

⁶⁶⁹ See John Elphinstone's 'Plan of the Ground adjacent to Fort William' showing the batteries set up by the Jacobites in the 1746 siege of the fort. BL Maps K.Top.50.37.1.a.



Figure 6.8 Part of 'A Trace and exact Plan of Fort William scituate on ye Locheale in Lochabor in ye Shire of Inverness', by John Hargrave, 1717 at 1: 8,400 (700 feet to an inch). MR 1/492 (Courtesy of The National Archives, Kew)

Richard How, afloat on Loch Eil.⁶⁷⁰ To counter the siege, the garrison's commander, Captain Caroline Frederick Scott, formed a project of attack that comprised a detachment of soldiers with sailors from the *Baltimore* negotiating by armed boats the shores of the loch to destroy Killmady Barns, or the Corpach—a large village to the west of the fort housing a contingent of Jacobite rebels. The *Baltimore* sailed towards the Barns and 'fired several Shot, & threw

⁶⁷⁰ TNA SP 54/30/2 G 'State Papers Scotland, Series II'.

some Coehorn Shells' to protect the attack force. Although this minor skirmish had little effect, Fort William successfully resisted the rebel siege and so a retreat by way of Loch Eil and the *Baltimore* was not effected.



Figure 6.9 Part of John Elphinstone's 1748 'Plan of the Ground adjacent to Fort William' showing the batteries set up by the Jacobites in the 1746 siege of the fort and the soundings of Loch Eil. Maps K.Top.50.37.1.a. (Courtesy of the Trustees of the British Library)

To the south west of Fort William is the 'Current of Ardgour' formed by a small peninsula between Loch Eil and Loch Linnhe and the waters flowing into the Irish Sea. In 1757, Lieutenant Hugh Debbeig of the Corps of Engineers, surveyed this area, taking soundings at low water and expressing them in fathoms on his map (see Fig 6.10).⁶⁷¹ Debbeig wrote a lengthy report to accompany this map and described the narrow passage which:

makes the Current so rapid that Ships with a leading Gale will run thro' at the rate of 12 Miles in an hour; so that it will be next to impossible for a Land Battery placed upon either side to strike a Ship more than once before she is out of reach before the Guns could be loaded again. The Passage is so deep that Ships of any Burthen may go thro' with great safety at any time of

⁶⁷¹ Another unfinished copy at BL Additional Ms. 33231 H2.

Tide, there being from 3 to 16 Fathoms depth of Water at lowest Ebb, and they may run within 30 Yards of the South Shore.

His report concluded: ‘As I am not acquainted with the intention of this Work, the above is submitted to better judges, who may be informed of the Design of it, without which one cannot determine what the Situation is capable of’.⁶⁷² Combined, Debbeig’s plan and report confirmed to Government the inappropriateness of the site for erecting a land battery.



Figure 6.10 ‘Plan of the Current of Ardgor’, by Hugh Debbeig, 1757. Plan at 1: 4,800 (400 feet to an inch) and sections at 1: 2,400 (200 feet to an inch). Additional MS. 33231 H1 (Courtesy of the Trustees of the British Library)

Coastal defences were undoubtedly ‘of the utmost consequence to this Coast’.⁶⁷³ But military establishments along the coast of Scotland needed to be connected to the interior and the troops ‘always ready to move, in any Direction’. In conjunction with knowing and using the Scottish coastlines, firths and lochs for military movement, the Board of Ordnance had to ensure they were connected overland. From the 1720s, military engineers in Scotland concerned themselves with ‘opening [...] great Road[s], by means of which, the Guns,

⁶⁷² BL Additional Ms. 33231 H1.

⁶⁷³ TNA WO 30/66, f. 142, Lt. Gen. Vyse’s report on part of the coast of Scotland, Edinburgh 16 June 1803.

Carriages &c can move without the least possibility of delay, in every direction'.⁶⁷⁴ The next section examines these 'great Roads', the military roads of Scotland.

The King's Roads

A road system capable of bearing vehicular traffic already existed in parts of Scotland before the eighteenth century. When Edward I embarked upon the conquest of Scotland in 1296, his army's baggage trains and siege-engines were transported by road by means of horse-drawn carts and ox-wagons as far north as Stirling and Dunfermline.⁶⁷⁵ There were, however, very few vehicle roads through the central and western Highlands and, throughout Scotland, many routes used only by horses or men on foot, and others used chiefly for droves of animals.⁶⁷⁶

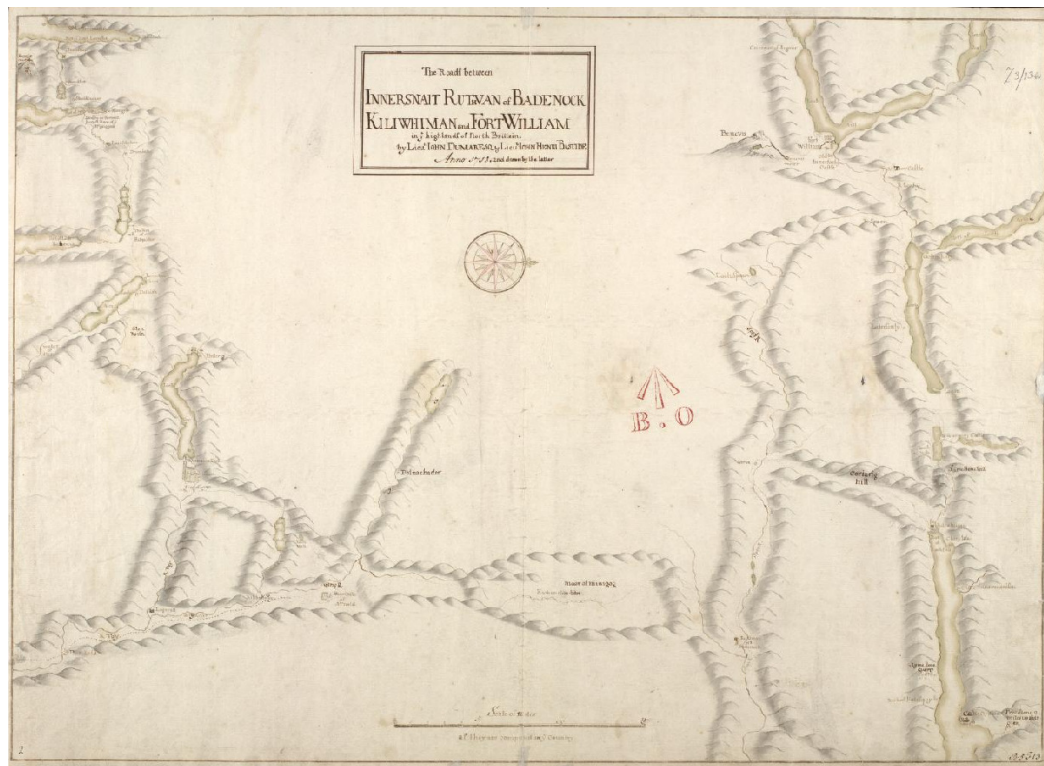


Figure 6.11 'The Roads between Inversnait, Ruthven of Badenock, Kiliwhiman and Fort William, in ye highlands of North Brittain', by John Dumaresq and John Henri Bastide, 1718. MS 1648 Z.03/13a. (Reproduced by permission of the Trustees of the National Library of Scotland)

One of the earliest eighteenth-century maps of the 'Roads [...] in ye highlands of North Brittain [sic]' (see Fig 6.11) was surveyed in 1718 by John Dumaresq and John Henri

⁶⁷⁴ TNA WO 30/66, f. 145

⁶⁷⁵ Barrow 1984.

⁶⁷⁶ Ruddock 1984.

Bastide and drawn by the latter.⁶⁷⁷ As overseers of the four new barrack forts being built in the Highlands from 1718,⁶⁷⁸ their concern was to gauge the communications between them, from Inversnaid on Loch Lomond to Ruthven of Badenoch via Loch Tay and Blair Athol, Kiliwhimen at the southern end of Loch Ness to Fort William. The ‘roads’ at this time were unsuitable for artillery or wheeled carriages and this deficiency combined with the development of more mobile military strategies gave rise to the planning and building of a new road system in Scotland, one that was co-ordinated and mapped by the military engineers of the Board of Ordnance.

Many of the new roads were built on the route of existing tracks, although some were entirely new. From the outset, however, all the military roads were either in, bordering on, or leading to points of military importance.⁶⁷⁹ As the eighteenth-century progressed, the Board of Ordnance directed more road construction projects that saw a corresponding change in the mapping, from relatively small-scale regional plans of entire routes to large-scale maps of small sections of roads.

Maps of route ways

Mobility was a strategic priority to both Hanoverian and Jacobite armies. In 1724, when Major-General George Wade reconnoitred the Highlands of Scotland, he was made aware of the want of roads and the advantages this afforded the rebel Highlanders. He observed:

the great disadvantages Regular Troops are under when they Engage with those who inhabit Mountainous Situations; The Savennes in France, And Catalans in Spain, have in all times been Instances of this Truth, The Highlands in Scotland are still more impracticable, from the want of Roads, Bridges, and from the Excessive Rains that almost Continually fall in these parts, which by Nature and constant use become habitual to the Natives, but very difficulty Supported by the Regular Troops, They are unacquainted with the Passages by which the Mountains are Travers’d, expos’d to frequent Ambuscades, and Shot from the Tops of the Hills, which they return without Effect.⁶⁸⁰

From 1725, Wade began planning a road system in the Highlands for securing ‘Peace and Tranquility [sic]’. He recommended ‘That a sum be provided, Annually, for making the

⁶⁷⁷ NLS MS 1648 Z.03/13a at a scale of c.1: 156,250 (5 miles to 2 inches), with various copies: MS 1648 Z.03/13b, MS 1648 Z.03/14a–c, BL Maps K.Top.48.58. and Maps K.Top.48.58.a.

⁶⁷⁸ TNA WO 47/31, p. 66.

⁶⁷⁹ Taylor 1996.

⁶⁸⁰ BL Additional Ms. King’s 100, ff. 14–15.

Roads of Communication and a Salary for the Person Employ'd as Inspector for carrying on so necessary a Work'.⁶⁸¹ The roads (see Fig 6.12), built by Highland Companies under Wade's direction, ran from Fort William to Inverness, Dunkeld to Inverness, Crieff to Dalnacardoch, and Dalwhinnie to Fort Augustus by the Corrieyairack Pass.⁶⁸²

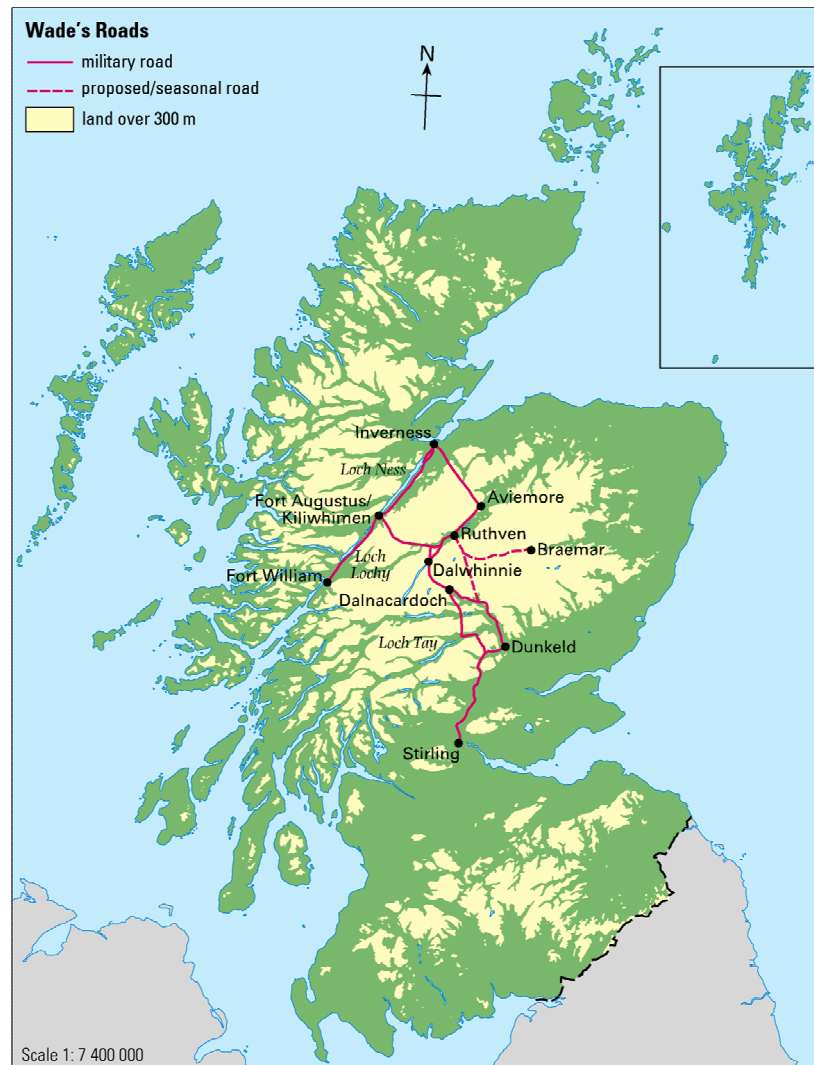


Figure 6.12 Distribution of George Wade's roads, 1724–1742

Wade usually represented proposed routes in two concurrent forms: map and written itinerary, often on the same sheet. His work offered a descriptive geography of parts of the Highlands that was truly utilitarian; it was the content of the maps rather than their

⁶⁸¹ BL Additional Ms. King's 101, ff. 20–21, Wade's report on his journey to Scotland in 1725.

⁶⁸² Moir 1983. The Ordnance Stores supplied tools for the building work which, being 'generally very heavy' required equipment of 'proportionable Strength', including shovels, pickaxes, iron crows, felling axes, hatchets, hand screws, and wheelbarrows (TNA WO 55/523, 26 May 1725; WO 55/349, pp. 46–47 and 116–117 warrants for tools, 28 March 1728 and 22 January 1729).

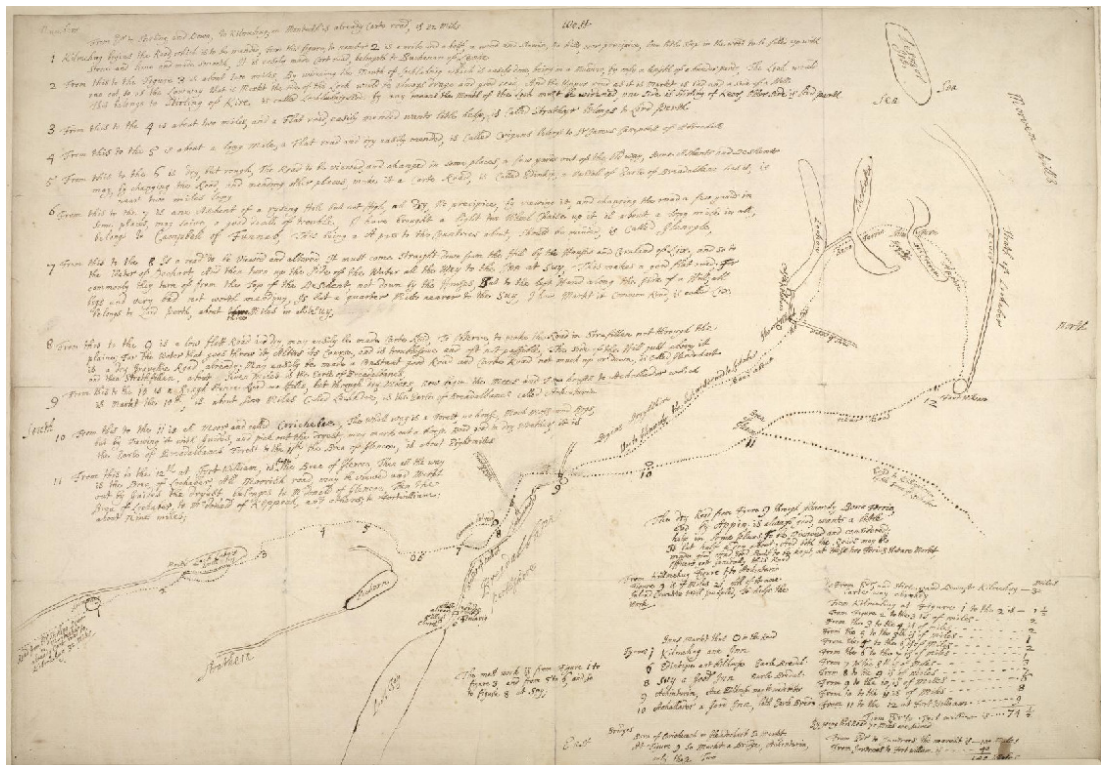


Figure 6.13 [Sketch and description of the proposed Roads from Callander and Loch Tay to Fort William and Appin including details of mileage and of inns], by [George Wade] between 1724 and 1745. Acc.10497 Wade.58m (Reproduced by permission of the Trustees of the National Library of Scotland)

appearance that mattered most. In the case of the geography practiced by Wade and other military engineers of the Board of Ordnance, military utility functioned as the structuring agent and the principle of inclusion and exclusion in their maps and reports. One such survey report described in detail the condition of the route between Callander and Loch Tay to Fort William and Appin (see Fig 6.13). Wade’s sketch began at the inn at Kilmahog in Perthshire, 32 miles from Edinburgh by ‘carte way’ and, thereafter, was split into twelve sections of distances varying between one and 9 miles. In total, 42½ miles of track were described. In addition to distances, Wade indicated where the track needed minor attention from the road engineers—‘4 From this to the 5 is about a long mile, a Flat road and dry easily mended’—or needed to be completely rebuilt—‘7 from this to the 8 Is a road to be viewed and altered. It must come straight down from the Hill by the Houses and Cornland’. The geographical description provided by Wade was essentially a very short physical, social, and military treatise on the route being mapped. The information provided was pertinent to road engineers and also to political commanders who were informed whose land the road or ‘carte’ passed through. Since this identified whether the landowner was for or against government, it revealed the security of the road for use by military troops. ‘11 From this to

the 12th at Fort William’, for example, ‘is first the Brea of Glencoe, Then all the way is the Brea of Lochaber, All moorish road, may be viewed and markt out by Guides the dryest, belongs to McDonald of Glencoe, Then the Brea of Lochaber to McDonald of Koppoch’.⁶⁸³ Both McDonalds had joined the Jacobites in the 1715 rebellion.⁶⁸⁴



Figure 6.14 ‘A Map of Part of the Highlands’, by [George Wade], between 1726 and 1737. Acc.10497 Wade.58c (Reproduced by permission of the Trustees of the National Library of Scotland)

Methods of survey and access to sources for compilation varied between road surveyors. Joseph Avery stated, for example, that his 1727 plan of the Great Glen, from Fort William to Inverness, was done by actual survey ‘in which the distances are truly Measur’d

⁶⁸³ NLS Acc.10497 Wade.58m.

⁶⁸⁴ BL Maps K.Top.48.12. ‘Description of the Highlands of Scotland’, by Clement Lemprière, 1731 which includes an ‘explanation’ of the Clans who joined with the Jacobites in the 1715 rebellion.

& the places truly set'.⁶⁸⁵ In contrast, 'A Map of Part of the Highlands' (see Fig 6.14) drawn by Wade was not done 'by actual Survey but laid down on the common computed distances of places supposing the miles to be of equal length with the miles round about Fort William'.⁶⁸⁶ Wade himself admitted that the map 'may be erroneous [...] Strathfillan & on to Sterling ought to be laid down more to the SE'. Despite this, he continued: 'though this is design'd only to give a general idea of so much of the country as is here laid down, yet, except what is before mention'd, it is thought to be pretty just'. Proposals to make a new road from the barracks at Ruthven to Aberdeen—'which would have open'd a Communication from the East Coast into the Highlands'⁶⁸⁷—were never fulfilled. When Avery compiled a map in 1735 of part of the intended route over the Grampians, from Ruthven to Braemar, he used extracts from surveys he made for the Duke of Gordon and also information from Major Caulfeild.⁶⁸⁸ Rather than supplying a separate report, Avery included on the map detailed remarks on the nature of the country and also noted the span of each bridge necessary to cross the numerous tributaries (see Fig 6.15). Avery's distinctive style makes it possible to attribute his name to another highly detailed map of the country around the Murray and Cromarty Firths.⁶⁸⁹ Unlike the previous planning documents, this map provides an overview of the geography of the Shires of Inverness, Sutherland, Ross, Nairn, and Elgin abutting the Firths; settlements, topography, and 'civilian' roads are drawn as they then were, not as they were planned to be.

In 1740 supervision of road construction devolved to Major Caulfeild. Coinciding with the change of personnel were heightened concerns of a Jacobite rising which prompted portrayals of Wade's network of military roads. Between 1742 and 1746, Richard Cooper, Thomas Willdey, and William Edgar all produced maps of the 'Kings Roads made by His Excellency General Wade'.⁶⁹⁰ Military commanders must have found these summaries extremely useful, assuming they had access to them. Thomas Willdey's map was dedicated to Lieutenant General Henry Hawley, Commander-in-Chief of the Hanoverian Forces in Scotland until 1746.⁶⁹¹ In 1745 Edgar was commissioned by the Government to map the King's Roads (see Fig 6.16). His 'Map of Perth-Shire', dedicated to James Murray, second Duke of Atholl, included on the verso a list of 'Roads of Communication Through The Highlands With The Rivers, Bridge and adjacent Villages', from Stirling to Fort Augustus,

⁶⁸⁵ NLS MS 1648 Z.03/21. Another version of this plan is shown at Figure 6.7.

⁶⁸⁶ NLS Acc.10497 Wade.58c.

⁶⁸⁷ BL Maps K.Top.48.54[a], 'A Map of the Kings Roads made by His Excellency General Wade in the Highlands of Scotland', by Richard Cooper, 1742.

⁶⁸⁸ NLS Acc.10497 Wade.58b.

⁶⁸⁹ NLS Acc.10497 Wade.58d.

⁶⁹⁰ BL Maps K.Top.48.54.a and b.; NLS Newman 1152(1); and Maps K.Top.48.56. respectively.

⁶⁹¹ NLS Newman 1152(1).



Figure 6.15 An extract from ‘A Plan of the Country where the New Intended Road is to be made from the Barrack at Ruthven in Badenoth to Invercall in Brae Marr’, by Joseph Avery, 1735. Acc.10497 Wade.58b (Reproduced by permission of the Trustees of the National Library of Scotland)

Ruthven, and Inverness, and from Inverness to Fort Augustus and Fort William, although the map itself was limited to Perthshire.⁶⁹² During 1745 and the early part of 1746, Edgar continued to draught maps of Aberdeen-shire—‘By order of His Royal Highness the Duke of Cumberland’—Argyllshire, Dumbarton-shire, and Inverness-shire, showing the roads and lochs with named settlements and the principal mountain ranges.⁶⁹³ According to Gough, ‘Mr. Edgar was a very faithful geographer, and did more shires, but his friends could not find his papers after he had accompanied the duke of Cumberland [in] 1745, and died of fatigue in the Highlands in the beginning of the year 1746’.⁶⁹⁴

In estimating the value of Wade’s roads, it must be remembered that they were built for strategic reasons, for improving the speed and ease of troop movements between military establishments to counter any insurrection. In this, the Jacobites at least felt their political

⁶⁹² BL Maps K.Top.50.69. In 1746, James, Duke of Atholl, joined the Duke of Cumberland in his northerly pursuit of Charles Edward Stuart whilst his attainted elder brother, William, supported the deposed Stuarts and Jacobite forces.

⁶⁹³ The ‘order’ is given on BL Maps K.Top.49.5.2. ‘Old and New Aberdeen with the adjacent Country’, unsigned although possibly drawn by William Edgar and not dissimilar to Adair’s ‘Mouths of the Rivers Don & Dee, Old and New Aberdeen’ (Admiralty Library Oa 03) surveyed between 1686 and 1698.

⁶⁹⁴ Gough 1780, vol. 2, p. 706.

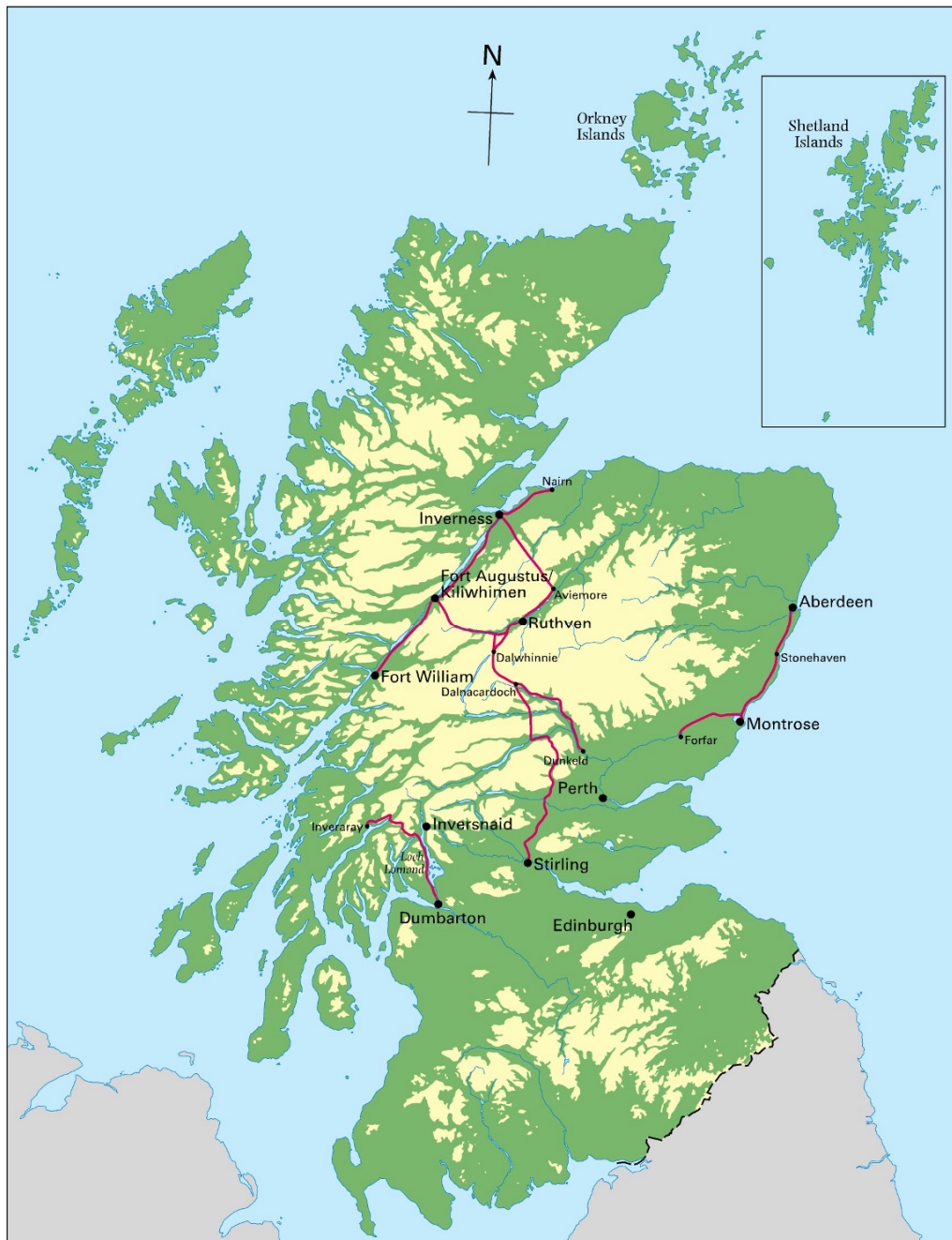


Figure 6.16 Roads mapped by William Edgar in 1746: BL Maps K.Top.48.56. ‘A Map of the Roads of Communication through the Highlands’; Maps K.Top.48.57. [the road between Forfar and Aberdeen]; Maps K.Top.48.59. ‘The Course of The Kings Road making betwixt Dumbarton and Inverary, (so as to Cross no Ferrys)’; Maps K.Top.48.60.a and b. ‘Inverness with The adjacent Country, including Nairn upon the East [...] and the Kings Road to Fort William upon the South-west’.

and military purpose was successful for in September 1745 it was reported that ‘some of [the McDonald] Chiefs stay’d at home [and] were breaking down the Bridges & ruining the

Roads'.⁶⁹⁵ Ironically, as the 'Forty-Five progressed, the Jacobite army benefited by the military roads and the Government troops tried to destroy their own constructions. Intelligence from London disclosed 'an Order from Lord Launsdale for breaking up the Roads &c.&c. doing every Thing yt can retard the Rebels in their March'.⁶⁹⁶

Records of road building

Parties of regular troops were employed in building the roads which were 'render'd both practicable and Convenient for the March of Your Majesty's Forces [...] and facilitate their assembling in one Body, if Occasion should require'.⁶⁹⁷ Between 1726 and 1737, Highland companies constructed 259 miles of road and 40 bridges, mostly on existing tracks, from Fort William and Dunkeld to Inverness, Crieff to Dalnacardoch, and Dalwhinnie to Fort Augustus by the Corrieyairack. In 1740 supervision of road construction devolved to Major William Caulfeild who expected his engineers to be 'thoroughly acquainted with the Country and its several Passes & Rivers' and 'every Season make an exact Plan of the Road carried on under their Inspection'.⁶⁹⁸ By 1767, Caulfeild and his engineers were responsible for building about 608 miles of roads with another 223 miles in progress. These included the roads from Dumbarton to Inveraray, Stirling to Fort William, and Coupar Angus to Fort George at Ardersier by way of Braemar and Tomintoul (see Fig 6.17).⁶⁹⁹

1749 saw a substantial deployment of manpower in the Highlands with official orders for 'carrying on the Roads in North Britain'.⁷⁰⁰ Caulfeild, as Inspector of the New Roads and Bridges in Scotland, was assisted by four engineers—Harry Gordon, James Bramham, George Morrison, and George Campbell—to oversee the men employed in building and in repairing the military roads.⁷⁰¹ One thousand four hundred and thirty workmen were formed from five regiments stationed in Scotland at the time: 300 from each of Guise's Regiment (the Warwicks) stationed in Aberdeen, the Royal Welch Fusiliers in Montrose, Pulteney's (Somersets) in Perth, Sachville's (Lancashire Fusiliers) in Glasgow,

⁶⁹⁵ NRAS 3246, Vol. 34, letter number 41, Hopetoun to Robert Dundas, 2 September 1745.

⁶⁹⁶ NRAS 3246, Vol. 34, letter number 143, Craigie to Robert Dundas younger, 14 December 1745.

⁶⁹⁷ BL Additional Ms King's 101, f. 17, 1726.

⁶⁹⁸ TNA WO 26/21, pp. 359–360, 1749.

⁶⁹⁹ Taylor 1996.

⁷⁰⁰ TNA WO 26/21, pp. 356–366.

⁷⁰¹ TNA WO 47/35, p. 505: 'George Campbell gone to Scotland with Major Cawfield to Survey the Roads'.

and 150 men from Ancram's (South Wales Borders). A further eighty men from the Welch Fusiliers, Sackville's and Ancram's Regiments were to repair existing military roads.⁷⁰²



Figure 6.17 Distribution of William Caulfeild's roads, 1740–1767

The orders for the engineers were specific. Each engineer was given profiles of the roads under their direction which included details on its depth and layered structure of the road and its required breadth. Caulfeild also advised the engineers on 'what weight of water comes down through those Places where Bridges must be made that they may see the same properly made to resist the torrents according to his directions'. Annually, in the winter,

⁷⁰² TNA WO 26/21, p. 356. The orders included directions for paying the troops employed on the King's Roads. For each day working on the roads, Privates were paid 6d each, Drummers 8d each, Subalterns 3s each, and Sergeants 1s each (p. 364).

Caulfeild provided the Board of Ordnance with an account of the work achieved that year. In the report, he specified:

the number of Officers & Men employed on each Road and for what number of Days, together with the length and breadth of work done; the Bridges made, with a particular account of their Expence [sic]; the quantity of powder used in blowing Mines & the expence of Mining with the waste and loss of Tools & Implements in the Service and all other contingencies.

Maps formed an important part of Caulfeild's reports. They could, in one graphic representation, geographically locate the road, describe its linear orientation, give an indication of the topography on either side in case the troops and artillery were forced to march off-road, indicate possible sites of ambush, and show how much of the road was built and by whom. John Archer's survey of the road between Kinlochleven and Fort William, for example, used a key to identify which parts of the road were built by detachments from Colonel Battereau's, General Guise's, and Colonel Rich's Regiments between 1748 and 1750 (see Fig 6.18). The map accompanied 'Major Caulfeild's report of the new Roads made in the Highlands in 1750'.⁷⁰³



Figure 6.18 'A Survey of the Road made by the Detachments of Col. Battereau's, Genl. Guise's, and Col. Rich's Regiments between Fort William & King-Loch Levan, 1748 and 1750', by John Archer, 1750. Maps K.Top.48.66 [a] with a report at Maps K.Top.48.66 [b]. (Courtesy of the Trustees of the British Library)

⁷⁰³ BL Maps K.Top.48.66.b.

With this in mind, the four engineers under Caulfeild's command were to 'endeavour to make themselves thoroughly acquainted with the Country and its several Passes & Rivers' and to provide a description of the landscape represented in writing to accompany 'an exact Plan of the Road carried on under their Inspection and what is wanting to compleat [sic] it'. The plan, to be made at the end of every road-building season (May to September) was to be given 'only to the General Officer Comanding [sic] in North Britain & to the Board of Ordnance'.⁷⁰⁴ These specific instructions both for content and for circulation reflect the value of the maps as state secrets for the eyes of governing authorities alone; they were not concerned with communicating information of general interest.

Harry Gordon's 'Survey of Part of the Road from Sterling [sic] to Fort William', for example, comprised four items.⁷⁰⁵ The first item was a report—Gordon's 'Remarks on the Country between Callender [Callander] and the Head of Loch Lubnegue [Lubnaig], thro' Which the Kings Road was carried'—in which he detailed the topography, including the passes into the Highlands, the hills, lochs and rivers, and vegetation cover:

The Pass itself is only the Breadth of 12 Foot cut thro the Rock for about 40 Yards in one Place, on the right Hand in going N. is a very steep shaggy Hill covered with wild Oaks on the left is a great Precipice at the Foot of which runs the Water of Leny over several Rocks in the Middle forming a beautiful Cascade, on the other side of this, is likewise Steep Rocks which Shelf up to very near the Top of the Hill; all this I have endeavoured to represent in the Plan, to make it more easily conceivable it is done in a sort of Perspective.⁷⁰⁶

The remaining items were maps of this road compiled between 1749 and 1751. The map showing the military road along the Water of Leny and Loch Lubnaig was compiled in 1749 and presented to the Board in January 1750 along with Gordon's remarks (see Fig 6.19 left).⁷⁰⁷ Maps of the continuation of the road northwards, from Loch Dochart at the foot of Ben More, past Crianlarich and Tyndrum, to the Bridge of Orchy and Loch Tulla, were drawn in 1750 and 1751, representing the road work done by five Companies from each of Colonel Bochlan, Buff [Bury?], and Rich's Regiments (see Fig 6.19 right).⁷⁰⁸

⁷⁰⁴ TNA WO 26/21, pp. 358–360.

⁷⁰⁵ TNA MR 1/479 (1) to (3) and (5), with item (4) being a copy of (5).

⁷⁰⁶ TNA MR 1/479 (1), Harry Gordon, 1751.

⁷⁰⁷ TNA MR 1/479 (3). A note on the map explains that the 'Part of the Road stained with yellow was opened last year by the Detachment of Genl Barrels Regiment but gravelled and mended by Sackvilles, as were also several other Parts of the Road to Sterling - likewise 500 yards of new Road was made this year at the Bridge of Kelrie'.

⁷⁰⁸ TNA MR 1/479 (2), (4) and (5).



Figure 6.19 Extracts from ‘A Survey of Part of the Road from Sterling to Fort William’, by Harry Gordon: (left) Water of Leny at 1: 7,200; (right) between Crianlarich and Tyndrum at 1: 14,400. MR 1/479 (3) and (5), respectively. (Courtesy of The National Archives, Kew)

Gordon’s later maps introduced not only more colour but a more dramatic use of perspective to support his remarks of ‘the Steepness of the Hills and many precipices’ the road-builders had to contend with (see Fig 6.20). In general, his style was consistent: roads were coloured buff, rivers and lochs sea-green (verdigris), settlements red (carmine), and hill-shading at least in outline in Indian Ink (brown wash used on later maps). He used stylistic symbols for areas of woodland and parallel hatching for cultivated land which, when in colour, was in yellow with a little red. Gordon favoured the cultivated glens for building roads, not only to avoid steep banks which meant that the roads had to be shored-up, but the river currents were calmer leading to fewer bridges and less chance of flooding so fewer drains across the roads were required. In addition, the valleys were more populated and an army on the march could avail themselves of quarters and supplies. One important detail not shown on Gordon’s maps, and only occasionally mentioned in his report, was mileages to indicate distances between settlements.



Figure 6.20 'Plan of Part of the Road from Perth to Fort George between Braemarr and Corgarff Barracks, made by 4 Companys of Col. Holmes's, 2 of Lord George Beauclerk's, and 1 of Lieut.-Gen. Skelton's Regiments of Foot, in Summer of 1753', by Harry Gordon. Drawn on four sheets stuck together. Maps K.Top.48.74. (Courtesy of the Trustees of the British Library)

One of the distinguishing features of the 1745 Rebellion was the movement undertaken by both armies. The Hanoverian army, under the command of Sir John Cope, was to seek out and destroy the rebel forces before they could march south and before they could be reinforced by other Jacobite clans. Cope and his army marched out of Edinburgh on 18 August 1745. On 20 September, the Hanoverian army reached Prestonpans, to the east of Edinburgh, having marched via Inverness, Banff, and Aberdeen without once engaging the Jacobites. Meanwhile, the Jacobite army, lead by Charles Edward Stuart, set out from Glenfinnan on 21 August (see Fig 7.1 battlefields in Scotland). The armies were on course to meet at the Pass of Corrieyairack—an inhospitable terrain that favoured the Jacobite rather than the rigidly drilled Hanoverian army—but inaccurate intelligence received by both commanders gave rise to strategies that caused the armies to avoid each other. With Cope proceeding north to Inverness, the Jacobites seized the opportunity and headed south, marching via Stirling and Edinburgh, reaching Prestonpans on 20 September and then on to England.⁷¹⁰ The 'Forty-Five was considered a very newsworthy event and several maps were published of the routes taken by both armies. Figure 6.21 is one example, part of a map of Great Britain 'Wherein are delineated the military Operations in that Island during the years 1745 and 1746, and even the next Routs of the Pr after the Battle of Culloden until his Escape to France'.

Until 1746, no known maps were produced of the army on the march, although route itineraries were often specified in written orders. In 1726, for example, Wade ordered two Companies of Colonel Cadogan's Regiment to march from Aberdeen to Inverness, a journey of seventy miles, via the following route (with rests at the 'Discretion of the Commanding Officer'):⁷¹¹

From Aberdeen to Inverary [Inverurie] or Kintore	12 Miles
To Huntley [sic] or Strabogy [Strathbogie]	12
To Keith	6
To Elgin	12
To Forres	8
To Nairn	10
To Inverness	10

Cartographically defined strategies for the army's deployment came into being with the

⁷⁰⁹ TNA MR 1/491, the title to Daniel Paterson's 1746 map

⁷¹⁰ Hook and Ross 1995.

⁷¹¹ BL Additional Ms. 23,671, f. 1, orders given out by Field Marshal George Wade, 9 August 1726.



Figure 6.21 Part of *A General Map of Great Britain*, Alexander Baillie sculp., published in London c.1747. Maps* 1125.(7.) (Courtesy of the Trustees of the British Library)

arrival, in January 1746, of the Duke of Cumberland to take command of the Hanoverian forces in Scotland. The Duke was considered a ‘great military genius’.⁷¹² He was an exponent of military strategy, borne out by the ‘scientific depictions’ of battlefield manoeuvres and deployment of troops preserved in the Cumberland Collection today. Part of this includes maps of Cumberland’s 1746 campaign in Scotland, with representations of three subtypes of eighteenth-century military movement. The first, maps of the order of march (some displaying preliminary battle formations); the second, summaries of the army on the march; and the third, records of encampments.

