National University of Ireland Maynooth

LAND SURVEYING IN EIGHTEENTH AND EARLY NINETEENTH-CENTURY DUBLIN

By
Finnian O'Cionnaith

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NATIONAL UNIVERSITY OF IRELAND MAYNOOTH

HEAD OF DEPARTMENT: Professor Marian Lyons
Supervisor of research: Dr Jacinta Prunty

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Declaration

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Philosophy, is entirely my own work and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my own work.

Signed:_____________________ (Candidate)

Date:_______________________

Abstract

This thesis explores and documents the profession of land surveying in Dublin, Ireland, during the eighteenth and early nineteenth centuries until 1810. It aims to present the many aspects of land surveying in Dublin during this period. As such, it is the history of a skilled, varied and complex craft practiced by both professionals and amateurs. It establishes a definition for the career title *land surveyor*, examines the viability of the profession in eighteenth-century Dublin and how the elements of surveying science, art, technology and business integrated together to create a feasible career.

The science and technology of surveying, established primarily from period treatises and manuals, is evaluated, compared and investigated with specific focus on surveying instrumentation and associated methodology. The practical application of surveying technology and techniques is examined through a series of case studies to demonstrate both the diversity of period surveying work and the individuals who practiced it. The cartographic output from such projects, the various artistic styles, strengths, weaknesses and trends additionally reflect this diversity.

Acknowledgements

I would like to express my deep appreciation and gratitude to my supervisor, Dr. Jacinta Prunty. Her guidance, advice and passion for research have been invaluable in enabling me develop the ideas in the thesis and to bring the work to completion. I am grateful for her detailed feedback as the thesis evolved and for her encouragement throughout the process. I would also very much like to thank Professors Colm Lennon and Marian Lyons, Department of History, NUI Maynooth, for their supervision and assistance.

I am deeply obliged to the directors and staff in numerous archives: Ann Simmons of Marsh's Library, Dublin; Penny Woods of the Russell Library, NUI Maynooth; the staff of the National Library of Ireland, particularly in their manuscript section; the staff of the National Archives of Ireland; Dr Tim Eggington of Whipple Library, University of Cambridge; Paul Ferguson of Trinity College map library; Ciaran Callan of Dublin Port Authority; Patrick Shine and Peter Conway of Dublin City Council, Rachel Bewley-Bateman of the Friends Historical Library, Dublin; Noel Healy of the Old Dublin Society; Bernadette Cunningham, Petra Schnabel and Sarah Gearty of the Royal Irish Academy; the staff of Libreia Nazionale Marciana, Palazzo Querini Stampalia and Centro di Rilievo, Cartografia ed Elaborazione, Venice; Andrew Moore and Sarah Montague of the National Gallery of Ireland and their colleagues Niamh MacNally and Kerry Eldon in the prints archive; Colum O'Riordan of the Irish Architectural Archive. Of particular note I would very much like to thank Dr. Mary Clark and her staff of Dublin City Archives, especially Andrew O'Brien, for the help, interest, generosity and encouragement they have given throughout my research.

I am truly grateful to all those who aided me so much during my travels; in Cambridge, Maureen and Brendan Donnelly for their hospitality and in Venice, Gloria Correggiari of Università Iuav di Venezia for her advice and introductions.

It has been a great pleasure for me to cooperate with some former lecturers and colleagues, in addition to fellow researchers, working on the same era of history or similar topics; Dr. Alison Fitzgerald, Department of History, NUI Maynooth and Dr. Christine Casey, Department of History of Art and Architecture, TCD, for their assistance with eighteenth-century artistic fashions; Professor James Kelly and Dr. Ruth McManus of St. Patrick's College, Drumcondra; Dr. John Montague; Dr. Frank Prendergast, Department of Spatial Information Science, DIT Bolton Street; Malachy McVeigh; and Dr. Niall McKeith of the National Science Museum, NUI Maynooth with his help with gaining access to eighteenth-century instrumentation.

This thesis, quite literally, would never have been possible in this form without the previous research conducted by Professor John Andrews. I have had the pleasure of not only reading his extensive works and following in his research footprints but also of meeting and communicating with him on several occasions. Nobody has done more to keep the subject of historical Irish land surveying alive than Professor Andrews and I am very grateful for his tireless work and enthusiasm on the subject.

I am deeply indebted to Dublin's surveyors of the eighteenth and nineteenth centuries. Over the course of nearly five years I have learnt about their lives – not only on a professional basis but also, occasionally, the joys and sorrows they suffered through their time in Dublin. In my mind, each surveyor has his own face, his own personality, his own particular take on life. The delight I have experienced in discovering some new trait about them or their often unique and occasionally clashing characteristics has been the driving force behind this research for me. As a land surveyor myself I passionately believe that these men deserve recognition of their life's work. My original and continuing focus for this research is for these men not to be forgotten and that their lives will live again, in some form, through a renewed interest in their wonderful and detailed measurements.

For my mother, Dr. Philomena Donnelly and my wonderful brother Fiachra O'Cionnaith.

Abbreviations

Ancient Records	*Calendar of ancient records of Dublin in the possession of the municipal corporation*. Ed. J. T. Gilbert and R. M. Gilbert, 19 vols. Dublin, 1889-1944.
CIRCE	Centro Cartografico Interdipartimentale, Venice.
DCA	Dublin City Archive.
DHR	*Dublin Historical Record*, Dublin, 1938 -
GB	Google Books.
IAA	Irish Architectural Archives, Dublin.
IHTA	Irish Historic Towns Atlas.
Ir. Georgian Soc. Bull.	*Bulletin of the Irish Georgian Society*
IUAV	Università Iuav, Venice.
ML	Marsh's Library, Dublin.
NAI	National Archives of Ireland, Dublin.
NGI	National Gallery of Ireland, Dublin.
NLI	National Library of Ireland, Dublin.
RIA	Royal Irish Academy, Dublin.
RL	Russell Library, NUI Maynooth.
RMSE	Route mean square error.
RSL	Religious Society of Friends Library, Dublin.
TCD	Trinity College Dublin.
UCD	University College Dublin.
WL	Whipple Library, University of Cambridge.

Table of Contents

List of figures

List of tables

Introduction

Eighteenth and early nineteenth-century Dublin offered land surveyors great opportunities. The city during this period was the subject of numerous surveys, it provided exciting and diverse potential for employment for land surveying practitioners and it was home for many of them. Surveyors from across Ireland were drawn to the city not only as a place of business but for the new surveying techniques, literature and technologies that Dublin offered them.

The purpose of this research is to explore the land surveying industry in eighteenth and early nineteenth-century Dublin (1690-1810). It is the aim of this research to examine in detail the history, technology, methods, processes and cartographic style of Dublin's land surveyors during this period.

Built around a small core of professionals over the course of a century, Dublin's land surveying industry was vibrant and productive in this period. The various methods and means of representing the city and surrounding lands in cartographic works, the measuring and laying out of new streets and roads, and the adaptation and integration of new technologies and techniques was the trade of Dublin's surveyors. The work they undertook was of utmost importance in the transformation of Dublin from a cramped medieval city to a Georgian metropolis.[1]

Maps provide a unique insight into eighteenth-century Dublin. As a result they are often consulted and printed in works about the history of the city during this period. Research into how such maps were produced, however, is less common and works concentrating on the practice and science of surveying during this period in Ireland are even rarer. The period covered by this research, 1690-1810, was a time of transformation in the surveying profession. Improvements in surveying instrumentation, technology and surveying techniques are found throughout the eighteenth century. This period was marked by major civic and infrastructure developments in Dublin city. The expansion of the city into the surrounding countryside, the construction of the Royal and Grand canals along with work on

[1] Edel Sheridan, 'Designing the capital city' in J. Brady and A. Simms (eds.), *Dublin* c.*1660-1810* (Dublin, 2001), pp 66-136.

improving the quays and harbour all provided opportunities for Dublin's surveyors to practice their trade.

The technological and cartographic advancements pioneered during this period had a radical effect on the ways in which Dublin's surveyors worked - moving them out from under the cartographic shadow of William Petty's Down Survey (1655-56)[2] and towards the standardisation of the Ordnance Survey from 1824 onwards. Another important influence on the work of Dublin surveyors at the end of this period was the Act of Union (1801). The Act, which officially removed Ireland's own parliament and introduced direct rule from Westminster, in essence downgraded Dublin from a national to a regional capital.[3] The resulting economic downturn in the city was strongly felt by civic bodies and negatively impacted on their plans for the re-development of the city centre, which in turn affected the market for Dublin's surveyors.

Rationale for the study

Dublin city has been selected for this study because of its relatively high concentration of surveyors during the eighteenth century, in comparison to the rest of Ireland.

Dublin is the capital city of Ireland and is located on the country's east coast. The city is built on a relatively flat coastal plain, divided by the River Liffey, with the Wicklow Mountains located to the south, and the open country of Kildare and Meath to its east and north. Dublin, a port city, was originally founded as two settlements, the Viking Dubh Linn and the Gaelic Baile Átha Cliath during the early medieval period.[4] The city retained its defensive walls until late seventeenth century, by which time a change in the socio-political-economic environment following Oliver Cromwell's campaign in Ireland (1649-59) and the Battle of the Boyne (1690) resulted in a more stable era and allowed for the successful extensive expansion of the city from its original boundaries.

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[2] A major survey conducted in the aftermath of Cromwell's Irish campaign (1649-50) in which Ireland was surveyed and land grants given to soldiers and sponsors of Cromwell in return for their support. It was conducted by William Petty and was called the Down Survey of Ireland.

[3] Sheridan, Edel, 'Living in the capital city' in Brady & Simms (eds), *Dublin* c.*1660-1810* (Dublin, 2001) pp 136-158.

[4] H. B. Clarke, *Dublin part 1, to 1610* (Irish Historic Towns Atlas, no. 11, Dublin, 2002), p. 2.

Dublin rapidly expanded during the ‘long’ eighteenth century both economically and physically. Its population increased from approximately 50,000 in 1700 to nearly 200,000 by 1810[5] making it the second largest city in the British Empire at this time. An active port city in the eighteenth century, it was home to important figures such as author Jonathan Swift (1667-1745), composer George Frederic Handel (1685-1759), architect James Gandon (1743-1823) and politician Henry Grattan (1746-1820). The city had a large social mix, with an upper-class population located in new and fashionable residential squares and streets in the north and east of the city, lower and working-class residences in the south west, and prosperous mercantile and manufacturing industries located throughout the city.[6]

Dublin was selected because of its rich cartographic history and availability of pre-Ordnance Survey mapping. These maps vary in size from the large and detailed prestige pieces such as John Rocque’s 1756 map of the city,[7] plans of the landed estates of private landlords and the Church of Ireland, to the smaller works that appear in commercial directories throughout the period. Fragmented urban estates provided ample opportunity for the employment of land surveyors, with small lott maps being produced in great quantities during this period. Such a large range of map types provides an opportunity to analyse the development in cartographic techniques over the period covered. Furthermore, it permits a comparison with modern mapping in terms of the standards of accuracy that Dublin’s eighteenth-century surveyors achieved.

The profession, business, science and technology of land surveying in Dublin during this period were all closely linked. The eighteenth century began with surveying largely restricted to simple works; maps with relatively basic decoration and very similar in style to the surveys conducted during previous centuries.[8] Instrumentation

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[5] Patrick Fagan, ‘The population of Dublin in the eighteenth century’ in *Eighteenth-Century Ireland / Iris an dá chultúr* vi (1991), pp 121-56.
[6] Constantia Maxwell, *Dublin under the Georges* (Dublin, 1936) p. 100; Edel Sheridan, ‘Designing the capital city’ in J. Brady and A. Simms (eds), *Dublin* c.*1660-1810* (Dublin, 2001), p. 66.
[7] See chapter 3 for an analysis of Rocque’s work in Dublin or John Montague, ‘John Rocque's Exact survey of the city and suburbs of Dublin, 1756, as evidence for the architecture of Dublin in the mid-18th century’, unpublished Ph. D. thesis, TCD, 2009.
[8] The cartographic design of William Petty’s Down Survey (1655-6) heavily influenced Irish surveying for over a century.

consisted of chains, plane tables and circumferentors,[9] all familiar to surveyors of the early seventeenth century. By the end of the eighteenth century the situation had altered. Surveyors had branched out to high-precision engineering works and urban redevelopment plans. They also contributed to scientific discussions.[10] Additionally the development of new and more accurate surveying instruments and new European cartographic styles had begun to influence Irish surveyors.[11] Older instruments disappeared, newer instruments took their place. Increasing technological sophistication within surveying reduced some instruments to the realms of virtual museum pieces; others were adapted, modified and retained. It should be noted that discussions connected to surveying methodology, instrumentation and cartography covered by this research are related to the eighteenth-century surveying industry rather than comparing them to the modern industry with its radically different technologies. Nevertheless eighteenth-century surveyors had a detailed technological knowledge and their instrumentation and methodology laid the foundations for aspects of modern surveying.

As such, a study into the ever-changing cartographic styles of the eighteenth and early nineteenth centuries reflects the advancement of the industry from simple boundary maps to intricate city plans heavily influenced by English and continental European cartographic styles. Increasing demands from the cartographic consumer market, influenced by improvements in map production in England and France, led to Irish surveyors adapting new methods and practices to reach levels of accuracy and design previously unseen in the country. It would be easy to become entangled in period cartography while exploring such a topic. Hence this study is primarily concerned with surveying, although cartographic works are also discussed and analysed where relevant.

Previous research papers and publications on the subject of eighteenth-century Irish land surveying and map production have tended to be dominated by the works of John

[9] The circumferentor is also known as a surveyor's compass.
[10] For example, *Freeman's Journal*, 11 Oct. 1787, John Heylin, a land surveyor from Mount Wilson near Edenderry Co. Offaly contributed to an ongoing discussion about determining magnetic variation.
[11] Arnold Horner, 'Cartouches and vignettes on the Kildare estate maps of John Rocque' in *Ir. Georgian Soc. Bull.* xiv, no. 4 (1971), p. 58.

Rocque.[12] This research, while acknowledging Rocque and his influence on Irish surveying, also devotes significant attention to examining the full spectrum of surveyors operating in Dublin during this period. Those surveyors who were weak practitioners of their trade, those who produced poor quality mapping, or those who had bad personal relationships with their employers are of equal historical importance as those, such as Rocque, who were the acknowledged leaders in their profession.

Land surveying was described by Dublin-based eighteenth-century surveyor Bernard Scalé (b.1739) as 'one of the most profitable and genteel professions'.[13] This research is more than an analysis of accuracy and precision. It is an examination of an industry as a whole, investigating levels of professionalism amongst individual surveyors and reviewing the instruments that allowed them to practice their trade. It aims to give recognition to all those mentioned in this research, for the lasting effect that their work had on Dublin city and how as a small group of individuals they influenced the development of Ireland's largest city.

Structure of thesis

There is a definite structure to the way in which a survey is carried out – define the survey's purpose, select the appropriate equipment, use suitable methods, transfer results onto paper and if necessary produce a final printed map. This thesis is arranged to reflect this process.

Chapter one consists of a preliminary study of the profession of eighteenth-century land surveying in Dublin. It introduces readers to the more practical elements of the profession before commencing a detailed analysis of technology and surveying methods in later chapters. The focus of chapter one is an examination of the eighteenth-century understanding and definition of *surveyor*; what similarities it has with the modern nomenclature, how it differed and what subsidiary roles were filled in part by land surveyors. Surveyors were recruited into the industry from many separate spheres of education and apprenticeships. Sources of employment, methods

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[12] J. H. Andrews, 'The French school of Dublin land surveyors' in *Ir. Georgian Soc. Bull.*, xxii (1980), pp 33-41; John Varley, 'John Rocque: engraver, surveyor, cartographer and map-seller' in *Imago Mundi* v (1948), pp 83-91; Arnold Horner, 'Cartouches and vignettes on the Kildare estate maps of John Rocque' in *Ir. Georgian Soc. Bull.* xiv, no. 4 (1971), p. 58.

[13] *Freeman's Journal*, 13 Jan. 1770.

of advertisement, marketing practices and available finance were all elements of the work of Dublin's surveyors during this period and each is analysed.

The science, technology and methods of eighteenth-century surveying are investigated in chapter two. Numerous surveying instruments were available for field surveys and the correct selection, or preference, of these instruments regularly defined the levels of accuracy Dublin's surveyors could attain. Each instrument type was subject to a series of physical and technical advantages and restrictions in relation to field surveying. Chapter two analyses the linear process of field surveying, measurement documentation, transference of results to parchment and map compilation in eighteenth century Dublin.

A land survey is primarily aimed towards documenting real-world measurements in a medium suitable for presentation and analysis, that is, a map. Chapter three reviews the practical elements of Dublin's cartographic production process. In order for a printed map to be produced, a series of parameters must be fulfilled such as consumer demand or official national/regional government support. Once the decision had been made to print a map, the industry of land surveying became entwined with that of eighteenth-century copper-plate printing. As such, an examination of printing technology and methods is of importance to explore eighteenth century printed map production. This includes a review of the frequency and evolution of geographic and non-geographic[14] map elements in Dublin mapping throughout the eighteenth century, noting evidence indicating the manner in which land surveys were performed and possible reasons for the map's creation. A series of examples focusing on several large scale town plan mapping projects undertaken in Dublin in the seventeenth and eighteenth centuries are also presented. The inclusion of seventeenth-century examples helps to demonstrate the development of both cartography and surveying between that era and the eighteenth century in Dublin.

Aside from analysing surveying techniques, methods and technologies, a review of important or influential surveys conducted in Dublin during this period is necessary to

[14] For example cartouches, vignettes and north arrows are not part of the physical world. Such elements are referred to as non-geographic features in this study.

explore both the industry and its capabilities. A series of cadastral,[15] civic, engineering and maritime surveys are explored in chapters four and five, spanning a period from the late seventeenth century to the early nineteenth century. Each example was selected on the basis of fulfilling the following criteria – it must be relevant to land surveying or an industry closely related to land surveying, it must be well documented, it must have had a direct influence on the city of Dublin during the eighteenth century, and must provide insight into elements of surveying not previously examined in this thesis. Chapter four documents the role that surveying played in the physical development of the city throughout the eighteenth century. Chapter five examines the growing division between land surveying and engineering during this period. Each survey example is of significance to both the history of land surveying and the history of Dublin.

The final chapter presents key findings and both general and specific conclusions about land surveying in eighteenth-century Dublin established by this research.

Eighteenth-century surveying and cartography in Dublin was almost an entirely male dominated industry[16] and as such, *he* and *his*, are used throughout this thesis.

Primary sources

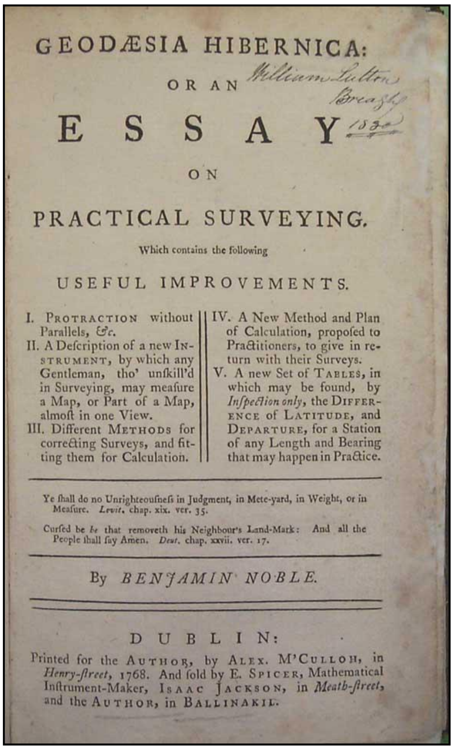
As a study of a profession, this research draws on a wide range of sources generated from numerous public bodies and from private practices. Surveying treatises and manuals, draft plans, cartographic archives, surveying advertisements, surveying instruments, street and building designs, private correspondences and opinion pieces published in contemporary newspapers and journals have provided both broad contextual information and case-study detail.

The records of *The commissioners for making wide and convenient ways, streets and passages* (1758-1815), hereafter referred to as the Wide Streets Commissioners or WSC, are by far the most revealing and complete source of primary material related to surveying in eighteenth-century Dublin. Aside from the records of negotiations with

[15] A comprehensive survey of property bounds.
[16] One of the few females in the business was Mary Ann Rocque, John Rocque's second wife who continued his map publishing business from London following his death in the 1760s.

existing property holders, evaluation of ideas submitted by the various commissioners and the commission's relations with the Irish parliament, the minute books provide a detailed record of the work performed by surveyors employed by this powerful body. The minutes relevant to this research are contained in twenty-two handwritten volumes and are now held by Dublin City Council. Between the years 1757 and 1810, the commission employed four full-time and several other contract surveyors. The work conducted by these surveyors, their fees and their correspondence, were recorded in the minute books by successive clerks and give an insight into both the professional lives of surveyors and their relationships with their employers. Aside from the Wide Streets Commission minute books, many of the maps produced by the surveyors employed by the commission still survive. These maps, ranging from basic cadastral maps to works of cartographic grandeur, are by far the most important collection of information on the cartographic output of surveyors and represent a realistic picture of the regular, day-to-day maps produced by Dublin's surveyors during this period.

The works of the Dublin City Surveyor were another valuable source of information on surveying activities. The city surveyor was responsible for the mapping of properties owned by Dublin Corporation and the position was held by ten men from its creation in 1679 to its disbandment in 1857. The maps produced by the various city surveyors have added importance because they cover a period of over fifty years before the foundation of the Wide Streets Commission. They demonstrate the evolution of map design and urban topographic representation over a longer period than those of the commissioners, in addition to being drawn by a larger number of surveyors.



GEODÆSIA HIBERNICA:

OR AN

ESSAY

ON

PRACTICAL SURVEYING.

Which contains the following

USEFUL IMPROVEMENTS.

I. PROTRACTION without Parallels, &c.
II. A Description of a new INSTRUMENT, by which any Gentleman, tho' unskill'd in Surveying, may measure a Map, or Part of a Map, almost in one View.
III. Different METHODS for correcting Surveys, and fitting them for Calculation.
IV. A New Method and Plan of Calculation, proposed to Practitioners, to give in return with their Surveys.
V. A new Set of TABLES, in which may be found, by *Inspection only*, the DIFFERENCE of LATITUDE, and DEPARTURE, for a Station of any Length and Bearing that may happen in Practice.

Ye shall do no Unrighteousness in Judgment, in Mete-yard, in Weight, or in Measure. *Levit.* chap. xix. ver. 35.

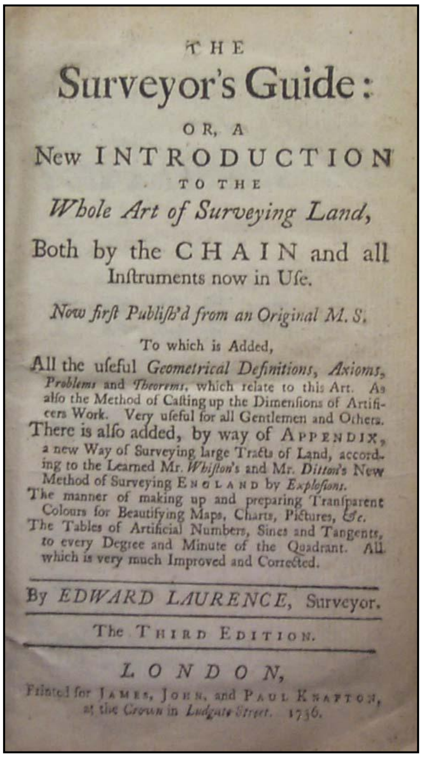
Cursed be *he* that removeth his Neighbour's Land-Mark: And all the People shall say Amen. *Deut.* chap. xxvii. ver. 17.

By *BENJAMIN NOBLE.*

DUBLIN:

Printed for the AUTHOR, by ALEX. M'CULLOH, in *Henry-street*, 1768. And sold by E. SPICER, Mathematical Instrument-Maker, ISAAC JACKSON, in *Meath-street*, and the AUTHOR, in BALLINAKILL.

Figure 1: Benjamin Noble, *Geodæsia Hibernica* (Dublin, 1767).



THE

Surveyor's Guide:

OR, A

New INTRODUCTION

TO THE

Whole Art of Surveying Land,

Both by the CHAIN and all Instruments now in Use.

Now first Publish'd from an Original M. S.

To which is Added,

All the useful *Geometrical Definitions, Axioms, Problems* and *Theorems,* which relate to this Art. As also the Method of Casting up the Dimensions of Artificers Work. Very useful for all Gentlemen and Others.

There is also added, by way of APPENDIX, a new Way of Surveying large Tracts of Land, according to the Learned Mr. *Whiston*'s and Mr. *Ditton*'s New Method of Surveying ENGLAND by *Explosions.*

The manner of making up and preparing Transparent Colours for Beautifying Maps, Charts, Pictures, &c.

The Tables of Artificial Numbers, Sines and Tangents, to every Degree and Minute of the Quadrant. All which is very much Improved and Corrected.

By *EDWARD LAURENCE,* Surveyor.

The THIRD EDITION.

LONDON,

Printed for JAMES, JOHN, and PAUL KNAPTON, at the *Crown* in *Ludgate-Street.* 1736.

Figure 2: Edward Laurence, *The surveyor's guide* (London, 1736).

A great wealth of eighteenth-century surveying treatises were consulted for this research – the most detailed works available in Ireland during the eighteenth-century being those of Irish surveyors Robert Gibson[17] and Benjamin Noble.[18] Apart from the importance of studying surveying techniques,[19] the comparison of Irish techniques with those taught in other countries, as published by Englishmen John Hammond's *The practical surveyor* (London, 1765) and Arthur Hopton's *Speculum topographicum* (London, 1611), assisted in appraising the surveying industry in Ireland at that time. Pre-eighteenth-century surveying treatises provided insights into the history of both surveying techniques and instrumentation and shed light on the development of the occupation of surveying. The most suitable collections of treatises and manuals consulted for this research are held in the National Library of Ireland and the Whipple Library at the University of Cambridge. Other Dublin repositories holding important surveying collections include Dublin City Archives, Marsh's Library, Trinity College Library and the National Archives of Ireland.

[17] Robert Gibson, *Treatise of practical surveying* (Dublin, 1762). Mathematician Thomas Harding acknowledged Gibson's surveying expertise in the following quote: 'Gibson, to whose knowledge this kingdom, in particular, is greatly indebted …' See Thomas Harding, *Table of latitude and departure* (Dublin, 1788), p. 4.
[18] Benjamin Noble, *Geodæsia Hibernica* (Dublin, 1767).
[19] Both Gibson and Noble were heavily referenced in George Adams, *Geometrical and graphical essays* (London, 1803).

It was common practice for authors of surveying treatises to recycle and to directly extract passages from other surveying works, claiming them as their own. As such, the study of surveying treatises from the late sixteenth century to the early nineteenth century often reveals repetition of techniques, diagrams and surveying advice.[20] William Gardiner, for instance, virtually rewrote Samuel Wyld's *The practical surveyor* (London, 1725) with improved techniques while still retaining Wyld's original chapter and section layout.[21] Adam Martindale was amongst those who openly praised the work of other surveying authors:

> Excellent books indeed there are in our English tongue, written by our famous Rathbourn, Wing, Leybourn and Holwell.[22]

Others, however, were not so cordial to previous authors;

> In treating of surveying, I thought to have met with no difficulty; having had however no opportunity of practice myself, I had recourse to books; a multiplicity have been written upon this subject, but they are for the most part imperfect, irregular and obscure.[23]

This repetition of existing works should be viewed as a strength within the surveying community. It built-up a strong tradition of practical techniques and inherited knowledge while often, but not universally, referring to previous authors, thus preserving their works. It also indicates that not only were existing surveying treatises regularly consulted by new authors, but that the introduction of new technologies and techniques within surveying was a gradual process. Surveyors were conservative by nature and they were slow to jettison established techniques and practices. Repetition of such works highlights which authors were considered authorities on surveying thereby making their original works worthy of duplication.

Contemporary newspapers were a useful source of primary information for this study. Whilst surveyors and surveying failed to grace the headlines and advertisements of newspapers as frequently as other industries and businesses, each article that touches, even tangentially, on the topic of surveying throws new light on this world. Dublin, during the period covered by this research, had several newspapers in circulation

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[20] George Adams admitted drawing on the works of Samuel Wyld, *The practical surveyor* (London, 1725) and William Gardiner, *Practical surveying improved* (London, 1737), George Adams, *Geometrical and graphical essays* (London, 1803), p. 353. Samuel Wyld had previously copied sections of William Leybourn's *The complete surveyor* (London, 1674).

[21] Gardiner, *Practical surveying improved*.

[22] Adam Martindale, *The country-survey-book* (London, 1702).

[23] Adams, *Geometrical and graphical essays*.

although not all of them ran concurrently. The *Dublin Evening Post*, *Freeman's Journal*, *Finn's Leinster Journal* and the *Dublin Journal* were rich sources of information.

Regrettably, few personal papers or writings of surveyors have survived from the period. One surveyor's diary[24] and several letters were found in various depositories. These were for the most part work-related and generally lacked personal information. They did, however, provide vital insight and clarified the surveyor's opinions on professional matters. Each of these fortuitous finds were considered highly relevant to this research.

Commercial directories presented a method of establishing not only the range and distribution of surveyors operating in Dublin during the period, but also the extent of the other industries related to surveying such as copper-plate engravers, scientific instrument manufacturers and map sellers. *Wilson's Dublin directory*, published annually from 1751 to 1837, was one of the most informed sources of commercial data. The early editions of the directory lack the full selection of careers that are listed by later editions. The shifting nomenclature of career titles was also a problem. Whilst not providing a comprehensive list of all surveyors operating in Dublin, the directories did allow for reasonably accurate estimates to be made as to the extent of the industry as well as the location of surveying businesses within the city. Despite the various strengths and weaknesses of the directories, they allow researchers a view, albeit restricted, into the commercial, political and social world of the eighteenth century.

Engineering drawings provide examples of the work that surveyors were conducting during the opening decades of the industrial revolution in Ireland. Of particular significance were the plans that accompanied reports on the Grand and Royal canals as well as the many maps made of Dublin harbour during the eighteenth century showing proposed changes to improve the harbour's capacity.[25] The eighteenth century marked a widening gap between engineering and surveying, as the technology of engineering advanced at a far faster rate than the technology of surveying.

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[24] Diary of Joshua Wight 1752/53 (Library of the Religious Society of Friends, Dublin).
[25] Of particular note is the work conducted by George Semple who made a series of nine maps of Dublin Bay in 1780.

Occasionally engineers and surveyors who had specialities in both fields spanned the gap[26] and could work in either industry comfortably.

Published plans of Dublin City[27] such as the works of Speed (1610), Philips (1685), Brooking (1728) allowed the characteristics of large scale, urban mapping over the eighteenth century to be compared and evaluated. Several compiled maps of Dublin city were produced during this period along with a number of revisions of these maps and smaller, less detailed plans found in commercial directories. These city plans allow comparisons to be made about the evolution in cartographic styling and representation of urban features, such as civic boundaries, industrial representation and building types.

Repetition of cartographic data was common throughout the eighteenth century; however unless stated on a map, such duplication is difficult to determine. The Down Survey was regularly copied as a base map onto which additional data could be superimposed. It carried significant authority and thus its duplication and consultation was beneficial to both surveyor and client. Features, such as roads, rivers and buildings, maintain a level of time invariance[28] over many decades. As such, the consultation, duplication and publication of survey work by earlier practitioners was not only common, but also a significant means of reducing costs and saving time. Copying previously-released cartographic data was not without its risks, however, especially if the original survey had been questioned or found to be incorrect.

Limitations of primary research

The availability of original documentation, while often extensive, was not complete for research in eighteenth and early nineteenth-century land surveying in Dublin. Of particular note were the cartographic records of the Wide Streets Commissioners. A

[26] George Semple, a surveying engineer and John Brownrigg, an engineering surveyor are two examples of profession crossovers during this period.

[27] John Speed, *Dublin* (London, 1610); Bernard de Gomme, *The city and suburbs of Dublin* (London, 1673); Thomas Philips, *An exact survey of the city of Dublin and part of the harbour* (1685); Charles Brooking, *A map of the city and suburbs of Dublin* (London, 1728); John Rocque, *Exact survey of the city and suburbs of Dublin* (Dublin, 1756). For facsimiles of these and other Dublin maps see Irish Historic Towns Atlas parts 11 and 19.

[28] A time invariant object is not affected by the passage of time. A tree would be an example of a poor time invariant object as its shape and size vary from season to season and year to year. A street junction generally has good time invariant properties and may remain unchanged for centuries.

list of the surviving maps of this organisation was prepared in the early twentieth century; however it was found that some of the maps listed were not available in the Dublin City Archives, primarily due to ongoing conservation work. The available body of maps still included the majority of the surveyors active during this period and a wide range of cartographic styles and purposes is represented.

A lack of personal writings, letters and diaries from important individuals, not only surveyors but their employers or customers, led to greater reliance on the few extant sources. The importance of maps in relation to the professional careers of eighteenth century surveyors cannot be overestimated; however the information contained within them in relation to their creators is limited. The personal writings which were consulted provided an interesting perspective on surveyor's opinions and attitudes, not only towards their own work but also towards others in the industry as well as their client base and as such featured prominently in the examination of the industry as a whole. Newspaper articles and adverts, while relatively scarce in contempoary newspapers, support arguments in relation to individual surveyors or those connected with the industry. A limited number of French and Italian language sources were also consulted.

One possible reason for the lack of personal writings may lie in the absence of a centralised governing body for Irish surveying during the period covered by this research. While the same could be argued for Britain, which also lacked a centralised body, the much greater size of the surveying population and the presence of a higher number of official organisations who employed surveyors, means that British sources are more numerous.[29] In contemporary France, the centralised and systematic storage of surveying documentation and maps from French surveyors and cartographers in the Bibliothèque Royale in Paris contrasts with the more dispersed sources available for any study of eighteenth and early nineteenth-century surveying in Dublin.

The body of surveyors covered was a small group of individuals over a period of approximately one hundred and forty years. Although other surveyors may have

[29] There is also the rather obvious reason that Britain was so much larger and more urbanized, affording more opportunities to surveyors than Ireland.

worked in Dublin during this period their impact on the surveying industry would have been relatively minor if their names or works remain persistently unknown.

Eighteenth-century surveying methodology

Central to this research was determining the surveying techniques utilised and highlighting examples of their occurrences in eighteenth-century surveys of Dublin. Surviving manuals and treatises provided academic instruction on the uses of surveying instruments and various levels of cartographic execution recommended during the eighteenth century. Many period treatises were not specifically published for the benefit of the surveying community. Instead, there was a significant market in lay surveyors – farmers, land owners, students and curious individuals – who would have had a vested interest in understanding both land measurement and land surveying. The preface to Samuel Wyld's *The practical surveyor* (London, 1725) emphasised the author's hope that his publication would have a wider market than the surveying fraternity alone;

> However, 'tis hop'd, the Country Farmer, who understands but so much of Arithmetick [sic], as to add, subtract, multiply and divide (with a little practise, the genuine part of perfection) by these plain directions, and with good instruments, will be enabled to find the content of each piece of land in his own occupation, and that this knowledge is extremely necessary to the country, none but the grossly ignorant will deny, since thereby he may judge what stock of cattle each field will be likely to feed, or what quantity of seed will be sufficient for each acre, or what number of workmen to reap or mow the same, &c. Which makes me admire, when I reflect, that this science so beneficial to the public, as well as particular persons, should be so much neglected, being so plain and obvious to every capacity.[30]

A similar audience was the target of J. Vaughan's *The gentleman and farmer's pocket assistant* (Shrewsbury, 1795) which aimed to;

> … enable a person, though he has no learning higher than the reading and understanding of words and figures, to find the contents of his field ... by the help of which every farmer may become his own land measurer.[31]

While period surveying treatises provided a high level of detail of surveying practice, it was often necessary to deduce methods directly from maps. Draft maps in particular provide unique insight into surveying techniques not always presented in printed maps. Both manuscript and printed maps contain evidence relating to the fashion in which they were made. Chain lines were often included in draft copies of maps as

[30] Wyld, *The practical surveyor*, p. vii.
[31] J. Vaughan, *The gentleman and farmer's pocket assistant* (Shrewsbury, 1795), p. vi.

were small, neat pin holes in the parchment indicating the use of compasses and pins. The inclusion of north arrows indicating magnetic variation testified to the use of circumferentors instead of theodolites to record survey measurements. Though, the absence of such markings in north arrows did not universally imply that circumferentors were not used. Evidence of theodolite usage was more difficult to determine. In several cases, certain surveyors were known to have used the instrument throughout their careers[32] thus creating a high probability of such an instrument being employed in their mapping – unless evidence dictated otherwise. The lack of spot heights and contour lines additionally made the use of levels difficult to ascertain. Many functions of a level can also be duplicated by a theodolite. However its application in both canal surveying and cross-sectional mapping was well documented[33] during the eighteenth century thus assisting the process of determining its usage. In marine charts, straight lines of soundings would show the course nautical surveyors took during their work. Their positions were recorded either through resections or intersections of theodolite/circumferentor measurements.

References to other surveyors or a strong similarity of sections of a map to another surveyor's style have been taken to signify that portions of the geographic detail had been copied from an existing map. Examples such as these, combined with information from period surveying treatises and the author's own background within the surveying industry, allowed eighteenth-century techniques and instrumentation to be evaluated.

In other instances, no deduction was necessary due to original explanations of techniques and methods or instructions, often recorded on maps, in minute books or in personal correspondence. For example, a deposition report from Alexander Taylor detailed his work under Charles Vallancey whilst making a copy of the Down Survey in Paris in the 1780s.[34] Similarly George Semple's detailed and semi-autobiographical *A treatise of building in water* (London, 1780), describing his use of levels to detect

[32] For example, John Rocque, Bernard Scalé and possibly Thomas Sherrard used theodolites for high precision surveys, often requiring measurements over long distances. Theodolites were the most suitable instruments available at the time for this type of work.

[33] Charles Vallancey, *A treatise on inland navigation* (Dublin, 1763); Richard Castle, *Essay on artificial navigation* (Dublin, 1730).

[34] *Report from select committee on survey and valuation of Ireland* p. 100 [445], H. C. 1824, viii.78.

subsidence on the river bed of the Liffey, removed the need for speculation in determining the methods employed.

Foreign mapping influences in Ireland were also reviewed to examine their effects on eighteenth-century Irish cartography. English, French and to a lesser extent German and North American maps provided a wider spectrum of cartography from which it was possible to better judge Irish mapping. It is not the purpose of this research to examine Irish mapping as part of a wider European or global scale, but it was deemed necessary early in the research process to consult foreign maps in recognition that Irish surveying did not exist in a cartographic vacuum. Although a limited consultation, this nevertheless provided a means of assessing the level of cartographic sophistication present in Ireland during the eighteenth century.

The quality of non-geographic map content was often key in determining the level of sophistication. A classification of cartouche and vignette styles thought the eighteenth and early nineteenth centuries was mainly derived from map consultation as there was remarkably little advice contained within contemporary treatises. The professional strengths and weaknesses of Dublin's surveyors were transmitted through such decorations, regularly enhancing a map's aesthetic quality. However, if incorrectly executed, such features would often present the surveyor's work in an amateurish light.

Large-scale published city maps and plans of Dublin such as the work of Brooking (1728) and Rocque (1756) represent a major portion of research conducted for this study. Use of these eighteenth-century maps in many modern publications focus on the map's ability to transmit information about the city.[35] This thesis focuses on the purpose, method, means and success of surveyors through eighteenth-century Dublin maps. Such maps were made of the same geographical area, Dublin, and despite the changes in cartographic style dictated by the era in which each was made, they represent the same area in a different manner and focus on different aspects of the city's framework and socio-political makeup. The methods, purpose and intentions of

[35] Of particular note are the two Dublin volumes of the Irish Historic Towns Atlas produced by the Royal Irish Academy, Clarke, *Dublin part 1, to 1610* and Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

each surveyor who produced a city plan of Dublin during the eighteenth century were directly expressed in his maps. It was also necessary to review seventeenth-century city plans of Dublin to establish what had preceded the main eighteenth-century maps of the city and the change in both surveying styles and cartographic purpose over this period.

The private lives of Dublin's eighteenth-century surveyors were researched to add the important human element to the study. Little evidence survives of the various aspects of their lives away from their profession; however, issues such as family, marriages, deaths and religion afford glimpses of the men.

Secondary sources

Several of the main sources of secondary research on eighteenth-century surveying come from the corpus work of J. H Andrews. His seminal publication *Plantation acres* (Omagh, 1985), is a detailed and wide ranging study of land surveying in Ireland from the sixteenth to nineteenth centuries. It was of great value during the initial phases of this research, particularly with regard to the location of primary source documentation. His biographical work on several surveyors in *Shapes of Ireland* (Dublin, 1997) and *The Queen's last map-maker, Richard Bartlett in Ireland 1600-03* (Dublin, 2008), were of great interest as was his article published by the Irish Georgian Society on Rocque's French School.[36] Andrews's *Maps in those days* (Dublin, 2009) was also of much assistance with regards to cartographic methodology, albeit as an ancillary to primary eighteenth-century sources.

Public bodies which employed surveyors during the eighteenth century are the subject of several modern papers and book chapters. The works of the Wide Streets Commissioners and the Board of Works have previously been examined in detail by several authors, with Edward McParland[37] and Frederick O'Dwyer[38] providing particularly relevant studies. However, it was found that no previous publication had

[36] Andrews, 'The French school of Dublin land suveyors', pp 275–92.
[37] Edward McParland, 'The Wide Street Commissioners: their importance for Dublin architecture in the late 18th-early 19th century' in *Ir. Georgian Soc. Bull.*, xv (1972), p. 2.
[38] Frederick O'Dwyer, 'Building empires: architecture, politics and the Board of Works, 1760-1860' in *Irish Architectural and Decorative Studies*, v (2002), p. 123.

focused specifically on the land surveying element of such bodies despite the many surviving records and documents from that era.

The detailed work of the Irish Historical Towns Atlas, published by the Royal Irish Academy, proved of great use for this study of historical Irish urban mapping. Volumes 11 and 19, by H. B. Clark and Colm Lennon respectively, cover many of the most important and influential maps of Dublin from the city's foundation to 1756. Lennon's additional publication *Dublin 1610 to 1756: the making of the early modern city* (Dublin, 2009) was of particular relevance to the timeframe covered by this research.

Publications on the land surveyors of Dublin, focusing on both those civically employed and private practitioners, were highly significant to this study. Mary Clark's *The book of maps of the Dublin city surveyors*, *1695-1827* (Dublin, 1983) presented not only a descriptive catalogue of the works of the city surveyor but additional professional biographical details which were of great aid value. Clark's other work on the subject of surveying, with Raymond Refaussé *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850* (Dublin, 2000), followed a similar line as the 1983 publication. This second work, however, contained many high-quality images of period mapping and a greatly expanded section related both to the archbishop's estates in Dublin and the surveyors employed to measure them.

Detailed biographies of surveyors are relatively rare. The most widely covered in secondary sources was the life and works of John Rocque. One of the most detailed work available on Rocque is John Varley's 'John Rocque; engraver, surveyor, cartographer and map-seller'[39] which covered both Rocque's origins and professional life. J. H. Andrew's study of Rocque's French School[40] is perhaps more relevant to Rocque's work in Ireland and John Montague PhD thesis[41] (TCD, 2009) on Rocque's 1756 survey of Dublin was of immense value.

[39] Varley, 'John Rocque; engraver, surveyor, cartographer and map-seller.'
[40] Andrews, 'The French school of Dublin land surveyors.'
[41] John Montague 'John Rocque's 1756 Exact Survey of the city and suburbs Dublin, as evidence for the architecture of the mid-eighteenth century city'.

The topic of eighteenth-century land surveying as a business, both Irish and internationally, has been covered by several authors. Mary Colley's 'A list of architects, builders, surveyors, measurers and engineers extracted from Wilson's Dublin Directories 1760-1837'[42] was invaluable in building a more accurate picture of Dublin's surveying industry during the latter half of the eighteenth century. Her inclusion of address information for surveyors also allowed greater research to be conducted on period survey business distribution in Dublin. Gerard Daly's[43] publications on the history of mapping in Dublin Bay and harbour during the eighteenth century were also particularly useful.

International studies on period land surveying and cartography too were highly valuable. Mary Sponberg-Pedley's *Commerce of cartography* (Chicago 2005) allowed a comparison to be drawn between the eighteenth-century Irish cartographic and surveying industries with those of contemporary England, France and America while Christian Jacob's *The sovereign map* (Chicago, 2006) skilfully examined the many reasons behind map creation and development focusing on the wider European cartographic community. David Woodward's *Five centuries of map printing* (Chicago, 1975) examined the changing technologies available for map printing on a global perspective while Edmund Bacon's *Design of cities* (London, 1782) highlighted the role mapping played in urban evolution.

A specific study of art and its influence on eighteenth-century cartographic fashion proved valuable to this research. Of particular note was a B.A. thesis by Ann Hodge, 'A study of the rococo decoration of John Rocque's Irish maps and plans 1755-1760' (NCAD, 1994). This comprehensive study opened many new avenues of enquiry and provided important and highly relevant insight into eighteenth-century art and its connection with surveying of the same era. This point was further reinforced by Arnold Horner's 'Cartouches and vignettes on the Kildare estate maps of John

[42] Mary Colley, 'A list of architects, builders, surveyors, measurers and engineers extracted from Wilson's Dublin Directories, 1760-1837' in *Bulletin of the Irish Georgian Society*, xxxiv (Dublin 1991), pp 7-68.
[43] Gerald Daly, 'George Semple's Chart of Dublin Bay (1762)', *Proceedings of the Royal Irish Academy*, xcii, no. 3 (1993). , pp 81-105, Gerald Daly, *Early maps from the Dublin Port board collection* (Dublin, n.d.).

Rocque'[44] and Nicola Figgis's *Irish artists in Rome in the eighteenth century* (London, 2001).

The general history of Dublin during the eighteenth and early nineteenth centuries provided an important social backdrop for thesis study. The relevance of many of these published works focused on the physical development of the city during this period in which surveyors played their own, small part. Christine Casey's *The buildings of Ireland: Dublin* (London, 2005) and Mary Clark and Alastair Smeaton's (eds) *The Georgian squares of Dublin* (Dublin, 2006) gave insight into the many property issues and architectural influences that were found in Dublin during the eighteenth century. Of particular note is Edel Sheridan's 'Designing the capital city' found in Brady & Simms (eds) *Dublin* c.*1660-1810* (Dublin, 2001) which charted the development of Dublin during the seventeenth and eighteenth centuries. Maurice Craig's *Dublin, 1660-1860: The shaping of a city* (Dublin, 2006) and Niall McCullogh's *Dublin, an urban history: the plan of the city* (Dublin, 2007) followed a similar trend as Sheridan's work but made much more use of period mapping, thus allowing for a clear connection between surveyors and developments in Dublin.

The above highlight some of the original or most influential works available related to the subject of this research. They do not represent the entire range of secondary material consulted yet they emphasize the diversity of existing material and were often vital in identifying further primary sources.

Summary

The following chapters aim to explore the many intricate and detailed aspects of eighteenth and early nineteenth century surveying in Dublin. By dividing the industry into separate and distinct sections, yet maintaining a continual connection to the surveying industry as a whole, this thesis presents land surveying as a diverse and important business in Dublin in the eighteenth century.

[44] Horner, 'Cartouches and vignettes on the Kildare estate maps of John Rocque', pp 57-71.

Chapter One: The profession of land surveying in the eighteenth century

1.1 Introduction

In order to understand eighteenth-century surveying in Dublin, it is first necessary to examine the profession of land surveying at that time. Surveyor's education, their training in the industry, their location within the city and their ability to maintain paid employment throughout their professional lives are all relevant to understand how surveyors operated.

The men who produced Dublin's cartographic works during the eighteenth-century did not always define themselves as surveyors. Measurers, engineers, soldiers and architects were all involved in the surveying industry and as such it is necessary to examine the titles used by these individuals and how they relate to the definition of traditional land surveyor. How such individuals entered the surveying industry is also highly relevant as there was more than one path available to those who wished to become part of the surveying business – either through an apprenticeship, formal education or family ties with the industry.

Surveying was a business in eighteenth-century Dublin. Those who practised it were motivated by profit and the ability to earn a living thus any study of the industry must acknowledge the methods and lengths that eighteenth-century surveyors took to ensure the continuation of their employment and the securing of financial income. Marketing assisted in providing eighteenth-century surveyors with a means of advertising their skills and securing new clients while a conveniently located surveying office near to potential clients also assisted in a surveyor's professional survival.

In this chapter the profession of 'surveyor' is defined based on eighteenth-century descriptions of the profession. The manner in which surveyors received their professional education, how they joined the industry and their location within Dublin is also examined. An analysis of surveying as a financially viable business in eighteenth-century Dublin is undertaken by exploring methods of marketing and advertising, availability of employment and attainment of financial assets by surveyors.

1.2 The definition of a surveyor

The role that a surveyor held in eighteenth-century society was as varied as the individual surveyors themselves. The *London Tradesman* published in 1747 defined a land surveyor as:

> …employed in measuring Land, and laying it out in gardens and other kinds of policy about gentleman's seats. [They are] To have a good taste, their way he ought to travel to France and Italy, and to have a liberal education, but especially a thorough knowledge of Geometry and Designing. They may earn a Guinea a day when employed in laying out, and are always esteemed above a Mechanic.[1]

The eminent Irish surveyor, Robert Gibson, defined surveying as:

> …that art which enables us to give a plan, or just representation, of any piece or parcel of land, and to determine the content thereof, in such measure as is agreeable and customary to the country or place where the land is.[2]

Despite these useful definitions, the reality of land surveying was much more diverse in eighteenth-century Dublin. Surveyors often were employed as engravers,[3] cartographers,[4] compliers, engineers,[5] publishers,[6] auctioneers, architects, land agents, valuers[7] and in the case of Patrick Roe of Smithfield, Dublin, a grocer.[8] Surveyors regularly undertook work distant from traditional surveying roles such as William Edgeworth's description of his surveying duties with the Bogs Commission:

> …to construct maps, to take levels, and to make soundings of borings in the bogs, under orders of my father, who was one of the engineers to the commission.[9]

Eighteenth-century Dublin's wider surveying community was not restricted to pure land surveyors – army and navy officers,[10] cartographers, measurers[11] and mathematicians[12] all dabbled as surveyors and were often in direct competition for the same limited client base.

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[1] R. Campbell, *The London tradesman* (London, 1747), pp 274-5. This represents a good example of the higher end of the profession of surveying in the eighteenth century. Such cases were rare in the Irish industry.

[2] Robert Gibson, *Treatise of practical surveying* (Dublin, 1763), p. 1.

[3] John Rocque, *Exact survey of Dublin* (Dublin, 1756).

[4] Herman Moll, *A set of twenty new and correct maps of Ireland* (London, 1728).

[5] George Semple, *A treatise on building in water* (Dublin, 1786).

[6] Bernard Scalé, *An Hibernian atlas* (London, 1776).

[7] Bernard Scalé, *Tables for the east valuating of estates* (Dublin, 1771).

[8] Mary Colley, 'A list of architects, builders, surveyors, measurer and engineers extracted from Wilson's Dublin directories 1760-1837', p. 56.

[9] *Report from select committee on survey and valuation of Ireland* p. 100, [445], H. C. 1824, viii.79.

[10] George Taylor and Andrew Skinner, *Maps of the roads of Ireland* (London, 1777).

[11] For example, William Purefield, 28 July 1761 (DCA, WSC/Mins/1, p. 146).

[12] Thomas Harding, *Hibernian Journal*, 26 June 1786.

The line between surveyor and an alternative career name was often blurred and easily crossed. For example, the role of Surveyor General would suggest the title of the most senior figure in land surveying, but in actuality this role was more directed towards that of engineering and architecture,[13] with the land surveying aspect often being covered by the Deputy Surveyor General. Chambers *Cyclopaedia* (Dublin, 1741) highlighted the various careers that could fall under the title of surveyor:

> SURVEYOR, one that hath the oversight and care of considerable works, lands, or the like. See Supervisor.
> Such are the surveyor general of the king's manors; surveyor of the king's exchange; surveyor general of the works; surveyor general of the crown lands, &c.
> SURVEYOR of the melting, is an office of the mint, whose business is to see the bullion cast out; and that it be not altered after the delivery of it to the melter. See Mint, and Coinage.
> SURVEYOR of the navy, is an office, whose business is to know the state of all stores, and see the wants supplied; to survey the hulls, masts and yards of ships; to audit the boatswains and carpenters accounts, &c. See Navy.
> SURVEYOR is also used for a guager. – And also for a person who measurers and makes maps of lands.[14]

The title gauger, measurer and surveyor adorn eighteenth-century mapping. Towards the end of the eighteenth century many Irish surveyors would often refer to themselves as engineers or use the letters C.E. (Civil Engineer) after their name.[15]

Measurer versus surveyor

The role of measurer was another eighteenth century title that combined aspects of many careers, including land surveying. Each of these professions was based on precision measurement so referring to a surveyor as a measurer is not entirely incorrect - it demonstrates how difficult it is to assign surveying, measurer or guager as career name.

William Hawney's *The complete measurer or the whole art of measuring* (Dublin, 1730) gives an impression of what vocations fell under the umbrella term of Measurer. Hawney's description of land surveying techniques show that surveying was not his main area of knowledge in his role as a measurer. The only surveying instrument mentioned is the surveyor's chain and approximately half a dozen

[13] Frederick O'Dwyer 'Building empires: architecture, politics and the Board of Works, 1760-1860' in *Ir. Georgian Soc. Bull., v* (2002), pp. 108-175.
[14] E. Chambers, *Cyclopaedia*, 3 ed. (2 vols., Dublin, 1741), ii, 19.
[15] Arthur Neville, as listed in Colley, 'A list of architects, builders, surveyors, measurer and engineers extracted from Wilson's Dublin directories, 1760-1837', p. 48.

examples are listed describing its use to obtain distances and areas. It is possible that Hawney was familiar with the mathematics behind land measurement or perhaps was simply quoting from the books he recommended at the beginning of *The complete measurer*.[16] The limits of his land surveying section are revealed as Hawney states that his examples would be useful to country farmers rather than landed gentlemen and his examples are directed towards single field surveys rather than surveys of large estates.[17] He does however go into detailed measurement techniques associated with flooring, bricklaying, masonry, weights and money which seems to indicate that Hawney was involved with the building industry rather than surveying.[18]

In any review of the surveying population of Dublin during the period of this study, care must be taken when the title of measurer appears. The only known measurer who worked as a land surveyor is William Purefield who was employed by the Wide Street Commissioners during the 1760s.[19] However that does not mean that others who referred to themselves as measurers were not involved in surveying.

Another career title associated with surveying, if not as diverse as that of measurer, is cartographer. John Rocque for example, who surveyed Dublin in 1754, described himself as a cartographer[20] and was involved in the mass production of maps for public sale in addition to his surveying work. A cartographer's work focused towards the marketing and compilation of maps whereas a surveyor's role would be primarily related to measurement. However, this study will show that the two terms were used interchangeably.

Surveyor regulation and associated problems in Ireland

One major problem with the definition of a surveyor in eighteenth-century Ireland was the very serious lack of regulation within the industry. Surveying was very fluidic, with amateur surveyors cropping up time and again only to disappear as quickly as they appeared. The abundance of easily read surveying manuals allowed people to self educate themselves in surveying and they could then use these skills to

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[16] Ward's *Young mathematicians guide*, Dr. Harris's *Elements of geometry* and Sturmius's *Mathesis Enucleata*.
[17] William Hawney, *The complete measure or the whole art of measuring* (Dublin, 1730), Appendix II.
[18] Ibid., p. 252.
[19] 15 Mar. 1762 (DCA, WSC/Mins/1 p. 146).
[20] *Dublin Journal*, 14 Sept. 1754.

supplement their regular income.[21] This lack of regulation was of serious concern for some eighteenth-century surveyors as poor work by under or completely unqualified surveyors was denting public confidence in the surveying industry. Peter Callan, a surveyor based in Drogheda, was so concerned about this lack of regulation that he wrote:

> Whereas the general regularity of the affairs of landlords and tenants in this Kingdom, chiefly depends on the skill, diligence and integrity of surveyors of land, since there are no Judges, no Magistrates, or incorporated Society, who legally assume to themselves the power of administrating Justice in matters of Surveying: But every man, who is please to undertake the occupation of Land-surveying (without any regular qualification) is at free liberty to impose on the public in the most important affairs, without any regular means of redress, but the liberty of the Press, to expose to public view, the unaccountable proceedings of such Surveyors as obstinately persist in known errors, to the general prejudice of Landlords and Tenants...[22]

The Irish dilemma was not an isolated one but was also found in contemporary France, England, Sweden and Germany. Bradock Mead, an English cartographer, feared that the abundance of under-skilled surveyors and cartographers was reaching crisis level. His suggested solution was some sort of centralised department to regulate works in the geographic industry:

> For what could redoud more to the British Fame, of improving Arts and Sciences, than the setting so noble a Project on Foot?... Geography seems to merit the National Concern, more than it has hitherto experienced.[23]

In Stockholm and Nuremberg, cosmographical societies had been established to filter out cartographic work that was deemed to be of too poor quality for commercial distribution.[24] In the 1740s, French geographer Gilles Robert de Vaugondy argued that claimants to the title of 'geographer' should undergo a rigorous examination before they be allowed to publish anything as well as suggesting that official support for the geographic community was 'very much on the decline in France.'[25]

The French government's response to such rumblings was the official backing of the Dépôt de la Marine by Royal Decree as the only official body who could publish charts. The decree dated 5 October 1773 states that:

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[21] Peter Callan, *Dissertation on the practice of land surveying in Ireland* (Drogheda, 1758), p. 15.
[22] *Universal Advertiser*, 1 Dec. 1753.
[23] Braddock Mead, *Construction of maps and globes* (London, 1717), preface.
[24] Mary Sponberg-Pedley, *Commerce of cartography* (Chicago, 2005), p. 192.
[25] Ibid., p. 192.

> …all marine charts, portulans, and instruction necessary for the conduct of vessels… be composed, prepared, and published exclusively at the dépôt of His Majesty by persons capable of doing the job well and that these works always be accompanied by printed analyses, with an indication of which authorities support the work. [This is done] not only in order to inspire in navigators a just confidence by exposing to them the degree of exactitude or doubt contained in these maps in each of their parts, but also in order to protect them from the dangerous uncertainty into which the heap of maps published without such particulars would throw them, maps that, although denuded of materials sufficient for their construction, are announced with fatuous titles, exaggerated in order to promote sales.[26]

The Irish response was similar to that of France. An attempt to introduce some sort of regulation in Irish surveying was initiated in 1750 by the Deputy Surveyor-General Gabriel Stokes who was tasked to help restore the public's confidence in the surveying industry. The result was the creation of a certificate of proficiency - an official reference from the Surveyor-General's office that the holder of such a certificate was fully capable of performing surveying work to a high degree of accuracy. To support the certificate, Stokes published the following declaration:

> Whereas by decretal orders from His Majesty's high court of Chancery, and court of Exchequer, the Surveyor-General is frequently directed to appoint skilful surveyors; and as the Surveyor General knows not (for want of examining, as was in the original institution of this office) who are skilful, gentlemen would do well for many other reasons, not to employ any surveyor, but such as have passed an examination, and obtained a certificate from the Surveyor-General's office, of their qualifications for the business of surveying of land, and of tracing Down Surveys.[27]

Research conducted by J. H. Andrews shows that a total of twenty testimonials such as the one above were published in eighteenth-century newspapers and of these thirteen focused on the certificate holder's ability to copy Down Survey maps.[28] This ability to copy from the main source of background data for the vast majority of the country, the Down Survey, was of the utmost importance. This emphasis was present because a common solution to boundary disputes was for a surveyor to examine the area in question from the Down Survey and plot out on the ground the boundary lines using reference data from this source.[29] Stokes's deputy, Robert Gibson, continued the surveyor-general's certificates until 1760 and from 1765 by Roberts's son George. The certificate system was discontinued eventually in 1784.[30]

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[26] Oliveir Chapuis, *À la mer comme au siel* (1700-1850) quoted by Sponberg-Pedley, *Commerce of cartography*, p. 192.
[27] *Dublin Journal*, 16 Dec. 1750.
[28] J. H. Andrews, *Plantation acres* (Omagh, 1985), p. 100.
[29] Robert Gibson, *Treatise on practical surveying* (Dublin, 1762), p. 284.
[30] Andrews, *Plantation acres*, p. 101.

The procurement of a certificate of proficiency from the surveyor general's office however did not mean that a certified surveyor's measurements went unquestioned or that other surveyors respected the certificate. In 1760 measurements taken by a Meath-based certified surveyor, John Magennus, were brought under scrutiny by another surveyor, John O'Brien of Dunboyne. O'Brien had publicly stated that Magennus's measurements of lands in Linnanstown, county Meath, differed from his measurements by two acres. In order to defend his work, Magennus sent his field notes to the eminent Dublin surveyor Jonathan Barker who confirmed that Magennus's notes were indeed correct. The latter also visited the land in question to survey and compare the two separate results. Aside from having his notes and surveys confirmed by a well-known and respected surveyor, Magennus in addition felt it necessary to assure the public that he had been trained and certified in the art of surveying by Robert Gibson, the then deputy surveyor general and included a reference from Gibson in the same newspaper article stating such:

> I certify, that I have instructed Mr. John Magennus, at Mulhuffey, near Kilcock, Land Surveyor, in the essential parts of surveying; and that he is duly qualified to perform any survey, however complex or difficult, to the greatest certainty; as also to divide lands, and trace defaced mearings from the Down, or any other Survey. Given under my hand in Dublin, July 21st, 1760. Robert Gibson, Teacher of Mathematics.[31]

O'Brien responded to Magennus's article on 2 August 1760 stating that he had brought two surveyors to lands in Raddinstown, not Linnanstown, in order to confirm his work and that they had agreed with him. Magennus appeared to have confused the two areas. O'Brien however was critical of Magennus's reference to his professional qualifications:

> But, as he believed said advertisement calculated to introduce Mr. Gibson's certificate, he is willing to leave the gentleman all the advantages that may possibly assure to him from so ingenious a method of growing into acquaintance with the world…not withstanding the airs he puts on in newspapers.[32]

As mentioned previously, the office of surveyor general predominantly fell to individuals involved in engineering or architecture rather than land surveying. This confusion in name extends from the creation of the office in the early seventeenth century with the combination of the positions of 'Superintendent of the Castles' and the 'Supervision of Royal Works' and was originally called 'Director-General and

[31] *Universal Advertiser*, 26 July 1760.
[32] Ibid.

Overseer of the Fortifications and Buildings of Ireland' when it was created in 1613.[33] The official title of 'Surveyor General of the Fortifications and Buildings' was used from 1670 onwards and was held by six men,[34] starting with William Robinson in 1670 and ending with Thomas Eyre in 1762.[35] Thomas Burgh, who held the position from 1703 to 1725, and who was an accomplished architect, briefly wrote on a method of calculating the area of a piece of land[36] yet it appears to be more a work of mathematical theory than a practical method of surveying in the field. He was also involved with surveys of Dublin bay and harbour for proposed engineering works.[37]

Peter Callan developed his own theories of how the surveying profession could be regulated. His proposal was that the industry could be more governable through a series of annual meetings where surveyors and their instruments would be appraised and if they were deemed insufficient then they should be suspended.[38] Those performing such inspections were to be selected on a five-year basis from among members of the surveying community and that the members of the *Dublin Society* should be responsible for the inspector's appointment.[39] Each surveyor would be required to recite an oath at each annual meeting stating that he would perform his duties in a diligent and impartial matter.[40] Callan also called for the standardisation of the paralleled paper on which surveys were drawn to eliminate it as a source of contention and that every map must legally have the surveyor's name upon it.[41] The surveying community in eighteenth-century Ireland never adopted Callan's ideas.

The makings of a surveyor

Eighteenth-century surveyors covered a wide spectrum of professionalism and personality with no two surveyors having the exact same balance of either. It is necessary therefore to examine not only what employers looked for in their surveyors, but also surveyor's opinions on others who practiced their trade.

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[33] R. Loeber, *A biographical dictionary of architects in Ireland, 1600-1720* (London, 1981), p. 23.
[34] William Robinson (*c.*1642-1712), Thomas Burgh (1700-30), Edward Lovett Pearce (1731-33), Arthur Dobbs (1734-44), Arthur Jones Neville (1744-1752) and Thomas Eyre (1752-62).
[35] O'Dwyer, 'Building empires: architecture, politics and the Board of Works, 1760-1860' pp 108-75.
[36] Thomas Burgh, *A method to determine areas of right-lined figure universally* (London, 1724).
[37] Thomas Burgh and Captain John Perry, *Dublin Bay* (London, 1728).
[38] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 47.
[39] Ibid., p. 45.
[40] Ibid., p. 46.
[41] Ibid., p. 47.

The desired qualities in surveyors varied from employer to employer. These could range from a good moral and religious background[42] to an in-depth understanding of the science and art of surveying and engineering.[43] The head of the French Dépôt de la Marine during the mid-eighteenth-century, Nicolas Bellin, described what he looked for in a good cartographer when he wrote:

> From the start he needs to have memory, a love of work, patience, and a flair for order and arrangement. Then he needs a sufficient command of geometry and astronomy, after which comes the long and sterile study of voyages and the critical discussion of their reports and journals, sources continually filled with uncertainties and errors that even the most assiduous labour sometimes cannot conquer. Add to this some knowledge of foreign languages…[44]

The question of professional honesty amongst surveyors was discussed during a parliamentary review of surveying and valuation in Ireland in 1824. When asked how checks were carried out on surveyors involved with the valuation of land, Richard Griffith explained:

> The person who surveyed the land should not be the valuator, he should be merely the surveyor, there would be no use in bribing him, because the only thing he could do would be to make an inaccurate survey, which would afterwards be detected.[45]

Sixty-six years earlier Callan commented on the subject of professional morality and honesty declaring:

> …it is morally impossible for any man dextrously to command a pen, or any mechanical tool, without some years constant application acquiring the command of hand, in the particular station he intends to render himself useful to the public; especially a surveyor of land, whose head ought to have been furnished with proper ideas, and hand with proper command, before he should undertake business of such important consequence which few surveyors ever desired to acquire any more than a month or two's instruction.[46]

The Irish engineer/surveyor George Semple listed the desirable qualities that he looked for when hiring surveying staff for his various projects:

> 1st: He must be extremely well versed in the business of a surveyor of land, in all its various branches, and be able to produce specimens of his own work actually performed with his own hands.
> 2nd: He must be sober, diligent and strictly honest
> 3rd: He must be healthy, active, able and willing to undergo the most laborious fatigue that can properly relate to the business of his vocation, and give due and personal

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42 *Dublin Journal*, 2 Nov. 1754.
43 *Freeman's Journal*, 22 Sept. 1787.
44 Sponberg-Pedley, *Commerce of cartography*, p. 25.
45 *Report from select committee on survey and valuation of Ireland*, p. 49 [445], H. C. 1824, viii.79.
46 Callan, *Dissertation on the practice of land surveying in Ireland*, p. 11.

attendance to it. And it may be presumed, that no gentleman will use means to impose on the board, by endeavouring through their influence, to put any person into such a weighty employment who doth not enjoy those, or the like qualifications. This ought to be strictly observed, because many weighty matters depend on it.[47]

The phrase 'his own work actually performed with his own hands' is the key to Semple's statement. A surveyor must, above all else, be capable of measuring and recording geographical data in the field and be able to defend his work.[48] Cartographers and geographers are mainly restricted to collating the work of others to produce their work.

Semple's second point was not one he adhered to in his own professional career. The Wide Street Commissioners in fact fired Semple in the 1750s due to a serious disagreement over the possession of maps that the Commissioners had ordered (see Chapter 4) and so his career might not be the best professional moral compass from which to take a bearing.[49]

Not everyone employed as a surveyor was as passionate or as honest as Semple may have wished. In his *Dissertation on the practise of land surveying* (Drogheda, 1758) Peter Callan presented an interesting analysis both of the types of surveyors as well as the many frauds and fakes operating in Ireland during the mid-eighteenth-century. Callan's own division of surveyors mentioned:

Complete Surveyors: Those surveyors who were well educated, well equipped and who had the talent and skill to perform accurate surveys.
Grand Surveyors: Men who bullied their clients by sheer force of will and a grandiose attitude and were more than willing to take bribes to see that their work always favoured their clients.
Bungling Surveyors: These surveyors had rudimentary skills but often resorted to guessing rather than accurate surveying techniques. They could either be honest men but just not particularly good surveyors, or dishonest men whose employer were willing to let them rule in their favour and defend them if found out declaring that the poor man's intention was very honest; and that his error proceeded from the want of sufficient skill and experience…[50]

Serious problems arose when both the tenant and the landlord hired their own bungling surveyor:

[47] George Semple, *Treatise of building in water in two parts* (Dublin, 1780).
[48] Peter Callan versus John Bell, *Universal Advertiser* 1 Dec. 1753-22 May 1759, *Dublin Journal*, 23 Jun. 1759 – 21 July 1759, *Dublin Gazette*, 20 Oct. 1759-27 Sept. 1760.
[49] 22 Jan. 1759 (DCA, WSC/Mins/1, p. 18).
[50] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 13.

> …the pernicious consequence of which is universally known by sad experience; each of the said contending parties being equally fluent in impertinent propositions, and groundless contradictions; likewise jarring and fighting for several days together, sometimes for several months, about a small piece of work; wasting the time , and consuming the substance of both landlord and tenant: At last both parties are obliged, with mutual consent to send for a *Grand Surveyor,* in order to leave the decision to the said controversy to his arbitrational at which the said Grand Surveyor appears with domineering air, and seeming arbitrary power. Oh! Then whoever bribes him best may be sure the depending debate shall be decided in his favour.[51]

The irony of which detailed description of this is that Callan himself was involved in a similar dispute with another surveyor, John Bell, both writing angry challenges to each other over several years.[52]

Callan's opinion of self-educated surveyors was shown in more graphic detail when he stated:

> The said Fops are like unexperienced book-taught pilots in dangerous harbours, in which they should soon be foundered or dashed against the rocks; or like a Man-of-War manned and commanded by unexperienced book-taught sailors, in which circumstances they should soon fall into the bottom of the sea or the hands of their enemies.[53]

Callan estimated that there were one hundred practical surveyors in Ireland, aside from 'fops' and 'pretenders'. The majority of the former were dishonest and fraudulent and cost the economy up to six thousand pounds per annum through their poor surveying.[54] Callan's opinion must be treated as biased as he has a recorded history of disputes with other surveyors,[55] yet it does give a fascinating glimpse into the darker corners of the Irish surveying industry at the time.

Despite their descriptions of moral guidelines and desirable personal traits, there were surveyors outside of Ireland who placed a more rigid definition on surveying often avoided by many eighteenth-century Irish surveying authors. English authors George Adams and John Grey separately listed the defining points that consisted of the profession of a land surveyor:

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[51] Ibid., p. 14.
[52] *Dublin Gazette,* 27 Sept. 1760.
[53] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 16. The term 'Fop' was a pejorative term for a foolish man over-concerned with his appearance and clothes.
[54] Ibid., p. 17.
[55] *Dublin Gazette*, 27 Sept. 1760.

> 1. Measuring of straight lines.
> 2. Finding the position of straight lines with respect of each other.
> 3. Laying down, or planning upon paper these positions and measures.
> 4. Obtaining the superficial measure of the land to be surveyed.
>
> We may therefore define land surveying to be the art which teaches us to find how many times any customary measure is constrained in a given piece of ground, and to exhibit the true boundaries thereof in a plan or map.[56]

It is unknown why Irish authors failed to define their profession in such a clinical manner as Adams and Grey, however it is important to note that neither mentioned the referencing of previously existing cartographic data in their definitions, which was a regular occurrence in the Irish industry at the time.

The eighteenth-century Irish surveyor can be viewed as an individual who was technically qualified to gather data in the field with a variety of instrumentation, capable of working with existing maps in order to extract relevant information as well as compiling data from various sources and able to take map data back to a real world environment and plot it as required. For the purpose of this study, all those who were involved in either the production of maps from the geographical data gathered by their own observations in the field, that is surveyors, and those whose maps are produced from the compilation of the work of others, that is, geographers and cartographers, shall be grouped into the greater realm of the surveying industry.

[56] George Adams, *Geometrical and graphical essays* (London, 1803), p. 182. John Grey added – 'laying out ground' and 'division of ground' to his definition, John Grey, *The art of land-measuring explained* (London, 1757), p. 15.

1.3 Becoming a land surveyor

Men were recruited into the surveying profession through a variety of means and for a variety of purposes. Whether they joined through an apprenticeship, military service, mathematical schools or through a family trade, each new surveyor was trained to work with a wide assortment of surveying instruments and to perform complex and often difficult calculations without the aid of twenty-first-century surveying software.

Recruitment for eighteenth-century surveying was in many ways radically different from that of the seventeenth century, mainly due to the changes in the political landscape over the course of these two centuries. Seventeenth-century surveyors active in Ireland were often affiliated with the operations of the English military. William Petty's Down Survey in the 1650s was a major employer for surveyors following Cromwell's Irish campaign. Petty's employees fell into two categories. The first were New Model Army soldiers tasked to conduct the surveys as well as being able to defend themselves from attack. [57] The second were a separate group of more educated men required for the transfer of field notes onto maps and to 'which painting, drawing, or any other kind of designing is necessary'.[58] Petty's method of keeping surveyors and map compilers separate continued following the next major military campaign conducted in Ireland, the Williamite Wars (1689-1691). This time the surveying project, again for the redivision of land, was called the Trustees Survey (1700-1703) and was named after the trustees for the forfeited estates.[59] This sixty-year cycle of war and surveying not only led to the general population associating surveyors with the powers-that-be but also acted as one of the major employers for the surveying community during this period.

The eighteenth century brought about a calmer socio-political landscape particularly in the Dublin area[60] leading to an increased availability of training and steady employment for surveyors. Owners of estates, both lay and ecclesiastical, tended to retain a set group of surveyors through the life of the estate. For example, the liberty

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[57] William Petty, *The history of the survey of Ireland*, ed. Thomas Aiskew Larcom (Dublin, 1851), p. 18.
[58] Ibid., p. xvi.
[59] Richard Sims, *A manual for the genealogist, topographer, antiquary and legal professor* (Oxford, 1856), p. 147.
[60] William Smyth, *Map-making, landscape and memory* (Cork, 2006), p. 359.

of Christ Church in Dublin retained the services of Thomas Cave throughout the 1740s, Thomas Reading during the 1750s, Samuel Byron during the 1780s followed by John Brownrigg. Michael Kenny was the preferred surveyor of the Domville estate during the 1770s[61] as were the then city surveyor and his assistant, John Green and Joseph Moland, to the estates of the archbishop of Dublin between 1710 and 1720.[62] John Roe was the surveyor of choice of the Pembroke family during the 1820s.[63] While there were obvious advantages to having a regular surveyor who would survey the same lands and be knowledgeable of their cadastral history, there were also drawbacks to being reliant on one individual as the owners of the Pembroke estate discovered:

> To all intents – Tuesday last was the day we appointed [Thomas] Cave to be on the lands of Booterstown, he took a sudden disorder and is since dead, I shall have the lands please God survey'd and every holding as they now are occupied severally setforth and the avenue in a straight line from Mount Merrion to the sea as designed….[64]

This section will explore the many paths available to those who wished to become land surveyors in eighteenth and early nineteenth-century Dublin. The order in which each path is placed does not represent its frequency in enrolling surveyors. Rather the order reflects the spectrum of enrolment, from those who existed on the periphery of land surveying and could undertake surveys as part-time employment, the amateur surveyor, through the professionals – Irish or foreign and whether they were born into the industry or joined through education – to the last set, military surveyors, who were literally enforced to practice their trade.

Amateurs

The basic art of surveying is relatively easy to learn. Petty felt that one solid month's study of surveying manuals would be sufficient to conduct a reasonably accurate survey in the field[65] whereas a nineteenth-century report on surveying and valuation suggested that four years would be preferable.[66] Between 1700 and 1810 an estimated thirty surveying manuals, some second and third editions, were available to surveyors

[61] Michael Kenny, Book of maps of the estate of Charles Domville in the city of Dublin, 1778 (NLI, Domvile papers, 21 F107).
[62] Raymond Refausse and Mary Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850* (Dublin, 2000).
[63] John Roe, Map of Ringsend and Irishtown, estate of the Rt. Hon. Richard Lord Viscount Fitzwilliam (Pembroke estate papers, NAI, 97/46/4/10).
[64] Letter of Richard Mathews, 1 May 1749 (NAI, Pembroke papers, 97/46/1/2/5/64).
[65] William Petty, *The history of the survey of Ireland*, ed. Thomas Aiskew Larcom (Dublin, 1851), p. 2.
[66] *Report from select committee on survey and valuation of Ireland*, p. 73 [445], H. C. 1824, viii.79.

operating in Dublin.[67] Robert Gibson's *Treatise of practical surveying* (Dublin, 1762) stands out as being the most widely-distributed Irish written manual during this period, even being republished in the United States as late as 1839.[68] Englishman Samuel Wyld's *The practical surveyor* (London, 1725), also available in Dublin, went into five separate editions during this period. With a reasonable grasp of mathematics and geometry, a surveying treatise and access to a simple surveyor's chain, anyone, in theory, could practice surveying. Peter Callan was strongly opposed to self-taught surveyors operating at a professional level, describing them as 'self conceited petty teachers of the mathematics'.[69]

Despite Callan's written protests, there was a market for self-educated surveyors during this period. For example, in 1754 the Earl of Kildare was in search of a new employee for his estates near Carton, Co. Kildare. The main qualification sought by the Earl, aside from a Protestant background,[70] sobriety, diligence and good behaviour was a good understanding of measurement and surveying which would make the potential employee 'more agreeable'.[71] Such skills for estate employees and stewards were also commented on by English land surveyor Edward Laurence:

> It is not only necessary that a steward should be a good accomptant, but also that he should have a tolerable degree of skill in mathematicks [sic], surveying, mechanicks [sic], and architecture; for in everyone off those particulars his ingenuity and skill will be upon many occasions call'd upon and made use of.[72]

This basic knowledge of surveying for estate employees could have tangible advantages for a landlord:

> As a steward should know the quantity as well as quality of every parcel of land occupied by the several tenants; so likewise he should have a map of the whole drawn out in the most perfect method…And by seeing in the map the position which every parcel in the estate hath with respect to one another, he will be able to judge what parcels are proper…[73]

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[67] Andrews, *Plantation acres*, Appendix D.
[68] Robert Gibson, *Treatise of practical surveying* (Hartford, 1839).
[69] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 15.
[70] There is little evidence available as to the religious background of individual surveyors however John Brownrigg, Charles Vallancey and A. R. Neville are recorded as being members of the Freemasons in the database of Dublin city members from 1760-1860 compiled by the Grand Masonic Lodge of Ireland. Jonathan Wight, an English surveyor working in Cork in the eighteenth century, was a Quaker. His diary is stored in the Religious Society of Friends library, Dublin.
[71] *Dublin Journal*, 2 Nov. 1754.
[72] Edward Laurence, *The duty and office of a land-steward* (3rd ed., Dublin, 1731), p. 33.
[73] Ibid., p. 54.

It is clear that even a basic knowledge of surveying could be beneficial in other forms of employment.

Immigrants

If one examines a list of surveyors operating in Dublin during the eighteenth century, the relative lack of traditional Irish names becomes evident. While the majority of these surveyors were in fact Irish but of English descent,[74] eighteenth-century Dublin provided definite employment opportunities for immigrant surveyors – as one visitor to the city in 1797 stated 'A foreigner is always preferred by the Irish nobility'.[75]

The general trend for immigrant surveyors operating in Ireland was for them to be initially employed for a specific purpose or project. With the beginning of construction of the Grand Canal in 1771, the board of directors of the Grand Canal Company went in search of an engineer who could also take responsibility for the project's surveys. They settled on Scotsman John Smeaton due to his 'integrity, knowledge, and experience in works of this kind.'[76] However, owing to his workload at the time, Smeaton was unable to accept the Board's offer, taking nearly two months to reply to their initial request. The Board's disappointment at his inability to work on their project was clearly expressed:

> We all lament much that your affairs are so circumstanced as to give us little hope of our being able to prevail on you to come over here to inspect our navigation, and reports on it, and give us your opinion on the whole.[77]

A delay caused by his previous engagements in the Newcastle area meant that Smeaton was not able to visit Ireland. He did, however, recommend a John Grundy esq. of Spalding, Lincolnshire who was:

> …a gentleman of great experience in the branches of Inland Navigation and Drainage, and who is in first rate reputation, by the works of that kind whereof he has acquitted himself.[78]

Perhaps the most famous of all immigrant surveyors to work in Dublin was John Rocque (ca.1709–1762). Rocque was a French Huguenot who was either born or

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[74] George Gibson - 'a citizen, son of a native', *Dublin Journal*, 2 Nov. 1754.
[75] Author unknown, *Dublin and its vicinity in 1797* (London, 1797).
[76] Redmond Morres, *Letters between Morres and Sematon on the Grand Canal* (Dublin, 1773), p. 5.
[77] Ibid., p. 13.
[78] Ibid., p. 18.

raised in London and had previous experience in publishing maps of London, Rome and Paris.[79] In 1754 he moved to Dublin[80] to produce a map of both the city[81] and its surroundings.[82] The previous city plan by Charles Brooking which was published in 1728 was, by the mid-eighteenth century, grossly out of date. However, at the same time, the city surveyor Rodger Kendrick was in the first stages of producing his own map of the city.[83] The two men's projects were in direct competition with each other. In this case Kendrick was far outclassed by Rocque not only in cartographic skill but also in marketing and business savvy.[84] This cartographic battle did however bring out some xenophobia within the surveying community, albeit through some sense of loyalty towards the local Kendrick rather than out-and-out racism directed towards Rocque.[85] Rocque went on to produce town plans of Thurles (1755), Kilkenny (1757), Cork (1759), Newry (1760) and Armagh (1760).

Herman Moll was another surveyor of continental extraction who was active on the Irish cartographic scene in the early eighteenth century. Moll, who was of German or Dutch origin, was so well known for his various atlases that he even appeared in *Gulliver's travels* as a friend of the narrator.[86] Moll produced his work through the gathering of cartographic detail from the latest sources and combining them to produce a larger map – thus removing the need to conduct field surveys. Moll's Irish connections included Henry Pratt, an estate surveyor, whose assistance Moll acknowledged in his *New map of Ireland* (1714) as Pratt had done 'all the improvements…viz. The Roads, Computed Miles from Town to Town &c.'[87]

However, not every immigrant surveyor made as big an impact as Rocque and Moll. Englishman James Pain produced only one small atlas and then completely

[79] Varley, 'John Rocque. engraver, surveyor, cartographer and map-seller', pp 83-91.
[80] Rocque dedicated his map to his employers: 'To their Excellencies Robert Viscount Jocelyn, Lord High Chancellor James Earl of Kildare and Brabazon Earl of Bessborough, Lords Justices General and General Governors of Ireland. This plan is most humbly inscribed by their Excellencies most dutiful and most obedient humble, John Rocque.'
[81] John Rocque, *A map of Dublin in four parts* (Dublin, 1756).
[82] John Rocque, *A map of Dublin and its environs* (Dublin, 1756).
[83] *Dublin Journal*, 2 Nov. 1754,
[84] Ibid., 14 Sept. 1754.
[85] Ibid.
[86] '… which thought I communicated many years ago to my worthy friend, Mr. Herman Moll, and gave him my resaons for it …': Jonathan Swift, *Gulliver's travels* (London, 1726), p. 191.
[87] J. H. Andrews, 'New light on three eighteenth-century cartographers: Herman Moll, Thomas Moland and Henry Pratt' in *Ir. Georgian Soc. Bull.*, xxxv (1992-1993), p. 17.

disappeared from Irish surveying[88] while Scotsman Peter May achieved even less impact with only one property being surveyed during his time in Ireland.[89] Jewish immigrant Richard Castle also commented that the foreign surveyor did indeed face difficulties moving and working in Ireland:

> …as I lie under the disadvantage of being a stranger in this kingdom.[90]

Foreign surveyors often had to adjust to Irish surveying traditions if they wished to operate successfully. A surveyor known only as Dr. Kelly described the differences found between surveying in Ireland and England:

> In Ireland I was chiefly employed in measuring farms, and smaller pieces of land, but in England I was engaged in enclosing lordships, which is considered most difficult as well as the most important branches of surveying...In Ireland, plantation measure is used with a two-pole chain of 14 yards and in England statute measure with a four pole chain of 22 yards; in measuring large tracts of land, a circumferentor is used with a chain, by Irish surveyors, and the theodolite by English surveyors…[91]

Assessment of the skills of Irish surveyors by their foreign counterparts varied. One English surveyor working with the Bogs Commission in the early nineteenth century presented a positive view of the common Irish surveyors while also highlighting how they were restricted to basic surveying practices:

> I have met with a great many in Ireland, who are fully competent. They, of course, would be placed under the direction of some person of science, who would put their plans together, and under whose direction the survey should be made.[92]

An interesting counterpoint is the highly negative view of some surveyors operating in Ireland during the time of the Down Survey in the 1650s:

> Suppose the surveyors employed had been as ignorant as, for the answering of certain of crooked ends, they were represented, was there more danger that they should mistake wet meadow for bog, then, on the contrary, bog for marshy pasture; or were they so drunk, as sometimes also hath been alleged, that they could not see the aforesaid distinction, and yet had not only their eyes, but as much of their other senses, reason, and art too, as served them to give sufficient account of the quality, figure, and situation of the land they admeasured? Or, it they were to be corrupted, who was most likely to corrupt them?[93]

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88 Royal Institution of Chartered Surveyors, *Five centuries of maps and map-making* (London, 1953), p. 63.
89 Andrews, *Plantation acres*, p. 229.
90 Richard Castle, *Essay on artificial navigation* (Dublin, 1730), p. 1. Richard Castle, also known as David Richardo and Davide de Richardi, was raised in Dresden while his father, Joseph Richardo, was a member of the court of Augustus, elector of Saxony/king of Poland in the 1690s, Loreto Calderón and Konrad Dechant, 'New light on No.85 St. Stehpen's Green' in Christine Casey (ed.) *The eighteenth-century Dublin town house* (Dublin, 2010) pp. 174-96.
91 *Report from select committee on survey and valuation of Ireland*, p. 84 [445], H. C. 1824, viii. 79.
92 Ibid.
93 Thomas Aiskew Larcom, *The history of the survey of Ireland* (Dublin, 1851).

The flow of surveyors was not one-way, with at least one Irish surveyor working for an English surveying business. However the surveyor in question, David McCool of Derry, admitted in 1803 that such occurrences were rare:

> …I being the first Irish surveyor ever employed by any of the London companies.[94]

McCool had been subcontracted by a London surveyor, Mr. Crow, to survey Lord Donegal's lands as:

> Mr. Crow…did not come to Ireland but wrote to me to see the whole business completed…[95]

Despite their various opinions on the state of Irish surveying and Irish surveyors, immigrant surveyors to Ireland played a major role in the eighteenth-century surveying industry and supplied the market with new cartographic styles.

Family ties

Surveying in eighteenth-century Ireland was heavily dominated by dynasties of surveying families. In Dublin the names Neville, Sherrard, Gibson and Roe span the course of several professional generations well into the nineteenth century. The history of family connections in surveying in Dublin extends back to the first dedicated map of the city surveyed by John Speed in 1610 for his book of cities in Britain and Ireland entitled *Theatre of the empire of Great Britain* (London, 1611). Speed was known to have employed his son, also named John, during the course of his travels to assist him with his surveys.[96] John Speed Jr. however did not pursue a career in land surveying and eventually became an anatomist.[97] Probably the longest surveying family operating in Dublin were the Nevilles. Jacob Neville first appears in Wilson's *Dublin street directory* in 1772 describing himself as a land surveyor but his career started in Co. Wicklow several decades previously. Having published a book on surveying in 1752 'showing everything useful in the art of surveying',[98] Jacob then attempted to produce a map of Co. Wicklow in 1754. Running into financial difficulties in obtaining a satisfactory number of subscriptions from the very start,

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94 Evidence of David McCool (NLI, Killadoon papers, MS. 35,065 (5)).
95 Ibid.
96 Sarah Bendall, 'Draft town maps for John Speed's theatre of the empire of Great Britain' in *Imago Mundi*, liv (2002), pp 30-45.
97 Charles J. Robinson, *A register of the scholars admitted into Merchant Taylor's school from AD 1562 to 1874* (Oxford, 1882), quoted in Bendall, 'Draft town maps for John Speed's theatre of the empire of Great Britain', p. 30.
98 Andrews, *Plantation acres*, p. 431. Appendix D.

Jacob struggled with completing the project and the final product did not appear until 1760.[99] Given the problems the he encountered during that Wicklow project, it seems that Jacob decided that a move to Dublin could be advantageous. In 1761 he penned the following rhyme best describing his financial woes:

> As the county of Wicklow I did survey
> I must now quit my hold for want of pay.[100]

Jacob's son, Arthur Richard Neville, or A. R. Neville as he signed himself in maps,[101] had his own thriving surveying, engineering and valuation practice from the 1780s onwards. Having unsuccessfully applied for the position of surveyor of the Paving Board in 1782[102] he eventually became Dublin city surveyor in 1801.[103] A. R. Neville went into full partnership with his son Arthur junior in 1808 from their office in Camden Street.[104] The role of city surveyor was once more filled by a Neville when Arthur junior attained the position in 1821.[105]

John Roe, who operated in surveying from the 1790s until the 1820s, succeeded his father, the previously-mentioned grocer/surveyor Patrick Roe.[106] The family tradition could also skip a generation. John Kendrick, a possible grandson or great-grandson of the 1750s city surveyor Roger Kendrick, worked as a surveyor for the Post Office in the 1830s.[107] David Aher was trained in surveying by his father, who was himself taught as part of Rocque's 'French school' style of surveying.[108]

The Gibsons were another family that played an important role in the surveying industry during the eighteenth century. A possible progenitor to the Gibson line may have been John Gibson who worked on the Trustees' Survey in the early eighteenth

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[99] *Dublin Journal*, 14 Mar. 1761.
[100] Ibid., 12 Mar. 1761.
[101] For example, A. R. Nevill C. S. & son, Map of Nettleton's holding on the East side of Kevin's Port, 1807 (DCA, WSC/MAP/621).
[102] 28 Aug. 1782 (DCA, PB/Mins/10, p. 23) '… he was educated in this business under his father, who was very eminent: & has ten years practice which has matured his knowledge …'
[103] J. T. Gilbert (ed.), *Ancient Records*, xiv, 398.
[104] *Wilson's Dublin directory* (Dublin, 1808).
[105] City surveyor maps, 'A map of small house … on the east side of Lwr. Exchange St …, 1821 (DCA C1/S1/22).
[106] Mary Colley, 'A list of architects, builders, surveyors, measurers and engineers extracted from Wilson's Dublin directories from 1760 to 1837' in *Ir. Georgian Soc. Bull*, xxxiv (1991), p. 56.
[107] *Wilson's Dublin directory* (Dublin, 1835).
[108] *Report from select committee on survey and valuation of Ireland*, p. 108 [445], H. C. 1824, viii.79.

century.[109] Robert Gibson, who eventually went on to become deputy surveyor-general, described himself as a mathematician but had also been active in land surveying since 1738.[110] Perhaps Robert's greatest achievement during his long career, apart from the certificate of proficiency that he initiated during his time with the surveyor-generals office, was his *Treatise of surveying* first published in 1752.[111] This book was still recommended reading over seventy years later when the Ordnance Survey instructed its officers to study rules listed by Gibson.[112] Robert's son, George, followed his father not only into the surveying business but also into the role of deputy-surveyor general, which he occupied from 1752 to 1760.[113]

This pattern of sons succeeding their father's official civic positions is found throughout surveying dynasties and was common in other professions of the era. Both William and David Henry Sherrard went on to replace their father, Thomas Sherrard, in the dual role of surveyor and secretary to the Wide Streets Commissioners after age and poor health caught up with Thomas in 1803.[114] While this may have been an example of nepotism in a civic surveying role, it may also have been the case that the Wide Streets Commissioners preferred their surveying work to be continued in the same style as that of Thomas Sherrard and thus chose his sons as his successor. Such second and third generation surveyors would have been raised in the industry. From an early age they would have been familiar with the role played by the surveyor and it is highly likely that many were home schooled by their fathers in surveying. These surveying dynasties were not just an Irish phenomenon. In France family names such as Cassini, Sanson and Delisle can be found operating in the realm of surveying and cartography throughout the eighteenth century.

Some families however branched off into related industries. The Semples for example, not only included the eminent engineering surveyor George Semple, but also architects, civil engineers and builders.[115] Family dynasties of surveyors played a key

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[109] *Dublin Intelligence*, 17 July 1708.
[110] Robert Gibson, *Treatise of practical surveying* (Dublin, 1752), preface.
[111] Ibid.
[112] Andrews, *Plantation acres*, p. 274.
[113] *Dublin Journal*, 25 July 1752, 19 Mar. 1765.
[114] 14 Jul. 1803 (DCA, WSC/Mins/18, p. 321).
[115] Colley, 'A list of architects, builders, surveyors, measurers and engineers extracted from Wilson's Dublin directories from 1760 to 1837', p. 58.

role in the industry in eighteenth-century Dublin and can provide some of the simplest method of tracking multiple generations of practitioners due to common family names.

Apprentices

Apprenticeships were another method of recruitment to the surveying industry. Apprenticeships usually ran for seven years, a common timeframe not just in surveying but in other trades as well. A 'master' would usually have only one apprentice at a time.[116]

In France, the geographer Philippe Buache supported the initiative that anyone related to the surveying industry should undergo an apprenticeship with an experienced surveyor. To add legitimacy to such apprenticeships, Buache suggested that all work conducted by the trainees be presented to the Académie Royale des Sciences in Paris for review – an additional check on the trainee's master's supervision skills. Such reviews were already standard practice at the time for mechanical engineering and science students in France. To ensure continued public confidence in the cartographic world, Buache argued that 'Geography must not be turned over to those to traffic in imagery'[117] i.e. to reduce false maps or those produced through dubious methods.

The requirements for surveying apprentices were loosely defined. Thomas Sherrard, when advertising for an apprentice in 1791, stated the qualities that he wished any potential candidate to possess:

> None need apply but a lad of taste, ability, and good connections, who has been suitably educated.[118]

Sherrard himself was a product of one of the most successful line of masters and apprentices that existed in eighteenth-century Dublin. It began with the arrival of John Rocque (1709-1762) and his apprentice Bernard Scalé (b.1739)[119] in Dublin in 1754

[116] However, Bernard Scalé took Thomas Sherrard and John Brownrigg on as apprentices at the same time – Scalé, Brownrigg and Sherrard, *Map of Essex Street for the Commissioners of Revenue* (Dublin, 1775).
[117] 'Le renversement de la geographie contre ceux qui commerce d'imagerie' Buache to le comte de St. Florentin, 21 Feb. 1763', quoted in Sponberg-Pedley, *Commerce of cartography*, p. 191.
[118] *Saunders News Letter*, 12 Dec. 1791.
[119] Francis Steer (ed.), *Dictionary of land surveyors and local mapmakers of Great Britain and Ireland, 1530 – 1850* (2 vol., London, 1997), ii, 460.

and continued for over a century. Rocque's artistic cartographic style was unique in Ireland during the mid-eighteenth-century and was passed onto the various apprentices that would follow in his wake. J. H. Andrews dubbed Rocque's, and his advocate's, method as the 'French School'.[120] The French school was not a physical structure with an established curriculum, but rather a hereditary style and mode of operation that was passed down from Rocque to his apprentice Bernard Scalé who in turn passed it on to his apprentices. Before Rocque's arrival in Ireland, maps were relatively simple line drawings with limited artistic decoration or colouring which gave the impression of still being heavily influenced by the Down Survey or late seventeenth-century city maps. Rocque's cartographic products were highly decorative. The included hill shading,[121] thematic groupings represented by separate design schemes,[122] all with a distinct rococo style.[123] Rocque's influence on the Irish industry was felt almost immediately. Both Jonathan Barker and Jacob Neville's maps from the time Rocque was operating in Ireland show that they tried to copy certain elements of his colouring and style.[124] Rocque returned to London in the 1760s, but Scalé remained in Ireland and went into partnership with William Richards in 1762.[125] Scalé advertised himself as a 'topographer, after the manner of Mr. John Rocque'[126] and updated and republished some of Rocque's work after his master's death. Scalé's time in Dublin was a fruitful one, with a flourishing business, a cartographic style that was difficult to match by his contemporary rivals and the birth of six children.[127] Scalé took on two apprentices in the 1770s - Thomas Sherrard (1750–1837)[128] and John Brownrigg (1748–1838)[129] – eventually making them full partners in his business in 1777.[130] This triple partnership was a very unusual occurrence in

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[120] J. H. Andrews, 'The French school of Dublin land surveyors' in *Irish Geography*, no. 5 (1967) p. 278.
[121] John Rocque, *Plan of Armagh* (Dublin, 1760).
[122] John Rocque, *Dublin in four parts* (Dublin, 1754).
[123] Ann Hodge, A study of the rococo decoration of John Rocque's Irish maps and plans 1755-1760 (NCAD, 1994), B.A thesis.
[124] Andrews, 'The French school of Dublin land surveyors', p. 278.
[125] Richards died in an accident in 1766 and Scalé reduced his work rate after the loss of his business partner.
[126] Bernard Scalé, *Tables for the easy valuing of estates* (Dublin, 1777), preface.
[127] William Bernard (1766-69), Henrietta Anne (1767-1850), Bernard (1770-1852, vicar of Baintree, Essex), Charlotte (1772- 73), Morley (b. & d. 1773) and Margaret Sophia (m. 1807). Steer (ed.), *Dictionary of land surveyors and local map-makers of Great Britain and Ireland, 1530-1850*, ii, 25. Two of Scalé's children died in 1773 – Charlotte and Morley
[128] Steer (ed.), *Dictionary of land surveyors and local mapmakers of Great Britain and Ireland, 1530 – 1850*, ii, 26.
[129] Ibid., p. 461.
[130] *Wilson's Dublin Directory* (Dublin, 1777).

eighteenth-century surveying, especially among non-related men, and Sherrard would eventually go on to repeat it with his company Sherrard, Brassington and Greene a few decades later.[131] Sherrard and Brownrigg left Scalé's business in 1777 to set up their own company located at number 123 Lower Abbey Street but their partnership had ended by 1782.[132]

[131] *Wilson's Dublin directory* (Dublin, 1813).
[132] *Wilson's Dublin directory* (Dublin, 1782).

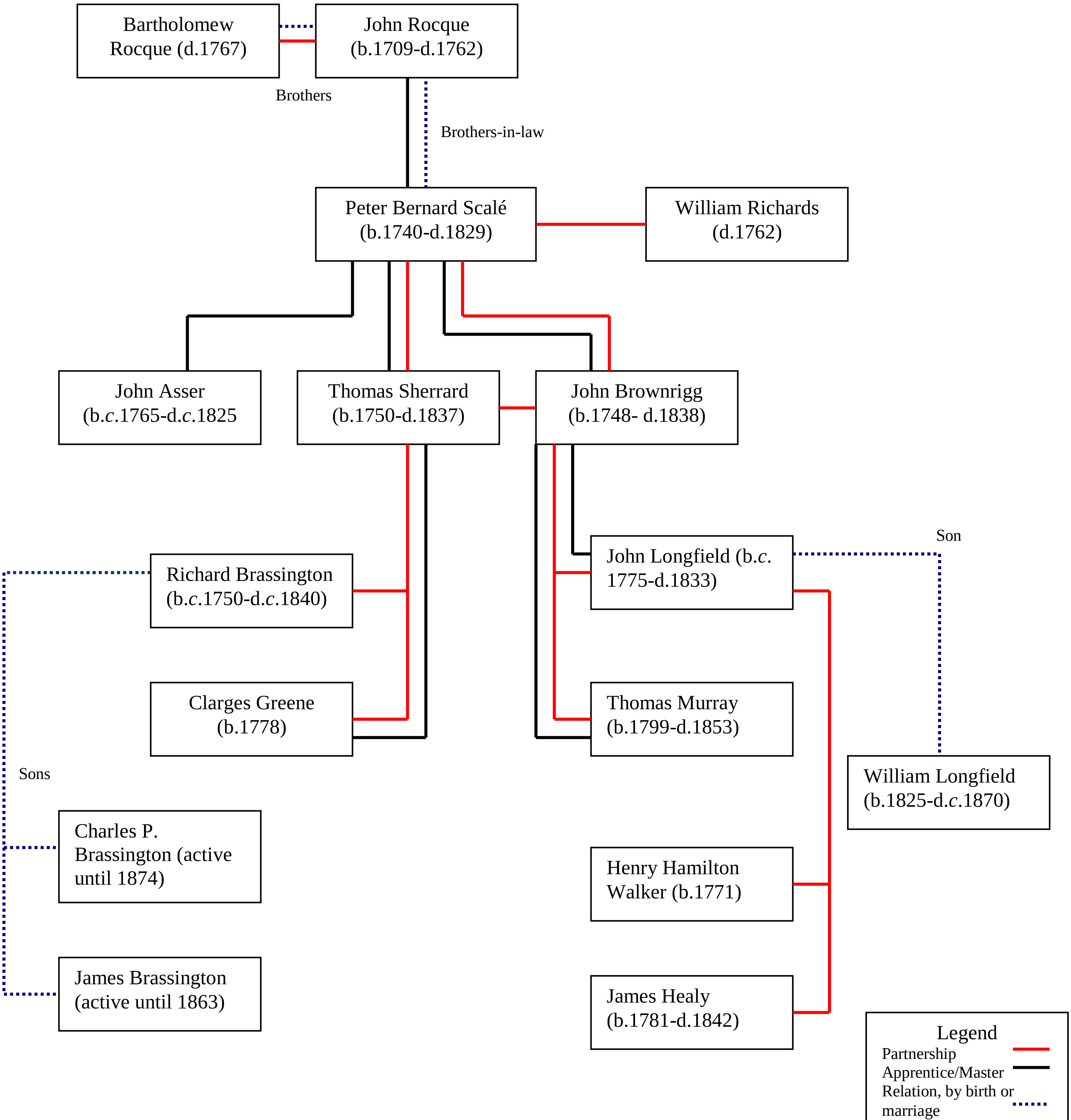

Figure 1.1 Partial French School lineage, 1709-1874 (compiled by F.O'Cionnaith).

Sherrard went on to have a very successful career as an estate surveyor and secretary of the Wide Streets Commissioners. He took on two apprentices in 1791[133] as well as educating his sons William and David Henry in the art of surveying. Brownrigg became one of Ireland's top canal surveyors opening up a surveying practice at 63

[133] *Saunders News Letter*, 12 Dec. 1791.

Grafton Street,[134] next door to a relation, possibly his brother, Henry Brownrigg. The Sherrard/Brownrigg partnership on a personal level is a difficult one to judge. Brownrigg and his wife Catherine named their son Thomas,[135] possibly after Sherrard, yet by the 1820s Brownrigg was criticising his former partner for the high price of two guineas that Sherrard's company charged for a day's labour:

> If work coming from under their hands, was twice as well done as other peoples, there would be no difficulty in the decision, but I have no idea this is the case! When Mr Sherrard and I lived together we were contented with one guinea per day clear of expenses![136]

Figure 1.2 The current buildings that occupies the location of Thomas Sherrard's residence/survey offices at 60 Capel Street (L) (1783-1800) and 1 Blessington Street (R) (1801-1828) (taken by F. O'Cionnaith, 2009).

Both Brownrigg and Sherrard kept Rocque's topographic styling but both toned down the decorative motif that was a trademark of Rocque and Scalé's work. None of the third generation 'French Schoolers' added to or further developed the school's style.

The fourth generation produced by the French School were the apprentices of Sherrard and Brownrigg. Sherrard's best known pupils were Richard Brassington and Clarges Greene. Brassington was taken on by Sherrard in 1791 and worked on a contractual basis with Sherrard until they became full business partners in 1801 from their office at 1 Blessington Street.[137] Greene worked with Sherrard as an assistant

[134] *Wilson's Dublin directory* (Dublin, 1779).
[135] Steer (ed.), *Dictionary of land surveyors and local mapmakers of Great Britain and Ireland, 1530 – 1850*, ii, 26.
[136] Andrews, *Plantation acres*, p. 443.
[137] *Wilson's Dublin directory* (Dublin, 1801).

from 1803 to 1805 and joined Sherrard's company as a full partner forming Sherrard, Brassington and Greene which operated until 1831.[138] After the Brownrigg/Sherrard split, Brownrigg opened his own office on Grafton Street and operated it with his apprentice assistants including John Longfield.