⁷¹² Walpole, quoted in Charteris, p. 246

On 30 January 1746, Cumberland wrote to the Secretary of State, Thomas Pelham-Holles, first Duke of Newcastle, that the army was to march to the relief of Stirling Castle and would set out the next day from Edinburgh for Linlithgow. Cumberland was familiar with the more mobile strategies practised by the armies in Europe and chose to adopt light infantry tactics in Scotland which

may appear slow and solemn, yet they are so accurate, that no unnecessary time being lost in dressing, or correcting distances, they arrive sooner at their object than any other, immediately form, and at the same instant proceed in perfect order to the attack.⁷¹³

A copy of the army's revised order of battle was enclosed. Cumberland explained his tactical changes: 'I put all the Cavalry in the third Line, because by all accounts the Rebels don't fear that, as they do our Fire, & on that alone I must depend'.⁷¹⁴ Rethinking a battle formation had a direct impact on the order of march.

An order of march had different forms of expression: written or cartographic representation, sometimes both. In the 'Marche Route of the Army under H:R:H: the Duke of Cumberland, from Aberdeen, Old Meldrum & Strathbogie to Inverness', from the 6 to 16 April 1746, each division's itinerary of march was arranged and listed simultaneously, so too were their encampments on a particular day (see Fig 6.22).⁷¹⁵ In other examples, simple pictorial plans were drawn employing rectangular symbols in order to distinguish the different divisions.⁷¹⁶ Such abstractions lacked topographical detail; relative position dominated over form. By the time Cumberland reached the battlefield at Culloden in April 1746, he had perfected an 'Order of March' that could 'swing' straight into battle formation, gaining a time advantage over the Jacobites. A 'Plan of the Battle of Culloden' by [?Henry] Schultz,⁷¹⁷ Cumberland's 'personal draughtsman', shows how Cumberland's army manoeuvred into the predetermined order of battle while still on the march (see Fig 6.23).⁷¹⁸ This map includes rectangular symbols to distinguish the various units, the pecked lines

⁷¹³ Dundas 1788, p. 9.

⁷¹⁴ TNA SP 54/27/55 A, ff. 211–212. A letter from the Duke of Cumberland, enclosing details for the relief of Stirling Castle.

⁷¹⁵ TNA SP 54/30/6 B 'State Papers Scotland, Series II', 5 April 1746.

⁷¹⁶ RLW 730017, a pen, ink and watercolour plan of the 'Order of Marches' before the Battle of Culloden. The paper has been folded [to include in a letter, pouch, pocket?]. Another fair copy at RLW 730018.

⁷¹⁷ Reference is made to the death of a Henry Schultz in TNA WO 47/34 'Minutes, Surveyor-General', f. 295 verso, 17 October 1749, but Yolande Hodson notes that 'The only reference to Schultz as draughtsman is given in *The Court and City Register for the year 1749* London: Printed and sold by J. Barnes *et al.*', and elsewhere he is recorded only as 'Mr Schutz' or 'Mr Schulz' (Hodson 1988, pp. 6 and 12).

⁷¹⁸ RLW 730025 'Plan of the Battle of Collodden' [sic] by [?Henry] Schultz, 1746, showing battle preliminary information.

General maps summarising the march of Cumberland's army in northern Scotland were compiled by Daniel Paterson and constitute post-war records of events.⁷¹⁹ Each shows military details—the site of engagement at Culloden, lines of movement, and encampments—superimposed on a relatively small-scale base map (between one and two miles to an inch). One of Paterson's original maps extends from Cullen in the east to the Isle of Skye in the west,⁷²⁰ presumably covering the period from the 9 or 10 April when the Second, Third, and Fourth Divisions camped at Cullen,⁷²¹ to sometime after 26 May 1746 when Cumberland set up camp at Fort Augustus.⁷²² The map records the encampments (Cullen, Elgin, Alves, Nairn, Inverness, Dores, and Fort Augustus) and Culloden battle lines in colour whilst the topography is drawn in Indian Ink and grey wash. The route between the camps is shown as a road defined by two parallel lines whereas another of Paterson's maps clearly shows the march of the army in four columns.⁷²³ The camps—at Fochabers, Alves between Elgin and Forres, Nairn, and Inverness—on this map are shown forming from and into the four columns of march.

Laying-out encampments was the responsibility of the Quartermaster General; Lieutenant-Colonel David Watson was appointed to this role in Scotland in 1745.⁷²⁴ The Quartermaster General was expected to reconnoitre and report on the suitability of sites for encamping or billeting troops, usually accompanied by a map or sketch of the site and arrangement of the camp. Several maps of the encampments during the 1746 campaign reside in the Cumberland Collection although it is difficult to tell at what stage they were drawn: whether they reflect the planning stage or are records of the camps once they were set up. Certainly none was compiled by Watson nor do they include notes referring to the advantages (or disadvantages) of the chosen sites. William Eyres, a Practitioner Engineer,⁷²⁵ drew large-scale plans of encampments at Cullen (11 April 1746), Speymouth (12 April), Alves (13 April), Nairn (14 April), Dores at the north end of Loch Ness (23 May), and Fort Augustus (26 May).⁷²⁶ All retain the same style: the topography is drawn in Indian Ink and

⁷¹⁹ TNA MR 1/491 (two copies) and RLW 730022: the 'March of the Royal Army' in Scotland.

⁷²⁰ TNA MR 1/491 (1) is likely the original and (2) a later, unfinished copy.

⁷²¹ See Figure 6.7 'Route from Aberdeen to Inverness April 5th 1746', TNA SP 54/30/6 B.

⁷²² RLW 7330047 is a plan of the camp on the 26 May 1746, drawn by William Eyres.

⁷²³ RLW 730022.

⁷²⁴ Watson was appointed Quartermaster to the troops under General Ligonier in November 1745. He was 'a good deal hurried' in marking out camps at various locations at a time when there was 'severe Weather for ye Soldiers, but They say They are to be fortified agst [sic] the Cold by additional Jackets, & some spirits to be carried alongst wt 'em' (NRAS 3246, Vol. 34, letter 96, John Gordon to Robert (Robin) Dundas, 16 November 1745). I am grateful to Rachel Hewitt for directing my attention to these volumes.

⁷²⁵ TNA WO 54/209, pp. 10–12.

⁷²⁶ RLW 730012, 730014, 730015, 730016, 730044, and 730047. An unsigned plan of the camp at Inverness on 6 May 1746 can be found at RLW 730033.

pencil with an occasional river or coastline in buff wash. The formation of the Royal Army encampments is shown as diagonally-dissected rectangles, one half coloured in red ink; for most of the plans, only the Duke's headquarters and the 'Grand Guard' are labelled, the plan of the camp at Cullen also includes text to identify the marches of the first and second columns. Another plan of the camp at Speymouth, by Paterson, shows the 'Rebellis Barracks' west of the Spey which are not included on Eyres' plan.⁷²⁷ Paterson enlarged the detail of the camps at Cullen (see Fig 6.24), Nairn, Inverness, Dores, and Fort Augustus in a series of insets along the base of his map of the 'March of the Royal Army in Scotland'.⁷²⁸ He identified the regiments with coloured ink and labels, and the 'Grand Guards', although the Duke's residence—in Cullen itself—is not marked in this example. Interestingly, the rigid formation of encampments—usually straight parallel lines of regimental units—prior to battle were in marked contrast to post-battle encampments. The encampment at Fort Augustus (see Fig 6.25), for example, was positioned along the River Tarff, designed for a prolonged stay rather than set out in 'battle ready' formation where the army units could effectively march 'in' and 'out' of camp.

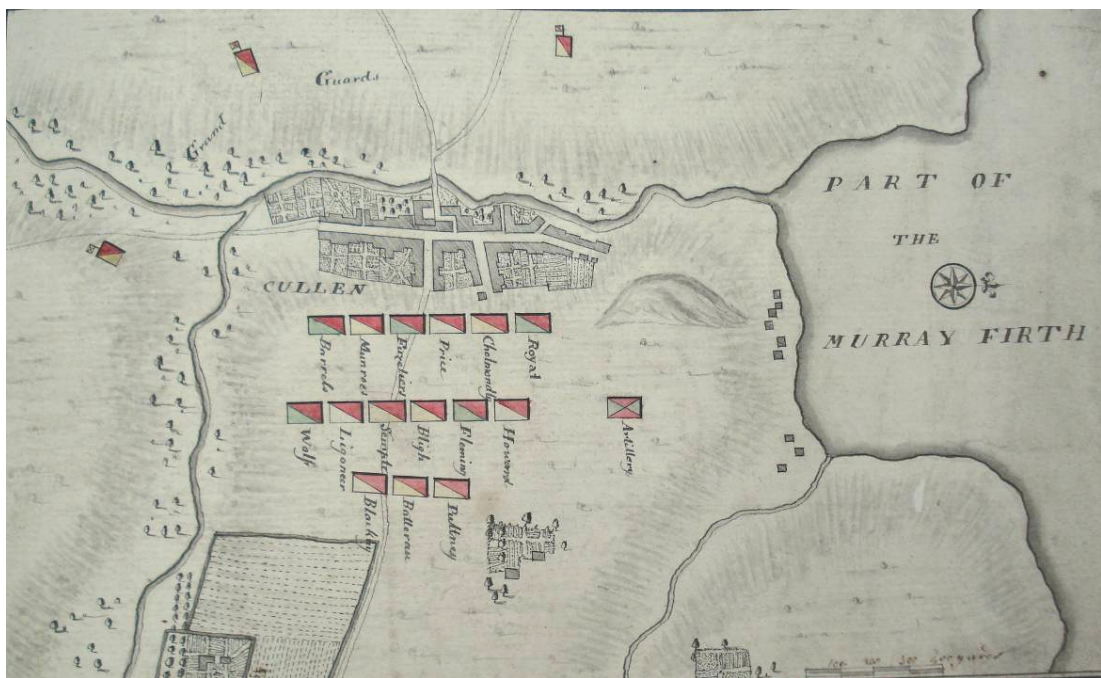


Figure 6.24 An inset of 'an Exact Plan' of the Royal Army Camp at Cullen on 11 April 1746, by Daniel Paterson, part of his map of the 'March of the Royal Army in Scotland [...] and the Country from Cullen to the Isle of Skie'. MR 1/491 (Courtesy of The National Archives, Kew)

⁷²⁷ RLW 730013 for Daniel Paterson's plan; 730012 for William Eyres.

⁷²⁸ TNA MR 1/491 (two copies).

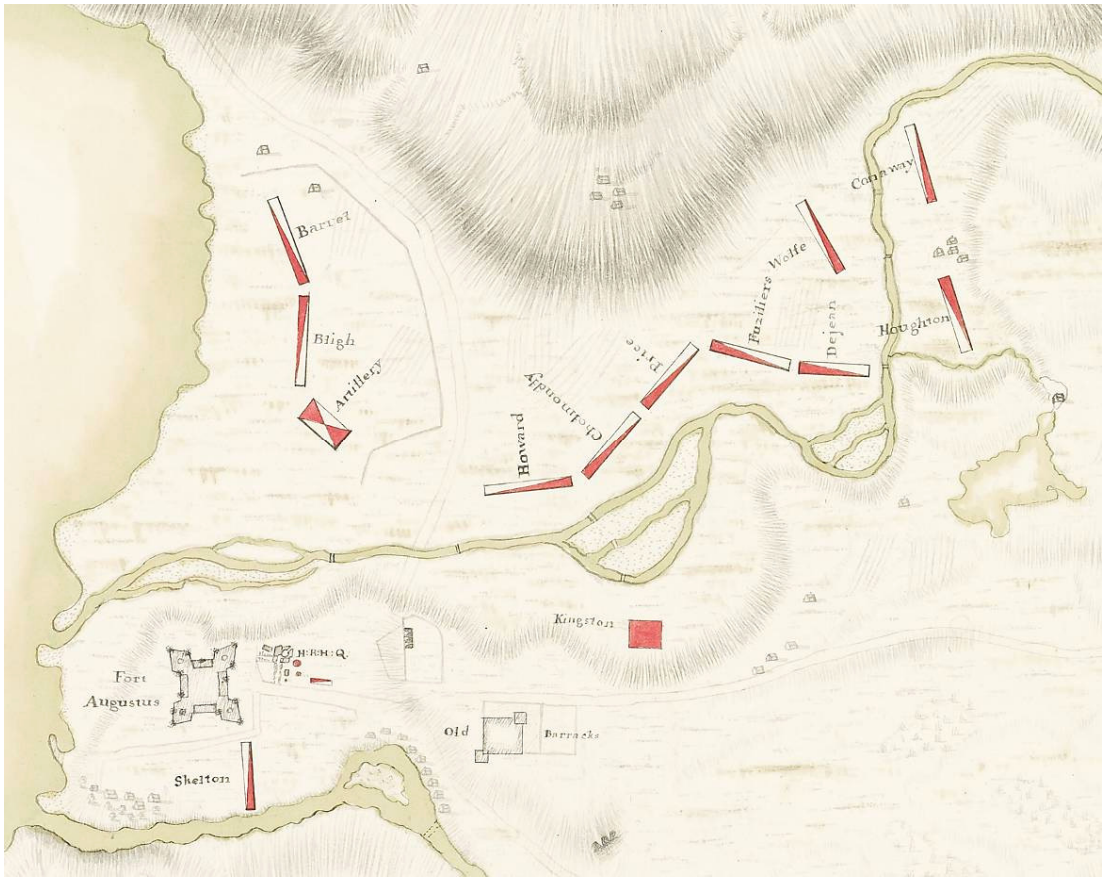


Figure 6.25 An extract from the ‘Plan of the Camp at Fort Augustus’, by William Eyres, 1746. 730047 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II)

The ‘King’s Roads’ were planned, built, and mapped for strategic reasons. The concern to establish a road network was, initially at least, for military reasons, for the movement of infantry, artillery, munitions, and stores. Politically, the roads were a means of access, the maps a means of imagining and depicting access from afar in order to impose military order. Their continued strategic purpose was highlighted in 1808 when military contingencies were being drawn to counter a Napoleonic invasion. The military concern was to redeploy troops from Inverness and Fort George at Ardersier to the south of Scotland and to consider strategies for concentrating the forces in the north to protect the Moray Firth.

Brigadier General Dirom, Deputy Quarter-Master General in North Britain at the time, wrote a report ‘relative to the Routes by which Troops may march’.⁷²⁹ To accompany the report was a map of the routes—‘enlarged and considerably improved by Major Johnston [Assistant QMG], who has taken great pains to make it correct and satisfactory’.⁷³⁰

Unfortunately, the map appears to be lost but the report gives a clear indication of what

⁷²⁹ TNA WO 30/61, f. 1 of the report, 14 June 1808.

⁷³⁰ TNA WO 30/61, doc. 22, letter to accompany the report, 5 October 1808.

would have been shown. Three routes—‘distinct and separate from each other’—by which to travel south were identified. The first was the ‘principal Military Road leading through the Center [sic] of the Highlands’, from Inverness and Fort George by way of Aviemore and Dalnacardoch and thence to Perth, Stirling, or to Glasgow. The planned route was by way of Wade’s military roads, at least as far as Perth and Stirling. The second route was by another of the military roads, from Inverness and Fort George to Grantown, Braemar and thence to Perth: one of Caulfeild’s military roads. The third route, ‘through a much lower part of the Country’, was by way of Nairn, Fochabers, and Huntly to Aberdeen; in parts, Caulfeild’s military road. In conclusion to his report, Dirom stated that ‘With regard to the resources and improvement of Scotland, it may be satisfactory to state, that troops may now march conveniently through many parts of the Country’.⁷³¹ The roads had been considerably improved since Wade and Caulfeild’s time but, this aside, their strategic vision and meticulous planning of routes to open up the Highlands cannot be denied.

‘Military’ Topographical Maps

Until 1746, topographical maps in the Board’s possession were either concentrated around fortifications,⁷³² or were small-scale representations of the country as a whole.⁷³³ In the ‘King’s Library’, however, the extensive geographical collection dating from the mid-sixteenth century included—in addition to manuscript and printed maps and views, and military plans and maritime charts—‘topographical ephemera’.⁷³⁴ Incorporated in this

⁷³¹ TNA WO 30/61, ff. 1–39 with an appendix: ‘Recapilulation [sic] of Routes from Inverness and Fort George to the Soutehr Part of Scotland’.

⁷³² For example, NLS MS 1646 Z.02/24a, NLS MS 1647 Z.02/76a–c and BL K.Top.50.6.a. ‘A General Survey of Inverness, & the Country adjacent to the Foot of Loch-Ness’ by John Henri Bastide in 1725 at a scale of 1: 18,000 (1,500 feet to an inch).

⁷³³ See, for example, figure 5.2 NLS Acc.11104. Map Rol.a.42 and BLK.Top.48.12: Clement Lemprière’s 1731 map ‘A Description of the Highlands of Scotland. The Situation of the several Clans and the Number of Men able to bear Arms, as also ye Forts [Fort William, Fort Augustus, and Fort George] lately Erected and Roads of Communication or Military Ways carried on by his Majesty’s command, with the Seats of the most considerable Nobility in the Low Country’, at a scale of 1: 411,840 (6.5 miles to an inch).

⁷³⁴ Barber 2005, p. 263. The King’s Library was built-up by George III during the sixty years of his reign (1760–1820) and has been described as ‘one of the finest libraries ever created by one man’ (Miller 1973, p. 125). It was presented to the British Museum by his son and successor, George IV, as ‘a gift to the British Nation’ and transferred there in 1828. The King’s Geographical and Topographical collections became the principal foundations of the British Library’s map collections, today known as the King’s Topographical Collection. The Collection consists of about 50,000 items including atlases, maps, plans, and views, printed and manuscript (BL King George III Topographical and Maritime Collections <http://www.bl.uk/reshelp/findhelprestype/maps/kinggeorgeiii/kinggeorgetopocols.html>). Around 40% of the collection relates to the British Isles, of which Scotland makes up less than 10% (these

category were manuscript maps of the lowlands of Scotland by John Adair and William Edgar, and printed maps of North Britain by John Elphinstone with manuscript additions showing the routes taken and posts occupied by the King's Army. Both Edgar and Elphinstone's maps were based on some of Adair's seventeenth-century surveys. The collection also includes what has been described as 'one of the most important, early and outstanding cartographic statements about Scotland', the Military Survey of Scotland.⁷³⁵

Adair was commissioned by the Scottish Privy Council in 1681 to complete a series of 'County Maps of Scotland'.⁷³⁶ The intention was for his maps to be engraved and published but progress was slow and many of his surveys remained in manuscript. The trail of Adair's surviving manuscripts is not always clear. Consequently, knowledge of their contemporary use is limited; the extent to which the Board of Ordnance referred to Adair's maps, as with his charts, remains open to conjecture. After his death, his widow Jean disposed of many of his manuscripts and, whilst some were acquired by engravers such as Richard Cooper, in 1723 thirty-nine printed and manuscript maps were delivered to the Barons of the Edinburgh Exchequer Office with claims that these were the complete record of Adair's works left to her.⁷³⁷ In April 1764, however, one of Adair's sons was 'desired' by the Board of Ordnance to return the 'Surveys of Scotland [...] in his possession [...] being the property of the Crown and Ordered to be lodged in the Office of Ordnance'.⁷³⁸ Today, Adair's maps and charts can be found preserved in the map collections of the National Library of Scotland, the Bodleian Library, the British Library, the Admiralty Library, Glasgow University Library, Edinburgh University Library, and the Advocates' Library in Edinburgh.⁷³⁹

percentages are very approximate, based on the number of guard volumes and their average thickness). The manuscript military maps and plans of Scotland within this geographical section number c.215. The King's practice of retaining important eighteenth-century maps and plans referred to him by the Board of Ordnance is demonstrated less by maps of Scotland than those of the colonies and Europe. See Skelton 1956; Wallis 1973; Barber 1990, 2003 and 2005.

⁷³⁵ Whittington 1986, p. 18.

⁷³⁶ Inglis 1918; Moir 1973

⁷³⁷ Robinson 1959; Moore 1985.

⁷³⁸ TNA 47/63, p. 245, 11 April 1764.

⁷³⁹ Cash 1907 provides a bibliography of twelve of Adair's manuscript topographical surveys which were deposited in the Sibbald archive along with the Pont and Gordon manuscript maps in 1723. The maps can be viewed at NLS Adv.MS.72.2.11 and online at <http://www.nls.uk/maps/mapmakers/adair.html> and <http://www.chartingthenation.lib.ed.ac.uk>. Also see Robinson 1959; Moore 1985.

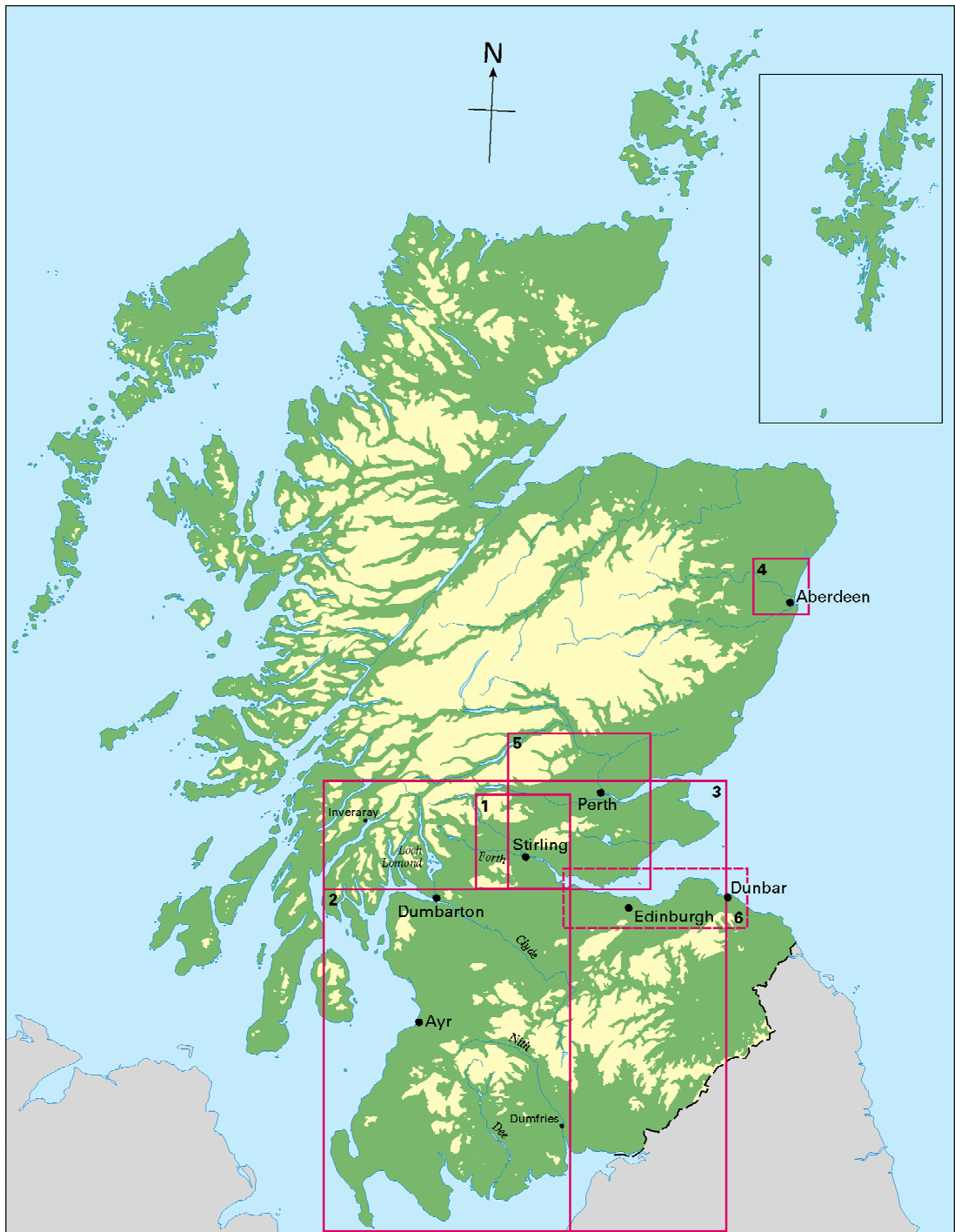


Figure 6.26 Graphic index of John Adair's surviving county maps of Scotland, c.1685–1700. (1) BL Maps K.Top.48.44 (year: 1685); (2) Maps K.Top.48.43 (1686; believed to be a copy of Pont's 'Galloway')⁷⁴⁰; (3) Maps K.Top.48.42 (1690); (4) Admiralty Library Oa 03 [12 and 13] (c.1686–1698); (5) BL Maps K.Top.50.70 (1700); (6) Maps K.Top.48.48.a and b published with 'improvements' (1745).

⁷⁴⁰ Moir 1973.

Four of Adair's manuscript maps of Scotland's counties, drawn between 1685 and about 1700, form part of the King's Topographic Collection at the British Library.⁷⁴¹ Two more charts of the Rivers Don and Dee in Aberdeenshire are in the Admiralty Library collection, the sheets covering the country in the vicinity of Aberdeen.⁷⁴² Figure 6.26 provides a graphic index of the coverage of these maps. Although the sheet lines imply a considerable overlap, this was generally not reflected in Adair's maps; usually most of the detail stopped at the boundaries of the counties given in the map's title, with only the coastline and sometimes the major rivers continuing into adjoining areas. The main exception to this was Adair's 1690 'Map of the South part of Scotland containing the Rivers Clyde, Forth, &c.' (sheet 3) which included detail from all the maps of the counties in the southern lowlands of Scotland on a large sheet (595 x 480 mm) but, at a scale of about 1: 275,000, more generalised than the remaining large-scale maps (with scales between 1: 42,240 and 1: 253,440).⁷⁴³ The borders of this map are marked with longitudinal and latitudinal gradations with divisions for every one minute and a grid covering the whole sheet for every 5 minutes. The 'Map of Strathearn, Stormount, and Carse of Gourie, with the Country about Stirling' (sheet 5)⁷⁴⁴ appears to be unfinished but otherwise Adair's maps provided general geographic information of use to a mobile army: roads and bridges for access; settlements for lodging the troops (especially for officers anxious about their comfort) or topography for encampments; forests for firewood; and cultivated areas, lakes and tributaries for ensuring the army was well provisioned whilst on campaign.

Were Adair's maps, therefore, of use to military commanders in Scotland? Wade may have found them so when considering 'the better Quartering His Majesty's Infantry in the Low Country of Scotland, as well as to secure them against the Insults of the Populace in times of a general Dissatisfaction'. He explained that

The Regiment whose Station is in the South-west part of Scotland may have their head Quarters at Glasgow in a Barrack capable of containing 5 Companys: And the other five may be sent severally to Air [sic], Irwin, Hamilton, Dunbarton or any other adjacent Towns for the Protection and Support of the Officers of His Majesties Revenue and may be able in a short time as Occasion may require to March and joyn the Regiment at their head Quarters. The same thing may be done at Edinburgh, Perth or Dundee.⁷⁴⁵

⁷⁴¹ BL Maps K.Top.48.42, K.Top.48.43, K.Top.48.44, K.Top.50.70, and K.Top.48.65 ('High & Low Roads').

⁷⁴² Admiralty Library Oa 03 [sheets 12 and 13].

⁷⁴³ BL Maps K.Top.48.42.

⁷⁴⁴ BL Maps K.Top.50.70 at a scale of 1: 50,688.

⁷⁴⁵ BL Additional Ms. King's 101, ff. 21–22, 31 January 1726.

Arguably, Adair's maps of route ways and settlements in the Lowlands did have a value for military purposes, but the lack of corresponding maps for the Highlands created a rationale for new military topographical mapping.



Figure 6.27 'A Map of The Firth and River FORTH, with Part of The Shires of Lothian Survey'd by Mr John Adair F.R.S. And Tweeddale and Eterick-Forrest Survey'd by Will. Edgar' in 1740. Maps K.Top.48.45. (Courtesy of the Trustees of the British Library)

In the 1740s, Adair's topographical surveys formed the basis of several maps created for and used by the state and commanders of the Hanoverian forces in Scotland. William Edgar, a county surveyor and self-described architect, first compiled a map that combined Adair's survey of 'The Firth and River Forth, with Part of The Shires of Lothian', with his own survey of 'Tweeddale and Eterick-Forrest' (see Fig 6.27 and Fig 6.28 sheet 1).⁷⁴⁶ Edgar's alignment of roads, along with the delineations of physical features and villages, were more sketched than precisely surveyed.⁷⁴⁷ In 1743, Edgar compiled two further maps in the style of Adair. The first, 'A New and Correct Map Of Loch-Lomund, with the Country Circumjacent' was constructed because 'the Maps of the Shires of Scotland composed by Hermon Moll are not only deficient but vastly Erroneous in most places'.⁷⁴⁸ The second, 'A [...] Map of Stirling-Shire and Clackmannan-Shire',⁷⁴⁹ was possibly based on Adair's 'accurate and particular survey' of Clackmannan-shire and part of Stirlingshire which he had presented to the Privy Council as a 'specimen' of his proposed county maps.⁷⁵⁰

Figure 6.28 is a graphic index of Edgar's topographic surveys of the shires that form part of the King's Topographic Collection. Included in the diagram are sheet lines for three unfinished, unsigned maps of Argyllshire; two can possibly be attributed to Edgar based on similarities in hand-writing styles.⁷⁵¹ The third, the country between Loch Fyne and Loch Lomond,⁷⁵² has no type with which to compare it, and the land height, rather than shown in Edgar's (and Adair's) characteristic 'hillock' style, is represented by hachured lines drawn in plan. As all these topographic sheet lines suggest, Edgar's surveys did little to extend Adair's work into the parts of the Highlands considered by Government to be the principal regions of 'Anarchy and Confusion'.⁷⁵³

In 1744, John Elphinstone entered the Military Branch of the Office of Ordnance as a Practitioner Engineer.⁷⁵⁴ Although later responsible for a number of picturesque views of

⁷⁴⁶ BL Maps K.Top.48.45.

⁷⁴⁷ Moir 1973. William Edgar produces several maps in 1745 and 1746 showing 'The Course of The Kings Road' (BL Maps K.Top.48.59) and 'Roads of Communication through the Highlands' (BL Maps K.Top.48.56).

⁷⁴⁸ BL Maps K.Top.48.47. A reduced copy is at Maps K.Top.48.59. Hermann Moll and John Adair were well known to each other, Moll having engraved some of Adair's maps. Moll did not incorporate all of Adair's surveys in his map of *The North Part of Great Britain* published in 1714, the focus of Edgar's criticism (Robinson 1959).

⁷⁴⁹ BL Maps K.Top.50.93.1.

⁷⁵⁰ Gough 1780, vol. 2, p. 660.

⁷⁵¹ BL Maps K.Top.49.26 and Maps K.Top.49.27. Both drawn in Indian Ink with a pencil grid, showing the blue line and some named settlements only.

⁷⁵² BL Maps K.Top.48.46.

⁷⁵³ BL Additional Ms King's 100, f. 10, 1724.

⁷⁵⁴ TNA WO 54/209, pp. 10–12, provides a list of the Military Establishment and their pay as of March 1745 which is the first time the Honourable John Elphinstone's name appears. He was paid £54 15s 0d per annum. By 1748, Elphinstone had been promoted to Sub Engineer on a salary of £73 (TNA

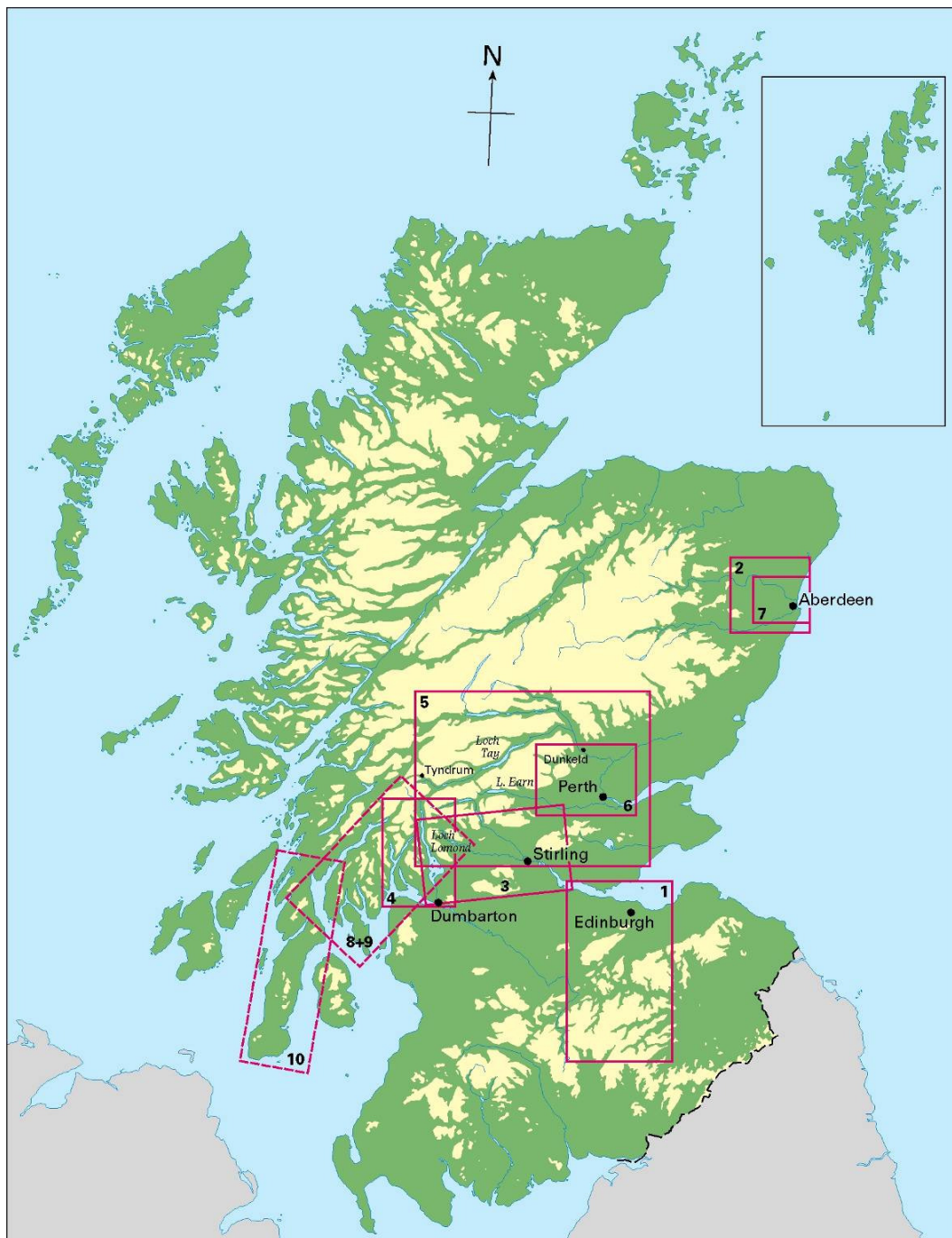


Figure 6.28 Graphic index of William Edgar's county maps of Scotland, 1740–1746. (1) BL Maps K.Top.48.45; (2) Maps K.Top.49.5.1; (3) Maps K.Top.50.93.1; (4) Maps K.Top.48.47; (5) Maps K.Top.50.69; (6) Maps K.Top.50.72.1; (7) Maps K.Top.49.5.2. Unsigned and unfinished (shown with pecked sheet lines): (8) Maps K.Top.48.46; (9) Maps K.Top.49.26; (10) Maps K.Top.49.27.

WO 54/210, pp. 21–25), and was next in line for a promotion to Engineer Extraordinary in 1752 (TNA WO 54/211, pp. 25–29).

Scottish castles and fortresses,⁷⁵⁵ Elphinstone was first acknowledged for providing a ‘considerable improvement in the map of Scotland’.⁷⁵⁶ Gough described Elphinstone’s *New and Correct Mercator’s Map of North Britain* (see Fig 6.29) as the ‘first attempt to settle the geography of Scotland’.⁷⁵⁷ The map—‘carefully laid down from the Latest Surveys and Most approved Observations’—included, amongst others, reference to Adair’s charts of the east coast from Berwick to Aberdeen, the Clyde and south-west Scotland, and Edgar’s map of Peebles-shire and manuscript maps of small parts of the Highlands.⁷⁵⁸ There was, however, contemporary criticism of Elphinstone’s map. Thomas Jefferys considered that although ‘The projection of a land map should certainly be drawn according to the gradual declension of the meridians’, Elphinstone’s map ‘being made on Mercator’s projection, which was designed merely for sea charts, the whole surface of Scotland is distorted, and the geography needlessly confounded’.⁷⁵⁹ In spite of misrepresenting the Great Glen as bent when it was known to be straight,⁷⁶⁰ Moir notes that ‘the map is more accurate than the criticisms suggest; the longitude is generally a degree too far east, [...] not an unusual error at that time; latitude on the other hand is remarkably accurate’.⁷⁶¹

Events during and just after the 1745 Jacobite Rebellion were to make the British Government acutely sensible of ‘the daily want of proper maps of North Britain’.⁷⁶² In a letter of December 1745, General Hawley, on his way to take command of the Government troops in Scotland, wrote: ‘I am going in the dark; for Marechal Wade won’t let me have his map; he says that his majesty has the only one to fellow it. I could wish it was either copied or printed, or that his majesty could please lend it to me’.⁷⁶³ The map Hawley alludes to may be Lemprière’s 1731 ‘A Description of the Highlands of Scotland’ (see Fig 4.3), of which

⁷⁵⁵ For example the perspective views of Glamis Castle (BL Maps K.Top.49.23.a.2–6) dedicated to the Duke of Cumberland with an elaborate frontispiece cartouche (BL Maps K.Top.23.a.1)

⁷⁵⁶ Moir 1973, p. 86.

⁷⁵⁷ Gough 1780, vol.2, p. 586.

⁷⁵⁸ There are several copies of this map which include manuscript additions detailing the military manoeuvres of the Hanoverian Army in Scotland at the time of the 1745 Jacobite Rebellion: BL Maps K.Top.48.17–21 and TNA MPF 1/247 (on the verso of this sheet, a note: ‘in the Earl of Albemarle’s of Sept. 1. 1746’). Adair and Edgar are identified from a note on the map: ‘As the Geography of this map differs greatly from all others hitherto published; it’s necessary to observe that the Authorities for the Alterations are Mr. Adair, Sr. Alexr. Murray of Stanhope, Captn. Bruce, Willm Edgar, Alexr Bryce, and Murdoch Mackenzie, &c., so that it must be as correct as possible till a New Survey of the Whole is made’.

⁷⁵⁹ Gough 1780, vol. 2, p. 586.

⁷⁶⁰ George Wade’s map of Scotland—NLS Acc.10497 Wade.58a—shows the Great Glen as a straight line, as does Clement Lemprière’s 1731 map of ‘A Description of the Highlands of Scotland’ (see Fig 4.3), BL Maps K.Top.48.12. and NLS Acc.11104. Map Rol.a.42, which was compiled from information collected by Wade during his reconnaissance of the Highlands in 1724.

⁷⁶¹ Moir 1973, p. 87.

⁷⁶² Quoted in Hewitt (forthcoming)

⁷⁶³ Quoted in Moir 1973, p. 104.