This French School legacy is not a complete history of Rocque's apprenticeship lineage but rather an example of one of the longest traceable lines of master/apprentice relations in Dublin surveying. It runs from the 1730s with Bartholomew Rocque, John Rocque's elder brother, to 1874 with Charles Brassington, son of Richard Brassington. To be a student of the French School was a mark of qualification for those who had completed their apprenticeship under one of its masters as was shown by David Aher when being examined by the select committee on the survey and valuation of Ireland in 1824:

> In what school of engineer were you originally brought up?
> In the French School of Rocque.[139]

The French school's success was unmatched by any cartographic organisation, albeit an unofficial one, until the establishment of the Ordnance Survey.

Surveying and Schools of Mathematics

In order to approach the surveying industry through any of the previous avenues mentioned above, a potential surveyor required some sort of formal education. Knowledge of mathematics and geometry as well as various sciences such as optics, astronomy, hydraulics and mechanics, were necessary to a surveyor's career. In contemporary France, the Jesuits ran an increasing number of schools throughout the eighteenth century that could provide for the educational needs of someone wishing to become a surveyor in addition to the more traditional subjects of history and philosophy. Discussions on both Copernicus's and Ptolemy's views on the design of the solar system as well as news from Jesuit missionaries working in Asia and the Americas provided students with a rich, detailed and up-to-date perspective on the geographical understanding of the world. These students of both the sciences of

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[138] *Wilson's Dublin directory* (Dublin, 1831).
[139] *Report from select committee on survey and valuation of Ireland,* p. 108 [445], H. C. 1824, viii.79.

surveying and the classic arts of philosophy and history came to be known as *géographes de cabinet* (geographers of the study).[140]

In England the situation was quite different. The focus was more on modern sciences and languages rather than a humanistic educational tradition. Philosophy and history were considered the realm of the gentry and thus did not provide the suitable background of a *practical* surveyor.

The Irish surveying industry wanted a more practical background for its members, and as such followed a similar trend to their English counterparts. The fact that they followed this trend, however, did not necessarily mean that they were ignorant of French superiority, with one Irish surveyor commenting:

> … it is generally admitted, that in all the arts and sciences, we are at least one hundred years behind the French.[141]

Some subjects were not as available in England and Ireland as many would have liked, particularly drawing, which has a natural application to surveying and cartography. Campbell, in the *London tradesman,* called for a more continental approach to education:

> The French King is so sensible of the great advantage of drawing, that he has, at the public expense, erected academies for teaching in all the great cities in his dominions; where the youth are not only taught gratis, but the parents are obliged by the magistrates to send their children to these schools.[142]

In Dublin there had been a professor of mathematics at Trinity College ever since the plantation surveys conducted following Cromwell's campaign.[143] Mathematical schools were quite common, especially in seaports like Dublin, throughout the eighteenth century with mathematical teachers regularly being listed in the commercial street directories. Benjamin Donn who ran a mathematical academy in Bristol listed a contemporary example of the curriculum of mathematical school students:

> At the Mathematical Academy in Library House, Kings Street Bristol, young gentlemen … taught writing, arithmetic, book-keeping, navigation and geography –

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[140] Sponberg-Pedley, *Commerce of cartography*, p. 30.
[141] George Semple, *Treatise of building in water* (Dublin, 1780), p. iii.
[142] R. Campbell, *The London tradesman* (London, 1774), pp 19-20.
[143] E. Evans, *Historical and bibliographical account of almanacs, directories etc. etc. published in Ireland from the sixteenth century* (Dublin, 1897), p. 36.

> elements of Algebra, altimetry, architecture, astronomy, chances, conics, decimals, dialling, fluxions, fortifications, gauging, geometry, gunnery, hydraulics, hydrostatics, levelling, mechanics, mensuration, optics, perspective, pneumatics, shipbuilding, surveying, trigonometry, plane and spherical; with the use of mathematical and philosophical instruments in a rational and expedition manner, according to new improvements – Also courses of experimental philosophy read on reasonable terms.[144]

Books on geography were widely available during that period to assist students with their geographical studies. *An introduction to geography* by W.C. Drich was already in its thirteenth edition by 1791.[145] Examples of the sort of mathematics that students were taught can be found in Hawney's *The complete measurer*. Hawney, in this case, took some artistic liberty with his question method but it is a clever example of a ratio/scale calculation:

> A Maypole there was, whose height I would know,
> The sun shinning clear, strait to work I did go.
> The length of the shadow, upon level ground,
> Just sixty-five feet, when measured I found.
> A staff I had there, just five feet in length,
> The length of its shadow was four feet one tenth.
> How high was the Maypole, I gladly would know,
> And it is the thing you're desired to show.[146]

Dubliner Samuel Byron was a product of the Dublin Society's drawing school, which, although mainly associated with the fine arts, also offered geographical, nautical, mechanical, commercial and military studies.[147] Specialising as a draughtsman, he eventually obtained the position of city surveyor in the 1780s.

Adam Martindale, 'a friend to mathematical learning', specialised in teaching both mathematics and surveying to his students in northern England during the late seventeenth and early eighteenth centuries. His admitted the scarcity of such as his services stating that:

> Mathematical schools, where better things might be learned, are very rare, and an able artist to instruct one in private is hard …[148]

Students of surveying in Martindale's school avoided problems common to students of surveying by having ready partners available to assist them in handling surveying

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[144] Benjamin Donn, *An epitome of natural and experimental philosophy including geography and the uses* (London, 1769), endpaper.
[145] *The Dublin Chronicle*, Mar. 1791.
[146] William Hawney, *The complete measurer* (Dublin, 1730), p. 253.
[147] *Dublin Journal*, 1 July 1783.
[148] Martindale, *The country-survey-book*, p. i.

chains and avoiding 'exposing of his unreadiness to the view of middlesome people' by gaining experience in a supervised environment.[149] There were times, however, when the lessons learnt by Martindale's students required practical demonstration in front of an audience;

> When I first began to instruct youths in mathematical learning in Warrington, some of my boys parents desired a sensible demonstration of their sons proficiency in somewhat that they themselves could in some measure understand, and particularly … upon measuring a piece of land: Whereupon I took four or five of my scholars to the heath with me, that had only been exercised within the walls of the school and never saw (that I know of) so much as a chain laid on the ground: and to the admiration of the spectators, and especially of a skilful surveyor then living in the town, they went about their work as regularly, and dispatched it with as much expedition and exactness, as it they had been old land-meters.[150]

No such school is recorded as having existed in eighteenth-century Dublin. However, the presence of mathematical schools is confirmed in every edition of Wilson's directories for the 1700s thus leading to the likelihood that such lessons were taught to Dublin's young surveyors.

Military

The military was a relatively large supplier of surveyors to the Irish industry from the sixteenth century onwards. One of the earliest military surveyors of note was Richard Bartlett who surveyed large sections of Ulster for Queen Elizabeth I from 1600 to 1603.[151] The majority of eighteenth-century military surveyors were officers, usually engineers, who received their training either at the Royal Military Academy at Woolwich or Naval Academy at Portsmouth.[152] One former member of the Corps of Surveyors working in Ireland was a Mr. Hyett, who later

Figure 1.3 Military surveyors at work in Scotland, by Paul Sandby *c.*1750, printed in J. H. Andrews, *Maps in those days* (Dublin, 2009), p. 231.

[149] Ibid., p. 65.
[150] Ibid., p. 66.
[151] J. H. Andrews, *The Queen's last map maker: Richard Bartlett in Ireland, 1600-03* (Dublin, 2008), preface.
[152] Douglas W. Marshall, 'Military maps of the eighteenth century and the Tower of London drawing room' in *Imago Mundi*, xxxii (1980), pp 21-44.

became professor of military drawing at the Royal Military Academy, instructing cadets in surveying and sketching the country.[153] It was rare for the military to train personnel to fulfil a role purely based on land surveying. A large part of military training was in calculating artillery ranges, the physical laws that affect falling heavy bodies (i.e. shells), the weight of shot by different gun bores and practical mathematics relevant to military operations.[154] Brigadier General James Douglas also emphasised artillery and 'bombarding in its general perfection' as a key subject for military surveyors.[155] An example of a mathematical problem relevant to the British Navy and contained in a widely-distributed mathematics text of the eighteenth century is given in the example below:

> Suppose a crew of fifty four English Sailors were to attack a French fort, and carry off six pieces of brass cannon weighing one with another 980lb French: How much would each John's share come to, supposing they could fell the cannon at 8l. a hundred weight English?

	Lb. (French)	*Lb. (English)*	*Lb. (French*	
Now	*100 lb*	*108£*	*980 x 6*	*6350,4 lb Engl.*
And	*112 M.*	*8£*	*6350,4 M.*	*453,6 £ Sterling*
Then	*54*	*543,6*	*1*	*8,4£*

> So that the share of each will be eight guineas[156]

Amongst the most well-known military surveyors of the eighteenth century was Lieutenant General Charles Vallancey (1726–1812)[157] who in 1786 was tasked with journeying to Paris to regain a complete set of Down Survey maps that had been captured by a French privateer in the English Channel.[158] Vallancey's career ranged broadly with his military survey of Ireland being his greatest cartographic achievement while his ambitious though ultimately erroneous theories about Irish antiquity[159] brought him more attention than his cartographic work. Vallancey's career will be discussed in more detail in chapter 5. Other military surveyors at the

[153] *Report from select committee on survey and valuation of Ireland*, p. 198 [445], H. C. 1824, viii.79.
[154] John Robertson, *A treatise of mathematical instruments* (London, 1775), appendices i – xvii.
[155] James Douglas, *The surveyor's utmost desire fulfilled* (London, 1727), p. 81.
[156] Robertson, *A treatise of mathematical instruments*, p. 141.
[157] *Hibernian Journal*, Nov. 1812.
[158] Ibid.
[159] Charles Vallancey *An essay on the primitive inhabitants of Great Britain and Ireland* (Dublin, 1807); *Grammar of the Iberno-Celtic, or Irish language* (Dublin, 1773); *A vindication of the ancient history of Ireland* (Dublin, 1786).

time included the Taylors: Major Alexander Taylor (1746-1828)[160] and Captain George Taylor (1772-1841).[161] The Taylors both worked on a roads survey of Ireland[162] with their fellow officer Captain Alexander Skinner in 1788. Following this project Alexander Taylor joined the 81st Regiment of Foot in 1881 and eventually transferred to the Corps of Engineers as deputy under Vallancey.

Summary

Regardless of where a surveyor received his training, a universal rule can be applied. The surveyor had to have a good understanding of mathematics and geometry in order to measure areas and distances. Abstract thinking and spatial awareness were also important abilities.[163] In the twenty-first century it is easy to imagine the world as if looking down from above because we have seen this view many times in our lives – satellite and aerial photography, the view from an aircraft window etc. But in the eighteenth century such views were entirely imaginative; they were created in the surveyor's mind and the readers of maps believed that what they saw was the truth. The phrase 'based on observations taken in the field'[164] appears in many eighteenth-century map titles, attesting to this claimed authority.

What drew individuals to the surveying industry, whether through family heritage, desire to see the world, financial gain or scientific curiosity is unfortunately nearly impossible to determine as it was a matter of personal choice, and surveyors rarely recorded their private thoughts on paper. Scalé referred to the role of surveyor as being 'one of the most profitable and genteel professions'[165] but this again fails to supply the deeper personal reasons behind becoming a surveyor. George Semple, however, gives his personal reasons for entering the industry:

> I had on many occasions before felt a great desire to acquire knowledge in difficult matters of arts and science, and whenever they grew easy and familiar to me, I could no longer perceive in them the charms which before captivated me. Interest alone could never sway me in these researches and pursuits; but from my earliest

[160] Steer (ed.), *Dictionary of land surveyors and local mapmakers of Great Britain and Ireland, 1530 – 1850* ii, 502.
[161] Ibid.
[162] Taylor and Skinner, *Maps of the roads of Ireland* (Dublin, 1778).
[163] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 11.
[164] For example: Taylor &Skinner, *Maps of the roads of Ireland* (Dublin, 1778).
[165] *Freeman's Journal*, 13 Jan. 1770.

> days I had entertained a notion, that the greater the difficulty, the sweeter the conquest.[166]

As the concept of surveying and the many methods of entry into the surveying profession have been examined in this section, it is appropriate to explore in the following section the distribution of surveying business throughout eighteenth-century Dublin.

[166] Semple, *A treatise of building in water*, p. 5.

1.4 Surveying businesses in eighteenth-century Dublin

The previous sections defined both surveying and the methods by which individuals entered the industry. At this point it is suitable to explore the number and distribution of surveyors operating in eighteenth-century Dublin. An accurate figure of the numbers of Dublin's surveyors operating during the eighteenth century and early nineteenth century is difficult to obtain. Surveyors frequently went by different job descriptions and often changed their title during the course of their careers to suit the various roles in which they specialised. The random appearance of amateur or part-time surveyors and the possibility of evidence being lost add levels of difficulty in establishing an accurate overview of Dublin's surveying population.

The late eighteenth century saw a massive increase in surveyor numbers in Britain and Ireland. Table 1.1 shows the increasing numbers operating in the industry in Britain and Ireland from the late medieval period until the mid-nineteenth century;

To 1545	1546-1602	1603-1654	1655-1724	1725-1783	1784-1850
28	235	446	1,189	3,276	7,886

Table 1.1: Number of surveyors in Britain and Ireland from sixteenth century to mid-nineteenth century, Francis Steer (ed.), *Dictionary of land surveyors and local mapmakers of Great Britain and Ireland 1530 – 1850* (2 vols., London, 1997), ii, p. 59.

The figures listed in table 1.1 must be approached with caution as not every surveyor operating during this period may have been documented; records may not have survived or have been as accurately recorded as they were in later periods.

The numbers of surveyors operating in Ireland can be divided between the rural and urban environment. Andrews speculates that the largest number of surveyors might reasonably be required in areas of intensive New English settlement, for it was in just such an environment that modern systems of agriculture and land tenure would create the strongest demand for land measuring as well as eliciting the largest supply of measurers.[166] He also speculates that about seventy surveyors would have been

[166] Andrews *Plantation acres*, p. 233.

sufficient to supply Ireland's surveying needs.[167] This figure, however, does not include amateur and part-time surveyors.

The situation was different in the capital. The demand for surveying in the city was more diverse[168] with Dublin-based surveyors operating throughout the country rather than purely in their local areas as many of their rural counterparts did.[169] Dublin was also a suitable base as large landlords and estate owners had residences in the city[170] and could obtain prices and recommendations from several different surveyors in a single day's research. Francis Steer estimates that by the 1790s, approximately 2% to 5% of the 5500 surveyors operating in Britain and Ireland worked at some point in their careers in Dublin.[171]

Analysis of directories

An authoritative listing of surveyors operating in Dublin during the eighteenth century is unavailable; however, estimates can be made using street directories of this era. This research relied heavily on *Wilson's Dublin directory* which focused solely on Dublin. William Wilson's directory was a business listing and was published annually from 1751 to 1837. It provides one of the best, albeit incomplete, address data-sets for surveyors operating at this time. For commercial advertisement, entry into Wilson's directory was voluntary. Wilson himself published a form of disclaimer stating that:

> These lists being subject to daily variation, by deaths, removals, partnerships &c. the editor, to render every future edition as correct and complete as possible, will thankfully receive, and diligently attend to, any additions or alterations that may become necessary.[172]

and in the first edition in 1751, that:

> Perfection is seldom to be met with in a first attempt of this kind …[173]

Early editions of the directory lack the full selection of careers that are listed in later editions. Builders, surveyors and engineers are few and far between before the 1760s however this does not mean that they were not operating in the city at the time, simply

[167] Ibid., p. 244.
[168] See Chapter 4 about surveying opportunities in Dublin.
[169] John Rocque, *Dublin* (Dublin, 1756), *Kildare* (Dublin, 1758), *Kilkenny* (Dublin, 1758), *Armagh* (Dublin, 1760).
[170] Maxwell, *Dublin under the Georges*, p. 133.
[171] Steer (ed.), *Dictionary of land surveyors and local mapmakers of Great Britain and Ireland, 1530 – 1850*, ii, 34.
[172] *Wilson's Dublin directory* (Dublin, 1795).
[173] *Wilson's Dublin directory* (Dublin, 1751).

that they had not chosen to advertise with Wilson.[174] The increase in numbers of these professions in later editions of Wilson's directory indicates that the directories became more efficiently compiled as time progressed.[175] The lack of a constant definition of career titles for surveyors is also a problem when consulting the directory, as there is often little differentiation between different types of measurer or surveyor. Despites the various strengths and weaknesses of the directories, they provide a glimpse, into the commercial, world of the eighteenth century. Table 1.2 illustrates the numbers of surveyors in the Wilson directories listed by decade between 1760 and 1810:

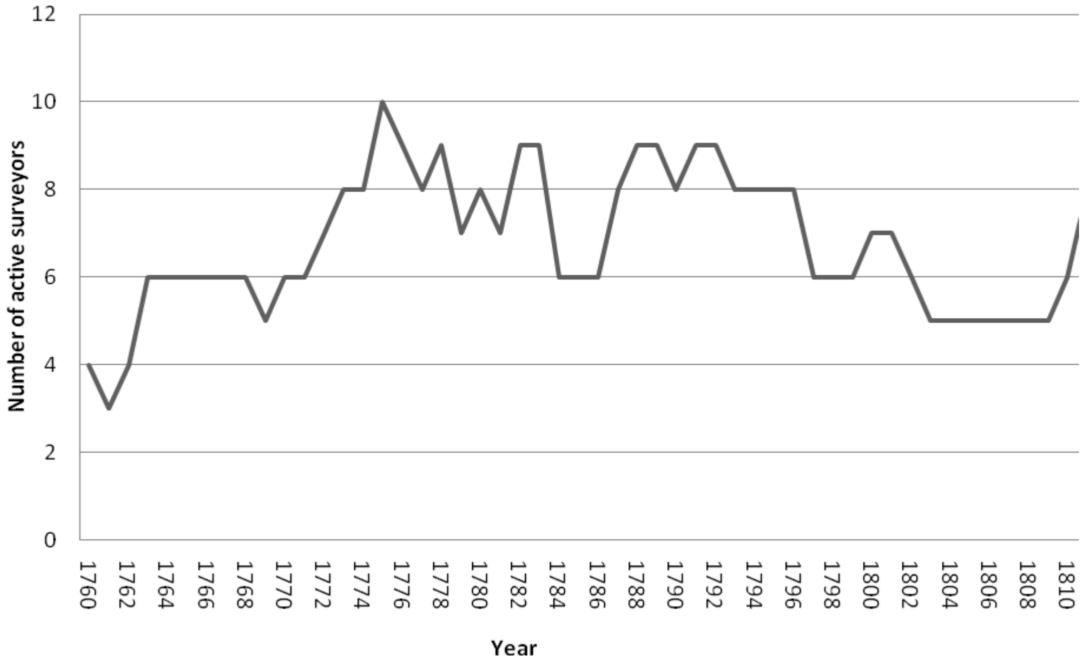

Table 1.2: Number of surveyors listed in Dublin by *Wilson's Dublin directory*, 1760 to 1810. (Compiled by F. O'Cionnaith)

The above chart should not be taken as an absolute. Measurers, engineers, architects and unmentioned surveyors all operated in Dublin during this period and were not listed in the directories. A more adaptive method of calculating the number of surveyors present in Dublin would be to consider each surveyor listed as a surveying company rather than an individual. It has already been demonstrated that surveyors took on apprentices and their own sons to work with them, and may also have had several assistants or *chainmen*. As a modern comparison, the Irish Institution of Surveyors lists nine surveying companies as being corporate members within the

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[174] For example the *Universal Advertiser*, 26 July 1760, mentions Barker as based in Dublin. Jonathan Barker ,for example, does not appear in the Wilson's directory yet he was operating from the city in the mid eighteenth century.

[175] For example, there is a wider range of career titles in the 1810 edition of *Wilson's Dublin directory* than the 1769 edition.

Dublin area as of December 2007.[176] This does not mean that twenty-first century Dublin has only nine surveyors, but has in fact several dozen, each working for a listed company so one could conclude that figures obtained from the *Dublin directories* are a good approximate dataset.

Figure 1.4 presents the locations of surveyors' offices from the 1760s to 1830s. It must be noted that surveyors frequently moved their offices but generally only within the same area or even the same street. John Ewing for example, moved from 9 Aughrim Street[177] to 2 Prussia Street,[178] neighbouring streets, in the late 1780s, A. R. Neville moved from 50 to 51 Camden Street in the first decade of the nineteenth century[179] and the measurer William Purefield moved a total of seven times[180] during his thirty-three year career in Dublin.

[176] Irish Institution of Surveyors Members http://www.irish-surveyors.ie/corporates/corporates_a_c.htm
[177] *Wilson's Dublin directory* (Dublin, 1781).
[178] *Wilson's Dublin directory* (Dublin, 1790).
[179] *Wilson's Dublin directory* (Dublin, 1809).
[180] *Wilson's Dublin directory* (Dublin 1762, 1764, 1769, 1777, 1783, 1784, 1793, 1794).

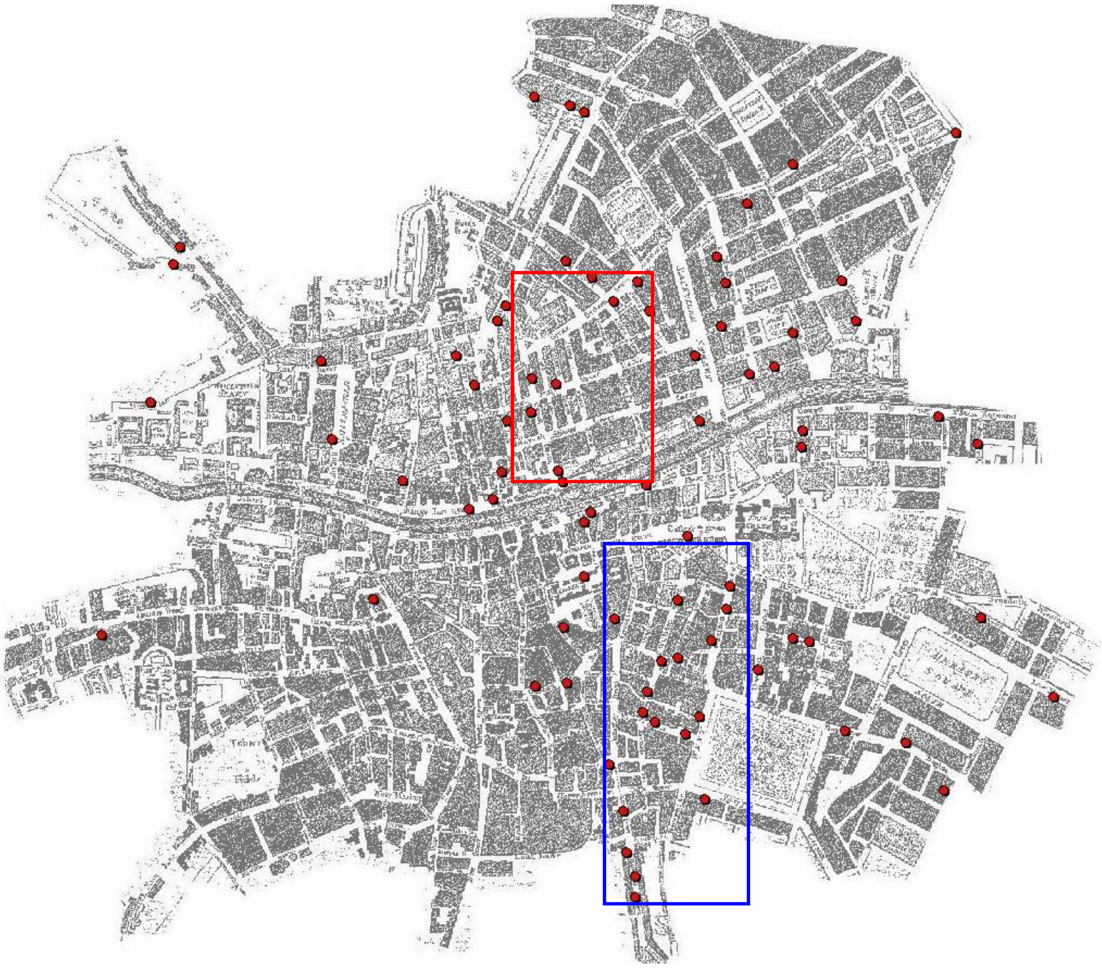

Figure 1.4: Location of surveying offices in Dublin, 1760 – 1837, indicated by red dots. Background Map *Wilson's Plan of Dublin (Dublin, 1810*), scale unknown, (compiled by F.O'Cionnaith).

The areas around Capel Street (highlighted by the red box) and St. Stephen's Green/Aungier Street (blue box) appear to have the highest density of surveying practices. Capel Street during the mid to late eighteenth century was one of the main commercial thoroughfares of the city leading down to Essex Bridge.[181] A surveying company would do well to have a ground floor shop, especially given its close location to many upper-class landowners[182] living on Rutland, now Parnell Square, and the rest of the north Dublin Gardiner estate. Surveyors on the south side of the Liffey were concentrated around a similar client market, that of landed gentry and landlords who lived in and around the Fitzwilliam estate.[183] Surveyors are conspicuously absent from the high-density poorer and older districts such as the Liberties and Black Pitts.

[181] Sheridan, 'Designing the capital city', p. 112.
[182] Ibid., p. 151. Chart of residents of Members of Parliament and peers of Ireland in Dublin 1798.

In Dublin, the length of surveying careers varied. The data in Wilson's directory between the years 1751 and 1837 enables the calculation of an average working career of a surveyor in Dublin at 15.45 years.[184] Thomas Sherrard bears the distinction of the longest recorded career during this period with 49 years[185] in the industry, from his apprenticeship with Scalé to the establishment of his highly regarded firm Sherrard, Brassington and Greene. Some, like Jacob Neville moved to Dublin after having worked for many years in other parts of the country as surveyors.[186] Others, like Rocque, operated in Dublin for only a few years before moving on, either back to their country of origin or to other parts of Ireland. Surveyors who spent the majority of their careers in steady employment working for civic bodies based in Dublin, such as the Wide Streets Commissioners, were the longest-established firms in Dublin. Sherrard is one such example.

Despite all efforts, there is no complete figure for the number of surveyors operating in Dublin during this period. Had the industry had been licensed then it might have been possible to establish a more precise figure, but as is, only an approximation of their numbers can be obtained.

[184] This figure does not include surveyors only listed as operational in just one year.
[185] From 1779 to 1828.
[186] *Dublin Journal*, 14 Mar. 1761.

1.5 Surveying fees, salaries and costs

> The Earth does not owe gratitude only to those who create books, unite maps to the art of geography and fit lands to sky and sky to lands as with a plumb line; but also to those who persuade, urge, correct and increase these works, promote them with money and expense, strengthen the feeble, recover the lost, and give shape and polish to the deformed, so that the illustrious offspring can be born and reborn and appear with beauty into the light and faces of men.[187]

Seventeenth-century Dutch cartographer Johannes Blaeu's above statement underlines many of the important issues related to the land-surveying industry. The enthusiasm to increase the knowledge of the world, the willingness to correct cartographic mistakes of the past, to push the science of surveying into new realms and to refine the art of map-making are all important elements highlighted. Aside from these majestic ideals, the fundamental point of his statement is the importance of patronage and financial support for surveyors – in essence, the commerce of surveying. Often surveying is considered as an art and a science, but what is also important to remember that its main function, especially to the surveying community, is that of a business. Surveyors could not live on the gratification of knowing that their cartographic style was in fashion or that their surveying techniques were scientifically sound. The main driving force behind the surveying business was a client's need for cartographic data and his readiness to pay for it. These clients ranged from heads of state[188] and civic bodies[189] to private individuals,[190] with varied surveying requirements for each individual survey.

Evidence of the cost of surveying is difficult to uncover as the majority of surveying in eighteenth-century Dublin was conducted in a private capacity, away from the detailed record-keeping of local and central government. Occasionally surveyors quoted prices in the local press and used this information against each other in the many volatile and libellous surveying disputes that occurred throughout this period.[191] A surveyor's fee, mainly established through either a flat fee or by the amount of land

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[187] Johannes Blaeu, *Atlas Novus* (Amsterdam, 1654), translated by I. Cunningham, quoted in Charles W. J. Withers, *Geography, science and national identity: Scotland since 1520* (Cambridge, 2001), p. vii.

[188] John Rocque described himself as 'Chorographer to the Prince of Wales', *Dublin in four parts* (Dublin, 1756).

[189] Wide Streets Commissioners, Ballast Board, Dublin Corporation.

[190] Bernard Scalé, Wynnsfield, Kildare (1772), map produced for John Wynn Baker, landlord.

[191] Brownrigg openly criticised Sherrard's prices in 1824: Andrews, *Plantation acres*, appendix E, p. 443.

covered by the survey,[192] covered his wages but also included costs of transportation, the fees of their assistant, equipment charges and possibly food and board. The price charged for surveys therefore varied greatly, often depending on the individual surveyor's personal preferences. In addition to examining the rates surveyors charged in Dublin, it is helpful to examine fees and expenses charged in eighteenth-century England and France to establish how surveying in Dublin compared to the great powerhouses of eighteenth-century surveying.[193]

It is difficult to determine which method of funding was the most lucrative during this period for Dublin surveyors as professional and financial success varied from individual to individual. Some surveyors focused on estate surveys,[194] others on well-paying civic positions[195] whilst others used a combination of the two.[196] As such, an examination of fees, salaries and costs provides greater detail on individual surveyors and their relative success within the profession.

Subscription

Securing funding for a major survey project was the first step towards completing a finished commercial product. One favourite funding method used in Dublin was subscription: the surveyor would advertise the proposed mapping project requesting that interested parties should pay approximately half the total cost of the proposed final map as a deposit, thus enabling the surveyor to obtain funds to begin the work. The subscriber could be further enticed into handing over money by promises of a free copy or a special reduction in the price of the published map. In 1754 both Roger Kendrick and John Rocque went in search of subscriptions for their respective Dublin maps, in direct competition with each other. Kendrick's subscription fee was half a guinea, which was to be paid to George Faulkner, a newspaper publisher, of Essex

[192] *Drogheda Journal*, 27 Aug. 1796, Michael McGawley charged 12 pence per acre.

[193] As a start, one must examine the monetary conversion for eighteenth-century Ireland, England and France. In France, two hundred and forty *deniers* made one *livre*, three livres made one *écu*, so one écu was worth seven hundred and twenty *deniers*. Decimalisation was introduced in France in 1803. English and Irish currency was based around *pounds*, *pence*, *shillings* and *guineas*. Each pound was made of twenty shillings; a shilling in turn was divided into twelve pence (abbreviated as 'd'). One pound and one shilling was the equivalent of one guinea. See Sponberg-Pedley, *Commerce of cartography*, preface.

[194] William Cox.

[195] Thomas Sherrard.

[196] Roger Kendrick was surveyor of Saint Patrick's estate as well as Dublin City surveyor.

Street or to Kendrick himself on Kevin Street.[197] In addition, if his subscribers were sufficiently encouraging, Kendrick was willing to extend the bounds of his map to four miles into the country surrounding Dublin. This tactic would, in theory, open up a wider market of subscribers as farmers and landed gentry in the immediate environs could have villas and estates included in the final map. Kendrick's Dublin map however was doomed to failure due to Rocque's superior use of marketing media,[198] as well as the latter's experience in large urban mapping. Kendrick also made gross errors in planning such a large project which will be outlined in section 1.6.[199] Rocque planned two maps simultaneously – one of Dublin city and the other of the city and its environs.[200] Like Kendrick he charged half a guinea for the initial subscription fee and the same amount eight months later when he assured the public that the map would be completed. Subscriptions were taken by several booksellers in Dublin as well as by Rocque himself from his lodgings in Dame Street. In addition he encouraged his subscribers to review his extensive back catalogue, which could be viewed anywhere that subscriptions for his map were taken.[201] Three hundred and forty-four people subscribed to Rocque's map including his fellow surveyors Jonathan Barker, Bernard Scalé and George Semple.

Lists of subscribers enable researchers to gain an idea of which sections of society were actively supporting the cartographic arts. George Taylor and Alexander Skinner produced their *Maps of the roads of Ireland* (Dublin, 1778)[202] with the assistance of subscribers who were instructed to leave their names with Mr. Wilson, of Wilson's directory at 6 Dame Street.[203] Taylor and Skinner made sure not only to note any of their subscribers' residences, which were subsequently included in their maps, but also to alert those who were interested in their second edition that they too could participate in the subscription scheme:

> The editor acquaints the public that this work is compiled from the only authentic survey ever made of the Roads of Ireland, by Messrs Taylor and Skinner, with assistance from many respectable noblemen and gentlemen. To accommodate former subscribers to the first work, the *supplement* will be sold separate, at the moderate private of a British crown. Such persons therefore, who have not as yet furnished a

[197] *Dublin Journal*, 31 Aug. 1754.
[198] Ibid.
[199] Ibid.
[200] Ibid., 7 Sept. 1754.
[201] Ibid. n.d. [Aug. 1754]
[202] Taylor & Skinner, *Maps of the roads of Ireland.*
[203] Ibid., p. vi.

> description of their respective seats are requested to supply the same, which shall be thankfully acknowledged.[204]

Taylor and Skinner's list of subscribers was eleven pages long and the breakdown of the 'respectable noblemen and gentlemen' subscribers included the lord-lieutenant Earl Temple, the lord chancellor, the lord primate, archbishops of Dublin and Tuam, the duke of Leinster, the duke of Devonshire and the marquis of Rockingham. Noblemen were listed in alphabetical order and gentlemen were classed by the county in which they resided. A breakdown of notable subscribers is given in table 1.3

Earls:	54
Viscounts:	20
Bishops:	17
Lords:	32
English Subscribers:	13
Scottish Subscribers:	9
Generals:	4
Colonels:	6
Lt. Colonels:	9
Majors:	17
Captains:	21
Lieutenants:	17
Cornets:	4
Ensigns:	5
Surveyors:	5

Table 1.3: Notable subscribers to Taylor and Skinner's *Maps of the roads of Ireland* (Dublin, 1778) (compiled by F. O'Cionnaith).

Table 1.3 is not a complete listing of all of Taylor and Skinner's subscribers but it demonstrates the range of those parties who took an interest in their project. In France, subscribers to Gilles Robert de Vaugondy's *Atlas universal* (Paris, 1757) mainly came from the book trade, yet there was also a healthy representation of military, church, academic, aristocratic and royal subscribers.[205] Politically powerful subscribers were not only a mark of quality as men of such high esteem would be willing to invest in the survey, but also acted as a deterrent against counterfeiting. The most important subscribers often had their coat of arms included for a small fee. In England Joel Gascoyne offered subscribers the chance to have their coats of arms engraved on the border of his map of Devon[206] for five shillings. It allowed gentry to demonstrate that not only were they patrons of art and science, but also ensured that particular attention would be paid to their lands and residences:

> Gentry will be influenced to keep their seats and arms lest their posterity see what their ancestors have parted with … Vagabonds will be deterred from making

[204] Ibid., p. xxvii.
[205] Mary Sponberg Pedley, 'The subscription list of the 1757 atlas universal: a study in cartographic dissemination' in *Imago Mundi*, xxxi (1979), pp 66-77.
[206] William Ravenhill, 'Joel Gascoyne, a pioneer of large-scale county mapping' in *Imago Mundi*, xxvi (1972), p. 67.

> counterfeit passes by putting false names and seals to them, both which may be discovered by such maps as these.[207]

It was hoped that counterfeiters would be deterred from producing illegal copies of such maps because of its powerful supporters. Regardless, this powerful deterrent did not stop the illegal reproduction of Charles Brooking's 1728 map of Dublin.[208]

Maps were not the only product of surveyors to find funding through subscription. With a keen market from both professional and amateur surveyors in Ireland, Jacob Neville (1752),[209] James Morphett (1760),[210] Thomas Power (1767),[211] Garrett Heagerty (1783),[212] Anthony Divir (1786),[213] and Nicholas Walsh (with the assistance of Thomas Sherrard 1787)[214] all published various treatises, pamphlets and manuals by subscription.

Official government support

Since the 1824 the Ordnance Survey, funded directly by the government, has been responsible for state sanctioned mapping projects within Ireland. Before this time however, official financial support for large mapping projects, either from the Irish parliament or civic authorities in Dublin, was less common. Certainly there were several organisations and commissions that were financed by the government which were involved in mapping but it was exceptional.

English royalty had a fluctuating interest in the cartographic arts. Charles II (1630 - 1685) paid a great deal of attention to major surveying projects in England during his reign and was willing to give his financial support on several occasions. His donations included £500 to John Ogilby's *Britannia*, £200 for William Morgan's Map of London, £200 for John Seller's *Atlas Anglicanus* in addition to issuing a royal order for John Adams 1681 survey of England allowing him 'to go freely to all necessary

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[207] Robert Plot, *The natural history of Oxfordshire* (London, 1705), p. ii.
[208] J. H. Andrews, 'Mean pyratical practices: the case of Charles Brooking' in *Ir. Georgian Soc. Bull.*, xxiii, nos 3 & 4 (1980), p. 33.
[209] 'A proposal for printing by subscription, A treatise of practical surveying', *Dublin Journal*, 28 Mar. 1752.
[210] 'A complete practical system of surveying', *Belfast News Letter*, 13 Mar. 1760.
[211] 'The universal land surveyor', *Cork Evening Post*, 15 Oct. 1767.
[212] 'A new and curious method of surveying', *Cork Evening Post*, 24 July 1783.
[213] 'The mariner and surveyors companion', *Strabane Journal*, 28 Aug. 1786.
[214] 'A treatise on surveying', *Dublin Evening Post*, 12 July 1787.

places and view points'.[215] Charles's successors, James II (1663–1701) and William III (1650–1702), did not finance surveys. Even the great collector of maps and scientific instruments, George III (1738–1820), followed the House of Stuart's reluctance to take a monetary interest in mapping. However, he did pay a substantial amount towards the construction of a large theodolite for William Roy's triangulation survey trigonometrically connecting England and France in 1787.[216]

In France, major surveying work could also be hampered by royal cash flow problems. Louis XV (1710-74) selected César-François Cassini de Thury to run a massive cartographic project to trigonometrically survey the whole of France in 1747. However, the support of the French crown was cut ten years later due to financial strain caused by French involvement in the Seven Years War (1756–63).[217]

The official support of mapping was in a similarly poor state in Dublin during the eighteenth century. Outside of sanctioned surveys conducted by governmental or civic bodies such as the Wide Streets Commission, Barrack Board, Paving Commission, Ballast Board, Bogs Commission etc., are few examples of authorities hiring surveyors. Charles Brooking was one of the minority of surveyors to benefit from official support. He produced a detailed map of Dublin which was published in 1728. Dublin Corporation was eager to obtain copies of the latest and most up-to-date maps available of the capital and assisted Brooking, not only for engraving the map, but also reimbursed him for some of his expenses incurred during the survey. The Receiver General of the City Revenues, Humphrey French, was instructed to pay Brooking £10 towards his expenses and the Council voted to contribute an additional £10 towards getting the map engraved in London. Despite their enthusiasm and financial encouragement of Brooking's project, he was unfortunately misnamed Thomas, rather that Charles, in every mention of him in the council's 1728 records.[218]

John Rocque also benefited from the local government support. In January 1757 Rocque made the Dublin corporation aware of the 'great pains, labour and expense'

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[215] E. G. R Taylor, 'Robert Hooke and the cartographical projects of the late seventeenth century, 1666 – 1696' in *Geographical Journal*, 90 (1937), pp 533-5.
[216] R. A. Skelton, 'The origins of the Ordnance Survey of Great Britain' in *Geographical Journal, 128* (1962), p. 422.
[217] Sponberg-Pedley, *Commerce of cartography*, p. 80.
[218] J. T. Gilbert (ed.), *Ancient records*, vii (Dublin, 1727/28), 443 and xiv.

he had endured to produce his map of Dublin in the same style as his well-received map of London. Rocque's reference to his London map is an example of how he used his extensive back catalogue of work to remind the council of the quality of his maps. It also implied that Dublin, too, could be considered as an important European capital along with London and Rome. The council, whether persuaded by Rocque's compliments or simply in acknowledgment of the quality of his work, decided to award the petitioner the sum of twenty guineas.[219]

In October 1777 the surveying partnership of Taylor and Skinner submitted to the Irish House of Commons a request for financial assistance to help them complete their road map of Ireland.[220] Despite their collection of £1,476. 6*s*. 0*d.* from their various private subscribers, they still required £1,455 10*s.* 6*d.* to pay for the total cost of the survey and publication expenses.[221] Referring to their work as being of 'a manner worthy the reception of a great and polite nation' they were successful in getting some, but not all, of the money requested. As a sign of their gratitude they dedicated their work to the Speaker of the Irish House of Parliament, the Right Honourable Edmond Sexton Pery.[222]

Private hire

Patronage served the surveyors' needs by supplying the gap left between subscriptions and civic authorities. The majority of surveys were supplied to meet the private market, whether landlords[223] or large bodies such as the church.[224] They were of such importance to surveyors that English cartographer Bradock Mead wrote:

> Indeed, without the Patronage of the rich and the great, it is hardly possible that the sciences should ever thrive much in any place.[225]

Records of surveyor's expenses in a private capacity are more common than in archives and newspaper articles as a pricing scale for others interested in hiring the

[219] J. T. Gilbert (ed.), *Ancient records*, x (Dublin, 1757), 252.
[220] *Commons Journals, Ireland*, ix (1777), 326, 331, 363.
[221] The survey itself cost £540.
[222] *Commons Journals, Ireland*, ix (1777), 326, 331, 363.
[223] Bernard Scalé, Lands belonging to Earl Clanbrasil, Dundalk, (1777), reproduce in Harold O' Sullivan, *Dundalk* (Irish Historic Towns Atlas, no. 16, Dublin, 2006), map 11.
[224] Francis Mathews, Map of lands in Templeogue (1783), reproduced in Raymond Refaussé and Mary Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850* (Dublin, 2000), map 32. John Roe, Map of the palace, Tallaght (1811), reproduced in ibid., map 37, p. 85.
[225] John Green, *Remarks in support of the new chart of North America in six sheets* (London, 1753), p. 3.

surveyor and as an advertisement for their competitive rates. Surveyors' charges usually followed one of two avenues: one was a charge by the number of days spent conducting the survey, the other charge related to the area of land being surveyed. Both approaches had been common place in Ireland since the sixteenth century when Arthur Robins wrote a short essay on the differences between surveys made in England and Ireland:

> … and where they have not this allowance of 10*s* by the day they have commonly 3*d* for every acre, if it be but to deliver up the bare content, and 4*d* for every acre if they make description thereof.[226]

During the Down Survey (1654-1656), William Petty charged £7. 3*s.* 4*d.* per 1,000 acres of profitable land and £3 per 1,000 acres of Crown, Church and unprofitable land.[227] If a survey happened to be far from Dublin, it was possible for surveyors to advertise their proposed route and offer to survey lands along this route as Jonathan Barker did in 1754 while making his way from Dublin to Cork via Waterford.[228] Generally speaking, the further the surveyor had to travel, the higher he could charge for his services. This was especially true for those held in as high regard such as Jonathan Barker. John Bannan, who was active in estate surveying in the early nineteenth century, was charging as high as several hundred pounds for a large estate, and as little as 6*d.* for a single field.[229] Some landlords who were, for various reasons, unwilling to pay high fees to have their entire estate surveyed, could simply ask for an existing survey of their lands to be updated. Lord Abercorn followed this process in 1803 when he was quoted £500 for a complete resurvey of his estate but instead asked for a revision of a previous survey conducted in the 1770s.[230]

Surveying prices, of course, had to move with the economic times and as a surveyor's reputation grew, very often so did his fee. Thomas Sherrard, for example, charged a shilling per acre in 1792 but by 1820 he was charging two guineas per day as a flat fee. His former partner, John Brownrigg, disagreed with Sherrard's high prices but did note that inflation had caused depreciation in currency since the time both Brownrigg

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[226] Robins the surveyor's bill, Robinson, Arthur (1587), S.P. 63/131/14; quoted in Andrews *Plantation acres*, p. 29.
[227] William Petty, *The history of the survey of Ireland*, ed. Thomas Aiskew Larcom (Dublin, 1851), p. 259.
[228] *Universal Advertiser*, 16 July 1754.
[229] John Bannan, Bills for surveying, 1810-17 (NLI, Rolleston Estate, MS 13794(6)).
[230] J. H. Gebbie, *An introduction to the Abercorn letters as relating to Ireland, 1736-1816* (Omagh, 1972), p. 250.

and Sherrard had worked together.[231] David McCool of Derry produced a map book for Lord Leitrim's lands at a rate of 6 1/2*d.* per day in 1803.[232] The Co. Kilkenny surveyor Patrick Mackey also noted the change of currency values when he wrote:

> Our daily subsistence is risen to thrice,
> Our instruments, and our apparel likewise;
> To be plain, for the future a shilling per acre,
> At the least should be paid to each lawful surveyor.[233]

In his book, *Plantation acres*, J. H. Andrews listed the various prices charged by surveyors from 1763 to 1795 by acres. Of the fourteen examples he gives, nine are below 5*d.* per acre, the rest above it with the highest being a Sherrard/Brownrigg survey conducted in Co. Galway in 1779 for 13*d.* per acre.[234]

In England, where surveying charges worked on a similar scheme as in Ireland, a surveyor could charge £182 10*s.* per year at 10*s.* per day in 1737 with his assistants making around £20 per year.[235] By 1764 assistant surveyors were making 7*s* per day and chainmen 6*d.* per day.[236] As regards charging surveys by the amount of land covered, a fee of 3*d.* per acre over 100 acres, 6*d.* per acre of enclosed land and 9*d* per acre of common land was frequent during the 1720s.[237] In the British North American colonies, a cost of 2*s.* 3*d.* to survey every 100 acres of cleared land was charged, 4*s.* 6*d.* for the equivalent acreage of uncleared land.[238]

The determination of how much, on average, an eighteenth-century Irish surveyor made in a year depended on how much work was available to him. The early nineteenth-century surveyor William Bald estimated that a surveyor could measure 50 to 150 acres depending on the day.[239] J. H. Andrews estimated that, considering the relatively little amount of detail that Irish surveyors were expected to collect in the field, a figure of 100 acres per day is not an unreasonable one. If, due to bad weather

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231 Andrews, *Plantation acres*, Appendix E, p. 443.
232 Evidence of David McCool, 1803 (NLI, Killadoon Papers, NLI Ms. 36,065 (5)).
233 *Leinster Journal*, 31 Jan. 1801.
234 Andrews, *Plantation acres*, Appendix E, p. 443.
235 A. H. W. Robinson, *Marine cartography in Britain* (Leicester, 1962), p. 77.
236 Willis Chipman, *The life and times of Major Samuel Holland, surveyor-general, 1764-1801* (Toronto, 1924), p. 23.
237 Steer (ed.), *Dictionary of land surveyors and local map makers of Great Britain and Ireland, 1530-1850*, ii, 40.
238 Bernard Romans, *A concise natural history of east and west Florida* (New York, 1775), p. 175.
239 *Report from select committee on survey and valuation of Ireland*, p. 59 [445], H. C. 1824, viii.79.

and office duties, a surveyor could reasonably be expected to spend every other day at fieldwork then an approximate yearly total of 15,000 acres could be covered comfortably. Based on Andrews's estimate for mid-eighteenth-century surveying pay rates, an annual income of £125 can be suggested.[240] It appears that a lack of centralised control in the industry meant that surveyors could charge what they wanted. The price was tempered only by the competitive prices of others.

Salaried employment

Apart from surveyor's private clients, there also existed the opportunity for salaried work to those with either the right connections or skills to retain regular employment with a civic body. Salaries varied from a regular monthly or yearly payment at a fixed rate, to irregular payments on a needs basis for an organisation such as the Wide Streets Commissioners who would hire one or two surveyors for their cartographic needs.

From its foundation in the 1750s the Wide Streets Commissioners provided regular and well-paid work to several Dublin surveyors.[241] The Wide Streets Commissioners (henceforth referred to as WSC) on average kept one full-time surveyor on staff but regularly used the services of additional surveyors, particularly during its first two decades of operations.[242] Surveying duties with the WSC consisted primarily of cadastral work – namely establishing property boundaries, assisting with valuations,[243] design of maps for the WSC's benefit[244] and facilitating with the eighteenth-century equivalent of compulsory purchase orders.[245] The range of WSC powers was generally confined within the present-day boundaries of the Royal and Grand canals.

Payments to the surveyors of the WSC were recorded in the commissioners' minute books, twenty-two of which cover the period from the mid 1750s until 1810. Written by hand by the commissioners clerk, the minute books carefully recorded a surveyor's daily tasks and payments issued. Thomas Sherrard, who was the WSC's

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[240] Andrews, *Plantation acres*, p. 240.
[241] 1 May 1758 (DCA, WSC/MINS/1, p. 3).
[242] WSC/MINS/1(1758) – WSC/MINS/2 (1779).
[243] 15 Mar. 1762 (DCA, WSC/MINS/1, p. 146).
[244] 14 Feb. 1806 (DCA, WSC/MINS/20, p. 17).
[245] 10 Oct. 1810 (DCA, WSC/MINS/22, p. 267).

surveyor/clerk from the 1780s onwards, was paid on a regular basis for survey work completed with his bills covering a series of months rather than being paid per project. Other surveyors simply presented their bills for the WSC's review and awaited payment. William Purefield, a measurer, was the WSC's second surveyor employed after the dismissal of George Semple in 1758[246] until the mid-1760s. For his work on establishing property boundaries and for designing plans for the creation of a new street in and around Dublin Castle, Purefield presented the WSC with a bill of £16 2*s.* 3*d.* in January 1762.[247] The WSC finances came from a coal duty and this was used to pay not only their surveyors, but also property owners affected by their work, grand juries and occasionally costs for map engraving such as the work conducted by Edward Fitzgerald who was awarded £12 4*s.* 4*d.* for his work on the commissioners' maps in 1802.[248]

The minutes of the WSC are useful for comparing the costs of different rates for surveying projects. At the beginning of 1785, Sherrard presented the commissioners with a bill of £107 10*s.* 8 1/2*d.* for maps and surveys that he had completed in the previous two years. Upon examination by the commissioners, Sherrard's bill was broken down into separate sets to be examined fully:

> Surveying rest houses in Thomas Street, Cut Purse Row and Francis Street: £5. 12*s.* 11*d*
> Surveying Dame Street, Georges Lane, College Green, Trinity Lane: £33. 1*s* 1*d*
> Work on New Street from Sackville Street to River: £5. 4*s.* 2*d.*
> Surveys from Drogheda Street to New Customs house and Glass House: £67. 12*s.* 2*d.*

The commissioners determined that Sherrard's bill was appropriate and that he should be awarded the sum.[249]

Sherrard's longterm work with the WSC benefited him not only by providing stable employment, but also the recognition of being a quasi-civil servant. As has been shown, Sherrard was also the owner of a private surveying firm. With his duties to the WSC keeping him busy for long stretches of time, by the 1790s Sherrard appeared to be receiving compensation payments in addition to his regular WSC work. Having to

[246] A full history of surveyors working with the WSC can be found in Chapter 4.
[247] 13 Jan. 1762 (DCA, WSC/MINS/1, p. 143).
[248] (DCA, WSC/MINS/18, p. 110).
[249] 14 Jan. 1785 (DCA, WSC/MINS/6, p. 74).

correspond with private citizens of Dublin whose property was being affected by the WSC's work in his role as WSC clerk, and his ongoing private/public surveying duties, Sherrard was awarded a large sum in addition to the surveying he had performed in 1791:

> Your committee having gone through the examination of the said several accounts, and vouchers, and having found during the progress of their examination the very great and actual labour and close attention required to be performed by the said Thomas Sherrard in directing and superintending all the lines and levels of the new streets and building in the city of Dublin, which the wisdom of the legislative have thought fit to commit to you case for the general improvement of the said city.
>
> We find that notwithstanding the difficulties arising from the nature of the said business, and the clashing interests of individuals which have appeared to us from the numerous applications to your board, the said works have been executed and brought to their state of perfection and we are happy to add to the public satisfaction under your orders, by the unremitting exertions of the said Thomas Sherrard for all of which labour and services he has made no charge whatever in his said accounts.
>
> We are therefore of opinion the said Thomas Sherrard ought to be allowed and paid the sum of £277 10*s.* for the same for one year ending 31 December 1791.[250]

Sherrard's compensation, or reimbursement, payments appear to be a form of regular salary from the WSC and he was still receiving it nine years later in 1800.[251] Sherrard was perhaps one of the few eighteenth-century surveyors who thrived financially. His 1837 will stated that his estate was worth £8571 12s 2d, including £3714 7*s*. 7 ½ *d*. in securities and £1456 15*s*. 5*d*. in other properties in Coolock, in addition to his Blessington Street home and horse and carriage.[252] Sherrard's assets were divided between his wife Mary and sons, William and David Henry, upon his death. In contrast, Sherrard's business partner Richard Brassington's net worth was estimated to have been £900 in 1837, including his home in Dominick Street, which was left to his wife Maria.[253]

Sherrard was not alone in his conflict between fulfilling his duties to the City and his work as a private surveyor. The office of Dublin city surveyor was created in 1679 to record the extents of city property out on lease by Dublin Corporation.[254] John Greene was the first city surveyor, and despite being replaced briefly during the civic Catholic

250 26 Oct. 1792 (DCA, WSC/MINS/11, p. 106).
251 23 Jan. 1800 (DCA, WSC/MINS/16, p. 40).
252 Last will and testament of Thomas Sherrard (NAI IWR. 1837/F286).
253 Last will and testament of Richard Brassington (NAI IWR. 1837/452).
254 10 Dec. 1668, J. T. Gilbert (ed.), *Ancient records*, iv (Dublin), 456.

resurgence during the reign of James II (1685-1690), Greene enjoyed a long career as city surveyor. Despite the regular income from this post, Greene found it difficult to balance his private and public work and on many occasions was 'often out of town when he is wanted'[255], likely surveying in a private capacity elsewhere in the country. Greene's continual absence from his official role led to the promotion of his assistant, Joseph Moland, as joint city surveyor in 1698.[256]

Over a century later, the holder of the same office, A.R. Neville, seemed to have the opposite of Greene's problems with civic cash flow. Neville was one of the more expensive surveyors to ever hold the post. Over the course of his nearly three-decade career as city surveyor (1801-1828), Neville charged the city over £2,000, with the largest payment of £817 18*s.* 6*d.* in April 1819. The city assembly became quite concerned with the amounts that Neville was charging and in 1808 it was recommended that he be given a flat fee annually so as to 'prevent the bringing forward of any bills from the city surveyor in the future'[257] such as his quite unreasonable charge of 10 guineas for examining maps at the town clerk's office.[258] While the recommendation for a flat fee was not taken up, the city assembly managed to restrict Neville's rampant charging by subtle methods such as making the tenants, rather than the city, pay for surveys of leased property.[259]

A flat fee was instigated for the role of surveyor of the Paving Board. Dublin's Paving Board was established in 1774 to improve the paving, flagging and street maintenance throughout the city and employed a land surveyor to supervise work, map areas requiring improvements and to pay contractors.[260] The position of surveyor to the Paving Board was advertised in June 1774 with the set payment rate of £100 per annum. [261] Three surveyors applied for the position, Thomas Owen, Thomas Mathews and William Cox,[262] with a ballot amongst the members of the Paving Board being

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[255] 20 Oct. 1690, J.T. Gilbert (ed.), *Ancient records*, v, 507.
[256] 24 Mar. 1706, J.T. Gilbert (ed.), *Ancient records*, vi, 349.
[257] 28 Apr. 1808, J.T. Gilbert (ed.), *Ancient records,* xvi, 87.
[258] 22 Apr. 1811, ibid., 253.
[259] Ibid.
[260] 7 June 1776 (DCA, PB/Mins/2, p. 138).
[261] 8 June 1774 (DCA, PB/Mins/1, p. 4).
[262] Mathews was the then City Surveyor and Cox was an accomplished estate surveyor. There is no known documentation relating to Owen.

used to decide the outcome. Owen was elected.[263] His payment was initially made on an irregular basis; however, by 1783 the board resolved that he would be paid each November[264] and that:

> The surveyor of this corporation shall not demand or accept any sum or sums of money, for measuring work done in the respective divisions, on pain of demission for his office.[265]

It is interesting to compare surveying income in contemporary France and England to Ireland. The top earner in eighteenth-century French surveying was the premier *géographie du roi* (geographer to the king) who received 1,200 livres a year with his assistant making approximately half of that, army surveyors earned 600 to 1,200 livres and the map compilers at the Dépôt de la Marine up to 600 livres.[266] Wages in England were similar to Ireland, with a surveyor making up to a guinea a day and an engraver, depending on his skills, earning from 30*s.* to £3 6*s.* per week.[267]

At least some military surveyors in Ireland could take advantage of regular salaries because aside from working in their private capacity as surveyors they were also entitled to collect their army pay. Governments at this time looking to combining the twin needs of maintaining a standing professional army as well as saving money during the sporadic outbreaks of the many eighteenth-century European wars, would reduce their officers to half pay when they were not on active service. This allowed army surveyors, such as Taylor, Skinner and Lieutenant General Charles Vallancey, who were active in Irish surveying, to operate in a private commercial capacity and supplement their half-pay income. In 1700 army half pay for a Captain stood at 3*s.* per day which would have applied to Taylor and Skinner during their surveying careers. Full army pay for infantry was 10*s.* per day by 1776, 16*s.* 6*d.* for a captain in the household infantry, £1 1*s.* 6*d.* per day for a cavalry captain, and up to £2 1*s.* per day for a colonel in the Horseguards.[268] The combination of the two sources of income could have given army surveyors the opportunity of undercutting their commercial surveying rivals in price schemes and still come away with a profit; however, there is no direct written evidence of this occurring during the eighteenth century.

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263 See chapter 4 for more on Owen's employment with Dublin's Paving Board.
264 25 Apr. 1783 (DCA, PB/Mins/10, p. 264).
265 27 June 1783 (DCA, PB/Mins/11, p. 6).
266 Sponberg Pedley, *Commerce of cartography*, p. 162.
267 R. Campbell, *The London tradesman* (London, 1774), pp 114 275.
268 Sponberg Pedley, *Commerce of cartography*, Appendix 4.

Miscellaneous expenses

Aside from staff and equipment, surveyors had to incur numerous other expenses in the course of their work. As far back as 1587 Arthur Robins listed some of the 'extraordinary charges' that a surveyor can run into:

> [Surveyors] ... have commonly the allowance of 10*s* by the day besides horsemeat and man's meat, travelling charges and all other charges whatsoever, and the servants of the said noblemen or gentlemen with the tenants of their several lordships or manors to attend upon them for measuring. [Regards hiring assistance] I shall be constrained to hire and maintain at great charges for that purposes, unless they be such as will do nothing else but misinform and seek to interrupt and hinder the service ….

As for Robins's opinion on what locals charged for food and board he commented:

> …the people for the most part…[are] also extreme chargeable in respect of carriages of tents, bedding and other furniture, and for victuals and all manner of provisions for the field.[269]

Surveying work is primarily mobile - the surveyor had to be able to travel to the land that required surveying and back to his office. Coaches were one possible means of travelling long distances to other towns or at speed across Dublin:

> A coach for a set down as far as public lights are erected, 8*d*. For a day, or twelve hours, in and about the City, or within four miles of the same, 8*s*.: and by the hour, 1*s*. and 3*d*. for the first hour and 8*d*. for every hour afterwards.[270]

To get to the survey site, Callan suggest that a surveyor charge 2*d*. per mile from their office,[271] probably with the use of his own horses. The surveyor might also need to hire pack mules to carry equipment and provisions if they were working in difficult terrain. Whilst no Irish example of a bill like this survives, the contemporary Cassini survey of France required two mules at a cost of 5 livres a day each and a further 26 livres per day was spent on feeding the two mules in addition to the survey's six horses.[272]

Adequate and secure storage of maps was an additional cost. In May 1797 Thomas Sherrard faced this situation with the completion of his map of Dublin, produced in four parts. Sherrard charged the WSC a total of £800 for this major piece of urban

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[269] Arthur Robins the surveyor's bill; quoted in Andrews, *Plantation acres*, p. 240.
[270] John Watson, *The gentleman and citizen's almanac* (Dublin, 1761), p. 30.
[271] Andrews, *Plantation acres*, p.238.
[272] François De Dainville, *La levée d'une carte en Langudoc à l'entour* (Paris, 1730), p. 364.

surveying, dubbed by the commission as 'The Great Map'.[273] The following month Sherrard presented a bill before the WSC for six mahogany cases, rolls and ledgers for his map which was paid by the commissioners.[274]

As a final point on surveyor's ideas on expenses, Bernard Scalé demonstrated that surveyors required a good business sense. His note below highlights that even small expenses were attended to and if possible the client was made pay rather than the surveyor:

> No letters will be attended to, unless free or post paid.[275]

Obtaining payment was key to the practice of surveying in eighteenth-century Dublin, but so was obtaining work from which such finances could be obtained. The following section will examine the methods which surveyors employed to advertise their professional skills and attain success.

[273] (WSC/MINS/14.), p. 141.
[274] (WSC/MINS/14.), p. 160.
[275] Bernard Scalé, *Tables for the easy valuing of estates* (Dublin, 1771), appendix.

1.6 Surveyors and the media

A surveyor could use the many local and national media available to him through the eighteenth century for numerous purposes. These included informing the general public of his capabilities,[276] his opinions, or muckraking, on his fellow surveyor's work,[277] new published works,[278] commenting on ongoing scientific discussions[279] and to announce new projects that might gain public interest.[280] This section will examine the use of the media by eighteenth-century Dublin surveyors.

The first regular newspaper appeared in Dublin in 1659. Running under the title of *An account of the chief occurrences of Ireland together with some particulars from England*, it was printed by William Balden and was available in weekly editions for only a few years. *Mercurius Hibernicus*, or the *Irish intelligencer* followed a few years later, but was equally short lived.[281] By the dawn of the eighteenth century a new generation of regular newspapers had appeared such as *Pue's Occurrences* (1703), the *Dublin Gazette* (1706), *Faulkner's Dublin Journal* (1725) and the *Freeman's Journal* (1763). *Pue's Occurrences* failed to see out the eighteenth century but the majority of the big newspaper publications lasted for a long time, some even surviving to the twentieth century.[282] The content and layout of eighteenth-century newspapers varied widely. Some kept European or British current affairs on the front page[283] whilst others started with opinion pieces, which were followed by page after page of adverts.[284]

Surveyors' presences in period newspapers, whilst rare, allow for a limited analysis of their advertising techniques. A Mr. J. Hoctor of Waterford, who had just returned from several years working in England, placed an advertisement in the *Leinster Journal* in September 1773. Describing himself as a 'land-surveyor and professor of mathematics' he assured potential employers that:

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276 Scalé, *Tables for the easy valuing of estates*, advertisement at rear of book.
277 Peter Callan, *Dublin Gazette*, 27 Sept. 1760.
278 Robert Gibson, *Dublin Journal*, 21 July 1752.
279 John Hylin, *Freeman's Journal*, 11 Oct. 1787.
280 John Rocque, *Dublin Journal*, 14 Sept. 1754.
281 Maurice Craig, *Dublin, 1660-1860: the shaping of a city* (Dublin, 2006), p. 108.
282 Ibid.
283 *Leinster Journal*.
284 *Freeman's Journal*.

> … he intends to practice land surveying only; and for that reason has disengaged himself from every other employment, being fully determined to exert himself with all imaginable care, faithfulness, justice and accuracy in every particular said branch; which he hopes will recommend him to the notice of all who please to employ him.[285]

Hoctor's notice that he intended to focus soley on surveying reflect the practice of part-time surveyors operating in the area trying to divide their time between their separate careers, or to prevent the more well known surveyors of the Dublin, who often worked for the landed gentry, filling a potential market gap. He finished his advert with a declaration that he was willing to present his qualifications to who ever requested them.

The issue of surveying qualifications was often dragged into media circles. Peter Callan and John Bell together submitted a total of eighteen articles to the *Dublin Journal*, *Dublin Gazette* and the *Universal Advertiser* between December 1753 and September 1760, both trying to publicly expose what they referred to as each other's poor qualifications in the field of surveying, following a series of contested surveys. The literary altercation between the two men was at times threatening and would be considered highly libellous in a modern setting. Callan referred to Bell and his nephew, also named John Bell, as 'abandoned wretches' and stated that he had observed them 'attempting several evasive tricks'[286] when the Bells and Callan met to compare a disputed survey. Bell at one point proclaimed that he 'would horse-whip Callan for daring to make use of his name [i.e. Bell] to so villainous a thing'.[287] Callan responded to the Bells' attacks and their 'intolerable evasions and prevarications' in their surveys by dismissing them as 'frantic expressions of miserable objects of Bedlam'.[288] The intensity of their argument grew from this point onwards with Bell and Callan repeatedly challenging each other to appear at the lands in question to compare surveys, yet the challenged party seems rarely to have appeared.[289] Whether their various absences were intentional or not is unclear, yet these challenges were in the same aggressive and quasi-abusive manner that characterised their dispute, with Bell writing in July 1759:

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285 *Leinster Journal*, 15 Sept. 1773.
286 *Universal Advertiser*, 24 Oct. 1758.
287 Ibid., 7 Apr. 1759.
288 Ibid., 19 May 1759.
289 Ibid., 19 Dec. 1758, 7 Apr. 1759, 22 May 1759, 30 Oct. 1759.

> Peter Callan of Drogheda, who styles yourself land surveyor, notwithstanding all your false and malicious advertisements, and mighty bravadoes, published from time to time to injure my character, I give you this public notice, that, upon the 27th of August next, at eleven o'clock, I will meet you on the lands of Gravelstown, to defend my survey against all splenetic pretenders to surveying whomsoever, and will make it appear, upon a fair survey (if Mr O'Brien gives leave to survey that land) that Bryan Connell's part does not contain 136 acres, as you have asserted. Dated at Cootehill, July 17, 1759, John Bell[290]

Characteristically their arguments did not conclude in a positive manner. In his final entry to the *Dublin Gazette* in 1760, Bell accused Callan of using improper and shoddy equipment and that he was unable to conduct even the smallest survey adequately.[291] Callan went one step further, calling Bell's mental health into question as he had previously done through his reference to Bedlam, a notorious London mental asylum:

> Whereas we cannot expect propriety nor connection in the advertisements of a man who is inflicted with a compound of mental disorders, as Mr. John Bell of Cootehill in his advertisement in the *Dublin Gazette* of the 20th instant, publicly declares himself to be; for whom I cannot think of a better remedy that the use of St. Patrick's Hospital …[292]

Such disputes amongst surveyors could also mean employment for those willing to step into the foray and mediate between the rival factions. A Mr. Donovan of Cork city, professor of mathematics and a land surveyor, advertised his willingness and capabilities in settling disputes between surveyors. An advert which he placed in the *Cork Gazette* in 1796 is an excellent example of self promotion in eighteenth-century Irish surveying:

> Mr. Donovan … will engage to revise and survey of any quantity of land exceeding forty acres, and require no payment if he detects no error. He determines controversies between land surveyors with such precision as will admit of no future debate. He has advanced the science of land surveying to a degree of perfection, of which it has been hitherto thought incapable. For an account of some important inventions &c. of his for which he intends to take out patents, see his hand bill, to be had gratis, at Connor's Circulating Library, Castle Street, where commands directed to him, will be duly attended to.[293]

[290] *Dublin Journal*, 21 July 1759.
[291] *Dublin Gazette*, 20 Sept. 1760.
[292] Ibid., 27 Sept. 1760.
[293] *Cork Gazette*, 6 Apr. 1796.

Roger Kendrick versus John Rocque

Another clash of interests fought out in the newspapers at this time, was that of Dublin city surveyor Roger Kendrick and the entrepreneur John Rocque over their respective proposals to map Dublin. This argument was, however, conducted in a more subdued, polite and indirect manner than the Bell/Callan dispute.

Roger Kendrick was the verger of St. Patrick's Cathedral[294] and held the office of Dublin city surveyor from 1735 to 1764 following the death of his predecessor James Ramsey.[295] On 31 August 1754 Kendrick placed an advertisement in the *Dublin Journal* stating the aims of his proposed city map and lambasting the previous dominant map of the city, the 1728 Charles Brooking map, which he described as being full of gross-errors.[296] This was a clear attempt to show that Brooking's map was not only decades out of date, which it was, but that it was incorrect and that Kendrick's new map would not fall foul of the errors of the past. However, aside from changing the scale (to 20 Irish perches to an inch), Kendrick's description of the area and decorations that were to be contained in his map sound remarkably like Brooking's. Kendrick listed the boundaries of his map as:

> … to take in the Royal Hospital in the west, and Ringsend in the east; St. George's Church or Summerhill in the North and St. Stephen's Green in the south.[297]

Each parish boundary was to be included, just as in Brooking's map, and Kendrick proposed to incorporate perspective drawings of the most important buildings in the city - again exactly like Brooking's map. Using his position as city surveyor to his advantage by having access to the latest maps of the city estates and lands, he stated that he already had a considerable part of the work completed and was seeking further subscriptions at a guinea a piece.[298]

The overall impression generated from Kendrick's initial advertisement is a continuation of Irish surveying traditions. His style and approach to design appear to recycle what has already come before him, showing no real ingenuity or uniqueness. This, coupled with his aggressive reference to Brooking's map, indicates that he was

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[294] Roger Kendrick, *Map of the liberty of Saint Patrick's* (1741).
[295] 18 Jul. 1735, J. T. Gilbert (ed.), *Ancient records*, viii, 188.
[296] The accuracies of Brooking's map of Dublin (1728) are discussed in Appendix E.
[297] *Dublin Journal*, 31 Aug. 1754.
[298] Ibid.

confident of his projects success. His inclusion of words such as 'truth and exactness' were relatively common in surveyor's advertisements during the eighteenth century and could be considered a form of personal reference, even if they come from the person placing the advertisement. An interesting omission is that Kendrick failed to mention his civic title as city surveyor in his initial advertisement.

John Rocque, on the other hand, made sure that the public knew who he was and in which cartographic circles he moved. Rocque was of French Huguenot descent,[299] and became one of the most influential individuals in the Irish cartographic scene with his move to Dublin from London in 1754 and his foundation of the 'French School' of surveyors.[300] Referring to himself as 'Chorographer to his Highness the Prince of Wales', initial advertisement stated that his employment in Dublin was at the request of the nobility and gentry of Ireland, who were enthusiastic for him to conduct a survey and plot a map of Dublin in the same style as Rocque's well-known maps of London and Rome.

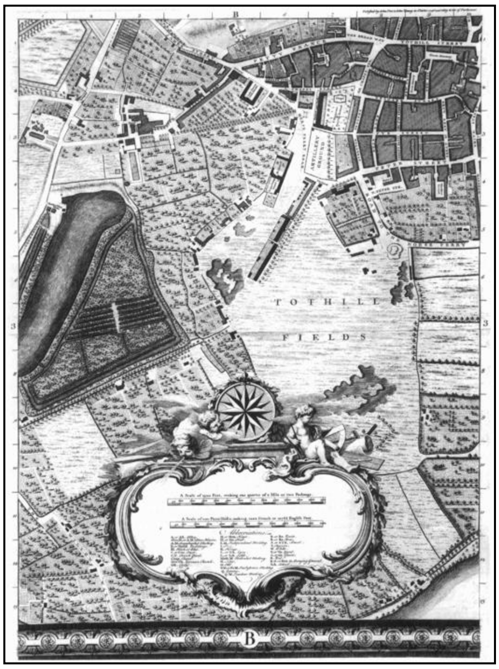

Figure 1.5: Section of John Rocque's map of London (London, 1747).

Rocque's association with the powers-that-be in the country was as good a reference as any eighteenth-century surveyor could hope to get. Rocque stated that the boundaries of his map were to include the environs of the city (a good source for maps sales to landed gentry), the harbour (opening a market for traders, merchant men and mariners) in addition to the surveying and charting of soundings from Dublin bay which in Rocque's own words would 'render it useful as well as ornate'.[301] Rocque seems to have ignored the Irish tradition of dismissing the competition or previous maps of the same area, preferring to focus on describing his own map's qualities in simple and relevant

[299] Varley, 'John Rocque: engraver, surveyor, cartographer and map-seller', p. 83.
[300] See section 1.3 for the French School and chapter 3 for more on Rocque's life.
[301] *Dublin Journal*, 14 Sept. 1754.

form.

In the following month both Kendrick and Rocque appeared again in the *Dublin Journal*, although for very different reasons. In the first week of September 1754 Rocque and two assistants were measuring a base line in the Irishtown area which at the time was covered by mudflats and marsh ground. Being unfamiliar with the tidal conditions in the area, the survey crew got into trouble and were caught in a rapidly-rising tide. In proceeding back to shore via the shortest possible route Rocque's two assistants found themselves in:

> … a deep pool; and had it not been for the timely assistance of some people gathering [on] shore, in all probability they [would] have been drowned.[302]

In submitting this article to the *Dublin Journal* Rocque was following a dictum that is still familiar to public relations agents to this day – all publicity is good publicity. Rocque was demonstrating to his potential customers that he and his assistants were willing to go to any length to get the most accurate measurements for his map of the city, even if that meant putting their lives at risk.

In the same issue of the *Dublin Journal,* Kendrick also appeared but with very different news than Rocque's. After initially trying to set out his city map on two sheets of imperial paper at 20 perches to an inch, Kendrick found that the paper was insufficient to show the full bounds of his project. He informed the public that his map would now be rescaled and his final product would appear on four sheets of imperial paper, minus the previously advertised profile drawing of the most important buildings in Dublin. As compensation to his customers, Kendrick reduced the cost of subscription to twelve English shillings even though his paper costs would have doubled with the map now being produced on four sheets instead of two.[303]

At the end of his advert, Kendrick thanked the Dublin surveying fraternity for their support in his major cartographic project;

> N.B. He [Kendrick] has been offered the friendly assistance of several surveyors in order to expediate his work, for which he takes this opportunity to return his earthly thanks; for it might then not be deemed or looked upon as his own survey, and he was determined from the beginning to do the whole himself, if possible, he was on that

[302] *Dublin Journal*, 14 Sept. 1754.
[303] Ibid.

> account obliged to decline their friendly offers, and proposed to perform the whole himself. He therefore hopes that his great care will not turn out to his disadvantage, as he may thereby be behind Mr. Rocque in point of time.[304]

There is evidence as to whom Kendrick was referring in his thankful message to Dublin's surveyors. Kendrick's associates in the wider Irish surveying fraternity would have seen the Rocque vs. Kendrick battle as one in which they had a vested interest. George Gibson pointed out at that time that he, Gibson, was 'a citizen, son of a native'[305] possibly to stir up some patriotic loyalty in Irish surveyors. Writing in 1756, Rocque's own opinion of the Irish people lacked the prejudicial rhetoric of his Irish contemporaries:

> The Irish keep up the most amiable society; are frank, polite, affable, make it their pleasure to live much with each other, and their honour to treat strangers with politeness and civility….From my part, I have had the pleasure of being in Dublin above two years and have had all that time to be acquainted with the genius and temper of the people, and in the picture I have drawn of them I have only expressed the sentiments of my heart and paid to virtue the tribute that is her due.[306]

Despite Rocque's threat to the status quo of Dublin surveying, Kendrick's own admission of mistakes did not assist his reputation. It must not have improved customer confidence to be informed that Kendrick had not initially planned his project well enough to establish what sort of scale could fit on two sheets of imperial paper before placing press advertisements about his work. His removal of the ornamental building facades would scarcely have assured the public that his map 'will make both pleasing and in many respects very useful to the city' compared to Rocque's death-defying surveying practices.

Rocque, however, made similar mistakes. On 2 November 1754 Rocque published an announcement in the *Dublin Journal* stating that his original intention of showing Dublin at the same scale that he had used for London and Rome could not be produced in a one-sheet format as he had originally envisaged. Instead, the map would be on two sheets but he assured his existing subscribers that their costs would not be increased. New subscribers would now, however, have to pay twenty-five shillings initially, while the final map would cost one-and-a-half guineas. Possibly sensing the

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[304] *Dublin Journal*, 14 Sept. 1754.
[305] Ibid., 2 Nov. 1754.
[306] John Rocque, *An exact survey of the city and suburbs of Dublin* (Dublin, 1756), quoted in B. P. Bowen, 'John Rocque's maps of Dublin' in *Dublin Historical Record*, ix (Dec. 1947-Feb. 1948), pp 117-27.

potential harm that could be done to his business by the xenophobic attitudes of his competition and the local press, Rocque made sure to state that he used Irish labour in the survey and that he intended to employ an Irish engraver for his final map.[307]

Kendrick's and Rocque's admission of errors are very similar. Both stated the mistake made, both alerted the public to price changes and both assured their customers that they would get the product out as soon as possible. However, Rocque went a further step with his damage-limitation scheme. To avoid the public becoming disenchanted with his work or believing that they had been deceived, Rocque invited anyone who wanted to see what progress he had made to call to;

> … see the original drawing in India Inks, (which are in great forwardness) and done in the same manner as they will be when engraved, he being willing to introduce the same method of engraving Topographical Maps in to this Kingdom which he formerly brought into England.[308]

This claim of a new and unique method of engraving was another one of Rocque's marketing ploys that Kendrick could not match. Rocque's style was new to Ireland. Although those who had invited him to come and map Dublin would have already been familiar with it, it may have been relatively unknown to the general public.[309] It was a break from the norm, something suitable for the upper classes of the major metropolitan centres of Rome and London. Rocque knew he had something different to offer, and he was more than willing to state this fact.

Rocque's final map of *Dublin and its environs* (Dublin, 1756) filled four sheets covering an area of eleven square miles and stretched from Howth Head to Bullock Harbour[310] while his *Dublin* (Dublin, 1756) map covered the city itself. Rocque's maps marked a major turning point in eighteenth-century cartographic style and engraving techniques in Ireland and his works were met by approval by the city authorities:

> Last week Mr. John Rocque presented to their Excellencies the Lords Justices his plan of the city of Dublin in four sheets, at which time there were present several of the nobility and gentry who approved of the plans as it was allowed to be the best of that kind ever published.[311]

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307 *Dublin Journal*, 2 Nov. 1754.
308 Ibid.
309 Rocque's style and his 1754 map of Dublin is discussed in greater detail in chapter 3.
310 Located in modern-day Dalkey – O.S. 6th edition Street Atlas reference: p. 60 F1.
311 *Dublin Journal*, 21 Sept. 1756.

Kendrick's map never made it onto the market, and it is unknown whether a final version was ever completed. Rocque's marketing and clever use of the press cannot be seen as the sole source of his success in his cartographic battle with Kendrick, but it shows his flair for the dramatic and highlights the differences that existed between the European cartographic business mindset and that of the relative cartographic backwater of Ireland in the mid-eighteenth century.

Aside from using the local media to promote work that had yet to take place, surveyors and cartographers advertised their available products, such as maps, atlases or treatises, to the general public. Robert Gibson first advertised his well-known *Treatise of practical surveying* in the *Dublin Journal* in 1752, which demonstrated 'everything that is useful and curious in that art.'[312] Gibson focused his advertisements not only on its coverage of the most practical elements of surveying in Ireland, but also on four new techniques he had developed to measure the areas of right lined figures and his observations on how to take measurements and tracings from the Down survey. His target audience, in Gibson's own words, were 'persons who have any property in land, to lawyers in controverter surveys and to *practical surveyors'*[313]and he advised his subscribers that their pre-ordered copies were ready for collection on the presentation of a receipt. Like Kendrick would a few years later, Gibson used George Faulkner as a printer and salesman of his treatise. Gibson's book went on to become a success and was still in print as late as 1839.[314] Research conducted by J. H. Andrews – between the years 1724 and 1810 a total of twenty separate surveying treatises, pamphlets and manuals were advertised in Dublin newspapers or in newspapers that were printed elsewhere in Ireland but were available in Dublin.[315] Many of these were simply advertisements of work already on the market; some are for future works that are looking for subscriptions whilst the remainder were advertisements of second and third editions.

A common advertising style was to compare the author's new work with those already on the market. For example, *A treatise on surveying*, written by Nicolas Walsh and

[312] Ibid., 21 July 1752.
[313] Ibid.
[314] Robert Gibson, *The theory and practice of surveying* (Harvard, 1839).
[315] Andrews, *Plantation acres*, appendix D.

assisted by Thomas Sherrard, was advertised in the *Dublin Evening Post* in April 1787 in which he directly quoted magnetic variation calculations by Thomas Burgh (former surveyor-general in the early seventeenth century) and Robert Gibson.[316] Thomas Harding advertised his *Practical surveyor's best companion* in the *Dublin Journal*[317] stating that he would compare his own methods of calculating latitude with those of Burgh, Gibson and Benjamin Noble.[318] This association with well known, already published treatise and their authors not only encouraged discussion of methods within the industry, but also from a marketing viewpoint, directly connected a new and untested piece of literature with successful surveying manuals, thus encouraging sales.

Non-surveyors involved with the selling of prints and maps also advertised in newspapers. William Allen owned a printing and bookselling firm at 32 Dame Street during the late eighteenth century.[319] He was widely known for his variety of maps and prints and was often involved with the advertising of Dublin surveyors' new works. Indeed, by the 1790s, with a mixture of marketing savvy and patriotic zeal, it was advertised in the *Dublin Chronicle* that being:

> … well known amongst the curious that it has been Allen's great object these many years past to encourage the rising geniuses of Ireland to rival the works of other kingdoms which under the auspices of a generous public, he has in a great measure accomplished, and hope for this continued support of the truly patriotic.[320]

Aside from the home grown, patriotic murmurings in the Irish press, there existed a healthy market for the foreign map in Dublin. John Rocque advertised in the *Dublin Journal* that his maps of Rome, London and the English and French Dominions in North America were available to be viewed from his office on Bachelors Walk.[321] Emanuel Bowen, in the same issue of the *Dublin Journal* as Rocque's advertisement, presented his six-map atlas consisting of a world map and continental maps for Europe, North and South America, Asia and Africa for 13*d.* plain or 1*s.* 7*d.* coloured. Drawing on his title of 'Geographer to His Majesty', Bowen used his royal connections as a sign of the quality of his work and a marketing ploy, stating that the

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316 *Dublin Evening Post*, 14 Apr. 1787.
317 *Dublin Journal*, 31 Aug. 1784.
318 Author of *Geodaesia Hibernica* (Dublin, 1768).
319 M. Pollard, *The Dublin book trade, 1550-1800* (London, 2000), p. 6.
320 *Dublin Chronicle*, 29 Mar. 1791.
321 *Dublin Journal*, 13 Sept. 1755.

maps in his atlas had originally been drawn up for the Prince of Wales and his brother Prince Edward.[322]

Occasionally there were times when surveyors and their employers wanted to stay out of the headlines. In September 1798 the WSC's rising costs drew the wrath of Lord Carhampton in the Irish parliament. In a long and damning speech, Carhampton accused the WSC of:

> … forming one of the most mischievous volumes extant in any country, habitually improvident of their own private expenses, it was not very surprising if men became lavish of the public money, when trusted to their expenditure. Thousands upon thousands of the publics money had already been squandered by this board, not for the purpose of opening narrow and inconvenient streets obnoxious to the city of Dublin, but with erections of new streets and square for the accommodation of the rich.[323]

This attack on the WSC was as long as it was scathing and had the potential to cause a very serious public backlash against the WSC's work. However, fortunately for the commissioners the events in the Irish parliament failed to make it to the front page of the *Leinster Journal* that week as Nelson's victory at the 'Battle of the Nile' (1798) was the main news story and more than likely the talk of the town.

Wilson's Dublin directory

Advertising and marketing was not restricted to newspapers. Cartographic works and surveyors often made use of other forms of print, namely books and street directories. The 1799 edition of Wilson's street directory contained two separate advertisements for two maps – one of Dublin and the other of Ireland – each of which is a fine example of a clear and strong marketing campaign by William Wilson.

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[322] Ibid.
[323] *Leinster Journal*, 22 Sept. 1798.

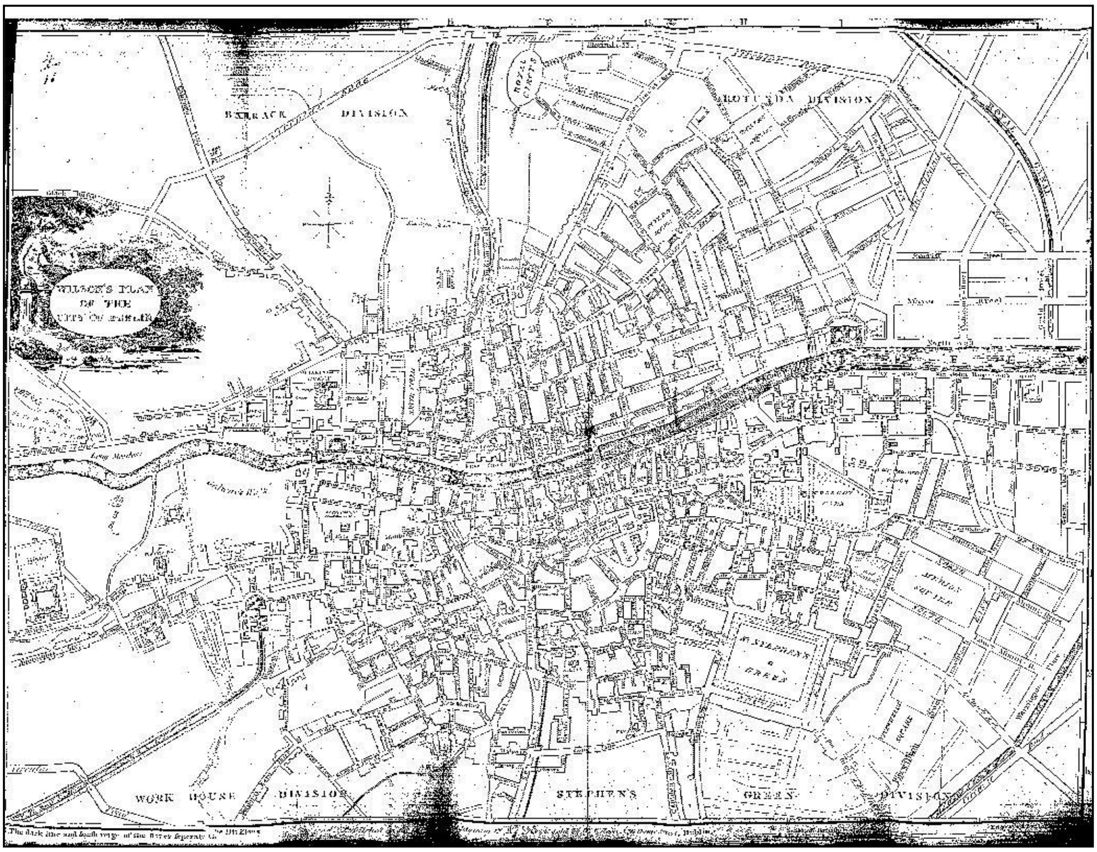

Figure 1.6: Example of city map accompanying street directory. *Dublin, Wilson's Dublin directory* (Dublin, 1795).

William Wilson, publisher of Wilson's Dublin directory,[324] had two separate maps of Dublin city compiled on his behalf. The first, a series of maps of the city for the back page of his street directory, was updated at regular intervals, the other was a more ornate, one-off, larger and coloured version sold separately at the price of 5*s.* 5*d.*[325] For the series maps, Wilson's logic may have been that if he could supply a cheaper, smaller and easy to use map of the city at more regular intervals than those compiled from a complete survey of the city (e.g. by Brooking (1728) or Rocque (1754)), he could increase the sales of his street directory. Indeed maps of the city were found at the back of most of Wilson's directories throughout the eighteenth century with updates being made every few years to keep up with the development and growth of the city.[326] An advert in the 1799 edition took pride that the Wilson map was the only map of the city showing the Royal and Grand Canals as well as James Gandon's new Customs House on the quays. The size of Wilson's series maps also made them reasonably unusual from a cartographic medium. While being nowhere near as well

[324] Pollard, *The Dublin book trade, 1550-1800*, p. 629.
[325] *Wilson's Dublin directory* (Dublin, 1799).
[326] 1762, 1775, 1795, 1810.

engraved or designed as Rocque's Dublin map, Wilson's were smaller in size than a modern A4 page thus making them much more attractive and easy to use for everyday purposes. By contrast Rocque's Dublin map was more of a prestige piece, and at four A1 pages was never intended to be carried around the city.[327]

Phrases like 'an exact map',[328] 'based on the actual survey'[329] and 'truth and exactness'[330] litter the cartouches and advertisements of eighteenth-century cartography. Given the time needed for map revision, a publisher who could find a quick and easy way to get the latest and current version of the city into print would certainly be able to exploit a gap in the market. Wilson's *Modern plan of the city and environs of Dublin* (Dublin, 1799) was compiled from other maps, rather than surveyed in the field. This cheap and time-saving method of map production allowed Wilson to show the state of the city following its rapid growth and development through the 1780s and 1790s:

> … the editor found it impossible to convey a correct and statistical representation of the city in its present enlarged and improved state, so as to bind up with that work, has therefore with no small labour and very considerable expense, completed the above elegant plan, which is now offered to the public at little more than half its value, in order to accommodate merchants and others, who may wish to frame the same for their respective counting houses.[331]

Claiming to be willing to take a financial loss, not only for the benefit of the customer, but also for the good of the city, was an interesting marketing ploy. Perhaps, because it was aimed at merchants, Wilson was hoping to improve their participation in his street directory, or possibly he hoped that if these merchants framed his map, others, with whom the merchants were doing business, would see it and buy a copy for themselves. Either way, Wilson had found a gap in the cartographic market and cleverly exploited it.

In the same 1799 issue of his street directory, Wilson was able to capitalize on the country's political instability following the 1798 Rebellion for marketing purposes. Wilson's *Modern pocket travelling maps of the roads of Ireland* (Dublin, 1799),

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[327] A review of the cartographic quality of the Wilson's Dublin directory maps can be found in Appendix E.
[328] William Cox, Littlefolkstown, 1767 (NLI, Palmer papers, MS. 21. F. 141(7)).
[329] Charles Brooking, *Dublin* (London, 1728).
[330] Advert by Roger Kendrick, *Dublin Journal*, 31 Aug. 1754.
[331] *Wilson's Dublin directory* (Dublin, 1799).

produced under the patronage of Earl Camden was, as Wilson described, 'elegantly engraved', 'ornamented' and 'produced to the highest degree of superior correctness and beauty'. Given that Ireland had temporarily come to the forefront in British politics and European affairs, there now existed a potential new customer base. In his advert for the map, Wilson wrote:

> At a period like the present, when the affairs of Ireland are so interesting to everyman, and the subject of general observation throughout Europe, it is presumed that the above authentic map of the Kingdom ... the author can with truth assert that it is the only [map] which gives a prefect representation of all the Post Towns in Ireland.[332]

Again, as with Rocque and his near disaster at Ringsend, Wilson could see that all publicity is good publicity.

Surveyor's own publications

Occasionally surveyors went one step beyond Wilson and used their own surveying books to advertise their surveying skills. Benjamin Noble referred to his own skills and ability 'to survey land, as usual, for any gentleman &c. who is pleased to employ him'[333] in an advert placed in his book *Geodaesia Hibernica* (Dublin, 1768) and Peter Callan declared himself as a 'student and practitioner in the art of surveying'[334] in his *Dissertation on the practice of land surveying in Ireland* (Drogheda, 1758). In *Tables for the easy valuing of estates* (Dublin, 1771), Bernard Scalé included a two-page advertisement for anyone who might have wished to hire him for his surveying and property valuation skills. Directing his advert at the gentry and landed nobles, particularly absentees living in England, Scalé claimed that his skills as a surveyor were so great that his client could in one view see:

> … the topographical appearance of the whole; the quantity, quality and present value of each farm, with the exact account of the timber on the whole estate; by which return, the nobleman or gentleman becomes perfectly acquainted with the circumstances of his estate, the same as if resident thereon.[335]

His wide range of skills included:

> Old surveys copied and transferred into books in a very elegant and complete manner, for perpetuity; modern surveys examined, maps drawn for leases; Demesnes and

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[332] Ibid.
[333] Benjamin Noble, *Geodaesia Hibernica* (Dublin, 1768), advert in full at end of book.
[334] Callan, *Dissertation on the practice of land surveying in Ireland and an essay towards a general*, p. i.
[335] Scalé, *Tables for the easy valuing of estates*, advert in full at end of book.

> improvements surveyed and drawn with care and elegance; Drawings and books of many thousand acres of different improvements may be seen.[336]

Aside from being an accomplished surveyor, Scalé also was able to partake in property valuations. In the same advert he offered his skills to those who wanted to sell, purchase or mortgage lands or houses, offering to work:

> ... with the greatest probity and punctuality and also with the utmost secrecy if required.

It seems that surveyor/client confidentiality was a service worthy of advertisement.

Scalé was not above self praise, either about his work or his own skills. His 1776 *Hibernian atlas* contained the following detailed and rather grand self-endorsement:

> In an age of dissipation and pleasure, when the instructive faculties are loosened by inattention, and the minds of the people in a great measure too much attached to trifling novelties, nothing but a work of extraordinary merit can reclaim the attention of the public to a subject of real utility, wherein novelty is blended with instruction, which at the same time amuses the imagination by mingling entertainment with genius. One stride towards the accomplishment of this great design is a judicious choice of proper subject.
>
> Amongst the first and most necessary of liberal arts is Geography; by it we may form a better idea of any country than it is possible for us to conceive without its assistance, but how strange is it to reflect that no man has ever exhibited an actual survey of this ancient and of late cultivated fertile kingdom; but when it is considered how few [of] these are capable of the important undertaking, the wonder ceases, and had not the present design met with more than common encouragement, joined with the extraordinary assistance of valuable materials and the author's constant residence and extensive practise for many years in every part of the kingdom, it never could have made its present progress. [337]

Marketing and self-advertising were central to the advancement of a land surveyor's career. Its execution often distinguished between those surveyors who were at the head of their profession, and those who were not.

[336] Ibid.
[337] Scalé, *An Hibernian atlas*, preface.

1.7 Summary

As has been demonstrated, surveying in the eighteenth century was not limited only to those who defined themselves as simply surveyors. The industry had loosely-defined boundaries through which many individuals, both professional and amateur, could pass. The lack of centralisation and organisation within the eighteenth-century surveying community in Ireland added to the lack of clarity for the title 'land surveyor'. Given the wide availability of surveying treatises, a basic understanding of geometry and mathematics, and appropriate equipment any individual could in theory practise land surveying without official sanction or formal qualification. Whilst attempts were made to enforce a form of regulation upon the industry,[338] the world of eighteenth-century surveying can best be seen as a loosely-formed group of individuals with a central tight-knit core of professionals.

The fluidity of the surveying industry in Dublin, and of Ireland as a whole assisted those who wished to enter it at various points of their careers. For the apprentice, obtaining a skilled master, a formal education or being related to a professional surveyor were the most common methods of becoming a land surveyor. The lack of official organisation within the industry additionally enabled foreign surveyors such as John Rocque to enter and leave the Irish surveying scene with little or no resistance. This lack of regulation also allowed amateurs who were self-educated in surveying to enter into the profession. However, such amateurs, as demonstrated by Peter Callan's categorisation of surveyors, could often suffer the disdain of professional surveyors due to their lack of formal sanctioning or surveying lineage.

A relatively small group of individuals were active in surveying in eighteenth-century Dublin. The city itself had only a limited amount of work available to surveyors yet their presence in Dublin was beneficial due to the number of landlords and owners of estates who required their services throughout the country. The location of surveying offices on principal commercial streets rather than back lanes indicates that many surveyors were successful enough to become part of eighteenth-century Dublin high street life.

[338] The two main attempts of surveyor regulation during the eighteenth century were Gibson's certificate system and Callan's suggestions for elected surveying officials.

The variety of sources of income available to eighteenth-century surveyors demonstrates that the industry was flexible enough to utilise the best method of funding for particular surveying projects. Subscriptions, patronage and salaries ensured that surveying could be a profitable industry but was never likely to propel surveyors into the realms of the rich. From surviving evidence, it appears that surveyors were amongst the ranks of skilled craftsmen, artists and professionals such as solicitors or accountants.

The intelligent use of contemporary media was an additional factor in ensuring a surveyor's success. While the presence of surveyors in newspapers and advertisements was relatively rare in eighteenth-century Dublin, the limited surviving evidence indicates that the level of communication within the surveying community was high. Surveying disputes indicate both the lack of official organisation and standardisation within the industry, but also the manner in which some surveyors addressed each other and what they thought of their competitors.

The following chapter will examine the surveying techniques and methodologies used by Dublin's surveyors during this period.

Chapter two: The science of eighteenth-century surveying

2.1 Introduction

Many eighteenth-century surveying treatises emphasise the inherent practicalities of land surveying.[1] Land surveying is an industry built on scientific principles, geometry, mathematics and precise instrumentation. Each of these elements contributes to the success of a survey and each is individually vital in achieving accurate measurements. The eighteenth century saw a steady increase both in the level of surveying technology and in awareness of the limitations of instrumentation. Advances in the fields of optics, metallurgy and instrument manufacturing ensured that levels of accuracy that had remained relatively static in the preceding centuries improved throughout the eighteenth century.

Appropriate surveying instrumentation was central to achieving accuracy in eighteenth-century surveys. The majority of eighteenth-century surveying instruments could be utilised for a wide variety of tasks, although some had a more specific function. Each instrument had its own advantages and disadvantages; each could suffer from a variety of instrumentational errors and were the subject of trends in surveying, although Irish surveyors regularly displayed a preference for older, more established instruments over more modern equivalents with a higher degree of accuracy.

As previously discussed, the eighteenth-century surveyor was not restricted to gathering data in the field. The transference of survey measurements from field books to either manuscript or printed maps was another highly practical element of surveying. Organisation of field book data, use of references from old map series and decisions on the method of production of the final map were important elements in successfully delivering a complete cartographic product to the general public.

This chapter examines the various surveying instruments used by Dublin's eighteenth-century surveyors. Each is discussed in terms of its prevalence within the industry and

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[1] Samuel Wyld, *The practical surveyor* (London, 1725); William Leybourn, *The complete surveyor* (London, 1674); Robert Gibson, *Treatise on practical surveying* (Dublin, 1763); Richard Castle, *Essay on artificial navigation* (Dublin, 1730); Callan, *Dissertation on the practice of land surveying in Ireland* ; Benjamin Noble, *Geodaesia Hibernica* (Dublin, 1768).

its advantages and disadvantages. The process whereby survey data was transferred from field notes to manuscript maps will be examined, as will the decision process, mainly financial, to justify engraving a map onto copper plate for printing. Eighteenth-century copper plate engraving techniques, methods and technologies will be discussed and Irish examples of copper plate printing examined.

2.2 The scientific instrument trade in Dublin

In order to look at the use of land surveying instruments in eighteenth-century Dublin, it is first necessary to examine who was manufacturing such instruments at the time and where a Dublin-based surveyor could acquire the tools of his trade. This section explores those who were active in making surveying and other high precision instruments in eighteenth-century Dublin and their interaction and relationship with land surveyors.

The demand for scientific and mathematical instruments was relatively small in eighteenth-century Dublin compared to the demand for craftsmen's trades such as watch making. Yet there was sufficient business available from surveyors, navigators, astronomers and institutions to keep a relatively healthy industry in operation throughout the century. The long working life of such instruments meant that only a few instrument traders could be supported comfortably, as reflected in period business directories.[2] The instrumentation industry did not work in an Irish vacuum, as Dublin was involved in the international trade in instruments. For example, the instrument trader Jesse Ramsden personally supervised the transportation of second-hand scientific instruments from London to Trinity College Dublin in 1793.[3]

The relationship between mathematical instrument-makers and surveyors was generally cordial with both parties interacting in a mutually beneficial way. Instrument makers often advertised themselves in surveying treatises which were frequently written by surveyors with whom they had an existing working relationship. London-based instrument maker Jonathan Sission's advertisement at the beginning of Samuel Wyld's *The practical surveyor* (London, 1725) is a typical example. Beginning by stating that the key to good surveying lies in accurate instruments, Sission assured the public that not only were his instruments accurate, but that they also took advantage of the latest improvements available. The link between Wyld and Sission comes to light later in the advertisement as Wyld mentions that:

> … he [Sission] being the *only person* that makes *the Theodolite*, *Spirit-Level* and *Parallelogram* hereafter mention'd.[4]

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[2] *Wilson's Dublin directory* (Dublin, 1769 – 1799), multiple editions.
[3] N. Goodison, *English barometers, 1680 – 1860* (London, 1977), p. 64.
[4] Samuel Wyld, *The practical surveyor* (London, 1725), preface.

Sission was amongst many manufactures or sellers of such instrumentation in London in the 1700s. Even Dublin, a far smaller city, had more than a handful of purveyors of scientific instruments.[5] Yet to an amateur gentleman surveyor who educated himself in the art of surveying through Wyld's book, Sission's advertisement may have been the only source of information on where surveying equipment could be purchased. Sisson's marketing ploy was designed to play on the reader's ignorance, but he was correct in that he may have been the sole provider of specialised equipment or altered equipment described in detail by Wyld throughout his treatise:

> Mr. Sission hath removed this inconveniency [unequal divisions on a protractor] by making each edge the arc of a great circle passing through the centre of the protractor; the space between the first and last divisions being two degrees thereof, and is divided into 60 equal parts or minutes.[6]

A further example of a collaboration between an instrument maker and surveyor can be found in Benjamin Noble's surveying treatise *Geodæsia Hibernica* (Dublin, 1768) where, like Wyld, Noble informed his readership that every instrument mentioned in his work could be purchased from a Mr. E. Spicer, mathematical instrument maker, of Dublin. Figure 2.1 shows the distribution of mathematical instrument makers in Dublin from 1769 to 1799 as gathered from the Wilson directories. It must be stressed that inclusion in commercial directories was not mandatory and as such the representation of instrument makers is only indicative. Nevertheless it is quite obvious that it was a small industry overall.

[5] William Wilson, *Wilson's Dublin directory* (Dublin, 1769 –99), multiple editions.
[6] Wyld, *The practical surveyor*, p. 48.

Figure 2.1 Mathematical instrument makers from *Wilson's Dublin directory* 1769, 1779, 1789 and 1799, background as listed in *Wilson's Dublin directory* 1810 (compiled by F.O'Cionnaith).

As with the land surveying industry, a handful of individuals dominated the trade in scientific instrumentation during the eighteenth and early nineteenth centuries. One of the first players to emerge was a surveyor/instrument maker, Gabriel Stokes (1682–1768).[7] He apprenticed as a surveyor under the watchful eye of the then city surveyor, Joseph Moland, who was also employed by the King's Hospital as a teacher of navigation and mathematics.[8] Stokes appears to have been a talented and highly-regarded expert in surveying and precision instrumentation as by 1721 he had received a grant of arms with a surveyor's staff as his crest for skill in his profession.[9]

The earliest evidence of Stokes's work in the instrument trade was his repair of a large quadrant as well as supplying new scientific instruments to Trinity College in 1715.[10] As an endorsement for his bill to the college, Stokes asked the then surveyor general, Thomas Burgh to support his cause:

> I frequently called at Mr. Stokes while he was at work on repairing the Quadrant belonging to the College, and I always observ'd he had been particularly careful in amending what was amiss; and it appeared to me when the work was finish'd & the observations made with the instrument afterwards, that he had perfected his

[7] Andrews, *Plantation acres*, p. 271.
[8] L. Whiteside, *A history of the King's Hospital* (Dublin, 1975), p. 16.
[9] Andrews, *Plantation acres*, p. 271
[10] Quadrant, Trinity College Dublin (TCD, MUN/P/4/20/21).

work & adjusted the Quadrant with skill & exactness: and in my opinion the several articles of the work done by him are moderately rated.[11]

Stokes became the deputy surveyor general in 1748 and was responsible for the development certificate of proficiency as mentioned in chapter 1.

He opened his own office in Essex Street at the 'Sign of the Dial' sometime in the 1750s from where he conducted his surveys in and around the city as well as continuing with his instrumental work.

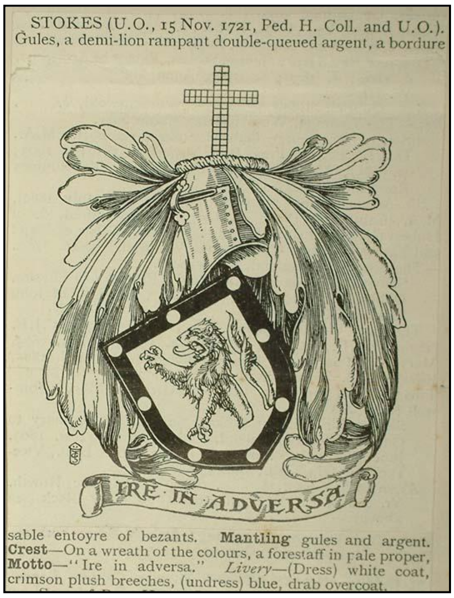

Figure 2.2: Crest of Gabriel Stokes awarded in 1721, (http://sandfordfamily.org.uk/gabrielstokes/gsbio.htm).

Stokes also dabbled in engineering. In 1735 he published a document on supplying water to Dublin city in which he argued that the city could be provided with fresh water without the need for water engines by simply using the natural laws of gravitation.[12] One of Stokes's more unusual pieces of work was his invention of the *pantometron* which was a miniaturised theodolite designed to be easily transported for surveying fieldwork.[13] His invention failed to grasp the surveying community's imagination and there are no known records of its use.

William King, possibly an in-law of Stokes, operated his own mathematical instrument workshop in Temple Bar. King was active in the industry until at least 1784 when he produced an octant for a Mr. John Jackson.[14]

[11] Thomas Burgh, 6 May 1715 quoted in A. D. Morrison-Low & J. Burnett, *Scientific instrument making in Dublin, 1700-1830* (Dublin, 1991), p. 21.
[12] Gabriel Stokes, *A scheme for effectually supplying ever part of the city of Dublin with pipe-water* (Dublin, 1735).
[13] Robert Gibson, *Practical surveying* (Dublin, 1752), p. 160.
[14] Morrison-Low & Burnett, *Scientific instrument making in Dublin, 1700-1830,* p. 22.

Three generations of the Lynch family, all named James, were also active Dublin-based instrument makers from the 1760s to the 1840s. The eldest, James Lynch, is known from a single bill in Trinity College, dated 1767, for an air-pump, gauge and receivers. His son, James, was the assistant to the professor of natural philosophy in Trinity and was also a member of the Royal Dublin Society. While certainly not one of the most influential practitioners of eighteenth-century surveying, James Jr. was active and knowledgeable in surveying matters. In 1802 he proposed making a map of Dublin county[15] and was able to analyse several suggestions sent to the Royal Dublin Society by the American surveyor Richard Freeman on his ideas for improving circumferentors.[16] Whilst disagreeing about the practicalities of the majority of Freeman's theories, Lynch did however find a number of ideas appealing:

> I will now take the liberty to mention a curious coincidence of idea between Mr. Freeman and myself on this subject [the diurnal variation], having for some time past projected a similar improvement; but I neither executed the instrument, nor published my intentions, Mr. Freeman remains unrivalled in his claim as the original inventor.[17]

James Lynch Jr. established his own instrument business with his son, which ran until 1846.[18]

As in most skilled professions in Dublin during the eighteenth century, foreign craftsmen made their presence felt. Both John Margas[19]and Richard Castle[20] who moved to Dublin during the century, each producing a number of surveying instruments. Other individuals operating in the mathematical instrument trade at the time and who fortunately signed their instruments included James Woodside (1733),[21] Alexander Stephens (1747),[22] John Fawcett (1785),[23] George McEvoy (1743),[24] Seacome Mason (1780)[25] and William Walker (1805).[26]

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[15] Ibid., p. 167.
[16] James Lynch, *Observations on Mr. Freeman's paper* (Dublin, 1806), pp 67-8.
[17] Ibid.
[18] Morrison-Low & Burnett, *Scientific instrument making in Dublin, 1700-1830*, p. 35.
[19] T. Murdoch, *The quiet conquest: the Huguenots, 1685-1985* (London, 1985), p. 234.
[20] Richard Castle, *Essay on artificial navigation* (Dublin, 1730), p. 7.
[21] National Science Museum of Ireland, St. Patrick's College/NUI Maynooth, inventory number 1912-393.
[22] Geraldine Fennell, *A list of Irish watch and clock makers* (Dublin, 1963), p. 31.
[23] 6 Jan. 1785, *Dublin Morning Post*, 'John Fawcett…makes and repairs all sorts of clocks and watches … theodolites, spirit levels, circumferentors …'
[24] Whipple Museum of the History of Science, Cambridge, inventory number 698.
[25] National Science Museum of Ireland, St. Patrick's College/NUI Maynooth, inventory number 0729.

Mathematical instrument makers and surveyors have been shown to have had a close professional relationship. The employment of specialised surveying instrumentation will be examined later in this chapter.

[26] Ibid., inventory number 0731.

2.3 The need for land surveys

The need for land surveys grew from disputes over land ownership, establishing of rents according to the exact acreage of a property, and for planning and construction purposes. Surveyors were often multi-skilled individuals and could survey land for most of these purposes. Thomas Sherrard, for example, spent most of his thirty-year career with the Wide Streets Commissioners on establishing the ownership of lotts and the laying out of new streets and civic developments[27] but was also involved in valuation of landed estates through his own private survey business. The requirements for surveys of lands varied – in some cases, such as city plans, the reasons for a map's creation could be civic pride, a practical tool to aid local government, or for the development of urban areas.

Infringements on property boundaries, whether intentional or accidental, were relatively common and disputes regularly required surveys of the land in question. Benjamin Noble quoted from the bible to help highlight this issue in his book *Geodaesia Hibernica*:

> Cursed be he that removeth his neighbour's land-mark; and all the people shall say amen. Deut. Chap. xxvii. Ver. 17.[28]

A letter written in 1761 from John Firth to the Fitzwilliam family highlights such a dispute:

> Ushers Quay, 11 August, 1761
>
> My Dear Lord,
> We have been at some trouble in ascertaining & fixing the boundaries of your lands, from those of other people, & very probably, may in some parts of your estate find an opposition from particular men, who from time to time have encroached upon you, & who, may contest it with you, upon finding you are resorted to take back what is bona fide your own. The mearings of Dundrum, may be one of them; a Manning,[29] who is troublesome about some of your ground near Merrion Street may be another & a Mr. Butler…of whom I have heard but too much is a third.

The legal loopholes that could be exploited by squatters or those altering land boundaries were also a concern for the Fitzwilliam family highlighted in the same letter:

[27] Minutes of the Wide Streets Commissioners, 1757-1810 (DSA, WSC/Mins/4-22).
[28] Noble, *Geodaesia Hibernica*, cover.
[29] Mr. Manning had previously caused trouble to the Fitzwilliam family in April 1761 over a plot on Merrion Street, 18 Apr. 1761, William Fitzwilliam, Dublin to his brother Viscount Fitzwilliam, (NAI, Pembroke papers, MSS 97/46/1/2/7/137).

> … Mr. Butler, a tenant, for such a given parcel of land & that you also find Mr. Butler has without lease or any authority, made use of another large parcel of land, close upon your own domestic Domain, which you are now determined to wall.
> … There is a law in this country which realises any parcel of land to him, who has been quietly in possession of it, for 20 years. Mr. Butler has gone on, upon this land seven or eight years, has paid no rent for it.

Of course the role played by a land surveyor was vital in solving such issues by establishing the legal boundaries of land and therefore ownership:

> … I have, therefore had this whole parcel of land, surveyed & have ordered Mr. Taylor…to build the wall, which is to divide your lands from those of L. Trimblistown & Lady Allen & to comprehend, within wall, all the land, for which Mr. Butler has no lease. Enclosed to you, a drawing of it, done from Mr. Barker's survey, by myself … as soon as I see you, which will be soon, will further explain it.
>
> John Firth[30]

Such infringements often required the recognition of individual field boundaries, particularly around the periphery of an estate, on maps[31]and of more importance from a landlord's perspective, any disturbance to these boundaries.[32] While a map was very effective at conveying information, it did not render a terrier[33] obsolete but rather acted as reinforcement.

Re-surveys of lands were an additional method of determining any changes that had occurred on a landlord's property. They assisted landlords in establishing new rents based on the productivity of the land, for example by increasing rents where unproductive land, such as bogs or marsh, had been drained and turned into pasture or arable land by the tenant. Classification of land, usually using a colour scheme or reference table within the map's border can be found in a number of surviving eighteenth-century maps.[34] Such maps could also be used as evidence of a tenant's abuse of his lease, mainly with reference to the burning of land to increase its fertility in the short term but to its overall detriment in the long term.[35]

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[30] John Firth to Lord Fitzwilliam, 11 Aug. 1761 (NAI, Pemborke papers, 97/46/1/2/6/8).
[31] John Longfield, Lands in Glasnevin, 1807 (NLI, Longfield papers, ms. 2789(110)), John Longfield, Lands in Simons Court, 1820 (NLI, Longfield papers, Ms. 2789-90(74)).
[32] John Longfield, Lands in Kill o the Grange, 1814 (NLI, Longfield papers, ms. 2789-90(32)), John Longfield, Lands in Loughlinstown, 1821) (NLI, Longfield papers, ms. 2789-90(74)), John Longfield, Lands in Glasnevin, 1807 (NLI, Longfield papers, ms. 2789(110)),
[33] A written description of land boundaries.
[34] Charles Frizzell, Lands in Deansgrange, 1791 (NLI, Longfield papers, ms.2789-90(25)), John Longfield, Lands in Kill o the Grange, 1814 (NLI, Longfield papers, ms. 2789-90(32)).
[35] 3 George III c.29, *Dublin Chronicle*, 19 Aug. 1788.

The physical makeup of eighteenth-century maps meant there was a need to replace them periodically. William Petty summed up the problems often encountered with the destruction of geographic information caused through wear, tear and time:

> When the mearers were fled, the surveyors dead, the marks on the land worn out, the rats had eaten the original plots, and a new interest risen up, for showing different mears … from what were shown at the first admeasurements.[36]

Some surveyors attempted to avoid the use of easily destructible paper through the use of vellum – Peter Duff produced several maps of lands in Meath using this material,[37] as did Alexander Stewart[38] – yet its use is comparatively rare throughout the eighteenth century. Paper maps were also delivered through potentially destructive or damaging methods with Thomas Sherrard and Michael Kenny sending folded maps[39] as letters to their respective clients. However, the greater long-term importance of estate and lease maps often meant that their rates of survival were far greater than engineering plans, as mentioned by Andrews:

> They were often kept as long as the property itself, and then transferred with it to the new owner and later in turn to his successor.[40]

Landlord or tenant

Surveyors did not necessarily work exclusively on the side of landlords. Cork surveyor Joshua Wight was approached by several tenants of an estate who requested him to survey their combined farms. Wight initially expressed reluctance, informing the tenants that if his results differed significantly from those of the surveyor employed by the landlord then it may 'breed a controversy and cause uneasiness'.[41] Wight eventually submitted to the tenants' request, promising to survey their lands 'as carefully and exact as if their lands was my own' but insisted on receiving his full pay before any map or catalogue of the lands was handed over to the tenants. He proceeded to survey several small holdings, apparently with the landlord's consent, and determined that many of them were actually smaller than the landlord's surveyor had previously stated. This error resulted in the landlord overcharging his tenants.

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[36] *Report from select committee on survey and valuation of Ireland*, p. 42 [445], H. C. 1824, viii.79.
[37] Peter Duff, Raleigh, Co. Meath, 1713 (NLI, Domville papers, ms. 11,937(42)), Peter Duff, Tallow, Co. Meath, 1718 (NLI, Domville papers, ms. 11,937(46)).
[38] Alexander Stewart, Ballymun, 1705 (NLI, Domville papers, ms. 11,937(49)).
[39] Sherrard & Brassington, Turnapin, 1803 (NLI, Longfield papers, ms. 11,937(16)), Michael Kenny, Glasnevin, 1804 (NLI, Domville papers, ms. 11,937(20)).
[40] Andrews, *Plantation acres*, p. 129.
[41] Diary of Joshua Wight, 25 Sept. 1752 (Friends Library, Dublin).

Upon procurement of the maps, the tenants presented their evidence to the landlord who seemed ‘uneasy’ at this revelation. He immediately sent for his surveyor, a Mr. K___y, who examined Wight’s new maps. Wight, the landlord and Mr. K___y retired to a public house to discuss the discrepancies further. However Wight, upon finding ‘the surveyor [K__y] being much in liquor’ and ‘stark drunk’, tried to leave at which point he was subjected to a verbal assault from K___y who, after calling him a dunce, was determined that Wight would ‘soon see who was right’. Wight then informed K y that he would only be free to look at the matter further the following week and not a moment before. This reply provoked the intoxicated K___y who:

> … in a great rage … said he would compel me and that he would follow me, wherever I went if would not meet him, there or upon the spot, he would post me up [in the] Gazette … and he would make me pay the rents …[42]

At this point the landlady of the public house, finding her husband was not present, requested a patron of the pub to forcibly remove Wight’s antagonist from the premises. Wight reflected on the incident later, concluding that ‘I was never so abused before’.

Examining his opponent’s surveys, Wight found that K____y had not included either a scale bar or north arrow in any of these maps and that K____y had calculated his acreages from ‘tables of difference of latitude and long[itude]’. Wight’s criticisms of this method were based, in his opinion, on the fact that ‘numbers were inflexible, paper was flat but land ruff, and attended with [deviations]’. It appears from Wight’s journal that this was the point that caused K___y to respond in such an aggressive manner. After the crisis had passed Wight informed the landlord that:

> … I made a good vow for I never would have another conversation with him right, nor wrong and I disapproved of his method … I would have nothing to do, or to say with him.[43]

Several days later a friend of the landlord approached Wight and asked him to come and resurvey the lands as the landlord was anxious to determine the exact acreage in his possession and to determine if the original difference was ‘a simple mistake or a wilful one’. Wight offered the tenants to resurvey their land, with their assistance, and that:

> … if I did not make my returns the same within a trifle, I would pay them back their money.

[42] Ibid.
[43] Ibid.

The tenants refused Wight's offered; they were satisfied with what he had already done and stated that:

> … they have paid for more lands than they have in possession, & my surveys make it appears so; ergo.[44]

Wight's disagreement does not appear to have been an isolated case, with Callan commenting:

> The landlords and tenants of this kingdom always complain of the wide difference and intolerable jarrings which frequently happen between surveyors of land; especially of late, when swarms of pretenders to that art wander about the country, using several fraudulent means to raise variance between landlord and tenants, which prove troublesome to some landlords, and the entire ruin of several tenants.[45]

There is no clear indication if Wight or K____y was such as 'pretender to that art' however, Wight's case does indicate that mis-measurements had a far wider impact than two sets of conflicting figures, affecting the lives of those involved, surveyor or not.

Relationships between tenant, landlord and surveyor were not always as amicable as the Wight example. Opinions of surveyors from passers-by or affected parties ranged from cordial to hostile but very rarely violent.[46] John Norden's fictional dialogue between a seventeenth-century surveyor, a tenant and landlord gives insight into how surveyors were treated and thought of whilst carrying out their duties:

Farmer:	Sir, I am glad I have so happily met with you, for if I have not been mistaken, you are a surveyor of land.
Surveyor:	Admit it so, Sir, what then?
Farmer:	I have heard much evil of the profession and to tell you my conceit plainely [sic], I thinke the same both evil and unprofitable.
Surveyor:	You seeme to be but a yong [sic] man in years and are you so deeply seene in the abuse of this faculty, that you can so peremptorily condemn it?
Farmer:	Call it you a faculty: What meane you by that word?
Surveyor:	Abilitie to performe a thing undertaken.
Farmer:	Then this faculty of yours, I say, is a vaine faculty, and a needless worke undertaken.
Surveyor:	Speake you this by conjecture, by report of others, or by due experience of your owne?
Farmer:	I speake indeede as induced to the opinion I hold, by all three reasons.[47]

[44] Ibid.
[45] Callan, D*issertation on the practise of land surveying in Ireland*, p. 1.
[46] Some took their resentment of surveyors further than suspicion, with one seventeenth-century surveyor, Richard Bartlett, being decapitated in Donegal, J.H. Andrews, *The Queen's last map-maker* (Dublin, 2008), p. 29.
[47] John Norden, *The surveyor's dialogue* (London, 1607), p. 1.

The landlord had a more positive view of Norden's profession:

> Landlord: I have at this time some occasion to use…one of your factuality and I have heard by my tenant, that your skill and diligence may satisfy my desire therein
>
> Surveyor: I shall do mine endeavour wherein you please to command me.[48]

John Hammond complained of having to disguise or hide his survey stations from local tenants due to attempts to sabotage his work:

> … observing to conceal these plugs or marks from the county-people, who in general, hating the practise of taking surveys of their grounds, will frequently remove the surveyor's marks, either to give him trouble or divert themselves.[49]

Surveyor and client relationships varied depending on the individuals involved and the circumstances related to the survey. Whether the surveyor was met with resentment or welcome, the need for land surveys was clear and common throughout the eighteenth and early nineteenth centuries.

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[48] Ibid., p. 38.
[49] John Hammond, *The practical surveyor* (London, 1765), p. 61.

2.4 Eighteenth and early-nineteenth century surveying instrumentation and practice

An accurate instrument is the most vital weapon in a surveyor's arsenal and is imperative to his ability to work correctly. Surveying instruments in the eighteenth and early nineteenth centuries are not totally alien to modern surveyors, yet many of them are radically different from their modern versions due to industrial and technological developments over two centuries. The following sections will examine the various surveying instruments used during the eighteenth and early nineteenth centuries as well as evaluating their use and potential errors that would be encountered.

2.4.1 Units of measurement

There was a lack of homogeneity in eighteenth-century Irish surveying with many scales in use in maps and several different types of measurement units being employed for surveys. In 1825 British legislation enforced the yard to be the unit of measurement, and all measurements were to be multiples and sub-multiples of it, with the acre containing 160 perches or 4,840 yards.[49] However, such laws were difficult to implement on a loose affiliation of surveyors. Traditional forms of measurement such as the Irish perch, the English perch, the Cunningham perch and the plantation acre remained on Irish maps for decades afterwards.

Discussions and descriptions of units of measurement are found in some of the oldest surveying manuals and treatises stored in Irish libraries. Valentine Leigh's *The most profitable and commendable science of surveying* (London, 1577) described such units used in the sixteenth century and their relationship to each other:

> Three Barley cones faire and round, taken out of the myddest of the eare, maketh an inche.
> Twelve inces make a foote.
> Three foote make a yard.
> Five yards and a halfe maketh a pearch, which in some countries men call a pole or rod.
> Four pearches make a day worke.
> Tenne daye worke or fourtie pearches maketh a rode or quart of an Acre.
> A hundredth and Ir perches or twoo rods, make an acre.[50]

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[49] 5 Geo. IV.c.74 [Eng.] (1825).
[50] Valentine Leigh, *The most profitable and commendable science of surveying* (London, 1577), section 4, p. 2.

By the eighteenth century using barley cones as a basis of standardised measurement had fortunately been replaced, yet there persisted a variety of measurement units and scales available to Ireland's surveyors.

Irish, English, Cunningham and plantation measures were used in Ireland throughout the eighteenth century. Each was divided into acres, perches and roods, with minor differences existing between each measure's divisions. For example, the Irish acre was the equivalent of 6,555 square metres whereas the Cunningham acres was 5,226 square meters.[51] This problem was not unique to Ireland – in Italy cartographers could choose from Ancona miles, Bologna miles, Fermo miles, Ferrara miles, Firense miles, Perugia miles, Ravenna miles and Roman miles.[52] Robert Gibson described some of the more common forms of measurement in his *Treatise of practical surveying* (Dublin, 1762):

> The *English statute perch* is *5*~ yards, the two- pole chain is 11 yards, and the four-pole one is 22 yards: hence the length of a link in a statute-chain is 7.92 inches.
>
> There are other perches used in different parts of England, as the perch of *woodland-measure*, which is 6 yards; that of *church land-measure*, which is 7 yards (or the same with the *plantation-perch)* and the *forest measure perch*, which is 8 yards.
>
> The *Irish* or *plantation perch*, is 7 yards, as before; the two-pole chain is 14; and the four-pole one is *28* yards: hence the length of a link in a plantation chain is 10.08 inches.
>
> The *Scotch perch* is 18-feet, or 67- yards, or 6 Scot's ells. In the shire of Cunningham in Scotland, their perch is 18 feet, and this perch is used in some few places in the north part of Ireland, as the statute perch is in some other parts.[53]

At least one surveying author included methods of converting statute measurements into local measurements allowing surveyors to practice their business country-wide, rather than being restricted to their local area due to a lack of conversion knowledge.[54]

Occasionally French units of measurement called *échelle de toise* can be found in eighteenth-century Irish mapping.[55] The toise, derived from the Latin *tensa brachia*, was the equivalent of six *pieds* or 72 *pounces*. Its equivalent in British feet was 6' 4"

[51] *Unit comparisons* http://www.sizes.com/units/cunningham_acre.htm.
[52] J.H. Andrews, *Maps in those days* (Dublin, 2009), p. 86.
[53] Robert Gibson, *Treatise of practical surveying* (Dublin, 1762), p. 130.
[54] Adam Martindale, *The country-survey-book* (London, 1702), p. 53.
[55] John Rocque, *City and suburbs of Dublin* (Dublin, 1756).

or 1.949m.[56] France itself had various separate units of measure, with one author describing how each French province had its own measurement variation.[57] The Royal foot (*Pied du Roi*- 1688-1799) was the standard unit of measurement that avoided regional variations and discrepancies.[58]

English author John Green attempted to rationalise the presence and use of such varying forms of measurement:

> In several maps there are three sorts of scales of miles, according to the various computations in different parts of the same country; the first is call'd the Magna, where on the great miles are measur'd; the second, Mediocria, for ordinary or middle sort of miles; the third, Parva, for the small miles; besides which are often affix'd scales of other country-measures as Dutch, French, Italian &c.[59]

James Ramsey, Dublin city surveyor during the 1720s, was asked by Dublin Corporation to produce three brass standard yards as a form of standardised measurement for civic use. The three yards were to be directly based on:

> … the standard yard remaining in the custody of the chamberlain of his majesties exchequer in England.[60]

This task took Ramsey nearly two months to complete at a cost to the city of ten pounds and seven shillings. Ramsey's role in establishing a standard unit of measurement with potential uses in many different industries suggests that he was no amateur surveyor, but someone within the same league as Benjamin Noble or Robert Gibson whose writings on standard practise would be published later in the century.

In Ireland, maps were usually printed at a scale of 1 inch to 'X' perches with several scale bars being drawn on the map to assist those who were familiar only with a particular form of linear measurement, that is, English or Irish. Benjamin Noble discussed this variety in measurements in Ireland during his opening statement in *Geodæsia Hibernica* (Dublin, 1768):

> The common standard measure mostly used in Ireland, by which we express the contents or quantity of any piece of ground, is the *acre*, containing four *roods*, each rood forty square *perches*, the perch consisting of seven *yards* in length, the square perch 49 square yards; therefore the acre contains 7850 square yards, or 160 square

[56] Kenneth Ferguson, 'Rocque's map and the history of nonconformity in Dublin: a search for meeting houses' in *Dublin Historical Record*, lviii (2005), pp 129-65.
[57] George Adams, *Geometrical and graphical essays* (London, 1803), p. 458.
[58] James Douglas, *The surveyor's utmost desire fulfilled* (London, 1727), p. 62.
[59] John Green, *The construction of maps and globes* (London, 1717), p. 9.
[60] 29 Apr. 1720, J. T. Gilbert (ed.), *Ancient records*, vii, p. 121.

> perches. In England their acre contains as many square perches as ours, but their perch is only 5 ½ yards in length, so that their acre contains only 4840 square yards. Hence an Irish acre is to an English acre in the proportion of 7850 to 4840, or as 49 to 30 ¼. Which last are the square of the Irish and English perches.[61]

Such huge differences between the units of measurement could lead to serious confusion if the unit on which a survey was to be based was not decided at the planning stage. The location of a survey could also affect the type of perch used. The English perch was found most often in Co. Cork and Co. Waterford, the Cunningham perch (eighteen feet nine inches) in Ulster with the Irish perch (approximately fourteen feet) being appropriated throughout the rest of the country.[62] In 1824 parliament decreed that the whole of Ireland was to be reduced to 'statute acres' and that the Irish acre was to henceforth be referred to as 'late Irish measure'.[63] Even after this officially came into effect, local measurement systems were often still found on maps in addition to the statute acre value. John Longfield, for example, continued to use both statute and plantation systems in his maps.[64] Map scales during this period ran in multiples of 20 perches i.e. 1': 20 perches, 1': 40 perches etc. the logic being that forty perches were equal to ten chains, thus conversion between chains and links to perches was a simple calculation that could be easily performed in the field. This is supported by analysing the scales of maps of Dublin's Wide Street Commissioners (see table 2.1).

Figure 2.3 Scale bar with Irish (top) and English (bottom) measurement systems, William Petty, *Hiberniae Delineato* (London, 1685).

Table 2.1 was assembled from a catalogue of 663 commissioners' maps that are held in the Dublin City Archives covering the entire life of the commission; from the 1750s through to the 1850s. Around 300 maps had no reference to scale and have

[61] Noble, *Geodæsia Hibernica*, p. 10.
[62] Andrews, *Plantation acres*, p. 126.
[63] Fitzwilliam estate correspondence, 14 Dec. 1748 (NLI, Fitzwilliam papers, mic.P.1020).
[64] John Longfield, Glasnevin, n.d. (NLI, Longfield papers, ms. 2789-90(88)). John Longfield, Portraine, n.d. (NLI, Longfield papers, ms. 2789-90(92)). John Longfield, Grangegorman, 1829 (NLI, Longfield papers ms. 2789-90(95)). John Longfield, Lands in Crumlin, 1829 (NLI, Longfield papers, ms. 2789-90(98)).

been excluded from this table. Whereas measurements could vary in different parts of the country, scale units used in Dublin during the latter half of the eighteenth-century kept to a more regular format.

From table 2.1 it becomes clear that multiples of twenty feet to an inch was the system preferred for the commissioners' surveys. Within these twenty feet divisions, a larger forty feet to an inch (1:480) scale was preferred over the smaller twenty feet to an inch (1:240) indicating that survey work tended to focus on several rather than individual lotts or specific features. The analysis of the commissioners' map scales was also complicated by the use of feet and perches as a standard unit of measurement. Table 2.1 demonstrates that perches were rarely used in comparison to feet to inches scale, with ten perches to an inch (1:201) being the most popular perch scale when used.

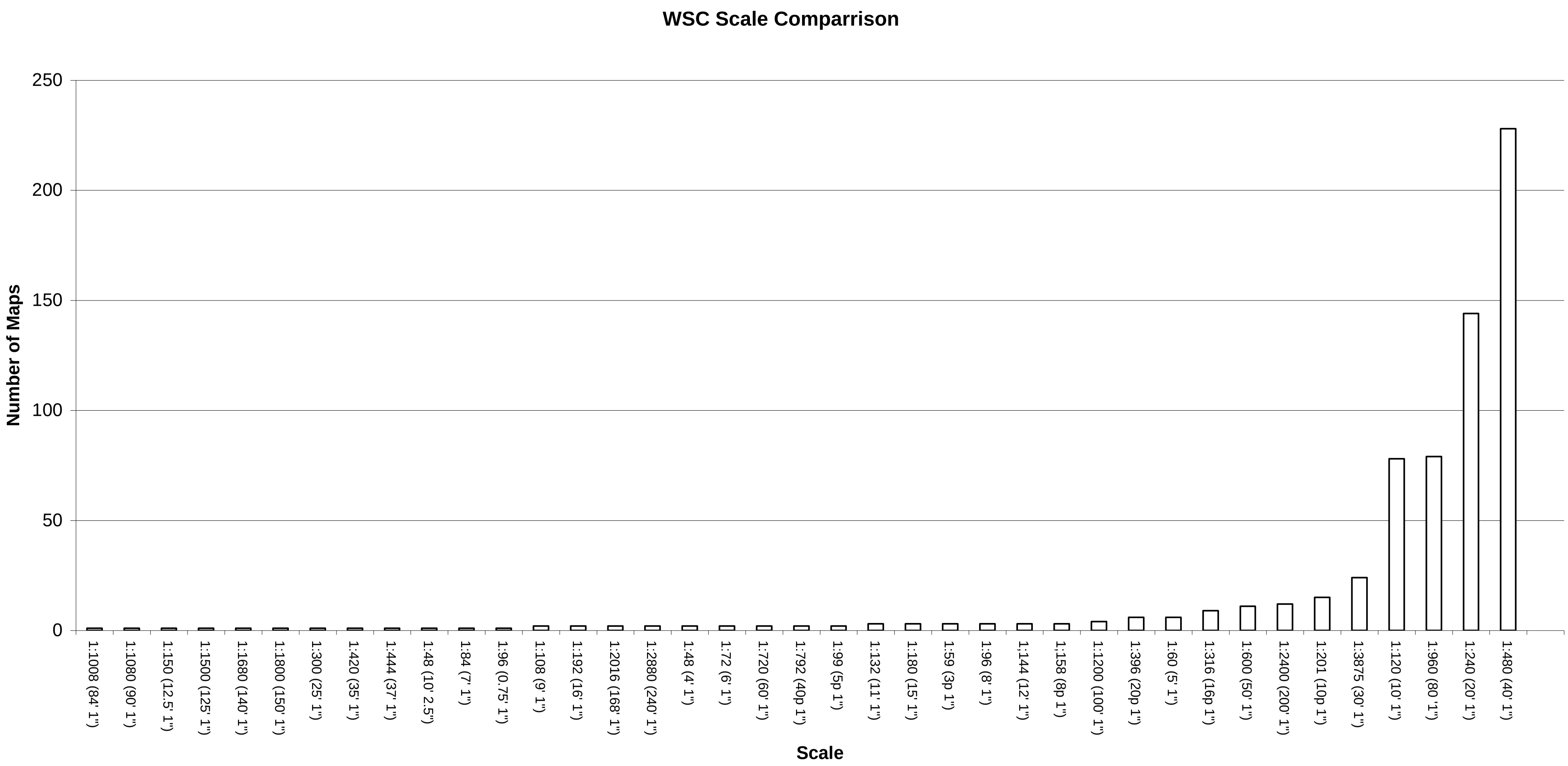

Table 2.1: Map scales used by the Wide Street Commissioners 1757 – 1810, WSC/Maps Dublin Civic Archive. All scales have been converted into their metric equivalent with the original map scales noted in the bracketed figures. Sample size equates to 633 maps.

2.4.2 The surveyor's chain

The surveyor's chain was the oldest[65] and most basic instrument available to eighteenth-century surveyors. It was used for taking distance measurements but could also be adapted to angle measurement if necessary. The earliest documented proof of the chain's use in Ireland was during the Wexford plantation survey of 1617[66] but it is far more likely to have been employed in various forms for several centuries prior to this.

Figure 2.4: Putti with a surveyor's chain, William Leybourn, *The complete surveyor* (London, 1674), preface.

Figure 2.4 shows the basic structure of a surveyor's chain. Chains, made of thick steel wire, usually came in a two or four-pole (33 feet or 66 feet respectively) format which were then subdivided into 50 links for the two pole or 100 links for the four pole. Each link in a four-pole chain would therefore be equal to 66/100 feet or 7.92 inches in length.[67] There was, however, a variety of chains available to eighteenth-century surveyors. The 'Gunter's chain', which was one of the more widely used versions of the surveyor's chain, was invented in 1620 by Edmund Gunter, Professor of Astronomy at Gresham College, England.[68] This chain was marked at every tenth ring with either a carved notch or differently-shaped link so as to enable the easy

[65] Then I looked up—and there before me was a man with a measuring line in his hand. I asked, 'Where are you going?' He answered me, 'To measure Jerusalem, to find out how wide and how long it is.' Zechariah 1:2

[66] Andrews, *Plantation acres*, p. 297.

[67] Wyld, *The practical surveyor*, p. 4.

[68] William Leybourn, *The works of Edmund Gunther* (London, 1662), p. 103; Adam Martindale, *The country-survey-book* (London, 1702), p. 26; J. Waddington, *A description of instruments used by surveyors* (London, 1773), p. 6.

calculation of length along the chain when taking offsets during a survey. Benjamin Noble was particularly enthusiastic about the Gunter's chain describing how:

> … nothing could be more convenient than this decimal division of the chain … [69]

Other authors felt that the chain was the only instrument that a surveyor actually needed to perform his duties:

> To enumerate the many mathematical instruments invented for this purpose, and to describe their use would be but a needless amusing work, seeing that herein the only instruments that I make use of are the common Gunter's chain, and a common five foot rod … with which I shall shew [sic] how to describe any plan, with much less trouble and in much less time than by the help of any theodolite, plain table, circumferentor … and if I mistake not, far more exact.[70]

Another chain variant at use at the time in Ireland was 'Rathborn's chain', which consisted of two poles of one hundred links each. Each pole was the equivalent of sixteen and a half feet.[71] Chain lengths could also vary from area to area:

> It were therefore very convenient, that our young surveyor were furnished with a chain fitted to the customary measure of the country where he lives, as I use to make chains for myself and scholars of 21 or 24 feet to the pole for Lancashire and Cheshire, where these measurers most obtain.[72]

As a means of easily counting the number of links or poles during any particular measurement, a large red rag could be tied to the centre link of each chain (the fiftieth for a four-pole and the twenty-fifth for a two-pole chain) as it was far more visible when measuring in long grass.[73]

The last steel link at either end of the chain was shortened to compensate for the attachment of a brass handhold that enabled the chain to be stretched out flat and transported more easily during a survey.[74] There was no strict circumstance for a surveyor to use either the two or four-pole chain, however many surveyors found that the Irish plantation measure four-pole chain was slightly too long for regular work and that the English statute measure four-pole chain was often more convenient to use, even though its measurements required conversion at the end of the survey.[75]

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[69] Noble, *Geodæsia Hibernica*, p. 25.
[70] Batty Langley, *Practical geometry* (London, 1726), p. 97.
[71] William Leybourn, *The complete surveyor* (London, 1674), p. 50.
[72] Martindale, *The country-survey-book*, p. 52.
[73] Wyld, *The practical surveyor*, p. 5.
[74] Robert Gibson, *Treatise of practical surveying* (9th ed., Philadelphia, 1808), p. 130.
[75] Noble, *Geodæsia Hibernica*, p. 25.

Figure 2.5a Gunter’s Chain, National Science Museum, St. Patrick’s College Maynooth/NUIM, 362.802.1.This particular chain was made by J. C. Chesterman, Sheffield (1790).The symbol ‘4P’ was stamped on each handle indicating four perches in length (photo taken by F. O’ Cionnaith).

Figure 2.5b Gunter’s Chain link/handle detail, National Science Museum, St. Patrick’s College Maynooth/ NUIM, 362.802.1. (photo taken by F. O’ Cionnaith).

Figure 2.5c Gunter’s Chain decimalised markings ever 5 links (indicated by arrows), National Science Museum, St. Patrick’s College Maynooth/NUIM, 362.802.1. (photo taken by F. O’ Cionnaith).

Chain usage followed the most basic principle of surveying: a direct measurement between two points. Before the measuring began, the surveyor would confirm the length of the chain from a known measurement.[76] Two stations would first be marked out by the surveyor along the boundary of the piece of land being surveyed. The surveyor and his assistant, still known in modern surveying as a 'chainman', would stretch the chain to its full length in a direct line between the two established stations:

> … for if the lines be not exactly measured, neither the form nor content of the plot can be true.[77]

Gibson stated that the accuracy of a survey measurement relied heavily on the professionalism and attention of the chainman holding the end of the chain at the station from which the measurement was being taken:

> … it is necessary to have a person that can be relied on, at the hinder end of the chain, in order to keep the foremost man, in a right line; and a surveyor who has no such person, should chain himself. The inaccuracies of most surveys arise from bad chaining, that is, from straying out of the right line, as well as from other omissions of the hinder chainman: no person, therefore, should be admitted at the hinder end of the chain of whose abilities in, this respect, the surveyor was not previously satisfied and convinced; since the success of the survey, in a great measure, depends on his care and skill.[78]

Control of the chain in the field and folding it to avoiding entanglements was another duty of the chainman, and required some skill and dexterity:

> Some little art is necessary in folding the chain. Always begin at the middle and fold up two links at a time, one from each side, until the whole are doubled up, when the handles will consequently be outside. Therefore, when the chain is required to be undone in the field it only requires to be thrown out from the handles, thus: - *hold the handles in the left, and throw the chain out with the right hand.*[79]

In rural surveying the distance between two stations was commonly more than one chain length apart. In such a case the surveyor would have to mark out the path of the line that the chain was meant to follow. Either the surveyor or his assistant would stand at the starting station and direct his colleague in a straight line between the two stations. The person not at the station would place markers along the length of the line. These could be either metal arrows, as proposed by Wyld,[80] rods[81] or nine inch

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[76] Gibson, *Treatise of practical surveying*, p. 129.
[77] Wyld, *The practical surveyor*, p. 5.
[78] Gibson, *Treatise of practical surveying*, p. 131.
[79] 'A Civil Engineer', *The present practice of surveying and levelling* (London, 1848), p. 3.
[80] Wyld, *The practical surveyor*, p. 6.
[81] Martindale, *The country-survey-book*, p. 27.

pegs,[82] along the length of the line between the two stations which would then act as a guide– thus ensuring that the most direct line between the two stations was measured. The phrase 'cutting the pole'[83] described this laying out of the chain in a straight line between stations. Losing these directional arrows or pegs in long grass was a genuine concern for surveyors and brightly coloured cloth was tied to links in the chain to overcome this.[84]

During the course of measuring the distance between the two stations with the chain, offsets[85] would be taken to points of surveying interest: boundary lines, buildings, trees etc. Offsets would be measured at a ninety-degree angle from the line of the survey and would be measured with either an offset staff or another chain.[86]

Figure 2.6: Putti with a surveyor chain, the one of the far right holds a basic circumferentor, William Petty, *Hiberniae delineatio* (London, 1685).

Chain measurements allowed surveyors to plot the land in question by dividing it into simple geometric shapes, most commonly triangles. By dividing an irregularly shaped

[82] Benjamin Noble, *Geodæsia Hibernica* (Dublin, 1767), p. 25.
[83] Diary of Joshua Wight, 25 September 1752.
[84] Robert Gibson, *Treatise of practical surveying* (9th ed., Philadelphia, 1808), p. 132.
[85] An offset is a perpendicular measurement taken along a base line between two stations to a point of note.
[86] Samuel Wyld, *The practical surveyor* (London, 1725), p. 6.

field into triangles, using chain measurements along bearings and angles measured by a circumferentor or theodolite, a surveyor would only need to apply simple geometric equations to calculate the area of the field and to plot its true shape. Offsets perpendicular to the chain measurement between two stations would divide an irregular border into two right-angled triangles. Wyld advised:

> It very rarely happens that the sides of a field are all strait lines, and therefore any method for measuring them from one or more stations in the middle, can seldom be put in practice; the best way being to go round, and measure the several angles from stations near the bounders…dividing the same into the largest trapezias and triangles that may be, and measuring the bases and perpendiculars by the same scale that the plot was laid down by.[87]

The size and occurrence of triangular measurements was entirely dependent on the nature of the survey, with the surveyor aiming for the minimal amount of measurement to reduce surveying time but also aiming to achieve acceptable levels of accuracy and measurement complexity. Figure 2.7 displays an excessive amount of measurements, however it illustrates the process of dividing a complex area into smaller, simpler, sections. At the completion of a survey, the surveyor would simply calculate the area contained within each triangle and total these results to obtain the area of the entire plot:

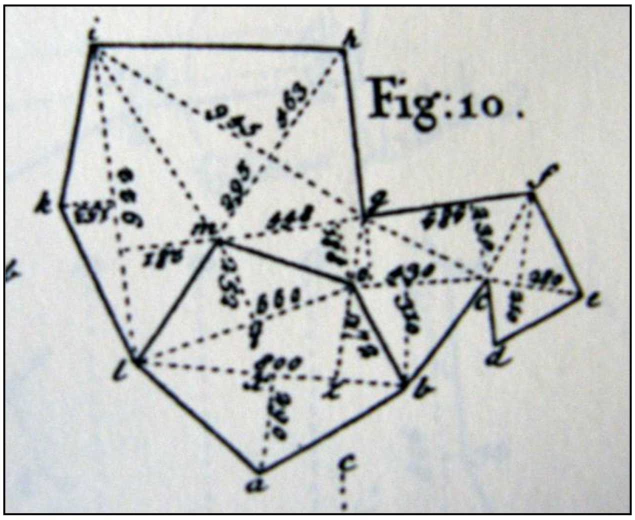

Figure 2.7: Example of triangular chain measurements during a survey, Samuel Wyld, *The practical surveyor* (London, 1725), appendix.

> … so shall the sum give the exact content of these small pieces, which added to that within the station lines, gives the true content of the field in square links.[88]

All measurements conducted with a chain had first to be transformed from their slope value to the correct horizontal value. As Gibson explained:

[87] Wyld, *The practical surveyor*, p. 63.
[88] Ibid., p. 65.

> All inclined surfaces are considered as horizontal ones; for all trees which grow upon any inclined surface, do not grow perpendicular thereto, but to the plane of the horizon … Besides, the irregularities of the surfaces of hills in general are such that they would be found impossible to be determined, by the most able mathematicians. Certain regular curve surfaces have been investigated with no small pains, by the most eminent: therefore an attempt to determine in general the infinity of irregular surfaces which offer themselves to our view, to any degree of certainty, would be idle and ridiculous, and for this reason also, the horizontal area is only attempted.[89]

Measurements using a chain were recorded in a surveyor's field book by the number of chains and links in a chain:

- Four pole: 7 chains 60 links between stations *A* and *B*. Written in field book as 760 as there are one hundred links in a four pole chain
- Two pole: 15 chains 20 links for the same distance between stations *A* and *B*. Written in field book as 1520 as there are only fifty links in a two pole chain.

Several contemporary surveying treatises contain examples of such measurement methods.[90]

A chain's use was not limited to simple direct distance measurements. A surveyor, either through lack of resources or accidental breakage of equipment, could still measure angles by using a chain in place of a circumferentor or theodolite, thus showing its great adaptability for field surveyors. The technique involved the creation of a triangle using the chain from which simple geometry calculations could determine the angle between stations.[91] This method, though reasonably accurate as a stopgap solution, was time consuming, both during the survey and the drawing up of the results. As Wyld states:

> There are other ways of working with the chain … [but only] when we have no other instruments.[92]

[89] Gibson, *Treatise of practical surveying*, p. 134.
[90] Noble, *Geodæsia Hibernica* (Dublin 1767), p. 40; Gibson, *Treatise of practical surveying*, p. 135.
[91] Wyld, *The practical surveyor*, p. 121.
[92] Ibid. p. 5.

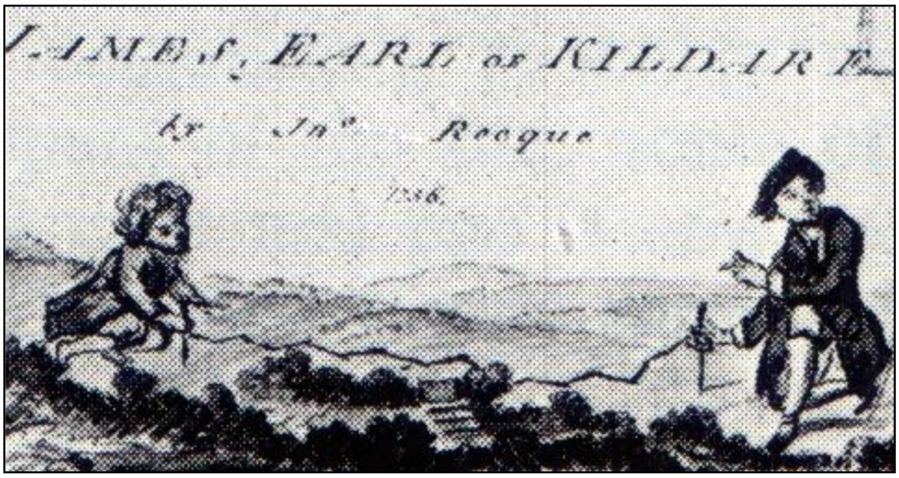

Figure.2.8. Bernard Scalé (right) using a chain during a survey of the Earl of Kildare's land 1756, John Rocque, A survey of Tullagorey (Kildare, 1756), show in Arnold Horner, 'Cartouches and vignettes on the Kildare estate maps of John Rocque' in *Ir. Georgian Soc. Bull.*, xiv, no. 4, (1971), p. 58

Given its practicalities, the chain was a favoured tool of the surveyor, and often found encouragement from land owners as well:

> Can you mention the reason why they prefer the chain in England in making enclosures?
> - I believe it is to avoid the risk of errors, especially such as might arise from taking angles, where a small inaccuracy would be of serious consequences, when lines are carried to a considerable extent.
> Was it owing to any particular prejudice which the proprietors had, or was it owing to the wish of the surveyor themselves?
> - I never head any opinion on the subject, but both parties seemed well satisfied.[93]

The relative tolerance of chain measurements was estimated to be half a link every ten chains in ideal circumstances but carelessness meant that an error of one or two links could easily occur during a survey.[94] Due to the physical wear and tear inflicted on a chain during the course of a survey, stretching of the links could become a serious issue. Both Wyld[95] and Noble[96] suggested that the chain should be measured at the beginning of each survey against a known, solid measure such as an offset staff so as to confirm the chains length or to adjust it accordingly.[97] Some surveyors though preferred to keep their chains a link or two longer than the norm to compensate for sagging of the chain during surveys, which was a bone of contention in John Bell and Peter Callan's newspaper dispute during the 1760s:

> … Peter Callan, with his two surveyors ... with their own instrument and a chain three inches too short, did survey and took field notes round the said lands … These

[93] Evidence of Dr. Kelly, *Report from select committee on survey and valuation of Ireland*, p. 84 [445], H. C. 1824, viii.79.
[94] Noble, *Geodæsia Hibernica*, p. 79.
[95] Wyld, *The practical surveyor*, p. 6.
[96] Noble, *Geodæsia Hibernica*, p. 79.
[97] 'He should measure carefully his chain, and if there be any errors therein correct them … for the chain, however useful and necessary, is not infallible', see George Adams, *Geometrical and graphical essays* (London, 1803), p. 187.

three mathematicians having examined the field notes, finds that there is an error of 36 links in the easting and westing, and another error of nine links in the northing and southing …[98]

While it was rare for a dispute about chain length to degenerate to the level that the Bell/Callan dispute did, with one threatening to horsewhip the other,[99] a long or short chain could still prejudice a survey.

George Adams referred to the chain as 'both useful and necessary' but not 'infallible' as it could suffer errors in its physical structure and the method of its use:

I have been informed by an accurate and very intelligent surveyor, that when the chain has been much used, he has generally found it necessary to shorten it every second or third day. Chains made of strong wire are preferred.[100]

Chain breakage was also a regular occurrence during surveys. Joshua Wight recorded that his chain could break up to two or three times a day but that a properly constructed chain could be a source of professional pride for a surveyor:

… excellent plantation chain, made by the ingenious Daniel Voster; the wire was well tempered and strong and the rings true, and so well turned that it never broke with me all the while nor seldom a chink in the chain, nor never opened but one in one of the rings.[101]

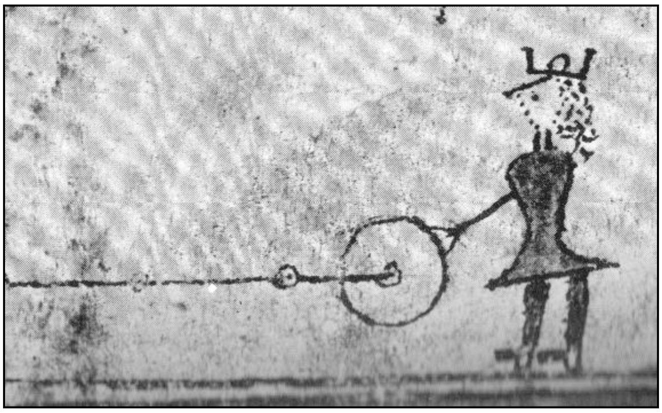

Figure 2.9 An Irish surveyor with his chain in 1768, James and Edmond Costello, A map of the land of Killamy (1768) in Ada Longfield, 'A Co. Sligo estate map of 1768' in *Irish Georgian Society*, xx, nos 3 & 4 (1977), pp 57-70.

John Hammond recommended that surveyors carry with them a small hand vice:

… that the chain may be put together again, the rings closed, and the links straightened … One of the chain men may easily carry these articles in his pocket:

[98] *Dublin Gazette*, 20 Sept. 1760.
[99] *Dublin Journal*, 21 July 1759.
[100] George Adams, *Geometrical and graphical essays*, p. 190.
[101] Joshua Wight's diary, 25 Sept. 1752 (Friends Library, Dublin).

> And it will be proper that one of them should every evening or morning before he goes into the field, examine the chain from end to end, and rectify what be found amiss.[102]

Callan could find no other solution to a stretched or broken link but to actually remove the whole link from the chain and to compensate for it in his calculations. He was also wary that other surveyors could sometimes purposely alter the length of their chains by stretching or pressing the hand-loops and offered an effective, if excessive, solution to this problem by having every join in the chain links welded shut permanently.[103]

The chain is rarely heard of, let alone seen, in the modern world of surveying. It has been replaced with more durable and reliable tapes made of synthetic materials that are very difficult to stretch or break. They are also less affected by expansion and contraction caused by heat – something that was not mentioned by any of the eighteenth-century surveying treatises consulted for this research. The measurement of the distances between stations in modern surveying has been replaced by the Electronic Distance Meter (EDM) using a modulating microwave or infrared carrier signal which is accurate to millimetre level and is not affected by the slope of the land as a chain or tape are. The chain however has left its mark in the modern surveying world, and the chainman remains an active title on surveying sites around the world.

[102] Hammond, *The practical surveyor*, p. 66.
[103] Callan, *Dissertation on the practice of land-surveying in Ireland*, p. 31.

2.4.3 The circumferentor

At the start of the eighteenth century the circumferentor was the surveyor's instrument of choice,[104] but by the end of the century it was slowly disappearing into the background to be replaced by the theodolite. Contemporary surveying treatises tell the story of how the circumferentors' fate as a relic of the past was sealed. An evolution in optics and manufacturing techniques in theodolite technology, combined with the inherent flaws of the circumferentor, led to its demise.

Circumferentors worked on the principle of measuring bearings, rather than angles as used with theodolites.[105] A bearing is a measurement in a clockwise direction from north. The circumferentor was able to perform this task as its design was similar to a large compass mounted on a tripod. Figures 2.10 and 2.11 demonstrate the instrument's use as shown in artwork that accompanied survey notes and maps. While the two Irish examples cannot bear comparison artistically with the French, they demonstrate that the instrument was important enough to feature in the surveyor's cartographic decorations. The circumferentor's main advantage was that it was of particular use in heavily forested areas where a direct line of sight could not be maintained between two survey stations.[106] The distance between stations could be measured as usual with a chain, and the network of stations could be maintained by having them all refer to the same reference point i.e. magnetic north. As such, the circumferentor was a practical instrument when surveying large country estates and demesnes. The instrument was more commonly used in Ireland and North America[107] than in Britain during the eighteenth century possibly due to its association with military surveys:

> It is not much used in England where land is valuable; but in America where land is not so dear, and where it is necessary to survey large tracts of ground, over stocked with wood, in a little time, and where the surveyor must take a multitude of angles.[108]

The circumferentor was set aside when surveying open pastureland where the theodolite could provide more accurate results.

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[104] Leybourn, *The complete surveyor*, p. 44.
[105] Wyld, *The practical surveyor*, p. 58.
[106] Leybourn, *The complete surveyor*, p. 44.
[107] '…which is much in use in America, and in some other foreign countries, for surveying woods and forests.', J. Waddington, *A description of instruments used by surveyors* (London, 1773), p. 5.
[108] Adams, *Geometrical and graphical essays*, p. 202.

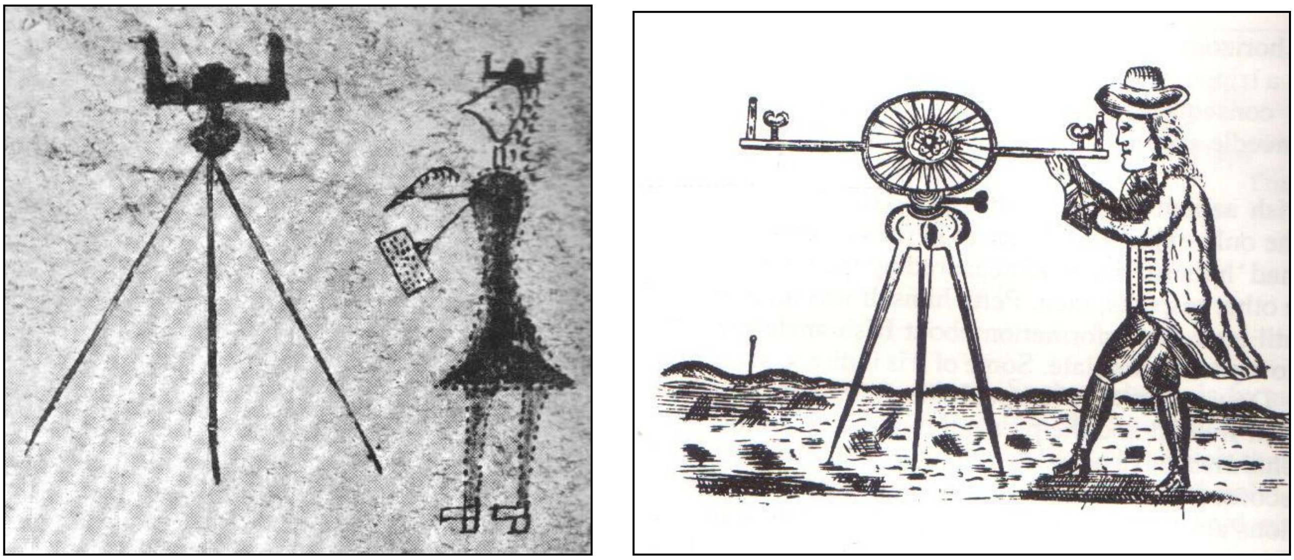

Figure 2.10 Two Irish surveyors and their circumferentors[109]

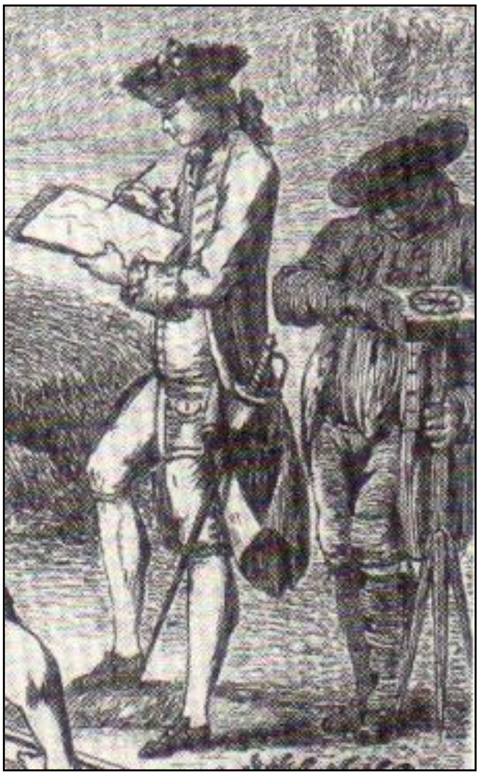

Figure 2.11 A French surveying assistant holds a circumferentor while the surveyor makes notes.[110]

[109] (L) Cork Archives Institute, U.137, Box 30; reproduced in Andrews, *Plantation acres*, p. 303. (R) James and Edmond Costello, A map of the Land of Killamy (1768) in Ada Longfield, 'A Co. Sligo estate map of 1768' in *Irish Georgian Society*, xx, nos 3 & 4 (1977), pp 57-70.

[110] Dupain de Montesson, *L'art de lever des plan* (Paris, 1763).

The name 'circumferentor' first appears in Ireland during the Down Survey[111] and went through a number of different spellings – circumvalenter,[112] sircomfrontor[113] – very often just being referred to as 'the instrument'. Elizabethan surveyor Arthur Hopton argued that the circumferentor's name was 'not aptly give', as it did not allow him to circumvent measurements.[114] The actual date of the circumferentor's appearance in Ireland is hard to determine although it is certain that the circumferentor was in use before the mid-seventeenth century, and possibly much earlier.

Figure 2.12 Image of two circumferentors faces, top – circa 1770 by Edward Spicer, Plunket Street, Dublin, recommended by Benjamin Noble in *Geodaesia Hibernica* (Dublin, 1768), p. 136, St. Patrick's College Maynooth/NUIM 344.801.2; bottom-1688 by Johannes Lewis of Dublin, St. Patrick's College Maynooth NUIM 343.801.1 (images taken by F.O'Cionnaith).

Figure 2.12 shows the faces of two circumferentors. The instrument consisted of a circular box about five or six inches in diameter, which contained a brass circular ring divided into degrees. At the centre of the box stood a vertical pin onto which a magnetically charged needle was placed that automatically pointed to magnetic north.[115] This needle was pointed at its southern end and had a small

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[111] Andrews, *Plantation acres*, p. 302.
[112] *Hibernian Chronicle*, 8 May 1786.
[113] *Dublin Mercury*, 28 Mar. 1767.
[114] Arthur Hopton, *Speculum topographicum* (London, 1611), p. 129, the instrument is also known as *La boussole* in period French surveying treatises, Loius Poussant, *Traité de topographie* (Paris, 1807), p. 154.
[115] Gibson, *Treatise of practical surveying*, p. 148.

ring at its northern end to help differentiate which side was directed towards magnetic north. Such ideas may seem simple but as Gibson points out:

> … such needles are better than those which are pointed at each end, because the surveyor cannot mistake by counting to a wrong end; which error may be frequently committed, in using a two-pointed needle.[116]

Surveyor Joshua Wight carried two needles with him:

> … but had no occasion to use but one of them, & never found it to deviate a hairs breadth all this time of my progress, which gave me great satisfaction & encouragement which I took special care of it & placed it upon the centre pin of the box in my chamber horizontal, & this I have found by long experience that the needle rather gathers strength by keeping it in such a position – and I say 'tis for want of land surveyors procuring good proof instruments, & keeping them in good order, that they fall into so many blunders & make such difference in their returns to the confusion of themselves & creating trouble for others.[117]

The circular box was covered by a glass lid to prevent the needle being affected by the weather such as wind or rain and the glass lid was in turn protected by an additional brass lid used during the transportation of the instrument. The circular box was attached to a 15-inch brass rotational index with sight apertures fixed to either end.[118] These apertures were utilised to align the instrument in the direction of a point of interest, such as another survey station, and thus allow a bearing from magnetic north to be read. The entire circumferentor was attached to a tripod by a ball and socket joint.[119]

In the course of a survey, the survey station onto which the circumferentor was set up was marked by digging up a sod of earth.[120] Occasionally a circumferentor contained one or two air-levels to assist in setting up the instrument in the most horizontal position possible.[121] Using both sights on the rotational index the instrument was directed towards either a point of detail such as a building or the next survey station. The bearing between the object to which the sights were pointed and magnetic north was recorded by aligning the magnetic needle with the 0° mark on the brass circle and then observing the angle which the index was positioned. Gibson recommended that, in order to record the positions of detail in the course of a survey conducted with a

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[116] Ibid., p. 150.
[117] Diary of Joshua Wight, 25 Sept. 1752 (Friends Library, Dublin).
[118] Gibson, *Treatise of practical surveying*, p. 148.
[119] Wyld, *The practical surveyor*, p. 55.
[120] Gibson, *Treatise of practical surveying*, p. 150.
[121] John Hood, *Tables of difference of latitude and departure for navigators and land surveyors* (Dublin, 1772), p. 7.

circumferentor, a staff with a white sheet be used to indicate the point in question.[122] This is similar to the use of reflecting staffs in modern total station surveys. Wyld stated that the circumferentor need not be set up at every station of a survey, and that every second station would be sufficient.[123] His logic was that the chain, which was usually used in conjunction with the circumferentor, could measure between the stations and the circumferentor could simply use a resection calculation to determine the stations skipped during the survey. This method, while theoretically sound, could potentially lead to the introduction of errors in the course of a survey. Gibson advised the opposite of Wyld and suggested that station positions should always be cross-checked with both backsight and foresight measurements during the course of a survey.[124] Gibson also suggested that the reading of the degrees was by far the most important point of the survey to which attention must be paid.

Despite its popularity in Ireland and its long association with surveying, the circumferentor had several innate flaws. Due to its fixed sight mechanism, objects above four or five degrees of the horizontal plane could not be seen with the circumferentor's sights.[125] If the instrument was adjusted to an angle to observe such points, the magnetic needle would be thrown out of balance and the measurement would be incorrect. Given the hilly terrain of Ireland, large amounts of time could potentially be wasted on surveys by setting up time and time again to achieve a good horizontal view of points of detail or survey stations. The needle, if not properly covered, could also be affected by wind.[126]

However, its single greatest strength also proved to be a fundamental weakness – the use of magnetic north as a reference point. The theory behind the circumferentor is sound, as there was no reference system in Irish surveying resembling the modern-day Irish National Grid. Even an early eighteenth century debate on the use of meridians gives insight at the universal lack of common reference systems during the period:

> 'Tis a vain singularity which map makers affect, of making use of various Meridians; one reckons longitude from the meridian of Corvo, another from Tenerife, a third from Ferro, London &c. Nay, one won't serve some, but they must have two or three,

[122] Gibson, *Treatise of practical surveying*, p. 149.
[123] Wyld, *The practical surveyor*, p. 59.
[124] Gibson, *Treatise of practical surveying*, p. 151.
[125] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 32.
[126] Ibid., p. 33.

and very often whence longitude is computed, for want of having it remark'd in the map. Is it not as easy for our geographers, (I am sure it is better) to fix upon one Meridian among themselves, from whence longitude should always be computed? As for instance, let the meridian of London be the first meridian, which is fittest, because it is more satisfactory to a Britton to know the distance of all places from his own country, than from another: And the question is, how far is such a place from London, not from Tenerife, or Ferro, of which one cannot have so good an idea of, if any at all.[127]

The nearest a surveyor could get to a reference system were reasonably accurate latitude and longitude values, but these were not always the most practical measurements to take given the poor weather of Ireland and the time involved in actually taking the readings. Thus bearings, all taken from the same reference point, i.e. magnetic north, were a quick, easy and cheap method of aligning scattered surveys or large estate surveys. But this method was also inherently flawed. Local and global variations in the earth's magnetic field introduced errors[128] that were unacceptable in high precision surveys. These magnetic errors, either from local magnetic anomalies or from the earth itself, were common knowledge as far back as the Down Survey when Petty feared that the weapons and armour carried by his surveyors would cause the needle of the circumferentor to give false readings.[129] Joshua Wight also noted the presence of such anomalies whilst using the circumferentor during his career:

… its performance is very liable to attraction by minerals that hid from us, & unseen, especially on or near the mountains, which I have found by many years experience that my needle have faltered two degrees in some places.[130]

English surveyor John Love wrote that:

This last instrument [the circumferentor] depends wholly upon the needle for taking of angles, which often approves erroneous; the needle easily of it self varying from the true north, if there be no iron mines in the Earth, or other accidents to draw it a side which in mountainous lands are often found: It is therefore the best way for the surveyor where he possibly can, to take his angles without the help of the needle, as is before showed by the semicircle: But in all lands it cannot be done without exceeding great trouble, as in exceeding great woods &c. It is good therefore to have such an instrument with which an angle in the field may be taken with or without the needle as is the semicircle, than which I know no better instrument for the surveyors use yet made public.[131]

[127] John Green, *The construction of maps and globes* (London, 1717), p. 148.
[128] J. Waddington, *A description of instruments used by surveyors* (London, 1773), p. 7.
[129] Andrews, *Plantation acres*, p. 302.
[130] Diary of Joshua Wight, 25 Sept. 1752 (Friends Library, Dublin).
[131] John Love, *Geodaesia* (London, 1688), p. 159.

Wyld gave a number of suggestions to correct minor variations of the needle in the field if the surveyor suspected that his instrument was being affected:

> If you have a suspicion that the needle doth not play well…then with a clean knife, key, or any bit of polish'd steel, that hath touched a loadstone, move the needle by applying it to the box, and examine when it hath settled again what degrees it then points at, … the cap and pin must be cleaned with some brown paper and a little putty, and thereby freed from such dust or dampness that hath gotten to it; if after all the needle does not play freely, place in the box another pin, or use another needle, or do both, and these necessaries a surveyor ought to have in his pocket while he is in the field.[132]

Regardless of how many keys or spare needles a surveyor might have at his disposal during a survey, nothing could prevent a large iron deposit or metallic impurities within the instrument itself from throwing measurements off. John Hood quoted Mr. Anderson's theories into the cause of magnetic variation in which he speculated that natural phenomena were to blame:

> This variation is much greater in summer than in winter, and is always irregular during the Aurora Borealis.[133]

Aside from local variations in the magnetic field a greater threat came from magnetic variation caused by the constant movement of the magnetic north pole. Unlike true north, magnetic north varies depending on the observer's position on the earth and the year in which the reading was taken. For example, if a surveyor set up a circumferentor and established that magnetic north varied from true north by 2° west he would find that after a year this difference had either increased or decreased despite the measurement being taken at the exact same point. To complicate matters, the reading of magnetic north also varies depending on the observer's position on the earth, thus a reading taken in London and Dublin at the exact same time would not necessarily be the same. Research data from 2005 suggests that the magnetic north pole could potentially migrate from the Canadian artic to Siberia by 2050.[134] Surveyors of the eighteenth century were unaware of the magnetic north pole's location as James Clark Ross discovered only it in 1831.[135]

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[132] Wyld, *The practical surveyor*, p. 60.

[133] John Hood, *Tables of difference of latitude and departure for navigators and land surveyors* (Dublin, 1772), p. 5.

[134] Magnetic north pole drifting fast, www.news.bbc.co.uk/1/hi/sci/tech/4520982.stm.

[135] Geomagnetism – History of Expeditions of the North Magnetic Pole, www.gsc.nrcan.gc.ca/geomag/nmp/expeditions_e.php.

Like many controversial or sensitive topics that affected Dublin's eighteenth-century surveyors, investigations into magnetic variation were followed by heated exchanges in the press, often to a degree that would be considered libellous, excessive and threatening by modern standards. However, the fallout from mathematician Thomas Harding's investigations on the subject makes the Rocque/Kendrick competition or even the Callan/Bell debacle seem mild.

On 29 May 1786, Dublin mathematician Thomas Harding published the findings of his investigations into magnetic variation.[136] During the course of that month he had taken nineteen separate readings of magnetic north and found that it lay on average 26°21' west of true north. By comparing his results to those of years past, Harding concluded that the westward movement of magnetic variation was a regular and calculable occurrence:

> This unaccountable attractive virtue (whether resident in the atmosphere or in the earth is equally uncertain) has engaged the attention of many since the invention of the mariner's compass but in no particular so much as its wonderful change of position, which appears to be as uniform as any other motion of the solar system.[137]

He concluded by stating that he was unsure if this westward trend would ever stop. He also theorised that the magnetic north and south poles could reverse polarity and positions, which at the time was unheard of by scientists but is today regarded as a known occurrence.[138] Harding reached a figure of a westward movement of 13 minutes per annum.

Almost a month later a response was printed in the *Hibernian Journal* regarding Harding's work, and it was not a positive one. Harding's opponent, *Magneticus in Angelo*, in the course of his short reply managed to dismiss every one of Harding's

[136] Knowledge of magnetic variation was not restricted to those in the scientific, mathematical or surveying professions. In Mary Shelly's Frankenstein, the narrator's original mission is to try and locate the cause of magnetic variation - 'I may there discover the wondrous power which attracts the needle; and may regulate a thousand celestial observations, that require only this voyage to render their seeming eccentricities consistent for ever', Mary Shelly, *Frankenstein* (London, 1818), p. 1.

[137] *Hibernian Journal*, 29 May 1786.

[138] Earth Changes: Magnetic Field Reversal , www.pureenergysystems.com/news/2005/02/27/6900064_Magnet_Pole_Shift. This has been proven to have occurred on several occasions shown by changing polarity of rocks extradited from the mid-Atlantic ridge rift system. Such samples have significantly expanded knowledge of seafloor spreading and helped explain continental drift theory.

findings stating the a reversal of the magnetic poles was an impossibility and even going so far as to assert that:

> The variation of the compass is neither essential in surveying …[139]

Despite *Magneticus* recognition of Harding's mathematical abilities, he also mentioned that the determination of magnetic variation is something that:

> … every common seaman and surveyor, know also how to find.[140]

Harding failed to respond to *Magneticus in Angelo's* initial reply, so it was again printed in the *Volunteer's Journal* sometime between June and August 1786. This second publication was enough to cause Harding to respond to his antagonist in the *Hibernian Journal*. Calling *Magneticus* 'an obscure writer', Harding defended his claim that knowledge of the variation of the needle was essential to surveying and stated that *Magneticus* obviously was not familiar with the science of surveying. Noting that *Magneticus* failed to supply any figures to support his dismissal of Harding's work, Harding challenged him to back up his claims with evidence:

> I therefore call upon him for the proof of his objections: If he advances an iota of any thing like reasons, I shall corroborate what I have said by abundant authorities; if he withholds them from the public, I shall take no further notice of an illiberal anonymous writer, who only substitutes assertion for demonstration and abuse for argument.[141]

As a parting shot, possibly to demonstrate his knowledge on the subject with the hope of deterring *Magneticus* from questioning his theories again, Harding printed a one-line quote from the first century Roman poet and astronomer Marcus Manilius:

> Ornari re ipsa negate, contenta doceri.[142]

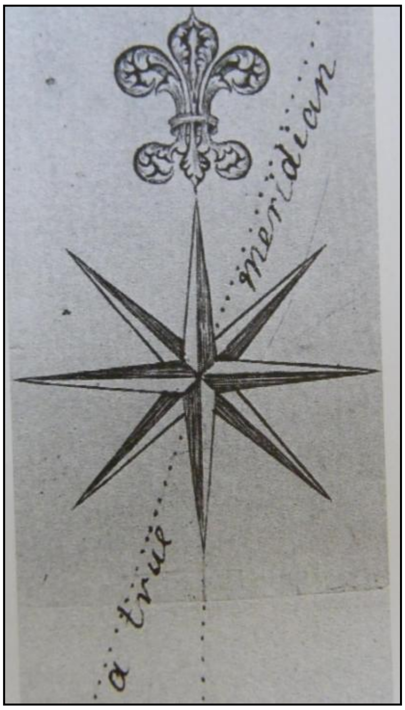

Figure 2.13 Roger Kendrick, *Map of Glanas Moin in the parish of Tallaght* (Dublin, 1752), showing magnetic variation.

Magneticus accepted the challenge and the next instalment of the literary battle appeared in September 1786. Harding appeared to have hit a raw

[139] *Hibernian Journal*, 26 June 1786.
[140] Ibid.
[141] Ibid., 30 Aug. 1786.
[142] 'All ornament my theme forbids, content if it be taught.'

nerve with *Magneticus* regarding his obscurity as one of his opening insults directed towards Harding states:

> … for how could he consign to obscurity, a person whom he has already affirmed to be an *obscure writer*.[143]

Magneticus listed readings taken from several mathematicians and astronomers including Burrows (1580), Gunter (1622) and Graham (1722), quoting their figures of magnetic variation and stating that the change in this variation was not regular or predictable. *Magneticus* continued his insults by implying that Harding's knowledge of simple mathematics was either missing or he must have had an uncommon knowledge of it. He asserted that Harding mistook what he said about variation not being important to surveying, but rather the knowledge of obtaining the variation and applying it was more important than actually understanding how it occurred.[144]

Four days later Harding produced his next defence by stating in great detail the results of his work. He gave the positions of the sun at the various times he performed his calculations, which was necessary to see how far magnetic and true north differed. He also determined that of the nineteen readings he took to calculate the magnetic variation, the greatest differentiation from the mean was in the region of 16 minutes and this was followed by the details of his calculation which gave him the magnetic variation 26° 20' for May 1786. Harding followed his explanation of his calculation by quoting the results of those scientists previously mentioned by *Magneticus* to defend his findings. By this stage of the newspaper battle Harding appears to have grown tired of defending his work month after month and testified that he had supported his work to the fullest and was walking away from the argument:

> Hereafter *Magneticus* may snarl on, while he can get a corner in a newspaper to creep into; I, for my part, shall not endeavour to unkennel the cur. Like his variation, he may shift as he pleases, and bungle on in his usual uncertainty. I am determined to be uniform in one point, which is, that he shall never extort another *syllable* from me on the subject. Every word here is my own, which is a sufficient display of the comparative abilities of *Magneticus* in Angelo. Thomas Harding, Meath Street, Sept. 5 1786.[145]

Magneticus delivered his response to these insults with equal force and venom:

> On observing Mr Harding appearing before the public with an air of sufficiency, putting off his nostrum vapours of false science, which floated for some time past in

[143] *Hibernian Journal*, 4 Sept. 1786.
[144] Ibid.
[145] Ibid., 8 Sept. 1786.

> the whimsical atmosphere of his brain, but are now happily dispersed without contaminating the understandings of the incautious with its noxious tendency …[146]

and,

> In his last address to the public, he concludes thus "every worked here is my own"; but I can prove, if called upon, that he had the assistance of a certain mathematician, whereas I had not the smallest from any ...[147]

Between the insults and insinuations, however, *Magneticus* introduced a number of interesting ideas. He explored the possibility that magnetic variation was not the same when measured at two different points on the earth and that Harding's use of readings from both Dublin and London was an inherently flawed methodology. He also referred to the work conducted by a M. Le Monnier who in his memoirs affirmed that the magnetic variation in Paris was stationary for several years before his time and that it had repeated this stationary pattern in 1773. Cracks were beginning to appear in Harding's work, and while his argument with *Magneticus* had ended, there were others in Dublin more than willing to take up the challenge of attacking Harding's findings.

The next salvo directed towards Harding came almost a year later in August 1787 from another critic under the pseudonym of 'A Linen Draper'. One might suspect that the linen draper and *Magneticus* were the same person, but their writing styles and demonstration of scientific knowledge seem quite different so it safe to assume that they were in fact two separate individuals. Draper's argument began much as *Magneticus* left off – that Harding's work was only relevant in calculating the present magnetic variation and that any attempts to predict future variations would be impossible because the variation was random rather than regular as stated by Harding. To support his argument, Draper gave the following examples of magnetic variation:

[146] *Hibernian Journal*, 13 Sept. 1786.
[147] Ibid.

Location	Years	Degree/Minutes	East/West
London	1580	11°15m	East
	1622	6°0’	East
	Difference is 5° 15’ over 42 years which on average 7’ per annum		
London	1692	6° 0’	West
	1722	14° 13’	West
	Difference is 8° 13’ over 30 years which on average is 7’ per annum		
Dublin	1722	11° 15’	West
	1751	19° 0’	West
	Difference is 7° 45’ over 29 years which on average is 16’ per annum		
Paris	1640	3° 0’	East
	1666	0° 0’	-
	Difference is 3° over 26 years which on average is 6’ per annum		

Table 2.2: *A Linen Drapers* examples of magnetic variation, 1580 to 1751.[148]

It is clear from these calculations that magnetic variation does not change at the same rate for every location and Draper continued by stating that Harding either ‘wilfully or ignorantly endeavoured to mislead the public’.[149]

Possibly trying to maintain some dignity after the *Magneticus* debate, Harding failed to respond to Draper’s public challenge. On 8 September 1787 Draper again published his opinion on Harding’s work, this time being far more vocal in his concern about the level of truth behind it. Referring to Harding as a ‘modern Merlin’, Draper’s personal opinion of Harding was made clear with his opening statement:

> There is a certain description of people we sometimes meet with, who are so wedded to their own opinion, however erroneous, that they will risqué every thing in sport of it; and it is very observable that the more chimerical this opinion is, the more inflexible such persons are in defend it – of this class your correspondent Mr. Harding seems to be one.[150]

To demonstrate the errors behind taking magnetic variation readings from the same location but from dates decades apart, Draper gave the following example:

> Suppose I engage to perform a journey of 500 miles *uniformly* in 5 weeks: Here if I travel 100 miles per week, (neither more nor less) it is evident I fulfill my engagement, for this is a *uniform* motion; but if I travel 10 miles the first week, 20 the second, 30 the third, and so on, here it is equally evident that though I may perform the journey within the time, still it is not by a *uniform motion*, but a very

[148] *Freeman’s Journal*, 30 Aug. 1787.
[149] Ibid.
[150] Ibid., 8 Sept. 1787.

desultory one, for no two days journey are alike; yet this is Mr. Harding's idea of uniformity! – This is precisely his mode of proving his position.[151]

The logic behind Draper's argument was scientifically sound. If Harding had taken magnetic variation readings over a series of years from the same location and could show that the change in variation was uniform over this time then Harding's theory would be correct. But he failed to do this. Instead he chose a narrow sample of results on which to base his findings. In table 2.2 both sets from London give an average change of 7' per annum, yet there is no way of telling whether this change was uniform over the forty-two and thirty year gaps. Modern research has shown that the speed of magnetic variation is not uniform but can increase or decrease in any given year thus proving that Harding was wrong.[152] There is also evidence that Draper had some knowledge of surveying as he quotes Robert Gibson's treatise on surveying challenging Harding that:

… if he knows a better authority than Gibson, let him cite it …[153]

Figure 2.14 Winged putti observe the position of a magnetic needle, William Petty, *Hiberniae delineatio* (London, 1685).

151 Ibid.
152 Magnetic north pole drifting fast, *www.news.bbc.co.uk/1/hi/sci/tech/4520982.stm*.
153 *Freeman's Journal*, 8 Sept. 1787.

Such constant attacks on his work were too much for Harding and he finally broke his silence in mid-September when he published a retort in the *Dublin Journal* either under his own name or using the pseudonym *Verax*. Unfortunately for modern researchers the issue of the *Dublin Journal*, which contained Harding's response, has been lost but its effects on Draper were quite obvious from his next article in the *Freemans Journal*. The anger behind Draper's words are almost palpable as phrases like 'incorrigible block head', 'vanity of being thought a discoverer first stimulated him to broach the opinion' and 'vomit forth his crude, frothy ideas in the face of the public' are found throughout the article of 20 September 1787. Apparently in the missing *Dublin Journal* article, Harding had insinuate that Draper was of poor moral standing, was 'a scoundrel, a pilferer &.c' and that he had simply used *Magneticus*'s ideas as his own. These accusations were repeated in an article of the *Volunteer Evening Post* at around the same time and seem to have prompted Draper to issue a direct challenge to Harding. Draper proposed that the two men meet and conduct a number of measurements on variation themselves, all under the supervision of a set of judges appointed by both Harding and Draper. Draper insisted that at least half of these judges be made up of fellow linen drapers and that a knight from Ballyfermot Castle also be appointed to review their work. Harding could appoint the remainder of the judges if he chose to accept the challenge.[154]

Harding failed to respond to the challenge. By October 1787 Draper was accusing Harding of being the laughing stock of European mathematics and pointed out that no land surveyor had rallied to his cause. Harding had published an address to the surveyors of Ireland in the *Volunteer Evening Post* saying that by retaking two of his readings, he had proven that his theory was correct. Draper accused Harding of claiming that he had stated that the variation occurred at the same rate of change all over the world, so Harding should have gone to London or even the Straits of Magellan to take these new readings. Draper, like Callan in his argument with Bell, suggested that his opponent was suffering from mental delusions and that:

> … we must only prevail on his friends to make him a present of a strait waistcoat, and procure him apartments in Swift's hospital.[155]

[154] Ibid., 20 Sept. 1787.
[155] Ibid., 9 Oct. 1787.

At this point a third and unlikely player entered the melee – John Heylin, a land surveyor from Mount Wilson near Edenderry Co. Offaly. Heylin was a firm supporter of Harding's work, it was possibly after having read Harding's address to Ireland's surveyors that Heylin decided to voice his opinion in the press:

> I cannot decline the opportunity which now offers, of testifying, in this public manner, my grateful sense of the advantages I received from your observations on the variation of the compass or magnetic needle. Having in the course of the last month taken a re-survey of a tract of land survey in the year 1724, during the interval the greater part of the ancient mearings were totally defaced – the map was perfectly safe – and the variation at that time (as appeared by the map was 13 degree 15 minutes westerly. After having taken a fresh bearing of such of the stationary lines of the old survey as were not defaced, and comparing them with the bearings taken in 1724, it appeared clearly that the bearings taken at that time were less than present by 12 ¼ to 12 ½ degrees each yearly. This decrease, rightly applied (being nearly equal to the increase of the variation) I found to answer every necessary end and purpose – the lost or defaced mearings were perfectly restored – 9A,2R.,27P regained and the true content of the land ascertained with the greatest certainty.[156]

Heylin made a mistake in stating that the change was 12 1/2 degrees a year, meaning minutes instead, but he did prove one of the advantages to surveying of knowing magnetic variation. By being able to compare his measurable bearings with the change in magnetic north since the time of the original survey, Heylin was able to deduce the location of the missing boundaries of the property. Using magnetic north as a common reference system in this case helped solve a serious surveying problem, but Heylin's defence of Harding fell well short of the mark. He was correct in stating that there had been a change in magnetic north between the two surveys, but again jumped to conclusions that this change had been uniform over the time period. Again, the sample data was simply too limited to prove that Harding was correct in his reasoning.

Harding's critics were closing in. Not only had *Magneticus in Angelo* and *A Linen Draper* gone against Harding in the newspapers, but so had a Mr. Walsh of Waterford and Mr. B of Chatham Street Dublin – a group that Draper referred to as 'this thundering legion'.[157] The newspaper discussion did, however, end on a somewhat positive note, as Draper extended a hand to Harding saying:

[156] Ibid., 11 Oct. 1787.
[157] Ibid., 16 Oct. 1787.

> … yet if he can behave himself for five minutes, and knows any person with whom he has interest sufficient to borrow a *clean shirt*, he has the Linen Draper's permission to make on the party.[158]

So who was correct in their theories – Thomas Harding or the thunderous legion?

It seems that Harding's theories, though interesting, were wrong. While it was practical to have a catalogue of the magnetic variation for different parts of the country to compare past and present surveys, as demonstrated by Heylin's case study, there was simply no way to determine that the variation changed at regular and calculable intervals and that future values could be determined. Even in the twenty-first century, the position of the magnetic north pole is something of a hit or miss science, albeit with a higher chance of being close to the true value than Harding's estimations. Surveying by its definition cannot rely on approximate figures. Surveys must be produced to the highest standards of precision and accuracy possible so eighteenth century estimations of future magnetic variation values would not have been adequate for surveyors use. To prove that Harding was incorrect it is necessary to examine magnetic variation values over a period of several centuries. Figure 2.15 shows the movement of magnetic north as observed from London from 1580 to 1910. The value of magnetic north moved from just above 10° east in the mid sixteenth century to 12° west by 1859. If Harding's theory were correct, there would be a smooth and equal movement of magnetic north over this period. By focusing on the longest continuous set of data available on this sample set (1859 to 1885 – figure 2.16 and table 2.3) it becomes clear that the movement during this period was not steady as Harding stated it would be, but in fact becomes stationary during the 1820s and then changes direction in the following decades.

[158] Ibid., 16 Oct. 1787.

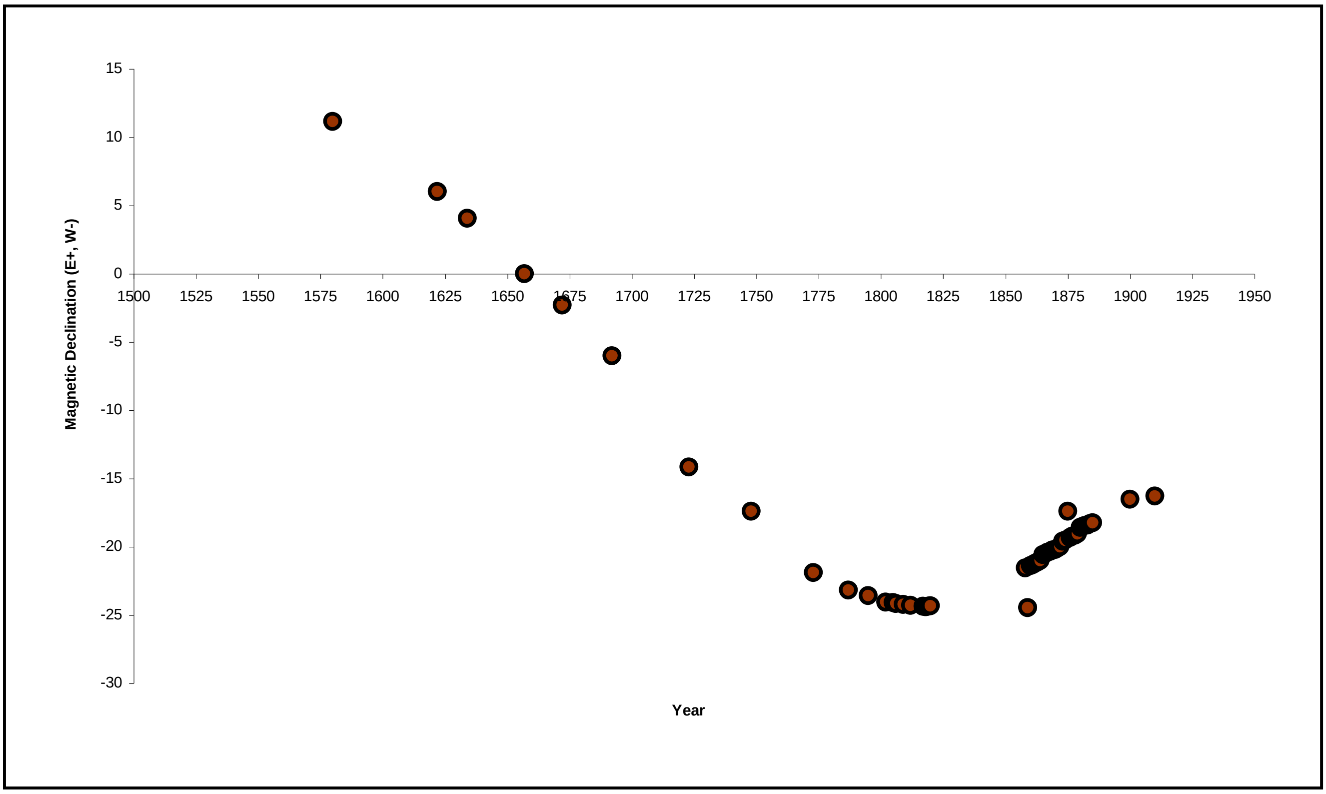

Figure 2.15: Magnetic variation as recorded in London, 1580 –1910.[159]

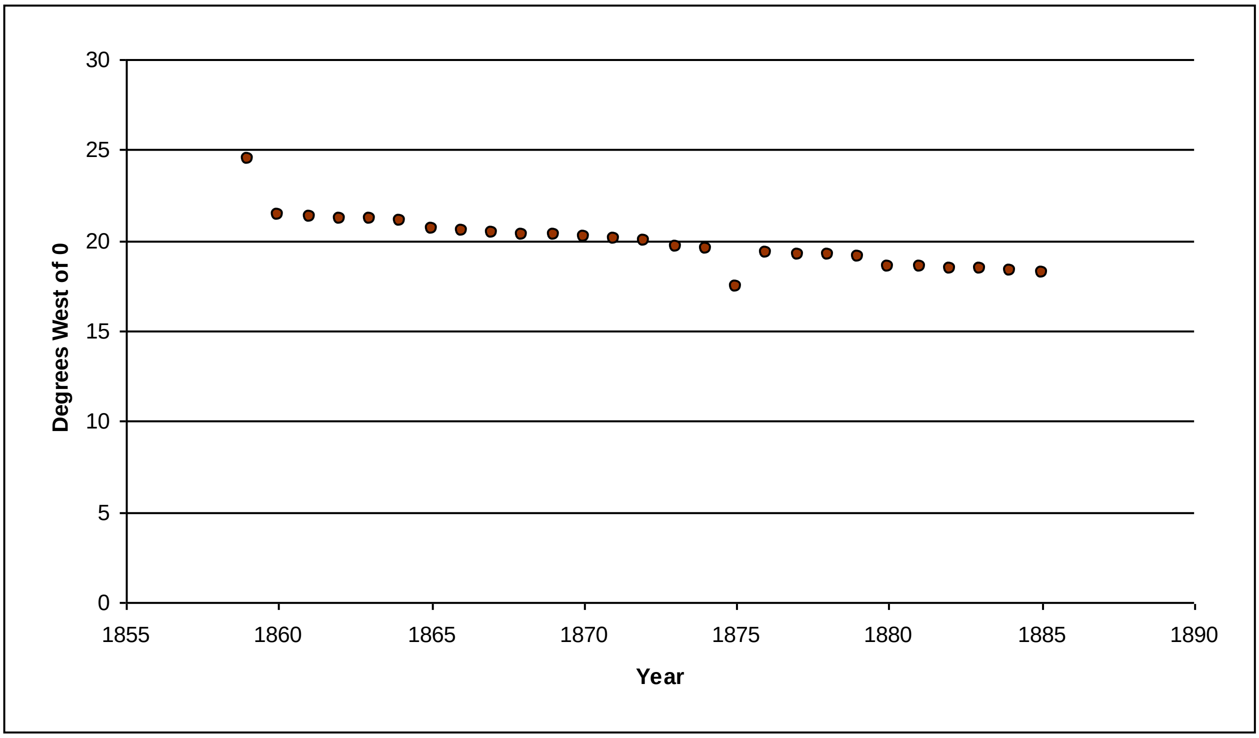

Figure 2.16: Magnetic variation as recorded in London, 1859 – 1885, showing uneven change in variation[160]

[159] Based on figures from Gerard Le Turner, *Scientific instruments (1500-1900)* (London, 1998), p. 40.
[160] Ibid.

1859	24°47’W
1860	21°40’W
1861	21°32’W
1862	21°23’W
1863	21°13’W
1864	21°03’W
1865	20°59’W
1866	20°51’W
1867	20°40’W
1868	20°33’W
1869	20°24W
1870	20°19’W
1871	20°10’W
1872	20°00’W
1873	19°58’W
1874	19°52’W
1875	17°41’W
1876	19°32’W
1877	19°22’W
1878	19°14’W
1879	19°06’W
1880	18°57’W
1881	18°50’W
1882	18°45’W
1883	18°40’W
1884	18°32’W
1885	18°25’W

Table 2.3: Magnetic variation in London from 1859 to 1885, based on figures from Gerard Le Turner, *Scientific Instruments (1500-1900)* (London, 1998), p. 40.

In 1791 Harding republished a slightly amended version of his theories. Again stating that magnetic variation was regular, with a change of 12’20”annually, he attempted to demonstrate his theory using variation values from 1657 to 1791 taken in Dublin only.[161] Taking an initial measurement from a 1657 observation, Harding then (willingly) continued to state that he could only determine measurements for 35% of his selected period:

> I cannot avoid remarking, with a degree of astonishment, that there is not one observation on the variation of the needle to be found in any of our city records from the year 1657 to the year 1745.[162]

This automatically throws doubt on his theory. Harding could not quantify the value of magnetic variation for 65% of his test period yet was using the entire 134 year period to valuate his results. Magnetic variation may have changed wildly from 1657 to 1745, however Harding failed to take this possibility into account or even acknowledge it. Two observations, one in 1712 by Joseph Moland (11°15’) and another mentioned by Gibson as being from 1722 (also 11°15’), were highlighted by Harding. However, he dismissed both of these as they did not correspond with his theory, referring to Gibson’s reference as:

> … a mistake, probably an error of the press.[163]

He continued to suggest that the work of Roger Kendrick while he was city surveyor in the 1750s was also dubious as:

> … I conclude the variation was 19 degrees westerly, and not in 1751 or 1752, as Mr. Gibson has noted it, and consequently it could not be so in 1753, when Mr. Kendrick, the City Survey, sanctioned it with the authority of his name.[164]

[161] A wise precaution as it was one point noted by his critics in their 1787 articles about his work.
[162] Thomas Harding, *Observation on the variation of the needle* (Dublin, 1791), p. 4.
[163] Ibid.
[164] Ibid., p. 10.

Harding's poor scientific logic and dismissal of historical data that did not correspond with his test model during his second attempt of determining a predictable set of figures for magnetic variation again doomed his theory to failure. Harding's theories, whilst fundamentally flawed, give a level of understanding into eighteenth-century knowledge of magnetic variation, which was of importance for surveyors using circumferentors.

In short-term work the circumferentor could perform any necessary surveying task, but its system was simply too exposed to errors introduced from magnetic sources to enable it to survive as a practical instrument into the modern era.[165] The improvement in theodolite technology throughout the eighteenth century was the final blow to the circumferentor. The theodolite offered a level of precision that the circumferentor simply could not offer due to the latter's reliance to an ever-changing reference source. William Gardiner highlighted the technology gap between the theodolite and circumferentor in his 1737 treatise:

> In surveying commons, roads, or waste-lands, where only the shape of the boundens and the length of the lines are required nearly, but not with accuracy either in them or the quantity, the circumferentor may do well enough for the angles … but it is by no means a fit instrument for taking a plan, where exactness is required; because we can't be certain of its' giving any particular angle … I have frequently found my needle varying more than five degrees [compared to a theodolite measurement].[166]

The circumferentor, in essence a pre-eighteenth century surveying instrument, appears to have followed the same pattern as other Down Survey traditions practised by eighteenth-century Irish surveyors. It was adopted en masse after outside intervention, was not improved technically but became the primary surveying instrument, and had a slow decline despite the presence of superior surveying technology, i.e. the theodolite, which may have been beyond the price range of many Irish surveyors. By the first half of the nineteenth century, however, the circumferentor's connection with the Irish surveying community had virtually ceased, thus ending a centuries-long connection.

[165] A modern analogy to the issue regarding magnetic variation would be that of signals from the GPS system being regarded as unreliable due to erratic changes. Such an error cannot occur in GPS due to accuracy monitoring and known levels of positional compensation.
[166] William Gardiner, *Practical surveying improved* (London, 1737), p. 49.

2.4.4 The theodolite

The theodolite came to the forefront of surveying during the eighteenth century and has remained in a dominant position ever since. Despite the addition of computer software, speed-of-light distance measuring and onboard Geographic Positioning System (GPS) equipment, the basics of theodolite technology remain the same as it was during the eighteenth century. The instrument is built around two circles, one horizontal, the other vertical, each divided into degrees, minutes and seconds. The horizontal circle is used to measure the horizontal angle from the instrument's position to the observation point. The vertical circle is used to measure the vertical angle between the theodolite and the point on which it is aimed.[167] The addition of a vertical circle created a distinct advantage over the circumferentor as the theodolite could then be used to pick up points above or below the horizon of the instrument. This vertical angle could convert slope distances to horizontal distances and was useful when conducting façade surveys of buildings.[168] The theodolite, when available, was the preferred instrument for working in large open areas for many surveyors:

Figure 2.17 John Rocque pictured beside his theodolite, 1756, John Rocque, A survey of Tullagorey (1756), in Arnold Horner, 'Cartouches and vignettes on the Kildare estate maps of John Rocque', in *Bulletin of the Irish Georgian Society*, xiv (1971), pp 57-71.

> As in laying down of a spacious business, I would advise him to use the circumferentor or theodololite, and for townships and small enclosure the Plain Table, so altering his instrument according as the nature or quality of the ground he is to measure doth require.[169]

The distinguishing feature of the instrument was the telescopic sights from which to observe points.[170] The whole apparatus was attached to a tripod during a survey and occasionally the instrument also contained a circumferentor that could be used to align surveys stations to magnetic north[171] and which Wyld described as:

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[167] Wyld, *The practical surveyor*, p. 35; Thomas Breaks, *A complete system of land surveying* (Newcastle-upon-Tyne, 1771), p. 288.
[168] An example of façade surveys using a theodolite can be seen in Bernard Scalé's *Five plates of the houses of parliament* (Dublin, 1767).
[169] Leybourn, *The complete surveyor*, p. 41.

> … being the most absolute instrument yet invented for surveying land.[172]

Some surveyors found this combined instrument offered many advantages in their fieldwork:

> This double observation is of great use to the surveyor; fore [sic] hereby he may either plot by the angle, or the bearing, or by both, as he shall find most convenient; and also, may prove his observations before he moves the instrument.[173]

This combination of theodolite and circumferentor represented a halfway point in the evolution of the theodolite's use in Ireland. Surveyors at the time would have been accustomed to using the circumferentor and were reluctant to replace it completely given its advantages when working on scattered land plots. Yet they must also have been aware of the technical advantages that a theodolite could bring to a survey, being free from magnetic interference. Gibson mentioned such a combination in his surveying treatise:

> This instrument will either give the angles of the field, or the bearing of every station distance line, from the meridian as the circumferentor and quartered compass do. [174]

A common feature of eighteenth-century theodolites was a horizontal circle measuring approximately twelve inches[175] in length. The largest example constructed during the eighteenth century was Ramsden's thirty-six inch theodolite built for the Royal Society and used in the establishment of a triangulation network between England and France in the 1780s.[176] Due to the increased size of the horizontal circle in Ramsden's instrument, more accurate readings could be taken thus making it ideal for high precision work.

Like most surveying instruments, the exact date of the theodolite's introduction to Irish surveying is unknown. An instrument called a 'theodelius', more than likely a progenitor of the theodolite, was in use by at least 1611 in Britain.[177] The instrument

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[170] Adams, *Geometrical and graphical essays*, p. 217. Waddington mentions three separate types of theodolite, the most preferred having a telescopic sight. The other two were described as 'The common sort with plane sights and a small radius…A better sort with plane sights and 10 or 12 inches diameter…', J. Waddington, *A description of instruments used by surveyors* (London, 1773), p. 5.
[171] Wyld, *The practical surveyor*, preface.
[172] Ibid., p. 35.
[173] Hammond, *The practical surveyor*, p. 19.
[174] Gibson, *Treatise on practical surveying*, p. 155.
[175] Ibid. Leybourn, *The complete surveyor*, p. 43.
[176] Edwin Danson, *Weighing the world* (Oxford, 2006), p. 215.
[177] Arthur Hopton, *Speculum topographicum* (London, 1611), p. 136.

is noted in late seventeenth-century English surveying treatises[178] whilst canal surveyor Richard Castle claimed to have brought the first theodolite to Ireland during the 1730s:

> The survey and the level may be taken at the same time, by the means of an instrument newly invented some time before I left England. I brought one of them over with me, which perhaps is the first of its kind brought into this kingdom.[179]

The first known visual record of the instrument identified in the course of this research is shown in figure 2.17 when it appeared in the margins of a map produced by John Rocque for the Earl of Kildare in 1756. The tribrack that connected the theodolite to the tripod was made of wood in early examples but was replaced by a brass fixture by the 1720s.[180] This suggests that the instrument was well established in England at least before the end of the seventeenth century and into the early eighteenth century.[181] Gibson,[182] Callan,[183] and Wyld[184] were aware of the instrument's advantages over both the plain table and the circumferentor. Wyld stated that the advantages of a theodolite over the plain table were obvious as the plain table's paper sheets were affected by damp weather conditions, all too common in Ireland. These could cause the paper to become distorted, undermining the accuracy of the survey.[185] Gibson praised the instrument's adaptability to the difficult terrain and conditions that were often encountered by Irish surveyors:

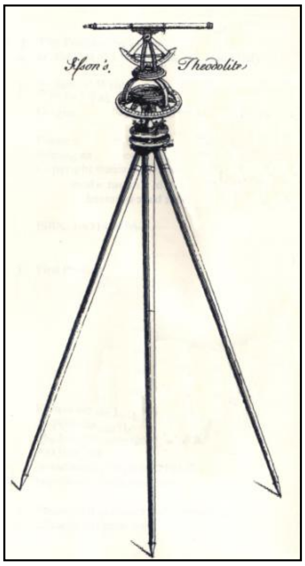

Figure 2.18: An eighteenth century Theodolite including inbuilt circumferentor, Samuel Wyld, *The practical surveyor* (London, 1725), preface.

> This instrument may be used in windy and rainy weather, as well as in mountains and hilly grounds; for it does not require an horizontal position to find the bearing, or angle, as the needle doth; and therefore is preferred to any instrument that is governed by the needle.[186]

Thomas Burgh also held the instrument in high

[178] Leybourn, *The complete surveyor*, p. 43.
[179] Richard Castle, *Essay on artificial navigation* (Dublin, 1730), p. 7.
[180] Wyld, *The practical surveyor*, p. 37.
[181] Leybourn, *The complete surveyor*, p. 43.
[182] Gibson, *Treatise on practical surveying*, p. 160.
[183] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 30.
[184] Wyld, *The practical surveyor*, p. 66.
[185] Ibid., p. 34.
[186] Gibson, *Treatise on practical surveying*, p. 160.

regard:

> The best instrument I have yet seen for the purpose of surveying is a Theodolite, with two concentric circles, made by Mr. Gabriel Stokes … which not only avoids the inconveniencies, but corrects the errors of the needle.[187]

Callan's opinion seems to suggest that the theodolite was a complex instrument to master but that its advantages to a surveyor outweighed any difficulties with learning the instrument's operation:

> But the theodolite containing, as it were, all the rest [semi-circle, circumferentor, plain-table], and being held in most esteem by the best artists, I shall confine myself to the description of it only; for he that knows how to use the theodolite, cannot fail to know how to use any instrument of the like nature.[188]

The eighteenth century therefore marked a revolution in surveying technology in Ireland with the development of a reliable surveying instrument unaffected by magnetism or poor weather. However, penetration of the theodolite to all areas of Ireland was not universal and the instrument was still unused by Limerick surveyors as late as 1843:

> [Circumferentors were] in the hands of every surveyor.[189]

The theodolite was operated in a similar fashion as the circumferentor with the instrument being set up on a station and the telescope or limbs being used to record the angles of relevant points from a reference point. Telescopic sights were preferred for theodolites, however their absence and replacement with more traditional sights did not render the instrument useless:

> In proportion as science advance, we find ourselves standing upon higher ground, and are enabled to see further, and distinguish objects better than those that went before us ... theodolites with telescopic sights are, without doubt, the most accurate, commodious, and universal instruments for the purpose of surveying, and have been recommended as such by the most expert practitioners and best writers on the subject, as Gardiner, Hammond, Cunn, Stone, Wyld, Waddington &c.[190]

For a circumferentor this reference point was always magnetic north, but for the theodolite the reference system was arbitrary. Common surveying practice uses an RO or Reference Observation, usually the previous survey station. At the end of the survey these stations would be plotted first using a mathematical surveying technique

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[187] Thomas Burgh, *A method to determine areas of right-lined figures universally* (Dublin, 1724), p. 13.
[188] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 30.
[189] Patrick O'Shaughnessy, *Practical surveying* (Dublin, 1843), p. 50.
[190] Adams, *Geometrical and graphical essays*, p. 217.

called a traverse that utilised the angles and distance observed in the field to produce a network of stations from which data could be accurately plotted.[191] Distances between stations and offsets were measured with a survey chain and a staff marked new survey stations. The staff usually consisted of a pole with a sheet of paper or white rag attached to make it more visible over long distances.[192]

Theodolites were utilised in every facet of surveying. They were of particular use in obtaining points by resection so were often the instrument of choice for establishing triangulation networks for surveys of large areas. Alexander Taylor is credited with their introduction to Irish road surveys for which triangulation networks were regularly employed as a replacement for the circumferentor.[193] The real importance of the theodolite, apart from its reliable measuring capabilities, was its ability to obtain vertical angles. This allowed horizontal distances to be calculated rather than being restricted to slope distances as per chain, circumferentor or perambulator surveys.