Figure 6.29 *A New & Correct Mercator's Map of North Britain*, by John Elphinstone, in 1745. Scale c.1: 850,000. Maps K.Top.48.18. (Courtesy of The British Library)

there were two copies.⁷⁶⁴ Another letter, this time from Andrew Mitchell, under-Secretary of State for Scotland, to Robert (Robin) Dundas, third Lord Arniston and Solicitor General for Scotland, dated 7 November 1745, provides further proof that maps for military purpose

⁷⁶⁴ BL Maps K.Top.48.12. and NLS Acc.11104. Map Rol.a.42.

were in limited supply: 'I have procured a copy of a map of the Lothians which will be published in a day or two, if you think proper to give it to General Handyside as a present from yourself I fancy he will like it, as the Geography of our Country is very little known'.⁷⁶⁵ He may have been referring to John Adair's map of the Lothians (see Fig 6.26 sheet 6).⁷⁶⁶ Printed in 1745 'With some improvements by a Gentleman', the map includes the south-bound marches and encampments of the Jacobite army in the lead up to the Battle of Prestonpans on 21 September 1745.⁷⁶⁷

One map used by officers of both armies during the rebellion was Elphinstone's aforementioned *Mercator's Map of North Britain* (see Fig 6.29).⁷⁶⁸ Lieutenant-Colonel David Watson, Quartermaster-General to the army in Scotland, was responsible for billeting the troops and used the map of North Britain to mark the 'posts proposed to be occupied by the regular troops in the Highlands [...] with the particular Districts of Each Command'.⁷⁶⁹ Copies were variously annotated to show the routes of military roads and locations of camps, barracks and defensive posts: 'Red, Quarters of the Marching Regiments & Dragoons; Green, Quarters of Ld. Lowdons Highlanders & Ld. John Murrays Additional Companys' (see Fig 6.30).⁷⁷⁰ But the map, at a scale of approximately 1: 850,000 (13 miles to an inch), was really too small-scale to provide the topographical detail necessary for tactical and ordnance decisions required of a military map. The lack, however, of a detailed map of Scotland—a military topographical survey—meant that Elphinstone's map was regularly used by army commanders until at least 1750.⁷⁷¹

Elphinstone's map served another purpose in the aftermath of the uprisings: as a post-war record of events that commemorated Hanoverian victories and saw the marginalisation and aesthetic subjugation of rebellious Scots. The new version of Elphinstone's map was dedicated to the Earl of Albemarle who succeeded the Duke of Cumberland as Commander-in-Chief of the forces in Scotland in 1746.⁷⁷² Albemarle was, by all accounts, reluctant to take the command and to stay in Scotland: it was 'this cursed

⁷⁶⁵ NRAS 3246, Vol. 34, f.79.

⁷⁶⁶ BL Maps K.Top.48.48.a. and b, the latter with manuscript additions. Dedicated to the Earl of Stair, it was a memorial map with no evidentiary record that it was used by Cumberland to plan his route for the relief of Stirling Castle in January 1746.

⁷⁶⁷ John Elphinstone may be responsible for the 'improvements'; in 1744 he published *A New and Correct map of the Lothians from Mr. Adair's observations* (see NLS EMS.s.738(8)).

⁷⁶⁸ BL Maps K.Top.48.17–21; TNA MPF 1/247.

⁷⁶⁹ BL Maps K.Top.48.18. and Maps K.Top.48.19. David Watson was Deputy Quartermaster General of the British Ordnance.

⁷⁷⁰ TNA MPF 1/247.

⁷⁷¹ BL Maps K.Top.48.18 with an 'explanation of the posts proposed to be occupied by regular troops in the Highlands in Summer 1750'.

⁷⁷² BL Maps K.Top.48.22. *A New Map of North Britain*.

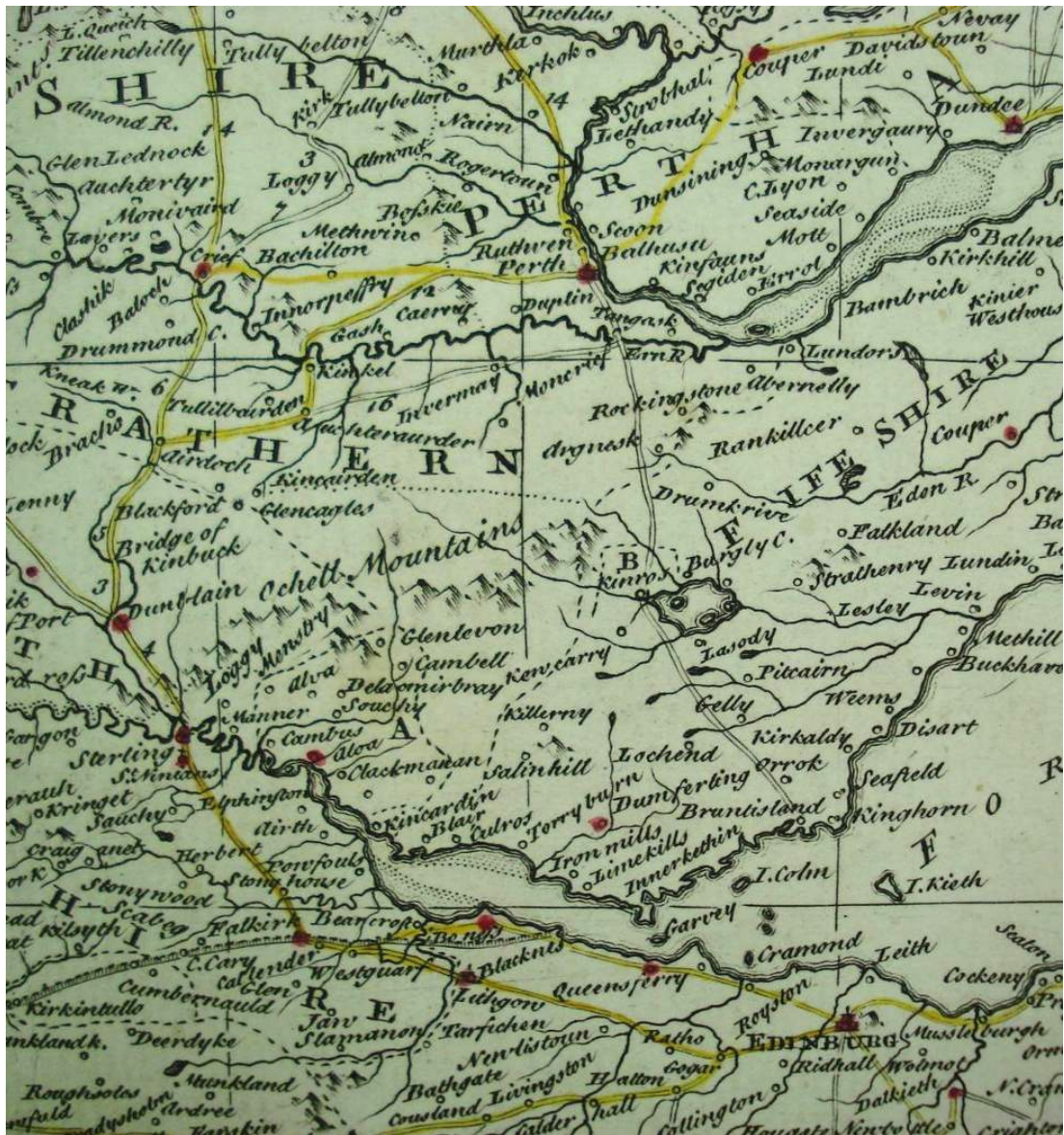


Figure 6.30 Military roads and camps marked on *A New & Correct Mercator's Map of North Britain*, by John Elphinstone, in 1745. Scale c.1: 850,000. MPF 1/247 (Courtesy of The National Archives, Kew)

country' in almost every letter he wrote.⁷⁷³ Prebble wrote: 'On the whole he behaved with tact and judgement but his views on what should be done to suppress the rebellious spirit of the Scots were conventional and matched his general disapproval of the country'.⁷⁷⁴ Such

⁷⁷³ Prebble 1961, p. 242. Although Albemarle was unhappy at being in Scotland, others were pleased about his command. David Watson wrote to Robert (Robin) Dundas: 'Ld Albemarle is to Command which gives me infinite Joy because I am perfectly satisfyd [sic] he will most punctually obey HRH [the Duke of Cumberland's] commands, viz to proceed always in the way he has begun' (NRAS 3246, Vol. 35, letter 34, Fort Augustus, July 1746).

⁷⁷⁴ Prebble 1961, p. 242.

conventions included carrying forward Cumberland’s plan of pacification with repairs to fortifications and new road building.

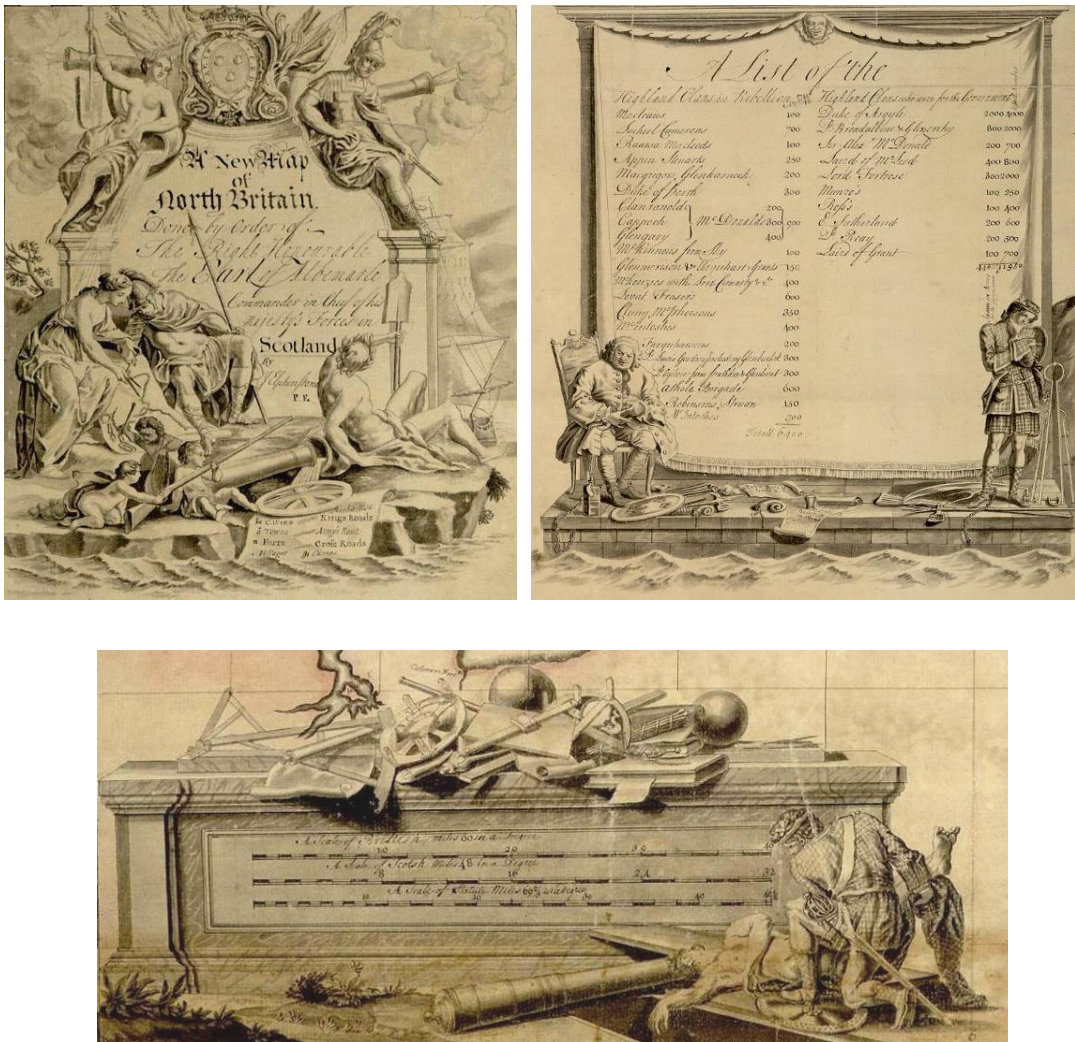


Figure 6.31 Marginal scenes from ‘A New Map of North Britain Done by Order of The Right Honourable the Earl of Albemarle Commander in Chief of his Majesty’s Forces in Scotland’, by John Elphinstone Practitioner Engineer, 1746, at a scale of c.1: 380,160. (Top left) title cartouche, (top right) list of the Highland Clans for and against Government, and (bottom) scale. Maps K.Top.48.22. (Courtesy of The British Library)

In the top left of the new map, a decorative title cartouche (see Fig 6.31 top left) depicting a conjunction of maps and military—a Roman soldier referring to a map, its legend listing the King’s roads and the army’s routes, a pair of dividers, shovels, and military arms—precedes inset views of Edinburgh, Stirling, Dumbarton and Blackness Castles. During the Jacobites’ march south in 1745, the towns of Edinburgh and Stirling fell to the rebels but the castles, garrisoned by Hanoverian troops, held out. Other insets include the road over the Corrieairack Pass, a feat of Hanoverian engineering but used to effect by the

Jacobites in their surge southwards, and a plan of the Battle of Culloden. Albemarle's aspiration of bringing the leaders of the rebellious clans to Hanoverian justice is reflected in the chained figure of a Highland nobleman (possibly Lord George Murray) at the base of a list of Clans for and against Government in the 'Forty-Five; his 'disapproval of the country' reflected by the chained figure of Lord Lovat alongside (see Fig 6.31 top right). The original image of Simon, Lord Lovat was both designed and engraved by William Hogarth who etched Lovat's portrait on his way to trial and eventual execution, and it is this image that Elphinstone has copied for Albemarle's map.⁷⁷⁵ Knowing what awaits him, Lovat is busy at work upon his memoirs. Hogarth has drawn him in the attitude of 'enumerating by his fingers, the rebel forces—"such a general had so many men," &c'.⁷⁷⁶ The map's scale is depicted on the side of a tomb on top of which is a jumble of surveying equipment and cannonballs, and below a Highland warrior burying a comrade (see Fig 6.31 bottom). At a relatively small-scale of c.1: 380,160 (6 miles to an inch), the map remained a summary of events rather than an authoritative tool in the prosecution of military action.

As Harley pointed out, 'much military topographical surveying in the mid-eighteenth century was inspired by hindsight—after events had demonstrated how better maps would have been useful in a particular campaign'.⁷⁷⁷ This was certainly the case in Scotland in the wake of the 1745 rebellion. General Hawley was not the only commander to find himself 'in the dark' for the paucity of adequate maps of Scotland. The Duke of Cumberland and the Generals under his command had also found themselves 'greatly embarrassed [sic] for the want of a proper Survey of the Country' during the campaign of 1746.⁷⁷⁸ After the Battle of Culloden, John Campbell, fourth Earl of Loudoun, was actively involved in Hanoverian punitive operations in the Highlands. Charged with the task of hunting down rebels in Inverness-shire, Campbell's only topographical reference was to relevant pages in a well-worn copy of Blaeu's 1654 *Theatrum orbis terrarum sive Atlas novus*.⁷⁷⁹

⁷⁷⁵ Simon Fraser, Lord Lovat (1667–1747) was described as a 'rogue's rogue'. As a young man he had fought for King William and Mary but betrayed their cause and was outlawed for high treason in 1698. Several years later he secured his cousin's wealth and estate by brutally abducting and marrying his widow, for which he was again outlawed in 1701. During the following decades, Lord Lovat participated in various revolutions and was engaged in spying, espionage, and counter-espionage. Frequently, it was doubtful whose side he was on. At Culloden, his allegiance was for the exiled House of Stuart and after the defeat at the Battle of Culloden he was captured, taken to London, tried, found guilty and sentenced to death in the spring of 1747. He was the last man in England to be beheaded.

⁷⁷⁶ Hogarth 1833, p. 219.

⁷⁷⁷ Harley 1978, p. 25.

⁷⁷⁸ NAS RH1/2/511, f. 10: a *Memorial* written by John Watson, brother of David Watson (QMG), in about 1770, elaborating on the military situation.

⁷⁷⁹ Mallett 1987, from Campbell's personal correspondence.

A military survey of Scotland was first conceived by the Quartermaster-General, David Watson.⁷⁸⁰ This role required Watson to supply the Duke and his Generals with geographical information of Scotland for their planning of the systematic suppression of Jacobite loyalists and establishing a military strategy for enforcing the rule of law. In order to properly fulfil this duty, Watson had to know Scotland and suggested the military survey as a means by which the country could be ‘thoroughly explored and laid open’.⁷⁸¹ Watson was employed as Chief Director of the survey between 1747 and 1755, and William Roy, then his assistant, its principal surveyor.⁷⁸²

Although proposed as a military survey with the backing of Government, in its production, it was poorly supported by the Board of Ordnance—both financially and with personnel. Watson wrote in June 1748 how ‘the Surveying Scheme, [...] has given me Infinite Pain’.⁷⁸³ On the same day, Charles Bush, an ‘Under Minister’ to the Board of Ordnance, informed William Skinner, Director of Engineers in North Britain, that ‘the Number of Engineers and others intended to have been employ’d under Lt Col. Watson in Surveying the Highlands south of the Chain, [was] being reduced’.⁷⁸⁴ For the first two years, Roy worked alone on the Survey.⁷⁸⁵ In 1749, John Manson, recently promoted from the Drawing Room to Practitioner Engineer, assisted him.⁷⁸⁶ The following year, in 1750, Colonel Napier, *Aide-de-Camp* to the Duke of Cumberland, informed Sir John Ligonier, Lieutenant-General of the Ordnance, of ‘His Royal Highness having consented to Lieutenant Colonel Watson’s having three more Assistants in the Survey he is making of Scotland’. The three junior engineers, recent graduates of the Royal Military Academy rather than highly experienced engineers were Hugh Debbeig, a Practitioner Engineer employed the previous year in surveying the proposed road from Newcastle to Carlisle, and John Williams and

⁷⁸⁰ Roy 1785.

⁷⁸¹ Roy 1785, p. 386. According to Smith 1779, image 225, ‘a quarter-master general ‘should be a man of great judgement and experience, and well skilled in geography : [...] he should know the country perfectly well, with its rivers, plains, marshes, woods, mountains, defiles, passages, &c. even to the smallest brook’.

⁷⁸² Roy 1785; Hodson 2007.

⁷⁸³ BL Additional Ms. 17499, pp. 130–131: a letter from David Watson to William Skinner, 7 June 1748.

⁷⁸⁴ BL Additional Ms. 17499, p. 132: a letter from Charles Bush to William Skinner, 7 June 1748. Major William Floyer, based in Edinburgh, was to have been employed on the Survey but was instead sent as an overseer of works at Fort Augustus (TNA WO 47/34, f. 61).

⁷⁸⁵ Watson was busy elsewhere in Scotland, assisting General William Skinner with rebuilding the Government fortifications destroyed during the 1745 Rebellion (BL Additional Ms. 17499).

⁷⁸⁶ TNA WO 47/34, f. 457 verso, 8 December 1749: John Manson’s ‘Memorial’ in application for a ‘Vacancy on the Home Establishment of a Practitioner Engineer’.

William Dundas, both cadets attending to John Muller at the Academy.⁷⁸⁷ A month later, [Thomas] Howse left the Academy to join the Survey and, in 1752, David Dundas, at the age of fifteen, was also employed as an assistant surveyor in Scotland.⁷⁸⁸

The Survey was conducted in two parts. The north of Scotland, including the Highlands, was surveyed between 1747 and 1752 and resulted in a ‘protracted copy’ and a ‘fair copy’ of the composite map.⁷⁸⁹ Between 1752 and 1755, the Lowlands were surveyed and a ‘protracted copy’ of the south of Scotland was produced (no fair copy was made).⁷⁹⁰ Whilst the survey parties were responsible for recording and sketching data in the field, Paul Sandby, acknowledged as the ‘father’ of English watercolour art, was the ‘chief Draftsman of the fair Plan’.⁷⁹¹ Two further draughtsmen completed the full compliment of artists: Charles Tarrant, whose exceptional cartographic style was highly commended by the Board of Ordnance and prolifically displayed in his work for William Skinner,⁷⁹² and John Pleydell.⁷⁹³ The Survey artists prepared the original protraction using the note- and sketchbooks compiled in the field by the surveyors. It formed the basis of the fair copy. Differences between the original protraction and fair copy can, in part, be attributed to the draughtsmen adding detail from other sources, including any military maps stored at Edinburgh Castle at the time.

The difference between the fair-drawn map of the north and the original copy of the south of Scotland is striking. Figure 6.32 shows Dumbarton and the area directly to the north as it is represented in the two copies. The original protractions were drawn in the most part in black ink with very few features in colour. The Highlands, or fair copy, abounds with colours that reflect the prevailing military colour schemes and conventions: red was used for

⁷⁸⁷ TNA WO 47/35, pp. 233–243, 17 March 1750. John Watson’s ‘Memorial’ (NAS RH1/2/511, ff. 8–9) includes a reference to ‘the pay of three assistants extraordinary for 210 days at 5/ per diem each paid to them by d. Watson amounting to £157 10s 0d’.

⁷⁸⁸ TNA WO 47/35, p. 505, 19 June 1750: ‘Mr Muller’[s] List of the Qualifications, Industry and Capacity of the Gentlemen Cadets’ at the Royal Military Academy. Number 34 in the list is a Thomas Haws [Howse], 35 Wm. Dundas, and 36 John Williams—‘Gone to Scotland with Col. Watson with leave’.

⁷⁸⁹ BL Maps K.Top.25.1a. the original protraction of northern Scotland, north of Edinburgh and Glasgow, mounted as 84 rolls of irregular size and shape. Maps K.Top.25.1b. the fair copy of northern Scotland; originally 12 rolls but now combined with the 10 rolls of the original protraction of southern Scotland (Maps K.Top.25.1c.) and remounted as 38 sheets of unequal size.

⁷⁹⁰ BL Maps K.Top.25.1c.

⁷⁹¹ NAS RH1/2/523, p. 1. There are several accounts of Paul Sandby’s time in Scotland whilst employed on the Military Survey. See Bonehill and Daniels 2009, and Jessica Christian 1990.

⁷⁹² TNA WO 47/35, p. 371, 8 May 1750: the Board being ‘pleased to Signify their Approbation of [Tarrant’s and Joseph Heath’s] Drawings’ and that they ‘truly merit the Boards further Encouragement [sic]’. BL Add. MS 17500, p. 40, 3 May 1750; TNA WO 47/35, pp. 337–338, 5 May 1750: Tarrant was recommended by Desmaretz as ‘a proper person’ to fulfil the Director of Engineers for North Britain, William Skinner’s request for a ‘Person to Assist him in Copying Plans and helping in several Surveys that are or may be wanted in Scotland’.

⁷⁹³ NRAS RH1/2/523, p. 2.



Figure 6.32 ‘The Military Survey of Scotland’, depicting Dumbarton in the northern ‘Fair Copy’ (left) and the southern ‘Protracted Copy’ (right).⁷⁹⁴

buildings and man-made structures, brown for roads, blue-green for water, green for woodland, yellow for cultivated ground, and buff for moorland. Hill features were drawn in the emerging style of the time, using hachured lines to indicate the direction of the slope and changing tones to differentiate the gradient.⁷⁹⁵ The relatively few symbols are stylised representations of trees, tilled fields, moorland, and sands or shoals. Other features such as mills and churches were shown sparingly. In its representation, the Military Survey reflected the engineers’ Enlightenment understanding that surveying was both a mathematical practice and a painterly pursuit, and that surveying had close connections with landscape painting.⁷⁹⁶

Notably, the maps were not graduated for latitude and longitude, nor presented with a scale statement. Arrowsmith determined their scale as one inch to 1000 yards (1: 36,000) which was corroborated by a small map entitled ‘the Great Map, shewing the King’s Road’ (see Fig 6.33), drawn by William Roy in 1753, with a manuscript note referring to scale:

⁷⁹⁴ ‘The Roy Military Survey’ (1747–1755) on the NLS website (<http://www.nls.uk/maps/roy/index.html>), sheets 19 (‘Protracted Copy’) and 65 (‘Fair Copy’). The original maps are held in the British Library at Maps K.Top.48.25-1.a-f. [1.b–c]

⁷⁹⁵ NAS RH1/2/523, p. 5.

⁷⁹⁶ Withers 2007.



Figure 6.33 'Part of the Reduction from the Great Map, shewing the Kings Road which is express'd by a Red Line & the Country Roads by a Brown Line', by [William Roy], c.1753, at a scale of 1: 144,000 (12,000 feet to an inch) Maps K.Top.48.64 (Courtesy of the Trustees of the British Library)

‘The Great Map is 3000 feet to an inch, & the Reduction is $\frac{1}{4}$ or 12000’.⁷⁹⁷ The former was less than the scale recommended by Watson in his instructions: ‘Every Representation must be laid down to a particular fixed Scale, [...] General sketches of a Country may be laid down to a scale of two Inches to a mile’ (1: 31,680).⁷⁹⁸ There is no explanation as to why the Military Survey was drawn to a slightly smaller scale than that recommended; it could simply be due to a rationalisation of the separate traverses into the collated protraction. In 1755, work on the ‘Military Survey of Scotland’ came to an end when the Survey personnel were called away to the impending outbreak of the Seven Years’ War (1756–1763) between Britain and France.⁷⁹⁹ The outbreak of this War renewed Jacobite hopes of an invasion of England and a corresponding uprising in Scotland by Irish and Scottish ‘Rebel’ Regiments. In a letter to the Lord Advocate, John Forbes wrote: ‘I am very well Convinced That none of them will be very rash to engage [sic] in anyr Rebellion, tho’ I should be very sorry if this part of the Country (I mean the highlands) be not look’d very well after & some Regts kept Constantly among them’. If a rebellion was to arise, Forbes was adamant that Watson, due to ‘his knowledge & ability sp[ent] in the manadgement [sic] of affairs in Scotland which he has made more his study than any man alive [and] knows every Corner of the Kingdom’ should be dispatched back to Scotland, it being possible to ‘Dispense wt his service elsewhere’.⁸⁰⁰

Watson’s knowledge of Scotland came from his surveying activities on behalf of the Board of Ordnance (although he was not an Ordnance engineer) as well as his access to the Military Survey. We know he used Elphinstone’s Mercator’s map of Scotland to plan army posts and troop deployment but the Survey provided him with fresh intelligence of the country from which to plan troop dispositions. An encompassing picture of the terrain was vital to its effective use. Roy later explained why: ‘The nature of a country will always, in a great degree, determine the general principles upon which every war there must be conducted [...] yet while the ranges of mountains, the long extended valleys, and remarkable rivers, continue the same, the reasons of war cannot essentially change’.⁸⁰¹ Accurately mapping the topography and drainage was therefore the principal concern of the engineers. Likewise the road network since this was the army’s main source of mobility. Roads, however, were depicted with variable accuracy and inconsistently from one sheet to the next.

⁷⁹⁷ BL Maps K.Top.48.64. The purpose of this map is not known; it may have been to demonstrate to Watson and others the value of a smaller scale version of the original to obtain authority for its production (Gardiner 1977).

⁷⁹⁸ TNA WO 30/115 [B], pp. 203–204.

⁷⁹⁹ TNA WO 47/45, pp. 460–461, 16 May 1755: ‘Mr Hugh Debbeig Engineer signified that the Survey of Scotland on which he had been Employed for five years past was finished’.

⁸⁰⁰ NRAS 3246, Vol. 36, letter number 7, John Forbes to the Lord Advocate, 19 February 1756.

⁸⁰¹ Roy 1793, p. i.

Some roads stopped at the edge of a sheet and failed to continue onto the next, the road south west of Culloden for example.⁸⁰² The drawing specification varied as well, sometimes roads were shown as two parallel lines, other times just one; some were coloured brown, others a dark grey.⁸⁰³ Keeping up with Caulfeild's road building programme must have presented particular problems for the surveyors and frequently provoked incorrect delineations. On the route between Tomintoul and the River Spey, for example, the Military Survey depicts the road crossing at Glenlochry and heading north towards Craiginacash (Creagan a' Chaise).⁸⁰⁴ Harry Gordon's 1754 map of 'Part of the New Road from Perth to Fort George' shows the road crossing at Croft, upriver and south of Glenlochry, the road then proceeding due west.⁸⁰⁵ Perhaps the three subsequent reductions of the Military Survey were intended to correct these misalignments, and make for easier handling?⁸⁰⁶

Conclusion

Maps were vital tools of access to the British army in Scotland in the eighteenth century. Troop movements for the purpose of gathering intelligence, policing the Highlands, and for marching to sites of conflict, generated a need for explicit cartographical materials in order to formalise strategic plans. Maps were not only prepared in order to plan troop deployments, they were also commissioned to record particular events. This was often the case after a mobile military campaign such as the 'Forty-Five. The surviving archive includes two hundred and two maps primarily concerned with military movement; they form 22% of the total archive. They also form an eclectic group: both terrestrial and coastal maps are included, as are linear and topographical surveys, and maps offering proposals for route ways and those that have been used and record troop movements. As a genre of military mapping, they define a change in mapping technologies reflecting the change from static fortification to more mobile imperatives and the government's evolving approach to the problem of Jacobite insurrection.

The maps of military movement are united by their function rather than by their physical form and cartographic conventions. However, the cartographic records in the

⁸⁰² 'The Roy Military Survey, 1747–1755' on the NLS website (<http://www.nls.uk/maps/roy/index.html>), sheets 26 to 25. The original maps are held in the British Library at Maps K.Top.48.25-1.a-f. [1.b–c]

⁸⁰³ Tabraham 2007.

⁸⁰⁴ 'The Roy Military Survey', sheet 27.

⁸⁰⁵ BL Maps K.Top.48.75. The road was constructed by five companies of Lord Charles Hay's Regiment in the 'Summer of 1754'.

⁸⁰⁶ See Skelton 1967.

surviving archive do allow some sub-division of this principal group, into: marine charts including coastal and inland waterways, road and route maps which form the greater part of movement cartography (44%), and topographical maps. When the building of forts failed to subdue outbreaks of Jacobite dissent, new measures were enforced that included sending military Companies into the Highlands to patrol them. This prompted extensive surveys of roads, lochs, and rivers, as well as the construction and mapping of military roads.

Scotland's extensive coastline and inland waterways also offered opportunities for rapid and efficient movement of troops and supplies. Most of the coastal charts in the surviving archive date from the late seventeenth century and are manuscript copies of John Adair's *Description* of Scotland's coast. Although these form, in varying numbers, parts of the Board of Ordnance Collection, the King's Topographical Collection, and the Maritime Collection, there are problems confirming that they were ever used by the military or political leaders in making decisions concerning Scotland. They are considered in this study due to their provenance which indicates that they would have been useful to the Board and monarch for reference purposes and were also deemed, by the Board of Ordnance, to belong to the state.

Wade's arrival in Scotland in the 1720s was the start of a more concerted effort on the part of the military to improve the communications between the military garrisons. Wade, but more especially his successor, William Caulfeild, was responsible for mapping and constructing a network of roads through the Highlands that opened-up the interior of Scotland to the military. Combined with maps of Scotland's waterways, route and marine charts were beginning to form a more comprehensive cartographic picture of Scotland. This was, however, still woefully incomplete as events during the 'Forty-Five were to show. Topographical maps of Scotland up to this point mainly represented the lowlands. The few topographical maps of Scotland, such as Lemprière's 'Description of Scotland' and Elphinstone's *Mercator's Map*, were available to only a few (the former, only to Wade and the King). Although David Watson, Quartermaster-General made use of Elphinstone's map to mark troop deployments and military posts, its inadequacy of scale prompted Watson to suggest that a military survey of Scotland be completed. The Military Survey, described by William Roy as 'rather [...] a magnificent military sketch than a very accurate map of a country' was a document of state surveillance and so was not in the public domain, a common trait of military mapping at this time.⁸⁰⁷

Route maps and topographical surveys helped produce territories of accessibility for the control and imposition of social order. They were commissioned by the state as a tool to

⁸⁰⁷ Roy 1785, p. 387.

facilitate the exercise of political power and warfare. Maps, according to Godlewska, ‘are also technology and technology has frequently been used as a rationale for conquest’. Indeed, ‘the basis on which technology acquires power over society is the power of those whose economic hold over society is the greatest. A technological rationale is the rationale of dominance itself’.⁸⁰⁸ Once the information was put on the map, the military constructed roads between military establishments, built bridges, launched ships to patrol some of Scotland’s extensive inland waterways, established military outposts, deployed troops to remote parts of the country, and recorded their political and military presence on maps.

In some cases, categories of military movement might be better understood and explained with categories from fortification and battle, for example, coastal charts and gun-battery fortifications; route maps—road and topographical—of armies and their encampments with battle plans. Another less useful attribute to this classification, for maps of military movement in particular, is that it splits maps, map makers, and military activities that are best understood together. For example Joseph Avery’s survey of the Great Glen was a reconnaissance, a road map, as well as a survey of an inland waterway; John Adair’s coastal charts, county maps, and his route map together were the beginnings of a comprehensive picture of Scotland that was of more political use than just military movement; and, in the same vein, Robert Johnson’s mapping of the military establishment at Cairnburgh Castle resulted in coastal charts of the islands and of Mull.

Despite a change in military practices in Scotland, reflected in the inclusion of maps of movement with the well-established fortification cartographies, Jacobitism remained a threat to British hegemony for the first half of the eighteenth century. Maps of military movement can be understood in accordance with maps of military conflict. A common culmination of a forced march was battle. Having explored the resources the British state had to hand for planning marches and encampments, the next chapter looks at the cartography of conflict and the Jacobite campaigns that culminated in battle with the British—Hanoverian—Army.

⁸⁰⁸ Godlewska 1995, p. 7.

CHAPTER 7

The Cartography of Conflict

Introduction

Despite attempts towards ‘Establishing Order [...] and reducing the Highlands to a more due Submission’ through constructing forts and barracks, building roads to improve communications between military establishments, and deploying government troops, the threat of Jacobitism for the British state continued to be real for more than half a century.⁸⁰⁹ It came in two forms: internal rebellion and intervention by a foreign power on behalf of the Jacobites.⁸¹⁰ In 1689, 1715, 1719, and in 1745–1746, the operations mounted by Scottish supporters of the exiled Stuarts against the Williamite and Hanoverian armies culminated in battles (see Fig 7.1).⁸¹¹ The study of the maps of several of these battles—Sheriffmuir in 1715, Glenshiel (1719), Prestonpans (1745), and Falkirk and Culloden (1746)—form the focus of this chapter.

No maps are known to be extant (or possibly none was ever made) of the first Jacobite campaign and the point from which it started, the battle of Killiecrankie on 27 July 1689. This clash, near Blair Atholl, between the Jacobite troops led by John Graham, Viscount Dundee, and William’s Scottish Army under the command of Major General Hugh Mackay, is worthy of mention here for two reasons. The first is its similarity to the last Jacobite rising, the ‘Forty-Five; both witnessed initially encouraging victories. The second was the sustained nature of the campaign; the first rising did not end until mid-1691 which turned the Government’s attention towards Scotland. Warrants were issued for ‘Brass Ordnance & [...] Mortar Pieces with all the ammunition Stores and Equipage thereunto belonging [...] to be transported to Scotland’,⁸¹² and ‘the Officers of the Ordnance [...] represented that they had appoynted [sic] Engineers to make Draughts and Estimates of what Works would be needfull to be done effectually to secure’ North Britain’.⁸¹³

⁸⁰⁹ BL Additional Ms. King’s 100, f. 15, Wade’s Report on the Highlands 1724.

⁸¹⁰ Lenman 1995.

⁸¹¹ A further three planned Jacobite risings—in 1708, 1741, and in 1744—were either abandoned or aborted.

⁸¹² TNA WO 55/424, Warrant No. 16 [a], issued by William III on 12 April 1689.

⁸¹³ TNA WO 55/344, p. 263, 1 April 1708. For detailed accounts of the 1689 campaign and the motivation for the Jacobite cause see, for example, Petrie 1958, Kidd 1993, Szechi 1994, Lenman 1995, Macinnes 1999, Saville 1999.



Figure 7.1 Distribution of battlefields in Scotland 1689–1746

The campaign of 1689 set in motion the Board of Ordnance military mapping of Scotland. The campaigns of 1715, 1719, and 1745–1746, and aborted and abandoned risings in 1708, 1741, and 1744, acted to sustain the interest of the British Government and the work of the military engineers in the pacification of the Highlands until at least the mid-eighteenth century.

The chapter begins by describing the archive of battle maps before examining the Jacobite campaigns in Scotland with a focus on the cartographic illustration of events as portrayed in contemporary maps and plans. Such a review addresses questions concerning the purpose of battle maps. Why were maps of battles drawn, especially when they illustrated a Government defeat? Who were the map makers, with whom did their allegiance lie, and to what did the maps signal in terms of notions of utility, propaganda or other purpose? When were the maps drawn—before, during, or after an event—and what relationship, if any, did this have to their purpose? Questions such as these examine the meaning of battle maps beyond the battle itself.

The Archive of Battle Maps Described

The Board of Ordnance archive contains fifty-one maps, plans and sketches of the five battles between Jacobite and Hanoverian armies in Scotland from 1715 through 1746.⁸¹⁴ By the eighteenth century, battle maps and plans were a well-established cartographic form of military narrative.⁸¹⁵ For the majority, their authorship can be attributed to draughtsmen on the Government side: military engineers such as John Henri Bastide, Dugal Campbell, John Elphinstone, William Eyres or Daniel Paterson,⁸¹⁶ map makers such as Thomas Sandby,⁸¹⁷ or army officers such as Charles Whitefoord a volunteer under Sir John Cope and Joseph Yorke *Aide-de-Camp* to the Duke of Cumberland.⁸¹⁸ The maps appeared in both manuscript and printed form. Maps remained in manuscript when their territorial, strategic, and geographical information was too sensitive to be displayed beyond the realms of state government. Printed maps emerged to meet the public's demand for cartographical journalism and news of heroic

⁸¹⁴ This accounts for only 5% of the archive.

⁸¹⁵ Buisseret 2003.

⁸¹⁶ TNA WO 54/209, pp. 10–12, March quarter 1745. In 1745, John Henri Bastide and Dugal Campbell were Engineers in Ordinary on £182 10s 0d *per annum*, and John Elphinstone and William Eyres were Practitioner Engineers on £54 15s 0d. Daniel Paterson, draughtsman of some of the 1746 K.Top plans of roads in the north-west Highlands (BL Maps K.Top.48.62 and 63 for example) is only noted in the 'Establishment Books' in 1749, receiving a warrant as a Practitioner Engineer on 2 January 1749 but deceased by 1750 or 1751 (TNA WO 54/210, pp. 21–25). Whitworth Porter refers to Paterson as one of the engineers with the Duke of Cumberland at Culloden (1889, pp. 160–161).

⁸¹⁷ Thomas Sandby entered the Tower of London Drawing Room in 1743, drawing a salary of £45 12s 6d *per annum*, and remained on its register until his death in 1798 despite holding various other posts (TNA WO 54/208, p. 18, March quarter 1743). As a 'competent topographical draughtsman with a bent for perspective', he was brought to the attention of the Duke of Cumberland and accompanied him on his campaigns in Scotland in 1746 where he was employed as "Draughtsman and Designer" to make maps, views and architectural studies' (Oppé 1947, p. 4; Hodson 1988, p. 6).