Despite its near universal praise by Ireland's eighteenth-century surveyors, the theodolite was not without its problems. The inherent errors with the theodolite lay not with the usage of the instrument, as with the circumferentor, but rather in the standard of manufacturing available in the eighteenth century. Noble estimated that any surveyor could only take a reading good to a quarter of a degree. However, he also warned that even though a quarter of a degree tolerance was possible, it may not actually be as good as a surveyor might have thought as:

> … it cannot be supposed that any instrument, finished by the nicest hand, can be mathematically true; and when those instrumental errors, tho' small, join with those from observation, they may make an error somewhat considerable. It is true, they sometimes may destroy each other, and then the angle observed, may be said to be the true one.[194]

George Adams commented:

> In the present state of science, it may be laid down as a maxim, that every instrument should be so contrived, that the observer may easily examine and rectify the principal parts; for however careful the instrument-maker may be, however perfect the

[191] Wyld, *The practical surveyor*, p. 54.
[192] Gibson, *Treatise on practical surveying*, p. 156.
[193] Andrews, *Plantation acres*, p. 356.
[194] Noble, *Geodaesia Hibernica*, p. 78.

execution thereof, it is not possible that any instrument should long remain accurately fixed in the position in which it came out the maker's hand …[195]

Other surveying authors agreed with Noble:

> The accuracy of geometrical and trigonometrical mensuration [sic], depends in a great degree on the exactness and perfection of the instrument made use of; if these are defective in construction, or difficult in use, the surveyor will be subject to error, or embarrassed with continual obstacles.[196]

and

> … no instrument is perfect, nor can be perfectly well used.[197]

The above points were correct – these instruments were entirely hand-made without the use of modern automated digital design and manufacturing techniques. Each instrument's accuracy must therefore have been directly related to the skill of the craftsman who built it. Their metallurgical properties may also have varied in standard. Modern theodolites are made from synthetic materials that are less affected by the expansion and contraction caused by changes in atmospheric temperature. As Noble correctly commented on all surveying instruments, not just theodolites:

> From what has been said, we may see the absurdity of those who would be for taking the lengths of stations, or their difference of latitudes and departures to half links, or decimals; when perhaps at the same time, they are not within three or four links of the truth: and this was the reason why I did not run out the following tables to decimals of links; for it is absolutely needless, to retain decimals in latitudes and departures of stations until the angles can be taked [sic] vastly more nice than is done in the present practice. [198]

Wyld estimated that even while being drawn up, the true accuracy of a survey was still highly dependent on the personal skill, or inherent error, introduced by the human element. He stated that an error or two or three minutes would be within tolerance as it '… is exact as they can be laid down on paper by the protractor'.[199]

The theodolite, though not infallible, marked a major increase in the level of accuracy that Irish surveyors could apply to their work. Although interest in the instrument was relatively slow during the eighteenth century, it became the instrument of choice during the nineteenth and twentieth centuries

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[195] Adams, *Geometrical and graphical essays*, p. 187. Modern survey staves consist of a high precision reflective prism to obtain millimetre accuracy from the Electronic Distance Measurement (EDM) unit of the instrument.
[196] Ibid.
[197] John Grey, *The art of land-measuring explained* (London, 1757), p. ii.
[198] Ibid., p. 86.
[199] Wyld, *The practical surveyor*, p. 43.

2.4.5 The plain table

The plain table, also known as the Parallelepipedon,[200] Panorganon[201] or Geometrical Table,[202] is an instrument that has virtually disappeared from modern surveying. Even during the eighteenth century the plain table was regarded as outdated and was rarely mentioned in Irish surveying treatises.[203] The instrument consisted of a board fifteen inches long and twelve inches wide that could be separated into three parts for transportation. A central, removable paper sheet, onto which observations were recorded, was surrounded by a frame divided into inches to assist in scaling the survey. This served also as a form of survey control when replacing the plain table's sheet.[204] A moveable sight was positioned across this paper allowing the surveyor to take angles of points. Additional instrumentation could be added to assist in orientating the survey, as can be seen in figure 2.19 where a compass has been attached to the instrument.[205]

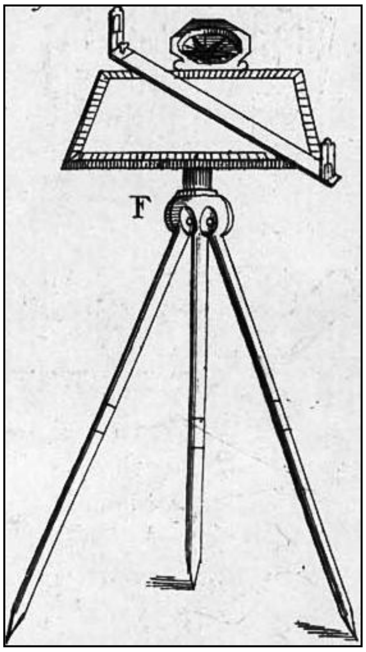

Figure 2.19: A plain table, Ephraim Chambers, *Cyclopaedia* (2 vols. Dublin, 1741) ii, 19.

Aside from recording of angles in the field and determining distances by chain, plain tables also worked through the process of resection; i.e. the measuring of a point by recording angles from two or more stations without physically going to the measured point. Figure 2.20 shows how a plain table might be used during a survey, as explained in Chamber's *Cyclopaedia* (London, 1728). The windmill and the church's position need to be recorded, but the surveyor is prevented from reaching them by a river. It would be impossible for the surveyor to use a chain in this situation. The surveyor would set up and level his plain table at station *C*. At *C* the surveyor would then align his

[200] Leybourn, *The complete surveyor*, p. 48.
[201] Hammond, *The practical surveyor*, p. 31.
[202] Arthur Hopton, *Speculum topographicum* (London, 1611), p. 93.
[203] Gibson dedicates only four pages in his *Treatise on practical surveying*, pp. 162-5.
[204] Ibid., p. 162.
[205] Ephraim Chambers, *Cyclopaedia* (2 vol., Dublin, 1741), ii, 19x.

sight with point *A* and draw that angle onto the plain table's paper sheet. The sight would then be moved to align with point *B* and again the angle would be drawn onto the paper. With these two angles measured, the plain table would be moved a known distance to station *D.* After setting up the instrument and re-levelled at *D*, the sights would be aligned with the same point on the windmill sighted from *C*. The line *C-A* and *D-A* intersects at a point which corresponds to the position of the windmill in relation to the two stations *C* and *D.* With the distance between *C* and *D* known, the distance *C-A* and *D-A* can be established. The same process is also used to obtain the position of the church and thus the distance between the windmill and the church (see figure 2.20) can also be calculated. Throughout the survey, the instrument's operator had to ensure that the plain table was not moved while at any particular station, as to do so might introduce angular errors into the survey.[206] Resections were of particular value during maritime surveys as well as establishing triangulation networks in larger surveys.

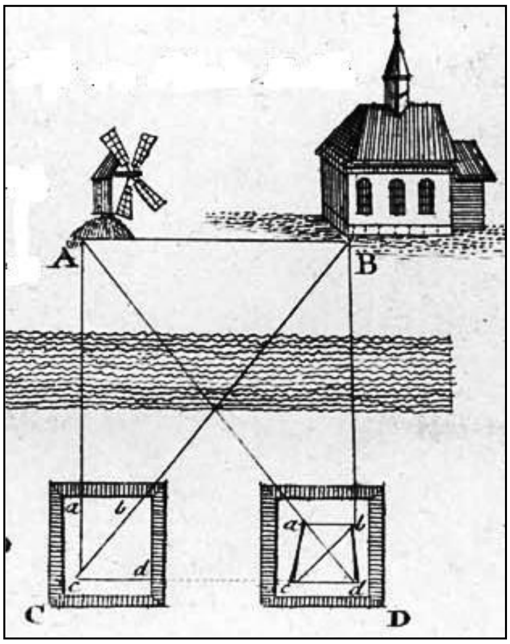

Figure 2.20: Intersection using a plain table, Ephraim Chambers, *Cyclopaedia* (2 vols., Dublin, 1741), ii, 19.

This method of measuring positions of objects from a distance was common in recording the positions of soundings in eighteenth-century coastal surveys. Coastal surveys were conducted by two methods – resection and intersection. For intersections, the position of a point, such as a prominent shore feature or navigational aid, was recorded with a circumferentor, theodolite or plain table from a separate part of the coast (point A, see figure 2.21). The same point was again observed from point *B.* By combining a series of observations to various points along a coastline, and protracting them so that a points' position occurred when two lines of observation coincided would be its correct position in relation to points *A* and *B.* If a ship of

[206] Martindale, *The country-survey-book*, p. 102.

suitable size was to remain steady it could be used by a surveyor. This would allow 360 degree view of Dublin bay if the ship lay anchor at the centre of the bay. Intersections were a common land surveying technique[207] for recording a point's position without physically having to reach it, and were also the main technique used by mariners[208] to chart large sections of coastline.

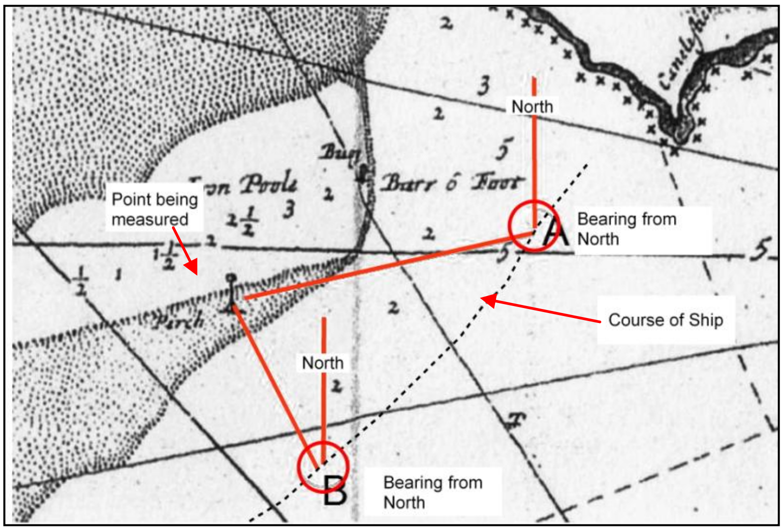

Figure 2.21 Intersection bearing measurements from a ship positioned at points A and B to stationary coastal structure of known location. Base map: Grenville Collins, *The bay and harbour of Dublin* (1686) (compiled by F. O'Cionnaith).

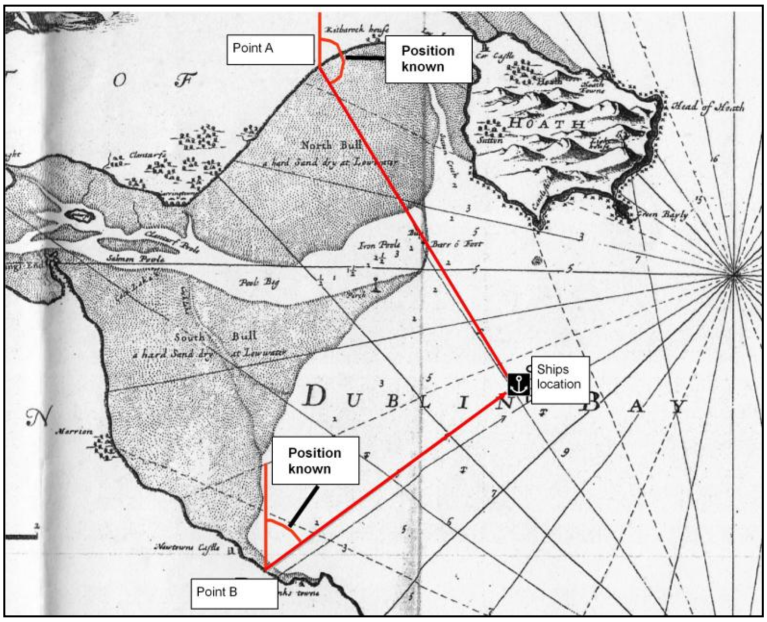

Figure 2.22 Resection bearing measurements from a ship at an unknown position at sea to two points, A and B, of known position. Base map: Grenville Collins, *The bay and harbour of Dublin* (1686) (compiled by F. O'Cionnaith).

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[207] Wyld, *The practical surveyor* (London, 1725), p. 73.

[208] Captain James Cook used the technique regularly during his three voyages to the South Pacific, Richard Hough, *Captain James Cook* (London, 1994), pp 136-7. Murdoch Mackenzie, *Treatise on maritime surveying* (London, 1774), p. 15.

Intersections work in the opposite manner. The position of two known points, *A* and *B* (figure 2.22) would each be recorded by the ship at an unknown position in relation to a common reference frame e.g. magnetic north. By protracting the bearings of the two instruments' measurements, the ship's position and thus the position of sounding measurements could be plotted. Soundings were typically recorded with a lead and line with knots tied in the line to indicate depth.

One major disadvantage with the plain table was that because it was in essence an exposed sheet of paper, it could not be used if the weather was wet. The paper would also have to be replaced if the survey proved to be too large to display on one sheet, in a process called 'shifting the paper'.[209] The instrument had several inherent flaws which reduced its effectiveness in surveying:

> The great inconveniency of the plain table is that its paper renders it impracticable in moist weather. Even the dew of the morning and evening is found to swell the paper considerably, and of consequence to stretch and distort the work. To avoid this inconvenience, and render the instrument useful in all weathers; by leaving off the paper, and setting up a pin in the centre, it becomes a theodolite, a semicircle, or a circumferentor, and applicable.[210]

William Gardiner also noted that instrumentational errors were often beyond the capability of a surveyor to adjust:

> The Plain table surveyors, when they find their work not to close right, do often close it wrong, not only to save time and labour, but the acknowledging an error to their assistants, which they are not sure they can amend, because in many cases it is not in their power, and may be more often the fault of the instrument than the surveyor; for in uneven land, where the table can't at all the stations be set horizontal, or in any other one Plane, its is impossible the work should be true in all parts.[211]

Overall, the plain table appears to have been still popular in the seventeenth century but was considered outdated by eighteenth-century standards. William Leybourn's *The complete surveyor* (London, 1674) describes how the instrument was suited for measuring small enclosures in urban areas[212] and described the plain table and a similar instrument know as a Parallelepipedon as:

> … the most absolute instruments for a surveyor to use.[213]

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[209] Gibson, *Treatise on practical surveying*, p. 162, Martindale, *The country-survey-book*, p. 102.
[210] Chambers, *Cyclopaedia*, ii, 15T.
[211] William Gardiner, *Practical surveying improved* (London, 1737), p. 41.
[212] Leybourn, *The complete surveyor*, p. 41.
[213] Ibid., p. 48.

Adam Martindale supported Leybourn's preference for the instrument, referring to it as 'the best of all fixed instruments'.[214] Vincent Wing also praised the instrument in his treatise *Geodaetes practicus redivicus* (London, 1699) stating that:

> Amongst the manifold instruments which have hither to been invented, for the exact and speedy plotting and measuring of all kinds of land, there is none so plain and perspicuous in use and practice, as this instrument, and therefore it aptly reciveth the name … of the plain table.[215]

The plain table's main advantage was its ease of use, especially for amateur or novice surveyors conducting work on small areas of land with minimal detail. However, for the professional, the same processes could be reproduced to a higher degree of accuracy and detail with circumferentor or ideally a theodolite:

> The Plain Table may still be, if considerably managed, very useful in planning the ground plot of buildings, gardens, or a few small parcels of land nearly on a level; but it is unfit in general for the practical surveyor, who ought to have an instrument whereby to plot large tracts of land as well as small, or hilly as well as on a level.[216]

Figure 2.23: A surveyor with a Plain Table, William Leybourn, *The complete surveyor* (London, 1674), preface.

As highly praised as it was in seventeenth-century surveying treatises,[217] its failure to be even mentioned in the majority of eighteenth-century surveying treatises consulted for this research indicates the instrument's fall from grace over the eighteenth century.

[214] Martindale, *The country-survey-book*, p. 82.
[215] Vincent Wing, *Geodaetes practicus redivicus* (London, 1699), p. 128.
[216] Gardiner, *Practical surveying improved*, p. 41.
[217] Leybourn, *The complete surveyor*, p. 48; Vincent Wing, *Geodaetes practicus redivicus* (London, 1699), p. 128.

2.4.6 The level

The level was in essence a nineteenth century instrument that had begun to find its momentum in the eighteenth century. There is relatively little written about it in contemporary surveying treatises, few if any eighteenth-century levels have survived in Dublin and the majority of maps from the period lack any form of height datum. Of the many surveying treatises consulted for this research, only a few mentioned levelling, with Peter Callan's *Dissertation on the practice of land-surveying in Ireland* (Drogheda, 1758) and Richard Castle's *Essay on artificial navigation* (Dublin, 1730)[218] being the only ones to discuss the subject in any detail.

The story of the level is in fact the opening chapter in the demarcation between land surveyors and their brethren, the engineers.[219] The need for accurate levelling became apparent during the industrial revolution as canals and later railways required height data to a high degree of exactness. By contrast, the requirements for estate and urban survey during the eighteenth century meant that levelling data was rarely seen.[220] This, coupled with a lack of detailed geographic reference data, usually consisting of a simple north arrow, meant that Irish surveyors failed to show terrain in the form of spot heights or contours in the vast majority of their maps.

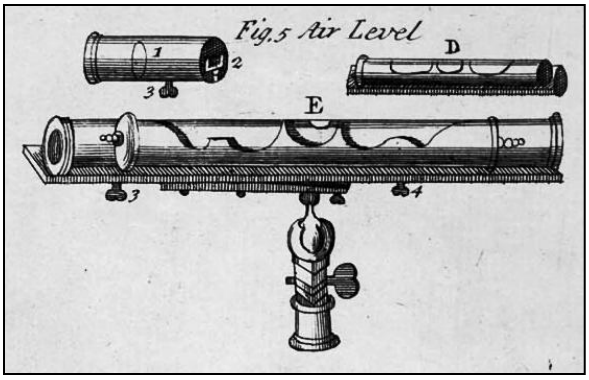
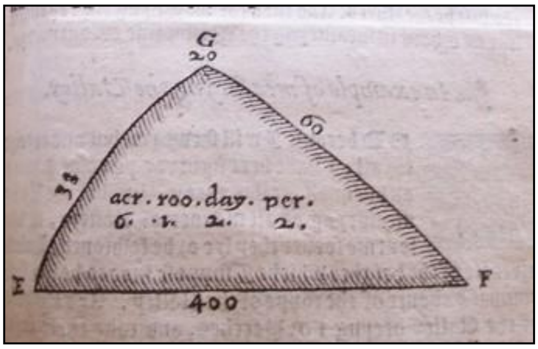


Figure 2.24: Surveyor's level, Ephraim Chambers, *Cyclopaedia* (2 vols, Dublin, 1741), ii, 19.

Callan referred to levelling as '… the art ... to be deemed the business of the most ingenious mathematicians'[221] and over the course of the eighteenth century few Irish

[218] The other being Adams, *Geometrical and graphical essays*, p. 365.
[219] See chapter 5 for more on the divergence between surveying and engineering, particularly concerning eighteenth-century canal construction.
[220] Thomas Sherrard's Map of Phibsborough Road from Church Street to the Botanical Gardens, 1798, is an important exception as it includes a cross-sectional view of Constitution Hill (DCA, WSC/MAPS/32).
[221] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 40.

surveyors were associated with this art. The establishment of ground levels is mentioned in several seventeenth-century surveying treatises, yet the majority of these entries appear to be more an exercise in geometry rather than levelling as it is properly known in land surveying (see figures 2.25 and 2.26). William Leybourn suggested a method to determine height differences between two points however it involved the impractical use of chains and poles, with no optical instrument being employed.[222]



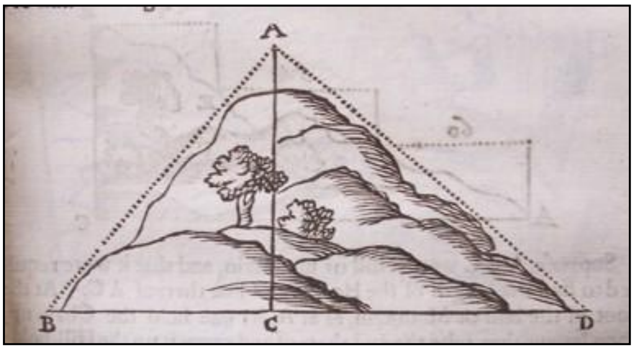


Figure 2.25 and 2.26: Sixteenth century and seventeenth century examples of geometric levelling exercises. (L) Valentine Leigh, *The most profitable and commendable science of surveying* (London, 1577), section 10, p. 2 (R) William Leybourn, *The complete surveyor* (London, 1674), p. 283.

From a review of contemporary estate and cadastral maps, there was little if any need for levelling data. With the dawn of the industrial revolution and the coming to Ireland of the canal, levelling took on a more practical role for any Irish surveyor associated with such a project. Richard Castle described the importance of levelling in canal construction as such:

> There must be the greatest care taken in levelling right the ground which the canals are to be cut, a mistake in this point being in a manner irrepassable.[223]

Period levelling instruments consisted of a telescope similar to that of late eighteenth-century theodolites onto which two transparent glass tubes approximately four inches in length were attached. These glass tubes were filled with water or alcohol but left with a small air pocket. This air pocket was utilised to establish when the instrument was level through the manipulation of screws that attached to its tri-brack mount. When the air in the glass tubes reached the centre point of both tubes, the instrument was said to be levelled.[224]

[222] Leybourn, *The complete surveyor*, p. 284.
[223] Richard Castle, *Essay on artificial navigation* (Dublin, 1730), p. 7.
[224] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 40.

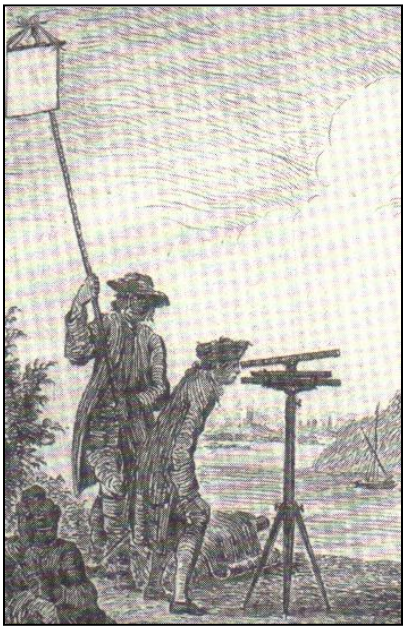


Figure 2.27: A surveyor takes a level reading while his assistant watches on, Dupain De Montesson, *L'art de lever des plans* (Paris, 1763) reproduced in Mary Sponberg-Pedley, *The commerce of cartography* (Chicago 2005) p. 20.

The telescope of the level could be rotated horizontally to view points in every direction but had to be re-levelled every time the instrument was set up at a different point. The distances over which a direct level reading could be taken were generally shorter than those possible for theodolite readings.[225] This is because the height data recorded by the surveyor was on the levelling staff held by his assistant rather than on the instrument as with degree readings with the circumferentor and theodolite. The levelling staffs were about ten feet long and could be slid into each other for both easier transportation and to allow measurements to be taken when there were rapid changes in height. The staffs were divided into one thousand equal divisions.[226] Callan claimed that longer distances were possible if the survey assistant attached pieces of paper to the main divisions of the levelling staff thus making them easier to identify at a distance. He also recommended larger levelling instruments, such as Callan's self-made 'specialised level', which was a gargantuan twelve feet in length, capable of measuring levels over five hundred yards apart.[227] These distances would be of sufficient length so that the curvature of the earth would have affected the levelling readings, thus introducing errors to the levelling run.

Earth curvature and its effects on levelling were known to Irish surveyors at the time. Despite Callan's assurances that levels could be measured at five hundred yards, Castle was slightly more wary and offered the following practical advice to surveyors who might encounter such problems:

[225] Ibid., p. 42.
[226] Wyld, *The practical surveyor* , p. 156.
[227] Callan, *Dissertation on the practice of land surveying in Ireland*, p. 42.

1st If the sum of the distances, in taking ye backsights, is equal to the sum of the distances, in taking the foresights, all the minute errors of the instrument will mutually balance, and destroy each other.[228]
2nd If the distance of the observation staff, from the instrument, be everywhere about four chains, all the curvatures in a mile's work will be less than half an inch.
3rd If the distance from the instrument to the hindermost staff be everywhere equal to the distance from the instrument to the corresponding staff, the curvature of the Earth, and the minute errors of the instrument will both be destroyed
4th If the distances of the instrument from the staffs be very unequal, and very long, the curvature must be accounted for, and the distances in order there to be measured.[229]

The basic technique of a levelling run is demonstrated in an eighteenth-century drawing shown in figure 2.28. The surveyor wants to know the height of point *B*. The height of point *A* is known to a surveyor as is the height of his surveying staff *E* which is positioned directly above point *A*. When viewing his staff through the level set up at *D* the surveyor can then record the combined height of *A* and *E*. The levelling staff is moved to point *B* and the staff's height is recorded again from *D* by simply rotating the level 180° horizontally.

By comparing the reading recorded at *C* to that of *E* and in relation to the height of the known point *A*, the level of *B* can then be established.

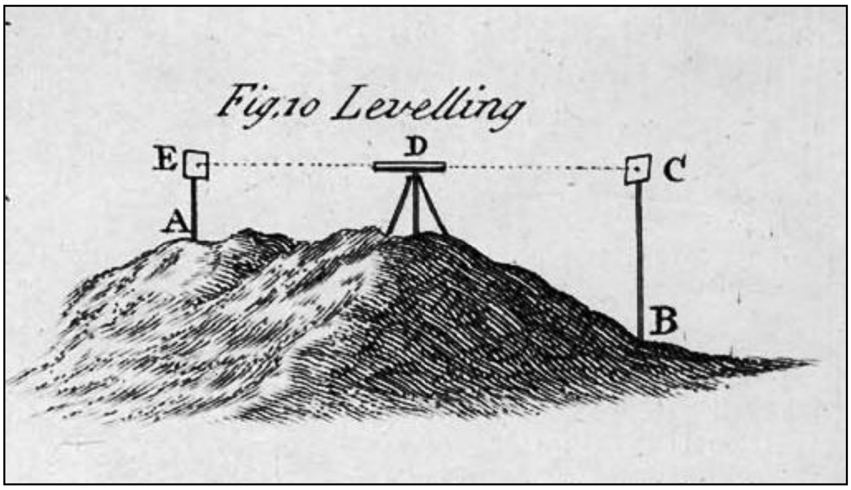


Figure 2.28 An example of a levelling run, Ephraim Chambers, *Cyclopaedia* (2 vol., Dublin, 1741), ii, 19x.

[228] This method is still common practice for surveyors as a quick check to determine if a levelling run balances without having to complete complex calculations.
[229] Castle, *Essay on artificial navigation*, p. 8.

Levelling must have been a rare occurrence during the course of most surveyor's work during the eighteenth century. The majority of maps from the early eighteenth century have no height data and even the estate maps of Rocque[230] and his 'French school' advocates[231] displayed height data only in the form of hill shading, presenting simply an image of the land, however sophisticated, rather than actual readings. Although the records of the Wide Streets Commissioners regularly mention the taking of levels as part of a survey, this often referred to the recording of the height of buildings being surveyed rather than ground levels. These measurements were conducted with a theodolite. Even the *Military survey of Ireland* (Dublin, 1776) produced by Charles Vallancey was conducted in a similar fashion to that of the *Scottish military survey* (London, 1747), with only the roads and town being plotted, with hills and mountains being drawn in by hand. One of the few Irish surveyors who can be truly associated with levelling is John Brownrigg, due to his work with canal surveying, to which levelling was vital. He also advertised himself as being proficient in the said art.[232]

The only information available for use of a height datum during the late eighteenth century and early nineteenth century comes from the bogs commission which employed the base of Nelson's Column in Sackville Street,[233] Dublin, as its point of origin.[234]

[230] John Rocque, *A survey of the town and lands of Maynooth* (Dublin, 1757). John Rocque, *Kilkenny* (Dublin, 1758).
[231] Sherrard, Brassington and Greene, *Kells: west division* (Dublin, 1817), reproduce by Anngret Simms, 'Kells', IHTA, no. 4 (1990), map 5(d). Thomas Sherrard, *Maynooth* (Dublin, 1781) and Bernard Scalé, *Maynooth* (Dublin, 1773), both reproduced by Arnold Horner, 'Maynooth', *IHTA*, No. 7 (1995), maps 7 and 4 respectively.
[232] *Dublin Journal*, 1 Jan. 1801.
[233] Now O'Connell Street.
[234] Andrews, *Plantation acres*, p. 204.

2.4.7 Miscellaneous surveying instruments

The instruments discussed in the previous sections, whilst being the most commonly found in eighteenth-century surveying, were not the only instruments that a surveyor could utilise. There existed a plethora of smaller, less common or more unusual instruments that met with various degrees of popularity during the eighteenth century.

The semicircle was often found in use during the earlier decades of the eighteenth century and was in reality simply a half-theodolite. Its horizontal circle was divided into 180° rather than the 360° of a theodolite and was recommended for use in open areas much like a theodolite and circumferentor.[235] The semicircle seems to have been a rare instrument during the eighteenth century with the surveying treatises of the time reflecting this point. Only Gibson briefly mentioned this instrument, albeit less than a page of his work.[236] The semicircle was also known as a graphameter.[237]

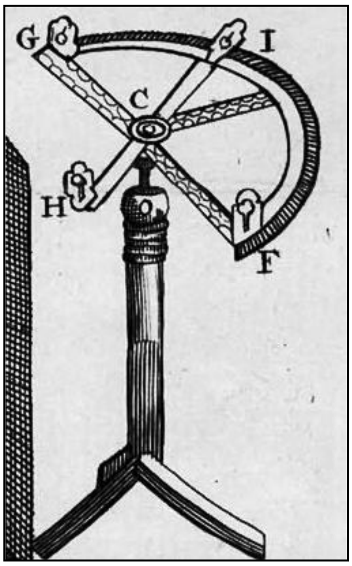


Figure 2.29 The semicircle, Ephraim Chambers, *Cyclopaedia* (2 vols, Dublin, 1741), ii, 19.

The pantometron was another theodolite offshoot that cropped up during the mid-eighteenth century. The instrument, developed by Gabriel Stokes, appears to have been a miniature theodolite, being only six or seven inches in diameter.[238] Stokes's invention, despite its compact size, failed to make an impact on the Irish surveying industry as it is mentioned only once in eighteenth-century Irish surveying literature.

Tripods were commonly used throughout the eighteenth century as demonstrated by images of surveyors operating in the field.[239] Yet despite their common occurrence

[235] Leybourn, *The complete surveyor*, p. 441.
[236] Gibson, *Treatise on practical surveying*, p. 161.
[237] Chambers, *Cyclopaedia*, ii, p. 18r.
[238] Gibson, *Treatise on practical surveying*, p. 160.
[239] John Rocque, A survey of Tullagorey (Kildare, 1756) reproduced in Horner, 'Cartouches and vignettes on the Kildare estate maps of John Rocque', p. 58; Wyld, *The practical surveyor*, preface;

none of the surveying treatises consulted for this research describes the apparatus in any detail, let alone gives recommendations from manufacturers for material from which they could be constructed. From images of period tripods one can conclude that the legs of the instruments were wooden, possibly with a pointed tip at the end of each leg and a metal connection point for a surveying instrument at the top of the tripod.

The protractor was the instrument of choice when transferring surveying readings from field books onto paper.[240] By supplementing the protractor's angular measurements for those of the instrument used in the field, i.e. from a theodolite or circumferentor, the surveyor could plot his survey in the same fashion.

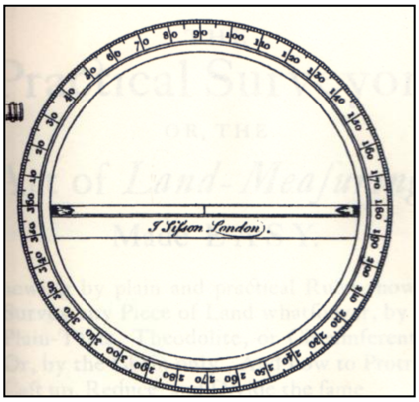


Figure 2.30 A 360° protractor, Samuel Wyld, *The Practical Surveyor* (London, 1725), preface.

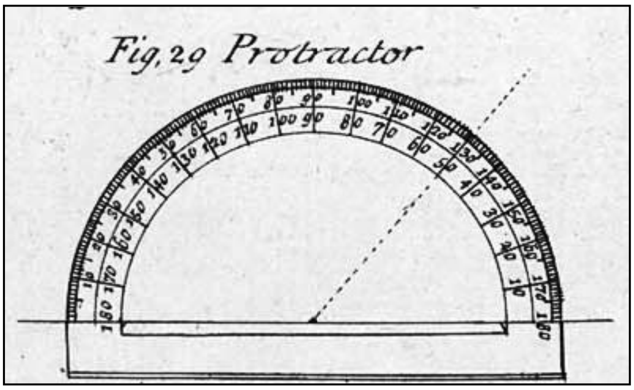


Figure 2.31 A 180° protractor, Ephraim Chambers, *Cyclopaedia* (2 vols, Dublin, 1741), ii, 19x.

Protractors were made of brass, ivory or horn and were about four or five inches in diameter.[241] Use of the full circle or semi-circle protractor was left up to the user as both instruments fulfilled the same function.

The field book was used to record data during a survey before the development of internal surveying software during the late twentieth century.[242] Despite its relative

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James and Edmond Costello, A map of the land of Killamy (1768) reproduced by Longfield, 'A Co. Sligo estate map of 1768', pp 57-70.
Dupain de Montesson *L'Art de lever des plan* (Paris, 1763).

[240] Leybourn, *The complete surveyor*, p. 56; Edward Laurence, *The young surveyors guide* (London, 1717), p. 113; Hammond, *The practical surveyor*, p. 30.

[241] Noble, *Geodaesia Hibernica*, p. 35.

[242] Wyld, *The practical surveyor*, p. 46; Leybourn, *The complete surveyor*, p. 59; Noble, *Geodaesia Hibernica*, p. 40; Gibson, *Treatise of practical surveying*, p. 272; Edward Laurence, *The surveyor's guide*, p. 111.

simplicity, the field book was an extremely important item, as stressed by Edward Laurence in his 1717 surveying treatise:

> You must always have in readiness in the field, a little book, in which fairly to insert your angles and lines; which book you may divide by lines into columns as you shall think convenient in your practise.[243]

Surveyor's field books were small, hardcover notepads roughly equivalent in size to a modern A5 page (148.5mm × 210mm).[244] The period field books consulted were divided into columns and rows by the surveyor, suggesting that they were ordinary blank page books adapted by surveyors and were not produced specifically for surveying. The only time a surveyor did not require a field book was when working with the plain table as the survey observations were drawn directly on sheets of paper.[245] Figure 2.32 demonstrates a typical field book layout with survey observations included. Field book layouts varied with each surveyor as did their comment structure regarding survey detail, yet all retained the same basic information: survey station number/name, bearing or angle to next station, chainage to next station and distance from offset measurements to survey detail. The station occupied by the surveyor and the offsets from the main chain were listed in the first column, with the length along the chain line that offsets were taken and observations and comments filling the second and third lines respectively. It should be noted that recording of field notes varied from individual to individual[246] and the example on the page following should be taken as generic.

[243] Laurence, *The surveyor's guide*, p. 111.
[244] John Travers, Estate of Earl of Mountrath in Roscommon, Leitrim and Westmeath, 1770 (NLI, Mountrath papers, ms. 2793).
[245] Langley, *Practical geometry* (London, 1726), p. 8.
[246] 'Scarcely any two surveyors set down their field notes exactly in the same manner', A. Nesbit, *Treatise on practical surveying* (York, 1824), p. 36.

Survey Station

Bearing/ Direction/ Chainage to next station

Number of chains from station 1 to offset measurement point

Offsets taken – *In.* indicating inside the survey. *Off* indicating outside the area contained by the survey. Some surveyors used additional *left* and *right* columns showing the direction of the offset. Measurements given in decimal chains e.g. 2.00 = 2 chains

Survey detail – each listed individually

No. Stat. Off-sets, &c.	Chaing. and Bearing	Observations	No. Stat. Off-sets, &c.	Chaing. and Bearing	Observations
1	269 ½ SE 89 ½		5	77 ¾ NW 77 ¾	
In. 0.15 0.15 0.00 In. 0.20	0.00 15.00 17.00 20.00	Begins at a Ford	Off. 0.10 0.00 0.00 0.20 0.00 In. 0.40	0.00 35.10 60.00 62.00 63.00 66.00	Through a Bog. A ford. Crosses the Bounds.
2	251 ¾ SE 71 ¼	Mearing	6	30 ¾ NW 30 ¾	
In. 0.20 0.15 0.15 0.05	0.00 4.00 26.00 41.00	‘Squire H----y’s	In. 0.00 1.40 Off. 0.40 4.00 0.30 1.00	0.00 7.00 8.20 8.20 1-.20 23.00 36.25	A small river The bounds Mearing L—d M—tg----t’s Estate, in U--g--d
3	252 ¾ SE 72 ¾	Estate Crosses the Bounds	7	345 ¼ NE 5 ¾	
In. 0.10 0.00 0ff. 0.30 2.20 2.00 0.15 0.00	0.00 7.00 15.20 15.20 21.00 33.00 36.40		Off. 1.40 0.10 1.30	0.00 7.10 18.48	
4	162 ¼ SW 17 ¾	A Wall mears rest of ‘Squire B---r’s			
	41.40				

Figure 2.32 Example field book entry, Noble, *Geodaesia Hibernica*, p. 40, annotated by F. O’Cionnaith. This measurement system, using chain lengths rather than physical distance, is radically different to modern land surveying techniques. It should be noted that chain length (2 pole or 4 pole) is not indicated in the above example therefore making the plotting of this survey difficult.

As previously mentioned, the application of a common geometric coordinate system, i.e. latitude and longitude, was rarely seen in eighteenth-century Dublin surveys. Its identification, however, was deemed of great importance in many eighteenth-century maps at a county, provincial, national, continental and global level. The theodolite could be used to establish latitude from astronomical bodies, such as the sun or north star,[247] however, another instrument available to eighteenth-century surveyors was the quadrant or astrolabe. These simple devices allowed surveyors to establish their latitude by combining a series of measurements indicating the level of elevation from the horizon of an astronomical body, usually the sun, from the horizon in the morning and comparing the time at which the sun reaches the same elevation in the evening.[248] By comparing these measurements to a series of logarithmic tables, a surveyor could obtain his latitude. Once latitude was established, it was possible to apply corrective calculations to surveys of large areas, in order to compensate for the effect of the earths' curvature thus correcting the cartographic projection. Distance to various parts of the earth's surface could then be calculated.[249] The simple Davis quadrant, and its more elaborate derivative, the Elton quadrant,[250] were two popular quadrants in the early eighteenth century with Campell's quadrant being widely used in the latter part of the century.[251] Quadrants could additionally be used to reduce slope measurements to their true horizontal values.[252]

A specialised distance measurement instrument operated by surveyors during the eighteenth century was the perambulator;[253] also known as the pedometer, way-wiser[254] or odometer. This instrument consisted of a wheel mounted onto a handle and was pushed in front of the surveyor. Each revolution of the wheel measured a specific distance, such as, a yard, and a small protrusion in the wheel made a clicking noise every time the wheel completed one full revolution thus allowing the surveyor to calculate the distance between two points without using a chain. Additionally, a small

[247] Wyld, *The practical surveyor*, p. 176.
[248] Ibid., p. 177.
[249] John Robertson, *A treatise of mathematical instruments* (London, 1775), p. 89.
[250] John Elton, 'The description of a new quadrant for taking altitudes without a horizon, either at sea or land' in *Philosophical Transactions of the Royal Society*, xxxvii, no. 423 (1731-32), pp 273-5
[251] J. A. Bennett, *Divided circle* (London, 1988), p. 136.
[252] Wyld, *The practical surveyor* (London, 1725), p. 77.
[253] Waddington, *Description of instruments used by surveyors*, p. 6; Thomas Breaks, *A complete system of land surveying* (Newcastle-upon-Tyne, 1771), p. 285.
[254] Adams, *Geometrical and graphical essays*, p. 197.

box about ten inches in width positioned on the shaft of the wheel contained three separate circles to record large distances – one rotation of the smallest circle being the equivalent to one chain, the second circle's rotation being the equivalent of one mile and the third being the equivalent of fifty miles. This adaptation had several advantages:

> The tiresome repetition of stooping with the chain or pole will be avoided.
> The expense of one or both chain-men will be saved.
> The length of a day's journey may be measured without keeping any account, till the end.[255]

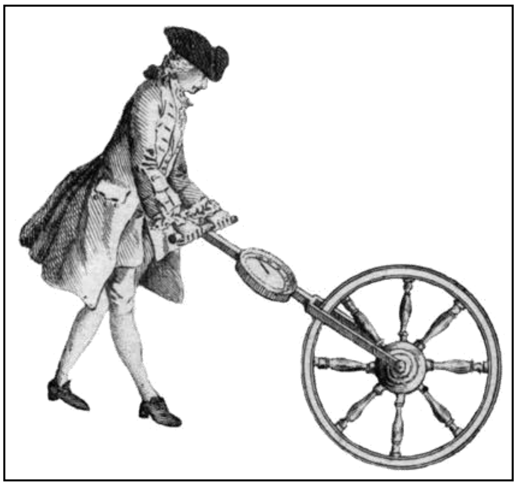

Figure 2.33 A surveyor, possibly John Rocque with a perambulator (http://www.mapforum.com/05/may.htm).

The perambulator was best suited to low accuracy surveys, such as road distances, as rough terrain could cause the instrument to give inaccurate results due to wheel slippage. It did however provide an easy-to-use replacement for survey chains when the accuracy obtained from chains was not required:

> … the wheel with its indices, showing the distance, and its box and needle with sights showing the bearing or position in respect to the meridian, is an instrument speedy and sufficiently exact; provided we reject the breadth of the road and only regard the bearing and length.[256]

Gibson recommended its use for road surveys. The readings thus obtained could easily be converted into measurement values in common use at the time:

> Roads are usually measured by a wheel for that purpose, to which there is fixed a machine, at the end whereof there is a spring, which is struck by a peg in the wheel, once in every rotation; by this means the number of rotations is known. If such a wheel were 3 feet 4 inches in diameter, one rotation would be 10 feet, which is half a plantation perch; and because 320 perches make a mile, therefore 640 rotations will be a mile also: and the machinery is so contrived, that by means of a hand, which is carried round by the work, it points out the miles, quarters, and perches, or some.-times the miles, furlongs, and perches.[257]

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[255] Hammond, *The practical surveyor*, p. 159.
[256] Ibid., p. 12.
[257] Gibson, *Treatise of practical surveying*, p. 134.

The instrument's method of use did, however, introduce a degree of error to results:

> … it gives a measure somewhat too long by entering into hollows, and going over small hills. This is certainly the case; the meaning wheel is not an infallible mode of ascertaining the horizontal distance between any two places; but then it may with propriety be asked whether any other method is less fallible.[258]

Thomas Breaks also acknowledged the perambulator's potential flaws when compared to chain measurement:

> …give me leave to ask the question, which of them is nearest to the truth? For I esteem it a matter of difficulty, to gain the true and exact horizontal distance between any two places, by measuring up the surface of the earth, let the same be performed with the utmost care; for though the chain be free from some objections, which the other instrument [the perambulator] is liable to, yet what person can pretend to lead a chain in that horizontal position, which is required to make a true distance?[259]

Despite its simplicity, the perambulator was rarely mentioned in Irish surveying treatises.

Instrument transportation was another practical concern for surveyors. Surveying instruments were the sole means for a surveyor to perform his work so if they were damaged or broken while travelling to the survey site this would have serious ramifications. Peter Callan complained that inexperienced or unprofessional surveyors carried their instruments in a loose and scattered fashion which caused the sights, centre pins and other elements of the instruments to become warped and battered. Callan deduced that this was often the cause of poor surveying in Ireland, as damaged instruments are inaccurate instruments. To solve this serious problem Callan suggested the following:

> To remedy which, let a pair of saddle-bags be made, each twenty inches in depth and twelve inches in breadth, with straps and loops for a hanging lock, and a long wooden case, with convenient clefts and concavities, to slide in, and fix all the afore-described sights, indexes, scales, and sliding compasses; a leather case with a wooden bottom for the box of the circumferentor, a tin case for the protractor, and a long leather case for a roll of paper; all which, together with the ball and sockets, screw-pins, staves, chain and pins, pencils and colours can be safely kept and carried in the said saddle-bags; and for the conveniency of travelling, a few changes of linen, with shoes and stockings, can also be carried in the said bags.[260]

The common lead pencil was of vital importance to any survey during this period. The pencil held several advantages over contemporary pens and quills when recording data in surveying field books as inkwells would have proved difficult to use in the

[258] Adams, *Geometrical and graphical essays* (London, 1803), p. 197.
[259] Thomas Breaks, *A complete system of land surveying* (Newcastle-upon-Tyne, 1771), p. 286.
[260] Callan, *Dissertation on the practice of land-surveying in Ireland*, p. 39.

field and the ink was liable to run if exposed to damp weather conditions. The quality of the lead mattered greatly to the surveyor:

> Black lead is produced in many countries, but the best yet discovered is found in the north of England: it is dug out of the ground in lumps, and sawed into scantlings proper for use: the kinds most proper to use on paper must be of an uniform texture, which is discoverable by paring a piece to a point with a penknife; for if it cuts smooth and free from hard flinty particles, and will bear a fine point, it may be pronounced good. There are three sorts of good black lead; the soft, the middling, and the hard: the soft is fittest for taking of rough sketches, the middling for drawing of landskips [landscapes] and ornaments, the hard for drawing of lines in mathematical figures, fortifications, architecture, &c. …[261]

Instructions were also clear for surveyors on how to assemble and maintain their pencils in the field:

> The best way of fitting black lead for use, is first to saw it into long slips about the size of a crow-quill, and then fix it in a case of soft wood, generally cedar, of about the size of a goose-quill, or larger; and this case or wood is cut away with the lead as it is used. [262]

Ink from quill pens was of little use as survey field books could become damaged by rain or moist conditions thus making writing difficult or impossible. One English surveyor advised on how best the measurements in the field books could be preserved in such a situation:

> An industrious surveyor will not leave the field for a small mizzling rain; and altho' he cannot then write in his book with ink, yet his observations may be entered with a black lead pencil, and these wrote over with ink when he return to his abode.[263]

One early nineteenth-century surveyor highlighted the importance a surveyor should place on legibility and properly formed letters and numbers:

> … whoever would excel in the art of planning, should use his utmost endeavours to become a complete and elegant penman.[264]

Surveyor's clothing could also play an important role in measurement observation as well as keeping the surveyor dry and warm. Due to the lack of communication equipment Gibson suggested that the surveyor direct his chain man in the correct direction by the use of his hat:

> Looking through the sights which govern the direction, and waft your hat to one or to the other side, as a token to the person you sent forward to stand more to the right or to the left, and continue to give the signal 'till you have him in the direction of the sights, and then put on your hat as a signal to him that he is in the true direction.[265]

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261 John Robertson, *Treatise of mathematical instruments* (London, 1775), p. 6.
262 Ibid.
263 Hammond, *The practical surveyor*, p. 67.
264 A. Nesbit, *Treatise on practical land surveying* (York, 1824), p. 251.
265 Gibson, *Treatise of practical surveying*, p. 288.

Reductions of existing maps were a regular occurrence throughout the eighteenth century and could be easily made if the surveyor or draughtsman had the correct instrument. Figure 2.34 shows the pantographia, used to reduce maps from one scale to another through a simple method of ratio conversion.

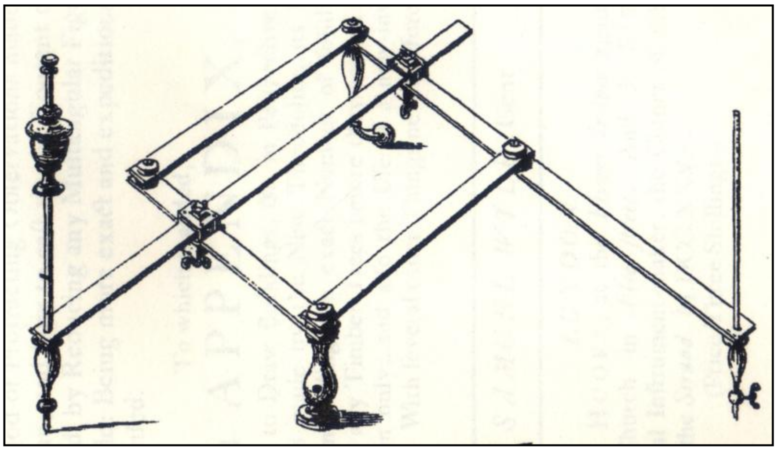

Figure 2.34: The pantographia, Samuel Wyld, *The practical surveyor* (London, 1725), preface.

Wyld described the instrument thus;

> … it may be set to any given proportion whatever, by the help of sliding centres, that are moved along certain lines calculated for that purpose, and dived on the sides of the parallelogram; so that a plot may be reduced with the utmost exactness to any given ratio, in respect of the former, either in proportion, as the length of the sides of the soul plot shall be to the fair one, or else as the area of the one to the area of the other; and another thing may be said of this instrument, that curves are as well reduced thereby as right-lines; which by any other instrument is exceeding difficult, if not impossible to be done.[266]

The advantage of being able to accurately copy an original map, without damaging it was noted by several surveying authors throughout the eighteenth century.[267]

After an enlarged or reduced rough copy had been produced, another copy was made on thin paper covered lightly with oil so as to make it transparent. This transparent copy could then be overlaid onto the new map made by the surveyor and common points could then be identified thus establishing the true property boundaries.[268]

[266] Wyld, *The practical surveyor*, p. 110.
[267] Hammond, *The practical surveyor*, p. 173; Leybourn, *The complete surveyor*, p. 60; Benjamin Martin, *The new art of surveying by the Goniometer* (London, 1771), p. 17.
[268] Gibson, *Treatise of practical surveying*, p. 287.

Occasionally, unique surveying instrumentation appears in an early surveying treatise, usually the invention of the author, who claim that such an instrument will revolutionise surveying. British army surveyor James Douglas developed an instrument he named the ‘Infallible’, a four-armed optical instrument the only mention of which is in a treatise he wrote in the 1720s.[269] Similarly, Gabriel Stokes developed his ‘pantometron’, a miniaturised theodolite which is mentioned only once in Gibson’s surveying treatise.[270]

The wealth and variety of instrumentation, both mainstream and specialised, available in eighteenth-century Dublin, meant surveyors often had more than one option for suitable equipment available to them.

[269] James Douglas, *The surveyors utmost desire fulfilled* (London, 1727), p. 23.
[270] Gibson, *Practical surveying*, p. 160.

2.5 From survey to map

The transformation of a series of field measurements into a final map was an important step in any land survey. The following sections examine the combination of original survey data with existing mapping, the decisions regarding whether a map should remain in manuscript format or be printed and the various aspects of engraving maps on copper plate for mass production.

Map compilation

The plotting of survey measurements onto parchment was the intermediate step linking a field survey with a finished map. The initial step in producing a first draft was acquiring adequate paper and a draughtsman. It was advisable for surveyors to produce a rough first draft of the survey site before they left it so as to avoid having to travel back to correct simple mistakes.[271] This was a sensible precaution given that the fastest a surveyor could travel in the eighteenth century was the speed of a horse. It would be time consuming to have to return simply to take one missed but important distance or bearing. The paper used for compiling surveys was either parallel lined papers,[272] useful when there was a possibility that the paper might be warped by damp conditions, or strong cartridge paper, several sheets of which could be glued to a cloth or canvas backing if the survey was so large that it could not fit on a single sheet.[273]

A draughtsman would consult the surveyor's field book and position the first station in the survey so that the entire survey could comfortably fit onto the sheet. By using the parallel lines of the paper to represent north, the draughtsman would then establish the bearing to the second survey station with a protractor and then use a scale ruler to draw a straight line to the second station representing the chain line.[274] Draughtsmen would mark each measured line's location with a pin thus removing any errors introduced in the marking of the map with pencil or ink dots. Such pin marks can still occasionally be found on manuscript maps or draft copies. Good examples of this can be seen in the draft maps of Colchester and Bedford produced by John Speed in 1607/08 which show numbered survey points in pencil throughout the entirety of both

[271] Callan, *Dissertation on the practice of land-surveying in Ireland*, p. 35.
[272] Note – parallel line paper was used only when compiling survey data, not for recording it in the field.
[273] Gibson, *Treatise of practical surveying*, p. 283.
[274] Wyld, *The practical surveyor*, p. 141.

maps. In the seventeenth century such methods of marking survey points were considered standard practice[275] yet there were those who opposed the idea of such marks on maps:

> … it is rude to draw your lines geometrical with painted keelers, or black lead …[276]

The field notes were thus plotted from station to station with the inclusion of data from offsets and the surveyor's descriptions until the survey had been fully reproduced on paper. A common trait of cadastral surveys throughout the eighteenth century was the identification of land adjoining the survey area by the neighbouring owner's last names. Data was recorded in the comments section of the surveyor's field book and highlighted the importance of accurate field notes during surveys, primarily as property demarcation disputes were very common sources of employment for surveyors.[277]

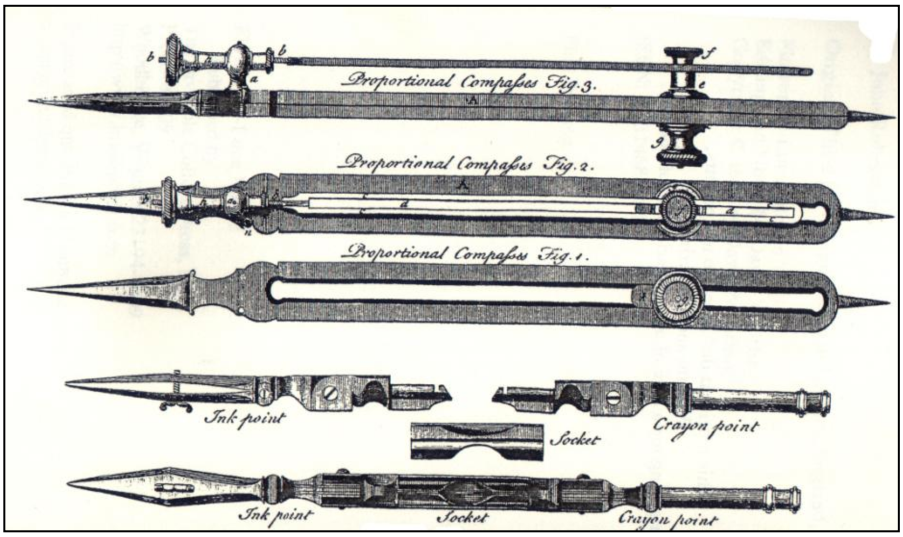

Figure 2.35 Eighteenth-century drawing instruments. John Robertson, *Treatise of mathematical instruments* (London, 1775), preface.

Surveyors would often compare or combine their surveys with older maps of the same area to minimise the amount of surveying work that they needed to do in the field or to compare or orientate the new survey with the older one. For example, a 1754 map by George Gibson of Leinster House[278] was copied and amended in 1812 by the Wide

[275] John Norden, *The surveyors dialogue* (London, 1607), p. 129.
[276] Arthur Hopton, *Speculum topographicum* (London, 1611), p. 103.
[277] Wyld, *The practical surveyor*, p. 46; Leybourn, *The complete surveyor*, p. 59; Noble, *Geodaesia Hibernica*, p. 40; Gibson, *Treatise of practical surveying*, p. 272.
[278] Leinster House, 1754 (DCA, WSC/Maps/411).

Streets Commissioners in order to compare an older boundary line between the building and lands belonging to the Fitzwilliam family. Surveyor John Heylin also discussed the importance of comparing new measurements to older maps in an article in the *Freeman's Journal*.[279] Eighteenth-century surveyors understood the issues relating to consulting older mapping and that the survivability of mapping and real world property markers was often a matter of to chance:

> To the antiquarian of the 25th century, I hope it will be found useful should a single copy of it have the singular good fortune to be preserved till that period, as affording them an opportunity, by consulting the angular measurement, of determining the position of many places in the country with a tolerable degree of accuracy, of which the devouring hand of time may not, perhaps, have left the least vestige remaining.[280]

The Down Survey and its use in eighteenth-century surveying

The main and most regularly-consulted reference mapping available to eighteenth-century surveyors was the 1655/56 Down Survey of Sir William Petty. The survey was conducted as a method of establishing the extent of confiscated lands in Ireland after Cromwell's campaign so that it could be distributed to soldiers of the New Model Army as a form of payment for their service:

> ... great sums of money are grown due, and in arrear unto the officers and soldiers who have been employed in reducing the said rebels, and to sundry other persons either for arrears yet unsatisfied, moneys lent, or provisions or other supplies furnished for the public service; and whereas, by the blessing of God upon the forces of this Commonwealth, the said rebels are subdued, and the said rebellion is appeased and ended... To the end, therefore, that all just satisfaction may be made unto the adventurers, officers, and soldiers, and other persons aforesaid, as soon as possibly may be, and that the country of Ireland may be planted and settled with security unto such as shall plant and inhabit the same.[281]

During the eighteenth century the Down Survey was kept in the surveyor-general's office in the Lower Yard of Dublin Castle. According to Gibson, the survey received its name because the Stafford Survey, that had preceded it, had consisted entirely of terriers[282] accompanied with basic outline maps of the property in question.[283] The Down Survey had been laid down onto maps - hence Down Survey.[284] The survey

[279] *Freeman's Journal*, 11 Oct. 1787.
[280] John Lindly, *Memoir of a map of the county of Surrey* (London, 1793) quoted in *Historian's guide to early British maps; Royal Historical Society* (18 vol, London, 1994), ix, 463.
[281] Thomas Aiskew Larcom, *The history of the survey of Ireland: commonly called the Down Survey* (Dublin, 1851), appendix 1, from Scobell's Act and Ordinances, chapter xii.
[282] A catalogue of property.
[283] Evidence of Alexander Nimo, *Report from select committee on survey and valuation of Ireland*, p. 70, [445], H. C. 1824, viii.79.
[284] Gibson, *Treatise of practical surveying*, p.284.

originally consisted of books containing barony maps, parish maps of each barony, an abstract or sheet referencing each map and a certificate at the beginning of each volume signed by Petty.[285] In 1711 a fire in the Treasury office in Essex Street damaged and destroyed several of the Down Survey that meant a complete copy was not held in the surveyor-general's office. Of the original 1,430 maps, 67 of the baronial maps were destroyed, 130 damaged and 2 missing. Of the parochial maps, 391 of the original 780 were either damaged or destroyed.[286] Sir Thomas Taylor copied many of the Down Survey maps before the Essex Street fire, yet this was a far from complete collection compared to the originals.[287]

This lack of a complete set of property reference maps for Ireland represented a major problem for eighteenth-century surveyors. Surveyors often referred to the Down Survey as a method of establishing the accuracy of their own maps[288] and as such the Down Survey were held in high regard by both surveyors and the civic authorities, being described as:

> … great use to gentlemen; though the Down Surveys only, are those allowed by the laws of the land to be final and decisive.[289]

and:

> This survey was laid down with the chain, and with wonderful accuracy considering the period at which it was executed.[290]

Despite the esteem in which it was held by Ireland's surveyors, the conditions in which the surviving maps were stored in Dublin Castle were far from ideal. Surveyor John Wilson Croker described the condition of the remaining maps:

> My attention was turned to the survey of Ireland a great many years ago, from circumstances of having had occasion to examine the Down Survey, as it is called. I found that survey in, I thought, a very perilous state in point of location, and a very impaired state in point of preservation. It was situated in, I believe, on the upper stories of a very old building, and very liable to accident by fire; some parts of it, as well I recollect, bore the marks of having already suffered by fire, and as the survey itself was considered of great importance to Ireland [it being admitted as legal evidence in certain cases], I thought I would be wise to guard against the total loss of the survey by fire, as well as the slower but equally sure process of destruction which

285 *Report from select committee on survey and valuation of Ireland,* p. 135 [445], H. C. 1824, viii.79.

286 Evidence of William Bald, *Report from select committee on survey and valuation of Ireland*, p. 62 [445], H. C. 1824, viii.79.

287 Gibson, *Treatise of practical surveying,* p. 285.

288 This method is still applied in the same manner as modern surveyors often use Ordnance Survey Ireland maps as their reference dataset.

289 Gibson, *Treatise of practical surveying,* p. 285.

290 Evidence of William Bald, *Report from select committee on survey and valuation of Ireland,* p. 62 [445], H. C. 1824, viii.79.

it was undergoing, by the mode in which those who had occasion to consult it were allowed both to handle the sheets themselves, and to make tracings or drafts from it.[291]

The missing maps could also result in a wasted trip by a surveyor to Dublin, such as in the case of William Bald:

Before leaving Dublin, to commence the territorial survey of Clare, I was anxious to examine to what extent they possessed documents of the county, in the Record Tower, Dublin Castle, where Sir William Petty's maps are kept. I found only three baronies of the county of Clare. I was anxious to take outlines of them, in order to compare with the surveys that were to be executed. I found the price high, and declined.[292]

Copies of the maps could be made for 6*s*. 8*d.* and a search of the maps without copying them cost 5*s.* Gibson advised that the most important issue about making traces of the Down Survey was to establish the scale at which the copy was made. It appears to have been a common mistake for surveyors to copy the map but fail to compare the scale differences on their own maps:

Of this I have seen many instances; yet the surveyor would make it do, as misclosures are many times forced to do; the consequence of either, the most unskilful surveyor cannot be ignorant of.[293]

Charles Vallancey's mission to Paris

Given the rapid deterioration of the existing Down Survey maps, coupled with the fact that many of the original set had been lost forever, Irish surveying was placed at a distinct disadvantage. Originally there had been two complete copies of the Down Survey made, one for storage in Ireland, the other to be stored in England in Petty's private collection. During its transportation to England the ship carrying Petty's copy was captured by a French privateer in the Irish Sea and the Down Survey maps were taken to the Bibliothèque Royal in Paris.[294] In 1774, Lord Harcourt, accompanied by the French Colonel Blaquiere, visited the Bibliothèque Royal where he found a complete copy of Petty's baronial maps. The Irish government, upon learning of the existence of this set, immediately requested that the French returned them, with the French replying that the maps in questions had 'been mislaid'.[295]

291 Evidence of John Wilson Croker, *Report from select committee on survey and valuation of Ireland,* p. 34 [445], H. C. 1824, viii.79.
292 Evidence of William Blad, ibid., p. 66.
293 Gibson, *Treatise of practical surveying*, p. 286.
294 Evidence of Alexander Nimo, *Report from select committee on survey and valuation of Ireland*, p. 78 [445], H. C. 1824, viii.79.
295 *Report from select committee on survey and valuation of Ireland*, p. 133 [445], H. C. 1824, viii.79.

The matter was taken up again in 1789 when General Charles Vallancey and his assistant, Alexander Taylor were sent at the request of the Irish parliament and with the permission of the King of France, Louis XVI, to make copies of the Down Survey maps that were missing from the surveyor-general's office in Dublin. Vallancey's correspondence from Paris[296] during the spring of 1789 show that despite the cooperation of the French government, aided by the negotiating talents of the Duke of Dorset, several practical problems related to the Bibliothèque Royal's procedures severely increased the time that Vallancey required to copy the Down Survey.

> There are 350 maps. The king's library is only open to the public twice a week, from 9 till 12 & by the specific kindness of Mr. Le Noir, I have obtained permission to be there myself from 9 – 12 in order to carry out any work. It will be impossible to complete the copy in 12 months, that I could finish in two, if I were placed in a convenient situation. I hope you will consider these circumstances, my lord, & I take the liberty of asking you to let me disperse with the rules and regulations of the king's library on this occasion, and give me the permission to take these maps to my lodging …[297]

Unsurprisingly, the Bibliothèque Royal officials refused to allow Vallancey to remove sensitive map collections to his private lodgings.[298] Vallancey was therefore obliged to follow the Bibliothèque Royal's rules for the remainder of his stay.

Upon their return from France in late 1790, a serious discussion took place in the Irish House of Commons, the Irish House of Lords and amongst the surveying community about whether Vallancey's maps should be admissible as evidence in the same manner as the original Down Survey maps by Petty. The main discussion focused on whether the differences between the French maps copied by Vallancey and the original Down Survey maps were so great as to make the Vallancey maps useless. They were in fact copies of copies, with inherent flaws introduced through use of manual copying methods.

The deputy surveyor-general at the time, Mathew Hancock, was asked to examine the Vallancey maps and to give his professional opinion to the Irish parliament. Hancock compared Vallancey's maps against the original baronial maps and found several

[296] See Appendix A for these correspondences in their original French.
[297] Charles Vallancey to Leopold de Biretiue, Paris, 14 Mar. 1789 (NLI, ms.1614). See Appendix A for complete correspondence.
[298] See Appendix A.

errors, but all relatively minor. Hancock's main opposition to the Vallancey maps was the scale at which they were produced:

> General Vallancey's copy is a transcript of the copy of the original baronial maps only, defective of every other likeness or means of information; too minute in many instances to afford the strong contour by which original boundaries, if defaced by time, could be accurately defined: too confined sometimes in space to declare the quality, or ascertain landmarks, such as castles, churches, &c. &c. ; in some instances, not very many indeed, erroneous, and differing from the originals as to figure, but totally deficient as to every other sources of information afforded by the originals. To authenticate them generally and entirely as records, might be dangerous; partially, where the originals have been destroyed, some use may be safely made of them; but, in no instances should they be admitted to serve as proofs of trails of boundaries, unless when none of the originals can be had.[299]

The law lords and chief officers of the time, lord chief justices, the Earl of Clonmell, Lord Carleton and Earl of Farnham, ruled that the Vallancey maps should not be considered on a par with the original Down Survey maps as the differences in scale was a problem, and more seriously, any new maps introduced into the legal system might lead to:

> … endless litigations between the old and new interests; that the Statute of Limitation sufficiently protected the crown, the church, and the possessors undisturbed, for 20 years of undisputed tenure; therefore they deem it inexpedient to legalise these copies.[300]

The House of Lords ruled that the Vallancey maps were not eligible as evidence in court cases and did not have the same legal status as the original Down Survey maps.

Vallancey's mission to Paris and its outcome demonstrates both the advantages and disadvantages related to map compilation. While there were distinct benefits to the Irish surveying community through Vallancey's work, the subsequent legal technicalities took precedent. It is a reminder that surveying and property law are often intertwined.

[299] Evidence of Mathew Hancock, *Report from select committee on survey and valuation of Ireland*, p. 132 [445], H. C. 1824, viii.79.
[300] Ibid., p. 134.

2.6 Printing, manuscripts and consumer demands

The decision as to whether a map in eighteenth-century Dublin should remain in hand drawn manuscript form, or be engraved or etched into copper for mass production was dependent on several factors, including the scale of the map, popular demand for the map and the information it contained. While previous sections examined the compilation of maps from various sources or field work, this section will discuss the justification and reasoning behind the decision to keep maps in manuscript form or to proceed to copper plate printing.

A review of eighteenth-century Irish mapping conducted for this research shows that large-scale surveys of specific areas, such as cadastral maps, in general remained in manuscript format.[301] In contrast smaller-scale maps covering a wider area were more common in printed format than manuscript.[302] One major factor is the commercial value of a map. While a cadastral manuscript map would be of value to parties affected by land disputes, inheritance or local construction, in the wider cartographic market of eighteenth-century Ireland, its economic value would be limited. Figure 2.36 shows a cadastral map of a lot in Castle Street surveyed for the Wide Streets Commissioners in 1766.[303] It would be difficult to justify its transference onto copper plate as it is of only one lot in the city and if mass-produced, would have a very limited consumer market.

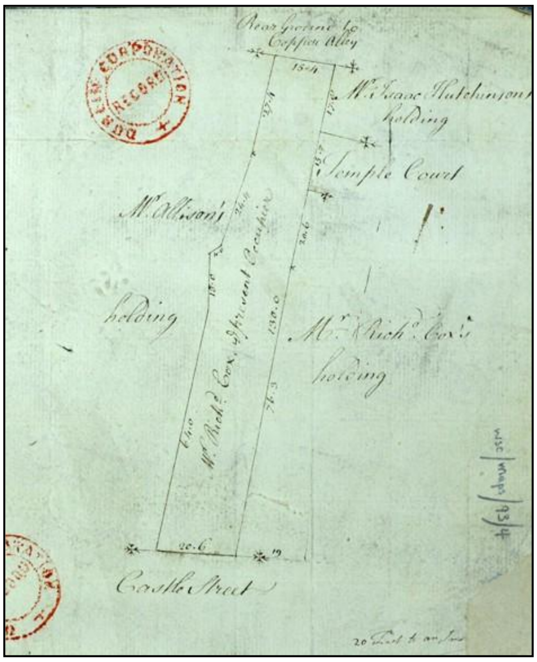

Figure 2.36 author unknown, Lott of ground on Castle Street, 1766 (DCA, WSC/Maps/93(1)), original scale 10'1"

[301] Manuscript maps are those drawn directly onto parchment and not printed.
[302] A useful comparison is between the catalogue of the Wide Streets Commissioners maps and maps produced for both the Royal and Grand Canal Companies. The large-scale WSC maps are in general manuscript maps, whereas the smaller scale canal company maps are printed.
[303] Castle Street, 1766 (DCA,WSC/Maps/93(1)).

Copper plate printing was expensive, time consuming and required skilled craftsmen. Both John Rocque and Roger Kendrick felt that there was enough evidence to justify their mass production of their maps of Dublin using copper plate printing.[304] Rocque in his case had over three hundred subscriptions before his map had been created, which helped finance the costs of engraving and printing.[305]

In order to justify proceeding with copper plate printing, a certain demand needed to be assured. Such a demand depended on numerous factors. Maps by their very nature are out of date as soon as they are published. The physical makeup of an urban landscape means that changes in infrastructure, land plots and buildings are unremitting. When these changes overtake the recorded data on a map, that map has been rendered out of date. An example from eighteenth-century Dublin is the time gap between Brooking's 1728 and Rocque's 1756 city plans. A map revision rate of twenty-eight years for a city such as Dublin meant that by the 1750s Brooking's map was substantially out of date. This lack of a contemporary city plan may have been one of the reasons behind the support for Rocque's project thus adding weight to his decision to produce his map through copper plate printing.

Taylor and Skinner's *Road maps of Ireland* (Dublin, 1777) is another example of how surveyors could use public demand to justify the use of expensive copper plate methods. This road map atlas, consisting of sectional maps of roads linking major towns and cities, would have been readily welcomed from a variety of private and commercial customers due to not only its detail, but also because it was produced in a easily transportable format – a book-sized atlas. To publish this atlas for only a very small number of customers would not have covered Taylor and Skinner's expenses. Even with their reputation, the two surveyors had to petition the Irish parliament in 1777 for additional funding to finish their work.[306]

Maps deemed to be prestigious, either by the surveyor or by those who commissioned the map, could also make the transition from manuscript to print. George Semple's

[304] *Dublin Journal*, 31 Aug. 1754.
[305] Ibid.
[306] *Commons Journals, Ireland*, ix, 326, 331, 363.

1757 plan[307] for the creation of Parliament Street in line with his newly-finished Essex Bridge was not only the first map produced for the Wide Streets Commissioners (WSC) but also one of the few WSC maps to be produced in printed form. The creation of a new street in the city centre connecting one of the main shopping thoroughfares, Capel Street, with one of the most important civic buildings in the country, Dublin Castle, appears to have been deemed prestigious enough to justify its transition into print.

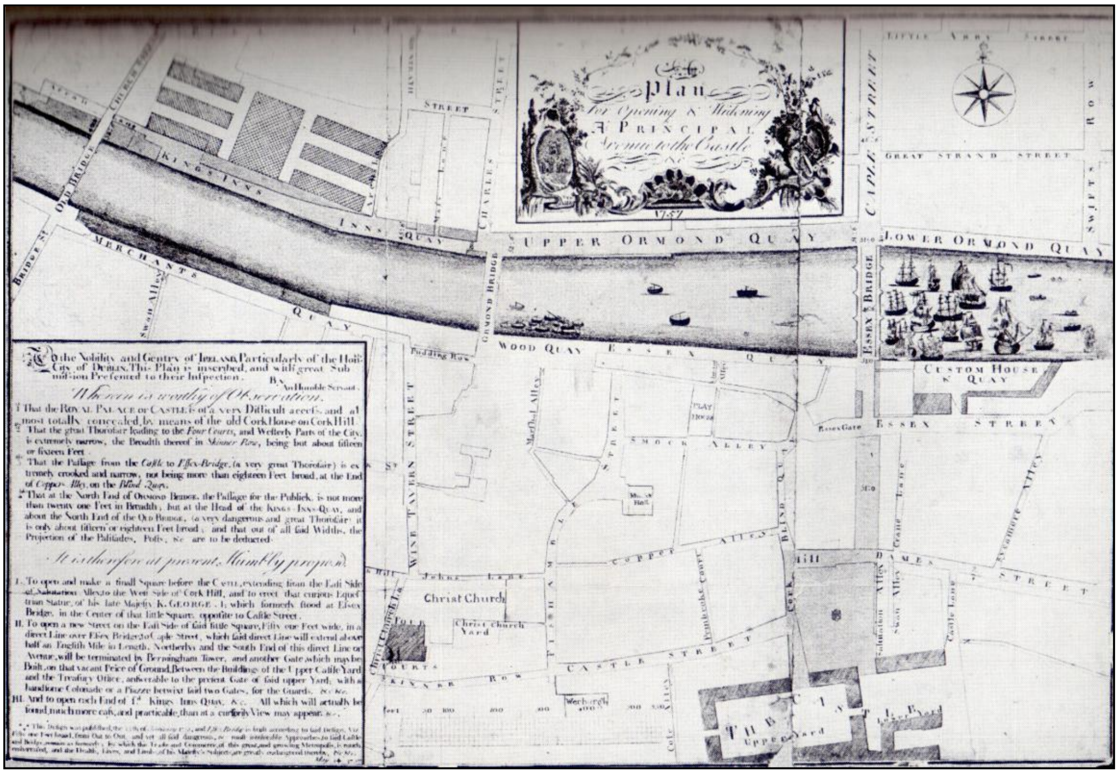

Figure 2.37 Printed map proposing construction of a new street. George Semple, *Proposed line of Parliament Street* (Dublin, 1757) (DCA, WSC/Maps/523.)

For the cartographic consumer public, the number of sheets that maps were printed on was an issue to be raised before purchase. Both John Rocque and Roger Kendrick[308] stated the number of sheets that their separate city plans of Dublin would require. On Rocque's, the only one of the two that actually made it to print, each of the four sheets that make up the map is individually numbered which indicates that these maps could be sold as individual sheets rather a customer having to pay for all four sheets.

[307] George Semple, *Proposed line of Parliament Street* (Dublin, 1757) (DCA,WSC/Maps/523).
[308] *Dublin Journal*, 14 Sept. 1754.

An advantage of copper plate printing, particularly over wood block methods, was that copper plate could easily be edited. This meant that map producers had the ability to recycle older copper plates by editing or adding new features to the copper plate. Bernard Scalé ran a reprint of Rocque's 1756 Dublin city map in 1773.[309] The small city plans that accompanied the Wilson's street directories throughout the eighteenth century are another example of this. These maps re-produced the same cartographic information year after year with only the changes made to the city since the map's last publication being added.[310]

Despite the obvious economic savings that reusing copper plates had on map production, it also had its drawbacks. In the 1779 issue of Wilson's map, Eccles Street was engraved outside the map border – a very serious mistake from both engraving and map-making perspectives. Such mistakes could lower a map's overall status and as eighteenth-century French cartographer Nicolas Le Clerc stated 'the punishment for bad maps is that no one buys them.'[311]

Wilson himself also stated that copper-plate printing, while it had many advantages, was expensive, had a limited production life and that it required considerable effort to produce a final map:

> The old plate of the City of Dublin, heretofore given in the Dublin Directory, being quite worn out, the editor found it impossible to convey a correct and statistical representation of the city in its present enlarged and improved state, so as to bind up with the work, has therefore with no small labour and very considerable expense, completed the above elegant plan which is now offered to the public at little more than half its value, in order to accommodate Merchants and others, who may wish to frame the same for their respective counting houses.[312]

Aside from consumer consideration, the ability to use copper plate printed maps for administrative and bureaucratic purposes had other advantages. In 1802 the WSC published a booklet entitled *Extracts from the minutes of the commissioners*[313] detailing the work conducted in Dublin by the Commissioners since 1762. As a preface to the document, a map by Thomas Sherrard was included showing a

[309] Bernard Scalé, *A survey of the city harbour day and environs of Dublin* (Dublin, 1773).
[310]See *Wilson's Dublin directory* maps 1762, 1779, 1795, 1810.
[311] Nicolas Le Clerc, *l'Imprimerie de Clousier, imprimeur de Roi* (Paris, 1786), p. 64, quoted by Sponberg Pedley, *The commerce of cartography*, p. 43.
[312] William Wilson, *Wilson's Dublin directory* (Dublin, 1799), preface.
[313] Thomas Sherrard, *A plan for improving the avenues contiguous to His Majesty's castle* (Dublin 1802).

proposed design for avenues surrounding Dublin Castle, which was never implemented. This design is one of the few WSC maps to make the transfer from manuscript to copper plate. However, its presence in this booklet was justified as it showed not only the standards to which the Commissioners worked, but also the scope of their ambitions for Dublin's urban environment.

Due to the importance of maritime trade in Dublin during the eighteenth century, many of the maps of Dublin Bay commissioned by the Ballast Board, the Admiralty, the Board of Inland Navigation and the Dublin Society were produced en masse for use by shipping companies and ship masters. Given the shifting nature of the sandbanks of Dublin Bay, such maps were produced regularly throughout the eighteenth century and represent a wide range of styles and both artistic and cartographic methods. Examples of printed maps of Dublin bay include those by George Gibson (1756), Bernard Scalé and William Richards (1776) and Captain William Bligh (1803).[314]

Civic administration also influenced whether a map remained in manuscript or printed form. As discussed previously in this section, there was a very real need for up-to-date maps of Dublin city, thus fuelling a demand, both from the public and civic authorities, for modern mapping. Sometimes these authorities produced their own maps of the city, such as Thomas Sherrard's now lost 'Great Map of Dublin', funded by the WSC in 1798.[315] However, often surveyors and cartographers produced these civic maps themselves, such as John Brownriggs's 1799 map of Dublin Corporation's city divisions and Allen & Son's map of Dublin with parishes *c*.1810. Both these examples represent forms of maps helping to define administrative boundaries, one being civic, and the other ecclesiastical.

The time and money spent on copper plate printing required justification in monetary terms for both the surveyor and the engraver. Although there were many successful maps produced through copper plate printing, some failed. Roger Kendrick's 1756 map of Dublin is a typical example of this. Having been surveyed and laid out, the

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[314] Referenced in Gerry Daly, *Early maps from the Dublin port board collection* (Dublin, year unknown).
[315] Minutes of the Wide Streets Commissioners (DCA, WSC/Mins/14).

map was never published which must have cost Kendrick both time and money. The decision to print from copper plate was a risky business decision that did not always meet with success.

2.7 Copper plate printing

Once a map had been compiled, created in manuscript form and ready to be transferred to copper plate for mass production, the surveyor and cartographer were faced with a choice of several methods and printing options.

Copper plate printing was a popular and widespread method of map production from the mid-fifteenth century to the mid-nineteenth century. The earliest known graphic print by this method is a series in the *Passion of the Christ* printed in 1446 in Berlin.[316] Copper plate printing gradually replaced wood cut printing, which during the seventeenth century was the premier method of mass-producing maps for a commercial market. Copper plate's ability to show greater detail and to physically survive the printing process longer than a wooden block meant that more ornate maps could be printed and in greater quantities.

As previously discussed, copper plate printing was expensive, time consuming and required skilled craftsmen for a product of quality to be created. Its use was not common in the Irish surveying industry with simple property maps such as those of the WSC, city surveyor, estate and cadastral maps being produced nearly exclusively in manuscript format throughout the eighteenth century. Market demand could be one reason for choosing copper plate printing over manuscript maps. A map run of more than a few copies would necessitate copper plate printing as a means of production. Large engineering or civic works might also require copper plate maps.

Etching and Engraving

Printing from metal plates is an intaglio[317] process, in contrast to the relief process of wood block printing. Intaglio printing from metal plates was accomplished through line engraving, dry point, etching, mezzotint,[318] or similar methods of incising lines in a plate. The plate used for printing could be any relatively soft metal including gold, silver, iron or zinc. For the production of maps, copper was the preferred metal and line engraving the most commonly used intaglio method.[319]

[316] British Museum, *A guide to the processes and schools of engraving* (London, 1914), p. 20.
[317] Printmaking techniques in which the image is incised into a surface.
[318] A dry point method to produce tonal difference in an image.
[319] David Woodward, *Five centuries of map printing* (Chicago, 1975), p. 52.

Copper's main variation, aside from weight and size, was its colouring and it was regularly classified for sale along these lines. Brass, although similar to copper, was considered too brittle.[320] Red copper was best for its adherence to the cutting stroke of the engraver's tool, the burin. Yellow or brassy copper was regarded as being too hard for engraving as its high zinc content made it difficult to engrave and could easily result in the burin breaking.[321]

Figure 2.38: The preparation of copper for engraving, Denis Diderot and Jean le Rond d'Alemabert, *Recuiel de planches sur les sciences, les arts líbéraux, et les arts méchaníques, supplement to the encyclopédie* (35 vols., Paris, 1762), iii, plate 3.

The older wood block method of map production required that for larger maps, the engraved or chiselled surface had to be a combination of wooden pieces thus creating the possibility of gaps appearing in the joins. This would without doubt be transferred onto the final print resulting in unsightly and unwanted lines. Copper plate however could be produced in larger sizes than wood block pieces and used as a whole rather than a combination of blocks. The physical properties of the copper itself allowed for finer and neater lines to be made rather than the relatively straight and rough lines associated with wood block engraving. Aaron Arrowsmith, who produced a map of Ireland in 1804, was known for his use of large copper plates:

> … thus avoiding the numerous junctions, which too often injure the appearance of good maps, when printed on many sheets.[322]

[320] William Faithorne, *The art of graving and etching* (2nd ed., London, 1702), p. 4.
[321] Ibid.
[322] Arron Arrowsmith, *Memoir relative to the construction of the map of Scotland* (London, 1809), p. 31.

Copper plate was easier to alter if mistakes were found during the revision of engraved work.[323] In addition it had a longer printing life that reduced the final cost of a single copy and allowed a better penetration of the product into the commercial market.

There were two common methods to transfer the initial map design from a manuscript onto copper. The first method involved the coating of the copper plate in wax onto which the map would be drawn in reverse.[324] The second method was proposed by French geographer Abraham Bosse in the seventeenth century[325] which involved the use of transparent paper onto which the map was copied. A form of carbon paper was then used to transfer the tracing directly onto the copper plate.

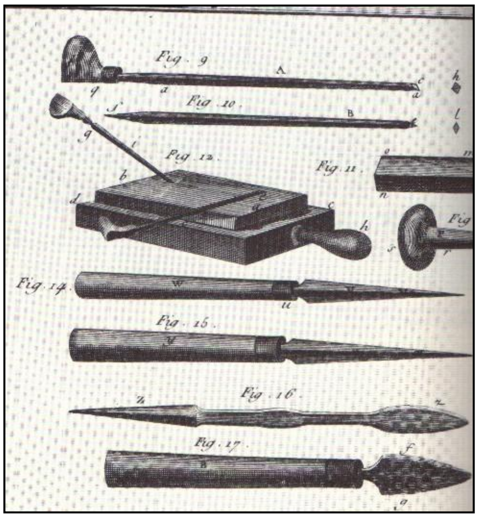

Figure 2.39: Burins used in eighteenth-century copper plate engraving, Denis Diderot, *Encyclopédie, ou dictionnaire raissonné des sciences, des arts et des métiers* (Paris 1751-65).

After the map had been transferred onto copper plate, two main techniques were utilised for copper plate map production, etching and engraving. Etching, the less common of the two techniques in eighteenth-century Ireland, required the scaring of the copper plate with acid to produce a shading effect[326] and was more to add terrain or decorative effect to maps rather than main cartographic detail. Engraving was the most common technique in use at the time to transfer map onto copper plate for printing. An instrument known as a burin (figure 2.39), was employed to indent the copper plate by running it along the cartographic detail of the transferred map. The produced indent would hold ink when the copper plate was finally pressed to print the map on paper. Engraving was the preferred method of map production as the depth of the indent in the copper plate was generally greater, thus making it more robust for printing and enabling more prints of a map to be produced from one copper than a plate that had been etched.

[323] Faithorne, *The art of graving and etching*, p. 41.
[324] Woodward, *Five centuries of map printing*, p. 53.
[325] Abraham Bosse, *Traicté des manières de graver* (Paris, 1645).
[326] Faithorne, *The art of graving and etching* , p. 11.

The burin, the main tool used for engraving, consisted of a sharpened metal blade with a wooden handle for ease of use.[327] They came in a variety of shapes and sizes depending on both the style and the width/depth of the indent that the engraver wished to make on the copper plate. Text was not engraved due to the complexity and time it would have taken to engrave every single letter in a detailed map. Instead lettered punches were utilised. Due to the purely manual nature of eighteenth-century copper plate-engraving, mistakes could easily occur. Unlike the older woodblock method, mistakes in copper plate engraving were relatively easy to correct. Figure 2.40 shows a tool called a burnisher which was an abrasively surfaced hand brush which would remove scratches and shallow indentations in the copper plate.

Whilst these two methods were the most popular during the eighteenth century, several experiments were conducted by French and German engravers. One of the French geographer Alexander Dalrymple's engravers would use a stone to scuff the copper plate, thus producing a shading affect. Despite the ingenuity of this technique, Dalrymple himself admitted, 'It is more elegant than convenient'.[328]

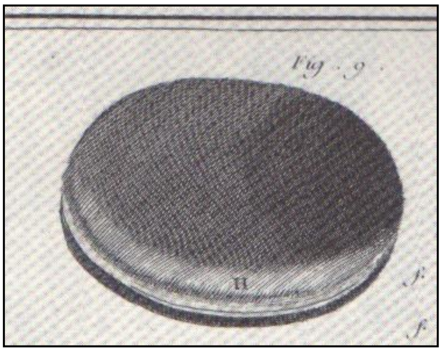

Figure 2.40: A burnisher. Denis Diderot, *Encyclopédie, ou dictionnaire raissonné des Sciences, des Arts et des métiers* (35 vols., Paris 1751-1765), iii, plate 3.

[327] Faithorne, *The art of graving and etching,* p.43.
[328] Quoted in Andrew Cook, 'Alexander Dalrymple's A collection of plans of ports in the East Indies (1774-1775): a preliminary examination' in *Imago Mundi,* xxxiii (1981), pp 51-8.

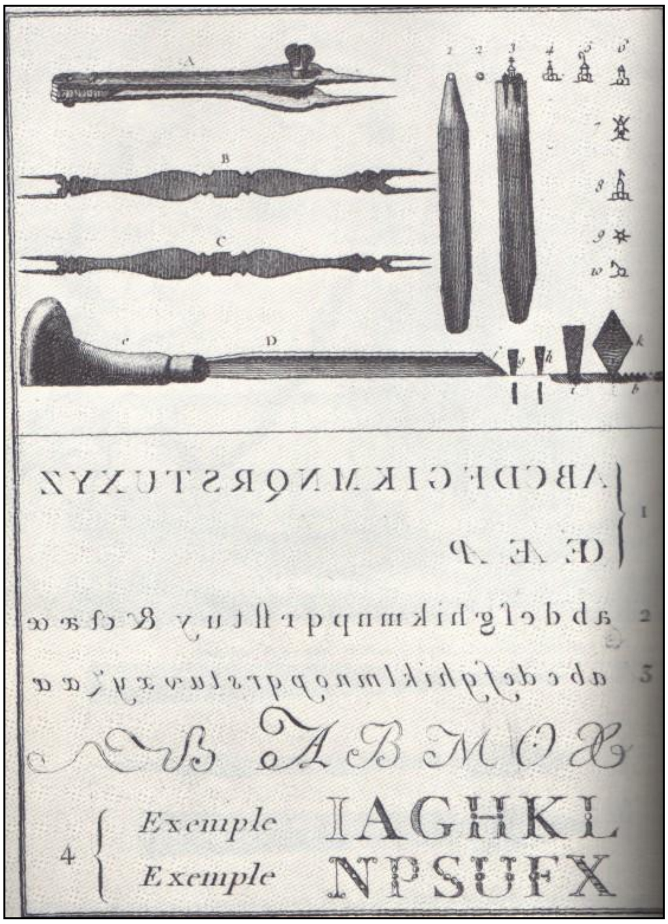

Figure 2.41 Letter Punches used in copper plate printing, Denis Diderot, *Encyclopédie, ou dictionnaire raissonné des sciences, des arts et des métiers* (35 vols, Paris 1751-65), iii, plate 3. The printer would have to read and place the letters in mirror form so that the text would be legible on the final printed map.

Despite the relatively high numbers of printers compared to surveyors operating in Dublin during the period covered by this research,[329] not all of them were involved with copper plate printing or map production. Some classified themselves as simply printers; bookseller and printers, or map and print sellers. However, many printers specified themselves as being copper plate printers or engravers. Table 2.4 shows those who defined themselves as copper plate printers active in Dublin during the years 1769, 1779, 1789, 1799 and 1810. It should be noted that in this skilled trade as in others, inclusion in Wilson's street directory was not mandatory and the higher numbers of copper plate printers in some editions may simply reflect the popularity of Wilson's publication rather than a true reflection of the number of printers at the time.

[329] See Chapter 1 for an analysis of Dublin's population of surveyors during the eighteenth century.

Year	Name	Occupation	Location
1769	Joseph Debenham Jr.*	Engraver & Copper Plate Printer	High Street
1779	Luke Johnson	Engraver & Copper Plate Printer	5 East Cole Alley
	John Debenham*	Engraver & Copper Plate Printer	52 Castle Street
	Charles Hencey	Engraver & Copper Plate Printer	18 Suffolk Street
	John West	Print & Map seller	51 Exchange Street
1789	Simon Brigly**	Copper Plate Printer	52 South Great Georges Street
1799	Joshua Lacey	Engraver & Copper Plate Printer	17 Essex Quay
1810	Allen George	Engraver & Copper Plate Printer	31 Westmoreland Street
	Thomas Bird	Engraver & Copper Plate Printer	57 South Great Georges Street
	John Farrell	Engraver & Copper Plate Printer	17 Essex Quay
	Edward Fitzgerald	Engraver & Copper Plate Printer	25 Abbey Street
	John Robinson	Engraver & Copper Plate Printer	28 Essex Street
	Samuel Shaw	Engraver & Copper Plate Printer	14 Essex Quay

* John and Joseph Debenham may have been related, possibly father and son due to their shared profession and proximity of work shops
** Simon Brigly shared a building with Henry Brocas, an engraver

Table 2.4: List of copper plate printers in Dublin, 1769-1810.

Pollard's *Dictionary of members of the Dublin book trade 1550-1800* (London, 2000) estimates the number of those involved in engraving, copper plate printing, print and map selling as approximately 230 covering the years 1550 to 1800, yet of this large number only a very small percentage were involved in the map trade.

Another valuable record of Dublin's copper plate printers and engravers comes from the various newspapers in circulation in eighteenth-century Dublin. Many printers and engravers advertised their intention to publish maps made by the top surveyors of the period with the intention of increasing awareness and to encourage sales. William Allen, print seller, advertised his connection with D. A. Beaufort's *Map of Ireland*[330] (Dublin, 1785) as well as A. R. Neville's *Map of the County of Wicklow*[331] (Dublin, 1795). Surveyors would also use a combination of separate engravers and printers to publish their maps. Jacob Neville hired engraver George Byrne of Smock Alley[332] to engrave his *Map of County Wicklow* (Dublin, 1760) and had the resulting copper plate printed by Thomas Silkock of Nicholas Street[333] in the same year.

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[330] *Dublin Evening Post*, 5 Apr. 1785.
[331] Ibid., 13 June 1795.
[332] *Public Gazette*, 6 Dec. 1760.
[333] Ibid.

Surveyors themselves could also double as engravers. Perhaps the most well-known of these surveyor/engravers operating in Dublin during the eighteenth century was John Rocque. Rocque's 1756 map of the city was etched, engraved and printed in Dublin. He also referred to his engravers/survey assistants in the *Dublin Journal*:

> Said John Rocque, in gratitude for the many favours he hath received in this Kingdom, thinks it a duty incumbent on him to engrave the above maps in Dublin, and is therefore provided with proper artists for that purpose, being the same persons who assisted him in this surveys.[334]

Rocque began his engraving practice in London in the 1740s where he lost one printing shop in Piccadilly to fire, and later opened a second one on the Strand.[335] Following his return to London in the 1760s and subsequent death, his engraving business passed to his widow, Mary Ann Rocque. Military engineer John Montresor engaged Mary Ann's engraving shop to produce his maps of Nova Scotia, Canada, Boston Harbour and New York in 1766.[336]

John Rocque utilised a variety of engravers and printers for his works, which may in reality reflect the popular demand for Rocque's maps rather than a specific trend within his own work practices. For his map of *Dublin and its environs* (Dublin, 1756), Rocque employed Andrew Dury as his engraver.[337] George Byrne engraved his *Map of Kilkenny* (Dublin, 1758), J. J. Perret for his *Map of Thurles*[338] (Dublin, 1757) and John Dixon engraved the title piece of his *Map of Dublin County*[339](Dublin, 1760). Scalé followed a similar trend as his master by varying his engravers and printers – Patrick Halpin engraved Scalé's *Geometrical elevation of the Parliament House* (Dublin, 1767), J. J. Perret engraved Scalé's *Plan of Dublin City, suburbs and environs*[340] (Dublin, 1760) and Richard Bushell who was also involved in selling Scalé's *Plan of Trinity College*[341] (Dublin, 1761). Others involved in the engraving, printing and

[334] *Dublin Journal*, Sept. 1754.
[335] Sponberg Pedley, *The commerce of cartography*, p. 100.
[336] Scull, *The Montresor journals*, p. 392, quoted in J. B. Harley, Barbara Petchenik and Lawrence Towner, *Mapping the American revolutionary war* (Chicago, 1978), p. 85.
[337] John Rocque, *Exact survey of Dublin city and its environs* (Dublin, 1756). Dury signed his name on sheet four of this map.
[338] Pollard, *Dictionary of members of the Dublin book trade, 1550-1800*, p. 457.
[339] *Exshaw's magazine*, Apr. 1760 p. 182.
[340] Ibid.
[341] *Public Gazette*, 7 Nov. 1767.

selling of maps in eighteenth-century Dublin and who advertised their business included James Barlow,[342] George Cowan[343] and John Duff.[344]

The close connection which many engravers and printers had with surveying demonstrates that map printing from copper plate did occur in Dublin during the eighteenth century. However, there is little direct evidence of these engravers and copper plate printers regularly printing maps aside from the large town plans. Many Irish surveyors[345] had their maps engraved abroad, thus widening the potential numbers of engravers available for work in Irish-related mapping. For example William Petty's *Ireland* (1675) was engraved in Amsterdam[346] while Bernard Scalé chose to have his *Hibernian atlas* (1776) engraved and printed in London.

Printers in Dublin existed in loose partnerships or companies relatively free of legislative restrictions until the Stamp Act[347] that required printers to print their names and address in their published works**.** Print shop staff, depending on its size, usually consisted of several journeymen and one or two apprentices. Apprentice printers worked for seven years learning the trade before graduating as journeymen and their experiences of such an education could vary widely. Dublin-born Thomas Gent suffered physical abuse under his tutor, Stephen Powell, before fleeing to England in 1706. Gent eventually became a printer in York in the 1730s.[348] Other runaway apprentices include fifteen-year-olds John Price and George Slack whose master, Robert Hudson, warned the public not to harbour them after they left 'without the least provocation.'[349]

There exists little evidence of the day-to-day operations, cost or persons involved with eighteenth-century copper plate engraving in Dublin, but there are examples from

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[342] Pollard, *Dictionary of members of the Dublin book trade, 1550-1800,* p. 21. Barlow's name appears on a Map of Hudson Bay published in 1749.
[343] *Hibernian Journal,* 6 Dec. 1774 –'new maps by late J. Rocque and B. Scalé.'
[344] Pollard, *Dictionary of members of the Dublin book trade, 1550-1800*, p. 170. advertised *Plan of Kilkenny* and printed Charles Vallancey's *Collectanea de Rebus Hibernicus* both in 1781.
[345] William Bald - Paris, Alexander Nimmo - London, *Report from select committee on survey and valuation of Ireland*, pp 58-93 [445], H. C. 1824, viii.79
[346] R. A. Skelton, *County atlases of the British Isles* (London, 1970), p. 106.
[347] 34 Geo. 3 [Ire.] (1794) c.3.
[348] Thomas Gent, *Life of Mr. Thomas Gent, printer of York* (London 1832), p. 2.
[349] *Dublin Chronicle,* 3 Oct. 1789.

England of the type of people who were involved in the industry. The 1747 edition of the *London Tradesman* listed the following desired qualities in an engraver:

> They ought to be acquainted with painting, have a nice judgement in the works of the most famous artists, and perfectly masters of the doctrines of light and shade, in which their art consists: They ought to be early learned to draw, and keep in constant practise, for there is nothing which the hand is more liable to forget than the performance of anything relating to pictures … They ought to have a fertile invention, and a kind of poetic fancy; They must have a delicate and steady hand and a clear strong sight, for their work is very trying to the eyes.[350]

Colouring

The application of colour in eighteenth-century mapping can be separated into several different categories. The first group contained those maps where colour was used as a means of highlighting boundaries or administrative areas such as city wards or counties and was used in both printed and manuscript maps. John Rocque's map of the *Kingdom of Ireland* published in 1780 involved four different colours to highlight the borders of the four provinces of Ireland in a simple yet highly effective way. Dublin city surveyor A. R. Neville replicated the same colouring scheme in 1800 to highlight a section of city property on the south side of College Green to establish three separate leases let to Sir William Fownes in the mid-seventeenth century (see figure 2.42) as did Thomas Reading and Peter Callan in their work for the Hatch estate during the 1740s.[351] This method was well established in Dublin by the eighteenth century as figure 2.43 shows a 1654 Robert Newcomen cadastral map of ecleastical lands near Tallaght using a similar colour scheme. Equivalent maps regularly appear in the records of the Wide Streets Commissioners and those of the city surveyor, both of which worked extensively in cadastral mapping within the city.

[350] R. Campbell, *The London tradesman* (London, 1747), pp 113-4.
[351] Maps of Thomas Reading and Peter Callan, 1727 – 1871 (NLI, Hatch Estate maps, ms. 21 F 107), maps 4 & 5.

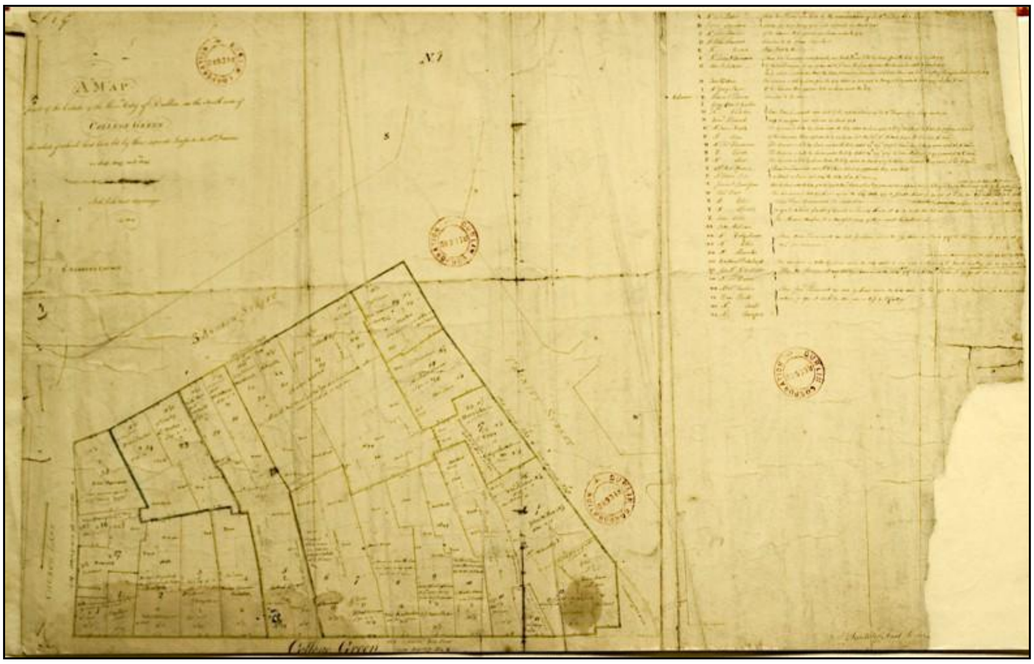

Figure 2.42 Use of colour to highlight specific land plot. A. R. Neville, Map…part of City Estate on south side of College Green, 1800 (DCA, WSC/Maps/103).

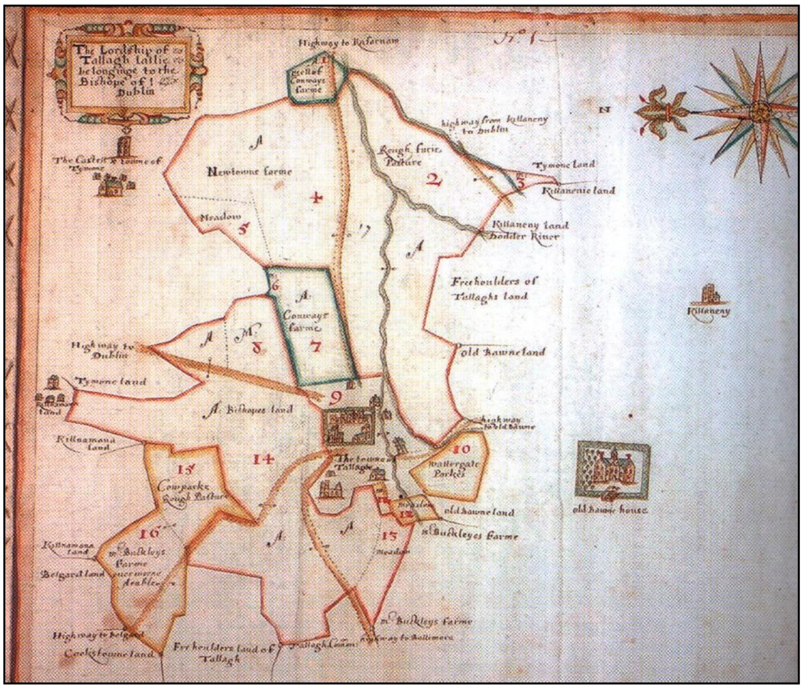

Figure 2.43 Colour used to distinguish between different land plots. Robert Newcomen, Map of Tallaght, 1654, reproduced in Raymond Refaussé and Mary Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850* (Dublin, 2000), map 25.

A second group of surveyors employed a more extensive use of colours to highlight certain features of the map, much as the first boundary group did, yet the colouring still retained a practical rather than decorative function. Figure 2.44 shows a section of a map produced by then city surveyor Roger Kendrick in 1754 highlighting land ownership and leases in and around Saint Patrick's Cathedral, Dublin. The watercolour allows the map detail to remain visible despite being within a coloured area. Such watercolours would have been applied after the map had been printed by hand either by Kendrick himself or by a member of staff in the print shop. Many examples of the work of Thomas Sherrard and Jonathan Barker belong to this category. A prime instance of Sherrard's uses of this colouring scheme was his 1790 map of Church Street/Phibsboro Road/Botanic Road with main buildings being highlighted in a water-colour red and outhouses such as sheds and stables in a water-colour grey.[352]

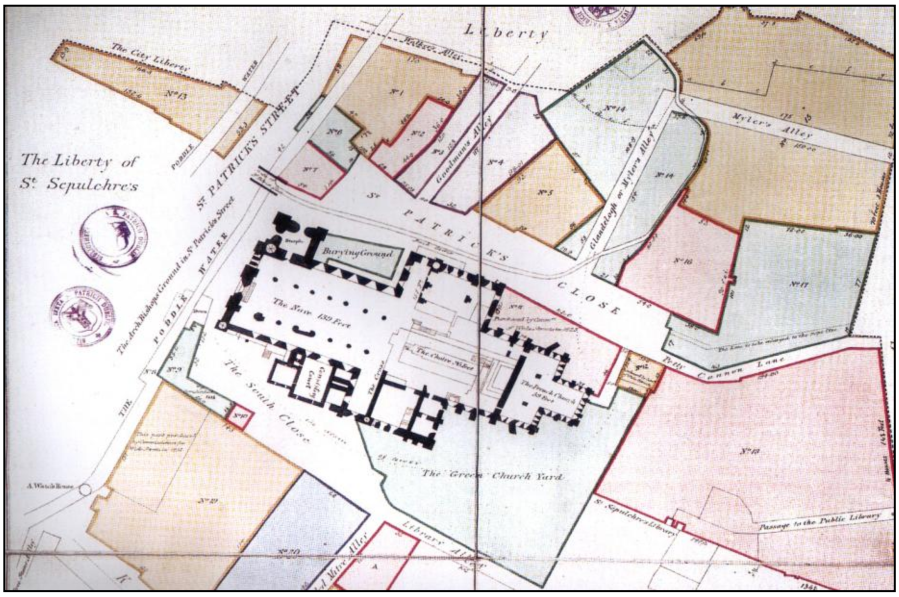

Figure 2.44 Colour used to highlight land ownership and leases. Roger Kendrick, Map of the Liberty of St. Patrick's Cathedral, 1754, reproduced in H.B. Clarke, *Dublin part 1, to 1610* (Irish Historic Towns Atlas, no. 11, Dublin, 2002), map 9.

Thomas Owen was requested by the Paving Board in 1785 to include simple use of colour for thematic mapping:

> … with the streets marked with different colours, distinguishing those which are to be kept in repair, those done with broad stone pavement &.c. &.c. also maps with the streets that are light with the new globes; which were ordered to be distributed to each director & commissioner.[353]

The final grouping utilised a more opaque form of colour that fulfilled the dual role of distinguishing separate map features in addition to giving the map a more decorative finish. Figure 2.45 and 2.46 show two examples of this technique. Figure 2.46 illustrates a section of lands in Templeogue surveyed by Francis Matthews in 1783. Matthews' use of colour highlights not only separate sections of land, but in addition demonstrates land usage and adds to the artistic quality of the overall map. Another

[352] Thomas Sherrard, Church Street, Constitution Hill and Phibsboro Road, 1790 (DCA, WSC/Maps/263).
[353] Minutes of Paving Board, 10 Jan. 1785 (DCA, PB/Mins/14, p. 25).

example of this technique is figure 2.45 which shows a section of John Rocque's survey of Maynooth in 1757. The colouring is both dense and covers a wide spectrum, which, while adding to the realism of Rocque's map, also adds to the cartographic information it contains by showing the contents of fields. Maps of this type were rare in eighteenth-century Ireland due to the time and expense involved, however they were often produced for estate surveys in manuscript rather than printed form.

Figure 2.45 Realistic colour scheme applied to map features. John Rocque, A survey of the town and lands of Maynooth, 1757. Reproduced in Arnold Horner, *Maynooth* (Irish Historic Towns Atlas, no. 7, Dublin, 1995), map 4.

Figure 2.46 Realistic colour scheme applied to map features. Francis Matthews, Map of lands in Templeogue, 1783, reproduced in Raymond Refaussé and Mary Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850* (Dublin, 2000), map 46.

The English surveying author Samuel Wyld was a strong proponent of this method of colouring and its use in maps. Wyld attempted to formalise the relationship between colours and the various features found in maps:

> … lay on the colours in manner following, being first ground, and bound with gum-water very thin and bodiless: arable for corn, you may wash with pale straw-colour, made of yellow oker and white-lead; for meadows, take pink and verdigrease in a light green; pasture in a deep green of pink, azure, and smalts; fenns, a deep green; as also heaths of yellow and indico; trees, a sadder green, of white-lead and verdigrease; for mud-walls and ways, mix white-lead and rust of iron, or with okers brown of Spain … for seas, a greenish sky colour, of indico, azure, smalts, white lead and verdigrease.[354]

One main reason for the lack of highly colourful printed maps was that using copper plate printing for colour did not appear until the nineteenth century.[355] Colour was regularly added by hand, either by the surveyor or by the purchaser of the map after printing. This manual application of colour was utilised for both printed and manuscript mapping. Several treatises were produced throughout the seventeenth and eighteenth centuries describing methods of colouring maps, as the process was seen as an acceptable and genteel pastime. John Smith's *The art of painting in oil* (London, 1701) states that map colouring would appeal to those:

> … that are inclined in ingenuity, to set forth the way and manner of doing this work, it being an excellent recreation for those gentry, and others, who delight in the knowledge of maps; who by being coloured, and the several divisions distinguished one from the other by colours of different kinds, do give a better idea of the countries they describe, than they can possibly do uncoloured.[356]

Wyld added to the idea that the colouring of maps was not necessarily the realm of the land surveyor:

> This colouring and adorning of plots, is rather the painter's work than the surveyor's: yet if he has time to spare, and patience to finish the work, it may prove a pretty diversion …[357]

There were those however who took a more disdainful view of map colouring, such as the French engineer Hubert Gautier who felt:

> … one can learn the complete essence of it in three or four lessons. Women and nuns can easily occupy themselves with this sort of activity.[358]

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[354] Wyld, *The practical surveyor*, p. 114.
[355] Woodward, *Five centuries of map printing*, p. 53.
[356] John Smith, *The art of painting in oil* (London, 1701), quoted in David Woodward, *Art and cartography* (Chicago, 1987), p. 134.
[357] Wyld, *The practical surveyor*, p. 115.
[358] Hubert Gautier, *Art du laver, ou nouvelle manière de peindre su le papier* (Lyon, 1687), quoted in Sponberg Pedley, *The commerce of cartography*, p. 69.

An 1805 city plan of Dublin engraved by B. Barker of Islington was produced uncoloured but had colouring instructions contained on the map's reference table:

> Explanation
> I The river separated the north and south divisions of the city as regulated by a late Act of Parliament no other distinction correct
> II The Buildings…..Red Wash
> III Intended D° ….. Faint D°
> IV County Boundaries…Blue Line
> V Earl of Meath Liberty…Green D°[359]

In this particular case the examined map's colouring instructions were not followed. Instead the city was divided into eight separate coloured sections between the North and South Circular Roads for the establishment of the areas patrolled by the inspectors of paving and lighting.

For manuscript colouring, allum-water was applied to the map as the initial preparation in order to prevent paint from being fully absorbed by the parchment or paper. Taking the materials needed to create different colours, grinding them into a fine powder and adding a small amount of water produced different paint colours. Several treatises described methods to produce basic map colours and how these colours could be altered to produce different shades. William Leybourn described the production of separate shades of blue as such:

> *Ultramarine*, being tempered with a weak gum-water makes the best blue
> *Bice*, washed and tempered with gum-water, is an excellent blue, but not transparent, and there are several sort of it, some lighter, some sadder.
> *Indigo*, ground and tempered with gum-water, makes a deep *Blue*, and it fit to shadow all other blues
> *Verditer*, washed and tempered with gum-water, is a good blue, but not transparent.
> *Litmus*, cut it in small slices, and steep it in a weak water, made of gum-black, for the space of a day or more, and you will have a transparent blue.
> *Logwood*, boiled in all respects as Brazil makes an excellent violet or purple-colour.[360]

The paint was applied with a brush and the outline of the colour was highlighted firstly with a black lead pencil and then with a pen using the same colour paint as that on the map.[361]

William Faithorne attempted to develop a method that removed the need to colour maps by hand by using more than one identical copper plate, each having incised on it

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359 Unknown, *A modern plan of the city and environs of Dublin* (Dublin, 1805).
360 Leybourn, *The complete surveyor*, p. 307.
361 Laurence, *The surveyor's guide*, p. 225.

only those parts to be printed in a single colour. When the original black and white print had been produced, the print would have been realigned and the coloured sections would each be superimposed onto the print in turn.[362] This method, however, was not observed during the course of this research in any examples of eighteenth-century Dublin map printing.

[362] Faithorne, *The art of graving and etching*, p. 69.

2.8 Summary

The array of surveying instruments and methods open to eighteenth and early nineteenth-century surveyors in Dublin was vast. The cordial relationship between the land surveying community and scientific instrument dealers is demonstrated through the various advertisements present in period surveying treatises[364] and the use of product placement and name dropping in such books only reinforces this point. Given the importance that surveying instruments played in the land surveying industry, and the relatively small number of instrument manufactures present in Dublin in the eighteenth century, it is important to note that these few manufactures were of paramount importance to Dublin's surveyors.

Despite the surveying industry taking pride in its practicality, the presence of many different forms of measurement systems in fact reduced the ease with which maps could be produced during this period. There appears to have been a general acceptance amongst the surveying community that variety in the forms of measurement was inevitable and there is little evidence of a desire to enforce standardisation. The lack of a centralised surveying body governing the industry again resulted in measurement variation transcending the entire surveying industry during this period however such variation appears not to have adversely affected Dublin's eighteenth-century surveyors to a great extent.

More varied than the available units of measurement were the instruments offered to eighteenth-century surveyors. The surveyor's chain, the circumferentor and the theodolite made up the main arsenal of the land surveyor of this period. Each had its own limitations and advantages, with the circumferentor being susceptible to changes in the earth's magnetic field and the metallurgical make up of the surveyor's chain making it susceptible to stretching. The eighteenth century saw the decline of the plain table and the emergence of the level in the Irish surveying industry.

The process of projecting survey measurements to a manuscript map was not the final stage in a map's production. Decisions regarding what form of colouring, if any, to

[364] Wyld, *The practical surveyor*, preface; Gibson, *Practical surveying*, p.160.

employ in addition to whether there was justification to engrave the map and have it mass produced were required following a map's transfer to paper. For the majority of maps reviewed as part of this research neither colour nor printing was required. Yet for some of the most prestigious maps of the eighteenth century, methods of copper plate printing and application of colour were of high importance to both the surveyor and the printer. As with their relationship with Dublin's instrument manufactures, the surveyor/engraver/printer association was both cordial and complex. Surveyors would use a variety of engravers for their various works, and the engravers themselves would often be involved in printing the final version of the map.[365]

The use of subscription lists was a clear indicator of customer demand[366] as was the prestige in which a surveying project was held.[367] Compiling maps from existing sources, especially the Down Survey, was another method employed to produce mapping in eighteenth-century Dublin. While not without its risks, it was very useful in proving the case for surveys and acted as one of the few authorities over the surveying industry.

The practical elements of surveying – recording results, using survey instrumentation, and transferring measurements to maps and the printing of cartographic products – were the key to a successful surveying career. Those who could master all of these elements were often at the forefront of the industry, ahead of those restricted to simpler surveys or manuscript maps. In the following chapter, the aesthetic presentation of geographical data, the various trends and fashions that arose in the eighteenth century concerning map design, and the various cartographic successes and failures of Dublin's surveyors will be analysed.

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[365] Rocque, *Exact survey of Dublin City and its environs*, Rocque's engraver Dury signed his name on sheet four of this map.
[366] Taylor & Skinner, *Maps of the roads of Ireland*.
[367] George Semple, proposed line of Parliament Street, 1757 (DCA, WSC/Maps/523).

Chapter three: The art of eighteenth-century land surveying

3.1 Introduction

Eighteenth-century surveying was more than the measurement of angles, bearings and chains. The maps produced during this period were a direct reflection, not only of a surveyor's skill in the field, but also of his professionalism, ability, aesthetic awareness and imagination. His main aims were for both intelligibility and reader-friendliness whilst maintaining geometric accuracy. Changes in fashions and styles often affected a surveyor's choices around how best to represent the land he had measured. Such fashions also affected geographic referencing and non-geographic elements such as cartouches and vignettes.

Map copying and data duplication were common features of eighteenth-century surveying. The regularity of such duplication, its advantages and potential drawbacks, are elements examined in this chapter. Dublin, as a relatively large European city, was the focus of several individual city plans from 1610 to the early nineteenth century. In order to best examine how the city was cartographically represented, it is necessary to inspect each major city-wide mapping project – both on an individual basis and as a collective whole.

As chapter two explored the technology and techniques of surveying, chapter three investigates how these elements could be combined to produce a map, or as one eighteenth-century surveyor stated;

> Hitherto we have been like children learning to spell; now let us set our syllables together.[1]

To accomplish this the chapter examines cartouches, vignettes and map titles, geographic referencing and area calculation, the copying of maps, the presence of buildings in maps and Dublin town plans pre-1728. The inclusion of seventeenth-century examples helps to demonstrate the development of both cartography and surveying between that era and the eighteenth century in Dublin. The chapter concludes with a review of the two most historical significant maps of Dublin form the period, Charles Brooking's 1728 map and John Rocque's 1756 map.

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[1] Martindale, *The country-survey-book*, p. 41.

3.2 Cartouches, vignettes and map titles

The cartouche[2] provided the eighteenth-century map maker with an opportunity to display his creative talents. The presence of non-geographic features[3] such as north arrows separated the amateur surveyor from the professional; high quality cartouches and vignettes separated the artist from the professional. Cartouches are non-geographic, decorative or ornate features containing a map's title, its dedication, its authors name and occasionally its scale bar. In Ireland, cartouches ranged from the simple shapes of the late seventeenth and early eighteenth centuries[4] to the ornate baroque[5] and later rococo[6] extravagance[7] of the eighteenth century and to the modest, yet decorative works of Dublin's early nineteenth-century surveys.[8]

Evolution of cartouche design throughout the eighteenth century reflects contemporary artistic trends. Several surveyors active during this period were educated at the Royal Dublin Society's schools of drawing, architecture and ornamental design and this education is reflected in their work. Thomas Sherrard and John Brassington, for example, were both educated at the same school as artist Bland Gallant who was known for his work as an engraver servicing the silver trade [9] The connection between map design, symbolism and fashions in eighteenth-century art, was commented on by William Allen in 1789 as;

> The advantages which assure the community … the study of design [is] not confined to the superior ranks of life; they are defined through a variety of ingenious branches of manufacture, in which a taste of knowledge of drawing is indispensably necessary, for their attaining perfection.[10]

[2] Ornate tablet or shield bearing an inscription, monogram or heraldic arms framed in elaborate scrolls, shell-shaped volutes or similar designs, Jane Turner (ed.), *The dictionary of art* (34 vols, New York, 1996), v, 899.

[3] This term relates to features that are part of a map's framework but were measured as part of the survey e.g. north arrows, scale bars, cartouches, vignettes etc.

[4] For example, Joseph Moland, Map of Lusk, 1716, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin 1,654-1850* , p. 59, map 8.

[5] 'The principle European style in visual arts … often extended to the whole period 1600-1750 without qualifying restrictions…to mean a florid and elaborate style in art, architecture, music or literature', Turner (ed.), *Dictionary of art*, iii, 261.

[6] 'A decorative style … the character of its formal idiom is marked by asymmetry and naturalism, displaying in particular fascination with shell-like and watery forms': Jane Turner (ed.), *Dictionary of art*, xxvi, 491.

[7] John Rocque, *Kilkenny* (Kilkenny, 1758); Gabriel Stokes, *Map of Shankill* (Dublin, 1722).

[8] Thomas Sherrard, *A survey of part of the city of Dublin showing several improvements intended by the Commissioners of Wide Streets* (Dublin, 1801).

[9] John Turpin, *A school of art in Dublin since the eighteenth century* (Dublin, 1995) p. 49.

[10] Ibid., p. 6.

Cartouches allowed more information to be conveyed to the map reader than simply the name of the area mapped, who produced it and in what year. The cartouche can hint at the social background of a map or even the political climate within which it was created without the need for large sections of text, as noted by the modern writer Christian Jacob:

> Writing interferes with the drawing, and only through a complex process of visual adaptation can the one order be dissociated from the other. Writing and drawing conform to two different forms of graphic logic.[11]

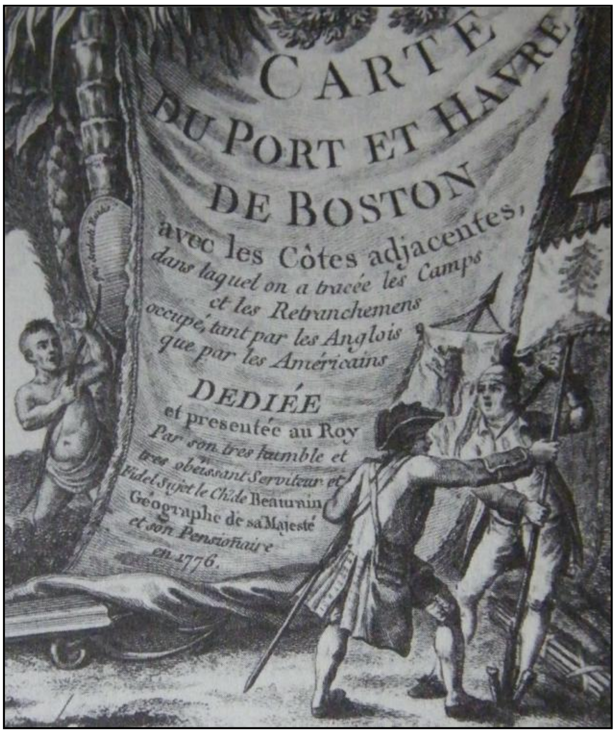

Figure 3.1 Political motifs in eighteenth century map cartouche. Jean de Beaurain, *Carte du Port et Havre de Boston* (Paris, 1776).

The early nineteenth-century English surveyor A. Nesbit had the following advice as to what non-geographic decoration may be included in mapping:

> Any compartment or device may be chosen to fill up the vacant corners of a plan, such as the compass, scrolls of paper, wreaths or festoons of leaves and flowers, branches or springs of oak, palm trees, weeping-willows, myrtle, laurel, olive, &c. &c. Also shields, coats of arms, columns supporting vases or urns, mathematical instruments, cattle, sheep, or whatever else may please the fancy of the draftsman.[12]

Cartouches were not a uniquely Irish feature of eighteenth-century cartography. The French cartographic community excelled in producing extravagant cartouches for major mapping projects throughout this period. An agreement between French cartographer Philippe Buache and his map patrons show that both parties recognised the importance of the cartouche to the overall appearance of the map, and the great wealth of symbolism that could be packed into thesis small space:

> One will display on these cartouches the arms of the Prelates and Barons of each diocese, those of the Province and those of the City. These coats of arms will be supported by their own devices or accompanied by geniuses or allegorical figures and

[11] Christian Jacob, *The sovereign map* (Chicago, 2006), p. 215.
[12] A. Nesbit, *Treatise on practical land surveying* (York, 1824).

> attributes reflecting the products of the land, the province's natural history, and the commerce of the different cantons and anything in particular concerning [its] ancient or modern monuments.[13]

An excellent example of an eighteenth-century French cartouche being used to express more than just geographic data is Jean de Beaurain's map of Boston harbour (1776), produced during the American Revolutionary War (1775-83). The map is a basic hydrographical chart of the approaches into and out of Boston harbour, yet its cartouche shows the author's political sensibilities as a member of the Massachusetts militia grapples with a British officer who appears intent on replacing the militia man's colonial banner with his own (figure 3.1). A Native American watches this scene with an inscription in the shield above his head – *Quo scelesti ruitis?* – translated by Sponberg-Pedley as 'Whither do you rush, O wicked ones?'[14] This inscription is the first line in Horace's Epode VII on the Roman civil war, reflecting the fraternal nature of the conflict. This connection is further reinforced as at the militia man's feet lies a Fasces, the symbol of ancient Rome meaning strength through unity. The cartouche on De Beaurain's map is an example of the cartouche as an art form.

While similar examples of extravagance are present in eighteenth-century Irish cartography, particularly amongst the members of Rocque's French School, simpler cartouches were the norm. The majority of maps did not require elaborate designs and cartouches were regularly added by the surveyor themselves, to varying levels of artistic quality.

Irish cartouches and title boxes can be divided into three distinct groups:
Firstly the basic shape, that is, a square, a rectangle, a triangle, an oval, in which is contained the map's title, its author, date of survey etc. These title boxes are very simple with minimal, if any, decoration and are commonly found amongst estate maps[15] and other day-to-day cadastral surveys[16] not meant for mass duplication or publication. They are found throughout the entire period covered by this study (1700-1810).

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[13] De Danville, *Le langage des géographes*, p. 64, translated by Sponberg-Pedley, *Commerce of cartography*, p. 56.
[14] Translated by Sponberg-Pedley, *Commerce of cartography*, p. 59.
[15] Michael Kenny, Map of Glasnevin, 1804 (NLI, Domville papers, ms.11,937(21)).
[16] Sherrard and Brownrigg, Fishamble Street, 1805 (NLI, Longfield papers, ms. 21. F. 88 (153)).

Rococo and baroque style cartouches are the second category. Baroque is associated with the seventeenth century but continued well in the eighteenth century whereas rococo emerged during the eighteenth century. A particular master of baroque was Gabriel Stokes[17] while Rocque,[18] and Scalé are both associated with rococo.[19] Such cartouches contain examples of landscape painting, surveying equipment and surveyors at work, putti, heraldry and images of local industry and agriculture. These cartouches are found mainly in prestige pieces or adorning city and town plans.

Thirdly an artistic style noted for its use of minimalist curved and swirled lines in and around the title of the map without any box or containment of such text. Whilst mainly being associated with Irish cartography from the beginning of the nineteenth century, one of the earliest examples of this style can be traced back to the 1780s.[20] Although lacking the artistic range of the baroque and rococo examples, or the definition of a title box format, this rounded and discrete format is both elegant and simple and its presence is a useful method in determining the age of a map missing either a date or surveyor's signature.

Figure 3.2 Simple cartouche, Joseph Moland, Map of Lusk (1716), reproduced in Raymond Refaussé and Mary Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850* (Dublin, 2000), p. 59, map 8.

Title bars

Basic shape title boxes represent the simplest, fastest and cheapest method of displaying surveyor and map information. There were a number of possible reasons for the selection of this style. Low prestige maps required less investment on the cartographer's side so less time and effort would be spent on map decoration. The surveyor may simply not have had the time, skill or desire to produce a detailed cartouche. Cartographic fashion may have

[17] Gabriel Stokes, Map of Tallaght, 1718, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 63, map 10.
[18] John Rocque, *Kildare* (Kildare, 1758).
[19] Bernard Scalé, *Dublin city and suburbs* (Dublin, 1773). Bernard Scalé, A survey of the demesne of Dundalk (1777), reproduced in O'Sullivan, Dundalk (*Irish Historic Towns Atlas*, no. 16, Dublin, 2006), map 11.
[20] Francis Mathews, Map of lands in Templeogue, 1783, reproduced in Refaussé and Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, map 46.

weighted in favour of a more simple design,[21] or a basic shape was deemed most suitable for a particular map.[22]

Such basic shape title boxes were very common in seventeenth and eighteenth-century maps of Dublin. John Speed's 1610 map of the city represents this style in its simplest form with the word 'Dubline' in a box. Forty years later, the work of Robert Newcomen showed the beginnings of a more decorative style, yet the titles for his map of Tallaght (1654) and Rathcoole (1654) were still very much of this basic shape This simple style was relatively common in cadastral manuscript maps throughout the eighteenth century. As these maps were for a practical purpose and not designed to be mass produced, relatively little attention was paid to elaborate map decoration. Joseph Moland's map of Lusk (1716), figure 3.2, is an example of this point. The map represents ten holdings in and around the village of Lusk in north County Dublin, with each plot area represented both within each field and also in a separate reference box in acres, roods and perches. The map is neat, clear and simple, without a north arrow of any sort, and the cartouche is similarly unfussy, being a slightly rectangular box with a double-lined border.

This simple title box, whilst being common in maps from the first half of the eighteenth century, can also be found in manuscript cadastral maps into the first decade of the nineteenth century.[23] Thomas Sherrard's work, as an individual and with his company into the first two decades of the nineteenth century, Sherrard, Brassington and Green, regularly produced some of the most ornamental and elaborate examples[24] of Irish map decorations seen since the era of John Rocque. Yet, for many of his lower prestige cadastral maps[25] Sherrard regularly used a simple box format title. Roger Kendrick and Thomas Cave, both known to have produced elaborate cartouches,[26] also reverted to a more understated cartouche design for their

[21] Joseph Moland, Map of Lusk, 1716, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 59, map 8.
[22] Sherrard and Brownrigg, Fishamble Street, 1805 (NLI, Longfield papers, ms. 21. F. 88 (153)).
[23] Michael Kenny, Map of Glasnevin, 1804 (NLI, Domville papers, ms.11,937(21)).
[24] Sherrard, Brassington and Green, A map of Balbutcher, Ballymun, 1808 (NLI, Domville papers, ms.11,937(61)), is an excellent example of a detailed, watercolour cartouche produced by Sherrard during his long surveying career.
[25] Sherrard and Brownrigg, Fishamble Street, 1805 (NLI, Longfield papers, ms. 21. F. 88 (153)).
[26] Thomas Cave, Map of Belinstown and Loughmartin, 1728, reproduced in Raymond Refaussé and Mary Clark, *A catalogue of the maps of the estates of the archbishops of Dublin 1654-1850* (Dublin,

cadastral maps.[27] John Brownrigg was yet another surveyor who regularly employed a similar template for his basic cadastral maps.[28] This design connection between Sherrard and Brownrigg is not unexpected as the two men were both pupils of Bernard Scalé and as such were likely to share common traits in their map decorations.

The simple box design was also used by Francis Mathews (1780)[29] and Gabriel Stokes (1724).[30] However Mathews's style lacks the clarity of either Sherrard or Brassington and appears out of date even when compared to Stokes's map which was produced nearly fifty years before Mathews's example.

Baroque and rococo

Some of the most high profile maps produced in Ireland during the eighteenth century are those considered, then as now, to be prestige pieces. These maps, usually estate, city or town plans, were commissioned for commercial purposes and as such were embellished with elaborate cartouches which regularly reflected the heraldry or industry of the city or town. Many of these decorative cartouches were drawn in the baroque and the later rococo style – fashionable eighteenth century artistic trends emphasizing dramatic, often strained effect and typified by bold, curving forms and elaborate ornamentation. The artistic level to which many of Ireland's cartouches were produced during the eighteenth century varies immensely.

Baroque and rococo cartouches can be recognised by some, if not all of its contents. The dedication or map title tends to be surrounded by curving shells,[31] curtains[32] or natural features such as flowers.[33] Putti are a regular feature[34] as are heraldic symbols,

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2000), p. 68, map 16. Roger Kendrick, Map of lands in the parish of Tallght, 1752, reproduced in ibid., 74, map 19.

[27] Thomas Cave, Map of Loughlinstown, 1716 (NLI, Domville papers, ms. 11,937(10)). Roger Kendrick, Map of Bridesglen 1757 (NLI, Domville papers, ms. 11,937(57)).

[28] John Brownrigg, Merrion Row, 1791 (NLI, Longfield papers, ms. 21. F. 89(189)); John Brownrigg, Harcourt Street, 1793 (NLI, Longfield papers, ms. 21. F. 89(159); John Brownrigg, Hawkins Street 1790 (NLI, Longfield papers, ms. 21. F. 89(165)).

[29] Francis Mathews, Parkgate, 1780 (NLI, Longfield papers, ms. 21. F. 86(58)).

[30] Gabriel Stokes, Millrace, Donnybrook, 1724 (NLI, Longfield papers, ms. 21. F. 86(132)).

[31] Rocque, *Kilkenny*.

[32] John Ewing, *City of Londonderry* (Derry/Londonderry, 1747).

[33] Rocque, *Kildare*.

either of cities[35] or of the patrons of the map.[36] Rococo differs from baroque in several subtle ways, mainly being less symmetrical and lighter in theme. Often the differentiation between rococo and baroque cartouches can be difficult. Baroque themes can be found throughout eighteenth century mapping whereas rococo, often with transitional baroque elements, are found in mid-to-late century examples.

Figure 3.3 Baroque cartouche, Gabriel Stokes, Map of Shankill (1722).

One of the earliest decorative cartouches on a map of Dublin is John Tormer's map of Ballinlogg (1665) which has curtains either side of the title and a small human head at its base. William Petty's *Hiberniae Delineatio* (London, 1685) has a standardised design for each county. A rare draft copy of this, which was presented to Ireland's surveyor-general sometime in the mid-to-late seventeenth century, is preserved in Dublin's Marsh's Library.[37] This draft allows an insight into changes that Petty envisaged before his final print as well as possible features he chose to exclude. The cartouche of West Meath is flanked by figures of justice and thought/philosophy and mounted with putti between two unfinished coats of arms (see figure 3.4). Putti make regular appearances throughout *Hiberniae Delineato*. For example Petty's scale bar on his map of Queen's County contains three winged putti holding a surveyor's chain (see figure 3.5) and the map of Kildare includes one putti drawn in ink, and another lightly drawn in pencil for possible inclusion in the final print (see figure 3.6). The use of putti with surveying instruments was a common decorative device in maps in both Petty's time[38] and after.[39]

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[34] William Petty, *Hiberniae Delineatio* (London, 1685); Rocque, *Dublin city & suburbs*; Thomas Cave, Map of Belinstown and Loughmartin, 1728, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 68, map 16.
[35] John Ewing, *City of Londonderry* (1747), reproduced in Avril Thomas, *Derry* (Irish Historic Towns Atlas, no. 15, Dublin, 2006), map 15. William Wilson, *Dublin* (Dublin, 1810).
[36] Scalé, *Dublin city and suburbs*; idem, A survey of the demesne of Dundalk (1777), reproduced in O'Sullivan, *Dundalk* (Irish Historic Towns Atlas, no. 16), map 11.
[37] William Petty, *Hiberniae Delineato*, 1685 (Marsh, H4. 1. 1).
[38] Leybourn, *The complete surveyor*, p. 43.
[39] Robert Gibson, Map of Kimmage, 1749 (NLI, Domville papers, ms. 11,937(3)).

Drafts were important elements when producing maps for mass production as they represented a serious effort in quality control – which was of special importance for Petty as in the case of the draft map of Connaught[40] all three of the Aran Islands as well as Achill Island are missing.

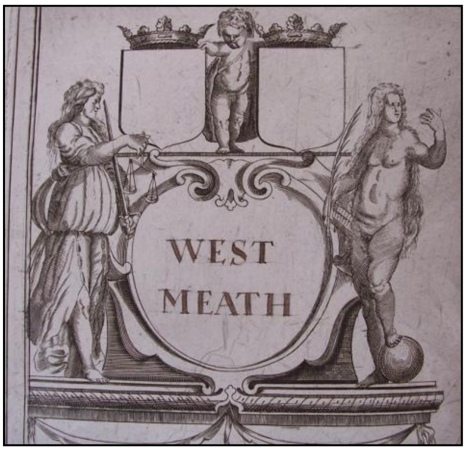

Figure 3.4 Petty's draft West Meath cartouche, William Petty, Hiberniae Delineatio, 1685 (Marsh H4. 1. 1).

Figure 3.5 Petty's Queen's County scale bar, William Petty, Hiberniae Delineatio, 1685 (Marsh H4. 1. 1).

Figure 3.6 Petty's draft Kildare scale bar showing an ink (L) and unfinished pencil putti (R), William Petty, Hiberniae Delineatio, 1685 (Marsh H4. 1. 1).

With the growing popularity of baroque decoration both in mainland Europe and Britain, it is no surprise to find this fashion in eighteenth century Irish mapping. A highly skilled and well implemented early eighteenth-century baroque cartouche can be found in Gabriel Stokes's *Map of Tallaght* (1718) which, despite its immense detail, seems out of place when compared to the map's sparse cartographic detail - one boundary line and four minute houses. Stokes's 1737 map of the archbishop of Dublin's palace in Tallaght is also worthy of note. His cartouche closely resembles that of the 1718 map and again is in stark contrast to the sparse cartographic detail. At least one surveyor, Richard Frizzell, is known to have used a stamp for repeated use of the same ornate cartouche[41] yet this method was not widespread.

Thomas Cave produced a transitional type of cartouche in his map of Belinstown and Loughmartin (1728) demonstrating the level of artistic design reached during the first half of the

[40] Petty, Hiberniae Delineatio, 1685 (Marsh H4. 1. 1), Connaught.

[41] Richard Frizzell, Map of Clondalkin, 1781 (NLI, Domville papers, ms. 11,937(38)); Richard Frizzell, Map of Ballyfermot, 1781 (NLI, Domville papers, ms. 11,937(60)).

eighteenth century: neat clear lines, elegant curves and putti perched on each top corner of the feature. However, whether intentionally or by fault of habit, Cave decided to isolate the cartouche from the rest of the map using a box.[42] This seems highly unusual as while a free floating cartouche was very common after Cave's period; it was rarely in use during his professional career.[43] One theory could be that Cave was simply keeping such non-geographical features separate from the map detail with thick, heavy, right angled boxes. It could also indicate that Cave's style was changing as his cartouche is well designed, yet he reverted to old habits by deciding to include a box around it.

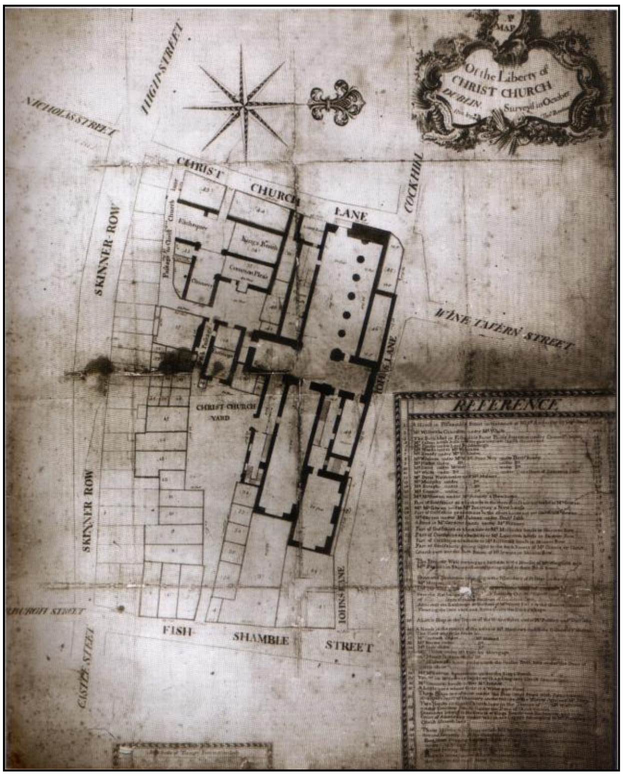

Figure 3.7 Example of mixed map design with a rococo cartouche but with a reference table along more traditional style guidelines. Thomas Reading, Map of the Liberty of Christ Church (1764). Reproduced in H.B. Clarke, Dublin part 1, to 1610 (Irish Historic Towns Atlas, no. 11, Dublin, 2002).

Thomas Reading was another surveyor who while altering his style to keep abreast of fashion, also demonstrated a reluctance to move from established norms. In 1764 Reading produced a map, figure 3.7, of the area around Christ Church cathedral in Dublin.[44] The geographic detail is well laid out and easily read with the internal structure of the cathedral included. Reading's cartouche features rococo motifs such as shells and flora. Its text is clear and easily read. However, Reading's scale bar and reference table resemble similar cartographic features that would not have looked out of place in early seventeenth-century maps with heavy, dark and simplistically designed borders surrounding small and difficult to read text. The overall effect of such a mismatch in Reading's style is to take focus away from the well executed

[42] Thomas Reading, Map of the Liberty of Christ Church (1764), shows a very similar style map to that of Cave's Belinstown map.
[43] Gabriel Stokes, *Map of Tallaght* (Dublin, 1718).
[44] Thomas Reading, Map of The Liberty of Christ Church (1764), reproduced in Clarke, *Dublin part 1, to 1610* (Irish Historic Towns Atlas, no. 11), map 8.

cartouche and good cartographic features to the out of place reference table which clashes with both the cartouche and the map detail. Like Cave in 1728, Reading appeared to be attempting to follow popular cartographic fashion yet seemed to be reluctant to leave behind certain aspects of cartography that he was either trained in or grew accustomed to. Despite their mixed styles and clash of fashion, Cave and Reading's maps provide a very useful insight into the evolution of Irish cartography during the first half of the eighteenth century and the changes in cartographic fashion.

One of the most influential individuals on cartographic fashion in Ireland was also perhaps the most skilled surveyors seen during the eighteenth century – John Rocque. What Rocque brought to Ireland during his brief stay in the 1750s, aside from his unique level of standardisation and detail in geographic features, was a new style of cartouche which combined the traditional features with innovative elements of classicism and symbolism previously unseen in Irish cartography.

Perhaps Rocque's most detailed and well executed cartouches was that of his map of London (1746). It is important to examine the London cartouche before approaching those produced in Ireland by Rocque in order to compare and contrast these works against his London masterpiece. The London cartouche (figure 3.8) envelopes a dedication to the lord mayor and aldermen of the City of London and is surrounded by a well-executed shell. London's financial, economic and administrative importance is reflected in the seven putti within the dedication. The lower two putti either side of the dedication are moving and packing trade goods while on the left side of the cartouche another holds a skin of a large cat, possibly a jaguar or leopard indicating the exotic international trade of the port of London. The rear of a three-decked galley can be seen behind the putti holding the animal skin, emphasising the maritime importance of the city. London's financial wealth was tied to its function as a port city, which in turn was dependent on its location on the River Thames. This connection between financial power and the river is shown by two putti at the top of the cartouche. One holds a shell from which pours coin, the other a jar with water flowing out of it representing the Thames. Both the coin and the water are flowing in the same direction demonstrating their inherent connection.

Figure 3.8 Detailed cartouche of Rocque's London city plan. John Rocque, *London* (London, 1746).

The administrative importance of the city is shown by a crowned putti at the highest point of the cartouches, holding a staff and leaning on a shield with the cross of Saint George. The final putti at the top right corner of the cartouche holds a caduceus, two serpents in the shape of a double helix mounted with wings, an ancient Greek symbol of Hermes, the messenger of the gods, guide of the dead and protector of merchants.[45]

Rocque moved to Dublin in 1754 to produce a map of the city as well as its suburbs and surroundings.[46] His symbolic, detailed and highly decorative cartouche (figure 3.9) design for his Irish maps reflects, in a more restrained manner, the core themes in the London cartouche – industry, administrative importance and trade using both classical[47] and rococo imagery.

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[45] This symbol is frequently confused with that of medicine which should be represented only by the Rod of Asclepius, a similar symbol which contains one wingless snake. Rocque's use of this symbol should be interpreted as that of the messenger or protector of trade rather than that of science or medicine. Bernice S. Engle, 'The use of Mercury's Caduceus as a medical emblem' in *The Classical Journal*, xxv, no. 3 (1929), p. 204.

[46] *Dublin Journal*, 14 Aug. 1754.

[47] While baroque and rococo styles were popular in mid to late eighteenth-century Irish mapping, antiquity and classical imagery were also well represented, not just in land surveying but through many industries. Architectural designs, both internal and external were often heavily influenced by classical formats, The Georgian Society, *Record of eighteenth century domestic architecture and decoration in Dublin*, vol. i (Dublin, 1909) plate XVI; vol. ii (Dublin, 1910), plate XVI, XXXVII, LV; vol. iii (Dublin, 1911), plate LIX; vol. iv (Dublin, 1912) plate LXVIII. Dublin's public buildings were also compared to those of the ancient world, for example, with reference to the parliament building, 'I expect to see much an edifice as Rome herself might boast of, or be an ornament to Athens', *Dublin*

The Dublin cartouche, produced in 1756, combines the map title and dedication:

> To their excellencies Robert Viscount Jocelyn Lord High Chancellor, James Earl of Kildare and Brabazon Earl of Bessborough, Lords Justices General and General Governors of Ireland …

The centre of the image is dominated by a shell arch under which flows a river, which from the three castles of Dublin the reader will understand to be the Liffey. Beside the Dublin coat of arms lies a woman, who may represent Anna Liffey,[48] Hibernia, charity or a mixture of all three, breast-feeding putti. The presence of a royal sceptre and the Irish houses of parliament to the left of the cartouche demonstrates Dublin's importance as the political and administrative centre of Ireland while to the right of the cartouche Britannia distributes books to two putti whilst holding a shield onto which the symbol of Ireland, a twelve-stringed harp, is displayed. Britannia and the royal sceptre underline the strong connection between Dublin and England during this period. What appears to be a water nymph lies beside the river holding either a paint brush or paddle, or it may represent a 'noble savage' figure. Unfortunately its connection with the rest of the cartouche is difficult to establish.

Journal, 2 Aug. 1768, and '[the city] will at once strike the age with the appearance of the beauties of ancient Greece and Rome', *Freeman's Journal*, 11 Aug. 1787. Classical studies were taught in Trinity College throughout the eighteenth century, including works of Herodotus, Tacitus and Cicero, thus making such historical references found in cartouches familiar and comfortable to the map buyers of Dublin. W. B. Stanford, *Ireland and the classical tradition* (Dublin, 1978), p. 49.

[48] The personification of the river Liffey which possibly originated from the Anglicisation of the Irish name for the river, *Abhainn na Life*.

Figure 3.9 Detailed cartouche of Rocque's Dublin city plan. John Rocque, *Exact survey of the city and suburbs of Dublin* (Dublin, 1756).

Rocque was not the only surveyor to include human figures in his non-geographical decoration during the mid-eighteenth century, but he did so far more regularly and to a higher artistic standard than contemporary Irish surveyors,[49] with his style being closely connected to French cartographic fashion.[50]

Dublin, like London, is a port city, and Rocque established its maritime connection with the presence of ships' masts in the background, a sea anchor and rope lying on top of several packages ready for shipment.

Apart from Dublin, Rocque also produced an equally detailed, if slightly less artistic cartouche for his Kilkenny town plan (1758). As with the drop in quality between the London and Dublin cartouche, the Kilkenny cartouche again demonstrates that the smaller the potential market for the map, the less emphasis and energy Rocque was willing to commit to map decoration. This does not indicate a lack of interest or degradation in Rocque's artistic style during this time, but it highlights the shrewd commercial attitude he regularly brought to his mapping projects.

[49] Michael Kenny, Book of maps of the estate of Charles Domville, 1778 (NLI, Domville papers, ms. 11,936); James and Edmond Costello, *A map of lands in Killamy* (Sligo, 1768); James Williamson, A book of maps of the estate of John Hamilton O'Hara, 1884 (NLI, O'Hara papers, ms. 14. A. 24).

[50] J. B. Nolin, *Le Globe* (Paris, 1707); Robert de Vaugondy, *Mappemonde ou description du globe terrestre* (Paris, 1752); G. Delisle, *Carte du Canada* (Paris, 1703); George-Louis Le Rouge, *Atlas Amériquain septentrional* (Paris, 1778).

The cartouche surrounding the title is entirely dedicated to demonstrating the industrial capabilities of Kilkenny. Scenes from mining, masonry and linen work are depicted, all contained in Rocque's usual shell design. From these three examples of Rocque's town plan cartouches, it is evident that his style is similar to that of mainland European cartographers, as discussed and illustrated in figure 3.1.

Figure 3.10 Evidence of local industry, John Rocque, *A survey of the city of Kilkenny* (Dublin, 1758).

Yet Rocque did not limit himself to pure urban surveying during his time in Ireland. In 1756-7 Rocque was employed by James, the twentieth Earl of Kildare, to produce maps of his various estates in County Kildare. Several of the cartouches and vignettes,[51] while not equal to the grandeur of Rocque's London cartouche, are amongst the most sophisticated ever produced in eighteenth-century Irish manuscript mapping. These maps, totalling over 160, were drawn at large scale, usually sixteen perches to the inch plantation measure, and in conjunction with the accompanying reference tables, give information on physical conditions, acreage and land use of each field, type of field boundary and type of buildings present.[52] Rocque again utilised his traditional baroque shell design and natural elements, such as trees, to enclose his drawings.[53] Putti again feature prominently, however their activities are orientated more towards agriculture than to expressing urban achievement. In Rocque's survey of Black Hill and Miller Hill, Co. Kildare (1757), two putti are busy gathering wheat surrounded by their farming tools and country background.

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[51] Ornamental or pictorial illustrations … used to refer to an illustration not enclosed in a border or squared off at the edges but shading away, Jane Turner (ed.) *Dictionary of art*, xxxii, p. 50.

[52] Horner, 'Cartouches and vignettes on the Kildare estate maps of John Rocque', p. 58

[53] John Rocque, A survey of Tullagorey, 1756, in ibid. John Rocque, A survey of Shanrah, Kildare (1756).

In addition, Rocque also included vignettes of country scenes,[54] farms[55] and large manor houses.[56] Of Such elements of Rocque's work were passed on to future generations of his students and were still routinely accompanying maps in the early nineteenth century.[57]

Figure 3.11 Agricultural cartouche themes. John Rocque, Black Hill and Miller Hill (1757). in *Ir. Georgian Soc. Bull.*, xiv, no. 4 (1971), p. 58

The work of Rocque's assistant during his period in Ireland, Bernard Scalé, is also worthy of note. Scalé's particular cartographic trademark was his antique effects, as illustrated in figure 3.12. Through the simple use of shading Scalé creates the illusion of depth and with minimal effort is able to significantly improve the artistic quality of the map's non-geographic detail.

[54] John Rocque, *A view of Kildare town* (Kildare, 1757); idem, A survey of the manor of Maynooth, 1757 in Horner, 'Cartouches and vignettes on the Kildare estate maps of John Rocque' , p. 58
[55] John Rocque, A survey of Ballegrenie, 1757, in ibid.
[56] John Rocque, A survey of Duneny, 1757 in ibid.
[57] Sherrard, Brassington and Greene, Survey of Balbutcher, 1781 (NLI, Longfield papers, ms. 11,937(61).

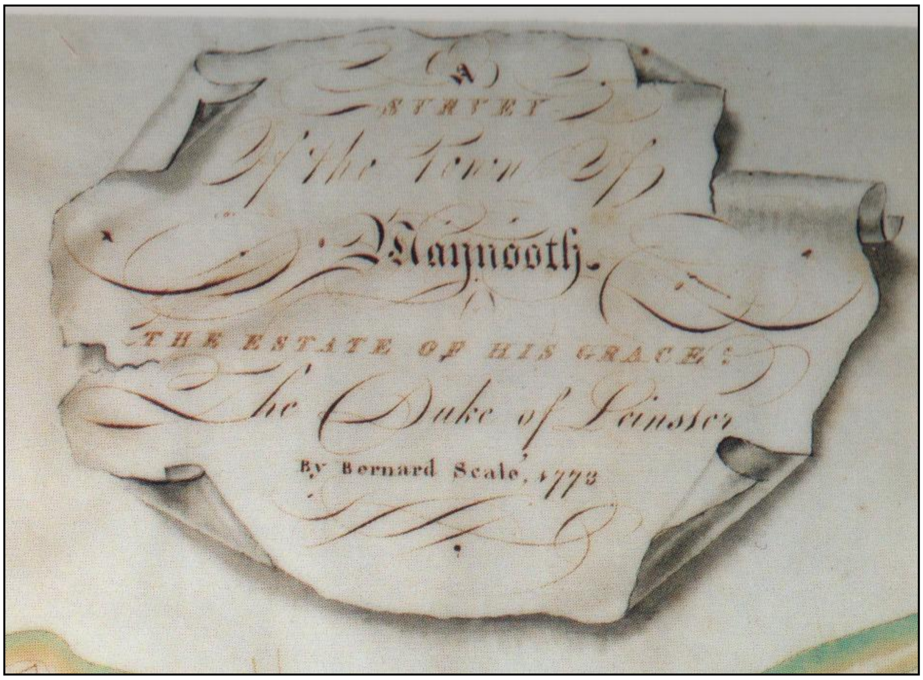

Figure 3.12 Example of typical Scalé cartouche design. Bernard Scalé, Maynooth (1777).

The rococo styles of Rocque and Scalé should not be viewed as being unique to Dublin mapping.[58] Rocque was known to have produced several rococo designs as part of his early career as an engraver (see figure 3.13), similar in style to French designer Juste Aurèle Meissonnier. Others known to have practised such designs during his time in London, included engraver William Hogarth and artist John Pine.[59] While in Ireland, Rocque employed several Irish artists to work on the decoration of his maps including John Dixon, Hugh Douglas Hamilton and Patrick Halpin. These artists produced a style referred to at the time as;

> … in point of taste, elegance of design and masterly execution [it] is allowed by the connoisseurs not to be inferior to any in Europe.[60]

Figure 3.13 Cartouche in the rococo style with fleur-de-lys and vanquished horse attributed to John Rocque, year unknown,<http://www.racollection.org.uk/ixbin/indexplus> John Rocque, Royal Academy of Art

[58] See Appendix H for more examples of the designs of Rocque and Scalé.
[59] Anne Hodge, 'A study of the rococo decoration of John Rocque's Irish maps and plans (1755-1760)' (BA thesis, National College of Art and Design, Dublin, 1994).
[60] *Dublin Journal*, 11 Oct. 1757.

Rocque and Scalé’s works were part of this wider Dublin classicism which was popular amongst the aristocracy, many of whom were collectors of Renaissance Italian art.[61] Many a nobleman who employed surveyors was also a patron of other arts[62] and thus it was often in his interest to be familiar with the latest artistic fashions.

Another method of flattering a patron was through the use of heraldic symbols. A heraldic scheme is contained in Scalé’s *A survey of the demesne of Dundalk* (1777) (figure 3.14) where Scalé included a lion, with the unicorn being replaced by a deer, the coat of arms of Lord Clanbrassil, the demesne owner.

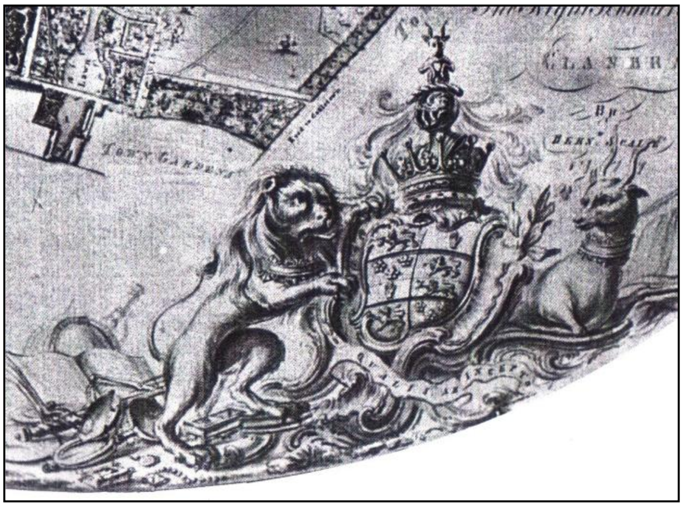

Figure 3.14 Ornate cartouche with heraldic theme. Bernard Scalé A survey of the demesne of Dundalk (1777), reproduce in Harold O'Sullivan, *Dundalk* (Irish Historic Towns Atlas, no. 16, Dublin, 2006), map 11.

Heraldry was not just the realm of Scalé and many city plans were produced in Ireland throughout the eighteenth century that included coats of arms as part of their cartouches. Rocque included the city seal in his Kilkenny town map (1758), as did Captain Greenville Collins *Dublin Bay* (1686), John Ewing, C*ity of Londonderry* (1747), Robert Porter for his *City and suburbs of Londonderry* (1799) and William Wilson’s *Dublin* (1810).

Wilson, despite the fact that his city plan appeared only as appendices to his directory, did adopt various cartouche and vignette designs. This was more likely due

[61] Frederick Hervey, Bishop of Derry in the 1740s was known to possess several paintings by Raphael amongst his art collection; Nicola Figgis, *Irish artists in Rome in the eighteenth century* (London, 2001), p. 18.
[62] The Beresford family, one of whom was a member of the Wide Streets Commission during the 1790s, employed artist Willem van der Hagen (d. 1745) to decorate the family house at Curraghmore, Nicola Figgis, *Irish artists in Rome in the eighteenth century* (London, 2001), p. 42. James Mannin, director of the Dublin Society’s school of ornament, was a subscriber to Rocque’s 1756 map of Dublin.

to the different engravers for his maps over the years rather than a planned shift in cartographic style. For example, the 1762 edition includes a town plan of Dublin with a shell and floral design, the 1795 edition[63] features a water nymph next to a jar from which flows a river, symbolising the Liffey. This water feature appears again in the 1810 edition of Wilson's *Dublin Directory*; on this occasion the river flows beneath the seal of the city of Dublin and is flanked by the same water nymph accompanied by an old man holding an arrow, possibly representing time.

Into the nineteenth century

Wilson's maps demonstrate that cartographic styles did not remain stationery after Rocque's time in Ireland, and by the end of the century a new, simpler, style in cartouche design had begun to emerge. The minimalist curled title design, as demonstrated in figure 3.15, which was far less visually dominant than those cartouches produced in the late 1770s.[64] This new style, developed from the 1770s onwards and with its graceful and neat swirling lines, lacked the artistic impact seen in previous generations of surveyor's maps. Yet it reflected the visual importance of the geographic data compared to the non-geographic data displayed on a map. This new method also required less time, investment and skill from the cartographer's perspective and gradually grew in importance during the end of the eighteenth century into the early nineteenth century. From a researcher's point of view, the presence of this form of design allows the approximate identification of the era in which undated maps were produced. Followers of this design included Bernard Scalé,[65] Thomas Sherrard,[66] John Longfield[67] and A. R. Neville.[68] Decorative cartouches and vignettes were still produced into the early nineteenth century; however, the simple swirl or title box appear to be the preferred choice of surveyors.

[63] This cartouche appears based on the 1784 design of Samuel Byron, City Surveyor, for the *Wilson's Directory* of that year.

[64] Early examples include Taylor & Skinner, *Kingdom of Ireland* (Dublin, 1778), and Francis Mathews, Lands in Templeogue, 1783, reproduced in Refaussé and Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, map 32 .

[65] Bernard Scalé, *County Cavan* (Dublin, 1776).

[66] Thomas Sherrard, *A survey of part of the City of Dublin showing several improvements intended by the Commissioners of Wide Streets* (Dublin, 1801).

[67] John Longfield, Several holdings in Mercer Street, 1800 (NLI, Longfield papers, ms. 11,937(185)). John Longfield, Skinners Row, 1808 (NLI, Longfield papers, ms. 2789(115)).

[68] A. R. Neville, Land off Kevin Street belonging to Saint Patrick's 1811 (NLI, St. Patrick's estate papers, ms. 11,937(194)).

Figure 3.15 Example of a more standardised early nineteenth century title design. Thomas Sherrard, *A survey of part of the City of Dublin* (Dublin, 1802).

Irish cartouche design progressed substantially throughout the eighteenth century. From the heavy lined, basic and at times crude cartouches of the seventeenth century, to the growing influence of European fashion through the work of John Rocque by midcentury which eventually led the way to simple, yet elegant designs adopted for their ease of use and non-interference with a map's geographical data. Cartouches and title designs often acted as trade or business cards for a surveyor, advertising the range and level of his skills. While Irish cartouche design can be classified as seen in this section, this is not a rigid classification. It must also be noted that many maps, especially manuscript estate maps, were produced without cartouches and the simple shape designs were still popular, if less dominant, by the end of the century.[69]

[69] John Brownrigg, Merrion Row, 1791 (NLI, Longfield papers, ms. 21. F. 89(189)); John Brownrigg Harcourt Street, 1793 (NLI, Longfield papers, ms. 21. F. 89(159)); John Brownrigg, Hawkins Street, 1790 (NLI, Longfield papers, ms. 21. F. 89(165)).

3.3 Geographic referencing and area calculation

Geographic referencing refers to any measurements, figures or symbols, for example north arrows, evidence of magnetic variation measurement, scale bars, survey control lines or latitude and longitudinal coordinates, which allow the position of a particular survey area to be established within a local, regional or global frame of reference.

In addition to the information contained within such geographic referencing features, they can also be used to decorate a map. One eighteenth-century surveyor highlighted the additional benefits such decorative features could bring to a map:

> If you will take the pains, you may, in one of the upper corners of the plan, draw the mansion house, &c. in the other the Lord's Coat of Arms, with Mantel, Helm, Crest and Supporters, or in a Compartment, blazoning the Coat in its true Colours: In one of the Corners at the Bottom, you may describe a Circle, with the 32 Points of the Mariners Compass, according to the Situation of the Ground, with a Flower-de-luce at the North part thereof, ever allowing the Variation of the Needle: And in the other Corner, make a Scale equal to that by which the Plot was laid down, adorning it with Compasses, Squares, Ovals, &c.[70]

North arrows and compass roses were the most common form of decorative geographic referencing in Irish eighteenth-century mapping. Some were well executed, ornate, neat and appropriately proportioned.[71] However, the majority were rough, basic and often, as J. H. Andrews stated, 'ludicrously large as well as distractingly colourful.'[72] Regardless of their artistic value, the presence of north arrows was of utmost importance for the geographic orientation of the map.

A feature of geographic orientation in the eighteenth-century was that maps were not universally orientated with the north point facing the top of the page as is now customary in cartography. Despite Samuel Wyld's insistence that 'the north part of the plot is always supposed to be placed upwards, and the east to be on the right hand',[73] not all maps were thus orientated. One well known example of this is Charles Brooking's 1728 map of Dublin, which is orientated south/north rather than north/south. While theoretically there is nothing inappropriate about this considering

[70] Wyld, *The practical surveyor*, p. 113.
[71] Of particular note are Thomas Cave, Rath, Navan 1748 (NLI, Domville papers ms. 11,937). Thomas Sherrard, *Athlone* (Dublin, 1784), reproduced in Harman Murtagh**,** *Athlone* (Irish Historic Towns Atlas, no. 6, Dublin, 1994), map 7(a).
[72] Andrews, *Plantation acres*, p. 153.
[73] Wyld, *The practical surveyor*, p. 112.

that the custom of having maps orientated north/south is arbitrary, it does stray from the norm. In this case there is a logical explanation as the corresponding view of the city on the top of the map (see figure 3.16) looks south over the city, thus the map and the city view are orientated in the same direction.

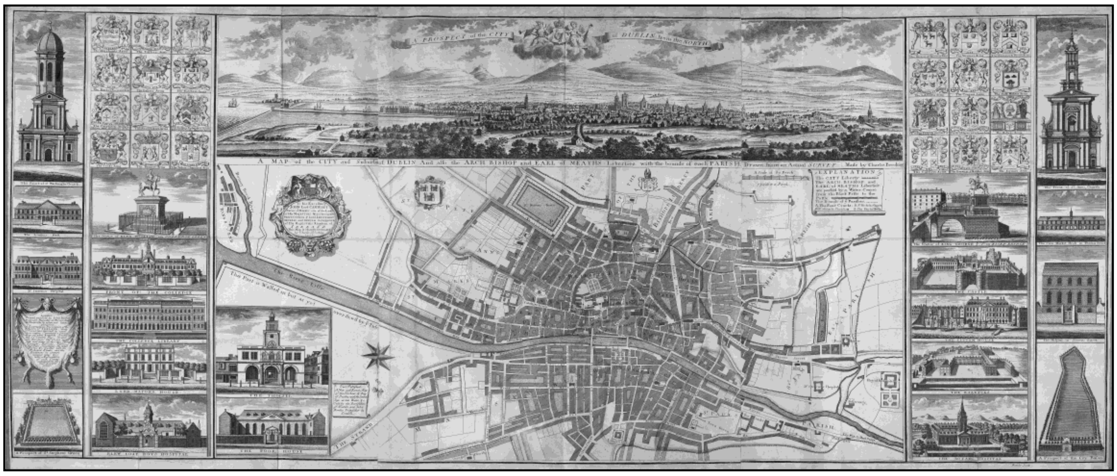

Figure 3.16 Charles Brooking, *Dublin* (London, 1728), reproduced by Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

Brooking was not the only surveyor to orientate his map in a less traditional manner. Bernard Scalé's map of Essex Street in 1777,[74] produced with the assistance of his then two apprentices, Thomas Sherrard and John Brownrigg, follows a similar logic. Scalé's north arrow is neat, clear and slightly off vertical. This strongly indicates that Scalé had to orientate his survey so that it would fit the paper size chosen for this map. Robert Gibson was another surveyor who again focused on visual correctness rather than north alignment for a map of Kimmage in 1749,[75] as did Jonathan Baker for his 1762 map of Dundrum.[76]

Scalé's attention to north arrow design was above the standard for an Irish eighteenth-century surveyor. His north arrows were ornate and detailed depicting scenes of country life or human figures presented in a style more complex and imaginative than that of other period Irish surveyors. Of particular note is Scalé's *Hibernian Atlas* published in 1776 which consisted of maps of each province and county in Ireland

[74] Scalé, Sherrard & Brownrigg, Essex Street, 1777 (NLI, Cloncurry papers, ms. 16. G. 16(15)).
[75] Robert Gibson, Mundon near Kimmage, 1749 (NLI, Domville papers, ms. 11,937).
[76] Jonathan Baker, A map of Dundrum and all its subdivisions, 1762 (NAI, Pembroke papers, 2011/2/2/4).

and illustrates the range of north arrows that Scalé was able to produce. The north arrows in the *Hibernian Atlas* only rarely reflect a particular attribute of the county or province upon whose map they appear, and as such can be considered largely decorative (see table 3.1).

County/Province	North Arrow Design
Ireland	Putti with paint brush
Leinster	Agricultural products
Louth	Laurels
Meath	Putti with picture of naked man (from rear)
West Meath	Woman's head
Dublin	Putti with north point in its left hand and south point under right foot
Kings County	Floral design
Queen's County	Floral design
Kildare	A hare, musket and hunting horn
Wicklow	A waterfall
Carlow	Two bundles of flowers
Wexford	Floral design
Waterford	Floral design
Longford	A crown and lord mayors chain

Table 3.1: North Arrow designs of note in Bernard Scalé's *Hibernian atlas* (London, 1776)

The *Hibernian Atlas* was not the only example of Scalé's artistic style as several of his maps[77] contain equally artistic and creative north arrows. The real creative strength of Scalé's north arrows is that they add to his map's cartographic style rather than competing with it and distracting the reader's attention as was common with other surveyors of the era.

Scalé's approach was adapted from that of his master John Rocque. Rocque's north arrows are atypical in eighteenth-century Irish cartography as they are often unassuming considering the immense visual impact on the reader of his geographic data. For example, Rocque's Survey of Co. Kildare (Dublin, 1760) is a large estate map of the Earl of Kildare's lands. The map itself is approximately 300cm x 200cm yet the north arrow, which is almost a foot in length, is surprisingly difficult to notice when compared to the wealth of geographic data contained within the map. The north

[77] For example Bernard Scalé, *Maynooth*, 1773, reproduced in Arnold Horner, *Maynooth* (Irish Historic Towns Atlas, no. 7, Dublin, 1995), map 6.

arrow's inclusion appears to be primarily as a decoration and its role as a form of geographic reference is secondary.

Scalé's apprentices learned such techniques from their master and of particular note is the work of Thomas Sherrard, two of whose maps, both published in 1784 after his departure from Scalé's surveying business, betray the master's influence. Figure 3.18 displays Sherrard's north arrows from his map of Athlone[78] which, when taken compared with Scalé's north arrow from his 1773 map of Maynooth (Figure 3.17) have several similarities – a winged figure, a north arrow marked by a fleur-de-lis for north and a shaped point for south, overall small and unassuming with high level of artistic detail. Sherrard, however, did not add extensively to the style developed in Ireland by Rocque and Scalé, and such high quality north arrows are very rare in Sherrard's work over his long career. There is evidence of other Irish surveyors with less artistic ability trying to replicate this style. A copy of a Thomas Logan map made by an unknown author includes what could be considered an attempt to copy Scalé's north arrow styling; however, a small man drawn with the north arrow appears to have been impaled through the north arrow, from the groin upwards.[79]

[78] Thomas Sherrard, *Athlone* (Dublin, 1784) reproduced in Harman Murtagh**,** *Athlone* (Irish Historic Towns Atlas, no. 6), map 7(a).
[79] Thomas Logan, Lord Palmerston's estate, Donnybrook, copied 1795 (NLI, Longfield papers, ms. 21. F. 88(133)).

Figure 3.17 Elaborate north arrow. Thomas Sherrard, Athlone (1784). Reproduced in Harman Murtagh**,** *Athlone* (Irish Historic Towns Atlas, no. 6, Dublin, 1994), map 7(a).

Figure 3.18 Elaborate north arrow Bernard Scalé, Maynooth (1773). Reproduced in Arnold Horner, *Maynooth* (Irish Historic Towns Atlas, no. 7, Dublin, 1995), map 6.

The most common style of north arrow design in eighteenth-century Irish mapping was that of the circular compass with north indicated with a fleur-de-lis. Given the limited amount that could be done with such a simple feature there is a surprisingly varied level of quality with this simple compass design. Thomas Cave merits particular note for the high level of detail, clarity, restrained colouring and proportional size of its compass points.[80]

At the other end of the artistic spectrum is the work of Peter Duff,[81] whose compasses and north arrows were crude, unusually outsized, dominating large portions of the map's surface and brightly coloured, particularly with yellow, which distracts the reader from the map's geographic data. Such design features, taken into account along with Duff's trademark use of equally large and brightly coloured callipers on his scale bars,[82] means that excessively large portions of his maps were dedicated to such geographic reference markers. An even more enthusiastic use of north arrows is

[80] Thomas Cave, Loughlinstown, 1716 (NLI, Domville papers, ms. 11,937(10)); Thomas Cave, Great Rath, Navan, 1748 (NLI, Domville papers, ms. 11,937(34)); Thomas Cave, Waterside, County Meath, no date (NLI, Domville papers, ms. 11,937(43)); Thomas Cave, Loughlinstown, 1746 (NLI ms. 11,937(53)).

[81] Peter Duff, Ballymun, 1713 (NLI, Domville papers, ms. 11,937(14)).

[82] Ibid.; Peter Duff, County Meath, 1713 (NLI, Domville papers, ms. 11,937(6)); Peter Duff, Raleigh, County Meath, 1713 (NLI, Domville papers, ms. 11,937(42)); Peter Duff, Tallow, County Meath, 1718 (NLI, Domville papers, ms. 11,937(46)).

found in the work of Roger Kendrick, who on one occasion produced two north arrows on the same map, both facing in opposite directions (see figure 3.19).[83]

Figure 3.19 Roger Kendrick, map of Upper Coombe, 1741(Maps of the liberty of St. Patrick's Cathedral, Marshs Library). with two north arrows facing opposite directions.

Stylistically the majority of Irish north arrows and compass points fall between those of Cave and Duff. Several surveyors[84] produced the same style north arrows throughout their professional careers and strayed little if any from the same basic designs. Such designs, particularly for compass points, maintained a common design throughout the eighteenth century with few major alterations. Figure 3.20 presents a compass point from Elyard Arnoldi, a German surveyor who operated in Ireland during the mid-seventeenth century, drawn as part of his map of Kilshane in 1668, which is similar to that of Michael Wills (1708) (figure 3.21), John Green (1715) (figure 3.22), Gabriel Stokes (1722) (figure 3.23), Thomas Cave (1728) (figure 3.24), Roger Kendrick (1741) (figure 3.25) and John Byrne (1789) (figure 3.26).

[83] Roger Kendrick, *Upper Coombe*, 1741 (Maps of the liberty of St. Patrick's Cathedral, 1741, Marshs Library).

[84] John Longfield, Lands in Simonscourt, 1814 (NLI, Christchurch papers, ms. 2789-90(70)); John Brownrigg, Fishamble Street, 1779 (NLI, Longfield papers ms. 21. F. 87(150)); Roger Kendrick, Maps of the liberty of St. Patrick's Cathedral, 1741, Marshs Library.

Figures 3.20 to 3.26. North arrow designs with strong similarities, 1668 to 1789

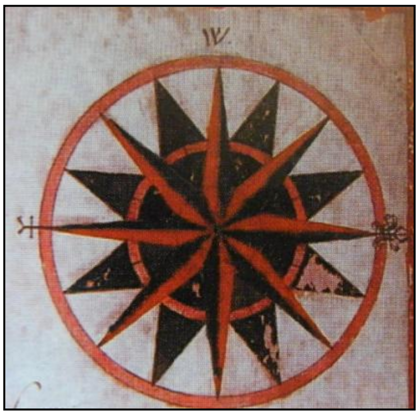

Figure 3.20 Elyard Arnoldi, Map of Kilshane (Dublin, 1668).

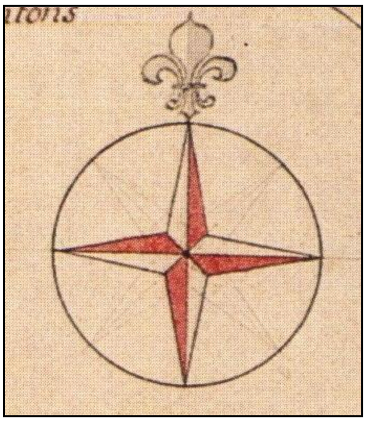

Figure 3.21 Michael Wills, Downpatrick (Downpatrick, *c*. 1708).

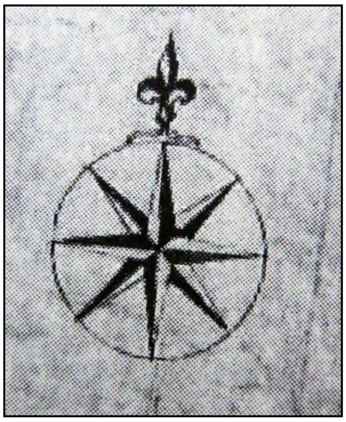

Figure 3.22 John Green, Map of Kilpatrick, Tutestown and Frenchanstown (Dublin, 1715).

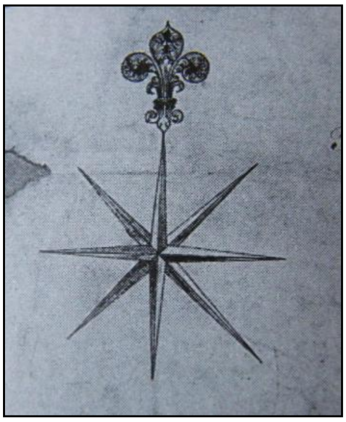

Figure 3.23 Gabriel Stokes, Map of Shankill (Dublin, 1722).

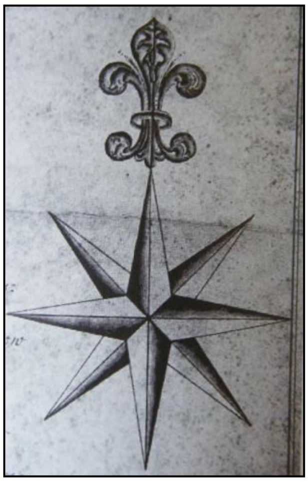

Figure 3.24 Thomas Cave, Map of Belingstown (Dublin, 1728).

Figure 3.25 Roger Kendrick, Map of the Liberty of Saint Patrick's (Dublin, 1741).

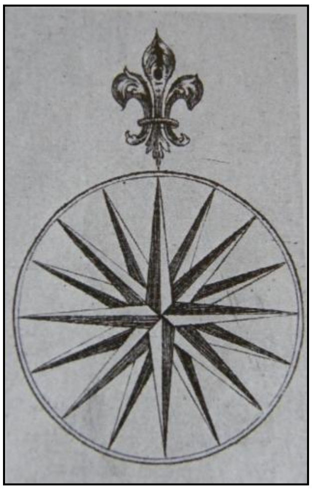

Figure 3.26 John Byrne, Map of St. Sepulchre's (Dublin, 1789).

Common traits such as a fleur-de-lis marking the position of north, a single or double circular rings around the compass, lack of human figures or floral decoration, the simple use of shading and colour and the lack of words or letters to indicate the different positions of the compass, are found throughout eighteenth-century Irish cartography. Compasses were produced at such a regular interval that at least one surveyor[85] used a woodblock stamp of a compass for his maps.

The standard north arrow and compass point were not the only designs available to Irish surveyors during this period. Of sporadic occurrence is the use of a human hand with a pointed finger usually extended to an arrow to demonstrate north. Michael Kenny, a Dublin-based surveyor during the 1780s, specialised in the use of the human hand north point and it appeared in many of his manuscript maps.[86] Other users of the human hand north point included Rocque[87] and William Cox.[88]

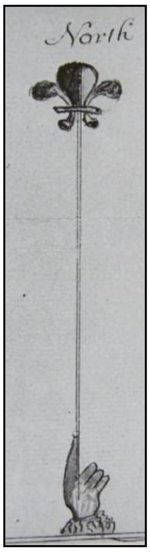

Figure 3.27 Human hand north arrow, William Cox, Map of the demesne of Tallaght (Dublin, 1767).

Another method of displaying the orientation of a map was through the use of letters. This method, usually found in simple urban cadastral maps with limited decoration, involved the positioning of the letters N, S, E, and W at the corresponding side of the map border indicating the four main points of the compass. This method was in use throughout the eighteenth century; with a map of Lusk[89] produced by Joseph Moland in 1716 being one of the earliest known examples. During the latter part of the eighteenth century and the early nineteenth centuries,

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[85] James Orr, Map book of the estate of Edward Brice, Co. Down, 1751 (NLI, Brice papers, ms. 19848). There is a possibility that Brownrigg used a stamp for his north arrows in some of his manuscript maps as well, John Brownrigg, Beresford Street, 1790 (NLI, Longfield papers, ms. 21. F. 86).
[86] Michael Kenny, Francis Street, 1770 (NLI, Domville papers, ms. 11,937(32)); Michael Kenny, Ballyfermot, no date (NLI, Domville papers, ms. 11,937(29)); Michael Kenny, Ballyfermot, 1777 (NLI, Domville papers, ms. 11,937(37)).
[87] John Rocque, *Dublin & its environs*.
[88] William Cox, *Map of part of the demesne of Tallaght* (Dublin, 1767).
[89] Joseph Moland, Map of Lusk, 1716, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 59, map 8.

Brownrigg[90] and Longfield[91] also regularly used this style of orientation, most often in their simple, less ornate cadastral maps.

By the early nineteenth century, the artistic north arrows and decorative compass points in Irish mapping began to be replaced with simpler arrows[92] indicating north and south. Coupled with the decline in complexity of cartouches during the same period (see section 3.2), this indicates a trend towards standardisation of non-geographic map decorations and the drastic reduction in artistic detail and individual diversity.

North arrows provide an insight into not only how a map was prepared, but also the surveyor's understanding of problems inherent to surveying. The main indicator of this information, aside from the direction of north, is magnetic variation. The level of understanding in eighteenth-century Ireland of this natural phenomenon is discussed in chapter 2 yet its impact on the work of Irish surveyors during this period can only be understood through an analysis of their maps. Overall, the vast majority of maps produced during this period make no reference to magnetic variation, and of the few that do, only a handful make an effort to document the degree to which this variation has affected the difference between true and magnetic north. North arrows indicating magnetic variation prioritise true north, with magnetic north being drawn across the true north arrow indicating the angular difference, in a dashed or less visually dominant style such as a single line (see figure 3.28).

During the time of the Down Survey (1655-6), the variation between magnetic and true north was negligible, yet at the time Petty advised that an analysis of the difference between these two set of readings be carried out as standard practice.[93] By 1787 the level of magnetic variation in Dublin was noted to be 14°13' west,[94] in 1752

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[90] John Brownrigg, Little Mary Street, 1804 (NLI, Longfield papers, ms. 21. F. 86(30)).
[91] John Longfield, Constitution Hill, 1816 (NLI, Longfield papers, ms. 21. F. 86(40)).
[92] John Roe, Map of the Palace, Tallaght, 1811, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 85, map 37.
[93] Marquis of Lansdowne, *Petty Papers*, i, 83, quoted in Andrews, *Plantation acres*, p. 305.
[94] *Freeman's Journal*, 30 Aug. 1787.

the variation was 19°00' west[95] and by 1817 the figure lay at 28°30' west[96]. In a stand-alone survey, such variations would not merit comment, however, if the surveyor was using data from a map produced years or decades previously, evidence that the surveyor took such variation into account or at least acknowledged its presence without necessarily giving figurative evidence would be of advantageous. John Longfield produced a map of lands belonging to Christ Church cathedral in 1816[97] based on an original 1762 map by Byron. Longfield included a north/magnetic north arrow to indicate the use by surveyor's of circumferentors, which were affected by the earths' magnetism, and that a significant period of time had elapsed during which magnetic north would have moved, that he did in-fact take such variations into account when comparing the two surveys. Longfield clearly understood the importance behind the issue.

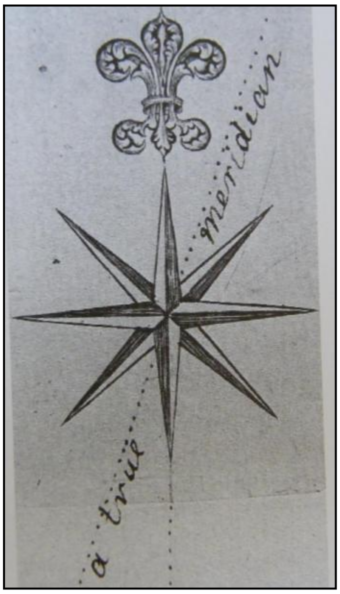

Figure 3.28 Recognition of magnetic variation in a north arrow. Roger Kendrick, Map of Glanas Moin in the parish of Tallaght (1752). reproduced in Raymond Refaussé and Mary Clark, *A catalogue of the maps of the estates of the archbishops of Dublin 1654-1850* (Dublin, 2000), p. 73, map 18.

Another survey by Longfield of lands in Tipperary[98] includes a value of magnetic variation in degrees and minutes. This coupled with a small note indicating that parts of this survey were duplicated from a Down Survey map again adds evidence that not only was Longfield using a circumferentor during his surveys, but that he also understood that magnetic variation changes over time and the impact this had on surveys. Longfield produced a series of eight maps of Glasnevin[99] in which magnetic variation is displayed on the north arrow but a figure of this variation, whilst measurable from the north arrow using a protractor, is not given. John Roe produced a map along similar lines to that of Longfield's Glasnevin maps, this time of a section

[95] Roger Kendrick, Map of Glanas Moin in the parish of Tallaght, 1752, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850,* p. 73, map 18.
[96] John Longfield, Map of lands in Louth, 1817 (NLI, Christchurch papers, ms. 2789-90(45)).
[97] Ibid.
[98] John Longfield, Lands in Killenaule in Tipperary, 1817 (NLI, Christchurch papers, ms. 2789-90(59)).
[99] John Longfield, Lands in Glasnevin, 1807 (NLI, Christchurch papers, ms. 2789 (106-114)).

of land belong to the Hatch Estate in Kilmainham in 1812.[100] While not referencing which map or original survey he had consulted, Roe did include the deviation between true and magnetic north.

The majority of surveys which included evidence of magnetic variation were manuscript estate maps; however Rocque included a true/magnetic north variation as part of his *Dublin and environs* (Dublin, 1756) map. This is one of the few examples of an eighteenth-century city plan which mentions magnetic variation.

The vital importance of taking magnetic variation into account, if not necessarily including it on the physical map, was highlighted by Benjamin Noble, quoting the scientist Molyneaux:

> I shall here add an extract from some observations on the variation of the needle, or our ingenious countryman, Mr. William Molyneaux, (Philoso. Trans. No. 230) "The variation of the magnetic needle is so commonly known, that I need not insist much on the explication there-of; 'tis certain that the true solar meridian, and the meridian shown by the needle, agree but in very few places of the world; and this too but a little time (if a moment) together; the difference between the true meridian and magnetic meridian, perpetually varying and changing in all places, and at all times; sometimes to the eastward, and sometimes to the westward.

Noble continued:

> On which account, 'tis impossible to compare two surveys of the same place, taken at distant times by magnetic instruments, such as the circumferentor, by which the Down Survey, or Sir William Petty's Survey of Ireland was taken, without due allowance be made for this variation. But then I would not be understood that it affects anything but the situation of the ground, or the bounds between the proprietors of different estates.[101]

According to Molyneaux, at the time of the Down Survey there was little to no magnetic variation in Ireland. However, due to the constant movement of the magnetic pole, by 1695 the magnetic variation in Dublin was 7 degrees west. Molyneaux concluded his analysis with a warning as to the likely consequence of ignoring magnetic variation:

> From what has been already laid down, we may see the absolute necessity of allowing for the variation of the magnet, in comparing old surveys with new ones; for want of which, great disputes may arise between neighbouring proprietors of land: and it were to be wished that out honourable and learned Judges would take this matter into consideration whenever any business of this kind comes before them.[102]

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[100] John Roe, A map of a piece of ground at Kilmainham in the county of Dublin, 1812 (NLI, Cloncurry papers, ms. 16. G. 50(1)).
[101] Noble, *Geodaesia Hibernica*, pp vi-vii.
[102] Ibid.

Area calculation

Determination of magnetic variation was not the only technique used by surveyors during their surveys for which evidence can occasionally be found on their maps. Area measurement lines are also present on a number of surviving maps and, as with magnetic variation measurements, provide a useful insight into work practices of eighteenth-century surveyors.

There were several techniques for producing area values from surveys during this period, and physical evidence of such calculations can be observed in manuscript estate maps of Peter Callan,[103] Alex Stewart,[104] John Brownrigg[105] and John Longfield. [106]

Determination of area was one of the most important aspects of an eighteenth-century surveyor's role as it allowed for the calculation of rents or values of the land. Bernard Scalé highlighted the important role that surveyors played in the lucrative business of land ownership and rental in his *Tables for the easy valuing of estates* (Dublin 1771):

> The increasing value of lands in this Kingdom, demands the particular attention of every person, anywise concerned therein; from the nobleman of the most extensive estate, down to the holder of a few acres … The author's extensive business in land surveying and valuation, gave him many opportunities of seeing how essentially necessary such a work is as the following would be to every proprietor to land, to clergymen, barristers, agents, attorneys, public notaries, stewards and also to the farmer, who has frequent occasion to let out small parcels of land, to those in a subordinate state. It is likewise an invariable guide, to those concerned in dividing common fields, where the value of one part and the other, so materially differ; it will guard against unavoidable errors proceeding from hasty and inaccurate calculations. In fine, it is a standard to correct errors, and detect impositions; particular care has been taken in the accuracy of all the calculations, and in arranging the whole in such a familiar manner, that gentlemen will surely be pleased in being saved the trouble of calculations …[107]

Many of the surveying treatises published in Ireland during the eighteenth century contain several methods for accurately calculating area. Amongst the most highly regarded is that of Thomas Burgh, who as surveyor general in the 1720s published a

[103] Peter Callan, Map of lands in Kilbany, 1750 (NLI, Hatch papers, ms.21. F. 112(5)).
[104] Alex Stewart, Map of Ballymun 1724 (NLI, Domville papers, ms. 11,937(71)).
[105]John Brownrigg, Old Church Street, 1812 (NLI, Christchurch papers, ms. 21. F. 86(22)). John Brownrigg, Beresford Street, 1790 (NLI, Longfield papers, ms. 21. F. 86(8); John Brownrigg, Holding on Charlemont Street, 1795 (NLI, Longfield papers, ms. 21. F. 87(104)).
[106] John Longfield, Ellis Quay, 1813 (NLI, Longfield papers, ms. 21. F. 86(34)).
[107] Scalé, *Tables for the easy valuing of estates*, p. i.

method of area calculation determined by angle of measurement, length of measurement and a localised coordinate system.[108] Burgh was also aware, as highlighted by Scalé earlier, of the importance of accurate area calculations from surveys:

> There is reason to wonder that an essay towards a geometric and universal method to determine the areas of rectilinear figurers hath been so far neglected that it does not appear to have been thought of at a time when the methods of obtaining the quadrature of curvilinear spaces have been carried to so great a degree of perfection. And the want of such a general rule must be well known to those who are acquainted with the inaccuracies of common surveys.[109]

Several surveyors[110] wrote on the problem of area calculation and offered solutions, usually from a limited selection of theorems not necessarily developed by themselves. Gibson's *Treatise in practical surveying* (Dublin, 1763) which Gibson himself directed towards 'persons who have property in land, to lawyers in controverted surveys and to practical surveyors'[111] produced a series of five methods to determine areas from surveys. Of these methods, several are highly practical and accurate whilst some are near improbable and verge on the ludicrous due to the difficulty with which they were implemented and the potentially dubious results that would be obtained. Gibson's series of calculations gives a broad understanding of the various methods of area calculation being employed in Ireland during the eighteenth century and as such are worth analysing.

Gibson's most practical solution is his first theorem – the division of the survey area into regular figures such as squares and triangles whose areas can be calculated separately and the area of the whole obtained by combining these separate regular-shaped areas. William Petty referred to this method as 'laborious prostapheresis' of triangles.'[112] Yet this method is not too far removed from the modern surveying equivalent of converting surveys into a series of triangles knows as a Triangulated Irregular Network (TIN) to determine contour lines. Given the large number of calculations involved in this method, Gibson advised:

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[108] See Appendix C for Burgh's theorem in full.
[109] Thomas Burgh, *A method to determine areas of right-lined figure universally* (London, 1724), p. 1.
[110] Jacob Neville, *New tables* (Dublin 1762); Thomas Power, *The universal land surveyor* (proposed) (Cork, 1767); William Hawney, *The complete measurer*; Thomas Harding, *The practical surveyor's best companion* (proposed) (Dublin, 1784); Thomas Power, *The universal land surveyor* (proposed) (Cork, 1786); Nicholas Walsh, *A treatise on surveying* (Dublin, 1787).
[111] Gibson, *Treatise of practical surveying*, p. 196.
[112] *Report from select committee on survey and valuation of Ireland*, p. xvi [445], H. C. 1824, viii.79.

> The lines of the maps should be drawn small, and neat, as well as the bases; the compasses really pointed, and scale accurately divided; without which you may err greatly. The multiplication should be run over twice at least, as also the addition of the column content.[113]

Samuel Wyld was also a supporter of this method, encouraging readers of his surveying treatise to actually survey irregular-shaped features in a way that would allow them to be drawn as regular shapes.[114]

This triangular method was not the only technique of area determination using triangles that Gibson suggested. A second method involved the stretching of a piece of land into a triangle, regardless of its original shape, and from there using a standard triangular area calculation to determine the new object's shape. The area of the actual land in question was then worked out from this overall figure. However, in comparison to Gibson's other suggested triangular method, this second method is overly complex with a significantly higher chance of errors being introduced. Gibson's own brief comments state that:

> This method will be found very useful and ready in small enclosures, as well as very exact, it may also be used in large ones, but great care must be taken of the points on the extended line, which will be crowded, as well as of not missing a station.[115]

Gibson's third method involved a grid of squares being laid over a plot of the survey area 'to determine in the area of a piece of ground from the map therefore, by the *square horn*'.[116] The square horn was a transparent or semi-transparent grid divided into inch squares so that scale transformations between the map and the real world area could be easily determined:

Horn = 100 perches, map scale = 10 perches to an inch

By calculating the number of whole squares (see figure 3.29) and then using the method of triangular division for the remaining areas on the edge of the survey whose irregular shape does not suit this second method, the total area can be determined. This method appears to have been slightly outdated by Gibson's time, but he defended its inclusion in his treatise:

[113] Gibson, *Treatise of practical surveying* , p. 196.
[114] Wyld, *The practical surveyor*, appendix A, p. 4, fig. 22.
[115] Gibson, *Treatise of practical surveying*, p. 211.
[116] Ibid., p. 201.

> I am confident I shall be judged to be too prolix on this head but as this method has stood the test of many ages, and is still used by many, I have for the benefit of those of the slowest capacity, explained it as fully as I was able.[117]

At least one eighteenth-century surveyor, Alexander Stewart, operated this method for calculating areas.[118]

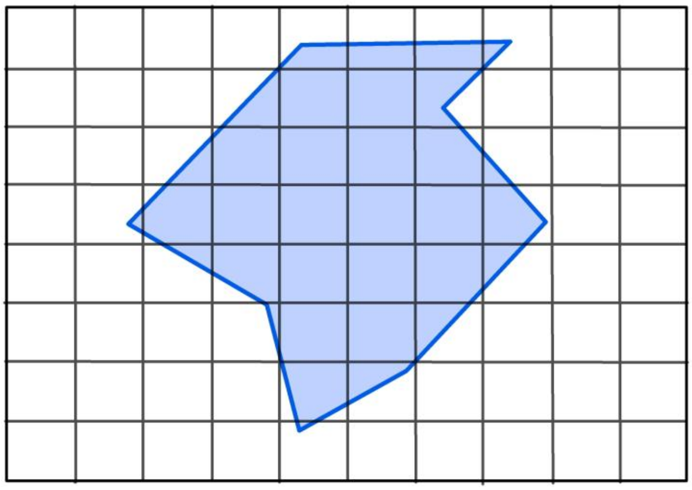

Figure 3.29 Example of Gibson's second method of area determination using a square grid over the survey area, in this case highlighted as a blue polygon (by F. O'Cionnaith).

Another method, with direct evidence of usage in eighteenth-century surveying in Ireland, places horizontal lines to divide the area in question into regular rectangular shapes and calculates the remainder using the triangle method (figure 3.28). Whilst there exists little, if any, evidence of the use of other methods mentioned by Gibson in eighteenth-century manuscript maps, there are several examples of parallel lines being drawn on drafts or rough final maps of at least two major period surveyors, John Longfield[119] and Thomas Reading.[120] A series of horizontal parallel lines appears on several maps produced by these surveyors with no indication that they were used for anything other than area calculation. Unfortunately the actual area calculation figures were not included on any of these drafts. Peter Callan was another surveyor who appears to have supported a more widespread use of this method as he advised that:

> … one surveyor should be appointed to furnish all the surveyors of the Kingdom with paralleled paper, drawn with one general correct instrument, as afore described;

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[117] Gibson, *Treatise in practical surveying*, p. 207.
[118] Alexander Stewart, Map of Ballymun, 1724 (NLI, Domville estate, ms. 11, 937(71)).
[119] John Longfield, Lands in Crumlin, 1813 (NLI, Christchurch papers, ms. 2789-90(27)); John Longfield, Ellis Quay, 1813 (NLI, Longfield papers, ms. 21. F. 86(34)); John Longfield, Holding on Charlemont Street, 1795 (NLI, Longfield papers, ms. 21. F. 87(104)).
[120] Thomas Reading, A map of part of Rathmines, 1742 (NLI, Hatch papers, ms. 21. F. 112(3)).

> which paper should be stamped, and sold at such a reasonable rate as should be approved by the *Dublin Society*.[121]

It could be argued that due to the lack of evidence of other area calculation methods on maps, that this parallel method was the most popular. However, the lack of written evidence does not mean that such methods as the highly practical triangular method were not widely practised. Quite simply, proof of its use could be on discarded draft copies, or the calculations may have been transcribed off the actual map sheet. The paralleled method was merely one of several methods in use throughout this period for simple area calculations.

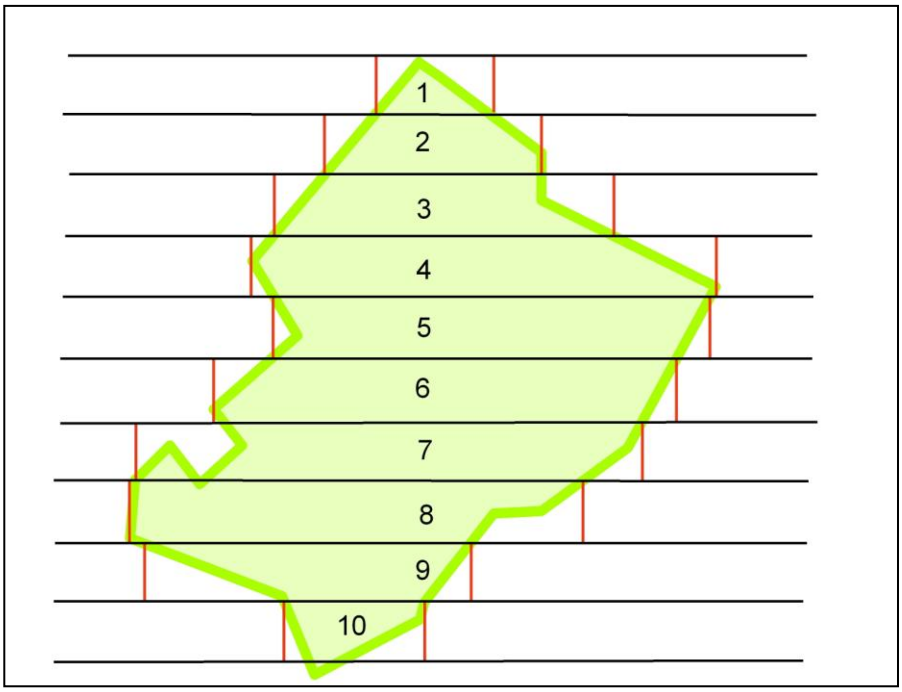

Figure 3.30 Area determination through the use of parallel method (by F. O'Cionnaith).

Despite Gibson's listing and description of several practical area calculation methods, he did include one that is almost as bizarre as it is unrealistic. Gibson's final method determined the area of a piece of ground by using weight. The map is divided into a regular grid of squares with every square that is not contained within the area of land in question removed (see figure 3.30). The map is then weighted. By comparing the initial weight of the map to its final weight the area can be calculated:

> Weight of the paper = 74.6 grains
> Weight of the map = 59.2 grains

[121] PCallan, *Dissertation on the practice of land surveying in Ireland*, p. 45.

> Then 74.6 = 223 square, 59.2 = 179.96 square in the map, and each square being 100 perches, makes 17969 perches or 110A 2 R 16P, differing from only 16 perches from the true content.[122]

This method bears a striking similarity to Archimedes' volume calculation using water displacement, however its practical use in surveying is highly dubious. Gibson was aware that this method would meet with disapproval and commented:

> Tho' this method of weighing may seem whimsical and ridiculous, yet if experiments be made with wine scales and weights, upon maps laid down by large scales, and drawn upon good even writing Demy paper, the contents produced will be found to be much nearer the truth than imagined.[123]

There is no evidence of this method being employed in the Dublin land surveying community during the eighteenth century.

Aside from evidence of a surveyor's artistic capabilities or calculation techniques, evidence of methods of practical land surveying are regularly found on the manuscript maps. Observation lines connecting widely separated tracts of land within the same survey can occasionally be found on draft maps. These lines were measured in the field using either a theodolite or more often a circumferentor to establish the relative angular position of dispersed areas of land and a chain to determine the distances separating them. This method of survey control can be found on draft maps of Reading,[124] Byron[125] and John Brownrigg.[126] Given the often dispersed nature of land ownership in eighteenth-century Dublin and its surrounding areas, connecting areas of land under the same ownership in one survey is a practical and efficient method and it is surprising that evidence of its existence is not more regularly observed on draft maps.

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[122] Gibson, *Treatise in practical surveying*, p. 217.
[123] Ibid., p. 218.
[124] Thomas Reading, Several parcels of land in Dalkey, 1769 (NLI, Christchurch papers, ms. 2789(3)).
[125] Samuel Byron, Ballymore Eustace, 1791 (NLI, Christchurch papers, ms. 2789(17)).
[126] John Brownrigg, Several holdings on north side of Channel Row, 1804 (NLI, Christchurch papers, ms. 2789(57)).

3.4 Copying maps

Map duplication and revision was common practice within the surveying community in Dublin throughout the eighteenth century. Both manuscript maps, particularly in relation to estate surveys, and large city and town plans printed with copper plate, were copied, both legally and illegally, during this period.

One of the primary reasons behind map duplication was the desire to save both time and money. Duplication, or revision, removed the need for complete and extensive resurveys of an area of land. The various estate holders within Dublin during the eighteenth century routinely kept surveys of their lands on record for future use,[127] and it was on these originals that later generations of surveyors based their updated and revised maps. The relatively small and close-knit surveying community[128] at this time facilitated the acquisition of previous surveys, whether from their own master's notes or from a colleague,[129] with any previous surveyor's work being regularly cited on the reproduction.[130] Even the eminent John Speed once stated that he had 'put my sickle into other men's corn'.[131] However the system was not without its critics, as one cartographer stated:

> … exact Geographic knowledge cannot be obtained by sitting at home[132]

The nature of geographical information[133] means that it changes regularly and randomly. Maps can rapidly become out-dated, particularly in urban areas where construction of buildings and changes in infrastructure is an ongoing process. John Longfield's 1816 map of the grounds of the Kings Inn on Constitution Hill in Phibsborough was grossly out of date by the 1830s due to the demolition of a row of houses along the Phibsborough road. As such, William Longfield, John's son and

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[127] Roger Kendrick, Maps of the liberty of St Patrick's Cathedral (Dublin, 1741–1825); Various, Manuscript maps of the Hatch estate, 1727-1871, NLI ms. 21. F. 11; John Longfield, Book of maps of estate of Christ Church, 1812, NLI ms. 2789-90); Various, Manuscript maps of the Domville estate in Dublin City, Dublin county and Meath, 1655-1816 (NLI ms. 11,937).
[128] See Chapter 1.
[129] George Gibson, Leinster House, 1812 (DCA, WSC/Maps/411).
[130] John Longfield, Holding on Arran quay, copy of Byron, 1790, copied 1812 (NLI, Christchurch papers, ms. 2789-90(1)); John Longfield, Lands in Deansgrange, copy of Frizzell, 1791, copied 1820 (NLI, Christchurch papers, ms. 2789-90(25)); John Longfield, Skinners Row, copy of Thomas Reading, 1762, copied 1814 (NLI, Christchurch papers, ms. 2789-90(31)).
[131] John Speed, *Theatre of the empire of Great Britain* (London, 1611), p. iii.
[132] Braddock Mead, *The construction of maps and globes* (London, 1717), p. 58.
[133] Naturally occurring geographical features or man-made structures present in the real world represented in a cartographic context.

successor, was able to trace the unaffected sections from his father's original map, and the new survey work for the map was restricted to the small area affected.[134] This method of partial tracing and partial copying was also employed by John Longfield[135] and John Brownrigg,[136] while direct traces, inclusive of the original survey's non-geographic decorations, also appear to have been a common practice.[137]

John Rocque's map publication business in London prior to his arrival in Ireland in the 1750s specialised in cartographic duplication. A list of Rocque's published and advertised works[138] indicates that a staple of his business was the copying of maps originally produced abroad, as was common in eighteenth-century Europe. There is no evidence that Rocque surveyed Berlin in 1747, Halifax, Nova Scotia and Constantinople in 1750, Minorca in 1753 or Lima in 1755[139] yet maps of these far-flung and distant lands and cities were all advertised by Rocque during his career[140] suggesting that they were copies. Maps could easily be copied from an original parchment onto copper plate, edited, updated and republished at a far cheaper and more quickly than conducting an original survey from scratch. The importation of maps from other countries was an expensive process and many map producers found it economically advantageous to trade home-grown maps with colleagues in other countries, a 'juste prix'[141] as commented by French map seller Roch-Joseph Julien in 1763 while trading French maps for English maps. London map seller William Fadden and his Dutch colleagues went so far as to smuggle maps to each other in order to avoid customs fees:

> The captain has asked that you would please have one of your servants pick up the roll [of maps] in order to avoid declaring it to customs.[142]

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[134] William Longfield, Constitution Hill, 1835 (NLI, Christchurch papers, ms. 2789(52)).
[135] John Longfield, Rathmore, Naas, 1824 (NLI, Christchurch papers, ms. 2789(82)); John Longfield, Plot of land covered by the High Court, 1818 (NLI, Christchurch papers, Ms.2789(60)).
[136] John Brownrigg, Chancery Street and Great Ship Street, 1800 (NLI, Longfield papers, ms. 21. F. 87(103)).
[137] John Longfield, Cook Street, 1805 (NLI, Longfield papers, ms. 21. F. 88(125)). Brownrigg & Co., Glasnevin, 1800 (NLI, Longfield papers, ms. 2789(28)).
[138] Appendix D.
[139] At this time Rocque was operating in Ireland.
[140] Varley, 'John Rocque; engraver, surveyor, cartographer and map-seller', pp 83-91.
[141] R. J. Julien, *Nouveau catalogue de cartes géographiques et topographiques* (Paris, 1763), p. 4, quoted in Sponberg-Pedley, *Commerce of cartography*, p. 76.
[142] Covens & Mortier to Faden, 18 Sept. 1778, quoted in Mary Sponberg-Pedley, *Map trade* (Chicago, 2000), p. 95.

During the 1740s Rocque produced dozens of maps of cities and countries throughout Europe and the Americas, indicating that he had many contacts in the cartographic community, both in England and further afield.

Scalé's reproduction of Rocque

One of Rocque's most prestigious maps produced during his time in Ireland, *Exact survey of Dublin* (Dublin, 1756), was itself copied by Rocque's assistant and brother-in-law Bernard Scalé. Scalé's *A survey of the city, harbour, bay and environs of Dublin* (Dublin, 1773) was a near exact duplicate of Rocque's map of the same name, a fact that Scalé did not hide, stating in the title that the map had been Rocque's and that he had simply included improvements and additions to modernise the map in keeping with recent urban developments. Given the cartographic quality of Scalé's work throughout his career, this new edition of his master's map was a disappointing example of map reproduction and design.

Scalé's map was produced from the same plates that Rocque had used,[143] a reality easily proven by comparing the intricate field boundaries surrounding the city on both Rocque and Scalé's maps. For Scalé the recycling of the original plates made sound economic sense. There are however several difference between the two men's maps.

The original Rocque plates were altered by an engraver named Robert Sayer, who unfortunately made two errors in the map's dedications – describing the map as being 'humbly inscribed by there [their] most humble servant.' The duplication of the word *humble* can be dismissed as a poor but forgivable use of English, yet the incorrect spelling *there* instead of *their* is a sign of carelessness from the engraver.

Scalé's main additions appear to be the inclusion as a dashed line of the various city wards of Dublin which were absent from Rocque's original map, and the addition of the newly-constructed Grand Canal and South Circular Road, as well as several smaller avenues and streets. Scalé's overall attempt to update the map seems to have been less than successful. The expansion of the city, especially developments along

[143] There is no surprise in Scalé having access to Rocque's original engraved copper plate for his map of Dublin as not only did Scalé work alongside Rocque during the original 1754 survey, but Rocque was also married to Scalé's sister, Mary-Anne, who would have inherited Rocque's possessions when he died. See Chapter 1 for more on the Rocque-Scalé relationship.

the main roads from the countryside into Dublin, was virtually ignored while nearly every building on Scalé's map can be found on Rocque's. This indicates that Scalé's modernisation of Rocque's original map was selective and half hearted. The tidal mud flats around the mouth of the Liffey remain identical in both the new and original, hinting that Scalé did not resurvey the area of the city most affected by coastal erosion and deposition and upon which the city depended for trade. The inclusion of the proposed fortification within the Phoenix Park can be found on both Scalé's and Rocque's maps, and was an unusual choice for Scalé given the time that had passed between Rocque's original inclusion of the proposed structure.

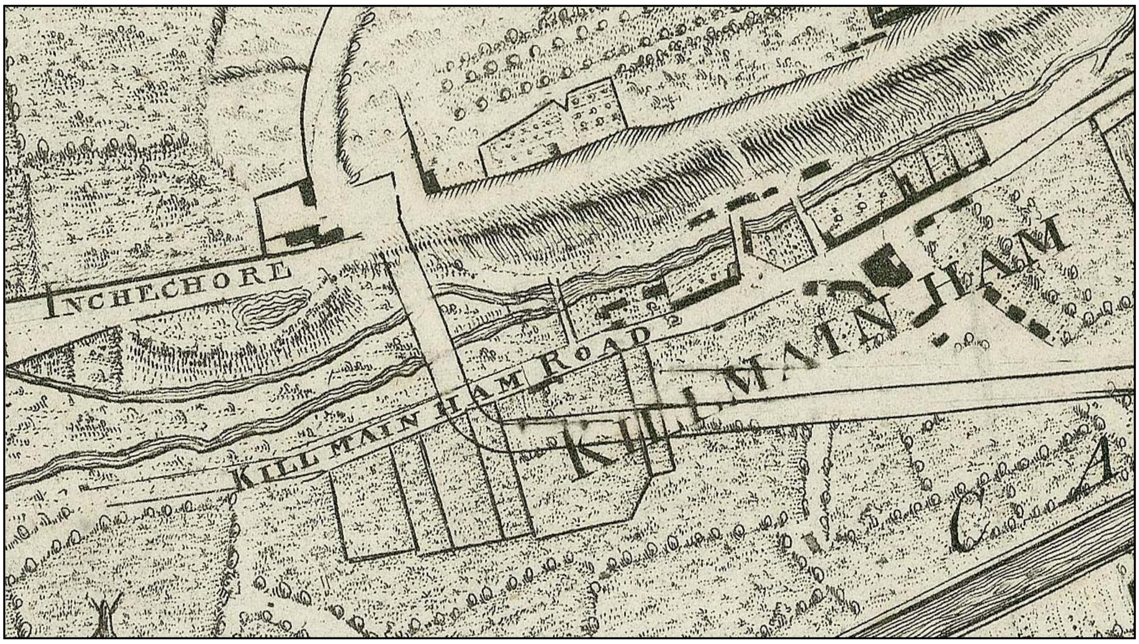

Figure 3.31 The South Circular Road/Inchicore Road junction showing overlapping engraving, B. Scalé, *A survey of the city, harbour, bay and environs of Dublin* (Dublin, 1773).