⁸¹⁸ BL Additional Ms. 36592 Whitefoord Papers volume 1, correspondence and papers of Colonel Charles Whitefoord 1738–1752; Additional Ms. 35354 Hardwicke Papers, correspondence of Philip Yorke, 1st Earl of Hardwicke with his son Sir Joseph Yorke, 1742–1764.

victories. In either form, however, the cartographical image could as easily reflect the ideology of glorious conquest or serve other propagandistic purposes.⁸¹⁹

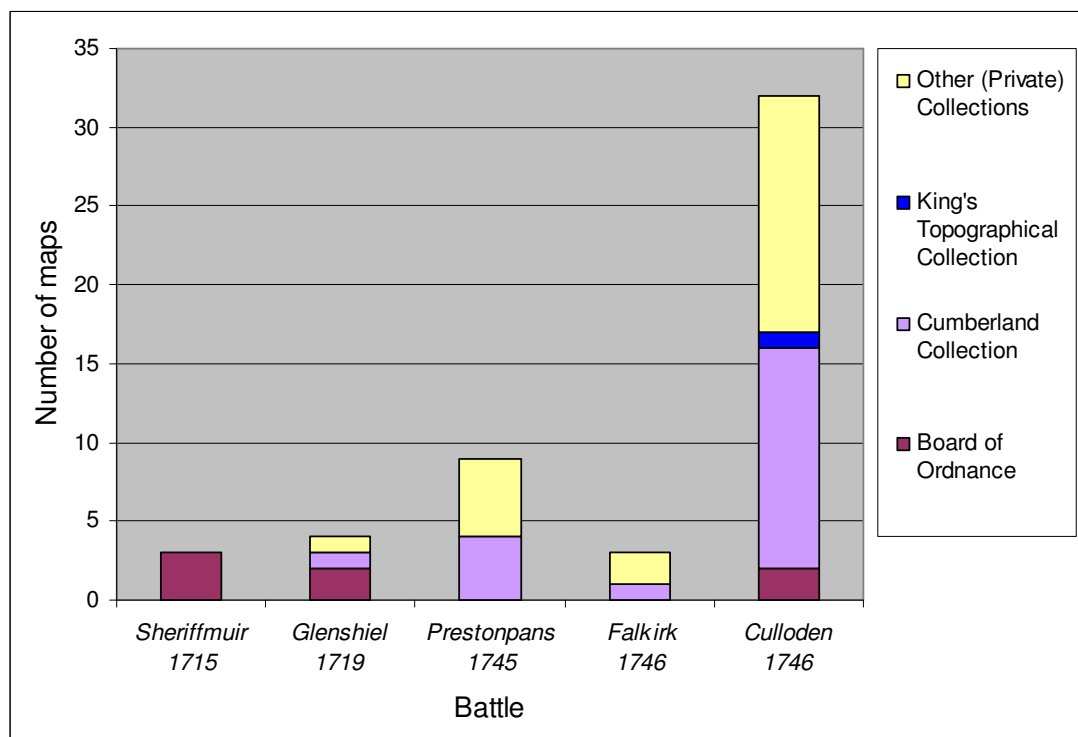


Figure 7.2 Frequency distribution chart and provenance of battle maps, Scotland 1715–1746

Figure 7.2 illustrates the number of contemporary maps extant for each battle.⁸²⁰ Unlike fortification plans and maps of military movement, the provenance of battle maps is more varied. Authorship most often reflects the maps' current archival location. Battle maps by military engineers form part of the Board of Ordnance, the King's Topographical, and 'other' or 'private' collections, such as a copy of Bastide's 'Plan of the Field of Battle [...] at the Pass of Glenshiells',⁸²¹ and were passed to the manuscripts department of the British Library but formerly housed at Blenheim Palace in Oxfordshire as part of the correspondence and papers of John Churchill, 1st Duke of Marlborough and Master-General of the Ordnance from 1702–1722. Maps and plans by Whitefoord and Yorke, participants in the 1745–1746 campaign, provide useful eyewitness testimony of the deployment of troops and the military representation of the same. Their plans of the battle formations for,

⁸¹⁹ Godlewska, Létourneau and Schauerte 2005; Luijk 2008.

⁸²⁰ Lists of battle maps, specifically of Culloden, have been created and published before; see Anderson 1920, pp. 173–175 and Aitchison 1994, pp. 11–15. They include non-contemporary maps, mostly published in the nineteenth and early-twentieth centuries, and are not included in the archive of military maps or the discussion.

⁸²¹ BL Additional Ms. 61343 G.

respectively, Prestonpans and Culloden formed parts of private correspondences and are in the manuscripts department of the British Library. The ‘curious and extensive collection of William Duke of Cumberland’, formerly ‘The King’s Military Collection’ and now the Cumberland Collection housed in the Royal Library at Windsor Castle, contains plans of military operations including battles, sieges, and encampments.⁸²² Of these, twenty-eight manuscript maps and plans relate to battles in Scotland and date, in the main, from the time of the Duke of Cumberland’s military campaign in Scotland in 1746.

Each Jacobite campaign had its own distinctive character and so did the maps of the battles fought. The final form of the maps depended on the role they played in the military engagements. They vary from simple pictorial plans of battle order lacking both topographical detail and scale to perspective plans and maps showing the disposition of the opposing armies in relation to the surrounding topography, the whole drawn to scale. The tactical movements of armies in their constituent parts—artillery, infantry, and cavalry—were represented by a style of mapping that had evolved in conjunction with the early modern European ‘military revolution’.⁸²³ Map makers no longer captured the ‘messiness’ of conflict, the incoherent engagement between cavalry and infantry, or the chaos, terror and disorder of a battle-scene. Instead, the different components of an army were mapped with remarkable clarity. Abstract formation-maps became commonplace with the order of battle of the opposing armies represented by conventional symbolism, texts used to identify the different military units, and an alpha-numeric system keyed in to an ‘Explanation’ to define the various phases of a battle.

Two genres of map are evident: contemporary manuscript accounts of the progress of the battles and printed broadsheet maps or ‘news maps’.⁸²⁴ The former includes three sub-types coinciding with events before, during, and after battle: (a) plans showing formal troop dispositions; (b) cartographic records of a battle in progress; and, more commonly, (c) maps made after the battle, as spatial and temporal records of events. Very few maps in the archive fall into the category of printed news maps. Those discussed in the remainder of this chapter are by-products of information transmitted by military map makers thought to be present at the battles and so form retrospective records.

A characteristic of the campaigns in Scotland, on either army’s part, is the lack of maps portraying evidence of tactical planning of the battle site before engagement. Although some written memoranda indicate that ‘scouting’ of enemy positions did take place, there are

⁸²² Printed in F. A. Barnard, *Bibliothecae regiae catalogus*, vol. 1 (London, 1820), pp. vii–viii, quoted in Hodson (1988), p. 2

⁸²³ Buisseret 2003.

⁸²⁴ Klein 1989; Luijk 2008.

neither detailed reconnaissance maps of the local terrain nor maps of potential grounds on which to stage the battles.⁸²⁵ The overall impression is one of hasty decisions and battle sites driven by the speed of events rather than the use of maps to strategically select sites for battle.

Although preparatory plans of battle sites were lacking, some plans of formal troop dispositions were drawn and distributed in advance of battle. For the Battle of Prestonpans, for example, a plan defining Lieutenant-General Sir John Cope's intended battle formation was drawn the evening before battle but on the actual day the plan was not executed given the lack of artillery.⁸²⁶ The plans of the Hanoverian army formation at the commencement of battle were retrospective records of events.⁸²⁷ These plans can otherwise be regarded as schematic diagrams of the 'order of battle', equivalent to the previous chapter's 'order of march', and often a well-rehearsed manoeuvre from the latter to the former. There is little direct evidence of maps being drawn in the thick of battle. More commonly, a battle's progress was mapped after the event although these records could be neat composites of sketches made by an eye-witness to the battle event. Most of the battle maps carry the date of the battle rather than a date signifying when a compilation was completed.

Here, I treat the battle plans chronologically and examine their features as a specific form of military narrative and their significance overall to understanding the Board of Ordnance activities.

The Battle of Sheriffmuir, 13 November 1715

In 1715, the London Government received warnings of a pending revolt in Scotland.⁸²⁸ Robert Johnson, overseer at Fort William, reported that the garrison was 'in great danger of being surprized [sic] by the Highland Clanns, they being all ready to rise, and they expect the Pretender to land every day'.⁸²⁹ When John Erskine, the sixth Earl of Mar,⁸³⁰ raised the Royal standard for the exiled Stuarts at Braemar on the 6 September, a Jacobite army began

⁸²⁵ Szechi 2006 recounts that the Duke of Argyll, commander of the Hanoverian army at the Battle of Sheriffmuir, 'made sure exactly where the Jacobites were by personally scouting their position' before proceeding into action (p. 153, 'State Papers Domestic' relating to Scotland, NAS RH 2/4/307/48 Argyll to Townshend, Stirling, 14 November 1715).

⁸²⁶ There are several copies of this plan: RLW 729153 'Order of Battle intended but not executed for want of Gunners', by William Eyres; and BL Additional Ms. 36592 (2 copies).

⁸²⁷ See plans: BL Additional Ms. 36592 by Charles Whiteford and RLW 729153 by William Eyres.

⁸²⁸ By the time of the Hanoverian succession in 1714, there was pervasive disillusionment with the 1707 Union between the kingdoms of Scotland and England.

⁸²⁹ TNA WO 55/346, p. 194, letter from Robert Johnson to the Board of Ordnance, 1 August 1715.

⁸³⁰ Mar had been a pro-Unionist and Secretary of State for Scotland in Anne's ministry, only for his political career to collapse with George I's accession to the throne.

to form and, as the clans gathered, they successfully manoeuvred against the Government garrisons:

The Laird of Glengary [sic] marched with five hundred men this morning from his house at Invergarry which place I'm sorry to tell your Lordship he has surprised, and carried Lieut. Lauder of the Lord Irwin regiment one serjeant & fifteen men prisoners along with him. This my informer says he saw, he further says that Capt. of Clanronald had taken a detachment of twelve men and a serjeant under the command of Lieut. Gains of the said Regiment at Tyreholm Castle one of his own houses. I doubt not that of Islandonnan has had the same fate. The Capt. of Clanronald is marched already & Sir Donald McDonnald is following him. Locheels march is dayly expected. Glenco with two horsemen and six footmen passed this day about a mile above this place [Fort William] and its said his men went through the mountains. I cannot learn that Appins men are yet march'd.⁸³¹

A substantial Jacobite force, comprising 6290 Foot and 807 Horse, formed under the command of Mar. Their intent was to march south to join other Jacobites on the move in the Borders and England. John Campbell, second Duke of Argyll,⁸³² gathered a substantially smaller but experienced Government army of 960 Dragoons and 2200 Infantry to stop Mar.⁸³³

The Battle of Sheriffmuir was fought on Sunday 13 November 1715. There are many eye-witness and participant accounts of the battle.⁸³⁴ One primary source is a contemporary Board of Ordnance plan detailing the engagement of which there are three engraved copies.⁸³⁵ These plans are unsigned but the Office of Ordnance 'Register of Draughts' attributes, in 1715, an original 'Plan of the Battle of Sheriff Muir' to Col:

⁸³¹ TNA SP 54/8/94, a letter from Sir Robert Pollock, Governor of Fort William, to Secretary Townshend, 24 September 1715.

⁸³² The Duke of Argyll was appointed Commander-in-Chief of the forces in Scotland on 1 September 1715 (TNA WO 55/346, 198).

⁸³³ Foard 2005.

⁸³⁴ For example: TNA SP 54/10/45A Mar to the Governor of Perth giving an account of the battle, 13 November 1715; SP 54/10/48 Argyll to Secretary Townshend on the battle of Sheriffmuir, 14 November 1715; and printed sources: SP 54/10/46A 'An account of the engagement near Dunblane yesterday the 13th instant betwixt the king's army under the Command of his Grace the Duke of Argyll, and the rebels commanded by Mar', 14 November 1715.

⁸³⁵ NLS MS 1649 Z.03/45a-c.



Figure 7.3 Part of [a plan of the Battle of Sheriffmuir], by [Thomas Lascelles], 1715. Scale 1: 9,600. MS 1649 Z.03/45c (other copies MS 1649 Z.03/45a and b) (Reproduced by permission of the Trustees of the National Library of Scotland).

Lascelles.⁸³⁶ Figure 7.3 illustrates one of these plans—the critical southern section of the map (or right-hand side) is missing in all three cases⁸³⁷—showing the eighteenth-century terrain, distinguishing tilled fields from open pastures, ridges of higher ground with the use of cross-hatching, and various sizes of settlements by way of three-dimensional houses. East is to the top of the map. The missing section would have shown the main battlefield, troop deployments, and the progress of battle which, by all accounts, was a confused affair as this contemporary ballad implies:

There's some say that we wan, some say that they wan,
 some say that nane wan at a' man;
 But one thing I'm sure, that on Sheriff-muir,
 A battle there was that I sa' man;
 and we ran, and they ran, and they ran and we ran,
 and we ran, and they ran awa' man.⁸³⁸

On 12 November 1715, a detachment of Mar's army was given orders to take possession of Dunblane. As they advanced within three miles of the place they received news that Argyll's army had already marched to intercept them and was encamped at 'Newtoun' near Dunblane.⁸³⁹ Argyll had previously scouted and reviewed the terrain between Stirling and Perth (although no maps appear to have been made) and decided to fight the Jacobites on 'the rising grounds on the other side of Dumblain [sic], where we are sure of both provisions and forrage. When we are there where the ground is good, if the enemy should advance we can have no better ground to receive them in'.⁸⁴⁰ The right wing of Argyll's army encamped in readiness for battle 'being under their Armes [sic] and in Order of Battle and their Cannon up on the Hill before them'.⁸⁴¹ Mar's army gathered near Kinbuck and set up camp either side of the road from Dunblane to Perth (see Fig 7.4 position **B**). The following morning, Mar revised his original intention to march towards Dunblane to meet Argyll's army. Instead, he ordered the troops to form into four columns and redirected them on to the Muir of Kinbuck (**C**).

⁸³⁶ TNA WO 55/2281, f. 16, entry [31]. The plan was stored in a roll. Thomas Lascelles was a military engineer. Following the Treaty of Utrecht in 1713, Lascelles superintended the demolition of fortifications and the razing of the harbour works at Dunkirk until 1716. In 1715 he was appointed Quarter-Master General to the army which may explain why (or even if) he was in Scotland for the Battle of Sheriffmuir and was therefore able to produce an original plan.

⁸³⁷ The loss of the southern portion took place before deposit in the NLS.

⁸³⁸ Anon [1785?].

⁸³⁹ Cameron 1716: a letter from John Cameron of Lochiel to the Gentlemen of Clan Cameron, 24 June 1716.

⁸⁴⁰ NAS RH 2/4/307/18, p. 39 Argyll to Townshend, camp at Stirling, 4 and 10 November 1715.

Quoted in Szechi 2006, p. 151.

⁸⁴¹ NLS MS 1649 Z.03/45a-c.



Figure 7.4 Extract from the plan of the Battle of Sheriffmuir showing the disposition of the Earl of Mar's army at **B**: 'The Rebels who lodged the same Night [12 November] on the Muir of Kinbuck the Road between them'; and **C**: 'were formed y next Morning in 2 Lines their front towards Dunblan [sic], with design to march directly against the Duke'. MS 1649 Z.03/45c (Reproduced by permission of the Trustees of the National Library of Scotland).

What followed is explained on the left-hand portion of the Ordnance map. Argyll, observing Mar's redeployment, ascended the hill to meet them—'3 Battallions [sic] and 5 Squadrons in Order of Battle and the rest on their long March'—in readiness for the encounter. The experienced Hanoverian army moved quickly. In response, the Jacobite army 'marched up in very great haste which occasioned some confusion' when 'their 2nd Line turn'd into their 1st and made but one Line, 6 or 7 men deep in some places'.⁸⁴² Argyll, taking advantage of the chaos, ordered his right wing to attack the Jacobite army's left. The Jacobites were driven back in a fighting retreat across the River Allan, during which many were believed to have drowned. Meanwhile, the right wing of the Jacobite army, formed of

⁸⁴² Cameron 1716; NLS MS 1649 Z.03/45a–c.

Highland clansmen, seeing that the left wing of the Government army had not fully deployed, successfully charged, cleaving the Hanoverian line:

Our Left seeing their Center [sic] peirc'd and their Communication with ye Right quite cutt of were obliged to retire, taking their Cannon with'ern ye way at ye side of ye Stonehill (as ye prickt lines shew) to Dunblan towards Sterling and twice made a halt to form themselves into Order (vide E and F) but in vain.

The Highlanders gave chase to the routed forces, thus losing the opportunity to attack the exposed flank of the remaining Hanoverian army.

Mar with 4000 men established himself on Kippendavie Hill. A natural entrenchment, the Jacobites were advantageously positioned but seeing Argyll and his troops returning from their pursuit of the Jacobite left wing, Mar, for some inexplicable reason, 'had not the Courage with his Superior Numbers to give Battle to our few haras'd & fatigued Troops'. Instead, the remaining Jacobite force, under the cover of darkness, made their escape. Argyll, unaware of the Jacobite army's departure, encamped for a second night near Dunblane, but 'next morning no Enemie being to be found, he return'd to Sterling, having by this signal Victory'.⁸⁴³

The map was (presumably) constructed according to a narrative about the victory that reflected the views of the Hanoverian authorities. In compliance with established Enlightenment practice, the battle narrative found expression in both cartographic and written form, most usefully, for the reader, displayed on the same sheet. Without knowing who the draughtsman was—possibly Thomas Lascelles—it is not possible to determine to what measure this narrative was derived from personal knowledge, from accounts provided from other military authorities involved in the battle, or from eye-witnesses to the event. Taking into account the level of topographical detail on the extant sheets, we must assume that the map was compiled after the event when there was time to conduct a measured military survey of the terrain. This in itself lent authority to the narrative according to Enlightenment thinking. If the battlefield was carefully depicted and described, then why should the details of the battle be any less accurate and truthful? In this sense, a cartographic depiction was no different to a landscape painting: 'accuracy suggested by detailed landscape depiction was frequently used in the art of the period to suggest the truth of the ideology lying behind a painting'.⁸⁴⁴ The ideology of the Battle of Sheriffmuir was of heroic

⁸⁴³ NLS MS 1649 Z.03/45a–c.

⁸⁴⁴ Godlewska, Létourneau and Schauerte 2005, p. 151.

victory by the Hanoverian army; the map maker promoted this ideal and reinforced and legitimated the government's victory through mapping.

The map and text represented the Hanoverian army—'an inconsiderable Number of Men'—as a disciplined, courageous fighting unit, even in retreat able to 'halt and form themselves into Order'. The Jacobite army by contrast, despite being of 'Superior Number', was described (and no doubt represented) as confused and impulsive, relatively easily routed by the King's army who performed a 'valorous Push under so many Disadvantages, all ye Measures of the Rebels were broke at once the Rebellion crush'd and ye Nations Peace resettled to his Graces immortal Glory and Honour'.⁸⁴⁵ There is no indication that the map was ever published as a piece of government propaganda although a declaration of victory was crucial to the new monarch, George I, and his Government. Sheriffmuir had shown just how serious a threat the Jacobites were to the stability of the British state.

The Battle of Glenshiel, 10 June 1719

In 1719, Jacobite and Hanoverian armies again clashed on Scottish soil, at Glenshiel in Wester Ross. Philip V of Spain offered assistance in restoring James Stuart to the throne of Britain. When the Earls of Marischal and Seaforth landed at Stornoway on the island of Lewis in late February, they were accompanied by six companies of Spanish infantry.⁸⁴⁶ They were joined by Jacobites who had taken refuge in France including Marischal's younger brother, James Keith,⁸⁴⁷ Lord George Murray, and his older brother the Marquess of Tullibardine under whose leadership they acrimoniously united. The intention was to unite with the Highland clans under Robert Macgregor Campbell—better known as Rob Roy—and march upon Inverness where they were to take possession of the garrison.⁸⁴⁸ Inverness had long been a focus of Jacobite attention; possession of the town was 'a pass that opens to them a fine Country along the East Coast, where they have many Friends in large plentiful Towns'.⁸⁴⁹ Major-General Joseph Wightman, commander of the garrison at Inverness, received news of a pending rising from several sources loyal to the Crown:

Soon after the first account of a Landing in Kintail, Collo Clayton hastened to Inverness, where having at that time but few troops & receiving

⁸⁴⁵ NLS MS 1649 Z.03/45a–c.

⁸⁴⁶ Szechi 1994; Tabraham and Grove 1995; Mackillop 2001.

⁸⁴⁷ Future Field Marshal in the armies of Frederick the Great of Prussia.

⁸⁴⁸ In a letter from Richard Struckburgh, commanding officer of Inversnaid Barracks, to Lord Roxburgh, Principal Secretary of State, it was noted that 'Rob: Roy has had several meetings with these Rebels that have been abroad very lately' (TNA WO 55/347, pp. 148–149, 21 April 1719).

⁸⁴⁹ TNA WO 55/523, a letter from Lord Carpenter to the Duke of Roxburgh, Edinburgh, 25 July 1719.

intelligence that the Rebels [sic] were in great numbers designing to possess themselves of that town, he with great industry summoned in the Country, & sett many hands to work to put the Castle in a posture of Defence.⁸⁵⁰

Tullibardine delayed setting out for Inverness, instead spending time in the Highlands recruiting. Support from the clans was not readily forthcoming. Reports reached Lord Roxburgh, Principal Secretary of State, that ‘a great number of Men, particularly Lord Drummond, Lord Tullibardin [Lord George Murray] & Rob Roy [were] threatening ye Country if they don’t rise’.⁸⁵¹ According to the *Edinburgh Evening Courant*, Seaforth had written a circular with a warning that ‘all his Friends in that Country, [were] to be ready with their best Horses, &c. to join him, under pain of Hanging without Mercy’.⁸⁵² The Government, on receiving intelligence of the Jacobite preparations, ordered three British frigates to search for insurgents among the numerous islets of the west coast of Scotland.⁸⁵³ Rather than wait for the Jacobite army to gather strength and advance on Inverness, Wightman formed an army and marched by way of the Strath-Affric road towards Eilean Donan.⁸⁵⁴

With a naval force threatening from the west and Wightman’s army fast approaching from the north-east, the Jacobites had little choice but to make a stand and elected to face the Hanoverian army at Glen Shiel—‘being straight and narrow, both sides having highland rugged hills and a water running betwixt the hills, which is the only level place there’ (see Fig 7.5).⁸⁵⁵ Neither army was large. Wightman reported that the ‘Numbers of the Highlanders that were engaged were 1640, besides the Spaniards who defended the Pass, and 500 on the Hills’. His own army comprised only 840 men, ‘not near half the Number of the Rebels [sic] we engaged’.⁸⁵⁶ The Jacobite army established their battle positions in the Glen

⁸⁵⁰ TNA WO 55/347, pp. 186–187. A report of events from Lord Carpenter to Charles Delafaye (under-secretary for the Northern Department) which was passed on to the Board of Ordnance, 25 July 1719.

⁸⁵¹ TNA WO 55/347, pp. 148–149, 21 April 1719.

⁸⁵² Postscript to the *Edinburgh Evening Courant*, 21 April 1719.

⁸⁵³ Millar 1882; Lenman 1995.

⁸⁵⁴ The Hanoverian army was formed from Colonel Montagu and Col. Clayton’s Regiments, a detached Battalion of Col. Harrison’s Regiment, 156 Grenadiers, Dragoons, Hussele’s Dutch Auxiliaries and four Companies of Amerong’s, and the Sutherland and Munro Highlanders. The road followed the alignment of the Rivers Beaully and Glass then Loch Affric.

⁸⁵⁵ ‘Ane Account of the Ingagement at Glensheel, June 10TH 1719’ in a letter dated 15 June 1719 written by a Jacobite sympathiser. Transcribed in Millar 1885.

⁸⁵⁶ Postscript to the *Edr. Evening-Courant* No. 84, dated from Glensheels [sic] 11 June 1719. Historical accounts of the battle offer various numbers, from less than 1500 including about 300 Spanish soldiers in the Jacobite army to 1500 in total, and between 1100 and 1600 men in Wightman’s army.

in advance of Wightman who, on arrival, ‘took about an hour to view their situation’ before forming his own troop dispositions.⁸⁵⁷

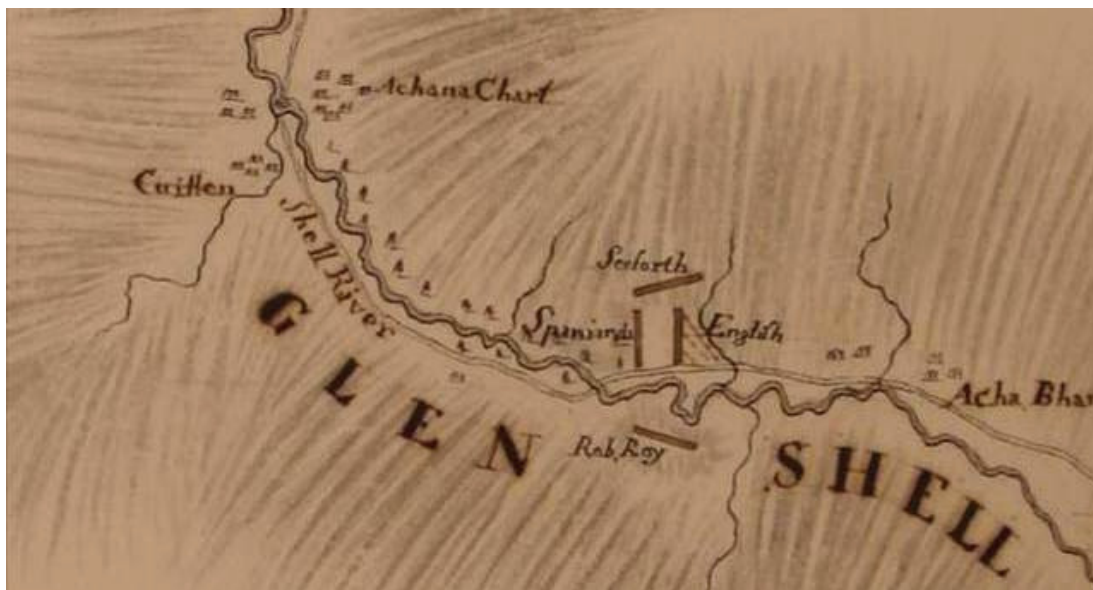


Figure 7.5 An extract from a ‘Plan of the Roads from Fort Augustus to Bernera’ showing the site of the Battle of Glenshiel (at the foot of the image, between ‘Glen and ‘Shiel’), by Daniel Paterson, 1746. Maps K.Top.48.63. (Courtesy of the Trustees of the British Library)

Four contemporary manuscript maps illustrate the army emplacements, redeployments during battle, and the rout of the Jacobite army. Two are Board of Ordnance plans, the third manuscript was in the papers of John Churchill, 1st Duke of Marlborough and Master-General of the Ordnance from 1702–1722, and the fourth map with the text in French, forms part of the Cumberland Collection.⁸⁵⁸ All four are attributed to John Henri Bastide who, in March 1718, was draughtsman of the new barracks being built at Kiliwhimen, Inversnaid, Ruthven, and Bernera.⁸⁵⁹ He served as a lieutenant in Colonel Montagu’s Regiment during the battle and later was Chief Engineer in Amherst’s staff during his Louisburg expedition in Canada in 1758.⁸⁶⁰

All four maps are almost identical, drawn in Indian Ink and wash. Figure 7.6 is an illustration of one of the maps, showing the battle as viewed from the south across the glen. The glen, the river running through it, the steep slopes on its southern side, and the lower slopes on the north side are all shown in plan, whereas the mountainous peaks on the north

⁸⁵⁷ *Edr. Evening-Courant* No. 84, 11 June 1719.

⁸⁵⁸ Respectively: NLS MS 1648 Z.03/22a and b; BL Additional Ms. 61343 G; and RLW 727016.

⁸⁵⁹ TNA WO 47/31, pp. 57–58, 7 March 1718. On 1 May 1719, the Board of Ordnance sent instruction to Andrews Jelfe, overseer of the works in Scotland, notification that he was not to ‘go on with the Barracks till the Rebels [sic] are dispersed’ (TNA WO 47/32, p. 191).

⁸⁶⁰ NLS EMS.s.163; Pollard 2009.



Figure 7.6 'A Plan of the Field of Battle that was fought on the 10th of June 1719, at the Pass of Glenshiels in Kintail North Britain with ye Disposition of his Majtys Forces under ye Command of Majr. Genl. Wightman, & of those of ye Rebels', by John Henri Bastide, 1719. Scale 1: 2,400. MS 1648 Z.03/22b (Reproduced by permission of the Trustees of the National Library of Scotland).

side of the glen are shown in perspective. To display the position of the armies and their various detachments during the course of the battle, Bastide used an eighteenth-century

convention of military cartography: that of symbols, colour, shading, letters and numbers on the face of the plan. The alpha-numeric was explained in a key down the right-hand side of the maps. Reflecting tactical theory, Bastide retained a distinction between infantry and cavalry. For infantry, the rectangles were narrow and varied in length depending on the size of the military unit. Unit '1', for example, constituting 'a Serj^t and twelve Granadiers' is depicted as a small square on the map, whereas unit '4'—'Col. Montagu's Regim^t.'—is a long, thin rectangle reflecting the greater number of men (see Fig 7.7). For the infantry deployed by horse—the Dragoons—the rectangle is broader (unit 7). Colour was an essential aspect of the convention system. The cartographer had to ensure that the locations of the different armies were clearly distinguished.⁸⁶¹ On Bastide's maps, the British units of Wightman's army were shown in red and the Dragoons in green, the Dutch in blue, and Munro and Sutherland's Highlanders in white (see Fig 7.7). The Jacobite army, its initial deployment depicted conventionally with rectangles, was coloured in yellow and grey.

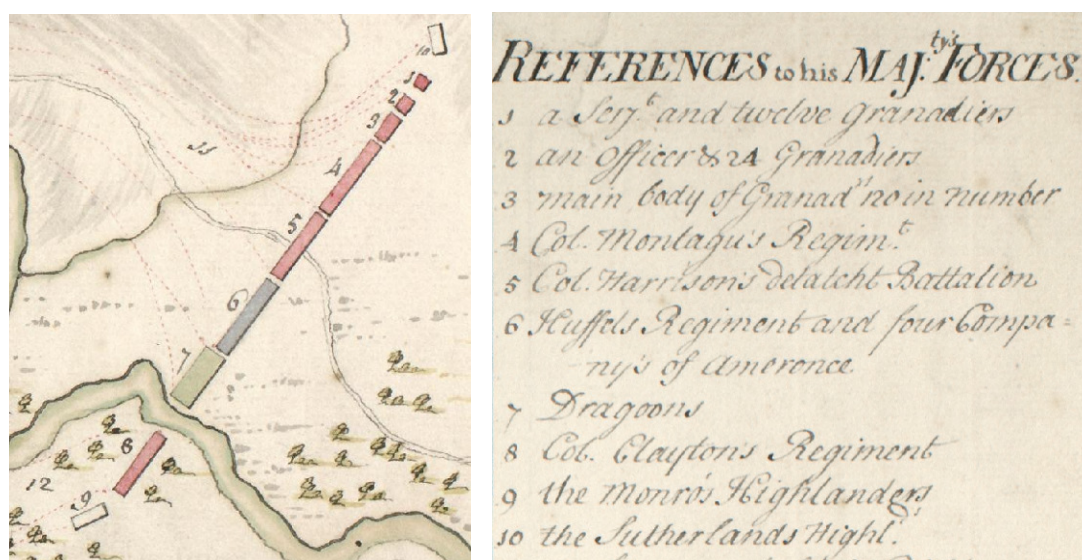


Figure 7.7 An extract from Bastide's 'Plan of the Field of Battle [...] at the Pass of Glenshiels', showing conventions of military cartography. MS 1648 Z.03/22a (Reproduced by permission of the Trustees of the National Library of Scotland).

Lines of movement across battle maps were shown by dotted lines. One of the differences between Bastide's four maps was the colour and application of these lines. On the two Board of Ordnance maps and the Duke of Marlborough's map, movement was indicated by red dotted lines and applied only to the Hanoverian army. The French map depicted the movement of both armies by black dotted lines. In representing the movement of the Jacobite army and in particular their rout, Bastide broke away from contemporary

⁸⁶¹ Harley 1978.

abstract conventions by using pictorial ‘stick-figures’. Figure 7.8 shows a body of 200 Highlanders commanded by Seaforth ‘drawn up before the action’ (reference **F**) on a steep rock, with Marischal and ‘200 of the M’Kenzies a little bit below them’.⁸⁶² The Jacobites are represented by both grey-filled rectangles and pictorial figures firing towards the Hanoverian forces. As the conflict commenced, Colonel Clayton’s Regiment with Hussele’s Dutch Auxiliaries marched ‘in line of Battle’ (**22**) towards the rock where they wheeled to attack Seaforth’s men. The Jacobites here were soon beaten: ‘Seaforth and all gave way, and the relief not being able to maintain it, returned’.⁸⁶³ Bastide showed the rout of the Jacobites (**I**) by pictorial stick-figures and the Hanoverian army’s pursuit (**23**) with dotted lines.



Figure 7.8 An extract from Bastide’s ‘Plan of the Field of Battle’, showing Seaforth’s Highlanders posted on ‘the Rock’, the advance of Clayton’s Regiment and the Dutch Auxiliaries, and the rout of the Jacobites. MS 1648 Z.03/22b (Reproduced by permission of the Trustees of the National Library of Scotland).

At the western end of the pass, where the road came close to the river, the Jacobites erected a barricade (reference **D** on Figure 7.9) and just to the north, on rising ground, they had thrown up breastworks in a position that commanded the plain and the pass (**A** and **E**).

⁸⁶² Millar 1885; NLS MS 1648 Z.03/22b.

⁸⁶³ Millar 1885.

These were occupied by the Spanish Regiment to form the Jacobite's centre. To their right, 'Lord George [Murray], Macdougall of Lorn, M'Kenzie of Avoch, 100 of Seaforth's men, and 50 men of detachments' were posted south of the river, upon steep, rising ground (F). Whilst Clayton's Regiment and the Munro Highlanders advanced against the Jacobite right along the south bank, Wightman led his Dragoons and Grenadiers with Coehorn mortars by the road on the north bank of the river until they were opposite Lord George Murray's position (F). Grenades were launched into the midst of the Highlanders' and Spaniards' entrenchments (F and A respectively), depicted on Bastide's map by solid red trajectories and the mortars by small rectangles with circles representing gun-barrels (17 and 18). Before long, the Jacobites gave way. To the right, an attempt by a Highland unit (H) to reinforce Murray's men failed and his men began to flee despite 'Lord George, M'Dougall, and Avoch drawing their swords and crying to them to stand' (I). The Spaniards fared no better, eventually abandoning their position to make an 'orderly retreat without the loss of any of the Spaniards or others, keeping constant fire with the K.g's troops', a fact noted on the maps by Bastide.⁸⁶⁴



Figure 7.9 An extract from Bastide's 'Plan of the Field of Battle', showing the bombardment of the Jacobite positions: 'A' the Spaniards; 'F' Murray's Highlanders.
727016 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).

⁸⁶⁴ Millar 1885.

As at Sheriffmuir, a victory for the Hanoverian army was only declared the following day when Jacobite expectations of reforming were quashed, ‘there were few or none to be had next day except the officers and the few men Lochiel had, with some others, and the Spaniards’. The Spanish were left to surrender whilst the remaining Highlanders dispersed.⁸⁶⁵ Lord Carpenter, the Commander-in-Chief of the Hanoverian forces, made no reprisals in response to the 1719 uprising other than seizing a great quantity of weapons from the rebels; defeat was enough for the Jacobites.⁸⁶⁶ Attention did turn, however, towards the west coast defences. Andrews Jelfe, overseer of the works in Scotland, was ordered by the Board of Ordnance ‘to loose no time in proceeding on the works at Bernera’ in Wester Ross, near the Isle of Skye, ‘for keeping a Comunication [sic] with ye same’.⁸⁶⁷ The Board refused to continue work on the defences at Inverness on the grounds that they had run out of money. An engineer was instead to report on the works completed by Clayton and what else was required to secure the town ‘lying so near that part of the Highlands, where Rebels can with most safety assemble’.⁸⁶⁸

The Hanoverian army had several reasons to commemorate and to publicise its success. The first, to act as a deterrent to local insurgents and the second as a warning to foreign powers preparing to use the exiled Stuarts as political tools. Battle maps were an efficient means of relaying such events to a distant audience. Bastide’s manuscript maps of the Battle of Glenshiel had specific destinations and purposes that can be inferred from the slight differences in the details. Two of the maps depict Wightman (29), astride a white horse, positioned behind the mortars as in figure 7.9, to the image’s right,⁸⁶⁹ two show him placed to the side of the mortar battery.⁸⁷⁰ This slight shift in position may imply that the latter two maps were commissioned by Wightman himself, showing him ‘leading from the front’. One was sent to the Duke of Marlborough, the other to the Board of Ordnance, both possibly as part of official reports describing the battle. The third, the French map, could have been commissioned as a commemoration of the Hanoverian victory and presented to George I, notorious for his reluctance to speak English at Court.⁸⁷¹ The fourth map, part of the Board of Ordnance collection, may have been Bastide’s own copy (possibly the original).

⁸⁶⁵ Millar 1885.

⁸⁶⁶ TNA WO 55/346, p. 259, 19 June 1719.

⁸⁶⁷ TNA WO 47/32, p. 261, 23 June 1719 and WO 55/346, p. 366. A self-defensible barrack was to be built at Bernera with a capacity for 150 men.

⁸⁶⁸ TNA WO 55/347, pp. 183–189, 25 July 1719, a letter from Lord Carpenter; 4, 7, and 11 August 1719, letters between the Board of Ordnance and Charles Delafaye on behalf of the Lords Justices.

⁸⁶⁹ NLS MS 1648 Z.03/22b and RLW 727016.

⁸⁷⁰ BL Additional Ms. 61343 G and NLS MS 1648 Z.03/22a

⁸⁷¹ RLW 727016.

Bastide's scenographic depiction of this battle, his use of pictorial and abstract symbols was, to my mind, deliberate; this was not a battle map caught in a binary of changing cartographic conventions. His combination of depiction and description of the strategic manoeuvring of the British army clearly defined, in military cartographic form, the dynamic aspects of the operational development of the battle. To the reader of the map, it conveyed military order, tactical manoeuvring, and discipline on the part of Wightman's army. In contrast, the Jacobite army displayed, according to the map, panic, disorder, desertion, and a lack of leadership, all the consequences of their initial strategic positioning lost once the armies engaged. Only the Spanish troops, when abandoning their position, made an 'orderly retreat'. His blend of plan and perspective to represent the battle was an effective style with which to narrate the 'glorious victory', almost as persuasive as a painting whilst remaining truthful to the technology of cartography. An engraved uncoloured plan of the battle from an easterly perspective (looking along the valley), also attributed to Bastide, was 'Sold by Peter DuNoyer, Bookseller' in the Strand in London sometime after the battle.⁸⁷² This map may have been the main reference for a near contemporary painting of the battle by a Flemish artist, Peter Tillemans.⁸⁷³

The Last Jacobite Rebellion, 1745–1746

The decades following the failure of the 1719 campaign witnessed a decline in the strength of Jacobitism despite occurrences of widespread, often violent demonstrations of disaffection towards the London Government. In the Highlands, meanwhile, three Russian men-of-war and transport ships were seen off the north-west coast. Reports circulated that some of the commanding officers were British or Irish and 'had formerly serv'd in the English Navy, but by their Conversation appear'd to be disaffected of Your Majesty's Government'. Rumours of naval stores, iron guns, and small arms being off-loaded from the ships was reported but Wade's attempts to procure further information about the quantity of arms and ammunitions came to nothing.⁸⁷⁴ Government plans to establish a military camp at Inverness, to raise six Independent Companies of Highlanders, and to deliver by ship from London a large

⁸⁷² NLS EMS.s.163 *A Disposition of his Maj^{ties}: Forces Command'd by Maj^r: Gen^l: Wightman & of ye Rebels at ye Pass of Glenshiells in Kintail North Britain where ye Battle was Fought on ye 10th of June 1719 is most humbly Dedicated to His Grace John Duke of Marlborough Captain Generall of His Maj^{ties} Forces &c: by John Bastide L^{: in the Hono^{ble}: Collonell Mountagu's Regiment of Foot.}*

⁸⁷³ *The Battle of Glenshiel*, by Peter Tillemans, with General Joseph Wightman (on a black horse) depicted in the foreground. National Galleries of Scotland.