Scalé's inclusion of the Grand Canal and the South Circular Road are the most prominent improvements that were made to the original map. However, Robert Sayer's carelessness appears to have expanded beyond his mistakes in the map's cartouche, as the updated lines which needed to be engraved to represent both the canal and the new circular road seem to have been engraved directly over the original engraving work, thus resulting in overlapping lines and reducing the attractiveness of the map as a whole.

Parliament Street, which had been built shortly after Rocque's original 1756 map of Dublin, is another example of the new feature being engraved directly over the original plate's indentations. It is important to note that Rocque had in fact included Parliament Street in a later edition of his original 1756 map indicating that Scalé had used Rocque's first edition copper plates.

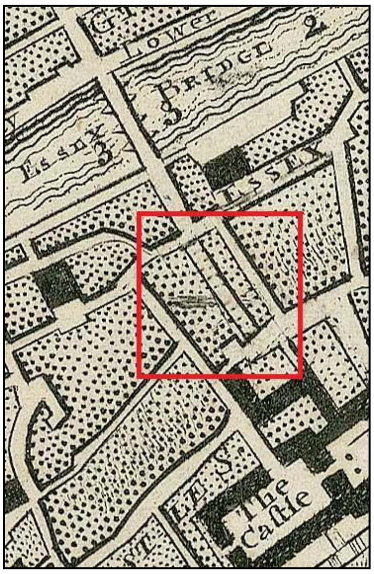

Figure 3.32 Updated section of Scalé's map showing Parliament Street (inside the red box). The street was engraved over existing detail on Rocque's copper plates, B. Scalé *A survey of the city, harbour, bay and environs of Dublin* (Dublin, 1773).

Scalé's 1773 updated print of Rocque's map is a disjointed combination of the work of Sayer and Scalé. The lack of new survey detail except for a few recent engineering projects is a mystery given Scalé's skill as a land surveyor, and his near certain participation in Rocque's original work in the 1750s.

Illegal Reproduction

Rocque's map of Dublin was not the only major city plan to be copied. Charles Brooking's *A map of the city and suburbs of Dublin* (London, 1728) was copied more than once - with two versions being produced in 1728, an illegally copied version in 1729 and a reprint *c.*1740 with minor alterations.[144] Brooking's publisher was a man names Bowles who produced the first edition of Brooking's map from his workplace in Mercers Hall, Cheapside, London[145] in 1728 and another edition from Black Horse, Cornhill, London. Andrews points out that the main differences between the Mercers Hall and the Black Horse editions were minor changes to Brooking's prospect of the city and the inclusion of lots along the North Wall similar to those laid out prior to Brooking's work in 1717.[146] In early 1729 a non-Bowles edition of Brooking's work appeared on the Dublin cartographic market, in a two and three sheet format and at a far cheaper price:

> Just imported from London, a new and correct map of the city of Dublin, either in two or three sheet, coloured: The price of the 3 sheets, 3s. 6d., and the 1 of 2, at 2s.,

[144] Includes new compass rose, the lots along East Wall and views of St. Patrick's and Christchurch cathedrals.
[145] *London Daily Journal*, 19 Dec. 1728.
[146] J. H. Andrews, 'Mean piratical practices, the case of Charles Brooking' in *Ir. Georgian Soc. Bull*., xxiii, nos 3 & 4 (1980), pp 33-41.

2d. unframed. Sold by Hanna Madocks at the Red Lyon in New Row, near Thomas Street, and by Thomas Benson at Shakespear's Head in Castle Street.[147]

The appearance of this illegal copy did not go unnoticed by the sellers of the original map:

> About six months ago was publish'd a map of the city of Dublin, from the actual survey of C. Brooking, sold at 5 Shill. English; and whereas there has lately been sent over a spurious, imperfect, and piratical copy of the said map, sold at an under price. The proprietor of the original map done from Brooking's survey finds himself obliged (notwithstanding the considerable expense he has been at in prosecuting said map in the best manner, and the great loss he is like to sustain thereby) to fall the price to an English Half Crown; which it is hoped will give no offence to any of these gentlemen who encourag'd the work.
> N.B. It is not to be doubted but that the publick will shew their abhorrence of these mean piratical practices, by discouraging the spurious copy; at least every one before they buy it will compare it with the original, which has Brooking's the Surveyors name, and Bowle's the Proprietor. All others are imperfect and spurious. The said original map is now sold by most booksellers in Dublin, at an English Half Crown.[148]

Prior to 1735 publishers who wished to protect their right of sale of a printed or engraved graphic work, rather than its content, had to apply for privilege from parliament or the King.[149] Brooking's work was produced in England. Therefore to protect the work, Bowles or Brooking must have applied to the English parliament for privilege. In contemporary France, the engraver or publisher had to supply one copy of a map to the office of the *Librairie*, two to the Royal Library, another to the Cabinet du Louvre, another to the keeper of seals, one more to the censor and three to the *Communauté de la Librairie*.[150] There were also two types of privilege in France, exclusive privilege[151] (*Privilège General*) or ordinary privilege[152] (*Privilège Simple*). However in both countries, such privileges only protected works within the country and not when those works were abroad. The legal loopholes thus created opportunities for those who wished to provide a cheaper alternative to the original product as in Brooking's case. The passions of those affected by such 'piratical practices' was regularly expressed:

> Since maps have begun to be multiplied and entered into pecuniary commerce, one has seen many ignoramuses who, by greed for profit, have mixed themselves up in

[147] *Dublin Weekly Journal*, 15 Feb. 1729.
[148] *Dublin Gazette,* 15 Mar. 1729.
[149] David Hunter, 'Copyright protection for engravings and maps in eighteenth-century Britain', *Library,* ix, no. 2 (1987), pp 128-47.
[150] 'Book sellers guild', Sponberg-Pedley, *Commerce of cartography*, p. 105.
[151] J.S. Grabit, *La géographie* (Lyon, 1789).
[152] Eustache Herisson, *Atlas protatif contentant la géographie universelle ancienne et moderne* (Paris, 1806).

> doing what they don't understand, and some sellers of images who have wanted to make geography a subsidiary of print making … The profession of geography has become a real den of thieves … The plagiarists try not to copy line for line ... making it a tricky business to discern who is the robber and who the robbed.[153]

English publisher Samuel Buckley continued the trend with:

> … That the man may not, after an expense of much money and many years application and study, be liable to lose the profits he might justly promise to himself and family from his labours, and to have only the honour at last of having made a very good copy for a Dutch bookseller to raise a fortune by, tax-free, quickly and surely, at no more trouble than that of reprinting it.[154]

Accuracy issues in relation to copying

Repeated tracing of older maps can undermine the quality of the work being traced through propagation of error. Eighteenth-century surveyors appear to have regularly copied from surveys decades old, sometimes even dating back to the mid-seventeenth century. John Brownrigg's map of Glasnevin (1800)[155] was copied from a Thomas Cave map produced sometime in the early eighteenth century, which in turn had been copied from a survey conducted by Richard Francis in 1640. While it is difficult to ascertain how much of Brownrigg's data came from the original Francis map, Brownrigg did not specifically state that the map was a combination of survey and traced work, only that it had been copied from both Cave and Francis, potentially making some of the map data over a century old.

While there is no evidence of discrepancies in the Brownrigg/Cave/Francis map, there is proof elsewhere that maps of the same area produced by different surveyors resulted in different measurements, thus making the selection of what map to use from what surveyor an important issue in copying and revision. In January 1698, Abraham Carter surveyed an area of land in Roganstown, near Swords, County Dublin, which belonged to the estate of Christ Church cathedral. This same map was copied by Thomas Moland in 1714, whose product was copied by Thomas Cave in 1773, who, like Moland and Carter before him, had his map copied in 1814 by John Longfield.[156] The map was produced to a scale of 20 perches to an inch and the area

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[153] Broc, *Plagiat cartographique*, quoted by Sponberg-Pedley, *Commerce of Cartography*, p. 105.

[154] Samuel Buckley, 'A short statment of the public encouragement given to printing and bookselling in France, Holland, Germany and at London' in S. Parks (ed.), *English publishing, the struggle for copyright, and the freedom of the press, 1666-1774* (New York, 1975).

[155] Brownrigg & Co., Glasnevin, 1800 (NLI, Christchurch papers, ms. 2789(28)).

[156] John Longfield, Roganstown, 1814 (NLI, Christchurch papers, ms. 2789(34)).

of the land in question was calculated to be 31 acres, 3 roods exactly.[157] While there is no direct documentary evidence, the quality of this area figure for the land in Roganstown must have come under question as in the same year as the copy 1814 was made; Longfield was asked to resurvey the exact same land.[158] Longfield's 1814 survey calculated the area as 32 acres, 2 roods and 7 perches. Delving back into the records of the Christ Church estate, Longfield found and copied yet another map of the same lands in Roganstown surveyed by Samuel Byron in 1794[159] which yielded a third set of figures, 32 acres 1 rood and eight perches. Given the relative closeness of the 1794 and 1814 surveys and the small errors that would have been introduced to both these surveys by the period instrumentation, it is highly probable that the figure of 32 acres calculated separately by Longfield and Byron was correct, rather than the figure of 31 acres obtained from the Carter/Moland/Cave/Longfield copy.

The Roganstown incident was not the only time Longfield encountered such discrepancies in maps or copies of maps. A similar situation occurred when Brownrigg, in collaboration with his then apprentices Longfield and Murray, found a discrepancy in their figure for lands in Dalkey (7 acres, 2 roods, 15 perches)[160] when compared to a map produced by Thomas Reading thirty years earlier (7 acres, 1 rood, 33 perches).[161] In this instance there was no independent survey, as with the Byron survey in Roganstown, to determine the correct acreage.

Surveyors were ever ready to point out errors in previous surveys to their employers as it helped explain discrepancies. In 1805 Sherrard and Brassington attached a note to a survey they conducted in Brunswick Street during which they had consulted a previous survey:

> It appears by the old map that there is a deficiency of about 7ft in depth on the east side of this holding. We account for it that in rebuilding the corner house it has been set back so much for the purpose of widening and improving the street.[162]

[157] There is no evidence related to this measurement as being in Irish or Statute acres.
[158] John Longfield, Roganstown, 1814 (NLI, Christchurch papers, ms. 2789(37)).
[159] John Longfield, Roganstown, 1815 (NLI, Christchurch papers, ms. 2789(36)).
[160] Brownrigg, Longfield & Murray, Several parcels of land in Dalkey, 1799 (NLI, Christchurch papers, ms. 2789(23)).
[161] Thomas Reading, Several parcels of land in Dalkey, 1769 (NLI, Christchurch papers, ms. 2789(3)).
[162] Sherrard and Brassington, Brunswick Street, 1805 (NLI, Christchurch papers, ms. 2789-90).

A similar note regarding discrepancies in maps was written by Longfield while examining previous surveys of an area in Lucan, County Dublin:

> The result which I expected by an examination of the ancient maps of Ash Park, have (in my opinion) been realised, and therefore the whole of W. Hyland's stores & Matt Hiln, together with Kirwan's holdings, as proposed for by those persons, are the sole property of Dean & Chapter of Christ Church, and not partly so, as described by Mr. Readings map & survey of 1751-52. The authority upon which I have made this conclusion, is Abraham Carter's map of 1704 annex'd to the cancel'd lease of Ash Park and which I said to agree with the map of Sir Rich. Steels estate which bounds the south side of Ash Park. Since the survey of 1704 there has been a small increase of propend on the north side of Lucan Lane, now called Garden Lane, and I have discovered a clerical error in the length of the estate boundary marked 141 ½ feet which allowing for the shrinking of parchment I think should measure on the map 232 ½. This error of 101 feet I find was so copied by Tho. Cave in his map of 1729, and I am of opinion that those errors or wrong information was the cause of Tho.s Reading's mistake in the Southern Boundary as described in his map of 1751-52.

The propagation of error had also been missed by Dublin city surveyor, Samuel Byron, when he was asked to copy the Ash Park map in the 1780s:

> In 1781 Samuel Byron made accessory of Ash Park, on the authority of Reading's map of 1751-52 and he also copied its inaccuracies, which from want of interior measurements, he was unable to detect, and it is probable some of the whole was not let in one demise. I should have fallen into the same errors. However, on reviewing the separate holdings on the south side of Garden Lane it occurred to me that the line of boundary marked in the maps of 1751 & 1781 could not be correct, and I trust the discovery is made in sufficient truce for the benefit of the estate.
> I have in present to the direction of the committee viewed & valued the separate holdings in Ash Park and I recommend the proposals of Mr. Hyland, Eustace and Kirwan to [be] accepted by the chapter.[163]

Longfield's suspicions and analysis of his predecessors maps was not only useful, but as London cartographer John Green decades earlier advised, very necessary when examining copied maps:

> 'Tis no excuse for one to say he copy'd his from another's maps; because he never aught to copy that which he has not first examin'd, and found agreeable with the best discoveries. The truth is, everyone that can copy or engrave a map, sets up for a geographer, and having done that, thinks the property is transfere'd and accordingly calls himself the author![164]

In addition, Green also advised:

> But no maps are not always exact copys of others, there are some which seem to be patch'd up with a piece out of one and a piece out of another, without any judgement or care: For the map maker often thinks himself obliged to make alterations from others, that something new may appear in what he publisheth, to this end, the

[163] NLI, Christchurch papers, ms. 861(265).
[164] John Green, *The construction of maps and globes in two parts* (London, 1717), p. 134.

situation of places is transposed, the course of rivers turn'd, the bounds of countys, provinces and coasts extended, or contracted in a very strange manner.[165]

Questions on the reliability of copied geographic information were obviously valid during the eighteenth and early nineteenth centuries. As such, the most highly regarded reference source for geographic data in Ireland during the eighteenth century, the Down Survey, sought to maintain its reputation for accuracy and its privileged legal status. Irish surveyors regularly consulted and copied the Down Survey[166] and in order to protect the status of the maps the Deputy Surveyor General would attach a note to such maps stating that surveyors had consulted an official source of information. These notes were brief, yet contained enough information to enable the client to confirm that the surveyor's work and the Down Survey maps consulted came from the same area and that the maps the surveyor was copying were legitimate, to avoid the errors experienced by Longfield in Roganstown and Lucan:

> This trace, for so much, agreeth with the map of the Down Survey taken fro the Parish of Santry in the County of Dublin remaining on Record in the office of his Majesties Surveyor General of Lands in Dublin Castle.[167]

Such notes are rare within Irish estate maps, yet they do occasionally appear in map collections.[168]

Even rarer are surveyor's comparisons of their own work to that of the Down Survey. Michael Kenny, a Dublin-based surveyor in the late eighteenth century, enclosed one such comparison in a note to the Domville family regarding a map of their lands in Glasnevin, as well as a description of his state of health:

> Above you have the map of that field I surveyed it with all the accuracy in my power, and make it 4A 3R 2P, cast it up various ways, and found able to answer the same, what I made of it, in the General Survey, I can't tell, as I have no paper related to your estate thus in one line from A to B that the gripe was uncertain much defrauded

[165] Ibid., p. 135.
[166] John Longfield, Lands in Killenaule, Tipperary, 1817 (NLI Ms. 2789(59)); *Report from select committee on survey and valuation of Ireland*, pp 34, 129, 134, 313 [445], H. C. 1824, viii.79; Robert Gibson, *Treatise of Practical Surveying*, p. 286.
[167] Note by Richard Holmes Deputy Surveyor General of Lands, Unknown author, *Santry*, 1766 (NLI, Domville papers, ms. 11,937(11)).
[168] Unknown author, Corbally, Co. Dublin, 1766 (NLI, Domville papers, ms. 11,937(48)); James Molly, Santry, 1764 (NLI, Domville papers, ms. 11,937(50)); Unknown zuthor, Rathleigh, County Meath, date unknown (NLI, Domville papers, ms. 11,937(54)).

> but on enquiring strictly, find it was your gripe therefore brought it in. I have been very unwell this fortnight part and not much better since [169]

The copying, tracing and revision of maps was an important, time-saving and economically viable way of reproducing surveys without the need for laborious field work. Such advantages appear to have encouraged the preservation of maps, particularly manuscript estate maps, which allows modern researchers to compare and contrast separate surveys and identify the advantages and errors associated with the recycling of geographic information.

[169] Note by Michael Kenny, Glasnevin, 1804 (NLI, Domville papers, ms. 11,937(20)).

3.5 The presence of buildings in maps

Geographic referencing was not solely restricted to magnetism or the direction of north. Many surveyors utilised local landmarks to place their surveys within local a reference framework. Jonathan Barker, for example, used several megalithic monuments and ancient standing stones as boundary points in a 1762 map of Dundrum and its surrounding areas.[170] These are displayed in profile, whilst the other buildings on the map remained in planimetric format. James Mooley used a similar technique when he included a large 'thorn tree' as a local reference point in a survey of Santry in 1764.[171]

The inclusion of such ancient or distinctive landmarks was widespread among eighteenth-century surveyors in Dublin. Important buildings or landmarks were regularly displayed in profile or occasionally in a three-dimensional view where the other buildings within the map were presented in planimetric form. Benjamin Noble advised that substantial or distinctive buildings should always be recorded during a survey:

> After this, or a similar manner, an actual survey of a county or province may be made; taking your stations along the different roads; and the various objects as castles, churches, or country seats, may be taken in, as you chain along, by taking the bearing of each object at two different places on the chaining.[172]

Barker, as mentioned previously, used megalithic monuments as boundary points in his map, and the appearance of historic monuments or ancient sites was routine in Irish estate and cadastral mapping. John Roe included a small profile drawing of a ruined castle in an 1801 map of the lands around Newcastle village[173] Samuel Byron included 'an ancient cairn' in a map of Kilcullen in 1794,[174] John Brownrigg included an old high cross near Loughlinstown[175] and a 'great military double ditch'[176] while John Longfield included a tower described as 'a turret'[177] in addition to an old castle

[170] Jonathan Barker, A map of Dundrum and all its subdivisions, 1762 (NAI, Pembroke papers, 2011/2/2/4).
[171] James Mooley, Santry, 1764 (NLI, Domville papers, ms. 11,937).
[172] Noble, *Geodaesia Hibernica* (Dublin, 1768), p. 50.
[173] John Roe, Lands of Newcastle – part of the estate of Michael Aylmer, 1801 (NLI, Cloncurry papers ms. 16 (G). 50 (7)).
[174] Samuel Byron, Kilcullen, Co. Kildare, 1794 (NLI, Christchurch papers, ms. 2789-90 (35)).
[175] John Brownrigg, Loughlinstown, 1798 (NLI, Christchurch papers, ms. 2789(11)).
[176] Ibid., (ms. 2789(10)).
[177] John Longfield, Back Lane, 1815 (NLI, Christchurch papers, ms. 2789-90(40)).

in Brennanstown.[178] These written descriptions allow a rough assessment of the condition of such historical features in the eighteenth century, which is of particular interest if such buildings did not survive to the modern age. An example of this can be seen in Longfield's 1822 map of the west side of Bridge Street in Dublin City which included a large section of the old city wall. While the city wall is shown only in planimetric view, unlike the other buildings mentioned so far, he gives the width of the wall, sixty feet, as a welcome piece of information now that so little of it is extant.

Historical features, such as castles, high towers or churches, represent a form of local referencing that was visible for miles. Indeed, even in modern Dublin city, both Christchurch and Saint Patrick's cathedrals remain two of the tallest structures within the city centre. However, there was always the risk that such notable buildings would be featured too prominently in a map, particularly concerning their size. One author advised that:

> The ground-plot of buildings, ought in all cases to be expressed by the same scale that the rest of the plot was laid down by, and to be taken notice of in the table of references; but never go about to draw the representation of a house or barn in the midst of the plot, so big as will cover an acre or two of land.[179]

Homes of wealthy people, and 'country seats' were also regularly displayed in profile in eighteenth-century Irish mapping. One of the most obvious examples is the inclusion of a landlord's house in estate mapping. Wyld stated that:

> But if [one] would express a gentleman's seat or manor-house, 'tis best done in some corner of the draught, or in the plan by itself, annexed to that of the estate to which it belongs. And the house must be drawn in perspective…and if the gardens, walks and avenues to the house are expressed, it must be in the same manner; and where there are trees, they must be shadowed on the light side.[180]

Fine examples of profile views of houses in estate maps can be found in the works of Rocque,[181] Longfield[182] and Barker.[183]

[178] John Longfield, Lands in Brennanstown, 1822 (NLI, Christchurch papers, ms. 2789-90(71)).
[179] Wyld, *The practical surveyor*, p. 113.
[180] Ibid.
[181] John Rocque, A survey of Duneny, Co. Kildare (1757).
[182] John Longfield, Kilcullen, Co. Kildare, 1809 (NLI, Christchurch papers, ms. 2789(125)).
[183] Jonathan Barker, A map of Owenstown, 1762 (NAI, Pembroke papers, 2011/2/2).

Figure 3.33 Rural dwellings, John Rocque A survey of Ballegrenie, Co. Kildare (1757). Reproduced in Arnold Horner, 'Cartouches and vignettes on the Kildare estate maps of John Rocque' in *Ir. Georgian Soc. Bull*., xiv, no. 4 (1971), p. 58.

Flattering the patron of a map by including a profile of his house made good business sense. Such inclusions may have been requested, or expected, by the landlord himself although no proof exists of this. The majority of these representations of a landlord's house were carried out to a reasonable degree of artistic quality, with Rocque producing some of the finest examples. However, not all were finished to the same high standards. A map drawn by Daniel McCollon in 1785 of Rush Demesne[184] stands out as an example of poor artistic quality as the estate house and several surrounding cottages were presented in profile in a style that can only be described as amateurish, with little or no regard to the orientation and drawn in heavy ink in a careless manner. The inclusion in McCollon's maps of such phrases as 'all the roads included in this survey', with every letter N written backwards in a similar fashion to Cyrillic only adds to the amateur appearance of the map. The inclusion of profile buildings did not always represent the commissioner of the map, as subscribers could also obtain the same privilege. Taylor and Skinner's *Maps of the roads of Ireland* (Dublin, 1777) offered subscribers such an option and the and the environs of each route in the atlas are littered with small profile drawings of houses of subscribers, the family name inscribed below (see figure 3.34).

[184] Daniel McCollon, Rush Demesne, 1785 (NLI, Hatch papers, ms. 21. F. 141(21)).

Profiles of estate houses were not universal in eighteenth-century Irish maps. Several surveyors attempted to present such buildings in a three-dimensional form by adding depth. John Roe presented the manor house of Rush Demesne in such a manner and with a reasonable degree of success as the separate wings of the building as well as detail, such as windows, are visible.[185] Scalé employed a similar technique in a plan of Tallow, Co. Waterford in 1774.

Figure 3.34 Subscribers' residences. George Taylor and Andrew Skinner, *Maps of the roads of Ireland* (Dublin, 1777).

Of particular note in the inclusion of important or relevant buildings are the maps produced for the archbishops of Dublin between 1654 and 1850, a typical estate collection. These maps, produced by over a dozen surveyors over two centuries regularly included small profile drawings of churches, towers, fortified houses and in one instance[186] a hangman's gallows complete with victim (see figure 3.41).[187] Most of the buildings were included as part of the map detail but those produced by the surveying consortium of Sherrard, Brassington and Greene in the early nineteenth century usually include a view of a building of note on the property within the cartouche (see figure 3.39).

[185] John Roe, The demesne of Rush, 1806 (NLI, St. Patrick's Cathedral papers, ms. 21. F. 141(13)).
[186] Robert Newcomen, The parish of Clondalkin (1656).
[187] A similar feature can be found on Rocque's maps of *Kilkenny* (Dublin, 1758) and *London* (London, 1748).

Figures 3.35 to 3.40: Buildings found in maps of archbishops of Dublin's estates, 1656-1810.[188]

Figure 3.35 Religious buildings, Arnoldi, Ballimore and Blackstowne (1656).

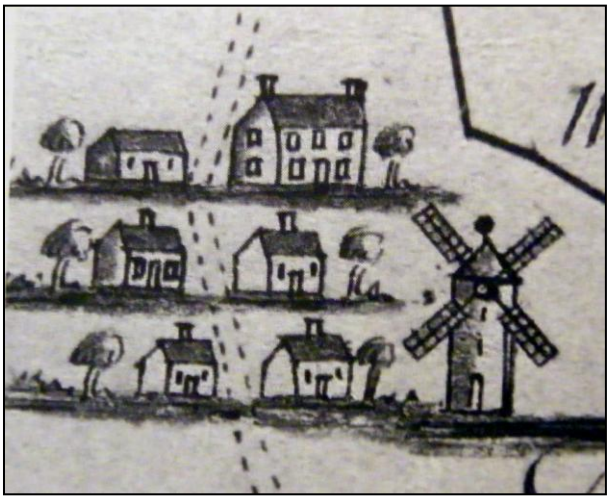

Figure 3.36: Houses with windmill, Joseph Moland, A survey of several parcels of land belonging to his Grace the Lord Arch Bishop of Dublin, Lusk (1716).

Figure 3.37: Lusk Village, Joseph Moland, A survey of several parcels of land belonging to his Grace the Lord Arch Bishop of Dublin, Lusk (1716).

Figure 3.38: Rural house, Roger Kendrick, Map of the land of Coolmine, surveyed 1747.

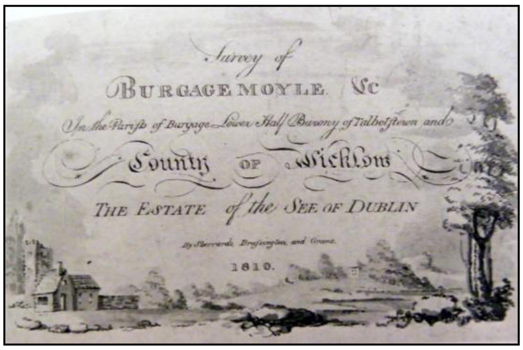

Figure 3.39: Decorative cartouche, Sherrards, Brassington and Greene, Survey of Burgagemoyle (1810).

Figure 3.40: Cottages. John Greene, Plots of land near Bow Bridge, (1682), the house on the left is on fire and there is a small man trying to extinguish the flames.

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188 Figures 3.35 to 3.41 reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850* with the exception of figure 3.40, Dublin City Surveyor maps (DCA, C1/S1/130) and 3.38 Maps of the liberty of St. Patrick's Cathedral, 1741, Marsh Library.

Figure 3.41 A figure hanging from a gallows, Robert Newcomen, The parish of Clondalkin (1656).

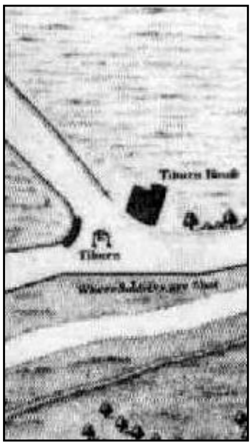

Figure 3.42: Another gallows, this time in John Rocque, *London* (London, 1748).

Aside from the homes of those financing a map, important civic buildings were often included in eighteenth-century Irish mapping.[189] Such buildings were usually presented in profile in the margins of the map rather than within the actual map itself. Charles Brooking's 1728 map of Dublin included Dublin Castle, the Poor House, St. Werburgh's church and other important public buildings within the city along the border of the map.[190] Scalé included a similar feature in his 1773 map of the city including Kildare House, the Royal Barracks and Kilmainham Hospital along the top of the work.

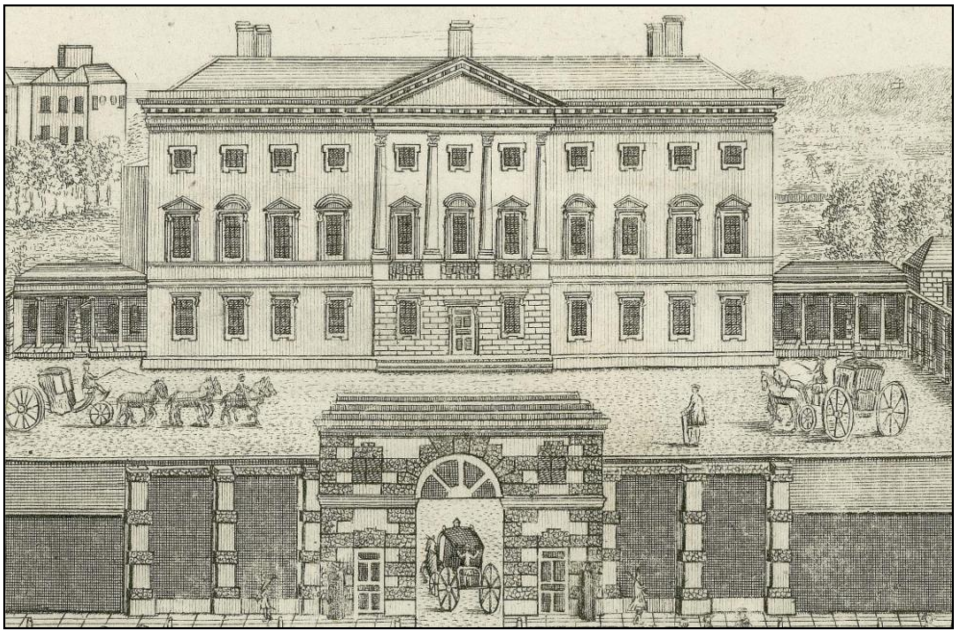

Figure 3.43 Kildare House, Bernard Scalé, *A survey of the city harbour bay and environs of Dublin* (London, 1773).

[189] Frederick O'Dwyer, 'Building empires: architecture, politics and the Board of Works, 1760-1860' in *Irish Architectural and Decorative Studies*, v (2002), pp 108-176.
[190] Charles Brooking's *Dublin* (London, 1728) is discussed in more detailed in section 3.7.

Scalé also produced a series of plans of Parliament House on College Green[191] around 1767. While it is likely, the four architectural plans are by another author as Scalé never ventured into architecture, the fifth plan, showing a complete façade survey of the building, is acknowledged to be Scalé's own work.

Figure 3.44: Parliament buildings Dublin, Bernard Scalé, *Five plates of the Houses of Parliament* (Dublin, 1767).

During the course of this research, only two surveying authors, Samuel Wyld and John Hammond, were identified as dedicating any space to façade surveys and how they were conducted. Both suggested that the theodolite was the preferred instrument[192] and that an intersection method was the appropriate technique, that is, measuring the angle and elevation of a particular point, for example the corner of a door, from two or more separate locations and then resecting the lines of observation when drawing the map. Accuracy was of utmost importance as:

> … objects ought to be delineated thereon according to their dimensions and different situations, in such a manner that the said representation may produce the same effects on our eyes as the objects were of they are the pictures.[193]

The surveyor would record the location detail such as doors, windows and corners of the building from a distance and then move to a second location at the same distance from the building and re-record the exact same points thus giving two sets of angles, both horizontal and vertical, that when drawn should meet thus giving the location of a recorded point.

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[191] Christine Casey, *Dublin* (Yale, 2005), p. 380.
[192] Hammond, *The practical surveyor*, p. 152.
[193] Wyld, *The practical surveyor*, p. 165.

Perspective played an important role in façade surveying. It was however rare in the more simplistic inclusions of profiled buildings in other maps, as objects such as windows at different distances from the view appear to be of different sizes. As Wyld correctly states 'altho' on the building one of 'them is really as big as the other'[194] as:

> … objects of equal bigness appear greater or less, according to their distance from the beholder's eye.[195]

Such complicated façade surveys could be quite time consuming, and to reduce the time involved features Wyld suggested the following short cut:

> And observe, that if the building be regular, there will need but few points to be given; for, where you have the height and breath (sic) of one window given, with its distance from the next, the whole row may thereby be drawn, being all of the same dimensions, but objects more irregular must be drawn by observing so many points therein, as shall be necessary: but practise in this case is the best guide.[196]

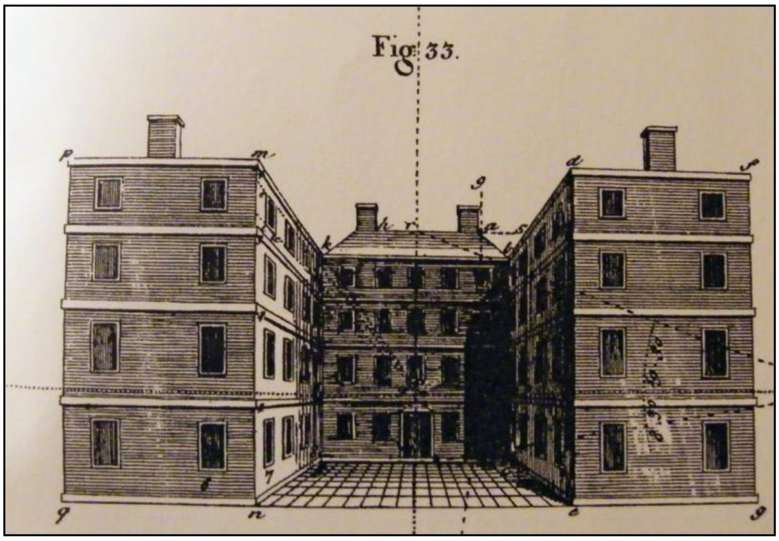

Figure 3.45 A diagram describing a method of conducting a façade survey, Samuel Wyld, *The practical surveyor* (London, 1725), appendix.

Given the complex nature of the parliament building, it is safe to assume that Scalé's survey took considerable time.

[194] Ibid.
[195] Ibid.
[196] Ibid., p. 169.

3.6 Dublin town plans pre-1728

The purpose of town plans can be civic, mercantile or scientific. It can also be a means of expressing municipal pride by comparing one particular town with those in proximity to it. This research examines several of the more influential or important pre-eighteenth century maps and plans of the city, noting especially changes in cartographic style and representations. As such, the maps of Giraldus Cambrensis (c.1200), John Speed (1610), Bernard de Gomme (1673), Thomas Philips (1685) and Herman Moll (1714) will be briefly discussed.

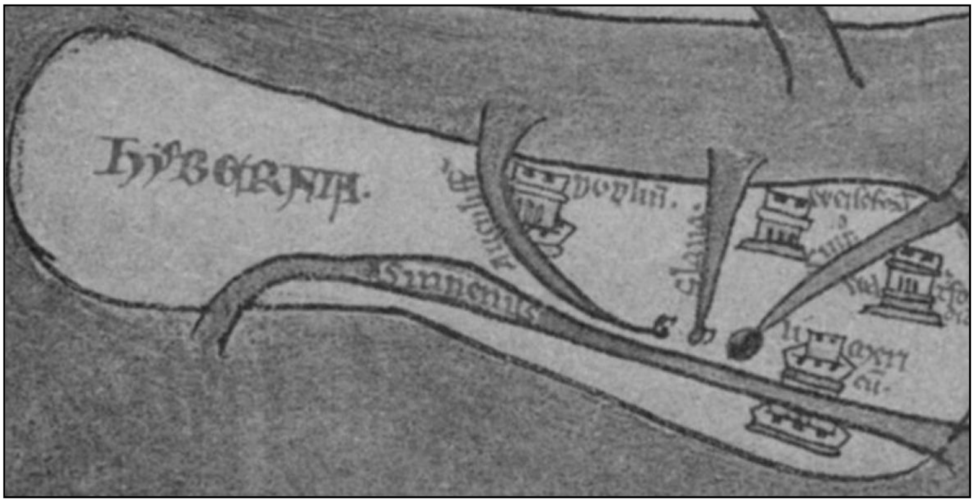

Figure 3.46 Giraldus Cambrensis's map of Ireland accompanying *Topographia Hiberniae and Expugnatio Hibernic* (*c*.1200). Dublin is located top centre.

One of the earliest representations of Dublin city in cartographic form dates to Giraldus Cambrensis's thirteenth century topographical description of Ireland and an accompanying map of Europe. This map, however, cannot be regarded as a true city plan.

In 1610 the English cartographer John Speed arrived in Dublin to create a map of the city for inclusion in his *Theatre of the empire of Great Britaine* (1611-12). Speed was described as being:

> … bred a Tailor, was by the generosity of Sir Fulk Grevil, his patron, set free from a manual employment and enabled to pursue his studies, to which he was strongly inclined by the bent of his genius. The fruits of them were his Theatre of Great Britain, containing an entire set of maps of the counties drawn by himself, his History of Great Britain, richly adorned with seals, coins & medals, from the Cotton collection; and his Genealogies of Scripture, first bound up with the Bible, in 1611 which was the first edition of the present English translation. His maps were very

justly esteemed & his History of Great Britain, was, in its kind incomparably more complete, than all the histories of his predecessors put together ...[197]

Born in Farndon, Cheshire in the early 1550s [198] Speed's first cartographic work was a four-sheet wall map of Canaan in biblical times, published in 1595.[199] Speed did not invent town plans; however his, *Theatre*, based in format on the earlier work of Ortelus's *Theatrum Orbis Terrarumn* (Antwerp, 1570), was a clever combination of town and county maps with the inclusion of historical notes and lists of the local aristocracy in decorative vignettes.

Figure 3.47 John Speed, http://www.mapforum.com/02/speed.htm

From 1606-1608 Speed surveyed approximately twenty-six towns and cities in England. His work was officially sanctioned and a reproduction of one of his official passes was copied into the precedent book kept by the town clerk of Warwick, dated 17 June 1607.[200] This copied pass described Speed's works as to survey and map towns that had not previously been recorded in such a format and to investigate coats of arms of the nobility and ancient monuments in their surrounding areas. According to a list of dates of Speed's time in each town recorded from his manuscript draft maps, it appears that Speed rarely spent more than a week at each site, for example, moving from Colchester to Ely, Huntingdon and Peterborough between late June and mid-August 1607.[201]

Speed's map of Dublin gives a detailed picture of the city essentially in its medieval layout.[202] The city is portrayed on a north-south axis extending from Trinity College in the east to Saint James's Gate in the west. The widths of Dublin's streets are exaggerated to allow the reader to see the many generic symbols of houses in profile that Speed used to populate his map. The important buildings of the city, individually

[197] Granger's *Bibliographical History of England* (London, 1779).
[198] Bendall, 'Draft town maps of John Speed's Theatre of the empire of Great Britaine', p. 40.
[199] Ashley Baynton-Williams, *John Speed*, www.mapforum.com/02/speed
[200] Heather Lawrence, 'Permission to survey' in *The map collector*, ixx (1982), p. 16.
[201] Bendall, 'Draft town maps of John Speed's Theatre of the Empire of Great Britaine', p. 40.
[202] Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19). p. 1.

numbered and listed in a small reference box in the map, stand out even further due to the generic design of the city's houses thus attracting the reader's attention more easily. The dense urban settlement on the south side of the Liffey is contrasted by the relatively sparse occupation on the north side of the river around Saint Mary's Abbey. One of the most useful and striking elements of Speed's Dublin map is his representation of the city's defences. These defences are absent from the two most widely circulated eighteenth-century maps of the city.[203] The city's gates and walls are shown in profile as is the fortified Dublin castle which appears in a much more ruinous state in Brooking's 1728 representation. The majority of the city's streets, gates, churches and important buildings are named and the Liffey is shown to be navigable by two and three mast ships up to Dublin's only bridge, at the location of the modern Fr. Mathew Bridge at the bottom of Church Street. Two high crosses are visible in Speed's map; both are unnamed but demonstrate Speed's interest in antiquities.[204] The off-centred north arrow suggests that Speed may have used a circumferentor during his work in Dublin however there is little additional evidence of the instrumentation employed in the survey.

Speed's Dublin map is very similar in style and format to his other town plans. Speed's Bedford map (London, 1611) contains the same house symbols in profile, similar reference structure and a slightly more decorative title than the Dublin map. His Darby map (London, 1611) contains more decoration than the Dublin plan, with several human and equine characters shown in the fields surrounding the town and a decorative deer surrounded by a palisade and more complex north arrow. Yet the Darby map retains Speed's trade-mark reference system and building design.

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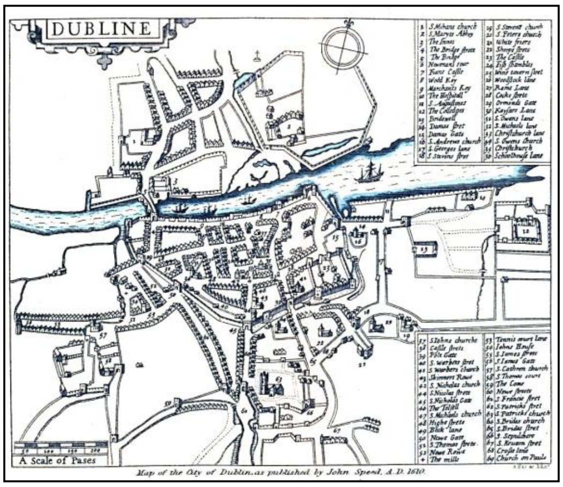
[203] Charles Brooking, *A map of the city and suburbs of Dublin* (Dublin, 1728); John Rocque, *Exact survey of Dublin* (Dublin, 1754).

[204] Both crosses are listed in Clarke, *Dublin part 1, to 1610* (Irish Historic Towns Atlas, no. 11), p. 17.



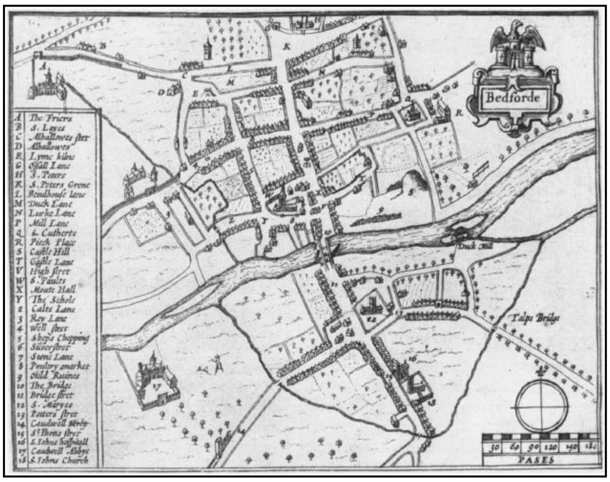


Figure 3.48 & 3.49 John Speed's Dublin (1610) (L) and Bedford (1611) (R) demonstrating Speed's standardised map design and layouts for his *Theatre of the empire of Great Britaine* (London, 1611).

Speed's map of Dublin is an adequate representation of the city at the beginning of the seventeenth century. What it lacks in cartographic style is compensated for by its timing: it captures the city just as it expanded beyond its medieval core.[205] This fact may explain why a reproduction of Speed's map was compared against the contemporary map in Robert Pool and John Cash's detailed description of Dublin's most prominent buildings published in 1780.[206] Speed's map of Dublin was a major cartographic milestone of the city's history[207] and one that would not be equalled in scale of importance until the work of John Rocque in 1754.

Bernard de Gomme's *The city and suburbs of Dublin* (London, 1673) is probably the most cartographically important map of the city between Speed (1610) and Brooking (1728) as it presents the evolution of the city from a walled Elizabethan town to the more suburban sprawl represented in Brooking's 1728 map of the city. Bernard de Gomme (1620-85) was a Dutch-born military engineer who had served in the English Civil War (1642–51) on the Royalist side and was appointed as quarter master general under Charles II. In 1673 he arrived in Dublin to produce a map of the city with the inclusion of a proposed fortification to protect the city and harbour.[208]

[205] Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19), p. 1.
[206] Robert Poole & John Cash, *Views of the most remarkable public buildings, monuments and other edifices in the city of Dublin* (Dublin, 1780).
[207] Twenty-seven derivatives of Speed's 1610 map of Dublin were produced from 1610 to 1886, Andrew Bonar Law, *The prints and maps of Dublin* (London, 2005).
[208] *Letters written by Arthur Capel, Earl of Essex, Lord-Lieutenant of Ireland* (London, 1770), p. 167.

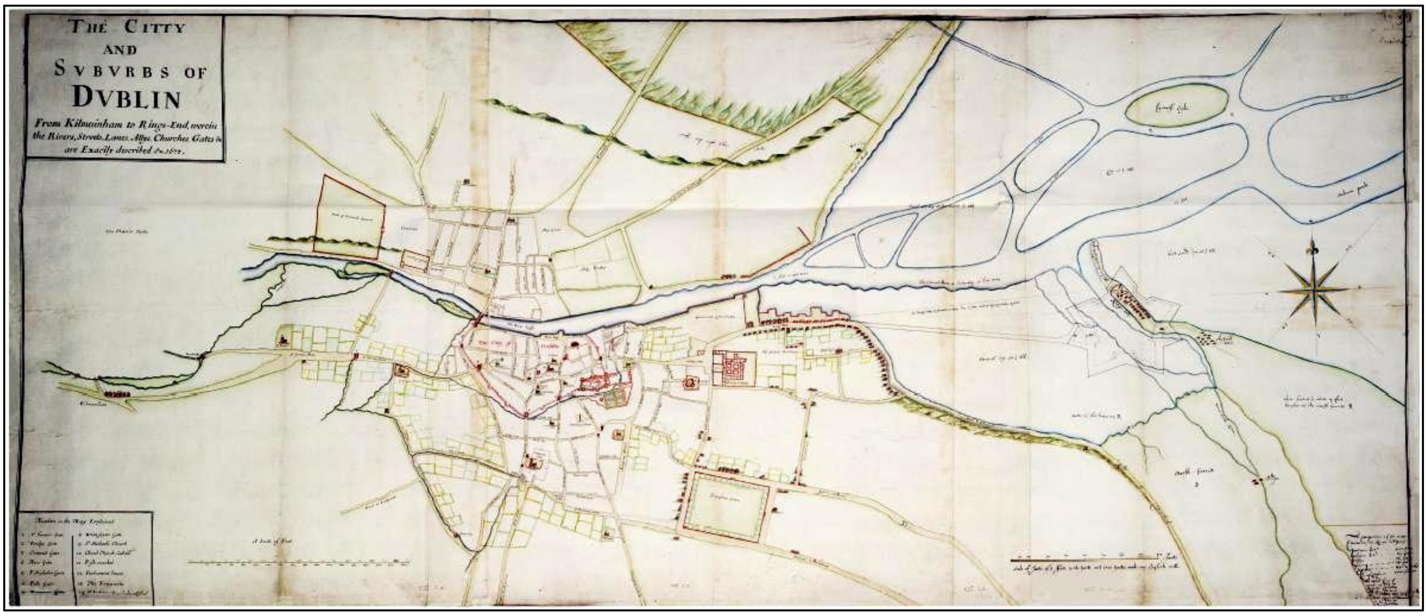


Figure 3.50 Bernard de Gomme, *The city and suburbs of Dublin* (London, 1673), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

Dublin is shown in a much wider view than Speed's 1610 representation as de Gomme's version stretched from Kilmainham in the west to Ringsend and Clontarf in the east. This allowed for the inclusion of Dublin's burgeoning suburbs and demonstrates the increasing urban development in what had previously been a rural environment.[209] Houses outside of the area shown in Speed's map were drawn in profile with large concentrations being found around Saint Stephen's Green and what was know as Lazy Hill in de Gomme's map in the modern Pearse Street area. De Gomme's work outside of the city includes insightful descriptions of developments and historic sites. Grafton Street is listed as 'highway to St. Stephens Green', the layout of modern Merrion Street is given with 'new buildings' being listed, Saint Patrick's well is highlighted as is a gallows on the highway to Merrion, modern Baggot Street. Within the city, the massively increased development along the quays is evident. The city wall along the river had been removed by de Gomme's time and whilst Usher's Island remains between Dublin's two bridges, the work of landlords Jacob Newman along Merchant and Wood Quay's,[210] and Humphrey Jervis on the north side of the river[211] is apparent. Ongoing work along modern Aston Quay is noted by de Gomme in his reference to 'ground taken in from the sea.'

[209] Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19), p. 3.
[210] John W. de Courcy, 'The Liffey banks in Dublin: the early works of the private developers' in *DHR,* lvii (2004), pp 146-51.
[211] Ibid.

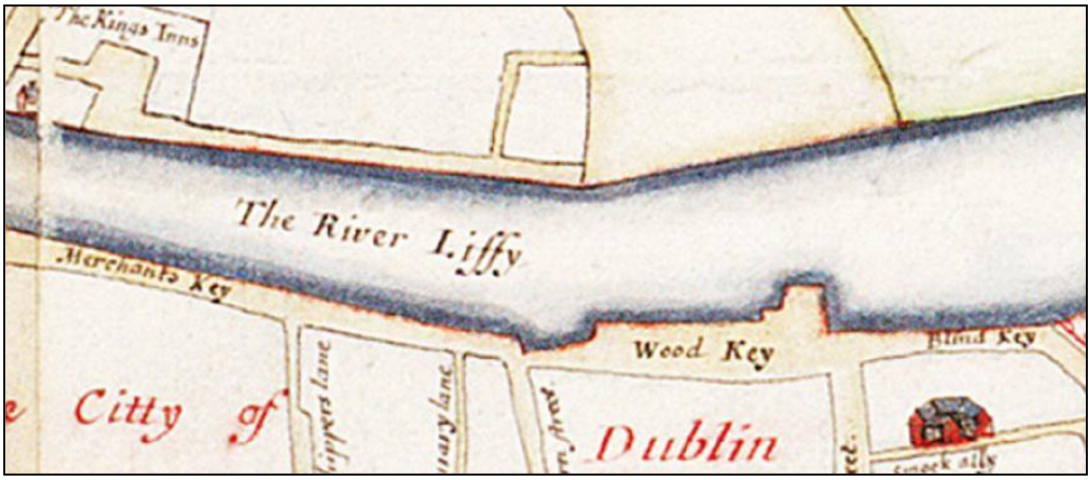


Figure 3.51 Improvements along the city's quays, Bernard de Gomme, *The city and suburbs of Dublin* (London, 1673), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

Dublin's fortifications are still visible in de Gomme's map and the city gates are named in a separate reference table. However features such as a decorative garden behind Dublin Castle and the presence of the Parliament House well outside the city walls give the impression of a city far less constricted by its medieval defences. De Gomme's expertise in military engineering is obvious with his inclusion of a proposed large star-shaped fort at Ringsend to defend the city and port. A smaller existing fortification is shown at Ringsend. De Gomme gives details of the surrounding tidal depths of the river and marshes in addition to the dimensions of his 'new cittadille at Ringsend' indicating that the existing one was to be replaced entirely. Unlike Speed, Brooking, Philips or Rocque, de Gomme's work did not include any ships or evidence of trade, other than marking out the course of the channel in Dublin Bay. This emphasises the militaristic purpose of his work.

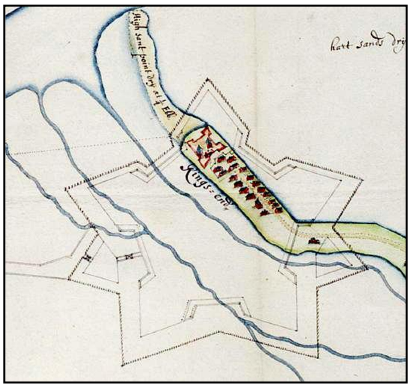


Figure 3.52 Proposed fortification at Ringsend, Bernard de Gomme, *The city and suburbs of Dublin* (London, 1673), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

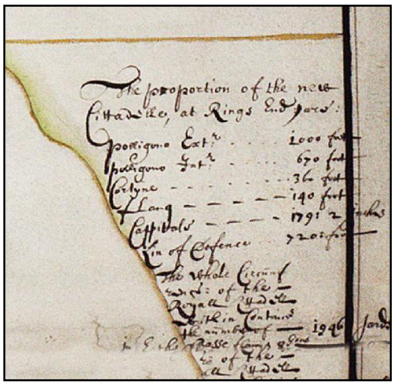


Figure 3.53 Dimensions written in the map's border for fortifications, Bernard de Gomme, *The city and suburbs of Dublin* (London, 1673), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

Thomas Philips 1685, *An exact survey of the city of Dublin and part of the harbour*, is a strong cartographical crossover between the works of de Gomme and Brooking. Philips' map is presented in an unusual east-west orientation designed to focus on the shipping approaches to the city. The continued urbanisation of the area surrounding the medieval core is clear with the city resembling Brooking's 1728 map rather than Speed's 1610. The city walls and gates (see figure 3.54) are still included and another proposed fortification, very similar in design to that of de Gomme, is shown however its position was moved from the marshy ground of Ringsend to the area currently occupied by Merrion Square. The representation of city blocks is strong and resembles Brooking's work published just over four decades later, yet the design of fields in the suburbs and the inclusion of a citadel bears a stronger similarity to de Gomme's work. Ships of various sizes and types are shown entering Dublin harbour yet none appear to reach the city, with four docked at Ringsend instead. The inclusion of the Kilmainham Hospital and the continual advancement of the city's quays and suburbs present an image of a city in a state of continual development and of urban improvement and expansion. There is no evidence of the techniques Philips used to survey his map of the city and harbour. However, considering the maritime focus of this map, it would be reasonable to assume that he employed a method of resection by using either a theodolite or circumferentor to obtain the shape of the coast in conjunction with lead and chain soundings to record the position of the river's channel into the harbour.

Figure 3.54 Thomas Philips, *An exact survey of the city of Dublin and part of the harbour* (1685), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

A far less grand map in terms of both size and cartographic detail is Herman Moll's map of Dublin in his 1714 maps of the principal ports of Britain and Ireland.[212] The majority of Moll's port maps, condensed into a small pocketsize book have only a single word title. Occasionally the ports were described, in French, regarding their geographic position to a large town or city:

> Douvres à 69 milles de Londres, Côte Méridionalle d'Angleterre….
> Carnarvan à 254 milles Nord-Ouest de Londres près l'isle d'Anglesy…..
> Limerick à 32 lieus Sud-Ouest de Dublin, essuya deux sieges fort rudes en 1690 et en 1691.

[212] Herman Moll, untitled (London, 1714), Marsh's Library, Y.6.20.

Occasionally Moll included a perspective view of the town, such as Harwich and Carrickfergus, however most of Moll's maps are entirely planimetric. Galway, Kinsale, Limerick, Dublin and Waterford were represented as Ireland's major port towns with Moll's representation of Dublin providing a limited, if useful image of the city in the decade prior to the work of Charles Brooking in 1728.

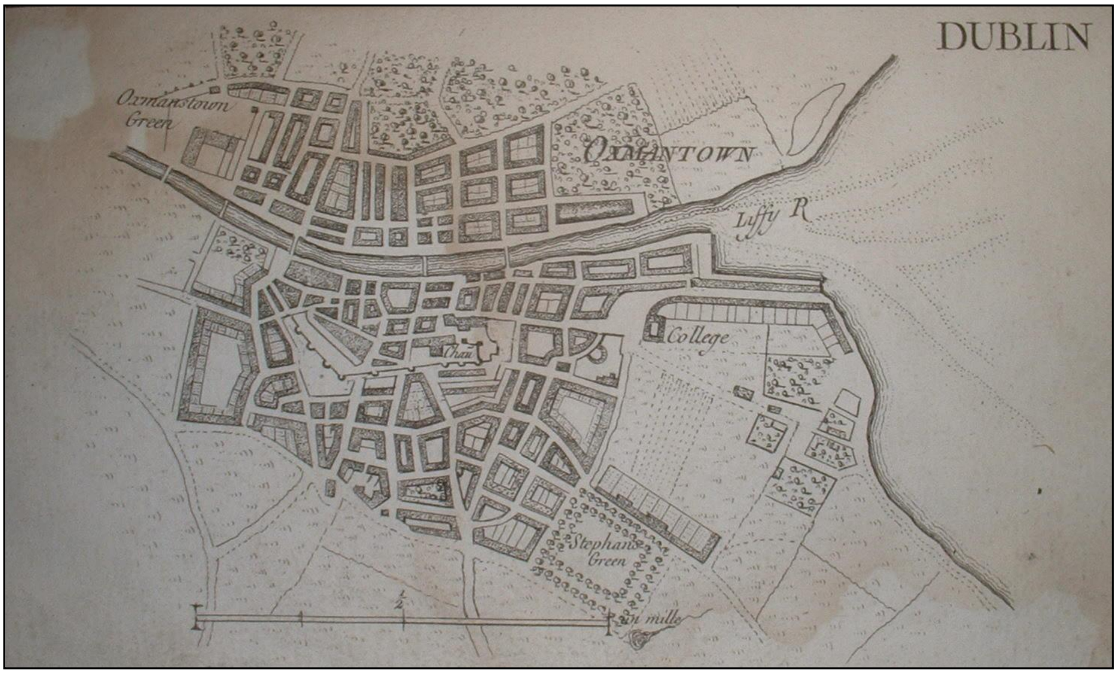


Figure 3.55 Herman Moll, *Dublin* (London, 1714).

The city's wall was recorded as having been demolished in the areas around the quays and the suburbs appear to have expanded, in particular on the north side of the city. Moll's map lacks any detailed view of the city's infrastructure or important buildings with only Dublin Castle, Trinity College, Oxmantown Green and Saint Stephen's Green being highlighted by text. It is doubtful that Moll surveyed the city himself as the map appears to have been compiled from other sources, with Philip's 1685 map of the city as strong contender for original data.

3.7 Charles Brooking: Dublin in 1728

Original city-wide maps of Dublin in the eighteenth century were relatively few and far between. Two stand out not only for their cartographic detail and standard of production but also because they are known to have been surveyed rather than simply compiled or copied – Charles Brooking's *A map of the city and suburbs of Dublin* (London, 1728) and John Rocque's *Exact survey of the city and suburbs of Dublin* (Dublin, 1756). Each came at an important time in the city's urban development. Brooking's shows in detail the advancements of the northern suburbs and the first signs of development around the southern parts of the city, while Rocque's displays Dublin as it was at the dawn of the work of the Wide Streets Commissioners and before their radical redevelopment of Dublin's thoroughfares. It is precisely because these maps were surveyed, rather than compiled, that singles them out for specific focus as part of any analysis of the cartographic history of eighteenth-century Dublin. Both Brooking's and Rocque's maps of Dublin were produced in radically different styles yet each to the highest standards available to them and far beyond the realms that existed for everyday map production in Ireland during the 1720s to 1750s.

Charles Brooking's *A map of the city and suburbs of Dublin and also the Arch Bishop and Earl of Meath's liberties with the bounds of each parish* (London, 1728) was the first major map of Dublin city since Speed in 1610. Whilst De Gomme and Philips had also produced maps of the city in the meantime (as noted already) neither was as detailed or contained direct evidence that they had been actually surveyed. Brooking presented evidence of his authority in the state of Dublin in 1728 by stating in the title:

Drawn from an Actual SURVEY[213]

[213] Charles Brooking, *A map of the city and suburbs of Dublin* (London, 1728).

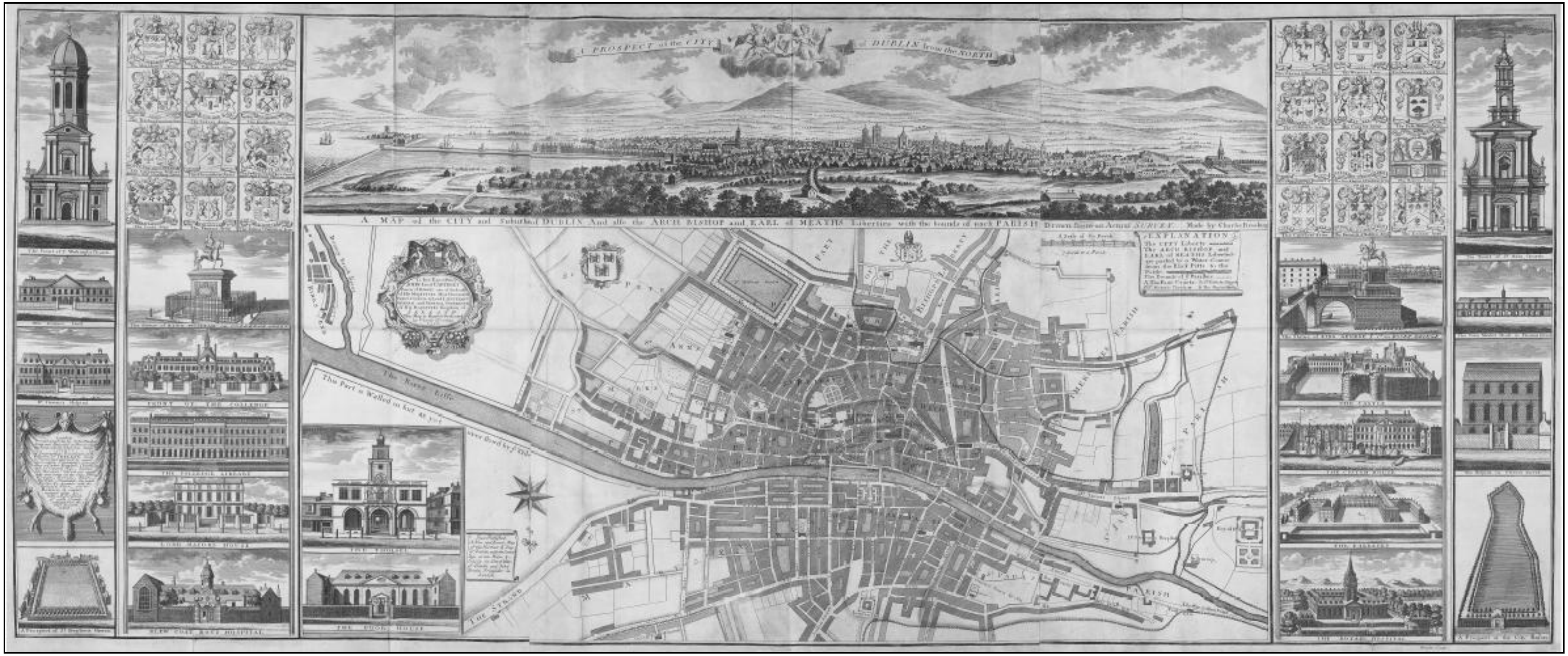


Figure 3.56 Charles Brooking, *A map of the city and suburbs of Dublin* (London, 1728), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

Brooking's work was an all-encompassing map of Dublin's civic, architectural, parochial and business worlds giving his map of the city a far greater cultural depth than the work of those who had preceded him or of many, including Rocque, who followed. Brooking's map contained two separate forms of boundaries, the city liberties and parishes, all of which were named. Along the edges of the map were profile views of Dublin's principal buildings, each referred to in the actual body of the map itself. Dublin's rich business world was represented by coats of arms of twenty-four separate guilds. The striking prospect of the city across the top served to complement the basic, but thorough, cartographic representation of the city within the main portion of the map.

The map's cartouche is a simple baroque design with a coat of arms supported by two winged deer at the top and two putti along either side. It lacks the creative detail that followed later but in comparison with contemporary cartouches produced in Ireland[215] it is at the higher end of the artistic spectrum. The dedication was as ambitious as the map's content:

> To his Excellency John Lord Carteret, Baron of Hawnes, one of the Lords of His Majesties most Honourable Privy Council & Lord Lieutenant General and General Governor of his Majesties Kingdom of Ireland. This map is humbly dedicated by Charles Brooking, 1728.

Additional coats of arms belonging to the archbishop of Dublin and the city's crest can be found within the body of the map.

The most unusual feature of Brooking's map is its orientation south/north rather than north/south. There is no rule of cartography stating that a map must be orientated with north at the top of the page considering that once a directional north arrow is included, the physical orientation of the map is arbitrary. One possible reason for this break from tradition may be that the prospect of the city that covers the top portion of the map is directed towards the Wicklow mountains, giving a good view of the improvements being made at the time to Dublin's quay and harbour as well as the progression of the northern suburbs and providing a vista of the city's taller buildings.

[215] Gabriel Stokes, Map of Shankill, 1722, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 65, map 13.

Presumably Brooking chose to orientate both his map and prospect to face in the same direction, thus reducing confusion for his readers.

Surveying Method, 1728

As Brooking stated that he actually surveyed Dublin, it is necessary to examine what techniques he may have used. There is no evidence in his 1728 map of the instrumentation or methods he used, however a contemporary author provides a detailed examination of urban surveying which may have been similar to the system used by Brooking. Samuel Wyld's *The practical surveyor* (London, 1725) gives a clear explanation of the preferred instruments and methods of urban surveying at this time. Urban surveying was considered to be a far more complex form of surveying than work in the countryside as:

> The performance of this work is very laborious, and you must be careful to keep the field-book in a plain and regular manner, otherwise the multitude of observations and offsets will be apt to breed confusion …[216]

The theodolite was the preferred instrument to record angular measurements, with the establishment of a station network using city streets and lanes as lines of sight. Due to the increased presence of metal in an urban environment, a circumferentor would have encountered significantly more interference from local magnetic sources than it would in a rural one.[217] To measure offsets from a line of sight between two stations, Wyld suggested the Gunter chain as:

> … the ground-plott of the houses, pavements, &c. are generally laid out by foot measure; therefore let every link thereof be a foot long, and fifty of these links will make the chain of a sufficient length.[218]

Offset staves and drawing equipment were also useful to have on site during the course of the survey.

Prior to a survey of the size and scale of Brooking's map of Dublin, a detailed reconnoitre of the main streets and lanes of the city would have been necessary. The establishment of a survey control grid of stations was vital to the success of a large urban survey and the creation of a loop of survey stations whose positions could be

[216] Wyld, *The practical surveyor*, p. 150.
[217] Ibid., p. 150.
[218] Ibid., p. 151.

checked by means of a traverse would also enhance the accuracy of the entire survey. Wyld strongly advised that:

> Before you being your work, it will be necessary to walk about the town, and choose 4 or 5 principal streets that lead out of one into another, enclosing between them several by-lanes, alleys, &c. And contrive your first station in such a manner, that when you come round these 4 or 5 streets, the last station-point; and observe, that the fewer angles you make in going round these streets before you close, the better.[219]

Once a network of survey stations had been set up, the next phase was to record the positions of street corners or 'remarkable houses, &c.'[220] that lay on these main streets. The number of observations that a surveyor recorded was entirely dependent on the detail of the final map. Rocque for example recorded the position of every individual building in Dublin during his 1756 survey of the city,[221] whereas Brooking seems to have followed Wyld's method of only measuring buildings of note and street corners resulting in the block layout of his map. The names of streets were recorded in the comments column of the surveyor's field book across from its observation figure. It was considered advisable to draw a rough draft of the survey in the field to prevent confusion when completing the map.[222]

Town and market squares required a different surveying methodology than street surveying. Wyld was aware of this issue and advised:

> When the station-line leads you into a square, you may plant the theodolite in the middle thereof, and from that one station direct the telescope to the corners, (very often there are but four, and the sides all strait) and measure the distance from the station to the corners … But if you would take notice of particular houses therein, or if the sides are very irregular, then go round it: but lanes and alleys are laid down by offsets only, from the station line through the middle.[223]

With the majority of problems encountered within an urban environment accounted for, the surveyor was advised to draw what had been measured at the end of each day's surveying, paying particular attention to the ground-plots of churches.[224]

Brooking completed his survey of Dublin in 1727 and, given the prestige of his work, sought funding from the city for its publication:

[219] Ibid., p. 153.
[220] Ibid., p. 152.
[221] Rocque, *Exact survey of the city & suburbs of Dublin*.
[222] Wyld, *The practical surveyor*, p. 152.
[223] Ibid., p. 153.
[224] Ibid., p. 154.

> Certain of the commons, setting forth that Thomas Brooking hath completely finished the map of the city and suburbs, and therefore prayed that some of the said maps be taken from said Brooking, or such that gratuity as should be thought proper: whereupon do pay to alderman Humphrey French, for the use of the within named Thomas Brooking, £10 Sterling, towards defraying the expense he was at making a map of this city, the same to be allowed the treasurer on his accounts.[225]

It seems almost insulting that Brooking was referred to as Thomas rather than Charles in reference to his cartographic masterpiece. However, given the minimal level of biographical detail known about Brooking, it cannot be stated with certainty that his first or middle names were not Charles Thomas or Thomas Charles or that the city officials did indeed make a complete mistake. For example, Scalé is regularly referred to as Bernard where in fact his first names were Peter Bernard[226] and thus the same may be the case for Brooking.

Cartographic Style

Of the main seventeenth and eighteenth-century maps of Dublin, Brooking's is the only one to show administrative boundaries and to list them in his legend, or 'explanation' as Brooking preferred. A total of eleven separately-named and distinct parishes are presented in Brooking's map. The 'bounds of ye parishes' are represented by a narrow dotted line and are at first glance difficult to view but do not interfere with or distract from the geographic data through which they run. Each parish name is orientated with respect to the parish's shape thus resulting in a series of randomly aligned texts throughout the map. The Dublin City liberty, for which the municipal council of the city was responsible, is more clearly marked with a heavy chain running primarily around the perimeter or outer suburbs of the city. A section of the archbishop of Dublin's liberty was also highlighted by Brooking. He included the archbishop's coat of arms inside this boundary and the crest of Dublin city within the city liberty border. Whilst Brooking refrained from any form of detailed explanation of the city's civic workings, his basic division of the city into its various parishes and forms of local government provides a greater indication of the city's internal workings than was supplied by Speed, de Gomme and even Rocque in their maps of Dublin.

[225] J. T. Gilbert (ed.), *Ancient records* vii, 443 (1727).
[226] Steer, *Dictionary of land surveyors and local map makers of Great Britain and Ireland, 1530-1850*, ii.

As mentioned, Brooking's version of the city's physical urban landscape was carried out per block rather than by individual building. This creates an interesting visual effect where emphasis is placed on street layouts rather than the city's buildings. Several buildings did however merit particular attention and are shown in profile along the map's edges. Churches were awarded special attention by Brooking but the Four Courts and the Playhouse in Smock Alley, neither of which appear in Brooking's detailed building profile drawings, are identifiable by being assigned letters which are referred to in the map's legend.

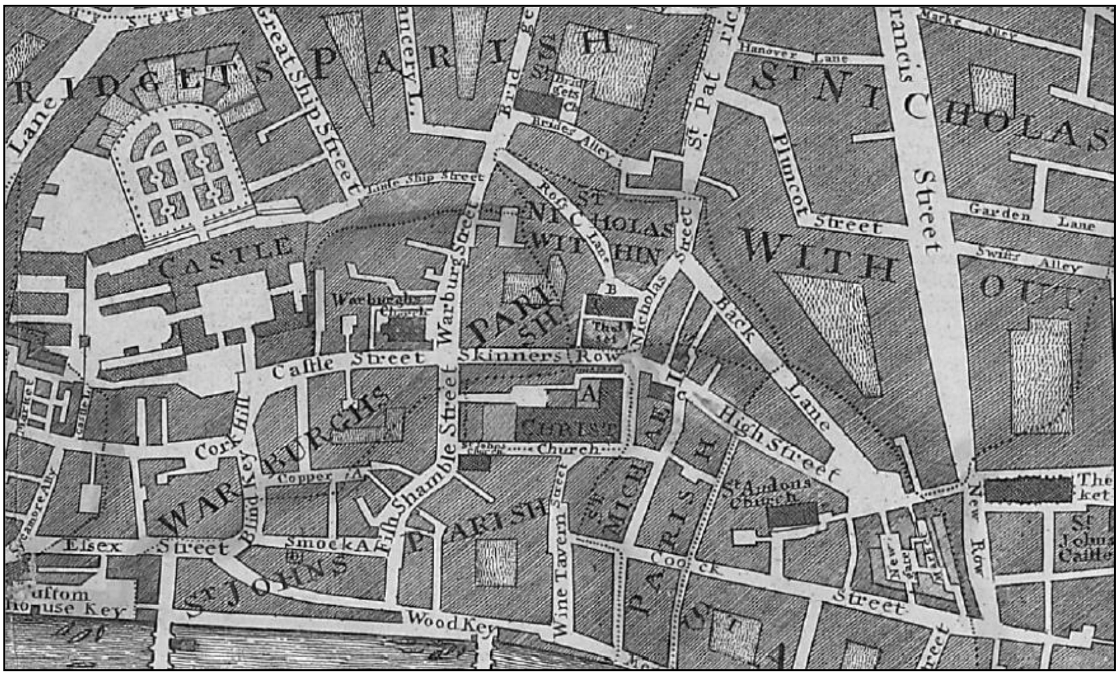


Figure 3.57 Brooking's representation of the buildings around Christchurch Cathedral, Charles Brooking's *A map of the city and suburbs of Dublin* (London, 1728), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

Infrastructural developments were clearly highlighted by Brooking with his inclusion of the section of the north bank of the Liffey running along what is known today as the North Wall and Dublin Port. Brooking's insertion of the phrase 'This part is walled in but as yet overflowed by ye tide' indicates that land reclamation was in process but as of 1728 had not been completed. Brooking's map was also the first major Dublin cartographic project not to include any portion or mention of the city's medieval wall or any form of proposed fortification. This is a radical step away from the earlier militaristic maps of de Gomme and Philips, coupled with the expansion of the city's suburbs and the highlighting of Dublin's premier citizen's home, the lord mayor's residence, within these suburbs, presents Dublin in a far more civil and residential/mercantile light. Brooking's only mention of any military presence in the city is his inclusion of the Royal Barracks in Oxmantown.

Profiled buildings

As mentioned, Brooking's map of the city included profiles of some of the most important buildings in addition to a prospect of Dublin. There appears to be no hierarchy or special focus to any of the twenty building profiles included by Brooking. However their inclusion gives a better understanding of the city's social structure than would have been available from Brooking's survey detail alone. Brooking included two churches, Saint Ann's on Dawson Street and Saint Werburgh's on Werburgh Street. Unusually neither of Dublin's two cathedrals was included. One possible explanation of the selection of these two churches out of the many that populated Dublin at the time was their modernity - Saint Ann's having been constructed in 1719 by Isaac Wills and Saint Werburgh's also in 1719 by survey general Thomas Burgh.[227] Saint Werburgh's was still unfinished when Brooking was conducting his survey, most likely in 1727, so his view of the church does not match that of the finished building. Figure 3.58 displays Brooking's version of Saint Werburgh's with a cupola, perhaps due to the assistance of Alessandro Galilei, a Florentine architect[228] who was connected to the project. In 1729 the year after Brooking's map appeared on the market, it was decided to erect a stone tower instead of the planned steeple.[229] Joseph Tudor's view of Dublin Castle (figure 3.59) produced in 1750 presents this alternative design of Saint Werburgh's tower indicating that the original design copied by Brooking was not followed.

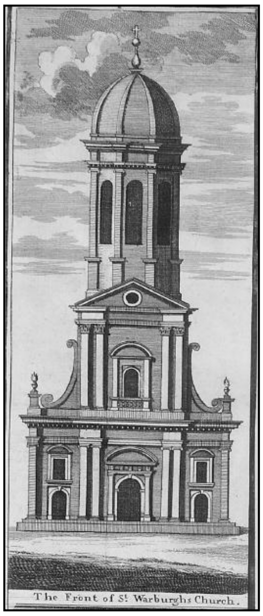


Figure 3.58: Saint Werburgh's, Charles Brooking's *A map of the city and suburbs of Dublin* (London, 1728).

[227] Christine Casey, *The buildings of Ireland: Dublin* (London, 2005), pp 342, 469.
[228] Letters of Robert Molesworth to his wife, 16 Oct. 1716 (NLI. P. 3752).
[229] Kenneth Severns, 'A new perspective on Georgian building practice: the rebuilding of St. Werburgh's church, Dublin (1754-1759)' in *Ir. Georgian Soc. Bull*, xxxv (Dublin, 1992), p. 4.

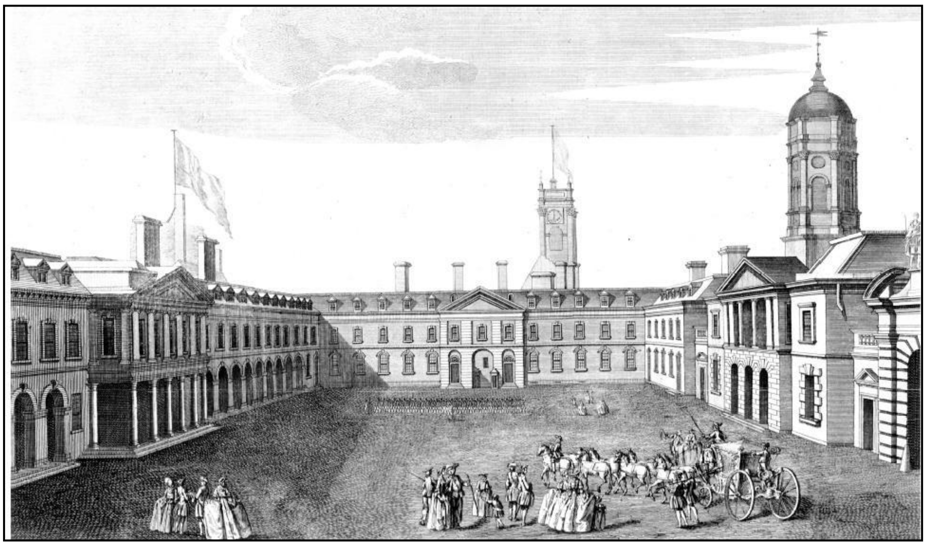


Figure 3.59 Saint Werburgh's stone tower in the central background. Joseph Tudor, *A prospect of the upper castle court from the council chamber, Dublin* (London, *c*.1750).

Aside from Brooking's Werburgh mistake, his series of profiles gives an insight into buildings and structures that have either been radically changed in appearance by the twenty-first century or no longer exist. Brooking's representation of Trinity College is a unique view of the college's western façade constructed in stages between 1670 and 1699 by Thomas Lucas and Sir William Robinson, before its remodelling in the late 1750s.[230] The 1728 version of the Tholsel gives a realistic image to a building that is currently[231] ruinous and consists only of the walls and façade of the ground floor. Dublin Castle is also shown as a dilapidated building with a large section of its exterior wall missing and with a medieval gate still present. The statute of King George I on its own pedestal off Essex Bridge no longer exists and despite the bridge being the subject of a large treatise by George Semple in 1780,[232] Brooking's image of this statue gives one of the most detailed profile views of the structure.

[230] O'Dwyer, 'Building empires: architecture, politics and the Board of Works (1760-1860)', p. 108.
[231] 2010.
[232] Semple, *Treatise of building in water*.

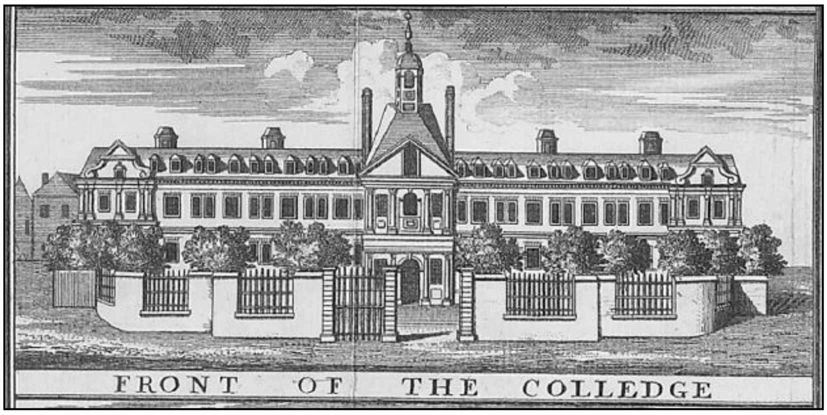


Figure 3.60 Western façade of Trinity College, Charles Brooking's *A map of the city and suburbs of Dublin* (London, 1728).

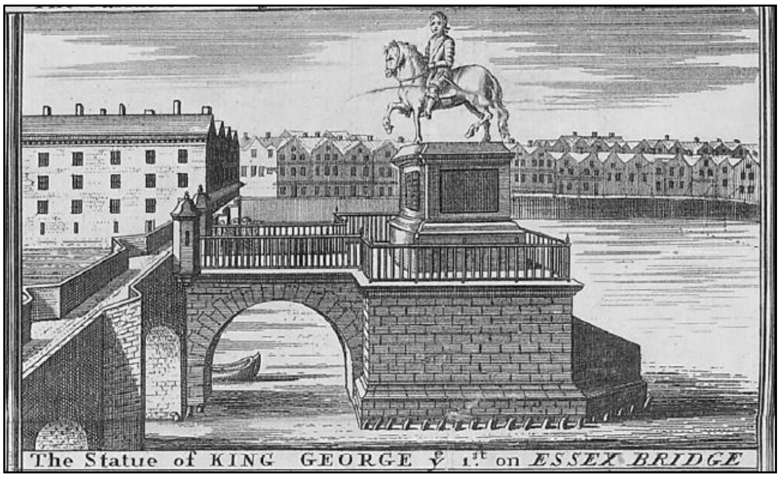


Figure 3.61 Statue of King George I Charles Brooking's *A map of the city and suburbs of Dublin* (London, 1728).

Figure 3.62 The Tholsel, Charles Brooking's *A map of the city and suburbs of Dublin* (London, 1728).

Brooking's profile view of St. Stephen's Green is highly reflective of the green's appearance in his maps, showing several plots that had yet to be constructed and as such add weight to the argument that Brooking's map was surveyed by himself. Other buildings included by Brooking comprise of the Blue Coat Hospital, Dr. Steeven's

Hospital, the Mansion House, the Corn Market, the Customs House and the Royal Hospital in Kilmainham whose profile is an exact duplicate of the same building's appearance in Brooking's prospect of the city.

Building profiles were not the only ancillary items to be included by Brooking along the edges of his Dublin map. Two adverts for maps of Dublin and Ireland were included – the map of Ireland being produced by Brooking's own publisher Bowles which consisted of:

> A geographical description of the Kingdom of Ireland newly corrected and improved by actual observation. Containing 1 general map of ye whole kingdom, 4 provincial and 32 county maps, divided into baronies, wherein are carefully laid down all the cities, towns, boroughs, barracks, rivers, harbours, headlands, the noted ferries &c.: together with the principle roads and the distances in common reputed miles &c. with a description of each county collected from the best accounts extant.

While lacking any claim of whom the author was or who had conducted such 'actual observations', these series of maps sound remarkably similar to the output of the Down Survey in the 1650s combined with descriptive guides to each county. The second map mentioned by Brooking is 'a new and exact map of the harbour & bay of Dublin' which included depth soundings and was again sold by John Bowles.

An added element to Dublin's social framework included by Brooking is his addition of the crests of Dublin's guilds either side of the Dublin map. Twenty-four were included in total and as with Brooking's profile views, there appears to be no obvious hierarchy or grouping. The insertion of these coats of arms adds greatly to the strength and presences of Dublin's manufacturing and service industries within Brooking's Dublin and deepens the available knowledge of the city and its structure for a reader.

Prospect of Dublin, 1728

Another unique feature of Brooking's Dublin is his inclusion of 'a prospect of the city of Dublin from the north' across the top of his map. Prospects of cities were not unique, but his is the only major map from either the seventeenth or eighteenth centuries to show one for Dublin. London cartographer John Green, writing in 1717, highlighted the advantages of including such prospects in cartographic works:

> The plan and prospects of cities which are sometimes set about maps are very useful, as well as ornamental. A certain another (Fuller's Pisagh Sightm p.3) speaking of the usefulness of maps, very well observes, that the eye will learn more in one hour by

observation, than the ear will benefit in a day by discourse. Is it possible for all the words in the world to give such an idea of St. Pauls as the draught of it?

Green continued, rather profoundly:

One may describe a place from a prospect, but it is impossible to draw a prospect from the description. In short, a draught shows at once what many words can't express, and the best one can have is but a confus'd idea without it.[233]

Figure 3.63 A section of Brooking's prospect of Dublin looking south, Charles Brooking, *A map of the city and suburbs of Dublin* (London, 1728), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

Brooking capitalised on this theory with the prospect of Dublin placing the city within the geographical reference of both the Dublin/Wicklow Mountains and the Irish Sea without the need to create a large-scale map of the entire Dublin region. The prospect was either created from more than one location or alternatively created away from the field as it is not possible to view the city from Ringsend to Kilmainham from the relatively flat north side of the Liffey. The road running through the centre of the prospect towards the viewer is most likely the Drumcondra Road given its relative position in relation to the coast and the city. The physical structure of Dublin's buildings is highly visible from Brooking's prospect. Several distinct types of houses, churches and centres of industry such as windmills are highly visible in the prospect. The original 1728 edition of the map lacks a reference table for the easy identification of prominent buildings such as Dublin Castle or the city's cathedrals. However, in the counterfeit version nineteen individual buildings are numbered and listed in a reference table crudely etched on top of the original engraving.

[233] Green, *The construction of maps and globes in two parts*, p. 154.

Brooking's 1728 map of Dublin perhaps lacks the cartographic and artistic sophistication of Rocque's maps of the city. However, the real value of Brooking's work was that he captured the city in detail before the rapid expansion of the northern suburbs in the first half of the eighteenth century in addition to representing the architectural and commercial make-up of Dublin on a far deeper social scale than Rocque was able to achieve.

3.8 John Rocque: Dublin in 1756

Rocque's *Exact survey of Dublin* (Dublin, 1756) can be considered the apex of the city's eighteenth-century cartography. Rocque's ability to organise and overcome logistical problems separates him from contemporary Irish surveyors and elevates him to the zenith of eighteenth-century surveying in Dublin He introduced a revolutionary change in cartographic style, method and relationship with geographic data into Irish mapping not seen since the arrival of William Petty almost a century before. Rocque, whilst being English of French descent or origin, had a long lasting effect on Irish surveying as he pioneered the development of a new cartographic style in this country with the growth of his independent French School[234] of surveying which carried on his unique surveying style.

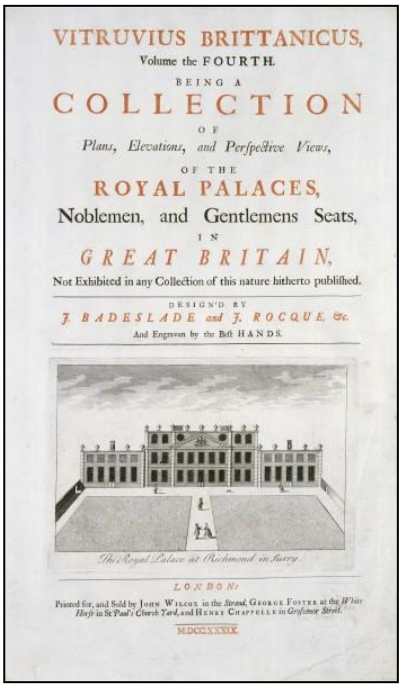


Figure 3.64 One of Rocque's earliest publications. T. Badeslade & J. Rocque, *The Royal Palace at Richmond in Surry Vitruvius Brittanicus, volume the fourth* (London, 1739), title-page

Background

Compared to other surveyors who operated in Ireland at the time, there is a ready source of information on Rocque's family and his origins. John Rocque was known to have had at least two siblings, brothers Bartholomew and Claude. Bartholomew Rocque (d. 1767) was the designer of decorative gardens[235] who published at least one book[236] whilst living at Walham Green in London. Bartholomew provided evidence of the French connection with Rocque family when he wrote:

> ...when I was at Monosque, a city in Provence, which was about twenty-seven years ago [approx. 1738][237]

Whether this connection was a direct family link or simply a place visited on business is unclear, however, it demonstrates that the Rocques had at least some dealings with France. John Rocque's personal connections with France remain equally unclear. He

[234] Andrews, 'The French school of Dublin land surveyors', pp 33-41.
[235] Mauro Ambrosoli, *The wild and the sown: botany and agriculture in western Europe, 1350-1850* (Cambridge, 1992), p. 358.
[236] Bartholomew Rocque, *A practical treatise of cultivating Lucer* (London, 1765).
[237] Ibid., quoted in Varley, 'John Rocque: engraver, surveyor, cartographer and map-seller', p. 83.

is known to have visited Paris,[238] was the god-father to the son of the French landscape engraver Francois Vivares,[239] he included the French measurement system of *Toise* on his map of Dublin, his first known professional description of himself was as a '*dessinateur de jardins*'[240] and his last will and testament was witnessed by three men, two of whom, Jas. Dorrett and Pierre Andre, were either French or of French descent. John Rocque was also known to have written in 1753 to his nephew Bartholomew, son of his brother Claude, in Switzerland using adequate written French which as Varley[241] points out may simply indicate that he had not written in French on a regular basis but may have had a better grasp of the language in its spoken form.

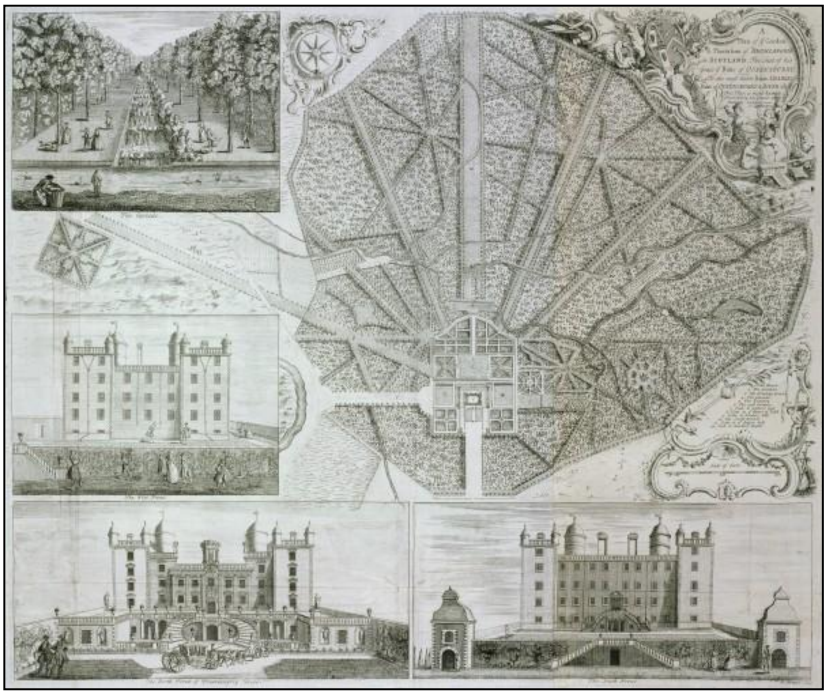


Figure 3.65 Early example of Rocque's work. T. Badeslade & J. Rocque, *A plan of the garden and plantation of Drumlangrig, Vitruvius Brittanicus, volume the fourth* (London, 1739), pl.45 <http://www.racollection.org.uk/ixbin/indexplus> John Rocque, Royal Academy of Art

[238] John Rocque, *Paris: plan of city and adjoining country reduced to same scale as that of London* (London, 1748).
[239] Michael Bryan, *Dictionary of painters and engravers* (London, 1904).
[240] John Rocque, Plan of the house, gardens, and hermitage of their Majesties at Richmond (London, 1734). Colm Lennon and John Montague, *John Rocque's Dublin: a guide to the Georgian city* (Dublin, 2010).
[241] Varley, 'John Rocque; engraver, surveyor, cartographer and map-seller', pp 83-91.

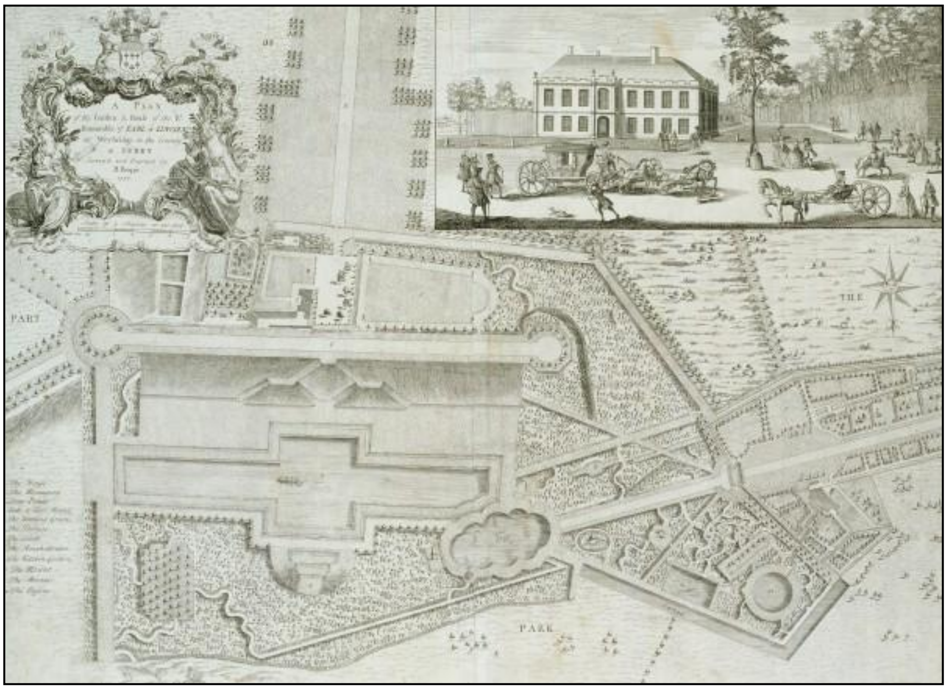


Figure 3.66 Early example of Rocque's work, T. Badeslade & J. Rocque, *A plan of the garden and house of ... the Earl of Lincoln at Weybridge, 1737 Vitruvius Brittanicus, volume the fourth* (London 1739) pl.67; engraved by Bartholomew Rocque, <http://www.racollection.org.uk/ixbin/indexplus> John Rocque, Royal Academy of Art

John Rocque was known to have been married at least twice. His first marrage to Ann Bew in 1751[242] was childless[243] and it is unknown if the second marrage to Mary Ann Scalé was also childless. Mary Ann carried on Rocque's business in London after his death, publishing reproductions of many of his maps[244] whilst also adding to Rocque's engraving business. John Montresor had many of his maps engraved by Mary Ann in 1766 and was more than happy in:

> … assisting them in the execution of several draughts I have given them to engrave for me viz. one of Nova Scotia, one of the province of New York, one of Canada from the first island to Montreal and on the city of New York and environs with the Boston harbour and channel from the Hook. [245]

Rocque began his career as a surveyor, engraver, and seller of maps and prints in London during the first half of the 1730s. The majority of his work at that time being co-produced with Thomas Badeslade and focused on country homes and decorative gardens. Badeslade was known to have produced work for George I,[246] and may have

[242] *Publications of the Harleian Society*, 20 (1911). Register of St Benedicts Paul's Wharf.
[243] Letter from John Rocque to Bartholomew Rocque dated 11th May 1753, quoted in Varley, 'John Rocque: engraver, surveyor, cartographer and map-seller', p. 85.
[244] M.A. Rocque, *Berkshire: Reduction of actual survey published* (London, 1762); M. A. Rocque , *The small British atlas, a set of maps of the counties of England and Wales* (London, 1764); M. A. Rocque , *Cadiz: Plan of the city and environs with harbor, bay, etc*. (London, 1762); M. A. Rocque, *Post-roads of Great Britain and Ireland* (London, 1763).
[245] Quoted in Lawrence Towner, *Mapping the American revolutionary war* (Chicago, 1978), p. 85.
[246] Thomas Badeslade, *Chorographia Britanni* (London, 1742), title page.

been Rocque's gateway to Hanoverian patronage. Rocque and Badeslade's maps produced during this period were compiled and published in *Vitruvius Brittanicus* (London, 1739*)*, 'a collection of plans, elevations and perspective view of the Royal palaces of Great Britain.' It is unclear if Rocque and Badeslade surveyed every map contained within this collection however several of the maps[247] do contain strong Rocque-like traits such as detailed terrain shading, uniformly planimetric buildings and ornate and highly decorative baroque cartouches. During this period Rocque's employees were know to have numbered at least ten, all foreign, 'as many draughts men as engravers',[248] many probably of the same French Huguenot origin as Rocque himself.

Possibly Rocque's greatest cartographic achievement was his *New and accurate map of London* (1746) produced in both 16 and 24 sheet formats. This map was engraved on a massive scale, with every city block in London surveyed and streets, laneways, alleys and docks individually named. His London map may have caught the attention of Robert Viscount Jocelyn and the Earl of Kildare as they were most likely involved behind the scenes in inviting Rocque to Dublin, hence explaining his dedication to them in the Dublin cartouche.

Rocque's *Exact survey of the city and suburbs of Dublin* (Dublin, 1756), displayed on the following page, represents the peak of eighteenth-century urban surveying in Ireland.

[247] T. Badeslade and J. Rocque, *A plan of the gardens & view of the buildings ... at Echa, Surrey* (London, 1737); T. Badeslade and J. Rocque, *Plan of the palace and gardens of Hampton Court* (London, 1736); T. Badeslade and J. Rocque, *Plan du jardin et vuë des maisons de Chiswick* (London, 1736).
[248] John Rocque to Bartholomew Rocque dated, 11 May 1753, quoted in Varley, 'John Rocque: engraver, surveyor, cartographer and map-seller', p. 85.

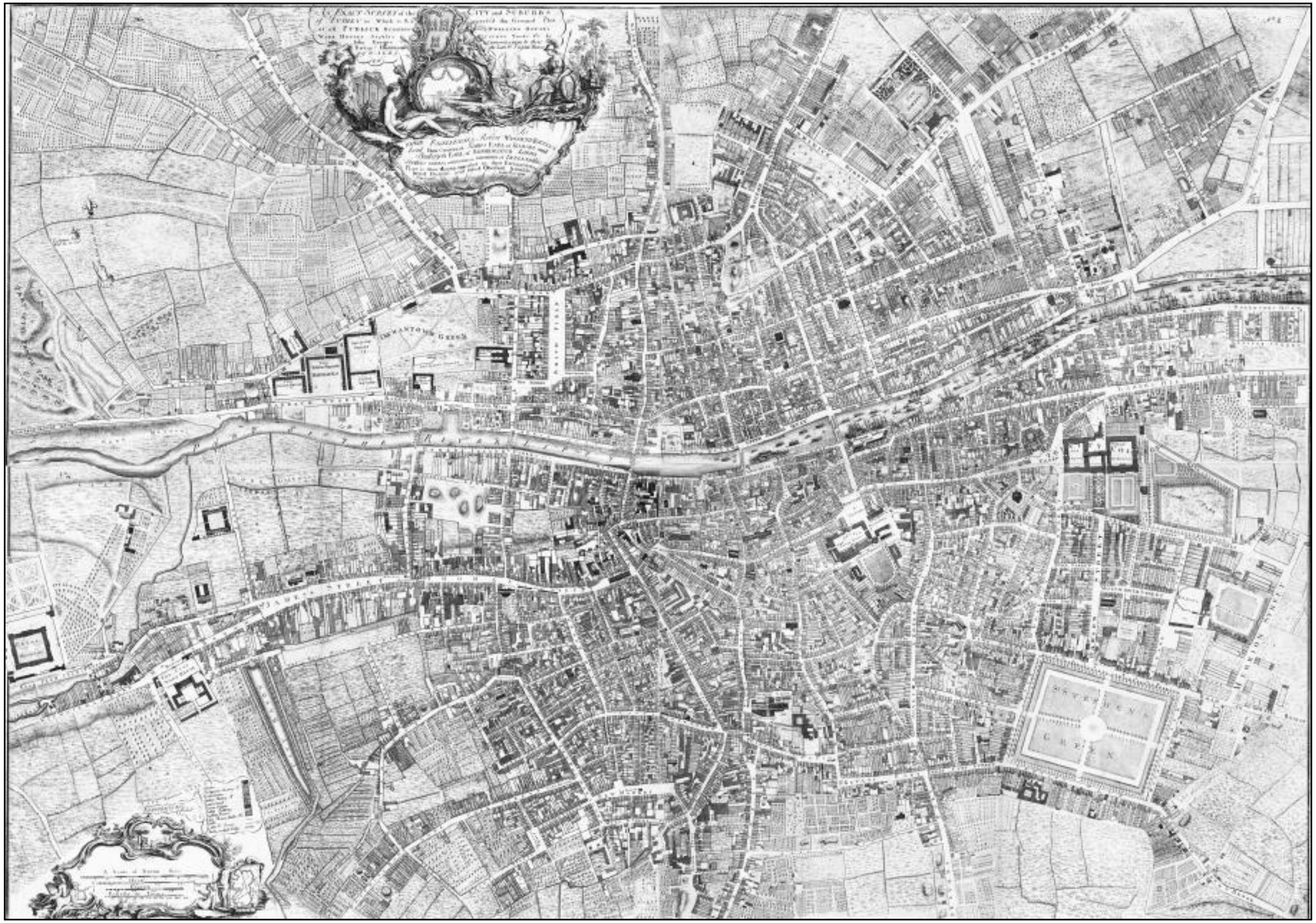


Figure 3.67 John Rocque, *An exact survey of the city and suburbs of Dublin* (Dublin, post 1756). Reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008), map 16. This map is a near exact duplicate of the original produced a few years after the 1756. The main differences are the inclusion of Parliament Street in the city centre and the reposition of the cartouche from the top left corner to the near centre, reducing its size slightly.

Surveying Dublin, 1756

The *Exact survey* was published on four separate sheets, each representing a quarter of the city and suburbs and was laid out at a scale of one inch to 10 Irish perches. The artistic detail and subtle suggestions of the cartouche in Rocque's *Exact survey* are discussed in section 3.2. However, the cartouche presents far less restrained information about the surveyor, his employers and his map. Rocque describes himself as 'Chorographer to their Royal Highnesses the late & present Prince of Wales' referring to the late Prince of Wales, Frederick (1707-51),[248] eldest son of George II and the future George III (1738-1820)[249] who occupied the position of Prince of Wales upon his uncle's early death. Rocque first used this official title in 1751[250] and he is listed as being a member of the household of George III when he was Prince of Wales.[251] Despite such high official references, there is little evidence that Rocque received official support or funding during the early stages of his mapping of Dublin.

The *Exact survey* is dedicated:

> To their Excellencies Robert Viscount Jocelyn, Lord High Chancellor James Earl of Kildare and Brabazon Earl of Bessborough, Lords Justices General and General Governors of Ireland. This plan is most humbly inscribed by their Excellencies most dutiful and most obedient humble, John Rocque.

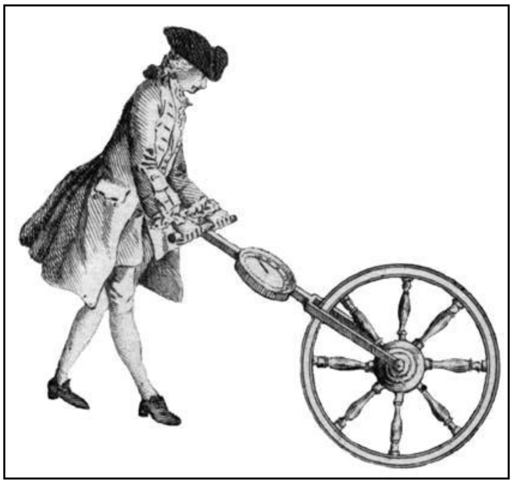


Figure 3.68 A surveyor, possibly Rocque himself, John Rocque, *A map of the county of Middlesex* (London, 1757).

The reasons behind the creation of this map can be found throughout the physical detail contained within its borders. The word *border* is highly relevant to the nature of the *Exact survey* as Rocque did not include any civic or ecclesiastical boundaries anywhere within his map. This stands in stark contrast to Brooking's 1728 map of Dublin in which administrative

248 Jeremy Black, *The Hanoverians* (London, 2004), p. 83.
249 Ibid., p. 115.
250 Varley, 'John Rocque: engraver, surveyor, cartographer and map-seller', p. 87.
251 Chamberlyne, *Magnae Brittanniae nottia or the present state of Great Britain* (London, 1755), p. 116.

boundaries are dominant indicating a more practical administrative usefulness to Brooking's map. Rocque's map appears to lean towards being a commercial product rather than one commissioned by the city or government. The inclusion of four sets of units of measurement, British feet, Irish and English perches, which were common eighteenth-century Irish mapping, and the more unusual French *echelle de toise* indicates that Rocque intended this map to be circulated not only in Ireland and Britain, but also in continental Europe. The lack of hydrographical data in Rocque's version of the river Liffey only adds weight to the argument that the *Exact survey* was a commercial product designed to appeal to as wide an audience as possible rather than to be reserved for mariners, engineers or civic authorities. Rocque funded the map through subscription[252] which was raised to 25 shillings in January 1755[253] owing to a mistake in Rocque's determination of the number of pages required for the map.[254] Over three hundred and fifty people subscribed to Rocque's work, including surveyors such as Jonathan Baker, George Semple and Bernard Scalé who was Rocque's brother-in-law and apprentice.[255] When Rocque reduced the *Exact survey* onto one sheet for publication in 1757 he approached Dublin city council to assist him financially with his endeavour:

> John Rocque, topographer to his Royal Highness the Prince of Wales, praying to be considered for taking and publishing an exact survey of this city and its environs (agreeable to his great plan of the city of London) in four sheets, which with great pains, labour and expense, he reduced into one sheet, and that the subscriptions for this work have not in any sort answered his expectation.
> Ordered, that the city treasurer do, on the Lord Mayor's warrant, pay the petitioner twenty guineas, the same to be allowed on his accounts.[256]

There is no direct evidence suggesting that Rocque used existing estate maps of various sections of the city to compile his *Exact survey*. These maps may have been more of a hindrance than an advantage to Rocque if he did have access to them as they were of widely dispersed sections of the city and usually without reference data to their surroundings i.e. individual plots or sets of plots.[257]

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252 *Dublin Journal*, 2 Nov. 1754; Colm Lennon & John Montague, *John Rocque and the exact survey of Dublin* (Dublin, 2010) p. x.
253 *Dublin Journal*, 2 Nov. 1754.
254 Discussed in section 1.6.
255 J. H. Andrews, *Two maps of eighteenth-century Dublin and its surroundings by John Rocque* (Dublin, 1977), p. 5.
256 *Ancient records*, x, 252 (11 Jan. 1757)
257 Manuscript maps of the Domville estate in Dublin City, Dublin county and Meath (1655-1816), (NLI, ms. 11,937); Manuscript maps of the Hatch estate (1727-1871), (NLI, ms. 21. F. 112); A book of

Evidence of Rocque's method of surveying the city is clearly visible on his map. Inside its scale bar there are small human figures, presumably Rocque with an assistant, operating what appears to be a theodolite. Rocque was known to have worked with theodolites in other surveys in Ireland,[258] and his history with the instrument dates back to his map of London in 1746 when he established a trigonometrical skeleton of the city to conduct his survey.[259] Rocque was known to have used chains in his survey of Dublin[260] and there is strong indication that a circumferentor may also have been amongst his equipment as the *Exact survey's* north arrow contains allowances for magnetic variation. The near drowning of Rocque's survey assistants during the measuring of a base line[261] is another indication that a trigonometrical method using theodolites was employed for his Dublin survey – a base line being a vital component in this process. It is possible that Rocque operated both theodolites and circumferentors during the course of his survey of Dublin however there is no evidence to indicate which was the preferred instrument was or if the theodolite was used in the city while circumferentors were used in the more open areas of the surrounding countryside.

Figure 3.69 A surveyor, possibly Rocque, found in the decorations of the Dublin scale bar, John Rocque, *Exact survey of the city and suburbs of Dublin* (Dublin, 1756).

maps of the several estates of the Rt. Hon. and Rt. Rev. Dean and Chapter of Christ Church, Dublin, 1800 (NLI Ms. 2789).

[258] John Rocque, A survey of Tullagorey (Kildare, 1756), a surveyor is included in the map's cartouche operating a theodolite.

[259] Andrews, *Two maps of eighteenth-century Dublin and its surroundings by John Rocque*, p. 2; John Rocque, *London and ten miles around* (London, 1746).

[260] *Dublin Journal*, 14 Sept. 1754.

[261] See section 1.6.

Cartographic Style

One of the most striking differences between Rocque's Dublin and his London surveys is the level of detail that Rocque included in his Dublin map. No effort was made in his London map to distinguish between different buildings except for stately homes or buildings of importance. Ordinary shops and houses were omitted and city blocks dominate the map's surface. Rocque's Dublin map however includes nearly every building within the city, 11,645 in total,[262] with separate hatching included to distinguish between residences and businesses. In Rocque's own words, the map was designed to show 'public buildings, dwelling houses, warehouses, stables, court yards …' which his *Exact survey* did in abundance. Andrews speculated that the detail at the rear of the majority of the buildings, coach houses and stables included in the *Exact survey* were measured by eye rather than being surveyed.[263] Even with the various contents of the fields surrounding the city remaining dubious and unable to be proven, the *Exact survey* still offered an unprecedented view of the city and on such a scale that had never been seen before in Ireland.

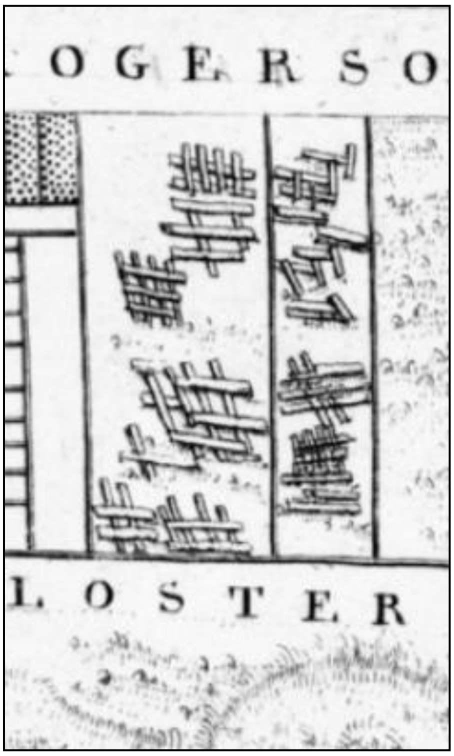

Figure 3.70 Standardised symbol for construction yards or building sites, John Rocque, *Exact survey of the city and suburbs of Dublin* (Dublin, 1756)

Decorative gardens can be found in many portions of the map, particularly around Trinity College and the Lying-in Hospital. Rocque's attention to detail of these features may date back to his early career designing gardens in England. Gardens at the rear of residential houses appear to be a similar generic size and design which supports the theory that only the fronts of buildings were surveyed, not the rear. The city's graveyards are shown with gravestones in profile from,

[262] Ferguson, 'Rocque's map and the history of nonconformity in Dublin: a search for meeting houses', pp 129-65.
[263] Andrews, *Two maps of eighteenth-century Dublin and its surroundings by John Rocque*, p. 3.

which, apart from trees, appear to be the only profile items in the *Exact survey*. Many of the graveyards are unnamed. The fields surrounding the city are a mixture of pasture and orchards with the highest concentration of arable farming to the south-west of the city. Rocque may have also employed an engraver's stamp for some repetitive city features as he appeared to use standardised symbolism when representing construction sites (see figure 3.70). The majority of these sites are found in and around the quays, particularly to the east of the city and, at first glance, appear to be ship yards with the crossed timbers, similar to ship construction. However, the same symbol can be found away from the river, for example on Meath Street and Saint Stephen's Green, thus eliminating its representation of ship yards but rather as a nonspecific symbol for construction or industry.

Rocque's attention to detail was intricate throughout the *Exact survey* however there are several instances of mistakes in his work. Precise details such as the presence of bollards on Henrietta Street and in front of Trinity College must be weighted against his omission of the Long Stone off College Green and the absence of surviving sections of the city wall. A section of Saint Patrick's Lane crosses the map's border which is a poor cartographical trait. Bow Lane is spelt *Beaux Lane*, a forgivable inclusion considering Rocque's French background and a common mistake as even one of France's greatest eighteenth-century cartographers stated:

> It is so easy to err when one is in a region whose language and pronunciations are not familiar.[264]

Rocque took the decision to include the equestrian statute of George II in St. Stephen's Green which was not erected until after the *Exact survey* appeared on the market.[265] With the statue's inclusion, Rocque took the same gamble that Brooking had taken with his inclusion of the then-uncompleted St. Werburgh's church in 1728. Rocque won his gamble, unlike Brooking. There was also the unfortunate yet unavoidable repetition of 'Stable Lane' as so many minor streets had not yet been assigned their own nomenclature.

[264] 'Il est si facile de pécher quand on est dans un pays don't la langue et la pronunciation ne sont pas familières.' C.R. Cassini to the Procureurs du Pays de Provence, 2 Aug. 1785, quoted in Sponberg-Pedley, *Commerce of cartography*, p. 186.
[265] Maxwell, *Dublin under the Georges*, p. 211.

Dublin's importance as a major port is highlighted in Rocque's presentation of the city's quays and the river Liffey. Commercially, eighteenth-century Dublin was very successful as indicated by a visitor in 1732:

> The merchants, citizens and manufacturers in Dublin are very numerous, and many of them rich and in great credit, perfectly well understanding every branch of trade of which their linen, woollen, silken and hair-manufactured goods are specimens.[266]

Rocque's cartographic interpretation of this wealth of trade can be found in the many brigs and sloops present along the city's quays and docks. In the section of the Liffey below the old Customs House beside Essex Bridge, a total of ninety five ships and boats of various descriptions can be found in the Liffey. Above Essex Bridge, under which sailing ships could not pass due to its height, smaller row boats can be found. Rocque did not survey these docked ships; it is against surveying logic to record vehicles and if he had done so, the streets of the *Exact survey* would be thronged with stationary carriages and coaches. Instead Rocque's inclusion of these vessels demonstrated cartographically both the success of Dublin as a port and the fact that the Liffey was navigable up to Essex Bridge. However, Rocque's only indication of information about the Liffey is a simple arrow near Kilmainham indicating the river's direction of flow.

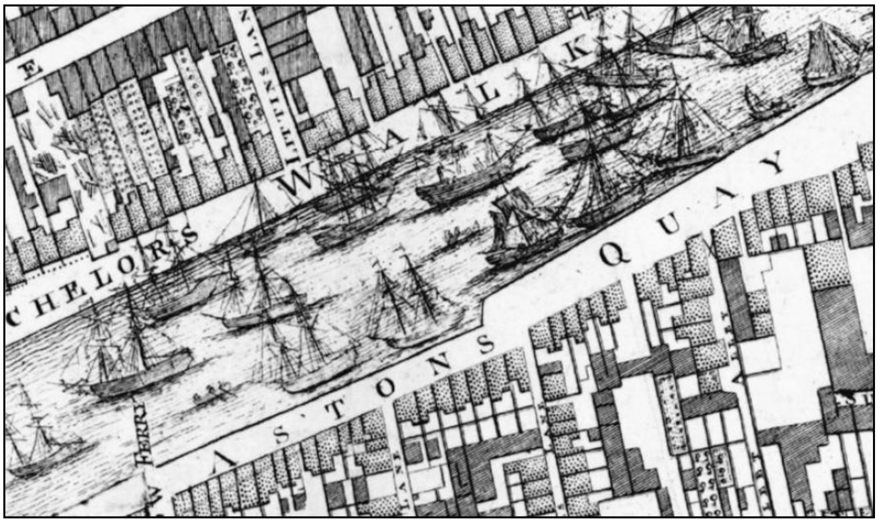

Figure 3.71 Ships in the River Liffey, John Rocque *Exact survey of the city and suburbs of Dublin* (Dublin, 1756).

Important public and civic buildings were paid special attention in the *Exact survey* and are highlighted by particularly dense hatching. The Four Courts, Dublin Castle,

[266] Edward Lloyd, *A description of the city of Dublin* (London, 1732).

Kildare House, the Blue Coat hospital, the Kings Inns, Customs House, the Lying-in Hospital and Dr. Steeven's hospital were amongst the many non-ecclesiastical highlighted and named on the *Exact survey*. The Parliament Building on College Green was paid particular attention too as it was the only building in the map to contain an internal layout which Rocque probably obtained from another source rather than his own hand. He forewent the inclusion of profile views of important buildings around the edge of the map as Brooking had done in 1728 and which Rocque had utilised in several of his maps at an earlier point of his career.[267] He also paid attention to religious diversity including a wide variety of places of Christian worship in Dublin during that period (see figure 3.73).

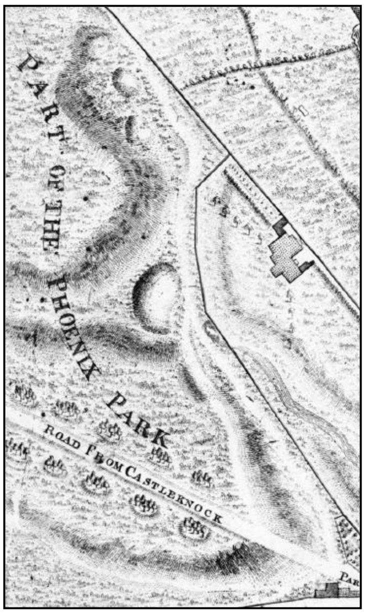

Figure 3.72 Example of Rocque's expression of terrain, *Exact survey of the city and suburbs of Dublin* (Dublin, 1756)

Figure 3.73 Rocque's legend, John Rocque, *Exact survey of the city and suburbs of Dublin* (Dublin, 1756)

[267] John Rocque, *A plan of the gardens & view of the buildings Esher* (Surrey, 1737); John Rocque, *Plan and elevations of ... South Dalton in the County of York* (London, 1737); John Rocque, *Plan of the park and views of the garden buildings at Richmond Lodge* (Surrey, 1736); John Rocque, *Plan du jardin et vuë des maisons de Chiswick* (London, 1736).

Aside from public and religious structures, Dublin's various industrial and guild buildings were noted in the *Exact survey*. Alms houses, carpenters' halls, glass houses, music halls, printing houses, bowling greens, watch houses shoemakers' halls and tailors hall were amongst the many features of Dublin's commercial and social fabric noted by Rocque.

One of Rocque's many trademarks was his inclusion of terrain shading,[268] yet the *Exact survey* contains sparse terrain information. Rocque failed to show the obvious slope that leads from Christ Church cathedral to the Liffey which could be defended as he may not have wanted terrain shading to interfere with map detail such as buildings, yet Rocque specifically included the central hill on which Armagh town and cathedral sit in his map of County Armagh in 1760. The only terrain features displayed within dense urban areas are dung hills, earth works, brick yards or quarries, one of which is located on Sackville Street. Areas outside the city, such as the Phoenix Park or the Dodder River valley, contain terrain shading which was highlighted by the orientation of text with terrain and other local features (figure 3.72).

The *Exact survey* was engraved by Andrew Dury who had a similar style to Rocque, especially concerning terrain shading,[269] if not as refined. As discussed in chapter 1, Rocque originally planned to produce his Dublin map on two sheets, however, finding that the scale at which it was to be engraved would suit four sheets better, advertised his mistake but assured his subscribers that those who had already paid would not be affected by a change in price. [270]

Rocque's City and Environs, 1757

The *Exact survey* was not Rocque's only map of Dublin. In 1757 *A plan of the city of Dublin and environs* was published by Rocque, giving a wider view of the area surrounding Dublin. The *Dublin and environs* once again demonstrated Rocque's uniqueness in the Irish surveying market as this second map of Dublin was once again published with a wider audience in mind – the presence of English and Irish miles

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[268] John Rocque, *A map of County Armagh* (Dublin, 1760); John Rocque, A plan of the gardens & view of the buildings Esher, Surrey (1737); John Rocque, A survey of Moortown, Kildare (1757).
[269] A. Dury and W. Herbert, *A topographical map of the county of Kent* (London, 1769).
[270] *Dublin Journal*, 2 Nov. 1754.

scale bars in addition to yard and *echelle de toise*, a reference in the title to the map being produced in the same scale of Rocque maps of London, Paris and Rome and the bi-lingual, if simple title in both English and French. The map covered a wide area – from Harold's Cross in the south to Glasnevin in the north and from the Phoenix Park in the west to Dublin bay.

Rocque's use of terrain once again sets this map apart from previous maps of Dublin. Areas such as the Tolka, Liffey and Dodder river valleys, in addition to the undulating hills and steep banks in the Phoenix park, give an element of dimension and realism. The crest of the hill on which Christ Church cathedral sits was included by Rocque yet was absent in his *Exact survey.* The mud flats, rock shoals of Dublin bay and channel of the river Liffey are shown in detail however depth readings are missing thus reducing the map's usefulness to navigation and highlighting a more multipurpose and commercial purpose. *Dublin and environs* differed from the *Exact survey* mainly regarding buildings, which were no longer shown as individual properties but as city blocks reminiscent of Rocque's map of London in 1746. Many individual buildings represent the city's hinterland, being mostly manor houses and important civic and religious buildings. Within the bounds of the city such sites are distinguished from the dot hatching of the surrounding residential and commercial city blocks by being shaded in solid black. Rocque notes only one historical site, 'Baggot & Rath Castle' outside of the city and like De Gomme, Rocque included a proposed fortification located within the Phoenix Park. Rocque is not known to have performed any military services unlike De Gomme, nor to have produced any real works of engineering so inclusion of the fortifications is somewhat of a mystery. *Dublin and environs is* devoid of any cartouche, decorative vignettes or elaborate north arrow – this being represented by a simple line, slightly askew of vertical located off Irishtown.

John Rocque's influence in Ireland was probably the greatest that any surveyor had on cartography since William Petty and the Down Survey a century previous to Rocque's survey of Dublin. Irish mapping prior to the 1750s appears to have still been heavily influenced by the work of Petty,[271] which may have been due to the use of the original Down Survey maps by surveyors throughout the eighteenth century as a base or reference mapping for their own work. Rocque's real impact on surveyors who were working in Ireland at the time of his arrival was not only the introduction of artistic styles that were common in Europe[272] but additionally the size, scale and detail of his Irish mapping projects. The *Exact survey* was a major and complicated logistical exercise motivated by financial gain and executed with finesse and expertise. The variety of surveying instruments Rocque employed for his survey, and his possible combination of theodolite and circumferentor measurements, was not often seen in Ireland during the eighteenth century. If he did not use a circumferentor while working in Dublin, the inclusion of a north arrow indicating magnetic north would highlight his understanding that the circumferentor was popular amongst Irish surveyors and the inclusion of such features would be welcomed within the surveying industry. Compared to Rocque's urban maps, those produced in the pre-Rocque eighteenth century era were simplistic,[273] occasionally crude[274] and bore a strong resemblance to seventeenth-century urban maps. However, it should be noted that this is not a reflection on the accuracy of non-Rocque maps, but simply an indication that Rocque's arrival triggered a divergence in visual quality of Irish mapping, between those surveyors who saw the advantages of producing more artistic maps[275] and those who, either by choice or an inability to adapt, remained with the more Down Survey-like styles.[276]

Few surveyors operating in eighteenth-century Ireland had the impact or left a legacy like Rocque. His apprentice Bernard Scalé trained others in Rocque's style, and the repeated reprints of his *Exact survey of Dublin* in the centuries since its creation is testimony to his greatness. J. H. Andrews summed up Rocque's work when he wrote:

[271]Peter Dunne, Templeogue, 1722 (NLI, Domville papers, ms. 11,937(4)); Thomas Cave, Loughlinstown, 1716 (NLI, Domville papers, ms. 11,937(10)); Thomas Reading, Santry, 1754 (NLI, Domville papers, ms. 11,937(40)).
[272] J. B. Nolin, *Le globe terrestre* (Paris, 1707); Jean de Buaurain, *Carte de port et harve de Boston* (Paris, 1776); Jean Lattré, *Atlas modern* (Paris, 1762); Charles Louis Francois Fossé, *Idées d'un militaire* (Paris, 1878).
[273] Robert Porter, *City and suburbs of Londonderry* (Londonderry, 1799).
[274] Miles Sweeney, Fethard (1763).
[275] Samuel Byron, Francis Mathews, Thomas Logan, John Magennis, Charles Frizell, James Vaughan.
[276] Thomas Reading and Miles Sweeney were both frequent users of styles similar to that of the Down Survey.

Despite his continental origins he had absorbed enough of the spirit of English empiricism not to make a parade of general principles or to insist on pressing them to their logical conclusions. The principles were made manifest in his maps, however, and much of their substance can be conveyed in three words: intelligibility, visibility and plainiformity.[277]

[277] Andrews, *Two maps of eighteenth-century Dublin and its surroundings by John Rocque*, p. 3.

3.9 Summary

Cartographic trends did not follow in linear succession but rather overlapped and co-existed over a period of decades. Design changes of north arrows, cartouches, vignettes and the manner in which terrain and buildings were represented throughout the eighteenth century show the ever-changing methods by which maps were designed. Such features applied a form of internal logic and a set of guidelines on the acceptable level of cartographic presentation throughout the eighteenth century.

The requirement to create such maps was driven by market demands. Landowners, map dealers, civic authorities and the general public supplied a market strong enough to support Dublin's surveyors throughout the century and also ensured that acceptable cartographic standards were maintained. Market demands could often result in map producers using shortcuts to meet supply. Map duplication was an important element of eighteenth-century surveying for both manuscript and printed maps. By utilising pre-existing cartographic works, extracting relevant data and combining it into a fresh map, a surveyor could increase the speed of a map's production. Such duplication was not without elements of risk; however, the regularity with which some surveys were copied is a strong indication of the high regard in which these surveyors were held by their professional contemporaries and successors.

A classification of cartouches, vignettes and geographic features such as north arrows, demonstrates the gradually changing styles in eighteenth-century Irish mapping. By combining these features with the manner in which decorative cartographic characteristics, such as buildings, were represented a discernable trend of increasing levels of complexity throughout the eighteenth century overlaid with an increased amount of standardisation can be identified.

Of the main city plans based on original surveys through both the seventeenth and eighteenth centuries, the works of Brooking and Rocque stand out for both their levels of sophistication and detail. By looking back to Speed, De Gomme and Philips, it can be observed that the more militaristic nature of seventeenth century city plans of Dublin was replaced by a more civic and mercantile theme in their eighteenth-century counterparts.

Chapter four: Urban surveying in eighteenth-century Dublin

4.1 Introduction

This chapter centers on the surveying work conducted as part of Dublin's urban expansion during the eighteenth and early nineteenth centuries. Focusing on several of the city's main estates and two of Dublin's civic organizations which were highly involved with land surveying, the Wide Street Commissioners and the office of Dublin city surveyor, this chapter examines the role that Dublin's land surveyors played in the physical development of the city.

The first section is an examination of the development of the Gardiner, Fitzwilliam/Pembroke and archbishop of Dublin estates. From the mid-seventeenth century onwards, private landlords of Dublin estates were to the forefront of the city's development. With this urban development came a greater need for surveyors and surveying. Thus the lives of some of the richest and most powerful men in eighteenth-century Ireland became intertwined with many of Dublin's surveyors.

The Wide Street Commissioners (WSC) and the Dublin city surveyor, each a distinct and separate body, undertook hundreds of cadastral and land surveys of Dublin throughout the eighteenth century. Primarily focused on cadastral surveys, the office of Dublin city surveyor was the highest civic position a surveyor could occupy within Dublin.[1] The WSC was responsible for the rejuvenation and redesign of many areas of Dublin city, with a variety of surveyors working for it from the mid-eighteenth century onwards. The relationships of both offices with Dublin's many private estates will be examined, as well as survey work conducted on these estates in a private capacity by their landlords. A portion of the WSC case study will include reproductions of maps produced for the commissioners' use during the eighteenth century.

The surveys examined in this chapter lack, for the most part, the elegance, extravagance and detail found in many major city plans during this era. However, what they provide is a view of the everyday work conducted by Dublin's surveyors, the difficulties they encountered, their relationships with their employers and their various success and failures.

[1] The office of deputy surveyor general was a similar official surveying position however it was concerned with Ireland as a whole. The Dublin city surveyor was based in and entirely focused on the city.

4.2 Eighteenth-century Dublin city estates

The establishment of land ownership and property boundaries is inherent to cadastral surveying. The estates of Dublin city and county, of which the Gardiner, Fitzwilliam/Pembroke and the archbishop of Dublin's lands are but three examples, were regular sources of employment for Dublin's eighteenth-century surveyors. Whether involved with mapping the existing lay of the land, or in designing and implementing improvements to an estate, Dublin's eighteenth-century surveyors found a regular training ground in the city's many estates.

As noted already, Dublin was divided into many privately-owned urban estates during the eighteenth century. Some estates some were bought out by their neighbours or inherited through marriage,[2] whilst others survived well into the nineteenth century.[3] Within each urban estate, the landlord determined its development and expansion, set leases and rents.

With Dublin's population almost quadrupling to nearly 200,000 residents during the course of the eighteenth century[4] the city expanded from its medieval core into the surrounding countryside.[5] With modernisation difficult within the oldest part of the city due to narrow streets and dense population, owners of the new suburbs had an opportunity to lay out lands following the latest town planning and architectural styles. An English visitor described the differences between the then two sections of the city, old and new:

> The general appearance of the city of Dublin … is extremely beautiful, from the number of public building[s] and the principal streets are well paved and lighted, and the flagged way at either side, with some exceptions, broad and tolerably clean, which is a difficult matter to preserve … but the inferior streets are equally filthy and diabolical.[6]

Independently-owned estates led to a patchwork of urban advancement with sections of undeveloped and older areas between modernised estates.

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[2] Jervis estate.
[3] Pembroke estate.
[4] Sheridan, 'Designing the capital city', p. 68.
[5] Clarke, *Dublin part 1, to 1610* (Irish Historic Towns Atlas, no. 11), p. 3.
[6] Unknown author, *Dublin and its vicinity in 1797* (London, 1797).

Estate development did not happen in isolation. The Gardiner estate located in the north-eastern portion of the city was redeveloped as part of the work of the Wide Streets Commissioners (WSC) from the 1750s onwards. The progenitor of the Gardiner estate was Luke Gardiner I, an Irish MP who bought the Drogheda Estate[7] in 1714. His son Charles expanded the estate further but it was Charles's son Luke Gardiner II who developed the Gardiner estate to the greatest extent.[8] Luke II was a member of parliament as well as sitting on the board to the WSC. As a commissioner he used his influence to benefit his own holdings within the city.[9] As part of his work with the WSC, surveyor Thomas Sherrard was regularly called to work on the Gardiner estate so much so that Sherrard Street, off Dorset Street, was named after him.[10] Sherrard designed a proposed relocation of St. George's Church to the centre of Mountjoy Square for Luke Gardiner in 1787 in addition to a palatial residence for the Gardiner family on the same square (figure 4.1). Sherrard also designed a section of new buildings at the corner of Cavendish Row and Great Britain Street[11] which was also on Gardiner's land (figure 4.2). Luke Gardiner personally approved this development.

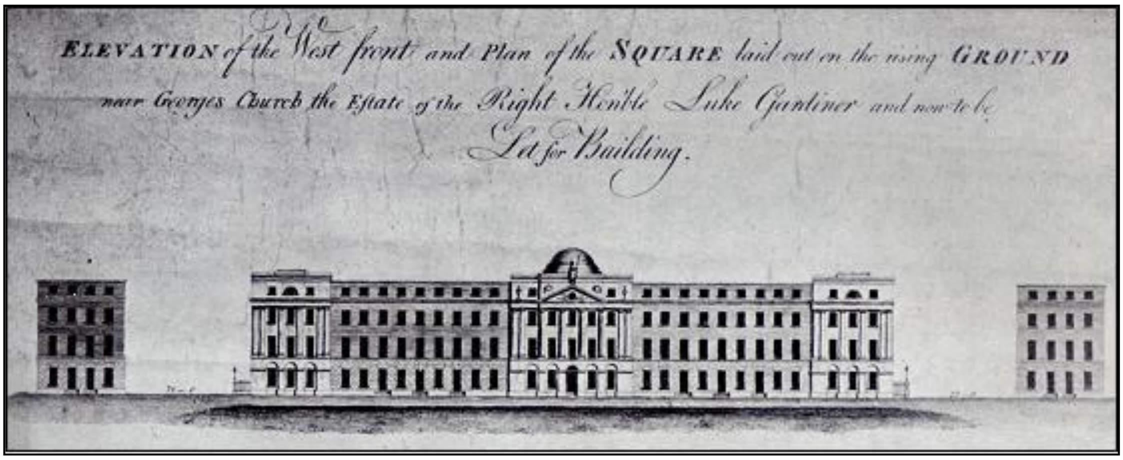

Figure 4.1 Proposed building design in the Gardiner estate. Thomas Sherrard, Elevation of the west front and plan of the [Gardiner] square, 1787 (DCA, WSC/Maps/63).

[7] This area covered the modern day O'Connell Street/Henry Street/Moore Street region. See Sheridan, 'Designing the capital city', p. 91

[8] Mary Clark and Alastair Smeaton (ed.), *The Georgian squares of Dublin* (Dublin, 2006), p. 35.

[9] WSC/Mins/6, p. 182.

[10] Sherrard Street is one of two thoroughfares named after an eighteenth-century surveyor – the other being Taylor's Lane, Rathfarnham, named after Alexander Taylor who began his Wicklow military road from that point in the 1790s.

[11] Now Parnell Street.

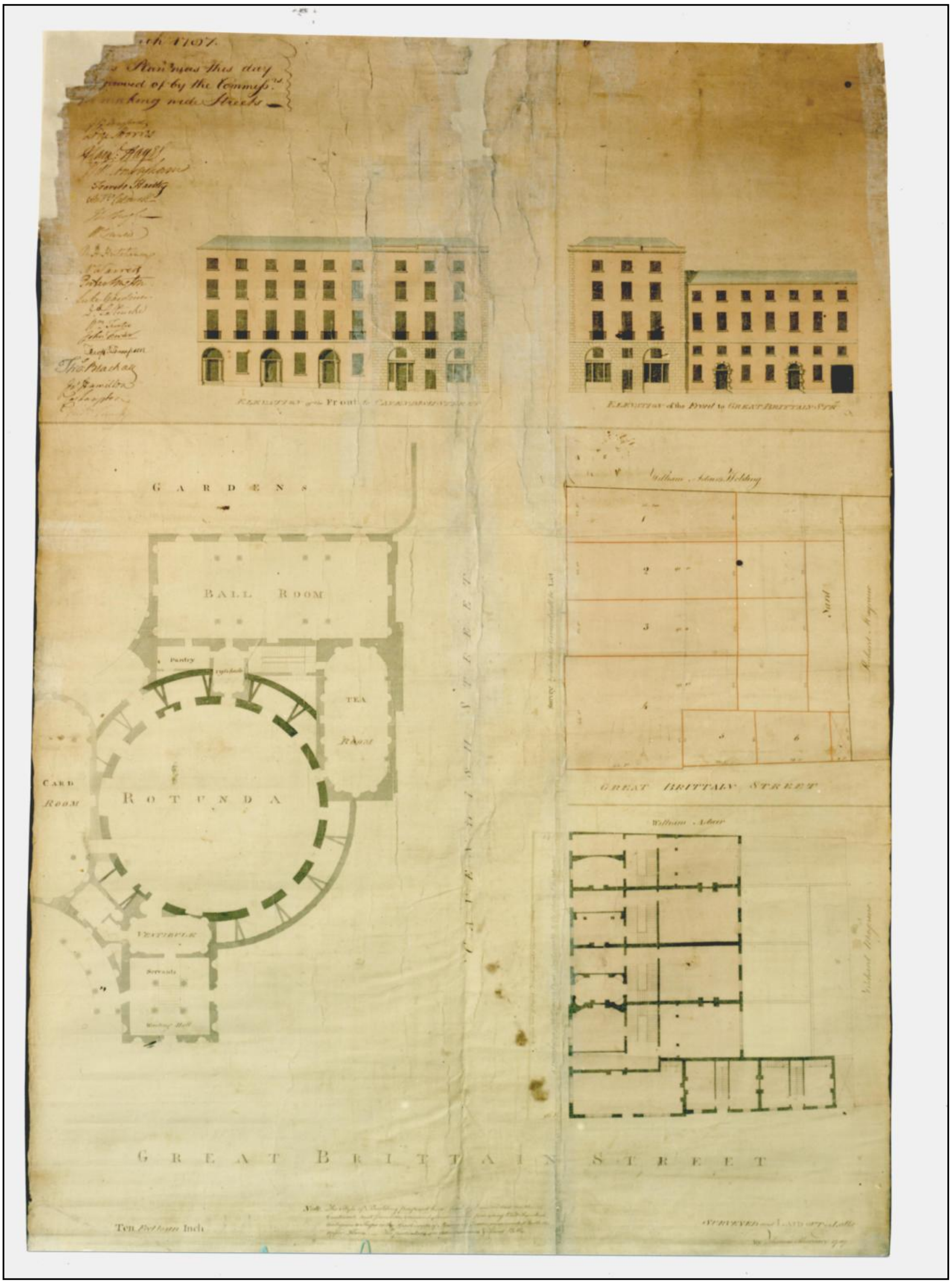

Figure 4.2 Proposed building design. Thomas Sherrard, 'Great Britain Street and Cavendish Row', 1787 (DCA, WCS/Maps/206).

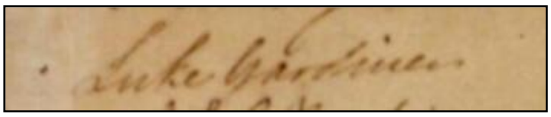

Figure 4.3 Luke Gardiner's signature on above map.

The Gardiner estate fell into decline after the death of Luke Gardiner II at the Battle of New Ross in 1798.[12]

The Fitzwilliam/Pembroke Estate, in the south eastern portion of the city, had a longer and more diverse relationship with surveyors than the Gardiners. Like other contemporary estate owners,[13] the Pembroke family tended to retain the services of a surveyor for a number of years and thus a lineage of their estate surveyors can be traced. Such retention of service had benefits for both client and surveyor – the client could depend on a surveyor who knew their tastes and requirements and who in addition would gain first-hand knowledge of the estate's properties over their years of service. During the eighteenth century, the Fitzwilliam/Pembroke estate developed both Merrion and Fitzwilliam squares in the city, but also maintained a large tenant population who paid rent and acquired leases of the family's land.

For the surveyor, a regular income from a wealthy patron must have added not only to their income but to their job security. Thomas Cave worked for the Pembroke family until his death in 1749 which was marked by the estate agent's sudden rush to find a new surveyor.[14] During the 1760s Jonathan Barker produced a series of maps of the entire Fitzwilliam/Pembroke estate from the Liffey to Dundrum. Barker's maps are produced to a high degree of professionalism however they betray the sole concern of the proprietor for his own lands. Barker's maps are almost entirely focused upon the Fitzwilliam/Pembroke properties, with only minimum detail being supplied for the neighbouring areas of the city.[15] They include local amenities useful to estate development such as extensive brickfields in Sandymount,[16] in addition to standard surveying features, for example field areas, buildings and land classification.[17] This leads to the realisation that like the Gardiner family, the Fitzwilliam/Pembroke family was primarily concerned with the developments within its own sphere of influence rather that a citywide development plan.

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[12] Charles Mosley (ed.), *Burke's peerage, baronetage and knightage* (107th ed., 3 vols, Wilmington, 2003), ii, 2748.
[13] The liberty of Christ Church, Domville estate etc.
[14] Letter of Richard Mathews, 1 May 1749 (NAI, Pembroke papers, 97/46/1/2/5/64).
[15] Jonathan Barker, A plan of Merrion Square, 1764 (NAI, Pembroke papers, 2011/2/2/10); Jonathan Barker, Plan of Merrion Square and adjacent neighbourhood, 1762 (NAI, Pembroke papers, 2011/2/2/8); Jonathan Barker, A map of Dundrum, 1762 (NAI, Pembroke papers, 2011/2/2/4).
[16] Jonathan Barker, A map of Baggotrath, 1762 (NAI, Pembroke papers, 2011/2/2/6).
[17] Jacinta Prunty, *Maps and map-making in local history* (Dublin, 2004), p. 102.

Father and son surveyors Pat and John Roe were employed in laying out parts of the Fitzwilliam/Pembroke estate, including Fitzwilliam Square in 1791:

> A new square is planned at the rere of Baggot Street, in which lots are rapidly taken and the buildings are to be immediately commenced. The design is not without elegance and the execution, it is believed, will be correspondent[18]

The Roes involvement with the Fitzwilliam/Pembroke estate continued until the 1820s. John Roe continued by himself following Pat's death with the assistance of his father's catalogue of maps.[19] Arthur Neville, city surveyor, also took advantage of the existing Roe maps[20] as well as producing many maps of the estate during the 1820s and 1830s. Neville regularly evoked his official title after his name whilst surveying in a private capacity.[21] Neville's duties were taken over by the surveying firm of Sherrard, Brassington and Greene in the early 1830s,[22] who proceeded to resurvey the entire estate. This is reminiscent of the project conducted by Jonathan Barker sixty years previously. Thomas Sherrard would have been elderly during this time[23] however Brassington continued to be associated with the Fitzwilliam/Pembroke estate until the 1860s.[24]

One of the largest estates in the county belonged to the archbishop of Dublin. Predominately rural, the archbishop's estate covered large swathes of Swords, Lusk, Finglas, Tallaght, Clondalkin and Rathcoole and was a productive employer of surveyors from the 1650s onwards.[25] The archbishop's estate had come into existence with the dissolution of the monasteries during the reign of Henry VIII. The estate had

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[18] *Dublin Evening Post*, 18 June 1791.

[19] John Roe, Map … in the barony of Rathdown, Co. Dublin, copied from Pat Roe's map drawn in 1780 with additions and alterations, 1815 (NAI, Pembroke papers, 97/46/4/15); John Roe, Map of Ringsend, 1821 (NAI, Pembroke papers, 97/46/4/16).

[20] Arthur Neville, Part of the estate of the Rt. Hon. The earl of Pembroke, surveyed by John Roe, revised by Arthur Neville, 1826 (NAI, Pembroke papers, 97/46/4/17).

[21] Arthur Neville (city surveyor) Map of … Grand Canal, Sideny Crescent, Warrington Place, 1830 (NAI, Pembroke papers, 97/46/4/18); Arthur Neville (city surveyor), Plan for the improvement of that part of the estate of the hon. Sidney Herbert …, 1830 (NAI, Pembroke papers, 97/46/4/19).

[22] Sherrard, Brassington and Greene, Survey of Bray Co. Wicklow, 1830 (NAI, Pembroke papers, 97/46/4/23).

[23] The 'Sherrard' in this case may also have been Thomas's sons William and/or David Henry.

[24] Richard Brassington, Map of part of the lands of Old Merrion, 1861 (NAI, Pembroke papers, 97/46/4/30).

[25] Robert Newcomen, The lordship of Tahhagh latlie belonginge to the bishope of Dublin (*c.*1654), reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, map 22.

not remained static from the fifteenth to the eighteenth century with property being sold and bought. The length of leases on this estate were set by the Irish parliament in 1634,[26] using a timeframe of twenty-one years for agricultural land and forty years for urban plots.[27] However, such leases were not always enforced strictly or returned to the archbishop and instead were inherited by the tenant's relatives or offspring resulting in a lease passing through several hands over many decades. Archbishop William King (1650-1729) complained in 1723 that he was only receiving a rent of £7 10s per annum on land worth over £300, due to the lease still operating on terms set 160 years previously.[28]

The archbishop of Dublin did not derive his entire income from rents alone. He was also entitled to a tithe, accounting for approximately one tenth of the produce of each parish.[29] This was not popular with tenants who were not members of the established church. A Mr. Brown of Trinity College addressed the Irish parliament in 1788 in relation to the difficulties that were encountered in trying to collect tithes. He also mentioned the resentment felt by tenants towards this ecclesiastical charge and those who encouraged such resentment for their own benefit:

> The real cause of oppression was the land-jobber or middle-man he having racked the tenant to the utmost, knew not how to increase this rent but by robbing the parson. He teaches the foolish peasant to curse the parson for the weight of his spade and the scantiness of his meat, though he has only to lift up his eyes to his tithe-free neighbour, and see him labouring under equal want of comfort, and heavier load of rent. The rent of land tithe-free is always much higher than of other land; it follows plainly that not a holder in Ireland would be advantaged by the abolition of tithe tomorrow.[30]

The lack of regular lease renewals made them rebellious, as mentioned by Bishop Webb of Limerick in 1641:

> [They] will not be brought in any order but are grown mutinous and prone to rebellion, neither durst any intermeddle with them as having late how in Bishop Adams time [1603-26] an officer of his being there for his lord's receipts had his brains beaten forth and another had his house burnt over his head, himself and his family perishing in that flame.[31]

[26] 10 and 11 Chas I, c.3. [Ire.] (1634).
[27] Raymond Gillespie, *The first chapter act book of Christ Church cathedral, Dublin, 1574-1634* (Dublin, 1997), p. 146.
[28] TCD ms. 2537/32, quoted in Refausse & Clark, *A catalogue of the maps of the estates of the archbishosp of Dublin, 1654-1850*, p. 24.
[29] G. O'Brien, *The economic history of Ireland from the Union to the famine* (London, 1921) p. 494.
[30] *Freeman's Journal*, 19 Feb. 1788.
[31] Bishop Webb's rental, p. 32, quoted in Refausse & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 28.

The establishment of land acreage, type and presence of buildings in addition to traditional terriers, fell to the land surveyors in the employment of the archbishop. There is a strong connection between the surveyors who worked on the archbishop's lands and those who were employed by Dublin Corporation and other major surveying enterprises such as the Down and Trustees surveys during the seventeenth and eighteenth centuries. This connection is not surprising considering the high social status of the Archbishop of Dublin not only as a senior member of the Church of Ireland but also as one of the major land owners in County Dublin. Archbishop William King (1650-1729) felt strongly about the necessity of hiring surveyors, urging the Bishop of Cloyne in 1717 to hire them 'as to maps it will be very necessary to have them'.[32]

Robert Newcomen produced several maps for the archbishop's estate in the 1650s[33] and was also employed by both the Down Survey and Dublin Corporation.[34] Joseph Moland[35] and John Greene,[36] both city surveyors in the course of their careers, produced maps for the archbishop during *c.*1710-16 in addition to their previous work for the Trustees survey in the first years of the eighteenth century. The fact that Moland was Greene's apprentice was another common feature found in the relatively tight knit group of surveyors who worked for the archbishop. Other city surveyors employed during the course of the eighteen and nineteenth centuries included Roger Kendrick,[37] also verger of Saint Patrick's cathedral, in the 1750s and A. R. Neville[38] in the early 1800s.

In addition to the connection to the office of city surveyor, there appears to be a distinct trend towards the employment of surveying lineages over time. Moland's

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[32] TCD, ms. 2534/148, quoted in Refausse & Clark, *A catalogue of the maps of the estates of the aArchbishops of Dublin, 1654-1850*, p. 24.
[33] Robert Newcomen, The lordship of Tahhagh latlie belonginge to the bishope of Dublin, c.1654, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 43.
[34] 10 Dec. 1668, *Ancient Records,* iv, p. 456.
[35] Joseph Moland, A survey of part of the lands of Drumeen, 1713, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*.
[36] John Greene, A survey of the towne and lands of Kilpatrick, 1715, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 56, map 3.
[37] Roger Kendrick, A map of part of the land of Glanasmoin, Tallaght, 1752, reproduced Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 73, map 41.
[38] A. R. Neville C.S. and Son, *A map of the mansion house and ground of the earl of Clonmel* (Dublin, 1807).

apprentice, Gabriel Stokes, was employed by the archbishop during the 1730s whilst Moland himself was originally John Greene's assistant during the 1690s.[39] Father and son surveying duos can be seen in the maps of Thomas Logan,[40] A. R. Neville[41], Pat Roe[42] and Thomas Sherrard.[43] Sherrard's apprentices, Richard Brassington and Clarges Greene, as well as his former partner John Brownrigg,[44] were also employed by the various archbishops of Dublin. Adhering to such lineages was not a universal theme, and many unconnected surveyors[45] were also employed by the archiepiscopal estates over the seventeenth and eighteenth centuries.

[39] 24 Apr. 1698, *Ancient records*, vi, p. 196.

[40] Thomas Logan and son, Map of lands in Templeogue, 1813, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850,* map 33.

[41] A. R. Neville C.S. and Son, A map of the mansion house and ground of the earl of Clonmel, Dublin (1807).

[42] Pat Roe, A map of part of the lands of Tallaght belonging to his grace the Arch Bishop of Dublin, 1774); John Roe, A survey of the demesne of Tallaght, 1811, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850,* p. 85, map 37

[43] Sherrards, Brassington and Greene, Survey of Burgagemolye, 1810, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 83, map 35.

[44] John Brownrigg, A map of part of the farm of St Sepulchers, 1793, reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, p. 80.

[45] Elyard Arnoldi, Ballymore, 1668; Peter Duff, Map of Clondalkin, 1703; Thomas Cave, Map of Belinstown and Loughmarting, 1728; Francis Mathews, Map of lands in Templeogue, 1783; reproduced in Refaussé & Clark, *A catalogue of the maps of the estates of the archbishops of Dublin, 1654-1850*, map 9s, 15, 33 and 46 respectively.

4.3 Dublin City Surveyors, 1679 – 1828

The highest civic position an eighteenth-century surveyor could attain in Dublin was the role of city surveyor. The office of Dublin City Surveyor spanned a period of 178[46] years starting in 1679 with John Greene Jr. and was held by at least eleven individuals during this period,[47] each of whom left his mark on surveying in Dublin to a varying degree. The role of city surveyor was not as expansive as that of surveyor to the Wide Streets Commissioners, yet it was the highest civic office held by a practitioner of surveying within the bounds of Dublin city. His main task was to map ground lotts belonging to the city to accompany a lease of that ground. By 1757, the length of such a lease was the equivalent of three lives or seventy years, which ever occurred first.[48] As the city was also responsible for the provision of services such as piped water, the city surveyor could be called upon to provide technical expertise with such engineering works. Unlike the surveyor for the Wide Streets Commissioners, the city surveyor was not tasked with regular acts of civic redesign and from evidence held within the *Calendar of Ancient records* of Dublin[49] and the book of maps of the city surveyor[50] the role was focused on division of land and establishment of leases.

John Green Jr. 1679-98
Barnaby Hackett 1689-90
Joseph Moland 1698-1718
James Ramsey 1718-35
Roger Kendrick 1735-64
Thomas Mathews 1764-82
Samuel Byron 1782-95
D.B. Worthington 1795-1801
A. R. Neville 1801-28
Arthur Neville 1828-57

Table 4.1: List of Dublin City surveyors (1679-1857), dates from *Ancient records* and Mary Clark, *The book of maps of the Dublin city surveyors, 1695-1827* (Dublin, 1983).

The first occupant of the position of Dublin City Surveyor was John Greene Jr., who petitioned Dublin Corporation to create the position in late 1679.[51] As part of the office of city surveyor Greene had to swear to:

[46] 1679 – 1857.
[47] Possibly more, Joseph Moland was appointed 'one of the city surveyors' see Mary Clark, *The book of maps of the Dublin city surveyors, 1695-1827* (Dublin, 1983), preface.
[48] 21 Jan. 1757, J. T. Gilbert (ed.), *Ancient records*, x, 263, instruction to Roger Kendrick.
[49] J. T. Gilbert (ed.), *Calendar of Ancient records of Dublin* (Dublin, 1889).
[50] Held by Dublin City Archives at the Gilbert Library, Pearse Street.
[51] 25 Dec. 1679, J. T. Gilbert (ed.), *Ancient records*, v, 183.

… execute their trust according to the best of their skill and knowledge, that his authority might be viewed and knowne [sic] for the better satisfaction of those persons who shall employ him, and for that the petitioner is desirous to survey and make an exact map of all the cittee tenures, and for this satisfaction to submit himselfe to the pleasure of the assembly's commission to be sealed the next post assembly …[52]

Greene's employment was entirely at the pleasure of the lord mayor, city sheriffs, and members of Dublin Corporation. Dublin's municipal corporation at the time was divided into two chambers or houses, the higher of the two consisting of the lord mayor and twenty-four aldermen while the lower[53] consisted of forty-eight sheriff's peers and ninety-six members of Dublin's various guilds. The Corporation met four times per year[54] in the Tholsel located near Christchurch Cathedral with many 'post assembly' meetings taking place sporadically during the remainder of the year[55].

After a decade occupying his official role, Greene's position was taken from him by events occurring far from Dublin. In 1685, James II, a Catholic, ascended to the throne of England. This event radically altered the sectarian divide that existed in the civic make-up of cities across Britain and Ireland. In Dublin, the oath of supremacy was removed after insistence from the king, allowing Catholics to be given the freedom of the city.[56] The new Catholic regime, which had been curtailed and discriminated against, now had the ability to control civic bodies and appoint its own people, Catholics, to positions of power. All appointments to Dublin Corporation were to have vice-regal approval and any existing appointments, including the position of city surveyor, could be removed at will. As Sir Ellis Leighton commented:

> Corporations are the creatures of the monarchy, and therefore, they have a particular obligation beyond other subjects at large to depend upon the monarchy and to uphold it …[57]

Greene's initial terms of employment with the Corporation entitled him to twenty shillings per survey.[58]

[52] 25 Dec. 1679, J. T. Gilbert (ed.), *Ancient records*, v, p. 183.
[53] Also known as 'the sheriffs and commons.'
[54] Christmas, Easter, Midsummer and Michaelmas.
[55] Sheridan, 'Designing the capital city', p. 73.
[56] Ibid., p. 74.
[57] 4 Apr. 1672, J. T. Gilbert (ed.), *Ancient records,* iv, 599.
[58] *25* Dec. 2 1679, ibid., v, 184.

In December 1687 Greene was removed from his official role and Barnaby Hackett, a Catholic, was appointed in his place. There is a strong possibility that Hackett was a relation of Thomas Hackett, a banker and money lender who was appointed lord mayor of Dublin in October 1687 under the charter of James II.[59] There is no record of Barnaby Hackett's work in surveying during this period, possibly because there was little need with no leases being sealed between November 1687 and May 1691.[60] He may have simply been someone with the right family connections and of a suitable religion tasked with occupying the position, with no intention of performing the city surveyor's duties. Despite his lack of activity, Hackett was well paid.

Hackett's role as city surveyor came to an end with the ascension to the throne of William III in the Glorious Revolution (1689) and James II's final defeat at the Battle of the Boyne the following year. Hackett's position became untenable with the Corporation calling for:

> … the forfeitures of those Papists who illegally succeeded in the … corporation …[61]

When Hackett disappeared from the records, Greene resumed his old role of city surveyor in July 1691.

Greene's role of city surveyor did not prevent him from working in a private capacity in land surveying, which at times affected his ability to fulfil his official duties. Thomas Sherrard, surveyor to the Wide Streets Commissioners from the 1780s onwards, also combined official and private surveying work[62] so Greene's case is not unique. By 1698 there was a need to hire a full time assistant for Greene as he was 'often out of town when he is wanted'.[63] Joseph Moland was admitted to the post of 'one of the city surveyors'[64] without an official salary and being paid only a commission based on the number of surveys he completed. Greene and Moland are known to have produced at least one survey in 1704[65] but by 1706 Moland was referred to as city surveyor, indicating that Greene had either retired from the role or

[59] Oct. 1687, J. T. Gilbert (ed.), *Ancient records*, i, 73.
[60] Clark, *The book of maps of the Dublin city surveyors, 1695-1827,* p. x.
[61] 20 Oct. 1690, J. T. Gilbert (ed.), *Ancient records,* v.
[62] Mar. 13, 1789 (DCA, WSC/Mins/8).
[63] 24 Apr. 1698, J. T. Gilbert (ed.), *Ancient records,* vi, 196.
[64] Ibid.
[65] John Greene and Joseph Moland, A survey of lands of Donnycarney in the county of Dublin, 1704 (DCA, C1/S1/130).

had been dismissed due to his focus on his private practice.[66] Greene is known to have continued to work as a surveyor for both the Archbishop of Dublin until 1715[67] and Trinity College until 1724.

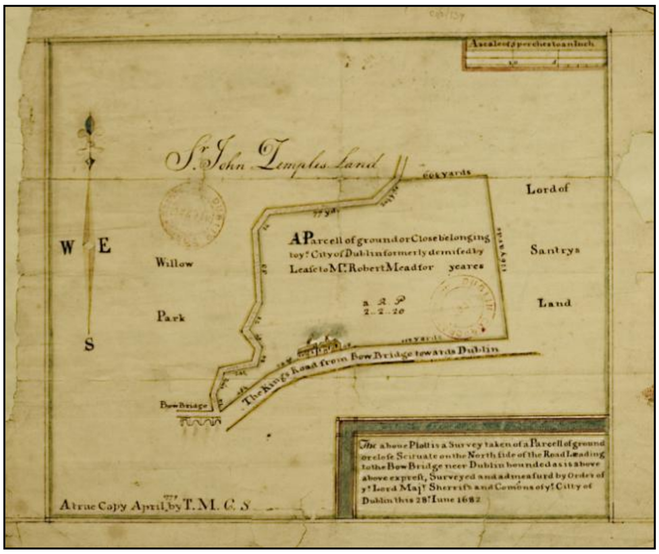

Figure 4.4 John Greene and Joseph Moland, A survey of lands of Donnycarney in the county of Dublin, 1704 (DCA, C1/S1/130).

Figure 4.5 John Greene and Joseph Moland, A survey of lands of Donnycarney in the county of Dublin *c.* 1704 (DCA, C1/S1).

Moland's payment on a piecework basis was appropriate for small cadastral surveys within the city, however it did not suit for larger projects that the city surveyor had to perform occasionally. One such example is a map of Dublin bay and harbour that Moland had been working on at:

[66] 24 Mar. 1706, J. T. Gilbert (ed.), *Ancient records*, vi, 349.
[67] John Greene, Details of houses at Tutestown (Dublin, 1715).

> ... great expense and labour in making an actual survey (by chain and instrument) … with the adjacent coasts and country, all rivers, and exact situation of all gentlemen's houses, and other places of note within the extent of the said map …[68]

Moland was paid the sum of fifty pounds sterling for his efforts. The following year however, Moland, having recently completed his map of Dublin bay, was again requesting additional payments from the Corporation, with the sum of thirty pounds sterling being approved.[69] Moland was not the only surveyor working on Dublin bay and harbour at the time. Thomas Holt was appointed surveyor and guager for the recently formed Ballast Office and may have conducted his work alongside Moland, or in addition to the work that Moland had just completed.[70] Other surveys conducted by Moland as city surveyor included work in Temple Bar,[71] Lazy Hill (modern Pearse Street)[72] and Donnycarney.[73]

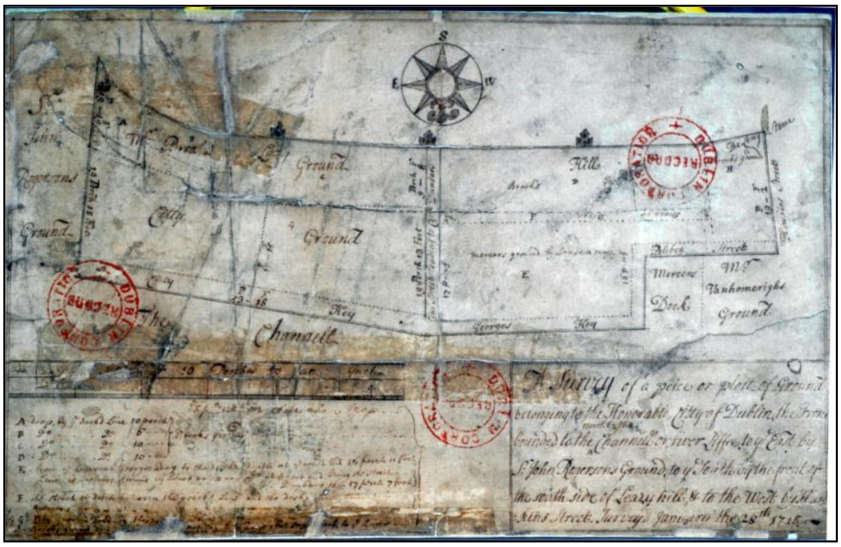

Figure 4.6 Cadastral map surveyed by Moland. Joseph Moland, Survey of Lazy Hill, 1717 (DCA, C1/S1).

For the majority of those who occupied the role of city surveyor, the position was for life. Moland died in office in late 1717 or early 1718 and his apprentice, James Ramsey, was appointed in his place. Records of Ramsey's work as city surveyor indicate he had wider scope than his predecessors as he was busy enough to have to

[68] 24 Mar. 1706, J. T. Gilbert (ed.), *Ancient records*, vi, 349.
[69] 16 Jan. 1698, ibid., p. 378.
[70] 16 Jan. 1707, ibid.
[71] Joseph Moland, Survey of several parcels of ground situate on north and south side of Temple Bar, 1707 (DCA, C1/S1/30).
[72] Joseph Moland, Surveyor of a piece of ground on south side of river Liffey near Lazy Hill, 1709 (DCA, C1/S1/52).
[73] John Greene and Joseph Moland, A survey of lands of Donnycarney in the county of Dublin, 1704 (DCA, C1/S1/130).

hire more than one assistant.[74] Perhaps Ramsey's greatest contribution to surveying was his technical support in establishing standard yard measurements for the Corporation, mentioned earlier in chapter 2. Ramsey occupied the post of city surveyor for seventeen years until his death in 1735.

Roger Kendrick, verger of Saint Patrick's Cathedral, was appointed Dublin City Surveyor on Ramsey's death in 1735.[75] During the late 1730s Kendrick's work appears to have been focused on long levelling runs, possibly in relation to piped water which is dependent on correct levels. In 1738 Kendrick was paid twenty-five pounds sterling for conducting a levelling run between Straffan, Co. Kildare and Dolphins Barn in Dublin City.[76] The following year Kendrick was again surveying in Kildare, this time being paid thirty pounds for his 'extraordinary trouble'.[77] The extraordinary trouble that Kendrick went to during the course of his surveys, for which he charged the Corporation, was not always welcomed by the city. Kendrick was officially reprimanded by the Corporation in relation to charging for several unauthorised surveys for the city paver.[78]

Kendrick's best documented work is his attempt to produce a city plan of Dublin in direct competition with John Rocque in 1754.[79] Kendrick's map never materialised however there is strong evidence to suggest that Kendrick had amassed a large amount of data from his role as city surveyor on which to base his proposal Dublin map. Kendrick had been paid £12, 15s. and 6d. to create a map of the city in nine parts four years previous:

> … thereby describing the precincts of the several districts, as they are now cleansed by the several persons who have undertaken that work …[80]

Kendrick's map of Dublin, for cleansing and other municipal purposes, was completed long before Rocque arrived in Dublin, thus his inability to produce a finalised map of the city for mass production remains a mystery.

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[74] 17 Jan. 1717, J. T. Gilbert (ed.), *Ancient records*, vii, 54.
[75] 18 Jul. 1735, J. T. Gilbert (ed.), *Ancient records*, viii, 173.
[76] 14 Apr. 1738, ibid. p. 286.
[77] 19 Oct. 1739, ibid. p. 350.
[78] 5 Dec. 1743, J. T. Gilbert (ed.), *Ancient records*, ix, 131-32.
[79] See section 1.6.
[80] 4 May 1764, J. T. Gilbert (ed.), *Ancient records*, ix, 357.

Kendrick's professional defeat by Rocque in no way affected his position as city surveyor, but by 1757, the subject of city leases and in turn the city surveyor role was placed under review by the Corporation. The theme behind this review was the 'preservation of the city estate'[81] by reconsidering the terms of leases and the actual boundaries of Corporation-owed lotts in response to the rapid development and expansion of the city. Leases were to be reviewed after three lives or seventy years, whichever came first, while the role and products of the city surveyor were also taken into consideration:

> 1) The annexing of maps to the original leases is in no sort a provision in the latter case, and not without something further, an effectual one in the former.
> 2) That upon the fall of every life within the 7 years, and before any renewal is granted, the city surveyor shall be directed to survey the premises and to report particularly all such changes he finds thereon.[82]

These were the most significant changes made to the role of city surveyor since the time of John Greene. Kendrick would be involved with the corporation again during the last decade of his surveying career.

Kendrick was suggested as a possible judge in the drawn-out public battle between Peter Callan and John Bell which was fought in the press during the 1750s. John Bell, in reference to the two men's conflicting field notes, suggested:

> … let the same exact field-notes be sent to be cast up by the Surveyor-General, or by the City Surveyor of Dublin, which, I think, will determine that affair …[83]

Peter Callan was not supportive of Bell's suggestion; however, Callan had a reputation for judging other surveyors mostly in bad light:

> By what motive can we be induced to believe, that there is a Surveyor-General, and a City-Surveyor of Dublin, lawfully empowered to determine the contents of field-notes? And if there be such superior officers, how can we know who they are, and by what law are they so established?[84]

Despite Callan's aggressiveness, he did make a valid point – there was nothing in the job description of Dublin City Surveyor that meant he could interfere between two surveyors in dispute, and if he did so, any judgement would not have enforceable legal support. Kendrick may have also been asked to become involved due to his official position rather than his personal qualities as a surveyor. It is important to note

[81] 21 Jan. 1757, J. T. Gilbert (ed.), *Ancient records*, x, p. 263.
[82] Ibid.
[83] *Universal Advertiser*, 7 Nov. 1758.
[84] *Universal Advertiser*, 21 Nov. 1758.

that Bell considered the role of Dublin City Surveyor second only to the Surveyor General, which is understandable given the relative lack of official civic surveyors.

Kendrick had been city surveyor for almost thirty years by 1764. Unlike his predecessors and the majority of his successors, Kendrick opted to retire rather than continue indefinitely. The midsummer assembly accepted Kendrick's option to retire as:

> … Roger Kendrick is grown old and unable to procure for himself an independent subsistence for the remainder of his life, do recommend that he be allowed an annuity of £20, during his natural life.
> We observe that he has given up such maps and papers as he had relative to the city estates.[85]

Kendrick's city surveyor career may have overlapped with that of his successor, Thomas Mathews. Mathews was already operating in a surveying capacity before Kendrick's retirement, producing a survey of Grafton Street area in 1752[86] and may have been an assistant of Kendrick's before his retirement and replacement in 1764.[87] From the perspective of cartographic presentation, possibly Mathews's most valuable act for students of eighteenth-century surveying was his compilation of a book:

> Wherein shall be entered by him all the maps, surveys and levels which he has hitherto made, or shall here after make, upon such occasions, the same to be left in the Tholsel office to be produced at any time hereafter[88]

Mathews was paid a fee of £100 for compiling this book of maps of which the Corporation 'much approve of.'[89] Possibly due to this act of preservation, many of Mathews' maps survive to this day.[90] As standard practice, Mathews would only receive payment for maps he produced if they were handed in to the town clerk, who in turn would give Mathews a certificate stating that the maps had been registered at the Tholsel.[91]

Mathews was often occupied with setting out lotts and dividing sections of land. In 1771 he was directed to lay out lotts for building on Oxmanstown Green. From

[85] 20 Jul. 1764, J. T. Gilbert (ed.), *Ancient records*, xi, 226.
[86] Dublin City Surveyor maps (DCA, C1/S1/69).
[87] 4 May 4 1764, J. T. Gilbert (ed.), *Ancient records*, xi, 208.
[88] 11 Apr., 1766, Ibid. p. 326-327.
[89] 20 Jul. 1781, J. T. Gilbert (ed.), *Ancient records*, xiii, p. 197.
[90] Dublin City Surveyor maps (DCA, C1/S1/4-5, 12. 38, 41, 46, 47, 54-56, 79, 80, 90, 91, 96, 99, 106, 114, 116, 120, 131, 133).
[91] 20 Oct. 1769, J. T. Gilbert (ed.), *Ancient records*, xii, 39.

Mathews' surveys, the land was noted to have 'been waste and unserviceable' and that through planned building projects it would become 'an ornament to that part of your honours' estate and greatly increase the rental thereof.'[92] Mathews was also active in setting out lotts on South Great George's Street.[93]

Aside from setting out lotts, Mathews' activities as city surveyor required him to use his skills for tasks not always associated with traditional land surveying. In 1772, stables belonging to a Mr. Mahon of Island Bridge were damaged, possibly by a waste water outlet built by the piped water committee of Dublin Corporation. Mathews and Joseph Parker, possibly an assistant or a surveyor hired by Mr. Mahon:

> … were directed to make out an estimate of such damages, which said estimate, so returned … amounts to the sum of £94 1s 6 1/2 d.[94]

An additional report determined that waste water had 'sapped the foundation' of the stable and Mr. Mahon was paid the sum determined by Mathews.

Mathews' connection to Parker is unclear, and the two are only mentioned together in this one incident. Mathews was known to have had at least two assistants, during his career as city surveyor. Isaac Gladwell, in an advertisement in *Finn's Leinster Journal*, was keen to show off his:

> … apprenticeship to Mr. Thomas Mathews, late Surveyor to the Corporation of the City of Dublin, where he has been employed in his profession for many years past ….[95]

Another assistant, R. Lewis, signed at least one map for Mathews in 1781[96] which was only one year before Mathews's death. This may have been connected with Mathews's age, infirmity or indeed absence on business as there is no record stating if Mathews's death was sudden or expected.

Mathews died in 1782 but Lewis never became city surveyor. The work of Mathews's successor, Samuel Byron, can be said to represent the pinnacle of the position of city surveyor. Unlike previous occupants of the position, Byron was originally hired on a one-year contract that was reviewed on an annual basis.[97] Byron's career was similar

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[92] 17 Oct 1771, J. T. Gilbert (ed.), *Ancient records*, xii, 156.
[93] *Ancient records*, xi, pp. 115, 166-67, 203.
[94] 16 Oct. 1772, J. T. Gilbert (ed.), *Ancient records*, xii, 224.
[95] *Finn's Leinster Journal*, 18 Sept. 1784.
[96] Dublin City Surveyor maps (DCA, C1/S1/69).
[97] 17 Oct. 1782, J. T. Gilbert (ed.), *Ancient records*, xiii, 261.

to many who worked in the field of surveying in eighteenth-century Ireland in that he was not trained solely as a surveyor but came from a background in art. Byron studied at the Dublin Society's Drawing School[98] which apart from teaching fine art, also provided courses in geographical studies. Byron was skilled in the fields of both arts and surveying. He was granted entry into the guild of cutlers, painter-stainers and stationers[99] which according to Andrews was 'an honour not known to have been shared by any other surveyor'.[100]

Much of Byron's work was in and around the St. Stephen's Green area. One of his early products was a detailed survey of the Green, which was well received by the contemporary media:

> The survey of Stephen's Green, which was presented by Mr. Byron to the Lord Mayor … is the most singular as well as beautiful production of the kind that can be imagined. Surveys and plans give in general little more than sites, boundaries, and contents; while this artist has extended his art infinitely beyond their mere rule and compass. In the above view mathematical accuracy, it seems, is not only critically preserved, but by a pencil unknown before in this line, we are delighted with an actual portrait of the celebrated square, in its most beautiful dress.[101]

Unfortunately no copy of Byron's map of Stephen's Green is known to have survived.

Apart from creating beautiful maps, Byron also helped uphold the Corporation's legal rights against holders of leases. Two months after completing his Stephen's Green survey, Byron was asked to examine a lott leased by a Mr. Myers on Grafton Street. Myers was accused of not complying with the terms of his agreement with the Corporation in that he blocked access to neighbouring lotts. Myers was found guilty and Byron was paid £20 19s. 9d. for his services.[102] Never media shy, Byron announced his marriage to a Miss Church in 1787 and continued with his work on the newly-emerging sections of the city.

Byron's work took him to the reclaimed sections of land in modern East Wall in 1788 where:

[98] *Dublin Journal*, 7 Mar. 1780.
[99] Ibid., 18 Oct. 1780.
[100] Andrews, *Plantation acres* , p. 276.
[101] *Dublin Journal*, 21 Aug. 1783.
[102] 17 Oct. 1783, J. T. Gilbert (ed.), *Ancient records*, xiii, 337.

> A gentleman yesterday riding by Summer Hill and the Strand, observed Mr. Byron, the City Surveyor, with his attendants, striking out lines for new streets, to be laid out in lots for building. The beautiful situation of the place made him pay attention, when he found that Mr. Byron had staked out a street of eighty feet wide … This will certainly be as elegant a street as any in London, and it is understood the proprietors intend calling it Buckingham Street, in compliment to our illustrious Viceroy … Gloucester Street is intended to extend to the Circular road, and between it and Summer Hill there are intervening streets intended, which are to be called Nugent Street and Grenville Street.[103]

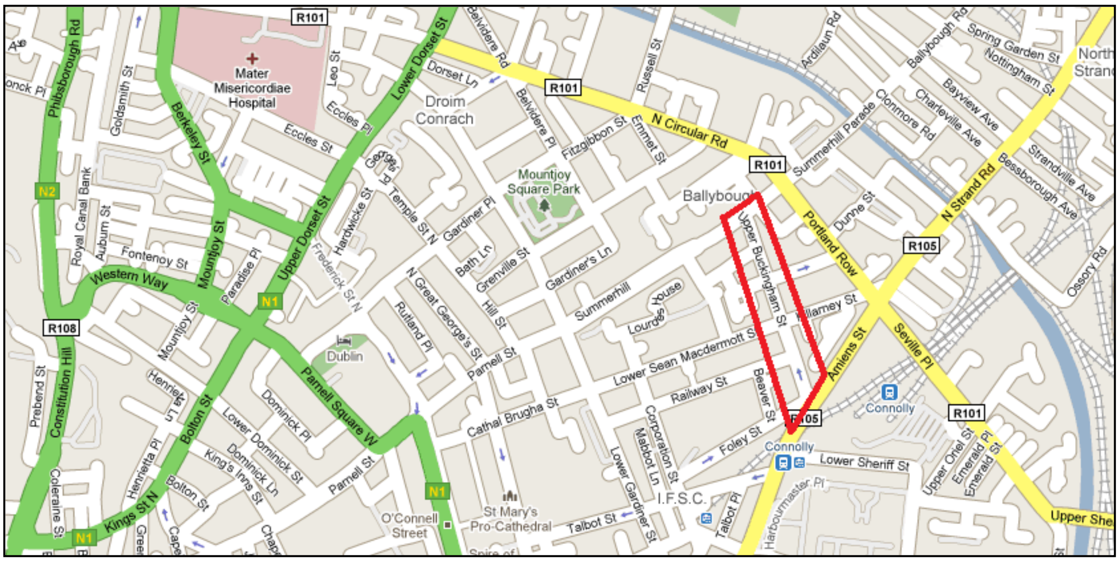

Figure 4.7 Location of Buckingham Street in Dublin, still under the same name (GoogleMaps, 2009).

Another of Byron's works to be featured in the media during the 1780s was his design of the ornamental grounds in Merrion Square which were 'universally approved and adopted by the gentlemen of the square, and … put into immediate execution'.[104]

During the later years of his life, Byron began to work with Arthur Richard Neville. Neville would eventually occupy the post of city surveyor in the early nineteenth century, and the first record of his work with Byron dates to 1791 when the two surveyors were tasked to 'ascertain the means and bounds' of lands leased to John Coghill in Clonturk.[105] In January 1795 Byron's contract with the Corporation was renewed for the last time.[106] Samuel Byron died at his home in King Street, Saint Stephen's Green in September of that year.[107]

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[103] *The Dublin Chronicle*, 31 Jul. 1788.
[104] Ibid., 4 Oct. 1788.
[105] 22 Jul. 1791, J. T. Gilbert (ed.), *Ancient records*, xiv, 209. This is now in the Drumcondra area.
[106] 16 Jan. 1795, ibid., p. 416.
[107] *Dublin Evening Post*, 8 Sept. 1795.

Little is known about Byron's successor, David Worthington. He was appointed to the post on Byron's death and his position was also renewed annually.[108] Worthington was known to use the initials C.S. after his name, denoting this official title,[109] a trend begun by Mathews[110] during his time as city surveyor which was occasionally followed until Worthington's time. Aside from Barnaby Hackett, Worthington held his official role for the shortest period, only six years, before his death in 1801.[111]

Arthur R. Neville was appointed city surveyor on Worthington's death. Neville's association with Dublin Corporation can be traced to 1704 when his grandfather, John Neville, was admitted as a freeman.[112] This honour would also be bestowed on Arthur in January 1795,[113] and followed the same recognition given to him by the people of Monaghan following a survey he conducted of the county in 1791.[114] Neville's work was not restricted to surveying of existing plots and buildings as he was allowed to submit plans for the construction of a new Tholsel, to be built on the site of the old one on Skinners Row, in 1803.[115]

Figure 4.8 Example of Neville's work. A. R. Neville, *Map of part of city estate on south side of College Green*, c. 1810 (DCA, C1/S1/39).

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108 16 Oct. 1795, J. T. Gilbert (ed.), *Ancient records*, xiv, 429.
109 D. B. Worthington, Map of piece of ground part of Sutor's Lane, 1801 (DCA, C1/S1/103).
110 Thomas Mathews, Map of a piece of ground on the north side of Thomas Street, 1778 (DCA, C1/S1/90).
111 1801, J. T. Gilbert (ed.), *Ancient records*, xv, 216.
112 Clark, *The book of maps of the Dublin city surveyors, 1695-1827*, p. xv.
113 16 Jan. 1795, J. T. Gilbert (ed.), *Ancient records*, xiv, 398.
114 *Dublin Evening Post*, 25 Aug. 1791.
115 22 Apr. 1803, J. T. Gilbert (ed.), *Ancient records*, xv, 295.

Neville's practices as a surveyor can occasionally seem dubious as his high costs and a habit of mixing private surveying business with his official work emerge throughout his career. As Clark mentions, Neville's combined payments over his twenty-eight year occupation of the position of city surveyor exceed £2,000 with the largest being £817 18*s.* 6*d*. in 1819.[116] The Corporation, alarmed at such high costs, sought to 'prevent the bringing forward of any bills from the city surveyor in future'[117] to little or no success. Neville also had a habit of drawing maps for his private practice on the rear of maps of the city estate,[118] which is something that even John Green never did despite his attention to his private career. Neville died in 1828, and the role of city surveyor passed to his son Arthur Neville Jr. Parke Neville, possibly Arthur Jr.'s brother or another close relation, held the position of joint city surveyor and City Engineer.[119] Arthur Neville Jr. was the last Dublin city surveyor when the post was discontinued in 1852.[120]

Dublin's city surveyors span the entire length of what is called the long eighteenth century. From the political and religious turmoil of the 1690s to the densely populated metropolis of the 1850s, the city surveyor represented Dublin's highest official surveying role and provides one of the longest, traceable lineages in Irish surveying.

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[116] Clark, *The book of maps of the Dublin city surveyors, 1695-1827*, p. xv.
[117] 28 Apr. 1752, J. T. Gilbert (ed.), *Ancient records*, xvi, 87.
[118] Clark, *The book of maps of the Dublin city surveyors, 1695-1827*, p. xvii.
[119] Ibid., p. xv.
[120] *Thom's Irish almanac and official directory* (Dublin, 1852).

4.4 Surveying and the Wide Streets Commissioners, 1758 – 1810

The Commissioners for making wide and convenient streets and passages, or as they came to be known, the Wide Streets Commissioners (WSC), were responsible for massive changes to Dublin's cramped and dense city centre during the eighteenth and nineteenth centuries. Originally established to create a street leading from the newly-reconstructed Essex Bridge to Dublin Castle in 1758, the WSC eventually shaped large portions of Dublin to their own style and taste by widening narrow streets,[121] sometimes creating new ones[122] whilst simultaneously enhancing their own properties,[123] to both the convenience and equal condemnation of Dublin's citizens.

Background

To fully understand the impact the WSC had on eighteenth-century Dublin it is first necessary to examine the physical framework of the city prior to its establishment. Dublin in 1758 still had an inherently medieval layout with narrow passages and roads unsuited to large coaches and the ever-increasing population of Ireland's capital city. Even by the end of the century, visitors to the city found sections of streets not to their liking:

> Narrowness and populousness of the principle thoroughfares, as well as … the dirt and wretchedness of the canaille … was a most uneasy and disgusting exercise.[124]

An anonymous visitor to the city in 1797 described the location of Powerscourt house as:

> Being situated in one of the narrowest streets, together with one of the most crowded meat markets in that city, being within a few feet of the hall door, renders it almost wholly unpleasant, and unworthy of notice.[125]

There were many traffic black-spots in the narrow and crooked streets:

> … much pestered with hucksters sitting under bulks and stalls in the streete [sic], whereby the streetes are made soe narrow that coaches or carts cannot well passe or turne, which is a greate annoyance to the inhabitants of this citty.[126]

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[121] Dame Street, South Great Georges Street.
[122] Frederick Street North, Parliament Street.
[123] Developments in the Gardiner estate were funded by the WSC, of note being the continuation of Sackville Street to the Liffey and the construction of Carlisle Bridge, now O'Connell Bridge.
[124] Arthur Young, *A tour of Ireland* (2 vol London, 1780), i, 6.
[125] Unknown, *Dublin and its vicinity* (London, 1797).
[126] 1670, J. T. Gilbert (ed.), *Ancient records*, iv, 489.

Additionally, such confined spaces, with little or no street lighting and poor lines of sight led to anti-social behaviour. A resident of Sackville Street complained to the WSC in the 1790s that:

> The line from Sackville Street to the New Bridge being divided by a Lane of six feet which is taken off the rere of my ground appears to me, and to those whom I have let to as a very great nuisance tending to create dirt, and probably will be resorted to by thieves, and night walkers, that may very much annoy the neighbourhood – the tenantry have therefore devised of me to represent it, that it may be shut up for the public accommodation.[127]

The southern junction of Essex Bridge caused particular problems for people and vehicles wishing to cross from the major thoroughfare of Capel Street to Dublin Castle along one of the few bridges to span the Liffey in Dublin. Crossing Essex Bridge, traffic met a T-junction at Essex Street and was funnelled through Blind Quay to Cork Hill where it merged with traffic from Dublin's then main east/west passage, Dame Street. Such problems did not go unnoticed and in 1757 the Irish parliament[128] created the WSC to deal with the Essex Bridge bottleneck.

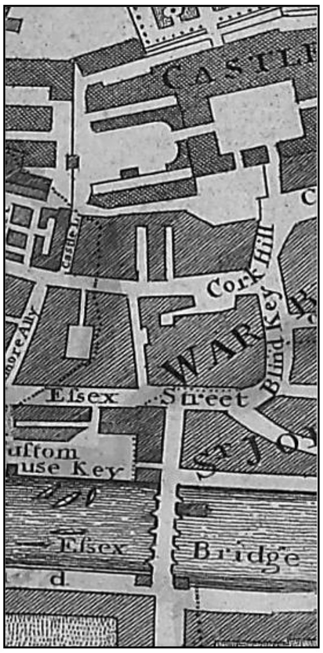

Figure 4.9 Essex Street area pre-WSC work, Charles Brooking, *A map of the city and suburbs of Dublin* (London, 1728).

Parliament Street

Surveyors and surveying had an unusually heavy influence on the initial work of Parliament Street. In 1751 a portion of Essex Bridge collapsed and the bridge became unusable for both pedestrians and coaches. George Semple, an engineer who was also an accomplished architect, builder and surveyor, was invited to rebuild the bridge by Dublin Corporation.[129] After encountering problems with the bridge's surviving piers, Semple went to London to examine documentation on the construction of Westminster Bridge which had been recently completed. His time in London also allowed him to consult a wide range of international literature on the subject of bridge building which was not readily available in Dublin, including a manual by Italian Leon Battista Alberti who stated:

[127] 15 June 1792 (DCA, WSC/Mins/11, p. 43).
[128] Given royal approval in 1757; *Statutes at large*, 31 Geo. II, c.19. [Ire.] (1757).
[129] Semple, *A treatise of building in water*, p. 2.

> A bridge must be made as broad as the street which leads to it.[130]

A detailed examination of Semple's joint surveying and engineering skill can be found in section 5.2. However, it appears that the reconstruction of the bridge had the additional advantage of causing an examination of the state of the streets at its southern junction. Semple's proposed designs for a new street, later named Parliament Street, supporting Alberti's theory, and also provided for a direct passage between the bridge and Dame Street.

Semple's new street was to be the same width as his new bridge, 51ft (15.5 metres) and he supported its implementation with logical arguments:

> 1st That the Royal Palace or Castle is of a very difficult access and almost totally concealed by means of the old Cork House on Cork Hill
> 2nd That the passage from the Castle to Essex Bridge (a very great thorofair) is extremely crooked and narrow, not being more than eighteen feet broad at the end of Copper Alley on the Blind Quay.
> 3rd That at the North end of Ormond Bridge, the passage for the publick is not more than twenty one feet in breath, but at the head of the Kings Inn Quay, and about the south end on the Old Bridge, is very dangerous and great thorofair, it is only about fifteen or eighteen feet broad, and that out of all said widths, the projection of palisades, posts &c. are to be deducted.[131]

Semple's new street was designed to:

> … contribute to the ease and safety of passengers, the adorning those parts of the city, and will be of use and benefit to the publick [sic].[132]

In May 1758 advertisments appeared in the *Dublin Journal*, *Dublin Gazette* and the *Universal Advertiser* requesting land owners and residents who were to be affected by the creation of the new street to voice their concerns directly to the clerk of the newly-formed WSC, Mr. Howard, who had been appointed the same month.[133] The creation of Parliament Street was the beginning of the most ambitious redevelopment plans seen in eighteenth-century Dublin, and surveyors would have a major role to play in the success of the WSC.

The legislation that created the WSC gave it the right to initiate compulsory purchase orders to buy land and plots that were required for their developments. Detailed

[130] Ibid., p. 8.
[131] George Semple, *Scheme for opening an approach to Dublin Castle* (Dublin, 1757).
[132] *Statutes at large*, 31 Geo. II, c.19 clause I. [Ire.] (1758).
[133] 6 May 1758 (DCA, WSC/MINS/1, p. 2).

accounts were made of the revenues of such plots, including their rent and value, beginning with the residents in the Essex Bridge area in June 1758.[134] Where residents refused to move, or when ownership could not be determined, a jury of twelve, appointed by the city sheriffs, would examine the resident's case and determine a value for the land, which the WSC paid. The jury's oath was as follows:

> You shall truly & diligently enquire into all such matters as shall be given you in charge & true verdict give according to your evidence. So help you God.[135]

Considering his wide-ranging work on the subject of passages to Essex Bridge, and his familiarity with the practicalities of executing the plan, George Semple was appointed the first surveyor to the WSC. By December 1758, Semple was in the process of preparing official maps for the Parliament Street project to be presented to the assembled jury.[136] Despite his extensive work on the project which had by the end of 1758 both legislative and financial support, a serious disagreement erupted between Semple and the WSC. Having twice refused to hand over maps to both the WSC clerk Mr. Howard, and the commissioners themselves, Semple was informed on 22 January 1759 that the commissioners were 'resolved that he shall be no further employed by them.'[137] The nature of the disagreement is unknown, and in his extensive *Treatise of building in water* (London, 1780), in which Semple detailed many aspects of his career, he failed to mention either his time with the WSC or his work on Parliament Street.

Semple's dismissal from the WSC was not a unique occurrence amongst the surveying community of eighteenth-century Dublin, but it was rare. Another notable case was that of Thomas Owen, surveyor to the Paving Board. His cause sheds light on some possible reasons for disagreement between Semple and the WSC. Owen was selected ahead of eminent surveyors Thomas Mathews and William Cox for the position of Paving Board surveyor in 1774,[138] and went on to have a relatively turbulent career. The first official complaint against him came in 1776 when a Mr. James Kelly of Church Street protested that Owen had given him incorrect advice as to the finished level of the paving of Church Street. Owen's defence to the board was:

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[134] 30 June 1758 (DCA, WSC/Mins/1, p. 6).
[135] 24 July 1761 (DCA, WSC/Mins/1, p. 88).
[136] 9 Dec. 1758 (DCA, WSC/Mins/1, p. 7).
[137] 22 Jan. 1759 (DCA, WSC/Mins/1, p. 18).
[138] 8 June 1774 (DCA, PB/Mins/1, p. 10).

> … in the variety of the questions asked him when in the [middle] of business [he] could not be accountable for every answer, especially before his level was completed …[139]

Having visited the site, the board found in Owen's favour and dismissed the charges against him. A second complaint came the following year when Major John Butler criticized Owen's 'misbehaviour' - whether professional or personal is not noted-and Owen was required to make a full apology to the members of the board and Major Butler which was accepted by all parties.[140] In 1780 Owen was once again in trouble with the board, on this occasion relating to negligence of duty. It was reported that 'a number of people who they employ, have been long kept out of their money, on account of Mr. Owen not having measured their work.'[141] Owen's work was checked and the charges against him were dropped.

Despite having avoided reprimand on two occasions, Owen's financial situation and continual trouble-making would eventually lead to his dismissal. Having been warned of possible dismissal in 1784 if he continued to look for payment outside of normal Paving Board channels,[142] the Board resolved in 1787 to close the position of Paving Board surveyor.[143] Owen's response was one of shock and astonishment. In a letter to the board he highlighted his thirteen years service, the improvements he had made to the city, his lack of money to provide for his family, his poor health and the future career of his son who he had been training as his replacement.[144] The board was unmoved by Owen's plight but awarded him £30, or four months wages, as a redundancy payment.[145] Owen again complained that his dismissal had ruined his reputation however the board contested this fact and issued Owen with a certificate stating the details of his dismissal.[146] Given Owen's dubious record, with a total of four official complaints against him over thirteen years leading to eventual dismissal, Semple's removal from office from the WSC must be seen in a different light. The possibility of tensions, arguments, conflicting agendas and personality clashes or a

139 9 Aug. 1776 (DCA, PB/Mins/2, p. 186).
140 13 June 1777 (DCA, PB/Mins/3, p. 157).
141 8 Apr. 1780 (DCA, PB/Mins/7, p. 50).
142 27 Jun. 1784 (DCA, PB/Mins/11, p. 6).
143 14 Feb. 1786 (DCA, PB/Mins/19, p. 258).
144 See Appendix G for the Paving Board minutes relating to Thomas Owen's dismissal.
145 21 Feb. 1787 (DCA, PB/Mins/19, p. 272).
146 12 Apr. 1787 (DCA, PB/Mins/1, p. 391).

combination of these, may have led to Semple's discharge. However these are not recorded and any further discussion would be merely speculation.

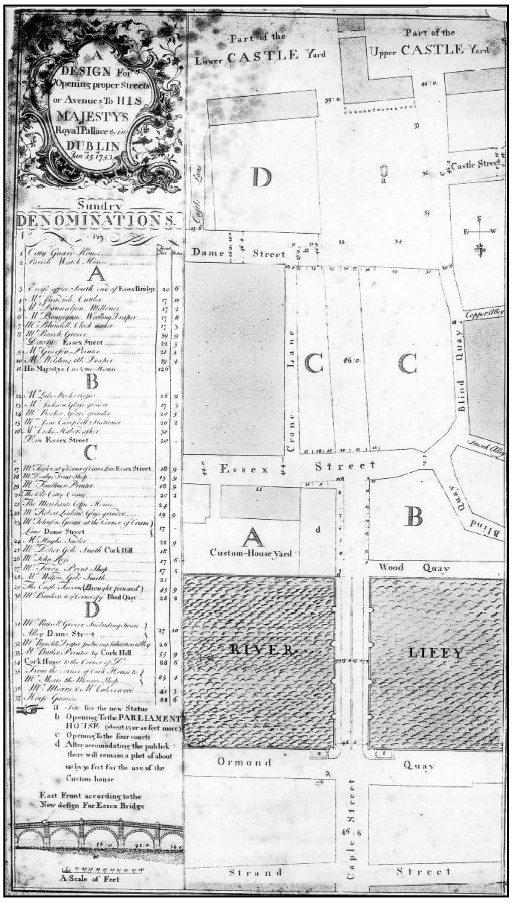

Figure 4.10 Parliament Street post WSC work, Unknown author, *A design for opening proper streets or avenues to his majesty's royal palace* (Dublin, n.d.).

Semple's replacement, measurer William Purefield, carried on work on the Parliament Street project and was retained by the WSC into the 1760s.[147] Purefield was a respected measurer, rather than a surveyor[148] who had previously worked on the new western façade of Trinity College in 1752.[149] However his work as the WSC surveyor did not go unquestioned or unexamined. Whilst finishing up work on Parliament Street, a map of Essex Street and Cork Hill produced by Purefield was scrutinised by the Commissioners. There is a clear indication that his work on this map did not meet with their confidence and the then city surveyor, Roger Kendrick, and the deputy surveyor general, George Gibson were asked jointly to produce their own survey of the same area which was to be compared to Purefield's original.[150] Purefield's work appears to have passed the test as he was retained by the WSC and produced further work on the Essex Street/Parliament Street area with prominent surveyor Jonathan Barker.[151]

[147] 28 July 1761 (DCA, WSC/Mins/1, p. 109).
[148] See section 2.2 for a comparison between a surveyor and measurer.
[149] Frederick O'Dwyer, 'Building empires: architecture, politics and the Board of Works, 1760-1860', p. 123.
[150] 8 Oct. 1762 (DCA, WSC/Mins/1, p. 180).
[151] 8 Nov. 1762 (DCA, WSC/Mins/1, p. 182).

The Wide Streets Commissioners and their powers

The Commissioners themselves were a group of upper-class landowners who were often members of parliament. The initial set of commissioners included Arthur Hill, Commissioner of revenue and later chancellor of the exchequer; Thomas Adderley of the Barrack Board, Philip Tisdall, later attorney general; and John Ponsonby, speaker of the House of Commons.[152] Later members included amateur architects Frederick Trench and David La Touche, John Beresford who was instrumental in the construction of the new Customs House and land owner Luke Gardiner who oversaw WSC work on his estate in the northern section of Dublin City. Some commissioners were more active than others, with La Touch and Trench in particular being active during the 1790s. The commissioners met at irregular intervals until the 1780s when meetings between some of them, not all, occurred several times a week. These meetings took place at the tholsel, the chamber in Dame Street[153] or the royal exchange.[154] Maps produced by the WSC were often hung in the coffee room of the royal exchange.[155] The involvement of such high powered individuals indicates the importance of the redevelopment of the city's infrastructure through the WSC and the political power, and resources, upon which the body could depend.

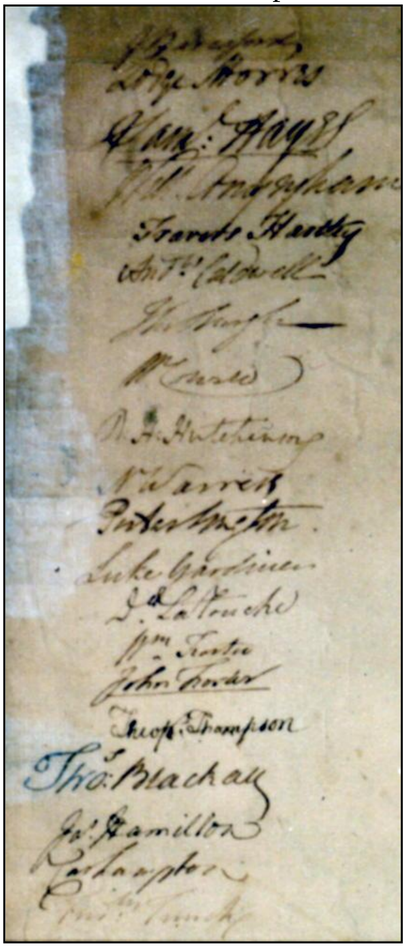

Figure 4.11 Signatures of the Wide Streets Commissioners, Thomas Sherrard, Great Britain Street and Cavendish Row, 1787 (DCA, WCS/Maps/206).

As the members of the commissioners changed through the decades, so did the legislative power given to them. The initial act enabling the WSC to create Parliament Street was expanded in 1759 to allow the commissioners to examine the possibility of

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[152] Edward McParland, 'The Wide Streets Commissioners: their importance for Dublin architecture in the late 18th-early 19th century' *Ir. Georgian Soc. Bull.*, xv (1972), p. 2.
[153] 15 March 1762 (DCA, WSC/Mins/1, p. 146).
[154] 14 Jan 1785 (DCA, WSC/Mins/6, p. 104).
[155] 21 Feb. 1804 (DCA, WSC/Mins/19, p. 167).

developing more than one street.[156] Their finances were boosted with another act[157] in 1781 enabling them to receive a sum of one shilling per ton of coal imported into the country. The WSC's financial position was further enhanced in 1790 with an act allowing it to borrow £100,000.[158] Such acts indicated that there was a definite need and desire to redevelop many sections of Dublin City as:

> … there are many narrow streets, lanes, and passages in the city of Dublin, and the liberties thereof, where there are waste and unbuilt grounds, or where houses and buildings have been heretofore made, and such houses or buildings have fallen or are going into decay, and the opening and widening of such narrow streets, lanes, and passages would be of great benefit to all and every the inhabitants of such narrow lanes, streets, and passages, and also to the owners and proprietors thereof, and of such waste or unbuilt grounds or houses and would be a great improvement to the said city.[159]

After the commissioners' initial flurry of action in the late 1750s and early 1760s, there was a period of inactivity during the 1770s. This can be most readily observed in the minute books of the WSC as during the 1780s, 1790s and early nineteenth century the commissioners used one minute book per year whereas only four books were completed for the period 1758 to 1781 – an average of 5.75 years per minute book. Despite the relative quietness regarding the work of the WSC, the effects of the construction of Parliament Street appear to have encouraged discussion on how best other sections of the city could be developed.

In early 1769, a series of articles on the development of Dublin's main streets and comments on possible theories for future projects appeared in the *Freeman's Journal*. What makes these articles unique is that many of the suggestions brought forth were actually implemented decades later. This suggests that their author may have been a member, or possibly future member, of the WSC. The author was evidently aware that changes to the city could not be completed overnight:

> Amongst a refined and civilised people, in great and opulent cities, all improvements and alterations should be carried on, with a view towards something more extensive on a *future day*. The expense of pulling down houses and purchasing ground renders it impossible to complete a scheme of magnificence at once, but everything may be accomplished by time and perseverance, by gradual and repeated effort. If this

[156] *Statutes at large*, 33 Geo. II, c. 15, clause v [Ire.] (1759).
[157] *Statutes at large*, 21, 22 Geo. III, c.17. [Ire.] (1781).
[158] *Statutes at large*, 30 Geo. III, c .19. [Ire.] (1790).
[159] *Statutes at large*, 30 Geo. III, c .19, clause, xxvii, [Ire.] (1790), quoted by Sheridan, 'Designing the capital city', p. 120.

principle had been early enough attended to, what prodigious advantages might have been gained in the situation of Parliament House![160]

The author proposed that if Sackville Street had been continued to the river[161]and that a street had been built on the opposite southern side of the river, it would have given a splendid view of Trinity College. This proposed street on the south bank of the Liffey would indeed be built and named Westmoreland Street, however, such work would not be finished until the early nineteenth century, nearly a half century after the article was published.

The author made several other creative suggestions that also became realities in the coming decades. Regarding the position of the Customs House the author wrote:

> From the strong tendency that the city discovers to enlarge itself eastwards, and to push down to the sea, I foresee, with much concern, that the bridge [modern O'Connell Bridge] so frequently mentioned, will at length from necessary force itself. If it must be no avenues more convenient or more beautiful than those two streets could possible be laid out [Sackville Street and Westmoreland Street]. A bridge being erected, the Customs House must be removed, the consequence of which is, that the merchants will follow.[162]

Other future works of the WSC were foretold including the widening of Dame Street and improvements to College Green.

Aside from accurately predicting the future development of Dublin, the author also discussed theories of city development and the need for such developments in Dublin. These discussions provide insight not only into the reasons for the WSC's existence in the eighteenth and nineteenth centuries, but also into the fact that discussions of the development of the city were not always conducted behind closed doors but in the press. Philadelphia, Pennsylvania, 'a remarkable instance of the beauty a metropolis may receive' was suggested by the author in the *Freeman's Journal* as a role model for Dublin due to its large, uniform streets and the strategic positioning of its public buildings. Dublin had:

> … hitherto felt severely the great inconveniences, of the want of such a scheme; and experience has of late convinced us, of the advantages of such a measure, by the few

[160] *Freeman's Journal*, 21 Jan. 1769.
[161] At the time it only progressed as far as Henry Street, with a small road, Drogheda Street continuing onto Bachelors walk.
[162] *Freeman's Journal*, 21 Jan. 1769.

alterations we have been obliged to make to remedy some of those inconveniences.[163]

Using Parliament Street as an example of the positive affects of the WSC's work the author continued:

> … the city is more airy, and consequently more healthy, as well as more convenient and pleasant, since one street has been opened [Parliament Street] and part of another widened [Dame Street] – no individual has suffered, many have gained …[164]

Despite the improvements so far highlighted, the city was still in need of extensive work. The author listed public buildings such as the tholsel, the mansion house and the four courts as being in poor state of repair – with even the city marshal being unable to provide decent accommodation for his family. Although some work had already been undertaken on Dame Street, there were still significant developments necessary which the author could imagine:

> … let us turn our eye down the hill; and enjoy the prospect along Dame Street, properly widened and regularly levelled in a direct line … has any city in Europe anything that can surpass (or perhaps equal) such a vista?[165]

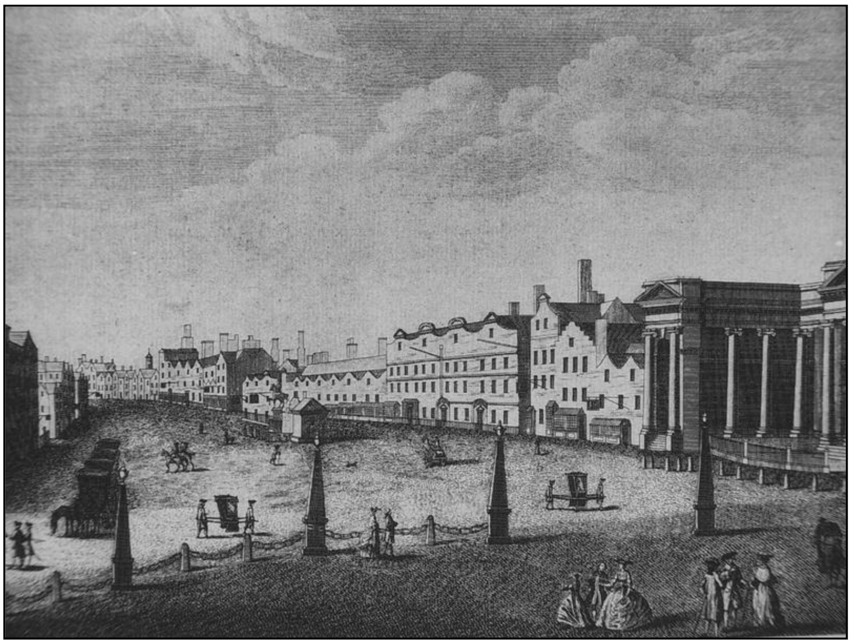

Figure 4.12 College Green looking towards Dame Street, Joseph Tudor (Dublin, 1750), reproduced in Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19)

[163] *Freeman's Journal*, 11 Feb. 1769.
[164] Ibid.
[165] Ibid.

The author obviously had a vested interest in the city's development and seemed well versed in civic development and architecture, not only in Ireland but also further afield. It appears that he had also taken 'The Grand Tour' of Europe as he mentioned visiting Florence, Genoa and Venice; so his[166] member or future member of the WSC is not an unreasonable conclusion to come to. Despite his logical arguments and obvious knowledge, the author concluded that he 'shall no longer give a loose to my ravished imagination'. The need for the continued development of the city following completion of the Parliament Street project was clear and obviously well supported.

The work of Thomas Sherrard

Survey work for the WSC was undertaken by several men during the first three decades of its existence. George Semple, William Purefield, Roger Kendrick, George Gibson and Jonathan Barker, as has been shown, were early providers of maps to the commissioners. One man however was to dominate the position of surveyor to the WSC for nearly half a century – Thomas Sherrard. Sherrard was a product of Rocque's 'French School' of surveying and was the apprentice of Bernard Scalé during the 1770s. His joint position of surveyor and clerk to the WSC during the later eighteenth and early nineteenth centuries makes him one of the most influential surveyors to help shape Dublin into its current layout. Sherrard's work was so important that a street was named after him – Sherrard Street Upper and Lower, off Dorset Street.

Figure 4.13 Sherrard Street Upper (taken by F. O'Cionnaith).

From map records, it appears that Sherrard first began to work with the WSC during the early 1780s producing maps of Dame Street[167] Rutland Square (modern Parnell

[166] There is no evidence that the author was in fact a man, and the possibility that a woman may have produced these suggestions must also be considered.
[167] (DCA, WSC/Maps/115), 1784.

Square)[168] and drawing up plans for the completion of Sackville Street by continuing it to the Liffey.[169] Sherrard's Sackville Street continuation plan represents a good example of the work of the WSC and the role that surveyors played, not only in laying out new streets, but also establishing property boundaries and ownership before development work began. Sherrard's map of the proposed improvements to Sackville Street (figure 4.14) shows the street's layout in 1786. Sackville Street stopped at Henry Street with Drogheda Street, which was half the width of Sackville Street, continuing onto the Liffey. Sherrard's map showed a total of twenty three proposed lotts to be laid out after the widening of Drogheda Street to the same width as Sackville Street. The proposed work would remove two 'blocks' of Drogheda Street between Henry Street and Princes lane, between Princes Lane and Abbey Street. The precision to which the WSC worked is revealed in the request that the buildings on the eastern side of Drogheda Street would have to be moved back one or two feet from their current positions to maintain the new street's symmetry. Such exactness was not restricted to the Sackville Street continuation, but can be found throughout the records of the WSC during the eighteenth century. Architect Samuel Sproule once reported that the windows of a house built on Dame Street had to be altered as they were:

> A few inches too low, & … the windows of Mr. Colles's house adjoining … are too high by four & an half.[170]

The figures on the following pages (figures 4.14 - 4.19 inclusively) represent many of the common styles found in WSC maps during the eighteenth century. The maps of the WSC had no set standardised form of representation and were therefore heavily influenced by the personal style of the surveyor who created them.

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[168] (DCA, WSC/Maps/41), 1789.
[169] (DCA, WSC/Maps/78), 1786.
[170] 26 Sept. 1783, quoted in McParland, 'The Wide Streets commissioners: their importance for Dublin architecture in the late 18th-early 19th century', p. 11.

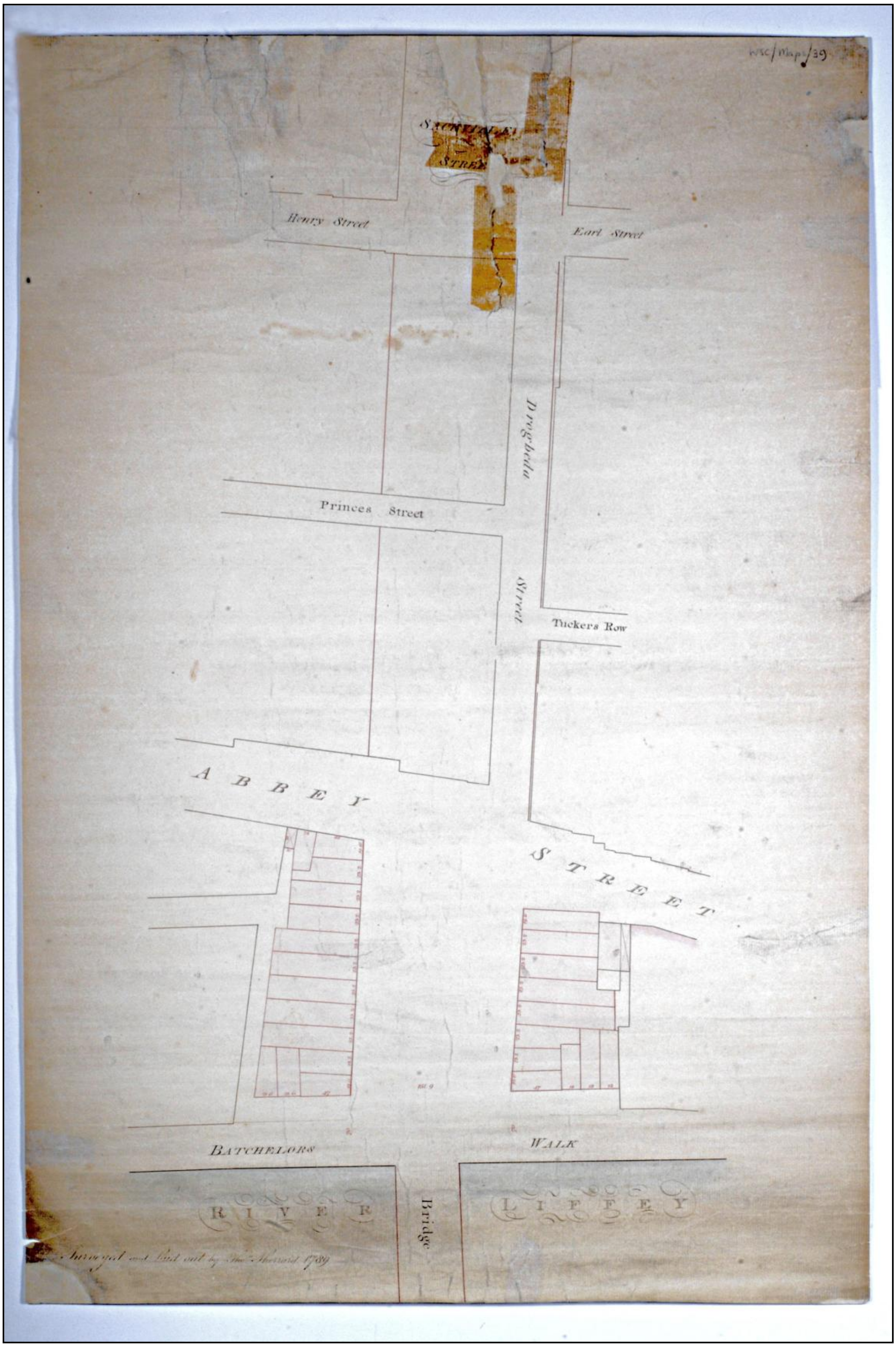

Figure 4.14 Thomas Sherrard, Sackville Street 1789, proposed continuation of Sackville Street to its modern layout by the widening of Drogheda Street (DCA, WSC/Maps/39).