⁸⁷⁴ BL Additional Ms. King's 101, ff. 3, 8. Wade's report on the Highlands, 31 January 1726.

consignment of ordnance stores and arms for use by these Companies, continued, along with a programme of fortification and road construction.⁸⁷⁵

Jacobitism did survive in several isolated but intensely committed local communities and they in turn successfully nurtured a network of communications between Scotland and Western Europe.⁸⁷⁶ In 1744, a planned invasion of England by Louis XV of France was aborted when the weather conspired against a Jacobite land assault.⁸⁷⁷ A year and a half passed before the threat of a French invasion was raised again. An article in the *Scots Magazine* reported that

the first Circumstantial account of the young Chevalier's motions, was the following article from Paris. "Paris, July 19. The Pretender's eldest son put to sea, July 14. from Belleisle, in the *Elizabeth* of 60 guns, provided with a large quantity of warlike stores, together with a frigate of 30 guns, in order to land in Scotland".⁸⁷⁸

The *Elizabeth* was badly damaged by an encounter with HMS *Lion* and had to turn back, taking with her Charles Edward Stuart's 700-strong force of professional soldiery and virtually all his munitions. The frigate, *Du Teillay*, continued to Scotland and on the 23 July made landfall upon the Isle of Eriskay.⁸⁷⁹ News of a landing on the mainland was slow to arrive. On the 17 August, it was reported in the *London Gazette* that:

Letters from Edinburgh, of the 11th instant, bring an account, that a French vessel of 16 or 18 guns had appeared on the West coast of Scotland; which, after having cruised for some days off the island of Bara [sic] and Uist, stood in for the coast of Lochaber; and had there landed, betwixt the islands of Mull and Sky, several persons; one of whom, from the general report, and from several concurring circumstances, there is the greatest reason to believe is the Pretender's son.⁸⁸⁰

On landing at Moidart, Charles Edward was initially rebuffed by the Jacobites who had invited him to invade Scotland, for without French troops and a good supply of arms and ammunition the clan chieftains claimed there was no hope of victory. They did eventually relent, spurred on by grievances against the Hanoverian order rather than for a desire to return the old, Stuart, order. The standard was raised at Glenfinnan, and the clans 'came out'

⁸⁷⁵ BL Additional Ms. King's 101; TNA WO 55/523, a warrant for ordnance stores and arms for the Highland Companies, 26 May 1725.

⁸⁷⁶ Lenman 1995.

⁸⁷⁷ Britain and France were already on opposite sides in the War of the Austrian succession.

⁸⁷⁸ Douglas 1755, p. 1.

⁸⁷⁹ Szechi 1994.

⁸⁸⁰ Douglas 1755, p. 2.

on what was to prove to be the Jacobites' last desperate rising for power and the British throne.⁸⁸¹

Orders were sent to Lieutenant-General Sir John Cope, Commander-in-Chief of the British forces in Scotland, to recall the military parties at work upon the roads, for them to rejoin their regiments; arms and ammunition were sent out from Edinburgh to the other garrisons; and Edinburgh Castle itself was ordered to be restocked with provisions and was reinforced with two companies of Lascelles' Foot.⁸⁸² From the camp formed at Stirling, Cope mustered a field force and marched them via Crieff towards Fort Augustus. At the last minute, Cope turned away from engaging the Jacobite forces at the Corrieyairack Pass, instead diverting his course to march north to Inverness. This left the Lowlands open to Charles Edward and his supporters. The Jacobite army advanced by way of Wade's roads to seize Perth before advancing on Edinburgh where, on 17 September, they took the city but not the Castle. From Inverness, Cope marched his army to Aberdeen and from there embarked by ship to land at Dunbar on the same day Charles Edward gained Edinburgh.⁸⁸³

The Battle of Prestonpans, 21 September 1745

Cope's army came face-to-face with the Jacobite Highlanders at the Battle of Prestonpans on 21 September 1745. The battle lasted no more than eight minutes and resulted in a resounding defeat for the Hanoverian army.⁸⁸⁴ Several contemporary maps illustrate events, their focus the changing deployment of the armies leading up to the point of engagement. Three manuscript maps of the battle show the disposition of both armies, from the evening of the 20 September to the battle's commencement on the 21 September, in relation to the topography.⁸⁸⁵ Four are manuscript plans of the 'Order of Battle'.⁸⁸⁶ The remaining two maps are printed records of events, or news maps, forming part of the Cumberland Collection.⁸⁸⁷ The news maps provide the most complete illustration of events with claims to be eyewitness accounts by 'an Officer of the Army who was present' and, in another case, by 'an Engineer in his Majesty's Service who was present: done from the only Correct Draught

⁸⁸¹ Petri 1958; Jarvis 1971; Szechi 1994; Lenman 1995; Duffy 2003.

⁸⁸² Douglas 1755.

⁸⁸³ Elcho 1973.

⁸⁸⁴ NLS EMS.s.90a.

⁸⁸⁵ BL Additional Ms. 57637 R.U.S.I. Maps Vol.II. no. (15) by Jordan Wren, Regiment of Foot; NLS Acc.8392 anonymous; RLW 729154 by John Elphinstone, Practitioner Engineer (TNA WO 54/209, pp. 10–12, *Establishment* for 1745).

⁸⁸⁶ BL Additional Ms. 36592 ff. 61 verso and 63 verso, by Charles Whitefoord, a Marine Officer with Cope's; NLS EMS.s.164 by J. M.; RLW 729153 by William Eyres, Practitioner Engineer (TNA WO 54/209).

⁸⁸⁷ RLW 729155 and 729156. Other printed maps do exist, for example NLS EMS.s.90a *Plan of the Battle at Preston, 21st Sept^{emr}. 1745*.

which was delineated by the Author for the use of the Right Honourable the Earl of Marchmont'.⁸⁸⁸

That relatively so many maps were made of an undisputed government defeat is in itself worthy of note. There was a public enquiry into Cope's handling of the 'Forty-Five although he was ultimately acquitted by a court-martial of any major misconduct in the campaign and battle. Major General Humphrey Bland, in his *Treatise of Military Discipline*, included an article that may help to explain Cope's vindication.

There is not any thing in which an Officer shews the Want of Conduct so much, as in suffering himself to be surpriz'd, either upon his post, or in marching with a Body of Men under his Command, without being prepared to make a proper Defence, and by not having taken the necessary Precautions to prevent it. When an Officer has had the Misfortune of being Beat, his Honour won't suffer by it, provided he has done his Duty, and acted like a Soldier.⁸⁸⁹

Martin Margulies' assessment of the report on the court-marshal proceedings published in 1749 points to the Board deciding that Cope had done his duty and that he acted the part of an honourable soldier. The Board judged 'That he [Cope] did his Duty as an Officer, both before, at, and after the Action: And that his Personal Behaviour was without Reproach. And that the Misfortune, on the Day of Action, was owing to the shameful Behaviour of the Private Men; and not to any Misconduct or Misbehaviour of Sir John Cope'.⁸⁹⁰

Although there is no evidence that any of the contemporary maps of the Battle of Prestonpans were presented as evidence at Cope's court-marshal, other contemporary events suggest otherwise. During the subsequent Seven Years' War (1756–1763), George Sackville was accused of disobedience when his cavalry failed to advance at the Battle of Minden. He was later forced to resign despite claims that the battle plan was changed and that the orders he received were ambiguous. He demanded a court-martial to clear his name and a map drawn by William Roy, Captain of Engineers and Assistant Quarter-Master General of the British Forces, was submitted as key evidence.⁸⁹¹ The map included overlapping flaps to show the positions of the troops at different stages of battle. For Harley, 'the cartography of

⁸⁸⁸ RLW 729156 and 729155, respectively.

⁸⁸⁹ Bland 1743, p. 114.

⁸⁹⁰ Margulies 2002, p. 43.

⁸⁹¹ NLS EMEU.s.174: *To Prince Ferdinand of Brunswick, this plan of the Battle of Thonhausen [Minden] gained August 1 1759 by His Britannic Majesty's Army, under command of His Serene Highness over the French Army, commanded by Marshal Contades, and taken from an actual survey, is with the greatest respect, humbly dedicated by William Roy.* London: Publish'd according to Act of Parliament [...] and sold by T. Major [...], Feb. 29. 1760. I am grateful to Chris Fleet for this reference.

defeat had to be at least as meticulous as that of victory: military scientists would pore over these dispositions for years to come'.⁸⁹² If Cope's 'obsessive attention to detail' and the fact that even maps of defeat were 'pored over' by contemporaries then perhaps it is safe to assume that maps of Prestonpans were presented at court to support Cope's actions. If maps were not presented at his court-marshal, they did appear in published accounts of the battle. One publication offered the public 'an enquiry into the conduct of General Cope' and advised the reader 'now [...] to cast his Eye on the Plan of the Battle'.⁸⁹³

The actual battle at Prestonpans happened so quickly that no maps were made during the engagement itself; a reasonably rare occurrence in any battle. At least one map maker was known to be part of the battle action, however. Lieutenant Colonel Charles Whitefoord, a volunteer in Cope's army, formed part of the small detachment manning the artillery mortars and cannon.⁸⁹⁴ He drew two plans of the 'Order of Battle at Preston-Pans' but, as with the majority of cases, after the battle.⁸⁹⁵ The evening before the battle, Cope's officers met for a council of war to review the Jacobite position and to make plans for the next day.⁸⁹⁶ Part of these discussions included preparation of schematic diagrams of the army's future battle formation to which category Whitefoord's 'Order of Battle intended' ('not executed for want of Gunners') falls into.⁸⁹⁷ William Eyres' 'Plan of the Battle at Preston-Pans' (see Fig 7.10)—another conventional schematic plan of the battle order—was made after the actual event. Eyres noted in his 'Explanation' that his information on the numbers of troops and the lengths of the battle lines was passed on by 'many officers, and Country Gentlemen who were Spectators', perhaps implying that Eyres was not actually present at the battle?⁸⁹⁸

In all the maps, there is a high degree of correlation in retelling the events, with perhaps the only discrepancy being the exact position of the Hanoverian army the night before the battle—to the immediate north of the marsh and ditches as in Elphinstone's map,⁸⁹⁹ or further back, in front of Warren Park where the Baggage Guard was deployed (see Fig 7.12).⁹⁰⁰ From Dunbar, the Hanoverian army marched west, aiming to cross the River Esk at Musselburgh. On receiving intelligence that the Jacobites were approaching the same

⁸⁹² Harley 1978, p. 18.

⁸⁹³ BL 111.c.69, p. 13: *An Enquiry into the Conduct of G—l C—pe*, printed for M. Cooper at the *Globe* in *Paternoster Row*, 1745.

⁸⁹⁴ BL Additional Ms. 36592; Duffy 2003.

⁸⁹⁵ BL Additional Ms. 36592, ff. 61 verso and 63 verso.

⁸⁹⁶ Elcho 1973.

⁸⁹⁷ Charles Whitefoord's two 'Order of Battle' (BL Additional Ms. 36592 ff. 61 verso and 63 verso) only show the Hanoverian army which agree with Figure 7.16, William Eyres' plan; RLW 729153.

⁸⁹⁸ RLW 729153.

⁸⁹⁹ RLW 729154; similar dispositions to that shown by Elphinstone are depicted on RLW 729156 and BL Additional Ms. 57637.

⁹⁰⁰ See RLW 729155 and NLS Acc.8392 and EMS.s.90a.

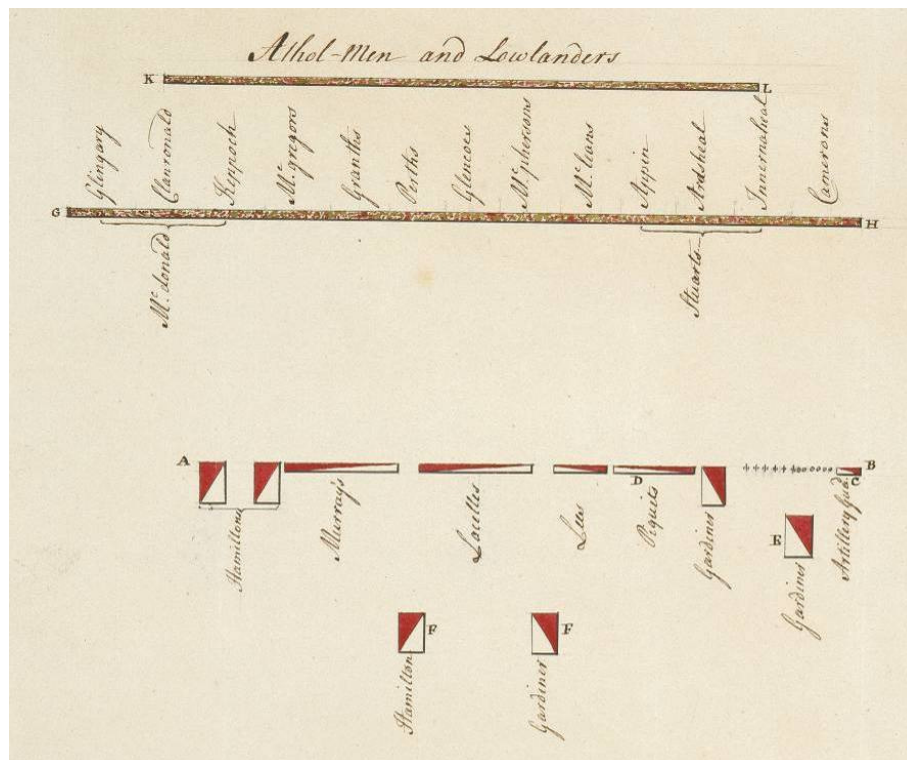


Figure 7.10 'A Plan of the Battle at Preston-Pans' [order of battle and explanation], by William Eyres, 1745. 729153 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).

crossing from the opposite direction, Cope called a halt on open ground to the north of Tranent—'a Plain about a Mile long and somewhat less in breadth'—and deployed his troops to face west, towards the on-coming Jacobites (see Fig 7.11 A).⁹⁰¹ Lord George Murray, at the forefront of the Jacobite army, made for the rising ground—the ridge of Falside Hill—to the west of Tranent and south of Cope's position (**Rebels 1**).⁹⁰² From here, the Jacobites observed the Hanoverian army and although Cope redeployed, moving closer to Preston House and facing south towards his enemy (**B**), he made no move to advance from which 'it was judged he intended to be upon the defensive [...] and his always Showing an inclination to decline the combat was the Greatest fault he Comitted [sic], for every motion he made to Shun an Engagement added so much courage to the Princes Army'.⁹⁰³ On closer inspection, Cope could not have chosen 'a more advantageous Situation', for he had the 12 foot walls of Preston Park and Colonel Gardiner's House (Bankton Park) to his right or west, while his front or southern flank was covered by the Tranent Meadows—a belt of marshes and ditches that ran almost due east from Preston (see Fig 7.11).⁹⁰⁴ Falside Hill where the

⁹⁰¹ RLW 729156.

⁹⁰² NLS EMS.s.90a *A Plan of the Battle of Preston Pans fought 21st Sep^r 1745*; Duffy 2003.

⁹⁰³ Elcho 1973, p. 267.

⁹⁰⁴ NLS EMS.s.90a an account to accompany the *Plan of the Battle of Preston Pans*; Duffy 2003.

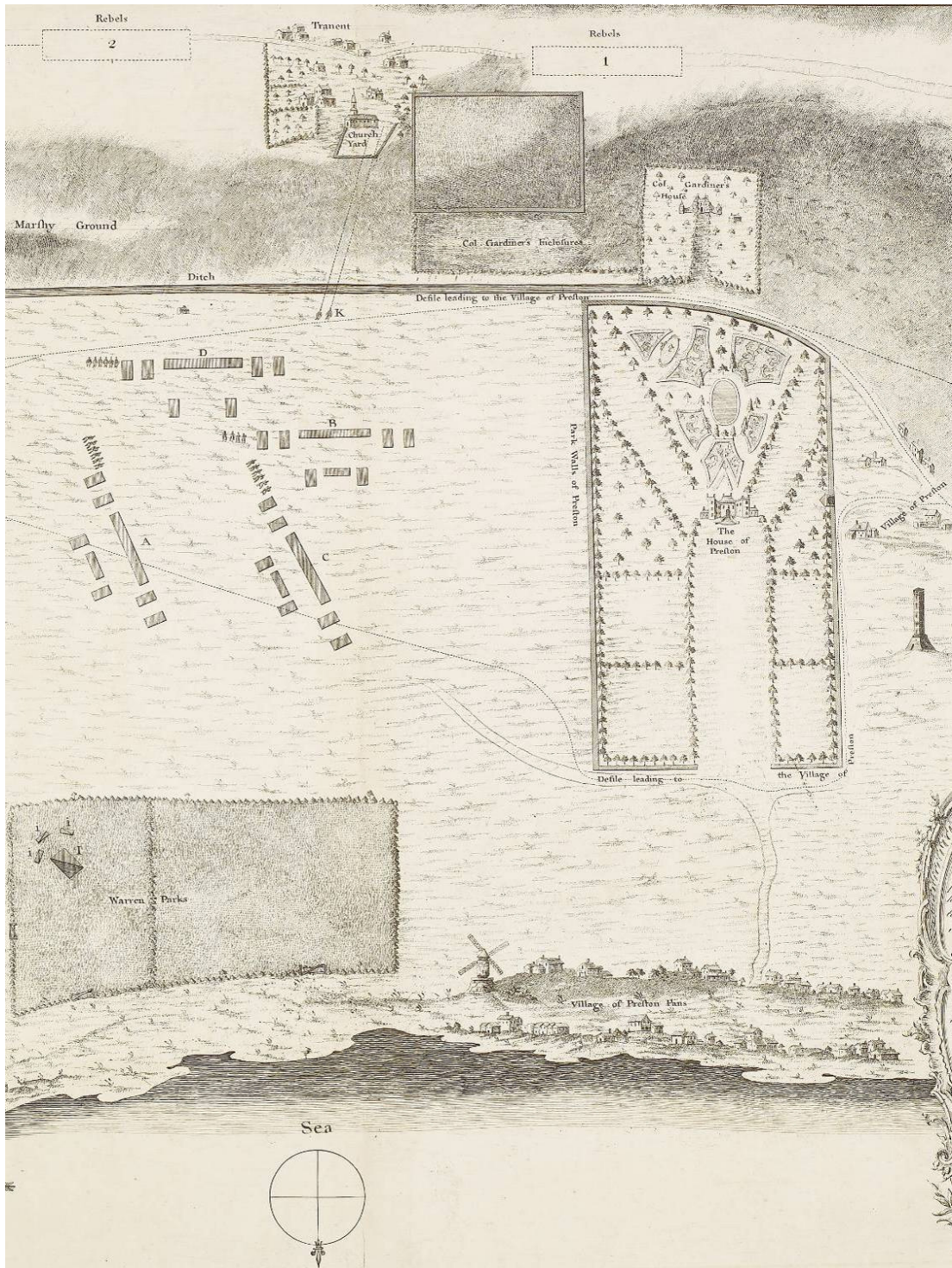


Figure 7.11 *Plan of the Battle at Preston 21st Septem^r. 1745. By an Officer of the Army Who was present. 'Publish'd according to Act of Parliament Decr. 21st 1745 to be had at Christopher Seton Engraver in Ordinary to his Majesty at the Golden Head in Suffolk Street Charing Cross'. South is to the top of the map. 729156 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).*

Jacobites first drew up was full of old coal-pit enclosures; terrain that was impracticable for a Highland charge.⁹⁰⁵

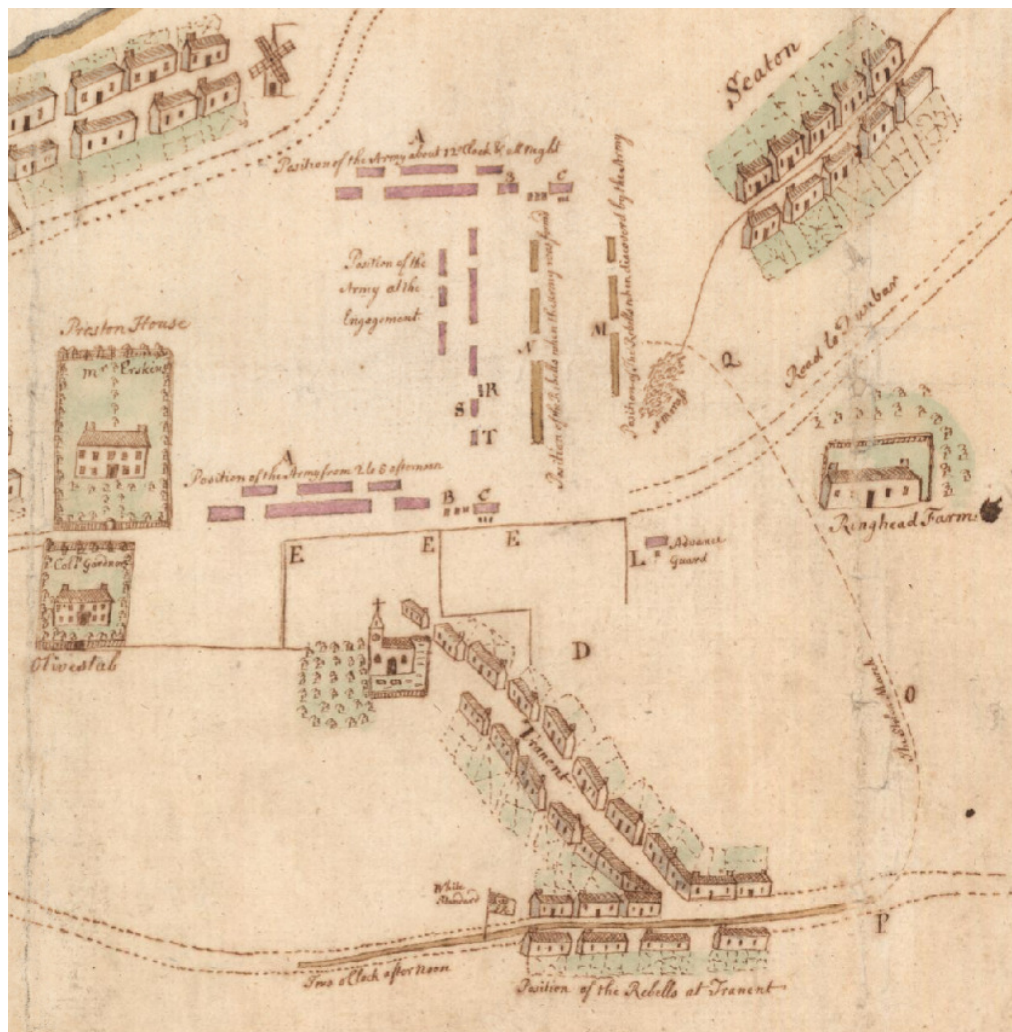


Figure 7.12 ‘A Plan of the Battle of Tranent fought Sept^r 21st 1745’ (Anon). Acc.8392 (Reproduced by permission of the Trustees of the National Library of Scotland).

Realising that their position on Falside Hill left the road to Edinburgh open, Charles Edward ordered two Battalions of Atholl’s Brigade to retire westward towards Musselburgh to block the bridge. Mistakenly believing that the Jacobites were going to attack his right flank, Cope redeployed for a third time to form a west-facing line (C), only for Atholl’s men to return and rejoin the main army. At nightfall, Cope made his fourth and final adjustment, moving his army further east, facing south across the marsh (D), to be in alignment with the Jacobite army redeployed to the east of Tranent (**Rebels 2**). From here, a ‘Wagon Way’ cut

⁹⁰⁵ RLW 729156.

across the marsh.⁹⁰⁶ Believing this was the only point across the marsh, Cope's men 'Lay on their Arms all night' in readiness for a Jacobite advance.⁹⁰⁷ But instead, the Jacobite army was guided by a local sympathiser well out to the east (see Fig 7.12 **P**) of the marsh from where they turned north (**O**) past the Hanoverian advanced guard (**L**) then west (**Q**) to approach the unprotected left flank of Cope's army (**A**).

In the early hours of 21 September, the Jacobite army 'advanced regularly to the Action' then formed in two lines on the field of battle. Cope, warned of their advance, responded with speed, wheeling his infantry to form a 669-pace line of battle facing east, parallel to the advancing Jacobites.⁹⁰⁸ In their haste, the Hanoverian army deployed too far north resulting in the armies outflanking each others' left.⁹⁰⁹ The first line of the Jacobite army, composed of Highlanders, outflanked the Hanoverian army by 100 paces (although some eye-witnesses said it was nearer 300 paces). Many of Cope's officers and spectators of the battle claimed that 'As the Rebel Army occupied 769 Paces, without any Interval in their Line [...] it could not consist of less than 3459 Men'. The second line, comprised of Atholl's men and Lowlanders, accounted for at least 2000 men.⁹¹⁰

Action began when Cope's artillery discharged and at the same time the Dragoons opened fire. Contemporary accounts of the battle published in Edinburgh claimed that:

the *Highlanders*, before they engaged, pulled off their Bonnets, and made a short Ejaculation to Heaven, then run [sic] forward, and received a full Fire; but, advancing, discharg'd, and then threw down their Muskets, and drawing their Broadswords gave a most frightful and hideous Shout, and rushed most furiously on his Majesty's Forces.

A considerable part of the Hanoverian army, largely made-up of raw recruits who lacked training and experience, broke and fled without engaging in combat. What little training they had received had not prepared them for the Highlanders' unconventional assault. The Highlanders 'carried everything before them; and in about seven or eight Minutes were absolute Masters of the Field'.⁹¹¹ Figure 7.13 illustrates the rout of the Hanoverian army. The draughtsman—'an Officer of the Army who was present'—managed to portray the dynamics of these brief moments of action by using the pictorial figures so popular with Bastide in his

⁹⁰⁶ RLW 729154.

⁹⁰⁷ RLW 729156.

⁹⁰⁸ RLW 729153.

⁹⁰⁹ Foard 2005.

⁹¹⁰ RLW 729153. Contemporary reports were that 'the Number of the *Highlanders*, that appeared on the Spot, did not exceed 1500, and that only 1000 of them engaged [sic] [...] Others say [...] that the Number of Rebels, that formed, at most did not exceed 2000, and that Part of them could not engage' (NLS EMS.s.90a).

⁹¹¹ NLS EMS.s.90a.

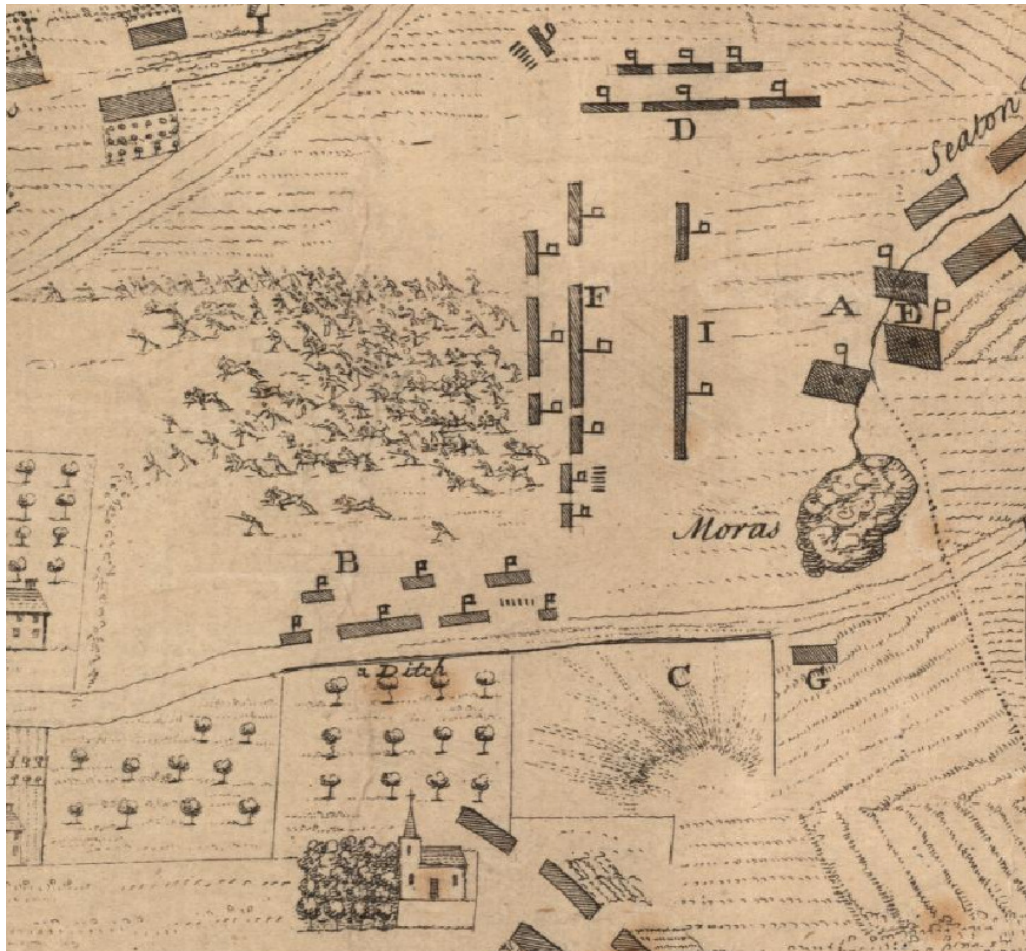


Figure 7.13 *A Plan of the Battle of Preston Pans fought 21st Sep^r 1745*, [Anon], showing the Hanoverian army in flight. ‘Sold by J. Collyer, at *Shakespear’s-Head*, in Ludgate Street; and G. Woodfall, at the *King’s-Arms* near Charing-Cross 1745. (Price 1s. plain, 1s. 6d. coloured.)’. EMS.s.90a (Reproduced by permission of the Trustees of the National Library of Scotland).

maps of Glenshiel, amidst the cartographic formality of conventional rectangular symbols. Three possible inferences can be made from this style of depiction. The first, that the officer was a Jacobite and just as Bastide had portrayed the chaos and panic of the routed Jacobite army at Glenshiel in this way, the officer was intent on a reader forming the same opinion of the Hanoverian army—leaderless, disordered, and deserting. The second, that this cartographic style—the use of pictorial figures—was a common symbol for a routed army, whether an ally or an enemy. Thirdly, as a style, it made for sensationalistic contemporary cartographic journalism. News maps of the Battle of Prestonpans may have been a way of showing overt support and admiration for the tactical manoeuvring of the Jacobite army, encouraged by Scotland’s dissent towards Hanoverian rule.

In describing the Battle of Prestonpans, the use of cartographic records has proved invaluable. Any variation in the cartographic depiction of events beyond an individual map

maker's artistic style can be attributed to variations in the operational circumstance under which battle maps or plans were made.⁹¹² In the case of Prestonpans, the plans were made as retrospective records and any depictive discrepancies can be attributed to the spectators' recounting of what they saw and what they could remember. To eighteenth-century military commanders, instructors of the military sciences and their pupils, the ruling elite, and, possibly in this case, to a court-marshal board, cartographic descriptions of battles were vital, for 'a literal description without a drawing cannot give a proper idea' of events.⁹¹³ Roy himself argued that 'from a plan of this kind [...] a much truer notion may be obtained [...] than what, without such assistance, could possibly be conveyed in many words'.⁹¹⁴

The Battle of Falkirk [Muir], 17 January 1746

Following their victory at Prestonpans, the Jacobite army marched into England as far as Derby. When the expected support from France and an English Jacobite uprising failed to materialise, however, the army retreated to Scotland. On 5 January 1746, the Jacobites took the town of Stirling. Stirling Castle, having undergone almost continuous refortification since the Union, withstood their advance and remained in Hanoverian control under the command of Major-General William Blakeney.⁹¹⁵ In response to the Jacobite siege of the castle, a Hanoverian army commanded by Lieutenant-General Hawley marched north, stopping at Edinburgh to assemble more troops, before marching north-west towards Stirling. Charles Edward, intent on confronting Hawley before he reached Stirling, marched a Jacobite force to Plean Muir south-east of the town. The Hanoverian army, meanwhile, moved more slowly and late in the afternoon of the 16 January they encamped on low-lying ground between Falkirk and Carron Water to the north (see Fig 7.14).⁹¹⁶

Three maps illustrate events, from the evening of the 16 January to the commencement of the Battle of Falkirk on the 17 January 1746.⁹¹⁷ Two of the maps, both by William Cuninghame an Engineer in Ordinary,⁹¹⁸ are almost identical; one is shown as figure 7.14. The only notable difference is the inclusion, on the second map, of a title cartouche and a dedication to the Duke of Cumberland (see Fig 7.15). It is likely that this map was drawn at a later date than the first (a fair copy), less a commemoration since Falkirk proved to be another unmitigated defeat for the Hanoverian army but rather as a record of the army's

⁹¹² Harley 1978.

⁹¹³ Vallancey 1779, quoted in Marshall 1981, p. 4.

⁹¹⁴ Roy 1793, pp. 155–156.

⁹¹⁵ See, for example, TNA WO 49 'Estimates 1639–1850: mainly for fortifications and works'.

⁹¹⁶ Szechi 1994; Duffy 2003; Foard 2005

⁹¹⁷ NLS EMS.s.164 by J.M.; RLW 730010 and TNA MPF 1/350 both by William Cuninghame.

⁹¹⁸ TNA WO 54/209, pp. 10–12, *Establishment* for 1745.

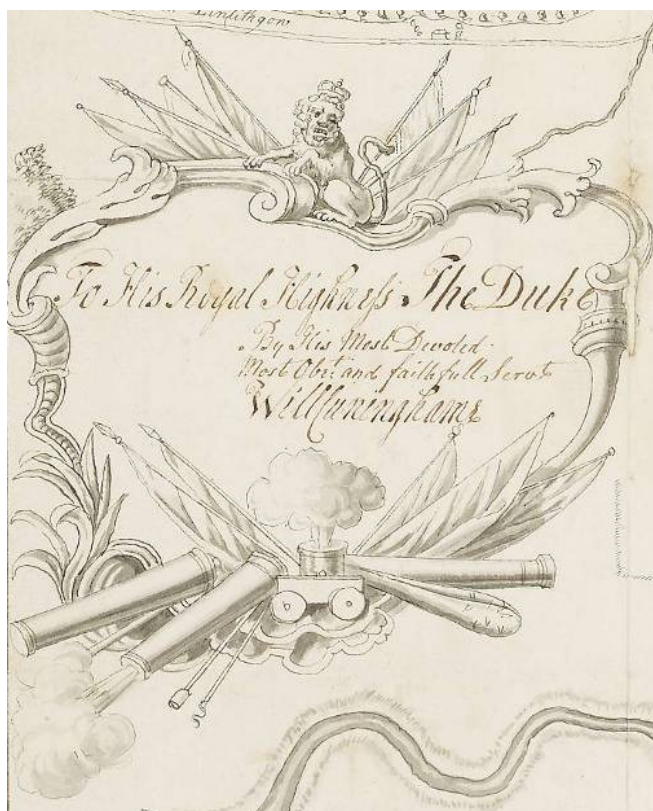


Figure 7.15 Cartouche from a [Map of the Battle of Falkirk], by William Cuninghame, 1746. 730010 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).

tactical manoeuvres and sequence of troop deployments in relation to the topography. The terrain on which the battle was fought was particularly difficult and was used to great advantage by the Jacobites who took the initiative, leaving Plean Muir in the early hours of 17 January to march to and deploy on commanding ground to the south west of Falkirk, on Falkirk Muir, an uneven rolling plateau that dominated the Hanoverian encampment (see Fig 7.14 O ‘The Rebel Army as they moved up the Hill, and engaged on the highest Ground’). The military potential of the upland had already been recognised by the Romans who built a stretch of the Antonine Wall along the ridge just to the north of Tamfour and what was eventually to be the site chosen by the Jacobites for the battle of Falkirk in 1746 (see fig 7.16). In introduction to his *Military Antiquities*, William Roy suggested, rather poignantly in this case, that:

The nature of a country will always, in a great degree, determine the general principles upon which every war there must be conducted. In the course of many years, a morassy country may be drained; one that was originally covered with wood, may be laid open; or an open country may be afterwards inclosed [sic]: yet while the ranges of mountains, the long extended valleys,

and remarkable rivers, continue the same, the reasons of war cannot essentially change. Hence it will appear evident, that what, with regard to situation, was an advantageous post when the Romans were carrying on their military operations in Britain, must, in all essential respects, continue to be a good one now.⁹¹⁹



Figure 7.16 Plan shewing [part of] the course of the Roman wall called Grime's Dyke [Antonine Wall], by William Roy in 1755. The extract covers the same ground as that shown in William Cunningham's plan (MPF 1/350) but north is to the top of the page here. Plate XXXV, Newman.360 (Reproduced by permission of the Trustees of the National Library of Scotland).

Mistakenly believing the Jacobites were not intending to engage his army but rather to by-pass it and march south to England, Hawley ordered 'three regiments of dragoons to march to the Muir, and take possession of the high ground between them and the rebels: he ordered the infantry to follow'.⁹²⁰ Hawley's initial (and rather late) intent was to intercept the Jacobite army and force them to engage. John Home, a volunteer with the Hanoverian army, wrote that 'in this conceit [...] the conflict happened upon a piece of ground which he [Hawley] had never viewed, and was a field of battle exceedingly disadvantageous to his

⁹¹⁹ Roy 1793, p. i.

⁹²⁰ Home 1802, p. 167.

troops'.⁹²¹ The Hanoverian army had a steep climb (**H**) into a strong south-westerly wind and driving rain, and the Jacobites, gaining the high ground ahead of the Dragoons, wheeled to face east (**O**) so their backs were to the storm and their right flank protected by a morass. Both armies began to form up in two lines, roughly north-south, with a steep scarp defining the battlefield on the north side and the marsh to the south. A steep-sided ravine running from the scarp summit to the low ground to the south separated the northern flanks of the armies but in the centre and south it was open sloping ground (see Fig 7.17).⁹²² Curiously, the Hanoverian right wing outflanked the Jacobite left which if taken as a deliberate offensive strategy was pointless on account of the intervening ravine.



Figure 7.17 An extract from a [Map of the Battle of Falkirk], by William Cuninghame, showing the deployment of the armies at the start of the battle, 17 January 1746. 730010 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).

If the explanation on the map is to be believed, the Hanoverian army once again displayed a high degree of order and discipline in taking up position—‘**I** Where the Dragoons first Form’d’, ‘**L** The Dragoons as they Engaged’, ‘**M** The Foot as they were form’d when the Dragoons Engag’d’—and the Jacobite army easily routed, ‘**S** Where

⁹²¹ Home 1802, p. 176.

⁹²² Home 1802; Duffy 2003; Foard 2005.

Barrells and Ligoniers Regiments pursued the Left of the Rebels [sic] after they were broke'.⁹²³ The latter indicates that Cunningham witnessed the battle, or at least acquired the information from a participant in or a spectator to it, and drew his plan after the event despite the image's suggestion of a pre-engagement plan. The maps give no visual indication of the following action that took place. As it was, the Dragoon charge failed after a violent encounter with the Highlanders: 'The resistance of the Highlanders was so incredibly obstinate, that the English, having been for some time engaged pell-mell with them in their ranks, were at length repulsed and forced to retire'.⁹²⁴ In their flight, the Dragoons rode over a Company of the Glasgow Regiment who then failed to reform in time to defend themselves against the Highlanders in pursuit of the retreating Dragoons. The Hanoverian right wing, however, held their line against the Jacobites, protected by the ravine, and in the intense barrage of musket fire, some Jacobites did take flight. Failing light and bad weather discouraged Hawley from seeing this small advantage through to the end and rather than going on the offensive, he retreated to his camp at Falkirk then back towards Edinburgh.⁹²⁵ The Jacobites were effectively left in command of the field.

The Jacobites claimed a victory and at least one map survives as an important piece of propaganda: a 'Plan of the Victory of Falkirk Muir fought the afternoon of January 16 1746'.⁹²⁶ The plan is little more than an order of battle showing the front line of the Hanoverian army and the 'Kings Army led by the Prince and consisting of Gentlemen of Rank from the Highlands'. Importantly, the regimental lines are depicted in relation to the topography which proved such a strategic advantage to the Jacobites and a tactical disadvantage for Hawley's army. The Hanoverian army, however, did not see Falkirk as a defeat. According to Hawley, they were 'masters of the field of battle',⁹²⁷ which may in part explain the pseudo-commemorative nature of Cunningham's maps and the misleading nature of the information he depicted which failed to describe events during and after battle. The fact that his maps were official records of the battle to inform, in this case, the Duke of Cumberland but as easily the king or the Board of Ordnance clearly and accurately about the events of the battle lent the maps an air of trustworthiness.⁹²⁸ In their production, Cunningham's maps were a form of Hanoverian propaganda. A version of his map was

⁹²³ RLW 730010

⁹²⁴ Quoted in Duffy 2003, p. 417.

⁹²⁵ 'The evening being excessive rainy, it was thought proper to march the troops to Linlithgow that night' (TNA SP 54/27/29A: a letter from Lt. General Hawley to Secretary Newcastle, 17 January 1746).

⁹²⁶ NLS EMS.s.164, by J. M.

⁹²⁷ TNA SP 54/27/29A, a letter from Hawley.

⁹²⁸ William Cunningham was an Engineer in Ordinary in the Military Establishment of the Board of Ordnance at the time of the 'Forty-Five' (TNA WO 54/209, pp. 10–12, March 1745).

published in *The London magazine, and monthly chronologer* to accompany a narrative of events.⁹²⁹

The Battle of Culloden 16 April 1746

On the 16th the Duke came up with the rebels a little on the side of Inverness—by the way, the battle is not christened yet; I only know that neither Prestonpans nor Falkirk are to be godfathers.⁹³⁰

The battle was Culloden. One of the best documented battles, Culloden is also one of the best mapped. There are thirty-two maps of the battle in the archive, most of them split between the Cumberland Collection and private papers although a few of the latter were drawn by Joseph Yorke, Cumberland's *Aide-de-Camp*.⁹³¹ The authors and the maps themselves give a more precise indication of when they were actually drawn, whether before battle as a pre-planned battle order sometimes changed at the last minute, a sketch made immediately after the battle, or post-battle records of the event, mostly commemorative but at least one displaying a sympathetic end to the ideology of Jacobitism.⁹³²

Chapter 6 has described how, by the time he reached the battlefield at Culloden, Cumberland had perfected the Hanoverian army's 'Order of March' to the extent that it could 'swing' straight into the predetermined order of battle as it marched:⁹³³ 'we marched in four columns, and by the ruff of a Drum formed instantly in to order of Battle'.⁹³⁴ There are a number of copies of the Hanoverian battle order, most of them neat copies, but one in particular conveys an immediate image of last-minute adjustments which were presumably made to take account of the groupings of the enemy forces (see Fig 7.18).⁹³⁵ The plan has been folded several times as if kept in a pocket or orderly book and has multiple crossings out as the troop deployment was revised. Of the few records of the Jacobite army's order most were included on the same sheet as the Hanoverian order but one plan—an order of

⁹²⁹ *The London magazine, and monthly chronologer*, Vol. 15, [1746], p. 98 for the map, pp. 41–42 for the text.

⁹³⁰ RLW 730023, a letter from Walpole, written on Friday 25 April 1746, to Sir Horace Mann (notes with a 'Plan of the battle of Inver-ness fought Apr. 16 1746', by Daniel Paterson).

⁹³¹ BL Additional Ms. 35354, f. 222, a *Rough sketch taken on the spot*; Additional Ms. 35889, ff. 107 and 111–112, a 'Sketch and a Rough Sketch of the Action at Collodon' [sic]; Additional Ms. 36257, ff. 75 and 100, an unfinished sketch and an Order of Battle.

⁹³² This last is artillery ordnance master in the battle, John Finlayson's map of which there are several copies: BL Maps *9115.(3.); NLS EMS.s.156; RLW 730031; and TNA MPF 1/1.

⁹³³ RLW 730025 'Plan of the Battle of Collodden' [sic] by [?Henry] Schultz, 1746, showing battle preliminary information.

⁹³⁴ BL Additional Ms. 14,257.fol.6*, 'A plan, in pen and ink, of the order of battle of the rebel army at the battle of Culloden, 16 April, 1746', by Dr. Richard Pocock, with text to accompany it, ff. 6–11.

⁹³⁵ There are neat copies of this 'Order of Battle', presumably made at a later date: RLW 730017 and 730018. Maj. Gen. Huske's name has been added in pencil to 730017.

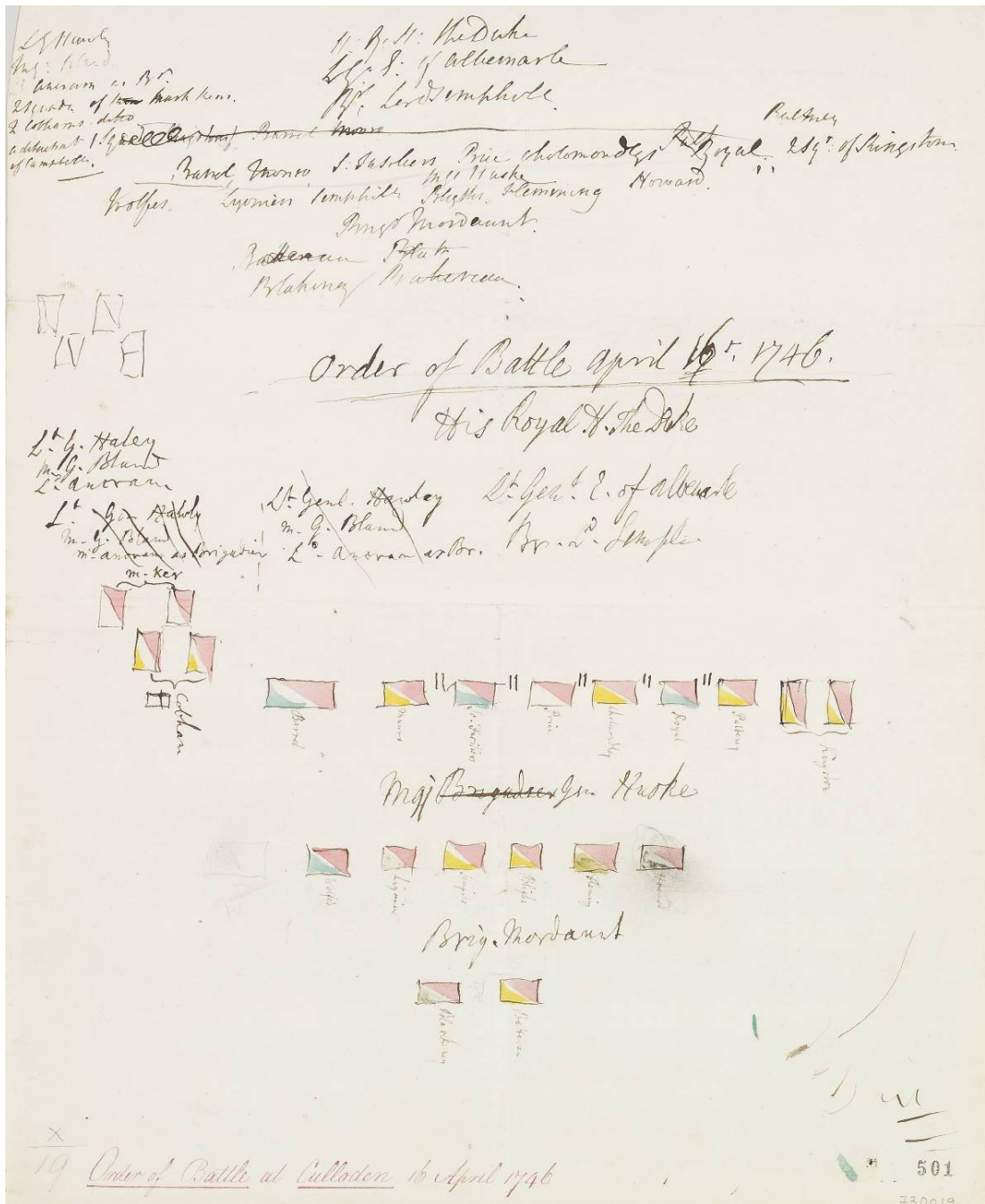


Figure 7.18 [Planning the] ‘Order of Battle’ [at Culloden] April 16th. 1746. 730019 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).

‘His Royal Highness’ Prince Charles Edward Stuart’s Army—was drawn by a Jacobite and included the number of men in each clan or ‘cell’, the Jacobite army totalling 8350 men.⁹³⁶ Two neat copies of this plan replace ‘His R: Highness’ with ‘The Pretender’ thereby

⁹³⁶ RLW 730021, [Order of Battle at Culloden 16 April 1746, of His Royal Highness].

indicating a change of authorship.⁹³⁷ All these ‘orders of battle’ are devoid of topographical detail by which to determine how, if at all, the battlefield landscape was used in deciding the strategic positioning of the various army divisions.

The earliest surviving map of the battle in action is possibly Joseph Yorke’s ‘Rough sketch taken on the spot’.⁹³⁸ The sketch was sent with a letter to his father the Lord Chancellor Philip Yorke, 1st Earl of Hardwicke, on 18 April 1746. It was then sent on to George II: ‘As the inclosed [sic] letter may possibly contain some minute particulars of the last Glorious day [...] I humbly beg leave to lay it before Your Majesty’s feet [...] it is accompanied with a rough Sketch of the Action, drawn on the field of Battle’.⁹³⁹ Yorke’s sketch was basic and included very little in the way of explanation or labels apart from ‘Cavalry wth Hawley’ and ‘2 Platoons of the Argyle Militia’. His draught did, however, include the walled areas between the Jacobite army and the River Nairn—the Culwhiniac enclosure—and the Hanoverian cavalry’s breach of it, as well as the disposition of the artillery. In front of the Hanoverian army’s left flank, Yorke marked an ‘X’ with a note: ‘Where the Hottest of the Action was’. An eye-witness account described this action:

Our forces to the left were drawn up on a rising ground much lower than theirs [the Jacobites] [and] stretching beyond their right line with a small shallow valley and a bed of a winter stream between them [...] We had twelve Cannon in front, four at each end, and four in the middle; [...] and behind the first line our Cohorns [sic] played; tis said the enemy intended to wait our attack, but our whole artillery played so briskly on them and galled them so terribly, that their right, some say, without order, advanced with a great fury in a highland trot in a deep column and in an unsoldier-like manner firing without order and moving sideways with their targets and broad swords as to stretch out to the length of our left wing; we kept our fire till they were near; but not withstanding, they broke the first line of Barrell’s Regiment on our left, and being let in, they were flanked by them, and met by the second line in front who tis thought by their fire killed several of Barrell’s mixed with the enemy.⁹⁴⁰

When Cumberland’s army encamped at Inverness in the wake of the Battle of Culloden, Yorke noted in his Orderly Book an instruction that ‘All Paper, Letter,

⁹³⁷ BL Additional Ms. 33954, ‘Order of Battle of the Rebel Army’; and Additional Ms. 35889, ff. 113–114, a pen and ink sketch plan of the ‘Rebel Army’.

⁹³⁸ An unfinished version appears in Yorke’s ‘Orderly Book 1746’, BL Additional Ms. 36257, f. 75. The sketch formed the basis for the map sent 2 days later to his father, Additional Ms. 35354, f. 222.

⁹³⁹ BL Additional Ms. 35354, f. 223, letter from Philip Yorke to the King, 26 April 1746.

⁹⁴⁰ BL Additional Ms. 14,257.fol.6*, ff. 6–9, Richard Pocock.

Commissions, Maps or Plans taken in the Field of Battle or since, to be brought to H.R.H. Qrs. & delivered to Sr. Everard Fawkener', Cumberland's private secretary.⁹⁴¹ This may explain why there are substantially more maps of Culloden than any of the other battles and why several of these are almost identical, commemorative maps produced by the Duke's personal draughtsmen—[Henry] Schultz, Thomas Sandby, and Dugal Campbell. On 7 May 1746, the Duke of Montagu, Master General of the Ordnance, wrote to Fawkener that he 'had given directions for Mr Dugal Campbell [...] to attend His Royal Highness [...] there are none [...] that are so proper to execute his Royal Highness commands as Mr Dugal Campbell'.⁹⁴² Campbell compiled a plan of the Battle of Culloden that was remarkably similar in design and content to one by Thomas Sandby, Cumberland's 'Draughtsman and Designer' (see Fig 4.15 for Sandby's).⁹⁴³ Sandby claimed to have drawn his at Inverness on 23 April, a week after the battle, which implies that Campbell's plan is a copy according to the date of Montagu's recommendation to Fawkener. Campbell's version was engraved and published by 'Authority' and 'Sold by M. Overton, in *Fleet-Street*, and C. Mosley, at the *Golden-Head*, in *Hart-Street*, the Upper-end of Bow-Street' (see Fig 7.19). It was advertised in the *General Advertiser* for 2 July 1746 as 'an exact plan having been transmitted to a Nobleman in Town. Drawn by D. Campbell, Engineer to the Duke, is now engrav'd on a Sheet Copper-Plate'.⁹⁴⁴

By printing and distributing a version of these plans, the government's intent was to celebrate the discipline and order of the King's Army. An eye-witness to the battle recounted how Cumberland's troops 'formed in Line of Action according to the Instructions received in the Morning, which was done with great Beauty of Discipline and Order'. In contrast, the Jacobite commanders, having observed 'the great Execution [...], thought to revenge it by making a desperate Attack at once; and immediately like Wildcats their Men came down in Swarms upon our Left Wing'.⁹⁴⁵ Comparisons of Cumberland's military prowess on the battlefield and the strategic errors of the Jacobite command became central to the numerous printed journals and pictorial accounts of the Battle of Culloden.⁹⁴⁶ In meeting the public's demand for cartographical journalism and news of heroic victories, the maps fulfilled an important political function: one of propaganda.⁹⁴⁷

⁹⁴¹ BL Additional Ms. 36257, f. 60, 'Camp of Inverness. Wednesday'.

⁹⁴² RLW 730026 'Plan of the Battle of Culloden'.

⁹⁴³ Hodson 1988, p. 6.

⁹⁴⁴ Hodson 1988, p. 8.

⁹⁴⁵ Hughes 1746, pp. 38 and 41.

⁹⁴⁶ Bonehill and Daniels 2009.

⁹⁴⁷ Godlewska, Létourneau and Schauerte 2005; Luijk 2008.

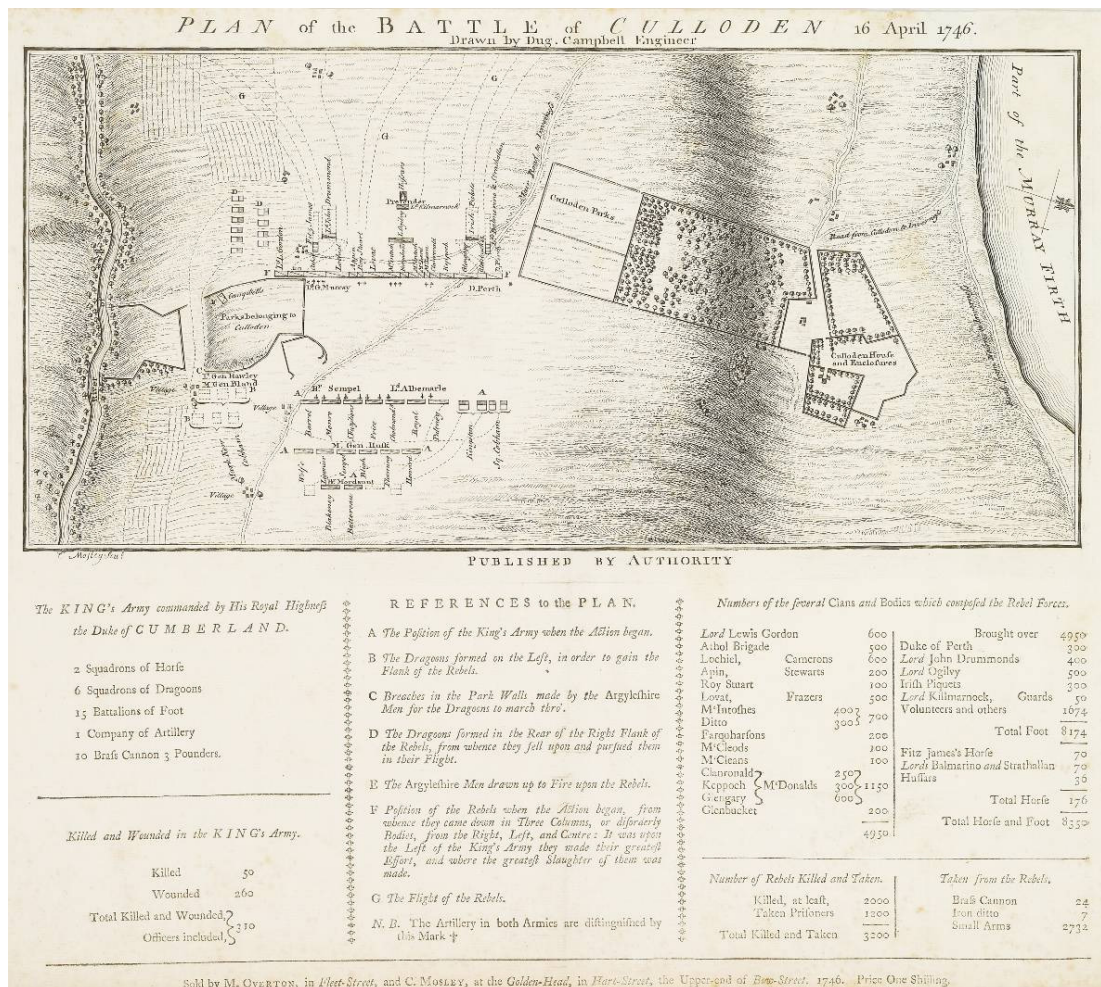


Figure 7.19 Plan of the Battle of Culloden 16 April 1746, by Dugal Campbell. 730027 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).

Both Sandby's and Campbell's plans are arguably the most informative and authoritative with the inclusion of detailed topographical information—Culloden House, its 'Parks', stone walled cultivated fields and enclosures on the south side of the moor, and streams running down to the River Nairn—the strategic positioning of the fighting units, and textual information on the compositions of the armies, the numbers killed in action, and an alpha-key to explain the dynamics of the plan. Both armies are shown in position when the action began, thereafter, the only movements shown in detail are those of the Dragoons: 'C Breaches in the Park Walls made by the Argyllshire Men for the Dragoons to march thro' and 'D The Dragoons formed in the Rear of the Right Flank of the Rebels, from whence they fell upon and pursued them in their Flight'. Sandby's and Campbell's plans could, in fact, be neat copies of the more 'scientific depiction' attributed to [Henry] Schultz, 'Cumberland's

draughtsman' (see Fig 7.20).⁹⁴⁸ Schultz's plan, however, included more preliminary battle information: 'A. The Army on its march in 4 Columns & forming in order of Battle'; 'B. The March of the Army in Order of Battle'.⁹⁴⁹

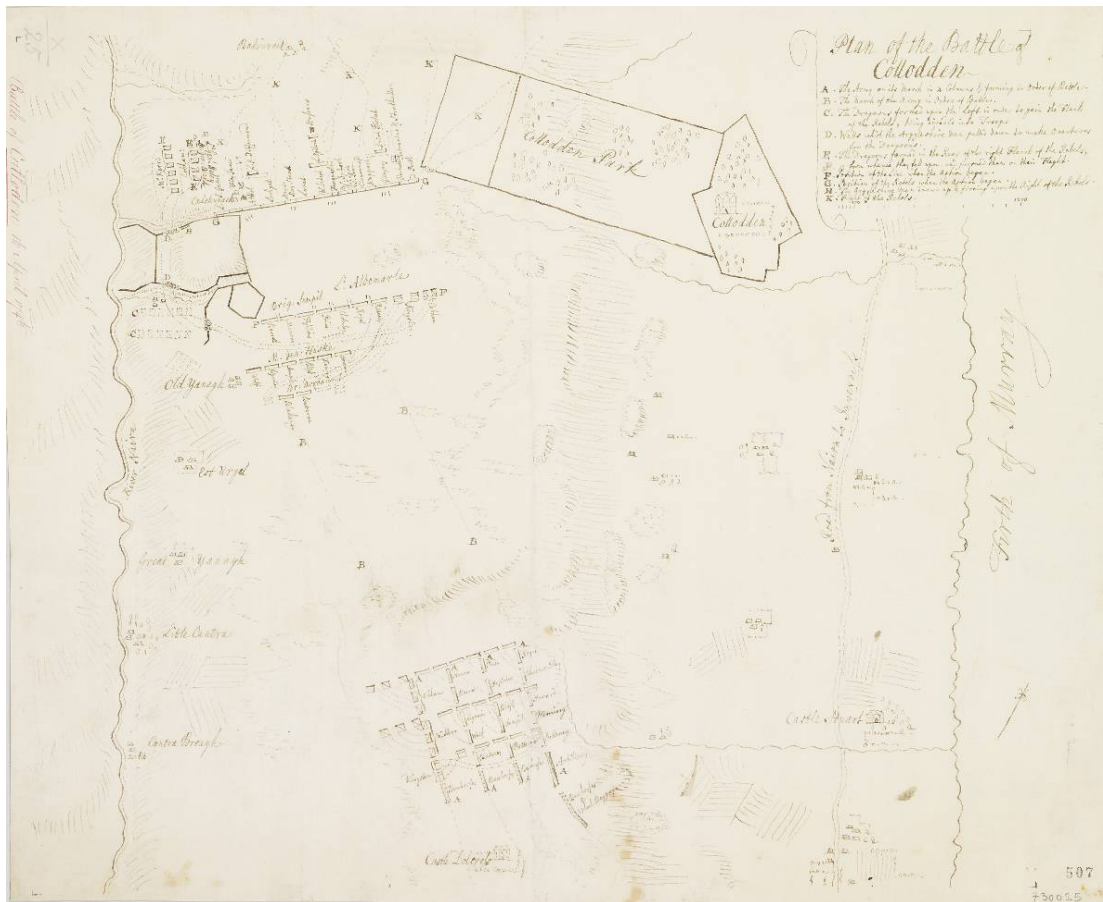


Figure 7.20 'Plan of the Battle of Collodden', by [?Henry Schultz], 1746. 730025 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).

Another contemporary map was compiled by Jasper Leigh Jones, a 'Lieut^l. Fireworker in ye Roy^l. Train of Artillery' (see Fig 7.21). As with Schultz's plan, Jones illustrated something of the march of the Hanoverian army prior to battle although he showed an obvious interest in the disposition of the artillery. He signified to the artillery train to the left of the main military march with labels for 'Cannon' and 'Tumbrells'. His depiction of the action was once again focused on the artillery, with little attention paid to the Dragoons and their breach of the Culwhiniac enclosures. On the Hanoverian side, he

⁹⁴⁸ Hodson 1988, p. 6.

⁹⁴⁹ RLW 730025, 'Plan of the Battle of Culloden,' by [?Henry] Schultz.

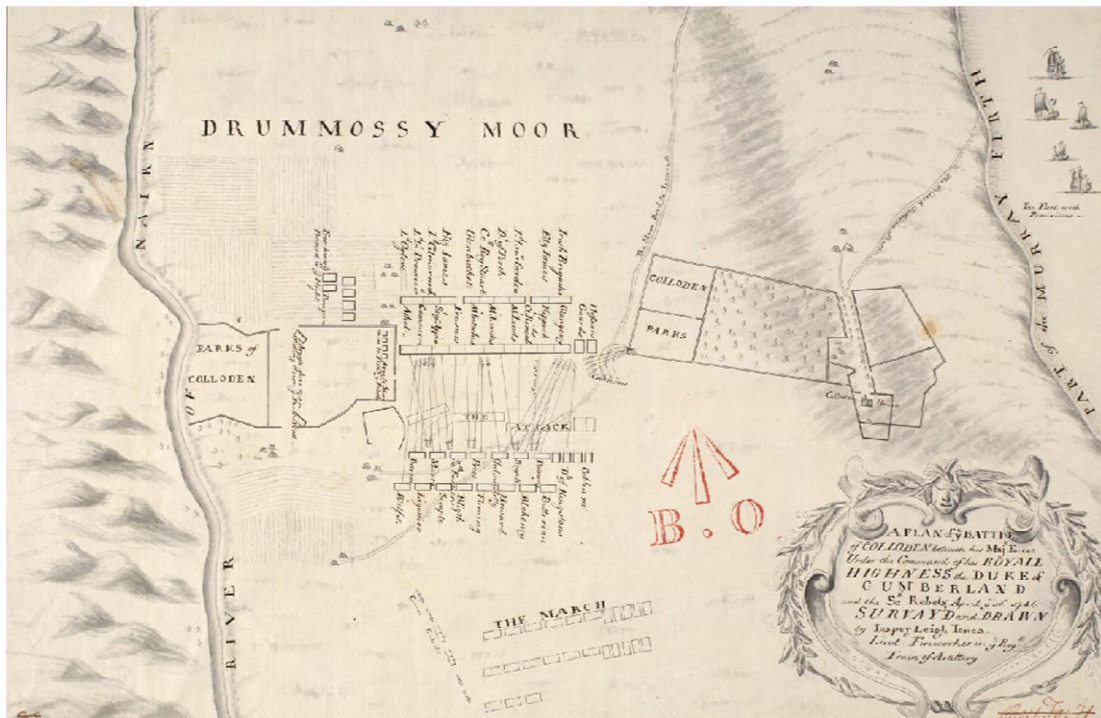


Figure 7.21 ‘A Plan of ye Battle of Colloden between his Majts. Forces Under the Command of his Royall Highness the Duke of Cumberland and the Sctt. Rebels April ye 16 1746’, by Jasper Leigh Jones, 1746. MS 1648 Z.03/30b (Reproduced by permission of the Trustees of the National Library of Scotland)

showed five groups of two cannon positioned in advance of the front line.⁹⁵⁰ Four further cannon and three Coehorn mortars were depicted in a forward position to the south east of Culloden Park. These cannon and Coehorns were in fact ‘time-lapsed’ depictions, having been brought up from the Hanoverian front line during the battle.⁹⁵¹ The Jacobite army, according to this plan, had two centrally positioned cannon flanked on either side by groups of five cannon. Between the armies’ front lines, Jones marked the advance of the Hanoverian army as ‘THE ATTACK’ and showed, with apparent scientific accuracy, the trajectory of the cannon and mortars.

On the right of his map, Jones depicted a Royal Navy flotilla in the Moray Firth—‘The Fleet with Provisions’. Two other map makers also represented the Fleet. The first, an unknown French Officer who compiled, probably before 1748, a ‘Plan exact de la disposition des Troupes Ecossoises sous le Commandement de son A.R.P.C. et de Celle des Troupes Anglaises’ (see Fig 7.22). The letters ‘A.R.P.C’ stand for ‘Prince Charles Edward Stuart’ and the map is dedicated to ‘Sa Majeste tres Chretienne’ (Louis XV) by ‘un Officier

⁹⁵⁰ There is some discrepancy in the number and positioning of both armies’ cannon. An eye-witness to the battle recounts that the Hanoverian army ‘had twelve Cannon in front, four at each end, and four in the middle’ (BL Additional Ms. 14,257.fol.6*, Richard Pocock).

⁹⁵¹ Woosnam-Savage forthcoming.

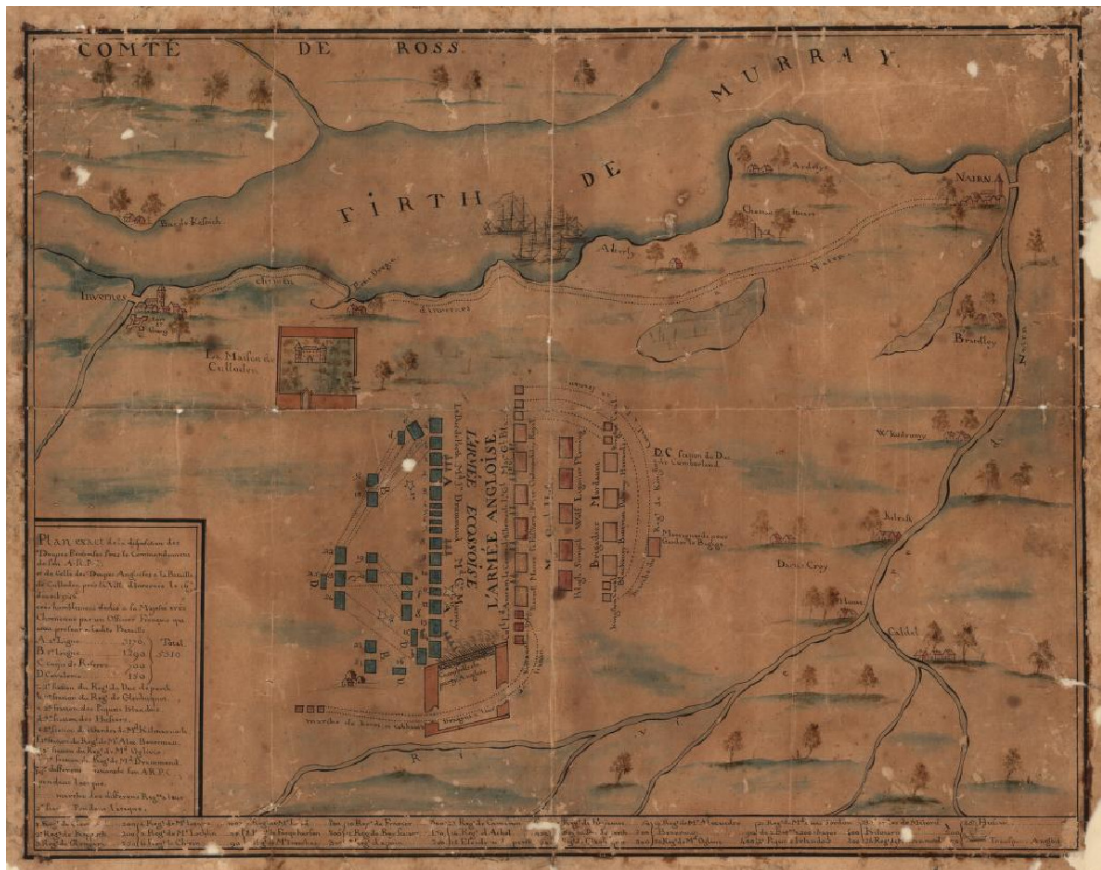


Figure 7.22 ‘Plan exact de la disposition des Troupes Ecossoises sous le Commandement de son A.R.P.C. et de Celle des Troupes Anglaises a la Bataille de Culloden pres la Ville d’Inverness le 16 d’avril 1746’, c.1748. Acc.11323 (Reproduced by permission of the Trustees of the National Library of Scotland).

Francois qui etoit present a la dite Bataille’. Robert Woosnam-Savage suggests that the ‘Officier’ may have been in the *Royal Ecossois* or Irish Picquets since the map shows more detail than any other of the centre rear of the Jacobite army.⁹⁵² Although the officer has shown the disposition of the opposing armies using conventional abstract symbolism and in considerable detail—Charles Edward Stuart is shown no less than three times: firstly, in advance of the front line; secondly, behind the left flank; and thirdly, behind the right flank of the Jacobite army—his representation of the geography was debatable. Margaret Wilkes has suggested that the officer’s interpretation of the coastline of the Moray Firth owes more to the Firth of Forth and that he may ‘have used an existing map of the Battle of Prestonpans as his topographical source’.⁹⁵³ Whether this was the case or not, a comparison of Ardersier Point (below the ‘MUR’ of ‘MURRAY’) with many of Skinner and Tarrant’s plans of Fort George and its environs shows how poor the coastline depiction on this map was. The map’s

⁹⁵² Woosnam-Savage forthcoming.

⁹⁵³ Wilkes 1996, p. 2.

merit lay in its detailed account of the Jacobite army's movements—depicted as more orderly and tactical than on any other map—and a unique glimpse of the changing movements of Charles Edward, possibly in response to the changing intensity of the Hanoverian cannonade. How truthful these positions were and, indeed, how truthful the map was is questionable if one takes into account the poor geography. At the time of its making, however, the plan would have proved an effective piece of Jacobite propaganda.

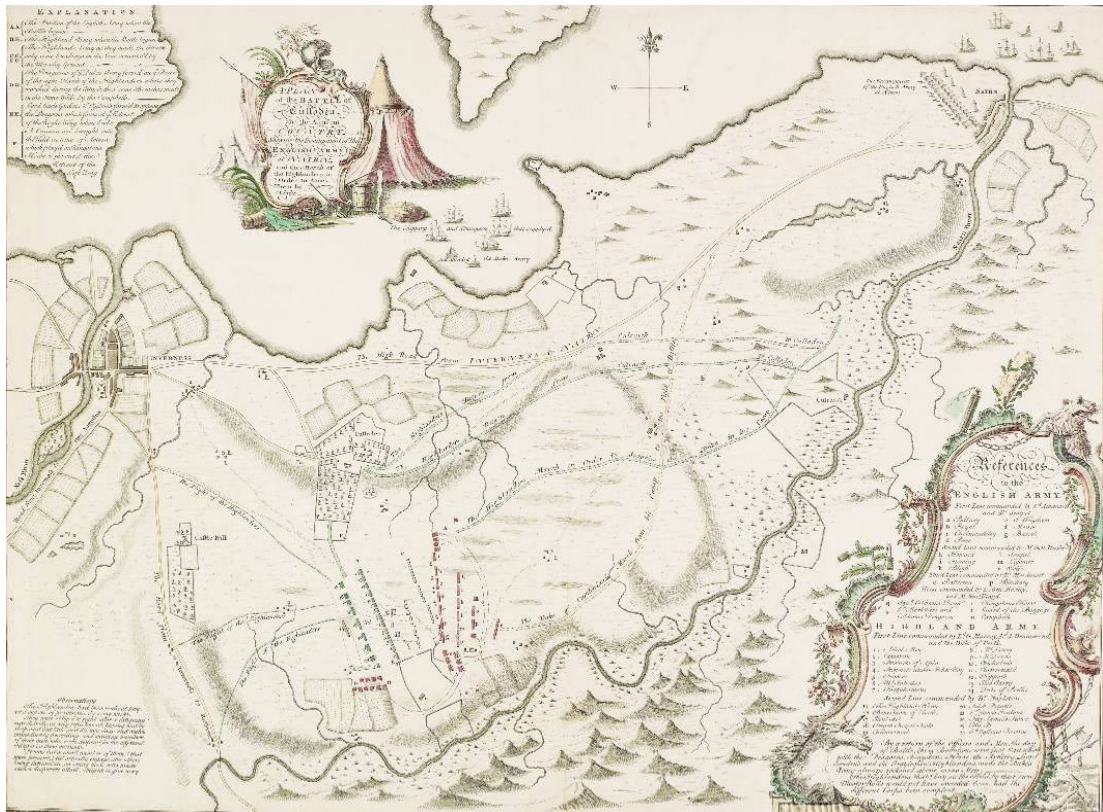


Figure 7.23 *A Plan of the Battle of Culloden and the Adjacent Country Shewing the Incampment of the English Army at Nairn and the March of the Highlanders in Order to Attack Them by Night*, by [John Finlayson], [c.1748]. 730031 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).

The second map maker after Jones to show the Navy Fleet was mathematical-instrument maker John Finlayson who also served as Charles Edward's engineer and commissar and acted as artillery ordnance master in the battle. Finlayson's map was acknowledged by contemporaries as 'the best plan of the encounter' (see Fig 7.23).⁹⁵⁴ There are four copies in today's archive, none dated but one has a manuscript note stating 'January the 18th 1753. Seized upon John Finllayson. By me N. Carrington'.⁹⁵⁵ They were all compiled after 1748; Finlayson's inclusion of an outline of a fort at Ardersier Point

⁹⁵⁴ Webster 2005, p. 200.

⁹⁵⁵ TNA MPF 1/1 'seized by Carrington'; BL Maps *9115.(3.); NLS EMS.s.156; and RLW 730031.

corroborates this.⁹⁵⁶ His cartographic narrative started with the Hanoverian army's encampment at Nairn on 15 April, the Duke's birthday, and where 'they say it was a fine sight to see the fleet and from ports with provisions sail as our army moved, and cast Anchor every night, and brought provisions ashore to our Camp'.⁹⁵⁷ In contrast, Finlayson observed that 'The Highlanders had been without pay, and scarce of provisions for some weeks'.

Believing the Hanoverian army would be busy celebrating the Duke's birthday, the Jacobites affected a night attack of the camp only to get lost in the mist and fail to rendezvous. Finlayson illustrated the Jacobite movements and then, the following day, the Duke's march towards Culloden. The Jacobites had been 'obliged to fight after a fatiguing march, without any refreshment: having had no sleep and but little food the two days and nights immediately preceding [sic]: and wanting numbers of their men, who were disperst in the adjacent villages'. As with the French Officer's map, Finlayson defined the Jacobite movements as 'time-lapsed' events: '**B.B.** The Highland Army when the Battle began' then '**C.C.** The Highland Army as they made the Attack only some breakings in the Line occasion'd by the Marshy Ground'. On all accounts, 'It was but a small number of them (that was present) did actually engage, the others being intimidate[d] on seeing those who made such a desperate attack, obliged to give way'.⁹⁵⁸ The Jacobite army took flight, some towards Inverness and others to the south, towards Ruthven.

Finlayson's decorative cartouche was bound by poignant symbols marking the end of Jacobite ideology (see Fig 7.24): a snuffed out candle; a chained lion and broken unicorn horn (the Scottish lion rampant coat-of-arms has unicorns as heraldic supporters); and broken thistles (symbol of Scotland).⁹⁵⁹ The failure of the 'Forty-Five marked the end of Jacobitism as a factor in the political life of Great Britain. The 'movement' itself, however, was not terminated; it changed character and was driven underground.⁹⁶⁰

Conclusion

This chapter has described and analysed the cartography of conflict. The focus has been the fifty-one maps, plans, and sketches of five battles in Scotland between Jacobite and Hanoverian forces—namely, Sheriffmuir in 1715, Glenshiel (1719), Prestonpans (1745), and

⁹⁵⁶ Moves to purchase Ardersier Point for the Crown began soon after Culloden but work on the fort only began in 1748.

⁹⁵⁷ BL Additional Ms. 14,257.fol.6*, f. 10, an account of the battle by Richard Pocock to accompany a plan of the Jacobite's order of battle.

⁹⁵⁸ RLW 730031, Finlayson's 'Observations'.

⁹⁵⁹ Webster 2005.

⁹⁶⁰ Petrie 1958, p. 413.



Figure 7.24 The cartouche from *A Plan of the Battle of Culloden*, by [John Finlayson], [c.1748]. 730031 (The Royal Collection © 2009, Her Majesty Queen Elizabeth II).

Falkirk and Culloden (1746). Rather than organise the cartographic documents according to sub-divisions of battle maps—‘order of battle’ and ‘record or memorial maps’—here, instead, I have chosen to treat each battle as a discrete event and the material chronologically. Such an approach reminds us of the political reason for battle maps beyond the battle itself.

Even taking into account my individual treatment of the battles, the maps, as a collective, display some common characteristics that can be summarised here. They each conformed to eighteenth-century conventions of military cartography that relied on the use of icons, from a mixture of pictorial and abstract symbols to full scientific abstractions, which were familiar to an eighteenth-century audience. These conventions developed to help distinguish the different regiments and military units in the field of battle. The most common abstract symbolism used on maps of battles in Scotland were unadorned rectangles distinguished by size to indicate the relative number of men in each unit, and colour to define the various detachments constituting an army. Lines of movement across a field of battle were shown by dotted or pecked lines, and cannon and mortar trajectories by solid lines. The final form of the maps depended on the role they played in the military engagements. The Scottish collection varied from simple pictorial plans of the order of battle, lacking both topographical detail and scale, to perspective maps and two-dimensional plans showing the changing disposition of the opposing armies relative to the topography and time.

Maps of the earlier battles formed scenographic renditions of various skirmishes between opposing military units. One of the most striking was Bastide’s map of the Battle of Glenshiel. This map provided a clear cartographic narrative of events using a system of ‘time-lapsed’ depictions linked to an alpha-numeric key, from the initial deployment of both armies, the individual skirmishes in different parts of the field of battle, to the final rout of the Jacobite army, shown effectively with pictorial symbols. By the time of the ‘Forty-Five, battle maps showed a greater tendency towards abstract symbolism and scientific depiction but still with a dependency on text to explain the movement from one stage of battle to the next. When the image portrayed by the map maker is compared with the accompanying textual narrative of the battle, it becomes clear that the eighteenth-century cartographic representation no longer captured the ‘messiness’ of conflict, the chaos and panic, for example, that must have ensued after a Highland charge or an entrenchment was breached by heavy artillery. The maps, instead, represented neat and systematic redeployments of troops over time and space. Nowhere is this more efficiently done—by Hanoverian or by Jacobite draughtsmen—than on the battle maps of Culloden. The Duke of Cumberland’s prowess as a military tactician was eminently displayed and, on some maps, commemorated. The

battlefield was to Cumberland ‘what a chessboard is to a chess player who wants to make moves with his pawns, castles and so forth’.⁹⁶¹

Between the first mapped battle and the last, battle maps became increasingly familiar to contemporaries because they were published and their cartographic iconography remained relatively constant. This was not only in response to the public’s demand for cartographic journalism, for ideological depictions of victories to accompany articles describing campaigns, maps were also being paraded as a legitimate political tool by both Hanoverians and Jacobites. State sponsored mapping commanded an authority and engendered a belief in what was being depicted but this was not always a truthful or complete representation of what actually happened. This is said, not to make claims that the map’s depiction was an illusion, but to highlight the persuasiveness of maps, their power in acts of political propaganda. The maps produced by draughtsmen on both sides formed a narrative that was guided by the views of the state authority behind their making rather than by a direct and honest experience of the event alone. Thus, the Battle of Falkirk, for example, was believed to be and was portrayed as a victory by both armies. The most effective distribution of government propaganda was to publish maps of the campaigns in Scotland. A map of Falkirk—more conclusively a defeat than a victory for the government army—was published as a cartographic narrative extolling the tactical manoeuvring of the Hanoverian Dragoons and Infantry from their camp north of Falkirk to the battlefield on a plateau to the south to stop the supposed southerly advance of the Jacobites. Maps of Culloden were published to commemorate Cumberland’s victory, to celebrate his battle strategy, and to put an end to the ideology of Jacobitism. Battle map utility can also be considered evidentiary as in cases of military court-marshal and pedagogic as part of the teaching of military science and history to young officer cadets at the Military Academy at Woolwich. Direct evidence that maps of the battles in Scotland were used in either a court-marshal or as a teaching aid is, however, more inferred than proved.

The extant archive of maps of the battles fought in Scotland between 1715 and 1746 show cartography to be an increasingly popular form of military narrative in the eighteenth century. Political and military leaders found them useful to reflect on battlefield tactics and as articles of propaganda; the population wanted to believe in the ideology of heroic victories. In their production, however, consideration must be taken of the operational circumstances under which battle maps were made and how, if at all, this influenced their content. Questions of purpose and thus truthfulness need to be kept at the forefront of the historical enquiry when analysing maps of military conflict.

⁹⁶¹ Frederick the Great, quoted in Harley 1978, p. 30.

In the next chapter I conclude the thesis and reflect on the reconstruction of the military landscape of eighteenth-century Scotland. This involves an understanding of the purpose behind the production of maps and an assessment of their operational uses.

CHAPTER 8

Conclusion

(Re)Constructing the Military Landscape of Scotland, 1689–1815

Introduction

In 1716, Lewis Petit, military engineer to the Board of Ordnance, surveyed and compiled a map of a citadel overshadowing the town of Perth in Scotland⁹⁶² (see Fig 8.1). Perth was occupied by the Jacobites and heavily fortified by them with lines of entrenchments during the rebellion of 1715. Petit's map relates to unfulfilled intentions to construct a new fort. Although never built, his plan reveals an imagination for a fortress modelled upon the ideal city—'Euclidian form and central planning, with total social control represented in its architectural composition'.⁹⁶³ Petit's design for the citadel was composed of a single geometrically-pure enceinte, containing parallel rows of barracks forming the perimeter of an internal parade ground with ramps of earth radiating out to each of the five bastions. Two of the citadel bastions overlooked Perth whilst the remaining three looked out over the surrounding countryside. In its depiction, the new citadel was devoted entirely to a military presence and in its form and situation it served the double function of defending itself from outside attack as well as offering a means from which to subjugate the local populace.

Petit's map of Perth, the citadel, and the purpose behind its commission and compilation, brings together the main strands of my thesis which has considered the construction of the military landscape—real and imagined—through the institutional mapping of Scotland in the eighteenth century. In the introduction to the thesis, I outlined the aims of my study which were threefold. The first was concerned to examine military mapping in and of Scotland as a national practice, a practice that was co-ordinated by a state institution—the Board of Ordnance—and, as such, displayed characteristics of institutional rationalisation. The second aim was to explore how changing state imperatives influenced cartographic practices (modes) and whether these modes created different kinds of spatial knowledge at different times. The final aim was to explore the role of maps in military and political activities in Scotland. In this conclusion, the strands of the study are drawn together to address each of these aims. This is done in four parts: a summary of chapter findings; a

⁹⁶² NLS MS 1647 Z.03/01d and MS 1647 Z.03/02a–c.

⁹⁶³ Pollak 1991, p. xxxv.

summary of methods and content; a review of cartographic modes; and an assessment of the political values of the maps of Scotland. The chapter finishes with a reflection on the limitations of the study and possibilities for future research.



Figure 8.1 ‘Plan of Perth and Adjacent Places with a projection of a Cittadel’ [copy], by Lewis Petit, c.1716. MS 1647 Z.03/01b (Reproduced by permission of the Trustees of the National Library of Scotland)

Summary Findings

This thesis has provided a detailed study of the military mapping of Scotland by the Board of Ordnance engineers, draughtsmen, and associated surveyors between 1689 and 1815. The detailed synthesis of Board of Ordnance material in six repositories resulted in the identification of 940 cartographic items—maps, plans, sections, and perspective views— together with related archival material on the work, nature, and activities of the Board of Ordnance. The cartographic records have here been re-constituted as a union archive to facilitate their interrogation across these different holdings. This thesis identified three main map types in the Board of Ordnance archive: fortification, movement, and battles. It is important to identify the principal features of each, and, in final conclusion, reflect upon this typology as well as the underlying thematic chronology of the map archive. These maps

represent an invaluable resource for considering the place of military mapping as a form of geographical knowledge in Enlightenment Scotland.

Chapter 2 explained how, by the mid-seventeenth century, most European states were increasingly involved in large-scale territorial surveys and how this engendered the ascendancy of the military or state surveyor. These military specialists—‘engineers’—were often institutionally trained and were taught to bring together work in marine charting, regional geographical mapping, land surveying, and topographical surveying to form a new and singular practice: ‘mathematical cosmography’, the ‘measured and mimetic reduction of the world to paper’.⁹⁶⁴ Faith in the usefulness of mathematical cosmography—the study of astronomy, geography, and geodesy—allowed the map to become a leading technology of geographical knowledge in the Enlightenment. This was a technology quickly adopted by the military and appropriated by government.⁹⁶⁵

During the Enlightenment, the military became increasingly ‘map-minded’, and mapping more focused on military concerns. General William Roy, principal surveyor of the Military Survey of Scotland, recognised this in remarking that

It becomes the Business, and not the least essential part of the profession of Military Men, to observe and consider Countrys in such a manner as to acquire, at least a General Knowledge of the principal Positions and Posts, which an Army should occupy, when occasionally employed for their Security and Defence.⁹⁶⁶

Military engineers were sent to Scotland initially to bring order to a rebellious nation. In so doing, they helped extend acts of political domination to the intellectual domination of the nation. They did this in two ways: firstly, by surveying and mapping the nation, and secondly, by opening up a conceptual-territorial space for military expansion and government intervention. The actions of Major-General George Wade, Commander-in-Chief of the forces in Scotland from 1724, offer a good example of both these ambitions. During his initial reconnaissance of the Highlands, he ‘caused an exact Survey to be taken of the several Lakes and that part of the Country lying between Inverness and Fort William, which extends from the East to the West Sea’ the purpose of which was ‘to render the Communication more practicable [...] for the March of Your Majesty’s Forces between

⁹⁶⁴ Forbes 1980; Edney 1994b; Edney 2009, p. 42.

⁹⁶⁵ From the nineteenth century, the term *cartography* was widely adopted for this practice of map making that, ideologically at least, produced a comprehensive geographic archive. See Harley 1987 and Edney 2009.

⁹⁶⁶ Admiralty Library Lf 113 [‘Military Description of the South-East Part of England’] by William Roy, July 1765. Also see TNA WO 30/55, f. 2.

these Garrisons, and facilitate their assembling in one Body, if Occasion should require'.⁹⁶⁷ On such maps, the military engineers depicted essential features of military importance: forts, castles, and barracks; roads, often with distances marked on and bridges and fords identified; relief and areas of marsh; and cultivated land and settlements for provisions for the troops.

Chapter 3 presented evidence of the rationalisation of state cartography in Britain. The structure of the Board of Ordnance—the cartographic co-ordinating body—was rationalised to make more effective use of cartographic specialists—the military engineers and civilian draughtsmen. In 1683, cartographic practices were first defined in *Rules Orders and Instruction for the future Government of the Office of the Ordnance*; in 1741, the Royal Military Academy at Woolwich was constituted to instruct junior cadets in the military sciences; in 1787, the Corps of Royal Engineers was officially recognised; and, in 1800, the Corps of Military Surveyors and Draughtsmen established. This growth in cartographic institutions highlights the growing recognition in the eighteenth century of the power of maps and their importance in national governance. The value of a military education, one based on formal training rather than experience acquired through length of service, was officially recognised in 1741 and, thereafter, engineers were taught military science, instructed in methods of survey and compilation, and in the practical use of maps for military action. Theoretical lessons using military treatises and the experiential act of surveying and drawing developed a national 'cartographic codification'.

Chapter 4 provided an overview of the archive of military maps in relation to military activities in Scotland. Fortification cartography was found to dominate the representation of military landscapes, accounting for 73% of the archive.⁹⁶⁸ Within this category, further sub-division was made according to four main types of Scottish fortifications: medieval castles, garrison forts, barrack forts, and coastal gun-batteries. Maps of military movement were found to be more diverse in nature, linked by function rather than by form. Their further division into route maps, topographical maps, and marine charts revealed a continuum rather than sharp division in typology. Together, they formed 22% of

⁹⁶⁷ BL Additional Ms. King's 101, f. 17, report of Wade's journey in 1725. The survey was carried out by Joseph Avery in 1725. Three copies of the map, at a scale of c.1: 71,280 (just over one mile to an inch) survive: BL Maps K.Top.50.1, Maps K.Top.50.2, and NLS MS 1648 Z.03/21 (BL Maps K.Top.50.1 looks to be a neat copy of NLS MS 1648 Z.03/21). Another copy drawn in 1742 at a scale of 1: 55,440 included similar detail of the lochs but was more concerned to show the new roads and is more highly coloured: TNA MR 1/496

⁹⁶⁸ Copies made substantially later than the original surveys, often as training exercises, were not included. These accounted for less than 10% of the total archive. Fortification plans, in absolute terms, numbered 687.

the total archive.⁹⁶⁹ Battle maps accounted for the smallest portion of the archive, only 5%.⁹⁷⁰ Two genres of map were evident—contemporary manuscript accounts and printed broadsheet maps or ‘news maps’—and these may be understood in relation to events before, during, and after battle.

Chapter 5 offered a detailed exploration of the engineers’ endeavours to codify fortification cartography at the compilation and design stage to produce conventions of design, scale, and colour that were nationally (and internationally) recognised by military and political leaders alike. Some conventions were adopted from continental Europe; for example, Vauban’s use of a hierarchical organisation in the representation of forts based on the use of different scales. Where maps of Scotland showed particular differences to continental practices was in the value of those scales. Colours were used to distinguish the different parts of a fortification and the stage of its construction. Certain colours became conventional, for example, carmine (red) was used to represent completed masonry constructions whereas incomplete or proposed works were washed in gamboge yellow. If we return to Petit’s plan of Perth for a moment (see Fig 8.1), we realise that he broke from established convention by representing the citadel—a proposed structure—in the graphics colours of a completed establishment. If this was deliberate which seems likely given his choice of a citadel and its careful positioning overlooking the town, then what was a conceptual military presence becomes all the more real. The map, in its representation, materialised military power.

Maps of military movement, described in chapter 6, were united less in their physical form and cartographic conventions than they were by common military function—depicting military movement or the potential of movement, whether by land, sea, or inland waterway. In their representations, these maps conveyed an impression of access to parts of Scotland beyond the observers’ view. This feature of maps was exploited by political and military personnel in governing and planning a future Scotland.

Battle maps, described in chapter 7, were familiar to contemporaries and even in the relatively short time between the first and last mapped battle—Sheriffmuir in 1715 and Culloden in 1746—a recognisable form of cartographic representation became established. Glenshiel, in 1719, marked an important transition between the use of a perspective projection and the plan. Thereafter, maps of the ‘Forty-Five consistently represented the battlefield landscape vertically, in two-dimensions, and were frequently drawn to scale. In both perspective and plan, abstract symbols were used to distinguish different army units and

⁹⁶⁹ In absolute terms, they numbered 202 maps.

⁹⁷⁰ This amounts to fifty-one maps in total.

were linked to an explanation of the battle by an alpha-numeric key. Battle maps were more commonly drawn after the event and for various purposes: commemoration; as part of an official report; a personal record of events. Maps of the Jacobite-Hanoverian battles had a very clear purpose: political propaganda. They are one of the few types of military map to be published and circulated beyond military or political eyes. The public, familiar with graphic design, knew how to read battle maps but they read what the government wanted them to which was not always a reflection of the events themselves.

Just as cartographic depictions became more standardised, the military texts required to validate and clarify them also conformed to a standard content. They included geographical explanations and written topographical descriptions as well as reports on the practicalities of a site for construction work and breakdowns of the costs of labour and materials. Military conventions required that ‘however exact the map may be as to distances, or if ever so highly finished and coloured, without a military itinerary annexed to the map, no general can depend on it for his manouvres [sic]’. Maps were, however, acknowledged to be of equal value to ‘itineraries’ in that ‘a literal description without a drawing cannot give a proper idea of the ground’.⁹⁷¹ Together, map and text provided the geographical descriptions necessary for decision making pertaining to military action.

The military maps of Scotland were commissioned by the Board of Ordnance for military and political purposes. The maps reflected an institutional style that was established through the rationalisation of the organisation and, in particular, a clarification of the cartographic role of the military engineers. Just as a corps of engineers—the *Ponts et Chaussées*—were established in France in 1716 and entrusted with the maintenance of the highways, and officers of the *Génie* were responsible for fortifications, and the *Ingénieurs-géographes* surveyed for the purpose of topographical mapping,⁹⁷² military engineers surveyed and mapped Scotland, constructed forts and roads, and represented military action. Unlike France, however, which was mainly mapped in times of peace, the state mapping of Scotland responded to threats to British hegemony especially to those posed by Jacobitism.

The Archive: a Summary of Method and Content

The extant Board of Ordnance map archive of Scotland’s eighteenth-century military landscape—940 records to date—ranges from crudely-executed reconnaissance sketches, unfinished topographical and fortification outlines to large-scale beautifully coloured

⁹⁷¹ Vallancey 1779, quoted in Marshall 1981, p. 4.

⁹⁷² Godlewska 1988; Picon 1992.

surveys, bird's-eye views of medieval castles, and memorials of military action. The maps were surveyed and drawn by European—British, French, German, and Dutch—engineers and draughtsmen employed by the British state, their commissions co-ordinated by the Board of Ordnance. Rules of graphic design were set nationally but were recognised internationally, in Europe and America.⁹⁷³ In general terms, the maps were drawn to provide a geographical military-based description of Scotland whose purpose may be understood as an imperative of the British state after the deposition in 1689 of James VII of Scotland and II of England by William of Orange and Mary Stuart. This imperative was justified by the continued if episodic chronology of Jacobite rebellion in Scotland for the next sixty years, then to be replaced between 1778 and 1782 by threats of raids by American and French privateers and, finally, concerns of an overseas invasion from France towards the end of the eighteenth and beginning of the nineteenth centuries.

Previous studies of the military landscape in Scotland have examined separately Scotland's fortifications, military roads, the Military Survey, and some of the battles.⁹⁷⁴ This study has offered, for the first time, a substantive examination of these maps and plans as a complete corpus of geographical description. In establishing a preliminary method by which to handle such a large and diverse archive, I chose to adopt one heuristic device, namely Harley's classification of the maps of the American Revolutionary War.⁹⁷⁵

Harley's model provided a means to analyse the military maps of Scotland, to look at the relationship between map forms and attributes with the range of military activities associated with the same maps. It thus allowed me to categorise the maps according to their perceived function in association with the principal realms of eighteenth-century military activity—fortification, movement, and battle—and to refine these further into sub-divisions pertinent to Scotland's military cartographic legacy.

This study suggests that Harleyian classification is a broadly appropriate method for organising and categorising military mapping practices in eighteenth-century Scotland. Maps were made for the purpose of fortification, movement, and battle. There are, however, problems with the classification or classifying in general. Taxonomic practice such as this splits maps, map makers, places, and periods and it is important not to lose sight of their connections when interpreting the purpose of mapping and the use of military maps. The aims set out in this study could be approached through a different ordering of the material,

⁹⁷³ Harley 1978.

⁹⁷⁴ For fortifications, for example, see , Tabraham 1986, Tabraham and Grove 1995, and Fleet 2007; for military roads, see Salmond 1934 and Taylor 1996; for the Military Survey, see Skelton 1967, Whittington 1986, Mallett 1987, and Hodson 2007; for battles see Duffy 2003, Pollard 2009, and Woosnam-Savage forthcoming (2009).

⁹⁷⁵ Harley 1978.

by map maker, place, or period. This is to recognise the authority the researcher brings to the investigation and the need to be sensitive to the nature of the maps in the context of their time.

State Imperatives: Changing Cartographic Modes

Eighteenth-century Scotland was, in military mapping terms, distinguished by periods of cartographic practice that resulted in different constructions of space. In the period 1689 to 1815, several distinct cartographic modes, ‘or ways of acting cartographically’, can be recognised in Scotland.⁹⁷⁶ The first, roughly from 1689 to 1724, reflected the state’s need to secure its medieval defences, to provide accommodation for an increasing number of troops, and to establish a secure military presence in the Highlands. Maps produced and used for this purpose were within the same cartographic mode, that of fortification cartography. The construction of new fortifications and the restoration of old ones required accurately surveyed topographical site plans. Mathematically accurate—scientific—designs for forts, fortification, barracks, and buildings rationalised the ways in which works were conceived. Plans, sections, and perspective views drawn to large scales enabled an engineer to visualise a fortification before building, to check its dimensions, accuracy, and strategic planning, and, most importantly for Scotland, fit a design to the situation; most forts in Scotland were irregular to account for variations in local topography. Such plans allowed the state to measure its capacity to wage a war of attrition in Scotland, to know the quantity of men a particular military establishment could hold, how much ammunition they required, how large the munitions store needed to be, and, likewise, the storehouse to sustain a fighting unit. In this first period, reports written to accompany the maps were less concerned, at least initially, with the surrounding geography as they were the capacity and cost of the establishment. As the Jacobite cause refused to submit and continued to grow in strength, location became a principal priority as the state realised the need to extend communications throughout the Highlands.

The second period, coincident with substantial military developments, was apparent in multiple cartographic modes. The period began in about 1724 and continued until the mid 1750s. It was a time when the London government was concerned to know more about the geography of Scotland, when acts of reconnaissance resulted in relatively small-scale topographical maps of the Highlands, when linear surveys were made of proposed and

⁹⁷⁶ Edney 2009, p. 17.

existing military roads, and when large-scale maps of new fortifications schemes and military enhancements to old ones were the focus of the military engineers' attention.

Fortification schemes, such as those of Fort Augustus and the two Fort Georges at Inverness and Ardersier, reflect the importance of strategic locations. Fort George at Inverness, for example, was 'a place of Importance for preventing the northern Highlanders from descending into the Low Country in times of Rebellion'.⁹⁷⁷ Detailed topographical mapping of the immediate environs was therefore vital and, as I have shown, was heavily relied upon. Once the location of forts was fixed, the main military concern was to connect one fort with the other by means of a road system that would allow the rapid assembly in one place of large numbers of troops should the need arise. Engineers surveyed and mapped existing route ways, noting where they were adequate for troop and artillery use, and where not. They then set about extending the military road network throughout the Highlands.

Maps of military roads and topographical maps of the lowlands were in existence prior to the 'Forty-Five Rebellion. In responding to the rebellion, however, military commanders in Scotland had no access to these maps and the few seventeenth-century maps known to have been used were woefully inadequate for tactical planning. In the wake of the '45—an event that was itself to be represented by a different cartographic mode—engineers reviewed and reconstructed the damaged Scottish fortifications and appropriated additional medieval castles in the Highlands to use as military outposts. A reconsideration of the military policy in dealing with local insurrection, however, culminated in a shift in military strategy, from an emphasis on static fortifications to the movement of more mobile units to police the Highlands. This led engineers to undertake topographical surveys of more extensive areas, culminating in the Military Survey of Scotland between 1747 and 1755. Such maps were most useful for identifying strategic locations for military posts but less so for identifying lines of communication between them and any corresponding territorial hazards—physical or human. In Scotland, therefore, coincident with the Military Survey was a road-building programme that gave rise to detailed large-scale linear surveys directing or following a military route way.

With the responsibility for road construction transferring to the Commissioners for Roads and Bridges after 1767 and the threat of a Jacobite revolt long since past, the military mapping of Scotland went through a relatively inactive period during the 1770s before once again being active in the 1780s. From this time, state imperatives were directed towards the coasts and with mapping and erecting coastal batteries to protect shipping, coastal towns, and harbours from American pirates, and from the 1790s, the threat of Napoleonic invasion.

⁹⁷⁷ BL Additional Ms. King's 103, f. 18.

These concerns witnessed the emergence of two particular cartographic modes: firstly, and once again, fortification cartography and, secondly, coastal surveys of the Firth of Clyde and Long Hope Sound in Orkney with the purpose of identifying appropriate sites for gun-batteries. Coastal surveyors used similar technologies as land surveyors, applying methods of observation and measurement to create linear, large-scale maps of coastal belts.

The Political Significance of Military Maps

Chapter 2 described and the thesis established that, in the eighteenth century, map making was a practical affair concerned with expanding geographical knowledge about the world and its representation in graphical and textual form. Additionally, Enlightenment scholars considered map making to be empirical and objective, above all, a science. Maps were therefore assigned a social-political value in the Enlightenment, one that established relationships between the map user (often also its maker), the map, and the territory that was mapped. Edney asserts that ‘every reader of a map has both a physical and a cognitive relationship to the map, so that [...] every map, regardless of its mode, entails an act of intellectual appropriation and can potentially serve a more instrumental function’.⁹⁷⁸

Orders for engineers in Scotland to send their maps to the Board of Ordnance in London, for the Board to then ‘pore over’ the artefacts to make political and military decisions, entailed both a physical domination of the map and an intellectual domination of the territory. A further example of the physical appropriation of maps is offered by orders to submit to Sir Everard Fawkener all maps and plans of the Culloden battlefield. In sending out such a command, Fawkener was intent on intellectually transposing the territory: detailed maps showing the tactical superiority of Cumberland and his Hanoverian army on the field of battle were subsequently produced and, in some cases, published to circulate a sense of heroic victory. The depiction of the battles between Jacobite and Hanoverian armies was a deliberate act to appropriate (and to mislead in some instances) the cognitive relationship between map and map reader. The map maker played on the map’s ‘scientific’ nature, promoting a rhetoric of accuracy and objectivity by mapping, in detail, the battlefield’s surrounding topography and the abstract movements of the army units. But the map’s narrative of battle was determined by the power behind its making and was often designed as an act of political propaganda rather than an authentic and thorough account of events.

Consider, too, John Elphinstone’s printed *Mercator’s Map of North Britain* which was annotated by David Watson in various colours to mark the routes of military roads and

⁹⁷⁸ Edney 2009, p. 24.

locations of camps, barracks, and defensive posts.⁹⁷⁹ For Watson, the map stood in for Scotland while he formulated plans for the military to act upon the nation, to establish a policing system in the Highlands. In this way, the map was used instrumentally, as were most of the fortification plans that resulted in construction projects, the road surveys that saw roads built or marched upon, and the close coastal surveys that identified strategic sites for gun emplacements. Used instrumentally, the map becomes an expression of authority and power of the state over Scotland, the land, and the people and ‘so the surveyor [...] replicates not just the ‘environment’ but equally the territorial imperatives of a particular political system’.⁹⁸⁰

Both King and Parliament—royal and legislative authorities—ultimately influenced the production of military maps. Engineers frequently promoted proposed mapping schemes as ‘an Object highly deserving the attention and encouragment [sic] of His Majestys Ministers’.⁹⁸¹ Although the Board had recourse to refer a fortification proposal to the monarch, it was parliament who ultimately controlled the state’s fiscal capacity to wage war and to defend the nation.⁹⁸² Such control, combined with the Board’s claims of institutional poverty, was often to the detriment of a fortification project deemed expedient by an engineer. When reporting on the defensive state of Fort William in 1710, Talbot Edwards, Second Engineer to the Ordnance, warned the Board that:

Spareing [sic] Money on Fortifycations Spoyles many a good Designe which like Armes or Artillery not truly fortfyed serves only to betray those that trust to them, while Strong works (tho chargeable) makes an Enemy pay also Deare before they are taken, and gives more time for Reliefe, which is the End of all Fortifycations.⁹⁸³

With so much at stake militarily and financially, there was a case for keeping a cartographic record at every stage of a construction programme, whether of a fort or a road. When Skinner was directing work on the foundations of Fort George at Ardersier, he was instructed by the Board of Ordnance that at all stages he was ‘to keep particular and exact Plans and Sections thereof [...] to be enter’d in your Diary or Progress Book [...] and you

⁹⁷⁹ BL Maps K.Top.48.17–21; TNA MPF 1/247.

⁹⁸⁰ Harley 1988, p. 279.

⁹⁸¹ TNA CO 325/1, f. 197, in a ‘Memorial’ by Captain Hugh Debbeig in 1776, in this case relating to a Military Survey of the Great Ports and Harbours on the coast of North America, to include ‘Particular Plans [...] taken upon a Scale of 100 feet to an Inch of all spots that are fit for Forts, Posts, or Batteries with Designs formed to the Situation’ (f. 199 verso)

⁹⁸² Osborn 1998.

⁹⁸³ TNA WO 55/319, p. 131, ‘*Report of Fort William in North Brittain Concerning the Place it Stands in and the usefullness of a small Magazin there*’, 1710.

are to transmit such book to the Surveyor General'.⁹⁸⁴ Caulfeild expected engineers to submit annually plans of the roads being built under their inspection.⁹⁸⁵ So deeply ingrained were plans in the military approach to defence that even their absence was noted. When Captain Caroline Frederick Scott took command of the Hanoverian garrison during the Jacobite siege of Fort William in March 1746, his report began: 'I must beg the Favour of you to make my most humble Apology to His Royal Highness that I have not sent him a Plan of our Fort. But, there were so many things to do, and so few work-tools, that I was obliged to bustle both night & Day, with one thing or other, which I hope will plead my excuse to His Royal Highness'.⁹⁸⁶ Maps, in the eighteenth century, were seen as 'a socially constructed form of knowledge' that advanced their use as pragmatic and political tools.⁹⁸⁷

Limitations and Possibilities

Whilst the surviving archive of military maps of Scotland in the eighteenth century has proved a substantial resource to work with, the fact that it is not complete has created some limitations to its study. Without knowing how complete the surviving archive is and what form the losses may take—what period they cover, which places, which genres of mapping—we can not fully appreciate the significance of the changing mapping technologies in Scotland. This study has shown that there were changes in cartographic practices that reflected changing political and military policies in dealing with Jacobite insurrection and the threat of overseas invasion. What we cannot determine is the full extent of these changes, quantitatively at least. The Board of Ordnance minutes and state papers for Scotland offer some assistance, for different times and different places, but they are also only a partial archive of the workings of the Board and their particular interest in the affairs of Scotland. Certainly, maps and reports together provide a fuller picture of institutional practices than would otherwise be gleaned from one or either: evidence of absence does not equate to absence of evidence in this case.

In recovering the meaning of mapping Scotland, this study has necessarily involved some inferences about the use of these maps at the time of their making. We make assumptions about the use of maps from their appearance and, in this case, categorise them accordingly into genres we think reflect the contemporary realities of events in Scotland and

⁹⁸⁴ BL Additional Ms. 17500, pp. 217–218, 14 May 1751.

⁹⁸⁵ TNA WO 26/21, p. 360, 1749.

⁹⁸⁶ TNA SP 54/30/2 G 'State Papers Scotland, Series II', 25 March 1746 'a Project for our Defence', f. 26.

⁹⁸⁷ Harley 1988, p. 277.

the way they were handled. How many were actually used for the purpose for which they were designed? I have offered an example in this chapter—Petit’s plan of a citadel above Perth— of one map which was not used for pragmatic or political purposes, rather it represented an ‘imagined landscape’. How many maps were involved in a political or military decision? The surviving archive contains several maps that show the terrain where a battle took place, the route the army took to get to the battlefield and, afterwards, to sites for encampments. These cartographic records, however, are surely just that—memorials of events rather than active players in the decisions that were made at the time. To argue this is not to undervalue the map or its influence in military decisions; rather, it is to draw some attention to the difficulty of recovering meaning and of knowing which maps were used, who used them, and with what outcome. This implies an area for future research that finds more evidence of map use.

One final ‘limitation’ to mention is the binary between my modern-day assessment of the surviving archive of maps and plans compared to what an eighteenth-century contemporary assessment would have been. Although every attempt has been made in this study to consider the eighteenth-century contemporary value of these maps—politically and militarily—this has necessarily been influenced by current thoughts on the study of early maps in the history of cartography and, more particularly, the historical study of Enlightenment mapping. In support of my comment above, more research could be done on this material to extend current thoughts on the actor’s rather than the historian’s perspective on the true value of this mapping in and of Scotland.

Such ‘limitations’ of this study highlight several areas of future research. This study has identified important people but has not sought to locate the diaries of individuals to look for further commentary on the military cartography of Scotland. Neither has it followed the military map makers outside Scotland, either to Europe or to America, to compare their subsequent maps and their approach to mapping following their experiences in Scotland. We already know, from Roy and Debbeig, that Scotland was a formative and critical period in their cartographic education; both made reference to it as demonstrated here by Debbeig:

When it is known the Memorialist served in Flanders the two last Campaigns under His late Royal Highness the Duke, that he was in Bergen-op-Zome during the Siege, that he had opportunity under the Dukes Passport of visiting at his leisure all the Fortified Towns on the Dutch Frontier, that he was seven years employed upon the Survey of Scotland (the greatest work of this sort ever performed by British Subjects and perhaps for the fine Representations of the Country not to equal in the World) that he served in

America from the Siege of Louisburg to the End of the War, and came last year from Newfoundland; He most humbly hopes his services and experience will be deemed sufficient to entitle him to ask the direction of the proposed Scheme if it should be adopted.⁹⁸⁸

The wider context to individual activity might usefully form the basis to further work, even although every effort has been made here to place the Board of Ordnance's activities within Scotland in wider context, in terms of contemporary mapping, conceptual and methodological work, and historiography. Even so, another possibility for future study would be the close comparison of the archive of military maps of Scotland with a European (or American) cartographic archive of the same, or part, period. This might, in part, help resolve the limitation of knowing how representative the surviving archive is of the timing and the extent of the changing cartographic modes employed in military mapping. Such a study would situate (or not) the mapping of Scotland more firmly not just as a European-wide practice in the eighteenth century but as a practice whose forms, conventions and socio-political meaning was established through the course of the century in an attempt to put the world to order.

⁹⁸⁸ TNA CO 325/1, 'A Memorial Relating to North America by Captain [Hugh] Debbieg Engineer 1776', f. 199 verso.

Bibliography

Primary Unpublished Sources

Maps have been individually referenced in the text above. For a full bibliography of these maps, see Volume 2.

ADMIRALTY LIBRARY

Lf 113 Untitled manuscript, containing ‘...remarks on the nature of the country in the south east countys of England, in the neighbourhood of the capital’. July 1765.

BRITISH LIBRARY

111.c.69 *An Enquiry into the Conduct of G—l C—pe* [General Cope]. Printed for M. Cooper at the *Globe* in *Paternoster Row*, 1745.

Add. Ms 17499 ‘Correspondence of General William Skinner, Director of Engineers in Scotland, with the Board of Ordnance, relative to the reparation of Fort William and the building of Fort George, co. Inverness, and other works; with copies of his correspondence with engineers, contractors, workmen, etc.; May, 1746–June, 1763’. Volume one.

Add. Ms 17500 ‘Correspondence of General William Skinner, Director of Engineers in Scotland, with the Board of Ordnance, relative to the reparation of Fort William and the building of Fort George, co. Inverness, and other works; with copies of his correspondence with engineers, contractors, workmen, etc.; May, 1746–June, 1763’. Volume two.

Add. Ms 22875 ‘Plans of Fortifications’ by Joseph Heath and [Charles Tarrant], [1750].

Add. Ms 23671 ‘Orders given out by Field Marshal George Wade, 26 August 1727’ [Rainsford Papers].

- Add. Ms. 31149 'Political papers of Lord Strafford', relating chiefly to the negotiations for the Treaty of Utrecht and the pacification of the North.
- Add. Ms 35354 'Hardwicke Papers'. Correspondence of Philip Yorke, 1st Earl of Hardwicke, with his son Sir Joseph Yorke, K.B., successively *Aide-de-Camp* to the Duke of Cumberland, Minister at Paris, and Minister at the Hague, created K.B. (1761) and Baron Dover (1788); 1742–1764.
- Add. Ms 36592 'Whitefoord Papers'. Vol.1. (ff.179). Correspondence and papers of Col. Charles Whitefoord; 1738-1752.
- Add. Ms 41994 'Ordnance Regulations, 1764–1811'.
- Add. Ms King's 70 'Rules Orders and Instructions for the future Government of the Office of the Ordnance', 1683–1760.
- Add. Ms King's 100 'Report on Wade's journey taken in pursuance of royal instructions dated 3 July, 1724'.
- Add. Ms King's 101 'Report of Wade's journey of the following year (under instructions dated June, 1725)'.
- Add. Ms King's 103 'Report of Wade's journey in 1727 under instructions from George II'.
- Add. Ms Stowe 477 'Michael Richard's letters to the Board of Ordnance, 1711–1714'.
- Maps*1125.(7.) *A General Map of Great Britain*, Alexander Baillie sculp. London, c.1747.

NATIONAL LIBRARY OF SCOTLAND

EMEU.s.174 *To Prince Ferdinand of Brunswick, this plan of the Battle of Thonhausen [Minden] gained August 1 1759 by His Britannic Majesty's Army, under command of His Serene Highness over the French Army, commanded by Marshal Contades, and taken from an actual survey, is with the greatest respect, humbly dedicated by William Roy. Sold by T. Major. London, 1760.*

EMS.s.163 *A Disposition of his Maj^{ties}: Forces Command'd by Maj^r: Gen^l: Wightman & of ye Rebels at ye Pass of Glenshiells in Kintail North Britain where ye Battle was Fought on ye 10th of June 1719 is most humbly Dedicated to His Grace John Duke of Marlborough Captain Generall of His Maj^{ties} Forces &c: by John Bastide L^t: in the Hono^{ble}: Collonell Mountagu's Regiment of Foot. London, [1719].*

ROYAL LIBRARY, WINDSOR CASTLE

14722 'A Sketch of the Field of Battle at Culloden', 1746, by Thomas Sandby.

Seccombe, Thomas Strange (1840–1899). 'Album of Drawings of the Royal Military Academy, Woolwich'.

THE (BRITISH) NATIONAL ARCHIVES, KEW

CO 325/1 'A Memorial Relating to North America by Captain [Hugh] Debbieg Engineer 1776'

SP 41/34/122 'State Papers Military 1711'

SP 54/8/94 'State Papers Scotland, Series II'

SP 54/10/139 'State Papers Scotland, Series II'

SP 54/27/29A 'State Papers Scotland, Series II'

SP 54/27/55A 'State Papers Scotland, Series II'

SP 54/29/27 'State Papers Scotland, Series II'

SP 54/30/2 G 'State Papers Scotland, Series II'

SP 54/30/6 B 'State Papers Scotland, Series II'

SP 87/24/93 'State Papers Foreign, Military Expeditions: Duke of Cumberland'

T 1/457	‘Treasury Board Papers and In-Letters 1767’
WO 26/21	‘Entry Books of Warrants, Regulations and Precedents, 1746–1751’
WO 30/54	‘General Roy's Papers: Instructions for the Engineers employed in the Survey of England’
WO 30/61	‘Defences of Great Britain’
WO 30/66	‘Defences of Great Britain’
WO 30/115	‘General Roy's Papers: Instructions to surveyors’
WO 30/115[B]	‘Defences of Great Britain: General Roy’s Papers’
WO 47/20A	‘Entry Book of Orders, Letters, Minutes and Reports, 1714’
WO 47/27	‘Minutes, Series 3, 1714’
WO 47/28	‘Minutes, Series 3, 1715’
WO 47/30	‘Minutes Series 3, 1717’
WO 47/31	‘Minutes Series 3, 1718’
WO 47/32	‘Minutes Series 3, 1719’
WO 47/33	‘Minutes Series 3, 1720’
WO 47/34	‘Minutes Surveyor General, 1749’
WO 47/35	‘Minutes Surveyor General, 1750 Jan–June’
WO 47/36	‘Minutes Surveyor General, 1750 July–Dec’
WO 47/38	‘Minutes Surveyor General, 1751 July–Dec’
WO 47/39	‘Minutes, Surveyor-General 1752 Jan–June’
WO 47/42	‘Minutes Surveyor General, 1753 July–Dec’
WO 47/45	‘Minutes, Surveyor-General 1755 Jan–June’
WO 47/47	‘Minutes Surveyor General, 1756 Jan–June’
WO 47/49	‘Minutes Surveyor General, 1757 Jan–June’
WO 47/51	‘Minutes, Surveyor-General 1758 Jan–June’
WO 47/61	‘Minutes, Surveyor-General 1763 Jan–June’
WO 47/63	‘Minutes, Surveyor-General 1764 Jan–June’
WO 47/64	‘Minutes Surveyor General, 1764 July–Dec’
WO 47/65	‘Minutes, Surveyor-General 1765 Jan–June’
WO 47/66	‘Minutes Surveyor General, 1765 July–Dec’
WO 47/73	‘Minutes Surveyor General, 1769 Jan–June’
WO 47/75	‘Minutes Surveyor General, 1770 Jan–June’
WO 47/76	‘Minutes Surveyor General, 1770 July–Dec’
WO 47/77	‘Minutes, Surveyor-General 1771 Jan–June’
WO 47/81	‘Minutes Surveyor General, 1773 Jan–June’

WO 47/93 'Minutes Surveyor General, 1779 Jan–June'
 WO 47/95 'Minutes Surveyor General, 1780 Jan–June'
 WO 47/109 'Minutes Surveyor General, 1787 Jan–June'
 WO 47/113 'Minutes Surveyor General, 1789 Jan–June'
 WO 47/114 'Minutes Surveyor General, 1789 July–Dec'
 WO 47/118 'Minutes Surveyor General, 1791 July–Dec'
 WO 49/118 'Estimates 1639–1850: mainly for fortifications and works'
 WO 54/66 'Establishment Quarter Book 1708'
 WO 54/67 'Establishment Quarter Book 1709'
 WO 54/68 'Establishment Quarter Book 1710'
 WO 54/69 'Establishment Quarter Book 1711'
 WO 54/199 'Establishment Books 1723'
 WO 54/200 'Establishment Books 1727'
 WO 54/201 'Establishment Books 1728'
 WO 54/204 'Establishment Books 1732'
 WO 54/207 'Establishment Books 1741'
 WO 54/208 'Establishment Books 1743'
 WO 54/209 'Establishment Books 1745'
 WO 54/210 'Establishment Books 1748'
 WO 54/211 'Establishment Books 1752 and 1755'
 WO 54/213 'Establishment Books 1756'
 WO 54/214 'Establishment Books 1760–1765'
 WO 54/215 'Establishment Books 1768–1780'
 WO 55/319 'Misc Entry Books and Papers, 1696-1714'
 WO 55/344 'Entry Book of Warrants, 1705–1709'
 WO 55/345 'Entry Book of Warrants, 1708–1712'
 WO 55/346 'Entry Book of Warrants, 1712–1717'
 WO 55/347 'Entry Book of Warrants, 1717–1725'
 WO 55/351 'Warrants 1740–1744'
 WO 55/352B 'Warrants 1745–1747'
 WO 55/353 'Warrants 1747–1750'
 WO 55/355 'Warrants 1754–1756'
 WO 55/424 'Warrants 1642–1744'
 WO 55/523 'Miscellaneous Entry Books and Papers 1719–1726'
 WO 55/2281 'Register of Plans of the Board of Ordnance 1700–1800'

WO 78/6012 'Plans of cities, castles, forts and barracks in North Britain' (Scotland), by Charles Tarrant, [1750]

THE NATIONAL ARCHIVES OF SCOTLAND

GD220/5/568/1 'Correspondence of James, 1st Duke of Montrose 7 June to 31 December 1715

RH1/2/511 'Correspondence concerned with the cost of The Military Survey of Scotland'

RH1/2/523 'Memorandum and answers by General David Dundas regarding General Roy's Survey of Scotland in period 1747–55, 12 Jan, 1806'.

RH15/17/25 'Correspondence of William Caulfeild'

THE NATIONAL REGISTER OF ARCHIVES FOR SCOTLAND

NRAS 3246 Vol. 34 'Letter 79', Andrew Mitchell to Robert (Robin) Dundas, 7 November 1745.

NRAS 3246 Vol. 34 'Letter 96', John Gordon to Robert (Robin) Dundas, 16 November 1745.

NRAS 3246 Vol. 35 'Letter 34', David Watson to Robert (Robin) Dundas, July 1746.

NRAS 3246 Vol. 36 'Letter 7', John Forbes to Lord Advocate, 19 February 1756.

Primary Published Sources

- Adair, John (17103). *The Description of the Sea-Coast and Islands of Scotland with Large and Exact Maps, for the Use of Seamen: By John Adair, Geographer for the Kingdom*. Edinburgh.
- Anon [1785]. The Battle of Sheriffmuir, fairly fought on the thirteenth Day of November 1715. In *A New Garland Containing Four Excellent New Songs*. [Falkirk].
- Blair, John (1784). *The History of the Rise and Progress of Geography*. London: T. Cadell; and W. Ginger.
- Bland, Humphrey (1743). *A treatise of military discipline; in which is laid down and explained the duty of the officer and soldier*. The fifth edition. Dublin.
- Burt, Edmund (1822). Memorial Addressed to his Majesty George I concerning the State of the Highlands, by Simon Lord Lovat, 1724. In *Letters from a Gentleman in the North of Scotland to his Friend in London*. Fifth Edition. London, pp. 254–267.
- Cameron, John (1716). A letter from John Cameron of Lochiel to the Gentlemen of Clan Cameron, 24 June 1716. *Transactions of the Gaelic Society of Inverness* (1904), 26, pp. 60–80.
- Defoe, Daniel (1706). *Caledonia, &c. A poem in honour of Scotland, and the Scots nation. In three parts*. Edinburgh.
- Dinsdale, J. (1748). *The Art of Fortification Delineated with Rules for Designing, Drawing, Washing, and Colouring, in the most Elegant Taste, Particular Works and Buildings, and their Plans, Elevations, Sections, Profiles, and Fronts, in Civil and Military Architecture* (trans.). London: printed and sold by E. Owen; G. Bickham; and by the booksellers in town and country.
- Douglas, F. (1755). *The history of the rebellion in 1745 and 1746, extracted from the Scots magazine: with an appendix, containing an account of the trials of the rebels; the Pretender and his son's declarations, &c*. Aberdeen.

- Dundas, David (1788). *Principles of military movements, chiefly applied to infantry. Illustrated by manoeuvres of the Prussian troops, ... Together with an appendix.* London: printed for T. Cadell.
- Gough, Richard (1780). *British Topography. Or, an historical account of what has been done for illustrating the topographical antiquities of Great Britain and Ireland.* Vol. 1. London: T. Payne and Son, and J. Nichols.
- . (1780). *British Topography. Or, an historical account of what has been done for illustrating the topographical antiquities of Great Britain and Ireland.* Vol. 2. London: T. Payne and Son, and J. Nichols.
- Hogarth, William (1833). *Anecdotes of William Hogarth, Written by Himself: with Essays on his Life and Genius, and Criticisms on his Works, Selected from Walpole, Gilpin, J. Ireland, Lamb, Phillips, and Others.* London: J. B. Nichols and Son.
- Home, John (1802). *The History of the Rebellion in the Year 1745.* London: Printed by A. Strahan, New-Street Square; for T. Cadell, Jun. and W. Davies in the Strand.
- Hughes, Michael (1746). *A plain narrative or journal of the late rebellion, begun in 1745: describing its progress in Scotland, and England.* London.
- Jackson, Basil Lieutenant-Colonel (1838). *A Course of Military Surveying; including instructions for sketching in the field, plan drawing, etc. and a ... description of the surveying instruments, etc.* London
- Jones, William D. (1851). *Records of the Royal Military Academy (1741–1840).* London: Parker, Furnival & Parker.
- Landmann, Isaac [1796]. *The principles of fortification, reduced into questions and answers, for the use of the Royal Military Academy at Woolwich.* London.
- Manners, John (1764). *Rules and Orders for the Royal Military Academy at Woolwich.* London: Printed by J. Bullock, J. Spencer and J. Bullock, junior.

Muller, John (1755). *A treatise containing the practical part of fortification. In four parts. ... Illustrated with twenty eight copper plates* London.

———. (1756). *A treatise containing the elementary part of fortification, regular and irregular. ... For the use of the Royal Academy of Artillery at Woolwich. Illustrated with thirty-four copper plates. The second edition.* London.

Pleydell, J. C. (1768). *An essay on field fortification; intended principally for the use of officers of infantry. Shewing how to trace out on the ground, and construct ... all sorts of redouts and other field works; ... Translated from the original manuscript of an officer of experience in the Prussian service.* London.

Porter, Whitworth (1889). *History of the Corps of Royal Engineers.* Vol.1. London: Longmans, Green, and Co.

Roy, William (1785). An Account of the Measurement of a Base on Hounslow-Heath. *Philosophical Transactions of the Royal Society of London*, 75. London, pp. 385–480.

———. (1793). *The Military Antiquities of the Romans in Britain.* London: printed by W. Bulmer and Co. and sold at the apartments of the Society; and by Messrs. White, Robson, Nicol, Leigh and Sotheby, Brown, and Egerton.

Royal Military Academy, Woolwich (1741). *Rules and orders for the Royal Military Academy at Woolwich.* London : printed by J. Peele and W. Wilkins.

———. (1764). *Rules and orders for the Royal Military Academy at Woolwich.* London: printed by J. Bullock, J. Spencer and J. Bullock, junr.

———. (1776). *Rules and orders for the Royal Military Academy at Woolwich.* [London].

Sandby, Paul (1777). *A collection of landscapes, drawn by P. Sandby, ... and engraved by Mr. Rooker, and Mr. Watts, with descriptions.* London: printed by G. Kearsly.

Smith, George, Capt (1779). *An universal military dictionary, or a copious explanation of the technical terms &c. Used in the equipment, machinery, movements, and military operations of an army.* London.

Sterne, Laurence (1775). *The life and opinions of Tristram Shandy, gentleman.* The tenth edition Vol. 6. London.

Thomson, John (1831). *Atlas of Scotland, or County Atlas; consisting of Maps of all the Counties on a very large scale, compiled from actual Survey, forming the most complete series of county maps ever published.* Printed for the Trustee upon John Thomson's Estate, Edinburgh.

———. (1832). *Atlas of Scotland, containing Maps of Each County.* Edinburgh: Barker.

Thurloe, John (1742). *A collection of the state papers of John Thurloe, Esq; secretary, first, to the Council of State, and afterwards to the two Protectors, Oliver and Richard Cromwell. In seven volumes. To which is prefixed, the life of Mr. Thurloe: By Thomas Birch,* Vol. 6. London.

Vauban, Sébastien Le Prestre de (1702). *The new method of fortification, as practised by Monsieur de Vauban. Together with a new treatise of geometry. The third edition. Carefully revised and corrected by the original. To which is now added, A treatise of military orders, By W. Allingham.* London.

NEWSPAPERS

Postscript to the Edinburgh Evening-Courant, April 21st 1719. Edinburgh.

Postscript to the Edr. Evening-Courant No. 84. Giving an Account of the particulars of the engagement on the 10th of June, sent by Major General Wightman, dated from Glensheels the 11th of June 1719. Edinburgh.

[*The*] *Gentleman's Magazine and Historical Chronicle.* London: Edward Cave.

The London magazine, and monthly chronologer, Vol. 15.

Secondary Sources

- Aitchison, K. R. (1994). *Culloden Dykes: Documentary Search*. Unpublished report for the National Trust for Scotland.
- Alpers, Svetlana (1987). The Mapping Impulse in Dutch Art. In David Woodward (ed.), *Art and Cartography: Six Historical Essays*. Chicago and London: University of Chicago Press, pp. 51–96.
- Anderson, Peter (1920). *Culloden: The Story of the Battle*. Stirling: Eneas Mackay.
- Bagrow, Leo (1985). *History of Cartography*, 2nd edition rev. and enl. by R.A. Skelton. Chicago: Precedent Publishing.
- Bal, Mieke and Bryson, Norman (1991). Semiotics and Art History. *The Art Bulletin* 73(2), pp. 174–208.
- Baldock, E. D. (1966). Milestones of Mapping. *The Cartographer* 3(2), pp. 89–102.
- Barber, Peter (1990). Necessary and Ornamental: Map Use in England under the later Stuarts, 1660–1714. *Eighteenth Century Life* 14(3), pp. 1–28.
- . (2003). King George III's topographical collection: a Georgian view of Britain and the world, in Kim Sloan with Andrew Burnett (eds.), *Enlightenment: Discovering the World in the Eighteenth Century*. Washington D.C.: Smithsonian Books in association with The British Museum Press.
- . (2005). George III and His Geographical Collection. In Jonathan Marsden (ed.), *The Wisdom of George the Third*. Royal Collection Publications, pp. 263–289.
- Barker, Nigel Patrick (1985). *The Architecture of the English Board of Ordnance 1660-1750*. University of Reading: unpublished thesis.
- Barnes, Trevor J. and Duncan, James S. (eds.) (1992). Introduction: Writing Worlds. In *Writing Worlds: Discourse, text and metaphor in the representation of landscape*. London and New York, Routledge, pp. xii–17.

- Barrow, G. W. S. (1984). Land Routes: The Medieval Evidence. In Alexander Fenton and Geoffrey Stell (eds.), *Loads and Roads in Scotland and Beyond: Land Transport over 6000 Years*. Edinburgh: John Donald Publishers, pp. 49–66.
- Belyea, Barbara (1992). Images of Power: Derrida/Foucault/Harley. *Cartographica* 29(2), pp. 1–9.
- . (1993). Review Article of L’Empire des Cartes: Approche Théorique de la Cartographie à Travers L’Histoire, by Christian Jacob. *Cartographica* 30(4), pp. 73–77.
- Blakemore, M. J. and Harley, J. B. (1980). Concepts in the History of Cartography: A Review and Perspective. Monograph 26 *Cartographica* 17(4), pp. 1–120.
- Bonehill, John and Daniels, Stephen (2009). *Paul Sandby (1731–1809): Picturing Britain*, exhibition catalogue, Royal Academy, in conjunction with Nottingham Castle Museum and Gallery.
- Bousquet-Bressolier, Catherine (2008). Études & Formation des Ingénieurs sous Vauban. *Le Monde des Cartes* 195, pp. 15–26.
- Buisseret, David (1992). *Monarchs, Ministers, and Maps: The Emergence of Cartography as a Tool of Government in Early Modern Europe*. Chicago and London: University of Chicago Press.
- . (2003). *The Mapmakers’ Quest: Depicting New Worlds in Renaissance Europe*. Oxford: Oxford University Press.
- Bulloch, John Malcolm (1931). *Old Highland Highways: Soldiers as Scots Road Makers*. Inverness: Robert Carruthers & Sons.
- Burnett, Graham D. (1999). The History of Cartography and the History of Science. *Isis* 90(4), pp. 775–780.
- Campbell, Tony (1981). *Early Maps*. New York: Abbeville Press.

- Cash, C. G. (1907). Manuscript maps by Pont, the Gordons, and Adair, in the Advocates' Library, Edinburgh. *Scottish Geographical Journal* 23(11), pp. 574–592.
- Casti, Emanuela (2000). *Reality as representation. The semiotics of cartography and the generation of meaning*. Bergamo: Bergamo University Press.
- . (2005). Towards a Theory of Interpretation: Cartographic Semiosis. *Cartographica* 40(3), pp. 1–16.
- Cavers, Keith (1993). *A Vision of Scotland: The Nation Observed by John Slezer 1671 to 1717*. HMSO: National Library of Scotland.
- Cénat, Jean-Philippe (2008). Stratégie, logistique et propagande: l'usage des cartes militaires par Chamlay. *Le Monde des Cartes* 195, pp. 27–37.
- Charteris, Hon. Evan (1913). *William Augustus Duke of Cumberland: His Early Life and Times (1721–1748)*. London: Edward Arnold.
- Chichester, H. M., rev. Steven A. Walton (2004). Muller, John (1699–1784). *Oxford Dictionary of National Biography*. Oxford: Oxford University Press.
- Christian, Jessica (1990). Paul Sandby and the Military Survey of Scotland. In Nicholas Alfrey and Stephen Daniels (eds.), *Mapping the Landscape: Essays on Art and Cartography*. Nottingham: Castle Museum, pp. 18–22.
- Cosgrove, Denis (1985). Prospect, Perspective and the Evolution of the Landscape Idea. *Transactions of the Institute of British Geographers* 10(1), pp. 45–62.
- . (2005). Maps, Mapping, Modernity: Art and Cartography in the Twentieth Century. *Imago Mundi* 57, pp. 35–54.
- . (2007). Book Review Essay. Epistemology, Geography, and Cartography: Matthew Edney on Brian Harley's Cartographic Theories. *Annals of the Association of American Geographers* 97(1), pp. 202–209.

- . (2008). *Geography & Vision: Seeing, Imagining and Representing the World*. London and New York: I. B. Tauris.
- Crone, Gerald R. (1953). *Maps and Their Makers: An Introduction to the History of Cartography*. London: Hutchinson University Library.
- Crone, Gerald (1978). *Maps and Their Makers, 5th edition*. Folkestone: Dawson
- Daniels, Stephen and Cosgrove, Denis (eds.) (1988). Introduction: Iconography and Landscape. In *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments*. Cambridge: Cambridge University Press, pp. 1–10.
- Desbrière, Michel (2008). Vauban et la cartographie des environs de Brest 1683–1695. *Le Monde des Cartes* 195, pp. 75–86.
- Dixon, Piers and Withers, Charles W. J. (2009). Guest Editorial. *Scottish Geographical Journal* 125(1), pp. 1–3.
- D’Orgeix, Émilie (1999). Aperçu d’un genre iconographique peu connu: les atlas militaires manuscrits de la première moitié du XVII^e siècle. In Catherine Bousquet-Bressolier (ed.), *Le Paysage des Cartes genèse d’une codification*. Paris: Musée des Plans-Reliefs, pp. 29–48.
- Douet, James (1998). *English Barracks, 1600–1914: Their Architecture and Role in Society*. London: The Stationery Office for English Heritage.
- Duffy, Christopher (1979). *Siege Warfare: The Fortress in the Early Modern World, 1494–1660*. London and Boston: Routledge & Kegan Paul.
- . (1985). *Siege Warfare: The Fortress in the Age of Vauban and Frederick the Great, 1660–1789*. London and Boston: Routledge & Kegan Paul.
- . (1996). *Fire & Stone: The Science of Fortress Warfare, 1660–1860*. London: Greenhill Books.

- . (2003). *The '45*. London: Cassell.
- Eckert, Max (1908). On the Nature of Maps and Map Logic. Trans. by W. Joerg. *Bulletin of the American Geographical Society* 40(6), pp. 344–351.
- Edney, Matthew H. (1993). Cartography Without ‘Progress’: Reinterpreting the Nature and Historical Development of Mapmaking. *Cartographica* 30(2&3), pp. 54–68.
- . (1994a). British military education, mapmaking, and military ‘map-mindedness’ in the later Enlightenment. *The Cartographic Journal* 31, pp. 14–20.
- . (1994b). Mathematical Cosmography and the Social Ideology of British Cartography, 1780–1820. *Imago Mundi* 46, pp. 101–116.
- . (1996). Theory and the History of Cartography. *Imago Mundi* 48, pp. 185–191.
- . (1997). *Mapping an Empire: The Geographical Construction of British India, 1765–1843*. Chicago and London: University of Chicago Press.
- . (1998). Cartography: Disciplinary History. In Gregory A. Good (ed.), *Sciences of the Earth: An Encyclopedia of Events, People, and Phenomena*. Garland Publishing, pp. 81–85.
- . (1999). Reconsidering Enlightenment Geography and Map Making: Reconnaissance, Mapping, Archive. In David N. Livingstone and Charles W. J. Withers (eds.), *Geography and Enlightenment*. Chicago and London: University of Chicago Press, pp. 165–198.
- . (2005). The Origins and Development of J.B. Harley’s Cartographic Theories. Monograph 54 *Cartographica* 40(1–2), pp. 1–143.
- . (2009). The Irony of Imperial Mapping. In James R. Akerman (ed.), *Cartography and the Mastery of Empire: The Imperial Map*. Chicago and London: University of Chicago Press, pp. 11–45.

- Elcho, David Lord (1973). *A Short Account of the Affairs of Scotland in the Years 1744, 1745, 1746 by David Lord Elcho* (ed. Charteris, E.). Edinburgh: The Mercat Press (facsimile reprint of the 1907 edition).
- Ewart, Gordon and Gallagher, Dennis (forthcoming). The Fortifications of Fort George, Ardersier, near Inverness: Archaeological Investigations 1990–2005. *Post Medieval Archaeology*.
- Fleet, Christopher (2007). Lewis Petit and his Plans of Scottish Fortifications and Towns, 1714–16. *The Cartographic Journal* 44(4), pp. 329–341.
- Fleet, Christopher and Kowal, Kimberly (2007). Roy Military Survey map of Scotland (1747–1755): mosaicing, geo-referencing, and web delivery. *e-Perimtron* 2(4), pp. 194–2.
- Foard, G. (2005). *Draft report on Prestonpans*. Prepared for Historic Scotland by the Battlefields Trust.
- . (2005). *Draft report on Sheriffmuir*. Prepared for Historic Scotland by the Battlefields Trust.
- Forbes, Eric G. (1980). Mathematical Cosmography. In G. S. Rousseau and Roy Porter (eds.), *The Ferment of Knowledge: Studies in the Historiography of Eighteenth-Century Science*. Cambridge: Cambridge University Press, pp. 417–448.
- Gardiner, R. A. (1977). William Roy, Surveyor and Antiquary. *The Geographical Journal* 143(3), pp. 439–450.
- Godlewska, Anne (1988). The Napoleonic Survey of Egypt: A Masterpiece of Cartographic Compilation and Early Nineteenth-Century Fieldwork. Monograph 38–39 *Cartographica* 25(1&2), pp. 1–171.
- . (1995). Map, Text and Image. The Mentality of Enlightened Conquerors: A New Look at the *Description de l’Egypte*. *Transactions of the Institute of British Geographers* 20(1), pp. 5–28.

- . (1999). *Geography Unbound: French Geographic Science from Cassini to Humboldt*. Chicago and London: University of Chicago Press.
- Godlewska, Anne, Létourneau, Marcus R. and Schauerte, Paul (2005). Maps, Painting and Lies: Portraying Napoleon's Battlefields in Northern Italy. *Imago Mundi* 57(2), pp. 149–163.
- Goode, Paul J. (1927). The Map as a Record of Progress in Geography. *Annals of the Association of American Geographers* 17(1), pp. 1–14.
- Hale, J. R. (1977). *Renaissance Fortification: Art or Engineering?* London: Thames and Hudson.
- Harley, J. B. (1968). The Evaluation of Early Maps: Towards a Methodology. *Imago Mundi* 22, pp. 62–74.
- . (1976). The Map User in Eighteenth-Century North America; Some Preliminary Observations. In Brian S. Osborne (ed.), *The Settlement of Canada: Origins and Transfer*. Proceedings of the 1975 British-Canadian Symposium on Historical Geography. Kingston, Ontario: Queen's University, pp. 47–69.
- . (1978). The Contemporary Mapping of the American Revolutionary War. In J. B. Harley, Barbara Bartz Petchenik, and Lawrence W. Towner (eds.), *Mapping the American Revolutionary War*. Chicago and London: University of Chicago Press, pp. 1–44.
- . (1978). The Spread of Cartographical Ideas between the Revolutionary Armies. In J. B. Harley, Barbara Bartz Petchenik, and Lawrence W. Towner (eds.), *Mapping the American Revolutionary War*. Chicago and London: University of Chicago Press, pp. 45–78.
- . (1978). The Map User in the Revolution. In J. B. Harley, Barbara Bartz Petchenik, and Lawrence W. Towner (eds.), *Mapping the American Revolutionary War*. Chicago and London: University of Chicago Press, pp. 79–110.

- . (1982). Historical geography and its evidence: reflections on modelling sources. In Alan R. H. Baker and Mark Billinge (eds.), *Period and Place: Research Methods in Historical Geography*. Cambridge: Cambridge University Press, pp. 261–273.
- . (1987). The Map and the Development of the History of Cartography. In J. B. Harley and D. Woodward (eds.), *The History of Cartography Vol. 1. Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*. Chicago and London: University of Chicago Press, pp. 1–42.
- . (1988a). Maps, Knowledge, and Power. In Denis Cosgrove and Stephen Daniels (eds.), *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments*. Cambridge: Cambridge University Press, pp. 277–312.
- . (1988b). Silences and Secrecy: The Hidden Agenda of Cartography in Early Modern Europe. *Imago Mundi* 40, pp. 57–76.
- . (1989a). Deconstructing the Map. *Cartographica* 26(2), pp. 1–20.
- . (1989b). Historical Geography and the Cartographic Illusion. *Journal of Historical Geography* 15(1), pp. 80–91.
- . (2001a). Power and Legitimation in the English Geographical Atlases of the Eighteenth Century. In Paul Laxton (ed.), *The New Nature of Maps: Essays in the History of Cartography*. Baltimore and London: Johns Hopkins University Press, pp. 110–147.
- . (2001b). Text and Context in the Interpretation of Early Maps. In Paul Laxton (ed.), *The New Nature of Maps: Essays in the History of Cartography*. Baltimore and London: Johns Hopkins University Press, pp. 33–49.
- Hasenmueller, Christine (1978). Panofsky, Iconography, and Semiotics. *The Journal of Aesthetics and Art Criticism* 36(3) Critical Interpretation, pp. 289–301.

- Headrick, Daniel R. (2000). *When Information Came of Age: Technologies of Knowledge in the Age of Reason and Revolution, 1700–1850*. Oxford: Oxford University Press.
- Hewitt, Rachel (forthcoming). The Military Survey of Scotland (1747–1755) and the Dundas Family of Arniston: ‘The Sole Motive of Restoring Quiet in the Highlands’. *Journal of Historical Geography*.
- Hewlings, Richard (2004). Jelfe, Andrews (c.1690–1759). *Oxford Dictionary of National Biography*. Oxford: Oxford University Press.
- Hodson, Yolande (1988). Prince William, Royal Map Collector. *The Map Collector* 44, pp. 2–12.
- . (2007). William Roy and the military Survey of Scotland. In *The Great Map: The Military Survey of Scotland, 1747–1755*. Edinburgh: Birlinn, pp. 7–23.
- Hook, Michael and Ross, Walter (1995). *The 'Forty-Five: The Last Jacobite Rebellion*. Edinburgh: HMSO.
- Inglis, Harry R. G. (1918). John Adair: An early map-maker and his work. *Scottish Geographical Journal* 34(2), pp. 60–66.
- Jacob, Christian (1996). Toward a Cultural History of Cartography. *Imago Mundi* 48, pp. 191–198.
- . (2006). *The Sovereign Map: Theoretical Approaches in Cartography throughout History*. Translated by Tom Conley. Chicago and London: University of Chicago Press.
- Kagan, Richard L. and Schmidt, Benjamin (2007). Maps and the Early Modern State: Official Cartography. In David Woodward (ed.) *The History of Cartography Volume Three: Cartography in the European Renaissance*. Chicago and London: The University of Chicago Press, pp. 661–679.

- Kain, Roger J. P. and Baigent, Elizabeth (1992). *The Cadastral Map in the Service of the State: A History of Property Mapping*. Chicago and London: University of Chicago Press.
- Kidd, Colin (1993). *Subverting Scotland's Past: Scottish whig historians and the creation of an Anglo-British identity, 1689–c.1830*. Cambridge: Cambridge University Press.
- Klein, Christopher M. (1989). *Maps in Eighteenth-Century British Magazines: A Checklist*. Chicago: The Newberry Library.
- Komedchikov, Nikolay N. (2005). The General Theory of Cartography under the Aspect of Semiotics. Paper presented at the *International Cartographic Conference 2005*.
- Konvitz, Josef W. (1987). *Cartography in France, 1660–1848: Science, Engineering, and Statecraft*. Chicago and London: University of Chicago Press.
- Kopperman, Paul E. (2004). Debbieg, Hugh (1731/2–1810). In *Oxford Dictionary of National Biography*. Oxford: Oxford University Press; online edn, Jan 2008.
- Latcham, Paul (2004). Skinner, William (1699/1700–1780). In *Oxford Dictionary of National Biography*. Oxford: Oxford University Press; online edn, Jan 2008.
- Lenman, Bruce (1995). *The Jacobite Risings in Britain, 1689–1746*. Dalkeith: Scottish Cultural Press.
- London, Hugh Stanford (1954). The Broad Arrow as a Government Badge. *The Coat of Arms* 3, pp. 135–136.
- Luijk, Ruben B. van (2008). Maps of Battles, Battle of Maps: News Cartography of the Battle at Neerwinden, Flanders, 1693. *Imago Mundi* 60(2), pp. 211–220.
- Macinnes, Allan I. (1999). Scottish Jacobitism: in Search of a Movement. In *Eighteenth Century Scotland: New Perspectives*, edited by T.M. Devine and J.R. Young, Edinburgh: Tuckwell Press, pp.70–89.

- Mackillop, Andrew (2001). Jacobitism. In Michael Lynch (ed.), *The Oxford Companion to Scottish History*. Oxford: Oxford University Press, pp. 349–352.
- Mallett, Robert (1987). *The Military Survey of Scotland 1747–1755: an analysis utilising the dual concepts of map form and content*. St. Andrews: unpublished thesis.
- Margulies, Martin B (2002). Unlucky or Incompetent? History's Verdict on General Sir John Cope Part II: The Battle of Prestonpans & the aftermath. *History Scotland* 2(3), pp. 37–43.
- Marshall, Douglas W. (1980). Military Maps of the Eighteenth-Century and the Tower of London Drawing Room. *Imago Mundi* 32, pp. 21–44.
- . (1981). Instructions for a Military Survey in 1779. *Cartographica* 18(1), pp. 1–12.
- Mathieson, John (1924). General Wade and His Military Roads in the Highlands of Scotland. *Scottish Geographical Journal* 40(4), pp. 193–213.
- Millar, A. H. (1882). The Battle of Glenshiel, 10th June 1719. Note Upon an Unpublished Document in the Possession of His Grace the Duke of Marlborough. *Proceedings of the Society of Antiquaries of Scotland*, 17, pp. 57–69.
- . (1885). The Battle of Glenshiel. Note Upon an Unpublished Letter in the Possession of C. S. Home-Drummond-Moray, Esq. of Abercairney. *Proceedings of the Society of Antiquaries of Scotland*, 19, pp. 64–66.
- Millar, A. H., rev. M. R. Glozier (2004). Slezer, John (d. 1717). *Oxford Dictionary of National Biography*. Oxford: Oxford University Press.
- Miller, Edward (1973). *That Noble Cabinet: A History of the British Museum*. London: André Deutsch.
- Miller, Ronald (1956). Major-General William Roy, F.R.S. *Scottish Geographical Journal* 72(2), pp. 97–100.

- Mitchell, W. J. T. (1984). What Is an Image? *New Literary History* 15(3)
Image/Imago/Imagination, pp. 503–537.
- . (1986). *Iconology: Image, Text, Ideology*. Chicago: University of Chicago Press.
- . (1994). *Landscape and Power*. Chicago: University of Chicago Press.
- Moir, D. G. (1973). *The Early Maps of Scotland to 1850*. Volume 1. Edinburgh: The Royal
Scottish Geographical Society.
- . (1983). *The Early Maps of Scotland to 1850*. Volume 2. Edinburgh: The Royal
Scottish Geographical Society.
- Moore, John N. (1985). Manuscript charts by John Adair: A further discovery. *Scottish
Geographical Journal* 101(2), pp. 105–110.
- . (2000). John Adair's Contribution to the Charting of the Scottish Coasts: A Re-
Assessment. *Imago Mundi* 52, pp. 43–65.
- Morgan, Basil (2004). Romer, Wolfgang William (1640–1713). In *Oxford Dictionary of
National Biography*. Oxford: Oxford University Press.
- Mukerji, Chandra (2003). Intelligent Uses of Engineering and the Legitimacy of State Power.
Technology and Culture 44(4), pp. 655–676.
- O'Donoghue, Yolande (1977) *William Roy 1726–1790: Pioneer of the Ordnance Survey*.
London: British Museum Publications, pp.19-29.
- Oppé, A. P. (1947). *The Drawings of Paul and Thomas Sandby in the Collection of His
Majesty the King at Windsor Castle*. Oxford and London: The Phaidon Press.
- Ogborn, Miles (1998). The Capacities of the State: Charles Davenant and the Management
of Excise, 1683–1698. *Journal of Historical Geography* 24(3), pp. 289–312.

- Osborne, Thomas (1999). The Ordinariness of the Archive. *History of the Human Sciences* 12(2), pp. 51–64.
- Panofsky, Erwin (1955). *Meaning in the Visual Arts*. London: Penguin Books, pp. 23–81.
- Parker, Geoffrey (1988). *The Military Revolution: Military Innovation and the Rise of the West, 1500–1800*. Cambridge: Cambridge University Press.
- Parnell, Geoffrey (1995). *The Buildings and Works of the Office of Ordnance at the Tower of London, 1660-1722* (Vol 1). Reading University: unpublished thesis.
- Petrie, Sir Charles (1958). *The Jacobite Movement*. London: Eyre & Spottiswoode.
- Pickles, John (1992). Texts, Hermeneutics and Propaganda Maps. In Trevor J. Barnes and James S. Duncan (eds.), *Writing Worlds: discourse, text & metaphor in the representation of landscape*. London and New York: Routledge, pp. 193–230.
- Picon, Antoine (1992). *French Architects and Engineers in the Age of Enlightenment*, translated by Martin Thom. Cambridge: Cambridge University Press.
- Pollak, Martha D. (1991). *Military Architecture, Cartography & the Representation of the Early Modern European City. A Checklist of Treatises on Fortification in The Newberry Library*. Chicago: The Newberry Library.
- Pollard, Tony (2009). Mapping Mayhem: Scottish Battle Maps and their Role in Archaeological Research. *Scottish Geographical Journal* 125(1), pp. 25–42.
- Prebble, John (1961). *Culloden*. London: The Folio Society.
- Rees, Ronald (1980). Historical Links between Cartography and Art. *Geographical Review* 70, pp. 60–78.
- Robinson, A. H. W. (1958). The Charting of the Scottish Coasts. *Scottish Geographical Journal* 74(2), pp. 116–127.

- . (1959). Two unrecorded manuscript charts by John Adair. *Scottish Geographical Journal* 75(3), pp. 169–172.
- Robinson, Arthur H. and Petchenik, Barbara Bartz (1976). *The Nature of Maps: Essays toward Understanding Maps and Mapping*. Chicago: University of Chicago Press.
- Rose, Gillian (2001). *Visual Methodologies: An Introduction to the Interpretation of Visual Materials*. London: SAGE Publications.
- Ruddock, Ted (1984). Bridges and Roads in Scotland: 1400–1750. In Alexander Fenton and Geoffrey Stell (eds.), *Loads and Roads in Scotland and Beyond: Land Transport over 6000 Years*. Edinburgh: John Donald Publishers, pp. 67–91.
- Salmond, J. B. (1934). *Wade in Scotland*. Edinburgh & London: The Moray Press.
- Sanger, Victoria (1999). Vauban et la topographie des places fortes: Brest et Longwy. In Catherine Bousquet-Bressolier (ed.), *Le Paysage des Cartes genèse d'une codification*. Paris: Musée des Plans-Reliefs, pp. 49–63.
- Saunders, Andrew (1998). 1600–1750: Early Evolution, in James Douet *English Barracks, 1600–1914: Their Architecture and Role in Society*. London: The Stationery Office for English Heritage, pp. 1–28.
- Saville, Richard (1999). Scottish Modernisation Prior to the Industrial Revolution, 1688–1763. In T.M. Devine and J.R. Young (eds.), *Eighteenth Century Scotland: New Perspectives*. Edinburgh: Tuckwell Press, pp. 6–23.
- Skelton, R. A. (1956). The Royal Map Collections of England. *Imago Mundi* 13, pp. 181–183.
- . (1967). The Military Survey of Scotland 1747–1755. *Scottish Geographical Magazine* 83(1), pp. 5–16.
- . (1970). The Military Surveyor's Contribution to British Cartography in the 16th Century. *Imago Mundi* 24, pp. 77–83.

- Stephen, Leslie, rev. Ruth Wallis (2004). Burrow, Reuben (1747–1792). *Oxford Dictionary of National Biography*. Oxford: Oxford University Press.
- Stewart, Richard W. (1996). *The English Ordnance Office, 1585–1625: A Case Study in Bureaucracy*. The Royal Historical Society: The Boydell Press.
- Szechi, Daniel (1994). *The Jacobites: Britain and Europe 1688–1788*. Manchester: Manchester University Press.
- . (2006). *1715 The Great Jacobite Rebellion*. New Haven and London: Yale University Press.
- Tabraham, Chris (1986). *Scottish Castles and Fortifications*. Edinburgh: Her Majesty's Stationery Office.
- . (2007). The Military Context of the Military Survey. In William Roy, *The Great Map: the Military Survey of Scotland 1747-55*. Edinburgh: Birlinn, pp. 25–35.
- Tabraham, Chris and Grove, Doreen (1995). *Fortress Scotland and the Jacobites*. London: B. T. Batsford / Historic Scotland.
- Tait, A. A. (1965). The Protectorate Citadels of Scotland. *Architectural History* 8, pp. 9–24.
- Taylor, William (1996). *The Military Roads in Scotland*. Argyll: House of Lochar.
- The National Archives (2004). *Ordnance, Board Records*. Military Records Information 66.
- Tomlinson, H.C. (1979). *Guns and Government: The Ordnance Office under the later Stuarts*. London: Royal Historical Society.
- Tooley, R. V. (1949). *Maps and Map-Makers*. London: B. T. Batsford.
- Turnbull, David (1996). Cartography and Science in Early Modern Europe: Mapping the Construction of Knowledge Spaces. *Imago Mundi* 48, pp. 5–24.

- Vetch, R. H., rev. F. J. Hebbert (2004). Richards, Michael (1673–1722). *Oxford Dictionary of National Biography*. Oxford: Oxford University Press.
- Wallis, Helen (1973). The Map Collections of the British Museum Library. In Helen Wallis and Sarah Tyacke (eds.) *My Head is a Map: Essays & Memoirs in honour of R. V. Tooley*. London: Francis Edwards and Carta Press, pp. 3–20.
- . (1994). *Historian's Guide to Early British Maps: A Guide to the Location of pre-1900 Maps of the British Isles Preserved in the United Kingdom and Ireland*. London: Offices of the Royal Historical Society.
- Warmoes, Isabelle (2008). La Rationalisation de la Production Cartographique à Grande Échelle au Temps de Vauban. *Le Monde des Cartes* 195, pp. 55–66.
- Webster, Diana (2005). The Last Battle. In Peter Barber (ed.), *The Map Book*. London: Weidenfeld & Nicolson.
- Whittington, Graeme (1986). The Roy Map: The Protracted and Fair Copies—Part One. *Scottish Geographical Journal* 102(1), pp. 18–28.
- Whittington, Graeme and Gibson, Alexander (1986). *The Military Survey of Scotland 1747–1755: A Critique*, Norwich: Historical Research Group of the Institute of British Geographers.
- Widmalm, Sven (1990). Accuracy, Rhetoric, and Technology: The Paris-Greenwich Triangulation, 1784–88, in Tore Frangsmyr, J. L. Heilbron, and Robin E. Rider (eds.), *The Quantifying Spirit in the Eighteenth Century*. Berkeley: University of California Press, pp. 179–206.
- Wilkes, Margaret (1996). Culloden: The Jacobite View. *The Scottish Records Association Newsletter*.
- Withers, Charles W. J. (1995). Geography, Natural History and the Eighteenth-Century Enlightenment: Putting the World in Place. *History Workshop Journal* 39, 137–164.

- . (1996). Encyclopaedism, Modernism and the Classification of Geographical Knowledge. *Transactions of the Institute of British Geographers* 21(1), pp. 275–298.
- . (1999). Reporting, Mapping, Trusting: Making Geographical Knowledge in the Late Seventeenth Century. *Isis* 90(3), pp. 497–521.
- . (2002). The Social Nature of Map Making in the Scottish Enlightenment, c.1682–c.1832. *Imago Mundi* 54, pp. 46–66.
- . (2003). Mapping. In Alan Charles Kors (ed.), *Encyclopedia of the Enlightenment*, Vol. 3. Oxford: Oxford University Press, pp. 18–20.
- . (2007). *Placing the Enlightenment: Thinking Geographically about the Age of Reason*. Chicago and London: University of Chicago Press.
- . (forthcoming). Histories of Cartography. In Matthew H. Edney, Mary S. Pedley and Graham Burnett (eds.), *The History of Cartography Vol. 4 Cartography in the European Enlightenment*. Chicago: University of Chicago Press.
- Wood, Denis (1992). *The Power of Maps*. London: Routledge.
- Wood, Denis and Fels, John (1986). Designs on Signs / Myth and Meaning in Maps. *Cartographica* 23(3), pp. 54–103.
- . (2008). The Natures of Maps: Cartographic Constructions of the Natural World. *Cartographica* 43(3), pp. 189–202.
- Woodward, David (ed.) (1987). Introduction. In *Art and Cartography: Six Historical Essays*. Chicago and London: University of Chicago Press, pp.1–9.
- Woosnam-Savage, Robert (forthcoming 2009). ‘To gather an image whole’: some early maps and plans of Culloden. In T. Pollard (ed.) *Culloden: The History and Archaeology of the Last Clan Battle*. Barnsley: Pen and Sword.

Wright, J. K. (1947). *Terrae Ingognitae: The Place of the Imagination in Geography*. *Annals of the Association of American Geographers* 37(1), pp. 1–15.

Young, John R. (1999). The Parliamentary Incorporating Union of 1707: Political Management, Anti-Unionism and Foreign Policy. In T.M. Devine and J.R. Young (eds.), *Eighteenth Century Scotland: New Perspectives*. Edinburgh: Tuckwell Press, pp. 24–52.