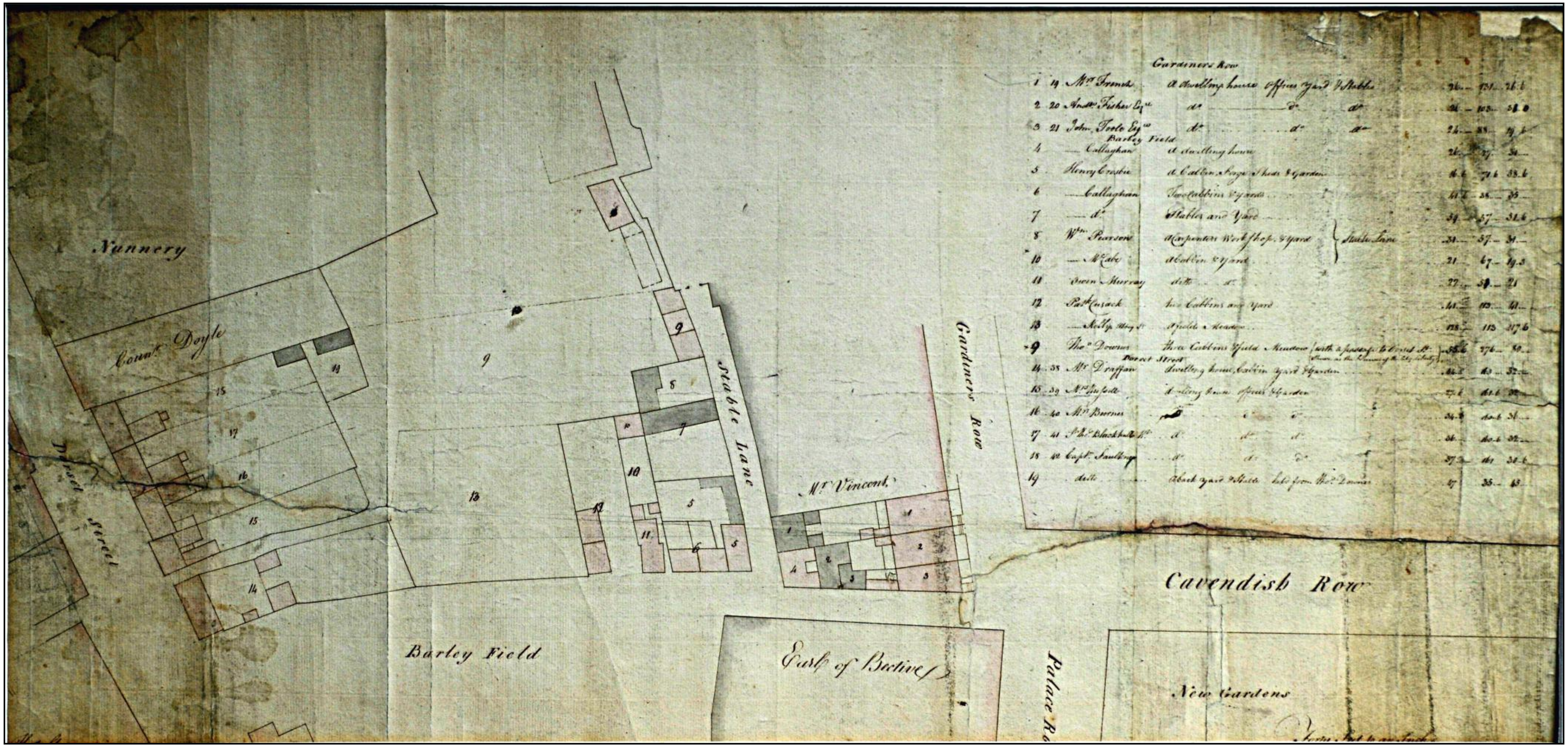

Figure 4.15 Sherrard's Plan of Cavendish Row and Dorset Street, Thomas Sherrard, Survey of the Barley Field, 1782 (DCA, WSC/Maps/18).

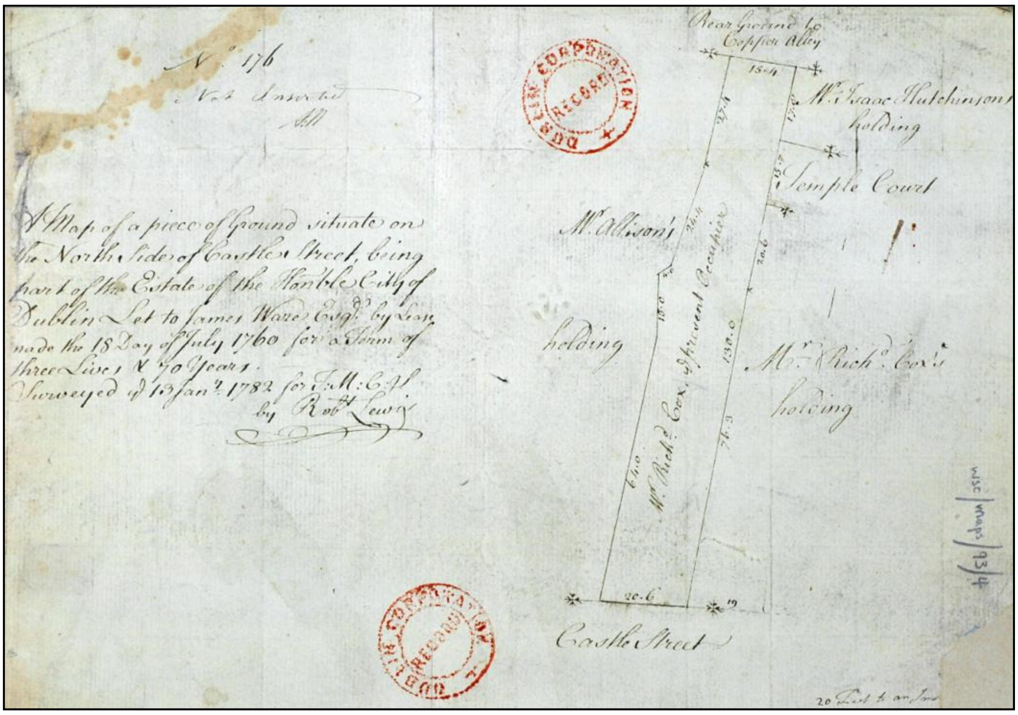

Figure 4.16 Robert Lewis, Map of…ground…Castle Street, 1782 (DCA, WSC/Maps/93/1-12). Not every WSC map was large or detailed. Many were small and basic with little or no decoration.

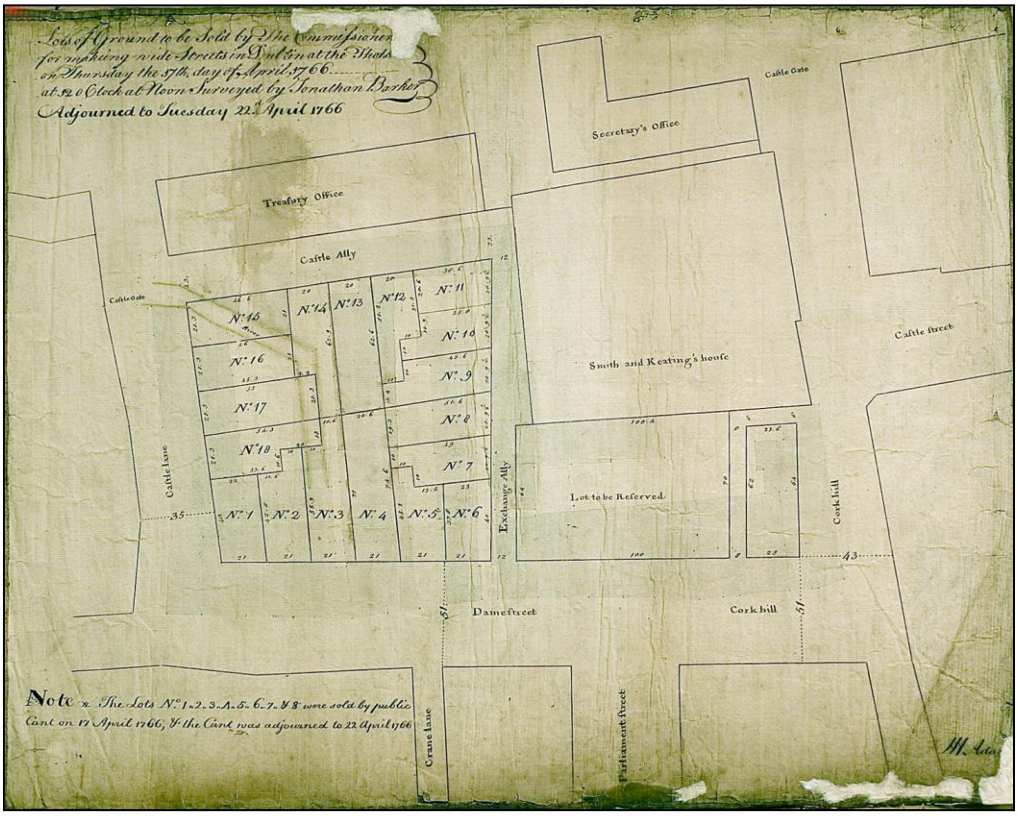

Figure 4.17 Example of the work of Jonathan Barker, Lot of ground to be sold to the commissioners for making wide streets, 1766 (DCA, WSC/Maps/162/1-3).

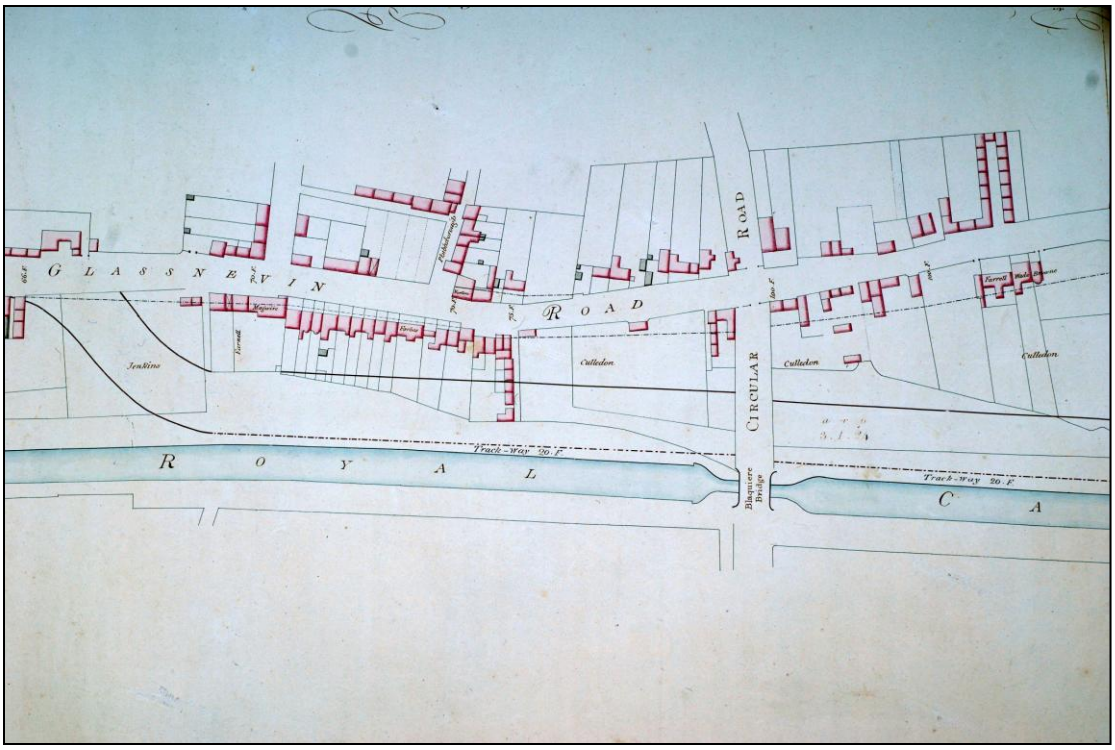

Figure 4.18 Portion of Thomas Sherrard, Church Street, Constitution Hill and Phibsboro Road, 1790 (DCA, WSC/Maps/263). The entire map is over seven feet in length running from Church Street to the Botanic Gardens in Glasnevin.

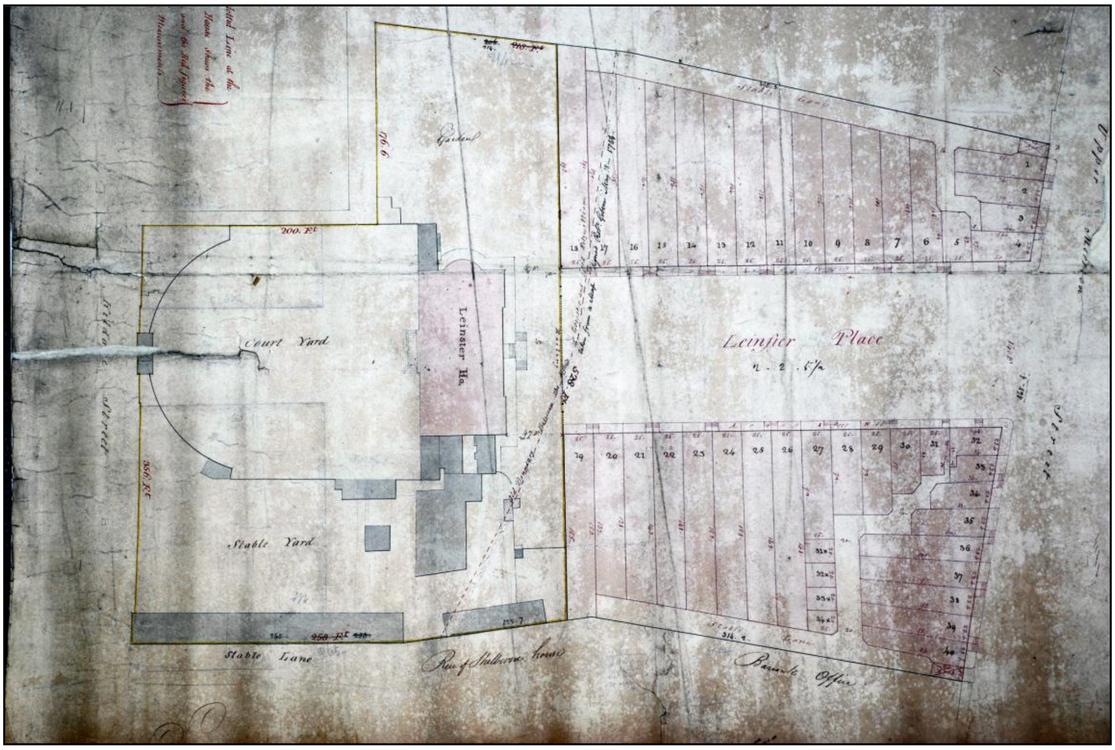

Figure 4.19 Robert Gibson, *Leinster House*, 1812 (DCA, WSC/Maps/411). This map was copied from a Gibson original. Gibson's name is the only one present.

Whilst Sherrard's work on Sackville Street may represent the best example of the maps of surveyors within the WSC, it only accounts for a small portion of his work with the commissioners. In one of his earliest jobs for the WSC in 1782, Sherrard was requested to conduct a 'survey of the houses and grounds' between Cavendish Row and Dorset Street so that Mr. Adams, the WSC valuation surveyor, could establish the costs of purchasing the properties.[171] This would allow for the construction of modern Frederick Street. Apart from Mr. Adams and the Commissioners themselves, Sherrard worked closely with many other WSC employees such as Samuel Sproule who produced architectural plans for the commissioners. For work on widening Dame Street, Sproule produced plans for the entire street whilst Sherrard was jointly asked to conduct levelling runs between Cork Hill and Trinity College[172] both of which passed the commissioners standards.[173]

Sherrard appears to have also been involved with the improvement of Dublin's streets outside of his role in the WSC. In January 1782 Sherrard wrote to Dublin's Paving Board, to discuss his new residence on Capel Street. He informed them:

> … he has taken the house within Michael Swift Esq formerly dwelt in Capel Street & is willing to give up the pallisadoes (so justly deemed a nuisance), if the board will be at the expense of removing them, turning the arches over the areas, & flagging & paving the footway; which must be the normal size & done under his approbation, & he will give the rails towards the expense.[174]

Sherrard worked with the Paving Board as part of his role with the WSC, however it is interesting to note his interaction with them as a private citizen also.

As clerk and surveyor to the commissioners, Sherrard often found himself involved in roles that departed greatly from traditional land surveying. In 1786 Sherrard informed the commissioners that he had supervised the demolition of No. 36 Bachelors Walk and that the neighbouring house, No. 37 was in danger of collapsing.The commissioners ordered that:

> … Mr. Sherrard do take the most speedy & effectual measurers to prevent any injury to the public from said house & do pull down, if necessary, so much of said house as may prevent any danger and dispose of the materials to the best advantage.[175]

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[171] 3 May 1782 (DCA, WSC/Mins/4, p. 59).
[172] 17 May 1782 (DCA, WSC/Mins/4, p. 52).
[173] 24 May 1782 (DCA, WSC/Mins/4, p. 67).
[174] 11 Jan. 1782 (DCA, PB/Mins/9, p. 191).
[175] 10 Jan. 1786 (DCA, WSC/Mins/6, p. 254).

Sherrard does not appear to have been formally reprimanded for this mistake however the incident reappeared before the commissioners in the following month. A Rev. Carey, who lived in No. 37, complained of the damage caused to his home by the demolition of the neighbouring house. Carey was willing to move from his home, however he insisted on being paid compensation by the WSC. Further investigations by the commissioner's valuation surveyor determined that Rev. Carey was only a tenant in No. 37 and that he had no genuine claim to compensation.[176] Sherrard paid £10 for the materials taken from No. 36, including doors and locks, indicating that he may have had connections in the building trade or possibly owned houses himself. Aside from occasionally destroying buildings, Sherrard was regularly required to hire watchmen to protect houses that were bought by the WSC and lay vacant for long periods of time.[177]

Sherrard's role as clerk to the WSC was a profitable side income in addition to the revenue generated by his successful surveying business. A multi-facetted position, dealing with some of the most powerful politicians in eighteenth-century Ireland, it often involved a high degree of personal responsibility as noted when Sherrard's role was renewed in 1789:

> Business of the clerks department;
> To fill up and serve summons upon the several commissioners each time of their meeting, to attend said meetings, take down minutes of the proceedings, enter them in the minute book and copy them into a fair book if necessary. To copy, make out and sign the several resolutions and orders of the board for the several parties and to prepare drafts on the sectary or treasurer for the several sums ordered to be paid by him … To write and forward all the letters ordered by the board and to keep copies thereof ... The clerk is not required to give attendance upon the valuation by jurys, issue summons for that business or have any interference whatsoever therein more than to enter verdicts when returned by the law agent and confirmed.[178]

Sherrard was paid £50 per annum for the role of clerk, in addition to being paid for every survey he conducted for the WSC. Maps produced for the WSC were stored by Sherrard 'in his office'[179] but it is unclear whether he had a specific office for his role as clerk or if this referred to his own surveying offices.

[176] 17 Feb. 1786 (DCA, WSC/Mins/6, p. 261).
[177] 11 July 1791 (DCA, WSC/Mins/10, p. 166).
[178] 13 Mar. 1789 (DCA, WSC/Mins/8, p. 224).
[179] (DCA, WSC/Mins/10, p. 200).

The work of the WSC did not always go unopposed, and land owners were particularly vigilant regarding both the amount of property that the WSC took, and the potential impact which this could have on their remaining property. Joshua Hubard wrote to the commissioners in 1792 complaining that despite work that he himself had assisted with the building of the Grand Canal bank beside his own property at Harcourt Lock, and an assurance published in *Saunders Newsletter*[180] that the commissioners were not to build close to that section of the canal, he had learnt, by accident, that the commissioners were indeed planning to build a row of houses between his property and the canal. Worried that this development would adversely effect his rental income, he wrote:

> And now in the foundations for houses being nearly completed in the whole of the front of my holding, and the holding itself very narrow, it cannot be put to any other use that I know of but the one for which it is laid out – and if the commissioners persist in including this holding in their order, who is to pay me the value of my profit rent on my tenant … The Commissioners I am persuaded will never be influenced by any body of men to destroy private property without amply recompensing the owner hoping they will take my case into consideration I must beg you will lay this letter before them at the next board.[181]

Sherrard was requested to investigate the situation on the ground and report back to the board.

Sherrard's 'Great Map'

The work conducted by the WSC could sometimes surpassed the updated available maps of the city. By 1791 they were in need of 'an accurate and general map of the city'. This proposed map was to cover the area enclosed to the north by the Royal Canal and the south by the Grand Canal showing:

> … the extent or front of each house and distinguishing the dwelling houses from the stables or warehouses and also waste ground not built upon: the whole to be laid down upon a scale of eighty feet to an inch; would be a very desirable object to obtain.[182]

This map, having apparently being proposed by Sherrard himself, was awarded £1,000 to be paid at three hundred guineas per annum until the map was completed. The most recent large mapping project to have taken place in the city was that of Rocque and his exact survey in the 1750s, and despite Scalé's production of an updated version of Rocque's map in 1773, it was obvious that a new, complete survey

[180] *Saunders Newsletter*, 13 Apr. 1792.
[181] 20 Apr. 1792 (DCA, WSC/Mins/1, p. 322).
[182] 1 July 1791 (DCA, WSC/Mins/1, p. 161).

of the city was required. Sherrard surveyed the city according to its divisions, of which six equally divided the city north and south of the Liffey. These were administrative areas and by January 1795 Sherrard had completed the north eastern division of his ‘great map’ at a cost of £200 sterling.[183] The entire project lasted until 1797 when:

> Mr. Sherrard laid before the Board the North Section of the Great Map of Dublin and its environs being the sixth and last section of said work done pursuant to resolution of the 13th April 1792 finished in the same style as the sections already done.[184]

Little is known about the ‘Great Map’ produced by Sherrard and no complete copy of it has survived. The only portion of it studied during the course of this research was a nineteenth-century duplicate of a section around Christchurch Cathedral included in Andrews *Plantation acres* (Omagh, 1985). The map appears to have been more detailed than Rocque’s survey of the city as the rear buildings and walls of houses and business were also obviously measured rather than Rocque’s practice of estimating their positions. At a scale of 80 feet to one inch, Sherrard’s map would have been much larger than Rocque’s and as such more buildings could be labelled while individual buildings could be numbered and referenced on a separate index. Shortly after the Great Map was presented to the commissioners, they sent a request to parliament requesting that funding be made available for the publication of the map and that the map be copyrighted to the WSC.[185] Nothing else is mentioned in the minutes of the WSC about the ‘Great Map’, and it may not have been published in view of how little

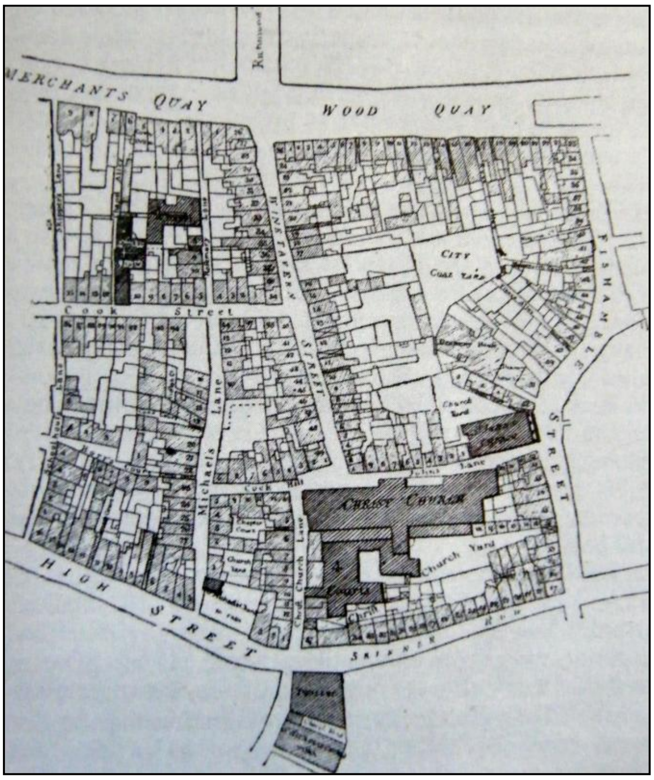

Figure 4.20 Nineteenth-century duplicate of Sherrard’s *Great map of Dublin* (Dublin, 1797), reproduced in J. H. Andrews, *Plantation Acres* (Omagh, 1985), p. 281.

[183] 30 Jan. 1795 (DCA, WSC/Mins/13, p. 36).
[184] 16 Jun. 1797 (DCA, WSC/Mins/14, p. 160).
[185] 4 May 1798 (DCA, WSC/Mins/14, p. 330).

information about it survives. Considering the attention and praise that Brooking and Rocque's maps of the city both receive, it seems a pity that the most detailed map of eighteenth-century Dublin has been virtually forgotten.

Focus of the Commissioners work

In August 1792 the jurisdiction of the WSC was expanded to half a mile beyond the North and South Circular Roads, thereby increasing the amount of development the commissioners could implement. Additionally, it was advertised that anyone who wished to create a new street within the jurisdiction of the WSC must submit plans to Sherrard's private practice office at 60 Capel Street.[186] This large increase in work-load did not go unnoticed by Sherrard and by 1796 'his private business remained totally neglected, to his very great prejudice.[187] The commissioners saw fit that Sherrard should be awarded an extra fifty guineas for his additional trouble. What may have added to Sherrard's complaint about his business being neglected was his recent and prolonged appearance before both the House of Commons and House of Lords in relation to the works of the commissioners. For over a month Sherrard had:

> … to attend a committee of the House of Commons, appointed to take into consideration certain measures of this Board [WSC] and was then ordered to attend daily (until discharged) with all minutes, maps and papers of this board.
> That during the sitting of said committee he underwent very long and painful examinations in the most solemn manner, touching the proceedings of the Board for a series of years past, as appears by said committees report. And by their orders did prepare and lay before them several schedules and other papers….That about the same period he received several orders from the House of Lords, and in obedience thereto, did prepare and present at their Lordships bar, the several papers called for …[188]

Despite the majority of the commissioners being members of parliament, the WSC did not always receive universal support from the peers. Lord Carhampton, a member of the Irish House of Lords, voiced his opinion about the commissioners and their work in a 1798 session reviewing a bill allowing taxation to be raised on coal imports for the financing of the WSC. Carhampton's appraisal, despite its wit and good humour, does show that the works of WSC could be self-serving rather than strictly in the best interest of the general public. Describing the commissioners as:

> … a body, certainly, as individuals; he lived amongst them in the habits of closest intimacy, nor were there men in the world with whom he would rather pass the

[186] 28 Aug. 1792 (DCA, WSC/Mins/11, p. 90).
[187] 22 Apr. 1796 (DCA, WSC/Mins/13, p. 301).
[188] Ibid.

> remainder of his life as men of honour and deserved respect, but bound up together, and labelled with the title of Wide Streets Commissioners, he considered them as forming one of the most mischievous volumes extant in any country. Habitually improvident of their own private expenses, it was not very surprising if men became lavish of the public money, when trusted to their expenditure. Thousands upon thousands of the public money had already been squandered by this board, not for the purpose of opening narrow and inconvenient streets obnoxious to the city of Dublin, but with erections of new streets and squares for the accommodation of the rich.[189]

Drawing on the humorous image of the commissioners closely gathered around a map, 'cutting and carving' the city up and 'endeavouring to influence his brother commissioner', Carhampton stated that all the commissioners did was begin work on narrow streets such as Cow Lane or Carrion Row, 'such places were too vulgar for pronunciation, and scarcely to be articulated without the risk of breaking gentlemen's teeth', rename them and then divert funds 'to embellish the street of one gentleman's residence'. He then went on to describe a meeting that had apparently taken place between the commissioners and the lord lieutenant's secretary who had recently arrived from England. The secretary was elected as a member of the WSC to 'check the profusion of the board.'[190]

Describing the proposed doubling of the coal tax as a 'tithe upon a necessary of life', Carhampton reminded the commissioners that in order to complete Westmoreland Street, all that remained was to purchase 'wretched tenements' in Fleet Street for a few thousand pounds. Once completed, the new street might 'stay their Lordships stomachs for superb embellishments'. He suggested that a vote on the proposed tax increase be delayed for three months.

The chancellor declared that:

> … he would rather walk up to his knees in mud, for the remainder of his life, and through the … gloomy allies that could be … the city of Dublin, than listen to … all that he had heard in the House for months past, about Wide Streets and Wide Street Commissioners.[191]

However the Chancellor did defend the commissioners by pointing out that they received no reward, fee or 'interest he knew upon earth' and were dedicated to their public service. Acknowledging levels of corruption, or rather disinterest amongst members of the commissioners, including one recently-elected commissioner who

[189] *Leinster Journal*, 22 Sept. 1798.
[190] Ibid.
[191] Ibid.

‘had not yet attended, nor did he know that he ever should’ a WSC meeting, the Chancellor asked the board that:

> … while they impeached the commissioners of that board with profusion, improvidence, and tediousness in their works, they should look a little to facts, and before they indulged in those charges, it would have been well to read the papers on their table, from which it would be seen that they [Parliament] had funds more than adequate to answer their [the WSC] debts.[192]

To conclude, the chancellor felt it was unfair to impeach men as being dishonest on a collective basis while at the same time declaring that individually they were respected.

Lord Carhampton did have a valid point about the commissioners favouring the rich over the poor. One need only examine a map produced by Sherrard in 1787 of Mountjoy Square, which was by then under construction.[193] The square and its approaches resemble the final design however, the entire western side of the square is occupied by a proposed palatial residence, with a façade of nearly of 600ft and topped with a dome, for the Gardiner family. Whilst the work on the Mountjoy Square may have been a private venture by Luke Gardiner, such a proposal could hardly be considered as in the best interest of the public.

Figure 4.21 displays the location within the city of all WSC maps that were dated between 1758 and 1810.[194] Concentrations of maps were produced mainly of areas that were of highest interest for the commissioners, especially in Dame Street, Georges Street, Castle Street and Sackville Street. Despite their focus on the city centre, it is evident that their work covered the entire area within their jurisdiction during this period. Isolated concentrations of maps include Ringsend, Island Bridge and Saint James’s Street demonstrating that their work was not entirely focused on major projects such as the creation of Parliament Street and the continuation of Sackville Street. However, given the number of dated maps confirmed to be from this era, it becomes obvious that Lord Carhampton’s arguments were not without merit. Aside from the high number of maps produced for the city’s main thoroughfares, which is understandable for a body concerned with improving urban communications,

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[192] *Leinster Journal*, 22 Sept. 1798.
[193] (DCA, WSC/Maps/62).
[194] A large number of surviving WSC maps are undated, and a full explanation of how figure 5.20 was created can be found in Appendix F.

there is also a disproportionately high number of maps produced of the city's more affluent and modern neighbourhoods compared to the poorer congested neighbourhoods in the south-west of the city.

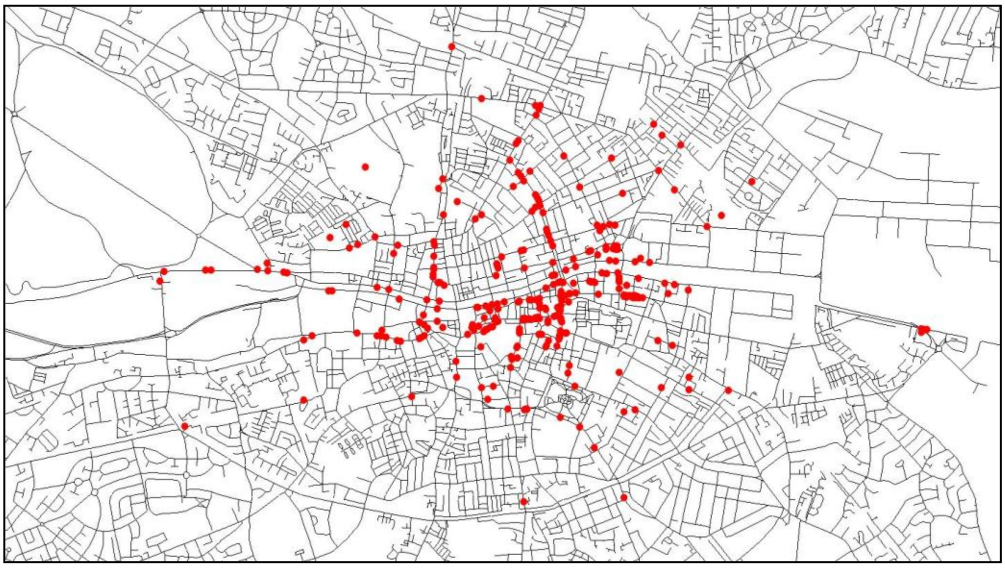

Figure 4.21 Location of all WSC maps between 1758 and 1810 (Compiled by F. O'Cionnaith).

Figure 4.22 displays the location all WSC maps confirmed to have been produced between 1800 and 1810. They reflect the nature of the work of the WSC during that decade, being concentrated around modern Westmoreland and D'Olier Streets as well as Beresford Place. Figure 4.22 also demonstrates the gradual movement eastwards of the WSC's work, from the Parliament/Capel Street axis during the 1750s and 1760s to the increasingly prominent Sackville Street/Trinity College axis of the early nineteenth century. The widening of narrow streets and construction of Carlisle Bridge opened up access to the eastern section of the city centre thus assisting this transition.

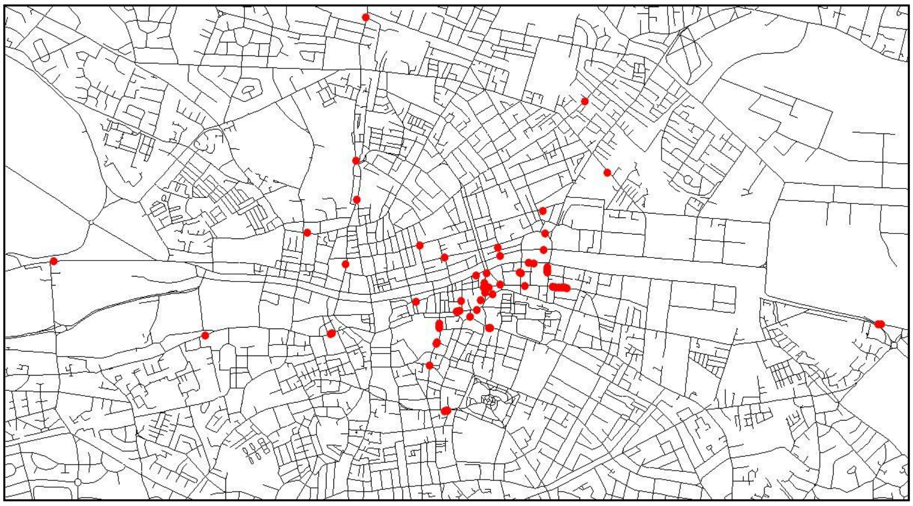

Figure 4.22 Location of all WSC maps between 1800 and 1810 (Compiled by F. O'Cionnaith).

Decline of the Wide Streets Commissioners

Despite Lord Carhampton's concerns about the commissioners' work, the design and construction of Westmoreland Street and D'Olier Street began in late 1799. By December Sherrard had been ordered to prepare two designs for improving the approach to Trinity College and from Grafton Street to Carlisle Bridge,[195] which had been built by the WSC in the 1780s.[196] Considering the influence of the Fellows of Trinity College, the WSC decided to consult them on the work.[197] The Fellows were unhappy with the proposals, worrying the 'very great inconvenience may ensue to the college from complying'.[198] However, such opinions were the least of the commissioners' concerns by the turn of the century. Following the political turmoil of the 1798 rebellion, in which Luke Gardiner, one of the commissioners had been killed at the Battle of New Ross,[199] the commissioners were regularly encountering financial problems. In 1800 the commissioners wrote to Marquis Cornwallis, Lord Lieutenant of Ireland, about the work that they were undertaking regarding the approaches to Carlisle Bridge. The letter suggested that the confusion caused by the 1798 rebellion had resulted in a request for funds for this work to either be ignored or lost.[200]

Political events were also conspiring against the WSC. The Act of Union (1800) stripped Ireland of its own independent parliament. With the country now being governed from Westminster, Dublin was in essence reduced to the level of a provincial capital. The first article of the act states in direct terms that the Irish parliament was closed:

> That it be first article of the union of the kingdoms of Great Britain and Ireland, that the said kingdoms of Great Britain and Ireland shall, upon the first day of January, which shall be in the year of our lord one thousand eight hundred and one, and for ever, be united into one kingdom, by the name of "the united kingdom of Great Britain and Ireland" …[201]

From 1801 onwards, funding for the commissioners' work would have to be approved from London. The post-union WSC would be a radically different organisation, with

195 5 Dec. 1799 (DCA, WSC/Mins/16, p. 12).
196 (DCA, WSC/Maps/160).
197 19 Dec 1799 (DCA, WSC/Mins/16, p. 24).
198 23 Jan. 1800 (DCA, WSC/Mins/16, p. 40).
199 Irish House of Commons 1692-1800 http://www.leighrayment.com/commons/irelandcommons.htm, 15 Jun. 1798.
200 (DCA, WSC/Mins/16, p. 56).
201 Act of Unions 1801 , <http://www.opsi.gov.uk/RevisedStatutes/Acts/aip/1800>

few major projects undertaken and a general decline in the level of standards for building on WSC land.

Finances were the focus of a report produced by the WSC in 1802, much of which was documented by Sherrard. *Extracts from the minutes of the commissioners* (Dublin, 1802) provide a summary of the main projects undertaken from the 1750s onwards detailing costs and additional sources of revenues generated by the commissioners themselves. After the early work on Parliament Street, the commissioners' main focus was on Dame Street during the 1760s and 1770s, Abbey Street, Rutland Square and Parkgate Street during the 1780s, with improvements to Sackville Street, Baggot Street and Skinners Row and the creation of Westmoreland Street, D'Olier Street and Frederick Street in the 1790s. Work on Parkgate Street was partially financed by a nine-year toll on the Mullingar Road,[202] lotts on Dame Street were sold by the commissioners to raise funds but most funding came from parliamentary legislation and the coal tax:

> The revenues with which the commissioners have been enabled to proceed upon these several plans of improvement have arisen partly from Kings Letter and partly from Parliamentary aid, and the produce of appropriated duties.[203]

Georges Street	£11,029 6*s* 3 *d*
Sackville Street	£84,767 0 *s* 0*d*
Abbey Street	£88,430 7 *s* 1 *d*
Frederick Street	£11,596 1 *s* 6 *d*
Westmoreland Street	£45, 335 13 *s* 5 *d*

Table 4.2: Overall costs of some of the WSC's largest projects.[204]

The *Extracts* also reported the quays west of Carlisle Bridge had yet to be opened, which the commissioners felt would 'be objects of great utility.'[205] The quays were in a general state of disrepair, with one visitor to the city describing them thus:

> … as if nothing in this capital was to wear the face of propriety, or consistency, much less of perfection, this noble structure [the Four Courts] is erected within a few feet of the dirtiest and most filthy part of the river Liffey, upon a piece of the ruined Quay, which is actually like a rotten ditch tumbling piecemeal into the water.[206]

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[202]Wide Streets Commissioners, *Extracts from the minutes of the commissioners* (Dublin, 1802), p. 32.
[203] Ibid., p. 1.
[204] Ibid., pp 2-34.
[205] Wide Streets Commissioners, *Extracts from the minutes of the commissioners* (Dublin, 1802), p. 34
[206] Unknown, *Dublin and its vicinity* (London, 1797).

The widening and straightening of Lower Abbey Street was estimated by the commissioners to cost an additional £10,000, almost the same price as creating North Fredrick Street.[207] A plan to build several new streets around Dublin Castle, isolating the castle from the surrounding areas and protecting it from accidental fire due to a number of 'forge manufactories' nearby, was never undertaken, possibly due to cost.[208] The Westmoreland/D'Olier Street project was additionally encountering financial problems. In a letter to the sectary of His Majesty's revenue, Sherrard wrote:

> … as to the opening of the avenues from the parliament house to Carlisle Bridge, there is no fund whatsoever in the power of the commissioners applicable to those purposes; but as it is a matter so absolutely necessary for the accommodation of the public, the commissioners will direct the grounds necessary for the said purposes to be valued, relying upon the assistance of government in any application that may be made to parliament, to institute a fund to carry these measurers into effect.[209]

By 1806 the financial restrictions placed upon the WSC were becoming evident. Simple tasks such as advertisement of works were being curtailed, being viewed by the board as 'the very heavy and unnecessary expense.'[210] From January 1806 the WSC would only advertise in two newspapers,[211] three times a week rather than three newspapers which had been the practice since the 1750s.

Sherrard was growing into middle age by the turn of the nineteenth century, and there is evidence in the commissioners' minute books that he was not as sprightly as he had been. In July 1803 Sherrard was allowed a leave of absence to go to England 'for the recovery of his health'[212] and in December of the same year a motion by Frederick Trench to the board of commissioners appointed Sherrard's sons William and later David Henry[213] as joint clerks and surveyors. Sherrard longevity with the WSC had distinct advantages for the commissioners and their work. With the final developments on Lower Abbey Street beginning in 1804, Sherrard was asked to retrieve maps of the area which he had produced in 1784 and also his plans for laying out lotts produced in 1790.[214]

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[207] 21 Dec. 1804 (DCA, WSC/Mins/19, p. 167).
[208] 15 Oct. 1801 (DCA, WSC/Mins/15, p. 134).
[209] Wide Streets Commissioners, *Extracts from the minutes of the commissioners* (Dublin, 1802), p. 42.
[210] 29 Jan. 1808 (DCA, WSC/Mins/20, p. 382).
[211] *Saunders Newsletter* and the *Correspondent.*
[212] 14 July 1803 (DCA, WSC/Mins/18, p. 321).
[213] 7 Nov. 1810 (DCA, WSC/Mins/22, p. 290).
[214] 21 Dec. 1804 (DCA, WSC/Mins/19, p. 167).

Despite the change of parliament and increasing financial pressure, the WSC still looked to London for inspiration as to how Dublin could be improved. Sherrard was asked to purchase a newly-published map of London by the commissioners in 1803 and have it mounted on rollers.[215] Sherrard's purchase might not have been of sufficient quality, or simply became outdated very quickly due to developments, as in 1808 the commissioners again asked Sherrard to buy another new map of London:

> … with the docks and other improvements to the present time and that he do dispose of the old map of London ...[216]

The end of the first decade of the nineteenth century saw the work of Sherrard and the commissioners focused around their new streets leading from Carlisle Bridge. This work was not always centred on widening streets or purchasing properties but rather on general improvements to the area. Sherrard was sent to correct building sites on D'Olier Street which were causing a nuisance as they projected into the line of the road.[217] He was also asked to produce a map of the Carlisle Bridge area to present before the Board of Revenue regarding the removal of obelisks that adorned the bridge as they:

> … only serve more distinctly to show the obliquity of said bridge in regard to its situation with the course of the river and the several avenues leading thereto.[218]

Whilst his father was busy taking down such features, William Sherrard had become involved with the creation of one of the city's iconic nineteenth-century monuments. In 1808 he received a letter from the secretary of the committees for erecting a statue of Lord Nelson requesting that:

> … they have considered the intersection point of Henry Street and Sackville Street as the best adapted to the purpose and to request you will take the trouble to request their idea to the Commissioners of Wide Streets …[219]

Following 1810, there are few if any records of surveying in the minutes of the WSC. However, work did still continue with surveying, widening and straightening streets, albeit to a reduced degree compared to the height of the commissioners' power during the 1780s and 1790s.

[215] 20 Jul. 1804 (DCA, WSC/Mins/19, p. 103).
[216] 4 Apr. 1808 (DCA, WSC/Mins/21, p. 38).
[217] 13 May. 1808(DCA, WSC/Mins/21, p. 56).
[218] 14 Feb. 1806 (DCA, WSC/Mins/20, p. 17).
[219] 29 Jan. 1808 (DCA, WSC/Mins/20, p. 380).

During the period between 1758 and 1810, the WSC had many positive impacts on the surveying community in Dublin. It was a regular employer of surveyors throughout the late eighteenth and early nineteenth centuries. Aside from Thomas Sherrard who spent the majority of his surveying career with the commissioners, the WSC is known to have been involved with a minimum of twelve other professional surveyors during this period. Roger Kendrick,[220] Thomas Mathews,[221] D. B. Worthington[222] and A. R Neville[223] all produced maps for the WSC whilst holding the position of city surveyor, as did assistant city surveyor Robert Lewis[224] and deputy surveyor general George Gibson.[225] Surveying partnerships were also involved in map production for the commissioners, with Sherrard employing his business partners Richard Brassington and Clarges Greene[226] at various times. Sherrard also produced maps with architects Samuel Sproule[227] and Henry A. Baker,[228] both of whom were amongst the chief architects working for the commissioners. Surveying with the WSC was also a multi-generational affair with sons of both Sherrard[229] and A. R. Neville[230] producing maps for the commissioners.

[220] (DCA, WSC/Maps/573, 576).
[221] (DCA, WSC/Maps/545, 583, 590, 595, 719).
[222] (DCA, WSC/Maps/97, 617, 701).
[223] (DCA, WSC/Maps/27, 125, 126, 128, 129, 130, 139, 166, 189, 573).
[224] (DCA, WSC/Maps/547).
[225] 8 Oct. 1762 (DCA, WSC/Mins/1), p. 180.
[226] (DCA, WSC/Maps/552).
[227] (DCA, WSC/Maps/115).
[228] (DCA, WSC/Maps/160).
[229] (DCA, WSC/Maps/124).
[230] (DCA, WSC/Maps/496).

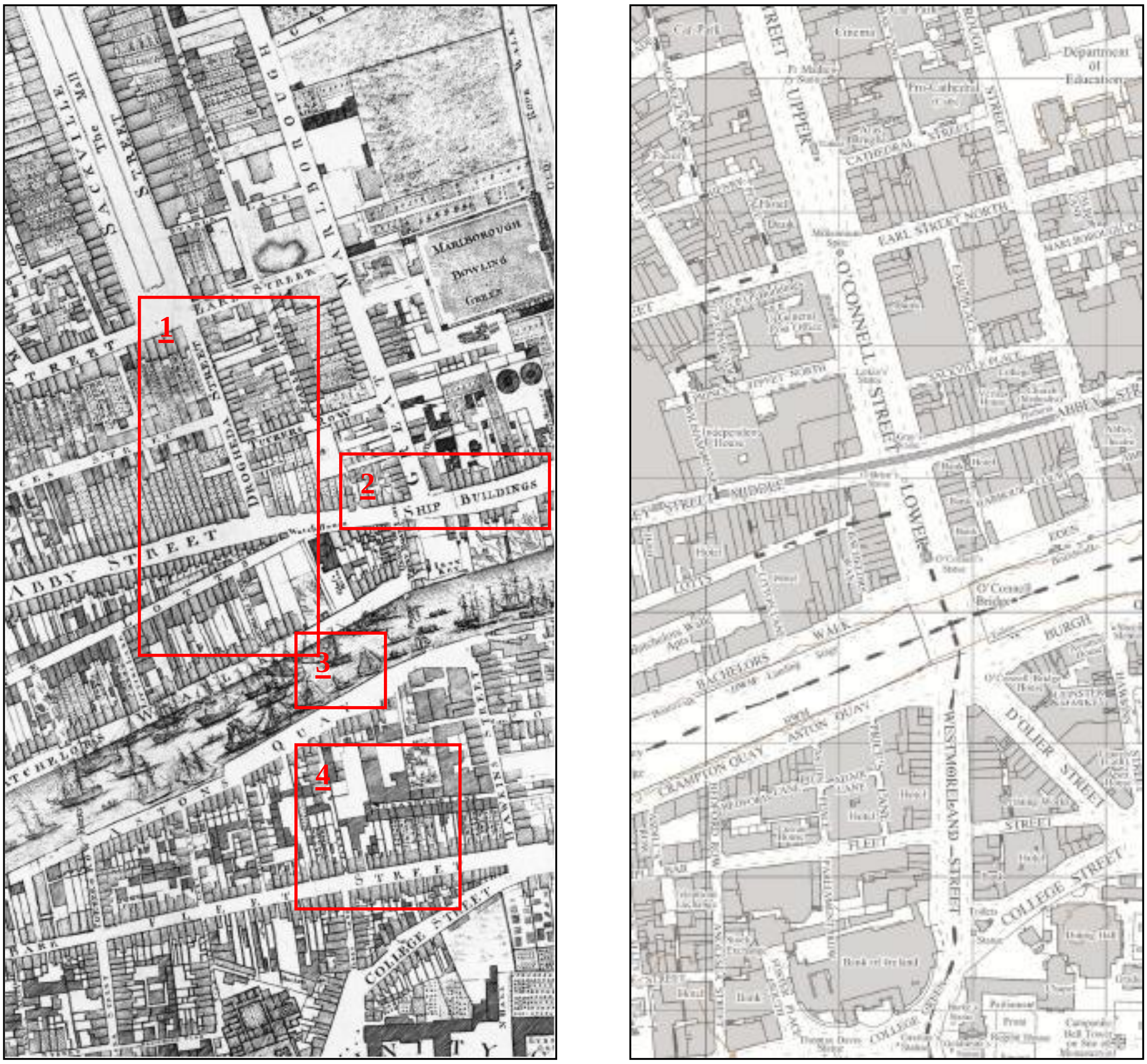

Figure 4.23 Evidence of the impact of the WSC work (L) The Sackville Street area from Rocque's *Exact survey of Dublin* (Dublin, 1756) (R) the O'Connell Street area from Dublin 2007, produced by the Ordnance Survey Ireland and reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008). For example: (1) Extension of Sackville Street to the Liffey, (2) straightening of Abbey Street, (3) construction of Carlisle Bridge and (4) construction of D'Olier Street and Westmoreland Street.

Aside from employing surveyors, the work of the WSC heavily referenced pre-1758 maps made before the commission's foundation. Maps dating back as far as the 1680s[231] were regularly consulted for determining property ownership and leases. Early eighteenth-century maps produced by Joseph Moland[232] and a possible

[231] John Greene, Survey of corner house, fronting to St. Nicholas Street, 1682 (DCA, WSC/Maps/568).
[232] Joseph Moland, Survey of a piece of ground on the south side of the River Liffey, near Lazer's Hill, 1709 (DCA, WSC/Maps/651).

progenitor of George Gibson, John Gibson[233] were also consulted by the WSC, thus making the commissioners the preservers of maps that otherwise may have been lost or destroyed.

The surviving maps of the WSC represent one of the largest collections of urban maps created of Dublin during the eighteenth and early nineteenth centuries provided a fascinating insight into their work reshaping the city, in which surveyors and surveying played a vital role.

[233] John Gibson, Map of portion of the lands and premises, the property of the Parish of St. Michael the Archangel, 1709 (DCA, WSC/Maps/745).

4.5 Summary

Surveyors played a key role in the urban development of Dublin during the eighteenth and early nineteenth centuries. They documented, planned, set out and helped redesign large parts of the city assisting in changing it from its medieval origins to that of a Georgian metropolis.

The vital role that cadastral surveying played in Dublin's development is closely associated with Dublin's many large estates. The establishment of property boundaries had high legal and financial relevance for the evolution of these estates, and it was a service which the Dublin's land surveyors fulfilled. The relationship between landlords and surveyors was examined in the estate surveying case study and it demonstrated that there was no standard format in landlord/surveyor dealings. Some surveyors spent large parts of their careers working for one estate; others were hired infrequently while the role of estate surveyor was occasionally passed from father to son.

The role of Dublin City Surveyor represented one of the longest lineages of successive surveyors found during this research. Their maps and records have survived relatively intact and they provide and insight into the day-to-day operations of surveyors employed by the city. While perhaps lacking the sweeping powers of his WSC equivalent, the role of Dublin City Surveyor was an important, official position within the surveying community and guaranteed its holder a steady stream of both work and income.

Perhaps the single most important surveying position associated with the development of Dublin during this period was that of surveyor of the Wide Streets Commissioners. The surveyors who held this position, Thomas Sherrard of particular note, were at the forefront of the city's evolution. Their regular meetings with the powerful and wealth of the country, their close dealings with land and lease holders affected by the WCS's work and the comprehensive records of their work allowed a detailed examination of their role to be undertaken. The surveyor of the WSC held the key role of transferring plans, designs and proposals from paper and making them part of Dublin's real-world landscape.

Estate development was not the only role that surveyors played in the improvement of Dublin during the eighteenth and early nineteenth centuries. The following chapter explores the role surveyors played in the advancement of Dublin's engineering infrastructure during this period.

Chapter five: Engineering surveying in eighteenth-century Dublin

5.1 Introduction

This chapter examines the role that land surveying played in eighteenth and early nineteenth-century engineering in Dublin. The relationship between eighteenth-century surveying and engineering is intricate, with the poorly defined parameters of each profession easily being crossed by many individuals. Both surveying and engineering share numerous fundamental elements such as precise measurement and various methods vital to construction in addition to the determination of height and establishment of straight lines. Surveyors could often find themselves heavily involved in large engineering projects[1] and engineers would employ surveying methodology as key components of their work.[2] It is therefore necessary to examine the connection between Dublin's eighteenth-century surveying community and many of the engineers who operated during the same period, their shared methodologies and those who crossed from one career to the other, either on a temporary or permanent basis.

Three separate case studies relating to eighteenth-century engineering surveying in Dublin are examined in this chapter – the reconstruction of Essex Bridge by George Semple in the early 1750s; the use of surveying in the developing transport infrastructure, namely roads and canals; with the final case study section focusing on maritime surveying conducted in and around Dublin during this period.

Surveying techniques could easily and readily be applied to engineering. Levelling was particularly useful in canal construction, which was undergoing a boom period during the eighteenth century. Depth measurement was utilised in surveys of both the River Liffey[3] and Dublin Bay throughout the same period. Engineers Thomas Burgh and John Perry both employed surveying methods in their work for a proposed canal from Sutton to Dublin city in the 1720s. Theodolites and circumferentors were used to correctly record the positions of boats taking such measurements in Dublin Bay,

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[1] John Brownrigg was regularly involved with canal construction and several aspects of the work of Thomas Sherrard for the Wide Street Commissioners could be considered as closer to engineering than land surveying.
[2] Thomas Burgh and Captain John Perry, *Dublin Bay* (London, 1728).
[3] Semple, *A treatise of building in water*, p. 18.

with evidence of both resection and intersection surveying techniques present in many surviving maps.[4] Engineering works to aid in the reduction of silt deposition in Dublin Bay relied heavily on maps produced by Dublin's land surveyors.[5]

Methods of communication infrastructure played significant roles in the surveyor/engineer relationship during this period. Road building and mapping,[6] bridge construction[7] and inland navigation[8] were not only vital to the broadening of transport and trade during the eighteenth century, but were also lucrative and progressive projects for period surveyors to become involved with.

While eighteenth-century engineering maps as a whole lack the artistic flair found in many estate maps of the same period, they often surpass their more traditional counterparts in terms of complexity, clarity and the amount of information passed to the reader. They play an important role in understanding the world of surveying in eighteenth-century Dublin.

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[4] George Gibson, *The bay and harbour of Dublin* (Dublin, 1756); Rocque, *The city, harbour, bay and environs of Dublin*; William Bligh, *Survey of the bay of Dublin* (London, 1800).
[5] George Semple, Stokes's survey compared with that of Rocque (1780).
[6] Taylor& Skinner, *Road maps of Ireland* (London, 1777).
[7] Semple, *A treatise of building in water*.
[8] Charles Vallancey, *A treatise on inland navigation* (Dublin, 1763).

5.2 George Semple – reconstruction of Essex Bridge, 1751-1753

An analysis of George Semple's work on Essex Bridge presents the close relationship between the twin professions of engineering and surveying. Semple was a multi-faceted individual, skilled at engineering, building and surveying. As such, his work on the reconstruction of Essex Bridge demonstrates the various aspects of his professional skill, including mid-eighteenth century methods and practice of engineering surveying.

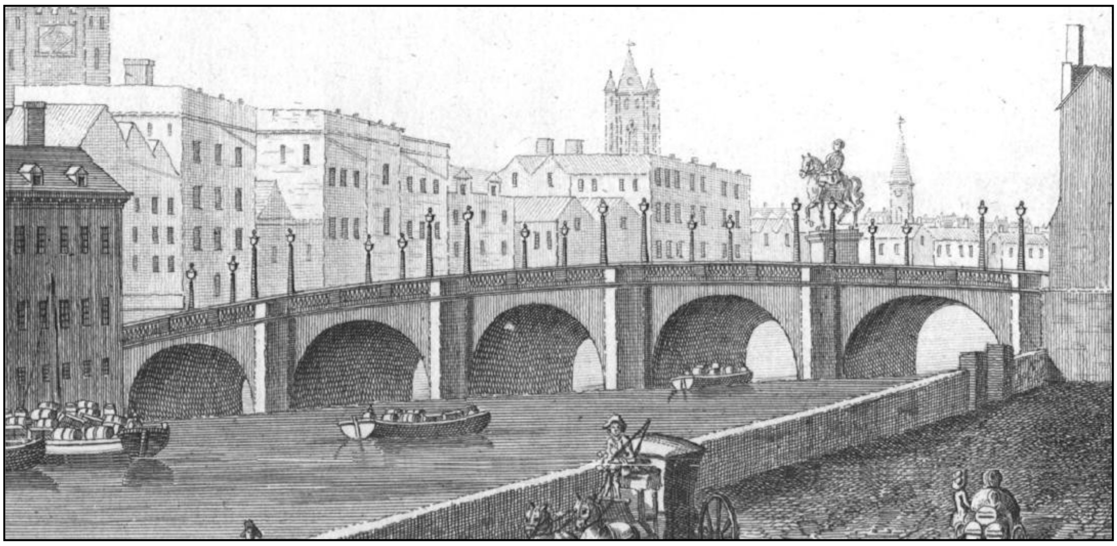

Figure 5.1 The first Essex Bridge, Joseph Tudor, *Customs House quay and Essex Bridge looking south* (London, 1753), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008), p. 32.

The original Essex Bridge stood at the bottom of Capel Street and was the lowest bridging point on the River Liffey before the construction of Carlisle Bridge. As one of the main crossing points of the Liffey within Dublin, it carried a high volume of traffic moving between the Dublin Castle area and Capel Street. The bridge was a multi-arch structure with a colonnade emerging approximately from the centre of the bridge over the river to the west with an equestrian statue of George I on top. The western third of the bridge was for pedestrians whilst the other two thirds of the bridge were for traffic. As previously discussed, in 1751 a section of the bridge collapsed and George Semple was given the task of with demolishing the old bridge and the construction of a new one.

The 1751 collapse of Essex Bridge was not the first time that serious damage had occurred to the structure. The bridge had initially been built by Sir Humphrey Jervis in 1676. In December 1687 a powerful storm hit the city which coincided with a high tide, storm surge and excessive flood waters in the Liffey resulting in the river breaking its banks and flooding the surrounding area:

> … in some houses the water rose up to the parlour floor, and on some of the quays much higher, so that boats plied in the streets.[9]

The excessive flood waters began to significantly erode the foundations of Essex Bridge, which had been built directly onto the river bed. At some point during the night of the 4th/5th December 1687, a hackney coach was crossing the bridge when a section of the road on the north side of the bridge collapsed and the coach, coachman and two horses were swept away by the river. One of the horses managed to free itself and swim to safety whilst the coachman and the remaining horse drowned in the river. Immediately following the accident, builders found that they were unable to remove the section of the bridge that had collapsed and simply repaired the damaged section and erected a new pier to support it.[10] The recollection of this fatal accident was recorded in Semple's *Treatise of building in water* (London, 1780) which provides a detailed examination of his work on Essex Bridge as well as many other projects he had undertaken in his career.

Semple was born around 1700 into the building and engineering trade, his father being a workman.[11] He was self-educated as:

> … from my earliest days, I was employed to do things, and not write upon them; for in truth, the whole of my scholarship except for what little I got whilst a meer [sic.] child, was acquired within the compass of six winter weeks, in the thirteenth year of my age.[12]

During a visit to the lord archbishop of Dublin in 1751, Semple became involved with rebuilding Essex Bridge, which had again partially collapsed in February of that year. At the archbishop's palace he met a Mr. Prior where Semple listened to him:

> … pathetically lament on the loss and inconvenience the public sustained by being near four months deprived of the use of Essex Bridge.[13]

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[9] Semple, *A treatise of building in water*, p. 3.
[10] Ibid.
[11] Ibid., p. 79.
[12] Ibid., p. iii.
[13] Ibid., p.1.

At the time two proposals were under review by Dublin Corporation for the repairing of the bridge – rebuilding the bridge with wood in a five month build costing £500, or with stone taking six months and costing £800. Shortly afterwards Semple, accompanied by his brother John, inspected the remains of Essex Bridge. The breach had occurred at the same location where the repairs had been made in 1687 and Semple suspected that the plinth below the breach had subsided slightly causing the collapse.[14]

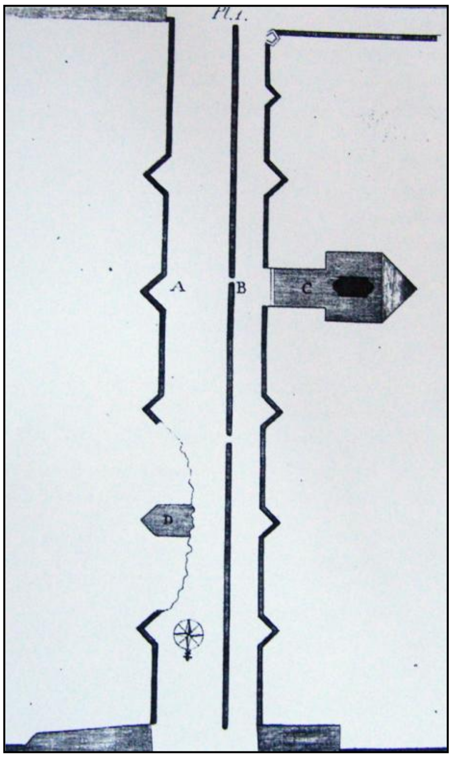

Figure 5.2 Semple's plan of the damage to Essex Bridge, George Semple, *Treatise of Building in Water* (London, 1780), p. 3.

Semple's initial action was to conduct a deformation survey of the remaining sections of the bridge. A series of depth measurements of the river bed were taken approximately 60ft (18m) above and below the bridge with a separation of 10ft (3m) between each measurement. A tight rope was laid across the river at the desired measurement location for Semple to secure himself in position to take readings using a sounding rod delimitated into feet and inches. The tight rope also acted as a standard datum from which the different depth measurements could be compared against each other, thus determining deformation on the bed of the river. Semple's own assessment of the survey was 'tolerable'[15] considering the speed of the river. It was obvious that the bridge must be entirely rebuilt and not just repaired as the foundations lying on the river bed was the fundamental problem behind the damage. If left, the remainder of the structure could easily collapse. To compensate for the loss of the bridge extra ferries were laid on by Dublin Corporation.[16]

[14] Ibid., p. 2.
[15] Ibid. p. 18.
[16] 8 Dec. 1752, J. T. Gilbert (ed.), *Ancient records,* x, 53.

Although a skilled builder and engineer, Semple felt that he was still lacking expertise for such a project:

> … in hopes of procuring better instruction, I settled my domestic affairs, and went to London, where I procured [£]40 worth of books, plans &c. which I ordered to be sent after me, and returned home within the compass of fourteen days, full of hopes that by their assistance, I should be able to pick out something for my purpose.[17]

Many of the books bought by Semple dealt with bridge building in antiquity with a bridge built by the Roman Emperor Trajan and ancient bridges of China featuring prominently. Semple appears to have found the work of Italian engineers, Andrea Palladio,[18] Scammozzi, Sebastian Serlio[19] and particularly Leon Battista Alberti[20] most useful to his work. Semple decided that the bridge's foundation needed to be of masonry which was to span the length of the bridge and to lie directly onto the bedrock below and not the river bed. In his own words, he wanted:

… a bridge that should last as long as the little adjacent mountain, called Sugar Loaf hill …[21]

Despite his enthusiasm, Semple soon encountered problems. There was excess waste on the river bed and he had difficulties in creating enclosures around the piers from which workmen could get access to them. His books could offer little advice on these problems. Once again Semple left for London on a multi-objective mission:

> 1st. To find out the methods which were at the time agitation, for opening the streets in London and Westminster. 2nd, And principally to consult my friends, and to procure advice concerning my intended inclosure [sic.] for laying the foundations. And 3rd, to procure several utensils, which I know I should want. [22]

Semple's initial objective, how to widen streets, came from one of Leon Battista Alberti's books stating that the streets approaching a bridge must be the same width as the bridge. This in turn led to the construction of Parliament Street in 1758. Semple discussed his second objective with two engineers, Mr. Etridge and Mr. Preston, who at the time were building a pier at Ramsgate in England. They advised him to use coffer dams, a method which partially dammed a river allowing constant access to the river bed. While his knowledge on coffer dams was limited, Semple again demonstrated how a network of knowledge existed among engineers in Western

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17 Semple, *A treatise of building in water,* p. 5.
18 Ibid., p. 10.
19 Ibid., p. 14.
20 Ibid., p. 8.
21 Ibid., p. 24.
22 Ibid., p. 27.

Europe. He wrote to Alexander Ewing in Paris requesting any information he had on the subject of coffer dams. Ewing sent Semple a book on the subject. Despite not knowing French, Semple was able to study the book:

> The language I was a stranger to but … my drooping spirits then instantly revived, and I immediately went on with my work with vigour and entertained the most sanguine hopes of success.[23]

By January 1753 work had begun at demolishing the old bridge and despite initial setbacks, the coffer dams were in place. The equestrian statue of George I presented its own problems for Semple. In a map proposing the opening of a new street between Essex Bridge and Dublin Castle, later named Parliament Street, Semple stated that the statue should be moved to a square, also to be built, at the top of the new street in front of Dublin Castle.[24] His plan for the relocation of the statue was not taken up.

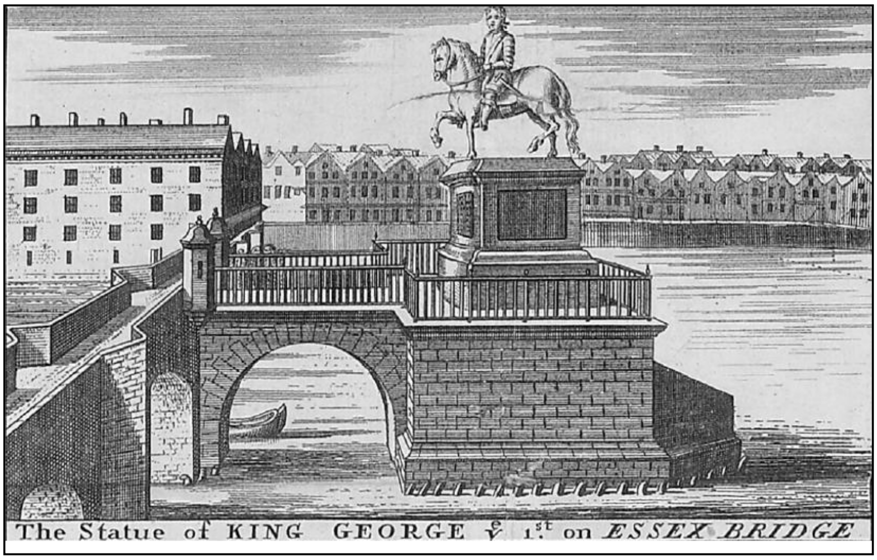

Figure 5.3 The statue of King George I on Essex Bridge, Charles Brooking, *A map of the city and suburbs of Dublin* (London, 1728).

Semple nearly died while inspecting the coffer dams which were used to assist clearing away the rubble of the old bridge. Whilst walking on top of the dam, it shifted and he had just enough time to get off it before it partially collapsed.[25] Mr. Prior, who had initiated Semple's involvement with the project, would regularly visit the site with several Aldermen and gave him 'great encouragement'[26] in completing his works. The bridge was finally completed by April 1753 and was opened by the lord mayor, Alderman Percival Hunt.

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[23] Ibid., p. 29.
[24] Semple, *Scheme for opening an approach to Dublin Castle*.
[25] Semple, *A treatise of building in water*, p. 39.
[26] Ibid., p. 4.

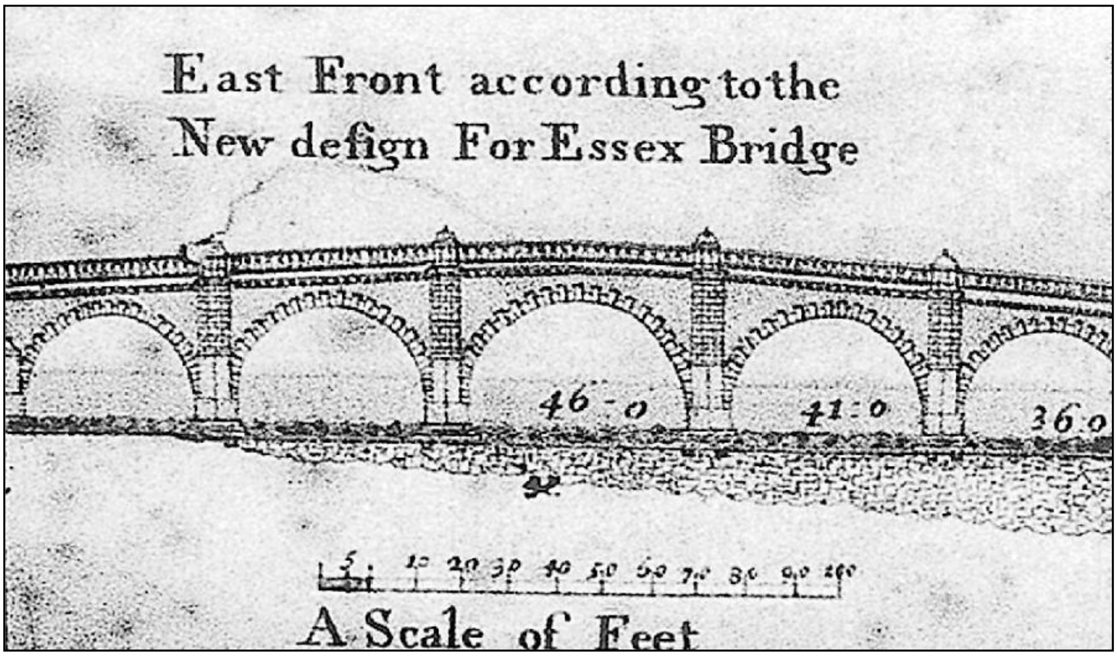

Figure 5.4 East front according to the new design for Essex Bridge, Unknown author, *A design for opening proper streets or avenues to his majesty's royal palace* (Dublin, n. d.).

The completion of the bridge left Semple physically weak, as its construction was;

> … attended with a great deal of labour night and day.[27]

In the following years, after his initial work on Parliament Street and his dismissal by the Wide Streets Commissioners (see section 4.4) Semple became seriously ill:

> … for excessive colds and extreme applications to that most arduous task, fell so heavy upon me, that my whole frame was, as it were, dislocated, and I was disabled from doing any kind of business and obliged to retire to the country in a deplorable condition, and was often so ill, that I could scarcely go across my room, but was particularly afflicted with the gravel and rheumatism.[28]

The reconstruction of Essex Bridge was primarily an engineering venture; however, Semple's use of a deformation survey was vital in the project's success. Semple best represents a group of individuals who at the dawn of the industrial revolution were moving away from the more traditional backgrounds of surveying and building, and combining their skills with modern scientific techniques to create a new profession - engineering. Semple's own hope for the future of Irish engineering was clearly expressed:

[27] Ibid., p. 58.
[28] Ibid., p. ii.

> I hope my young countrymen will now exert themselves, and use their utmost endeavours to make themselves masters of the art … and not lay the corporation of the city, or other gentlemen under a necessity of procuring artists from other countries, when they have, or may have as fit persons for their purposes at home.[29]

Semple was just one practitioner of surveying and engineering during this period. His work had a direct impact on eighteenth-century Dublin through his combined use of these two, closely-connected professions.

[29] Ibid., p. 62.

5.3 Charts of Dublin Bay and Harbour, 1671-1803

Dublin is a port city, highly dependent on access to the sea for trade and communication. Dublin Bay offers good shelter for ships from adverse weather and sea conditions however the sea floor is covered with sandbars reducing shipping to a channel continuous to the River Liffey. Given the reliance on sea travel in the eighteenth century and the regular change brought to the layout of the sea floor of Dublin Bay by deposition of sediment, which frequently affected shipping lanes, Dublin's bay and harbour feature prominently in eighteenth-century Irish mapping. Indeed more charts of Dublin harbour were produced during this period than city plans of Dublin. The majority of such were navigational, with soundings and dominant coastline features strongly represented, however many engineering drawings were also produced highlighting the problem of sediment deposition in the bay and suggesting several innovative methods of eliminating or avoiding these problems.

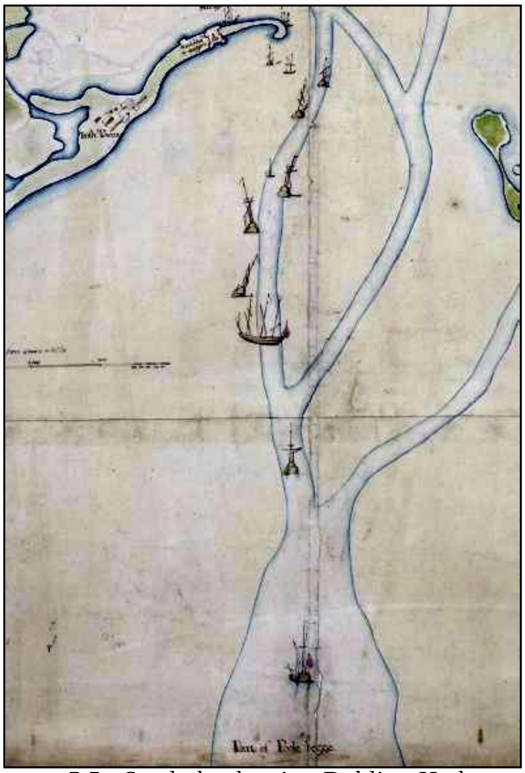

Figure 5.5 Sand banks in Dublin Harbour, Thomas Philips, *An exact survey of the city of Dublin and part of the harbour* (1685) in reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

Dublin port and harbour were legally the responsibility of Dublin Corporation by charter of Queen Elizabeth I. In 1708[30] the Ballast Board Act was enacted creating a body, the Ballast Board, responsible for the maintenance of Dublin harbour and bay and through this body many maps were created and preserved providing an illustrated history of the same area covering the entire eighteenth century. The Ballast Board inherited several maps produced of Dublin bay prior to its establishment thus providing a background to the state of hydrographical surveying

[30] '… in the sixth year of her late majesty Queen Anne (1707-1708) … appointed conservator of the port of Dublin … 20 Mar. 1760, J. T. Gilbert (ed.), *Ancient records*, x, 409.

immediately prior to the eighteenth century. Early marine charts of Dublin bay included John Seller's *The English pilot* (London, 1671)[31] and Thomas Philips, *An exact survey of the city of Dublin and part of the harbour* (1685) which detail the labyrinth of navigable passages from the open sea to the Liffey. It was these passages through the sand banks that became the overriding theme of most eighteenth-century charts of the harbour, as accurate mapping of these routes would enable profitable sea trade. Resections and intersection surveys appear to have been popular methods of establishing sounding positions and coastal layouts.[32]

Captain Greenville Collins's map of Dublin Bay was included as part of his *Great Britain's coasting pilot* (London, 1686) with the Dublin map being a section of a larger, smaller scale map showing the south-east coast from Waterford to Dublin. Collins' map presents a high degree of detail around Dublin Bay's coastline. However his representation of the city is less accurate and appears to be a means of orientating the reader in relation to the position of the two features, city and harbour.

One of the first eighteenth-century engineering maps of Dublin harbour was the work of Dublin surveyor Gabriel Stokes in 1725. His manuscript map focused on the mouth of the river Liffey and was produced at a time of heightened interest in possible engineering projects to improve the port's efficiency. One of the main proponents behind this initiative was Captain John Perry. Perry had previously been employed by Tsar Peter II of Russia (1672-1725) on inland navigation and the improvements of existing rivers. In September 1713 Perry conducted a survey of Dublin harbour at the request of the Corporation before departing for England to conduct similar work. In 1725 Perry submitted a report to Dublin Corporation entitled *A method proposed for making a safe and convenient entrance to the port of Dublin* (Dublin, 1725). Describing the shoals of Dublin bay as 'beyond all memory accompanied with distress', Perry suggested the construction of a canal from Sutton, near the north of

[31] Gerald Daly, 'George Semple's Chart of Dublin Bay, 1762' in *Proceedings of the Royal Irish Academy*, xciii, no. 3 (1993), pp 81-105. Seller was also the author of the navigational treatise *Practical navigation* (London, 1669).
[32] Alexander Dalrymple, *Essay on the most commodious methods of marine surveying* (London, 1771), p. 6.

the bay, to the north bank of the Liffey.[33] Addressing the problem of tides and their effect on the proposed canal water level, Perry gave this suggestion:

> …. to fix a sluice towards the outward part of the canal where the ground is best for the purpose, by which to keep up such head of water from thence to the city as may at all times of the tide answers the service of boats … with expedition and safety going from thence to the quays, on occasion of loading and unloading large ships lying below the sluice that have not sufficient depth of water for coming up to the quay …[34]

The estimated cost of this proposal was £36,606 16*s.* 9*d.* which, after consultation with the merchants and shipmasters of Dublin, was decided by the council to be too costly and Perry's scheme was rejected.

Perry's scheme was only one of a number of engineering works at the time being conducted for Dublin shipping. Brooking's *A map of the city and suburbs of Dublin* (London, 1728) shows the continuation of Dublin's Liffey walls out to Ringsend on the south bank and an equal distance on the northern bank. Brooking's mention of the land enclosed by the north wall as 'this part is walled in but as yet overflow'd by ye tide' indicates that this was still a work in progress and his panorama of the city shows both the areas behind the new north and south walls as yet uninhabited.

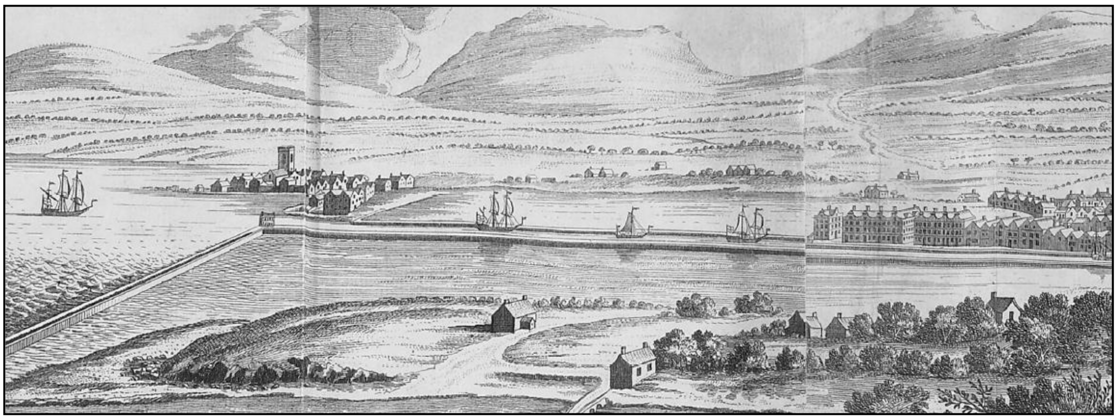

Figure 5.6 Newly constructed walls along the Liffey, Charles Brooking, *A map of the city and suburbs of Dublin* (London, 1728).

Despite Brooking's strong indications that the area behind the north wall was waterlogged, as indicated by the reflections from the three ships in the river in figure

[33] No date, J. T. Gilbert (ed.), *Ancient records*, vii, xvii.
[34] J. T. Gilbert (ed.), *Ancient records* vii, p. xvii.

5.6, the area had been mapped and divided into lotts in 1717. An anonymous map,[35] possibly originating from Gabriel Stokes given the similarity to his style, presents this walled area as a series of lotts, distinguished by each owner's name and the area of each lott in acres, perches and roods. This may indicate that the reclamation work behind the north wall had either not been as successful as originally planned or had suffered a setback between 1717 and 1728. Another possibility is that the overall enclosed area was known in 1717 and the map was a proposed plan of the area once it had been finally drained. Regardless, the anonymous map shows that there was a demand for reclaimed land from the Liffey and Dublin bay.

Perry was not finished with his work on Dublin bay after his initial canal proposal in 1725. Three years later, he, along with Surveyor General Thomas Burgh, produced a map of the bay with a concentration of depth readings at the mouth of the Liffey. Burgh and Perry, 'in company with persons appointed by the Ballast Office'[36] utilised Brooking's recently-published map for their representation of Dublin City thus making their production an accurate version of both city and harbour from surveys conducted in the same year. What appears to be Perry's canal is represented as a deep channel running from Sutton to just outside the city indicating that he had not entirely abandoned his recommendations presented earlier to the Corporation. An important feature of the Perry/Burgh map is its representation of soundings, strongly indicating that an intersection was used, probably from two sets of shore-based surveyors, to map the physical path they travelled during the survey. Despite the presence of soundings in many other eighteenth-century charts of Dublin Bay, few give as strong evidence of the survey techniques used as Burgh and Perry's 1728 map.

The 1750s and 1760s witnessed another flurry of surveying activity in Dublin bay. Eminent surveyors such as George Gibson, John Rocque, Bernard Scalé and engineer George Semple all produced detailed surveys of the area highlighting a distinct change in map artwork and greater investigation of the sea floor.

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[35] Entitled *A map of ye strand of north side of ye river Anna Liffe as it was granted and set out in easter assembly 1717 by ye Rt. Hon. Thomas Bolton esq. lord mayor of the city of Dublin* (Dublin, 1717).
[36] Thomas Burgh and Captain John Perry, *Dublin Bay* (London, 1728).

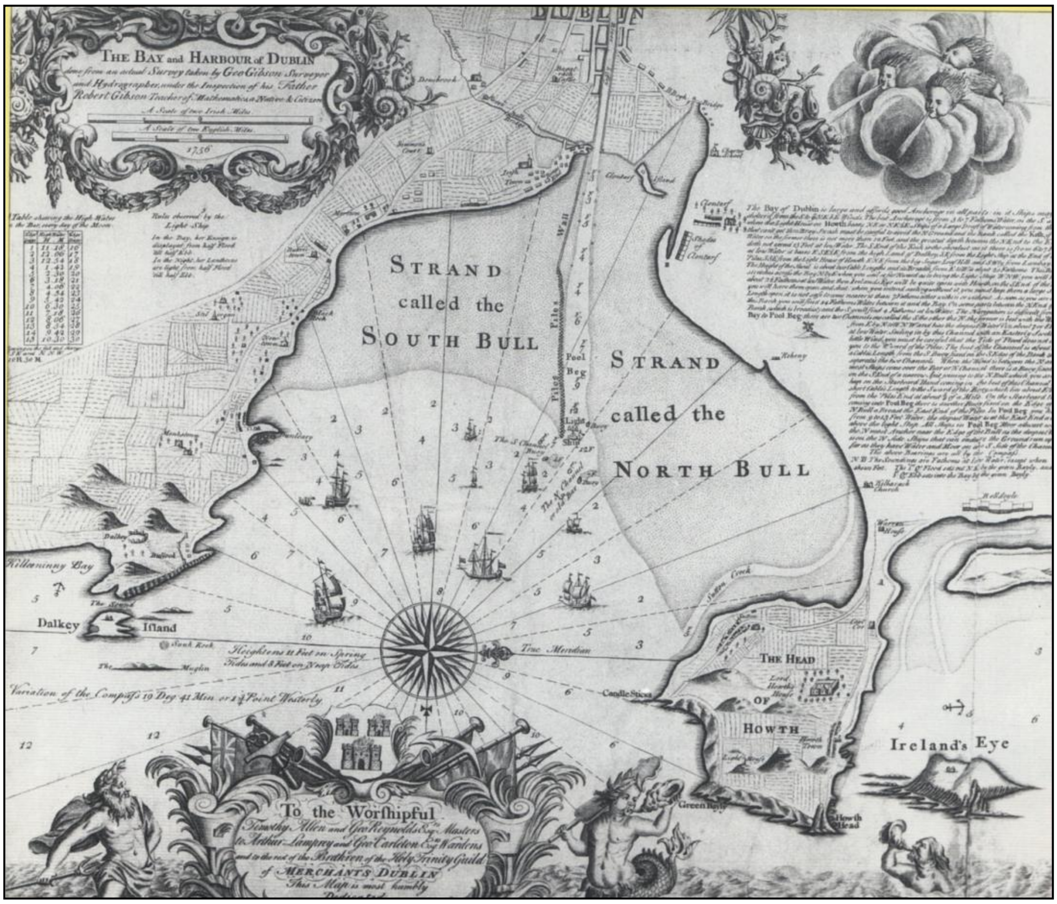

Figure 5.7 George Gibson, *The bay and harbour of Dublin* (Dublin, 1756).

Gibson's *The bay and harbour of Dublin* (Dublin, 1756) is a good example of the change in native Irish map decorative fashion between the early and mid-eighteenth century. The edges of Gibson's maps are highly decorated including representations of Neptune supporting the cartouche, baroque vignettes and a higher concentration of ships in the harbour than is found in earlier maps. Gibson surveyed the area under the supervision of his father, Robert, and the amount of detail, both written and visual, contained within the map strongly indicates that the entire work was by Gibson's own hand. Aside from a wider area covered by sounding readings seen in earlier eighteenth-century maps, Gibson provided a detailed account of the bay indicating that he was familiar with navigation or had consulted Dublin's ship captains:

> The bay of Dublin is large and affords good anchorage in all parts. In it ships may be sheltered from the S to N.E …WINDS. The best anchorage is from 3 to 7 fathoms on S side …[37]

Useful navigations aids such as the position of sunken rocks, highly visible buildings on shore that could be used as landmarks, the level and time of high water at the mouth of the Liffey and the working of the stationary light ship to guide ships into

[37] George Gibson, *The bay and harbour of Dublin* (Dublin, 1756).

port give Gibson's map a high degree of practicality for sailors. Gibson was keen to state his Irish origin highlighting in the map's scale bar that his father was a 'native and citizen.' His cartographic detail is relatively basic and typical of Irish mapping produced in the early to mid-eighteenth century.

John Rocque's representation of Dublin harbour was of a higher cartographic quality than previous maps. Rocque's Dublin harbour[38] is crammed with sloops, brigs and other sailing ships as part of a series of maps he produced of the city and surrounding area in 1756/7 and gives it a more realistic theme than those that had preceded it. Whilst never producing a dedicated map of the harbour, Rocque is known to have surveyed the mudflats around Ringsend[39] and his inclusion of the depth readings, the stationary 'light ship', a 'quarantine sloop' and the 'pacquet moorings' indicate that he had performed additional survey work in the area.

Whilst Rocque's work on Dublin bay may only have been cursory in comparison with his work inland, his apprentice and brother-in-law, Bernard Scalé gained far more experience in its ebbs and flows in the 1760s. Published jointly with William Richards in 1765, Scalé's *Directions for navigation into the bay of Dublin* (Dublin, 1765) was a detailed examination of the best shipping lanes between Wicklow Head and Balbriggan with comments on water depth, places to shelter from storms, and the location of dangerous shoals and sunken rocks. The two surveyors were employed by the pilot committee who were interested in producing what amounts to an eighteenth-century equivalent of a risk assessment evaluation, considering:

> … the fatal accidents that ships and vessels, trading to or from the port of Dublin, would be liable to, in case of any mistakes or inaccuracies that hurry or inadvertency might have produced.[40]

As an added assurance to the book's purchasers, the pilot committee had insisted that the publication be delayed until their own 'Haven-Masters' and 'Pilot Masters' had confirmed the depth readings and bearings produced by the two surveyors during the course of their 'useful work'. The head of the pilot committee, Nathanael Card found:

> … with that ingenuity, judgement and fidelity which the committee as lovers of trade, and … encouragers of navigation, cannot, upon the occasion, omit recommending

[38] Rocque, *The city, harbour, bay & environs of Dublin*.
[39] *Dublin Journal*, 14 Sept. 1754.
[40] Bernard Scalé and William Richards, *Directions for navigation into the bay of Dublin* (Dublin, 1765), postscript.

this chart to all Masters of ships trading to this port, as they are fully satisfied that within the limits of this survey many dangers are now pointed out, that were hitherto totally unknown.[41]

Mapping silt

The problem of silt deposition highlighted in the majority of late seventeenth and early eighteenth-century maps of Dublin was still a major problem in the 1760s. The extension of the Liffey walls, as showing in Brooking's 1728 map, had channelled the river's force to reduce sediment build-up at the mouth of the river however it was not a sufficient or permanent solution to the problem.

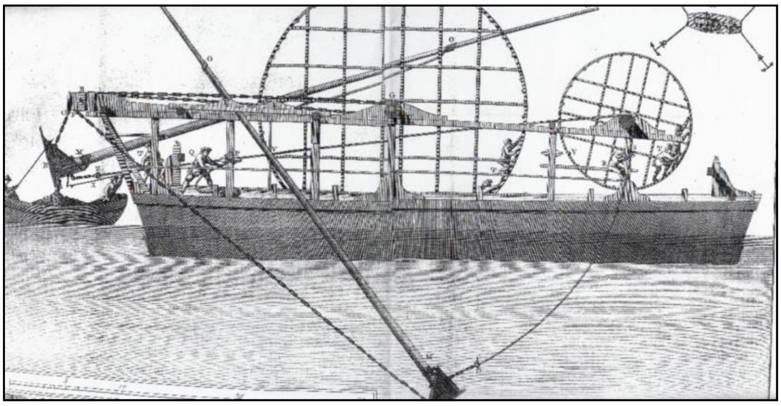

Figure 5.8 Charles Vallancey, *A treatise on inland navigation* (London, 1763), Mid-eighteenth-century dredging equipment – note the manually-powered wheels.

If the silting up of the Liffey continued, the viability of Dublin as a sea port would be greatly diminished or possibly removed. Writing in 1780, Robert Poole and John Cash highlighted the situation in Dublin bay:

> Dublin would have had a commodious and secures station for shipping; if the entrance of the bay had not been so choked up, that vessels of birthen [sic] cannot come over the bar.[42]

Contemporary writers understood the physics behind this problem, with Charles Vallancey writing:

> The entrance or mouths of rivers are commonly the shallowest, because the velocity of the water is here so diminished, by the little fall of the bed, and by its spreading and widening, that it deposits mud, sand &c. whenever it overflows[43]

One possible solution was dredging, and Vallancey recommended its use when '… their [rivers] beds are so strong … that the stream cannot deepen them …'[44]A dredging machine in 1745 cost 10,000 French Livers (£460 sterling)[45] and from

[41] Ibid.
[42] Robert Poole & John Cash, *View of the most remarkable public buildings ... in the city of Dublin* (Dublin, 1780), p. 7.
[43] Vallancey, *A treatise on inland navigation*, p. 84.
[44] Ibid., p. 82.
[45] Ibid.

period schematics they appear to be relatively inefficient machines, requiring large amounts of manual effort in their operation.

It was to address this problematic situation that George Semple approached the Ballast Board in 1762. Using existing maps of Dublin bay and harbour, Semple had charted the changing depth and position of Dublin bay's sand banks and believed he had several solutions to improve the economic capability of the harbour. In a letter to the board, Semple stated the work he had already undertaken and the objectives of his prospective project:

> … I have in the following work industriously endeavoured to collect and carefully laid down some of the most authentick [sic] surveys of this harbour for some hundred years past down to the present time; wherein by inspection may easily be discover'd the great loss the river was at for want of a direction into the bay, and I have given the sundry shiftings and changes of the sands and taken new and exact soundings through the whole bay … which doth most evidently demonstrate the happy effects of erecting the New Pier, together with two different designs for completing the safe and commodious harbour … And I humbly apprehend that these maps and plans ought to be carefully perused … to give present and general satisfaction to the publick [sic] particularly the members of both the House of Parliament a in time being as a convincing proof that the indefatigable labours of your board is already productive …

Semple had previously worked in Kingstown[46] for a board similar to the Ballast Office, and also included his plans of Kingstown harbour as part of his proposed improvements of Dublin Bay as:

> … tho it dos' not come under your inspection yet as it properly belongs to and is part of this harbour [Dublin] I have also given it a place in this work ….[47]

[46] Modern day Dun Laoghaire
[47] George Semple, Letter to chairman … of the Ballast Office (Dublin, 1762), quoted in fully by Gerry Daly, 'George Semple's charts of Dublin bay, 1762' p. 83.

Semple's proposals comprised eight maps, some with newly-surveyed soundings but overall none of which consisted of new surveys of Dublin bay or harbour. Semple's first map was a duplication of John Seller's *The English pilot* (London, 1671) but in four other of his proposal maps he compared the previous work of Burgh and Philips,[48] Stokes,[49] Rocque[50] to each other and to his own readings. These initial comparative maps appear to be an attempt to show the worsening situation in relation to sediment build up in Dublin harbour however those copied from Rocque and Stokes show fewer sounding readings than the originals whilst the map copied from Burgh and Philips included the original surveys for a canal from Sutton to the city which had been abandoned decades previously, leaving its presence a mystery in the 1762 copy.

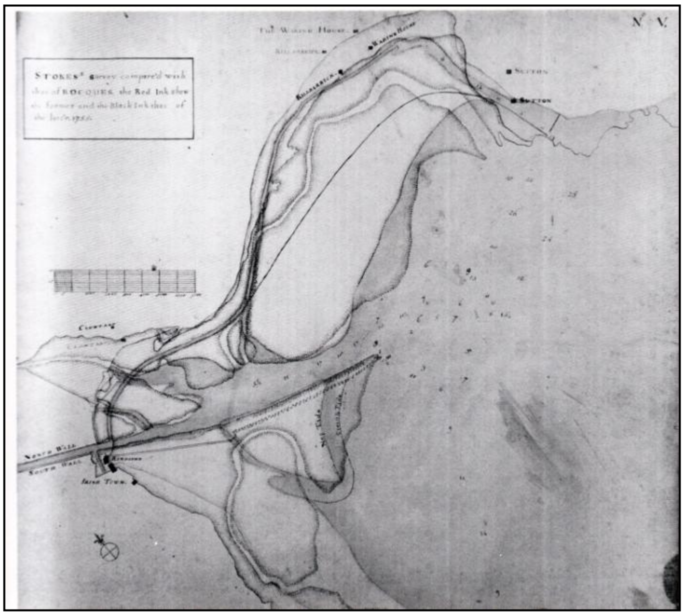

Figure 5.9 George Semple, *Stokes's survey compared with that of Rocque* (Dublin, 1780).

Semple's own original ideas are contained in maps labelled VI and VII of his set of eight. He proposed that two large sea walls be built, one extending from 'Buters Town'[51][Booterstown] in the south and one from Sutton in the north. Each was to extend into Dublin Bay for over a kilometre, until they had reach a point where it met the Liffey's main channel in the bay, whereupon they would meet the north and south walls respectively of the rivers banks which would also have to be greatly extended. The area contained with the two walled sections would be 2444 plantation acres in the northern section and 1266 plantation acres in the southern section – calculated by

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[48] George Semple, Letter to chairman … of the Ballast Office (Dublin, 1762), map. II, III.
[49] Ibid., map. III, V.
[50] Ibid., map. VI, V - both copies of Rocque, *The city, harbour, bay & environs of Dublin*.
[51] George Semple, Letter to chairman … of the Ballast Office (Dublin, 1762), map VII.

Daly to be a total of 2291 acres.[52] Such an undertaking would be a massive increase in land recovery for Dublin city compared to the pre-existing eighteenth-century reclamation works featured in the 1717 map[53] and also mentioned by Brooking.[54]

The engineering logic supporting such an endeavour is questionable. Considering that modern Bull Island, which was created by sedimentary deposition accelerated by the construction of then North Bull Wall and which occupies approximately the same area as the northern section of Semple's reclaimed land, the amount of physical work and financial backing required for Semple's project would not be justifiable. Semple's ideas were never taken up by the Ballast Board, however, his mapping project not only demonstrates the gradual silting up of Dublin bay over the seventeenth and eighteenth centuries, but also shows that engineers were actively using pre-existing mapping.

The dawn of the nineteenth century saw intense interest in the mapping of Dublin bay and like the 1750s series of maps, demonstrated the changing of cartographic styles and the evolution of map production. Two major charts of the bay were published in a three year period, one by John Cowen in 1800 and the other by Captain William Bligh former Captain of H.M.S Bounty.

Cowen's map, *Dublin Bay* (London, 1800) again represents a trait in eighteenth-century Irish cartography by reproducing the style of earlier cartographers without significantly embellishing a newly produced map with decorative changes. Cowen's style is very similar to that of Scalé in his 1765 *Directions for navigation into the bay of Dublin.* The inclusion of a profile view of the coast from a sea perspective is a direct copy from Scalé's work and Dublin is represented in a generic block layout with no real regard as to the city's actual layout. Without the inclusion of the Grand Canal Docks this map could easily have been dated to the 1760s/1770s.

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[52] Daly, 'George Semple's charts of Dublin bay, 1762', p. 97.
[53] Unknown, entitled *A map of ye strand of north side of ye river Anna Liffe as it was granted and set out in easter assembly 1717 by ye Rt. Hon. Thomas Bolton esq. lord mayor of the city of Dublin* (Dublin, 1717).
[54] Charles Brooking, *A map of the city and suburbs of Dublin* (London, 1728).

Whilst Cowen's map appears outdated, Bligh's representation of the bay is a highly advanced work of cartography for the first years of the nineteenth century. Like the change in attitude towards surveying and mapping caused by Rocque's arrival in the 1750s, Bligh's work also indicated that the future of cartography in Ireland would be radically different and independent of anything that had been produced of Dublin bay in the past.

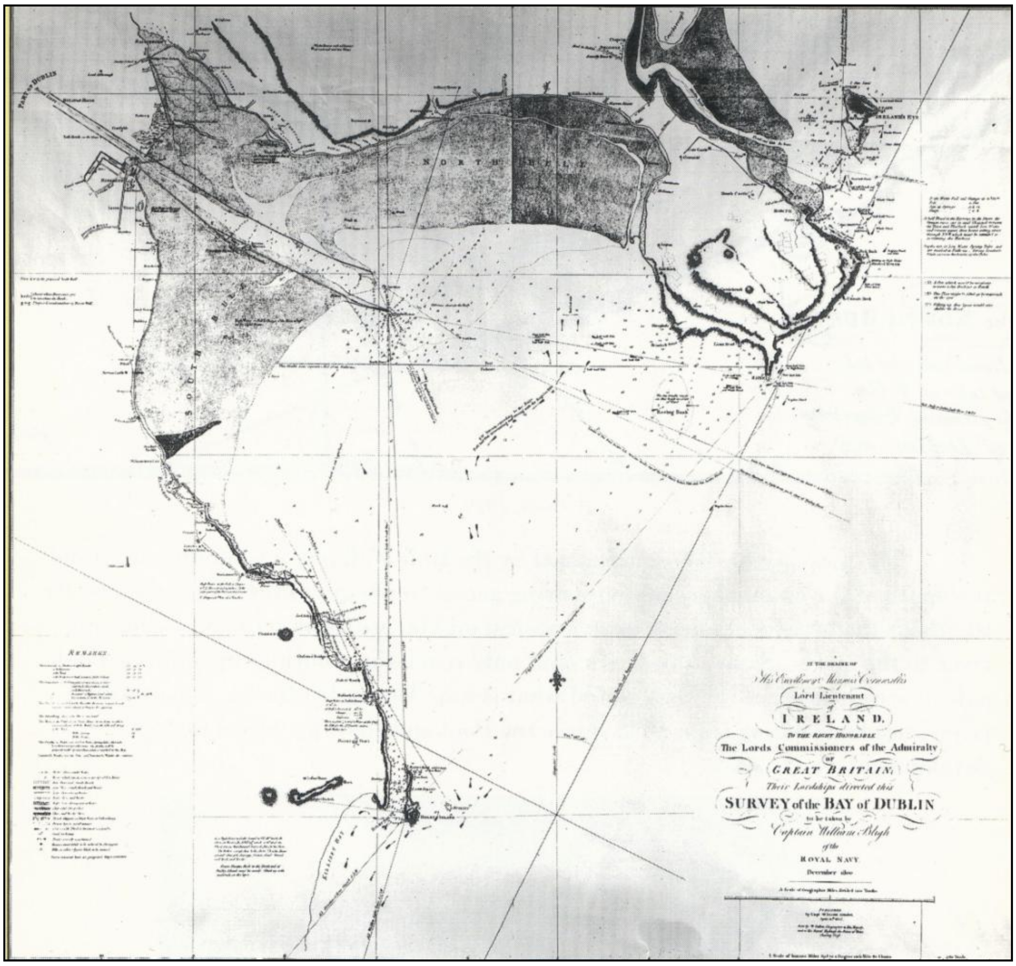

Figure 5.10 William Bligh, *Survey of the bay of Dublin* (London, 1800).

William Bligh (1754-1817) had had a tumultuous career before this 1803 survey of Dublin Bay. Having served in the Caribbean as a midshipman he was recommended at the age of twenty two by none other than Lord Sandwich, at the time First Lord of the Admiralty, to join Captain James Cook's third voyage to the Pacific in 1776.[55] Bligh's four-year voyage with Cook on *H.M.S. Resolution* allowed him to map large portions of the Pacific, from the tropics to the Bering Sea and also gave him his first command, upon Cook's death in Hawaii in 1779. Bligh was a talented navigator

[55] Richard Hough, *Captain James Cook* (London, 1994), p. 333.

however he was known for his sharp tongue and poor sense of humour, commenting on the ‘crossing of the line’ ceremony on board the Resolution as ‘a vile practice … to afford some fun.’[56] Bligh had the misfortune of having three mutinies occur under his command,[57] the most famous being that onboard H.M.S. Bounty in 1787, and was also governor of New South Wales, Australia, during the Rum Rebellion in 1808.[58]

Bligh’s map of Dublin bay is extremely detailed and clearly laid out in comparison to maps and charts of the same area produced throughout the eighteenth century. The coastline of the entire bay is highly detailed with a large and tight concentration of soundings recorded around Kingstown Harbour,[59] Howth Head and the entrance to Dublin harbour and the Liffey.

Like Burgh and Perry’s map of 1728, the course Bligh took across Dublin Bay is recognisable as a string of soundings indicating that Bligh employed the same intersectional technique that had been used in previous surveys of the harbour. Devoid of any non-cartographic decoration or artistic cartouche, Bligh’s map was a hint at the future of standardisation that was to be introduced by the Ordnance Survey in the 1820s.

The charts and maps of Dublin bay and harbour differ from plans of the city produced in the eighteenth century. They recorded an area virtually devoid of human interference and as such can be considered as a good example of how a group of surveyors and engineers could vary in their representations of the same natural feature, i.e. the sea bed and shore. While the maps mentioned in this section are not a complete and exhaustive record of those produced for Dublin Bay during this period, they show the varied styles and techniques of maritime surveyors. These surveyors highlighted the bay’s ever-changing sea bed and the maps and charts produced emphasize each individual’s cartographic strengths, weaknesses and uniqueness.

56 Hough, *Captain James Cook* , p. 429.
57 H.M.S Bounty (1787), Spithead and Nore mass mutinies (both in 1797), Rum Rebellion (1808).
58 A.W. Jose et al, (eds), *The Australian encyclopedia* (Sydney, 1927), pp 171–2.
59 Modern Dun Laoghaire.

5.4 Surveying and transportation infrastructure

> The marking out the road is indispensably requisite in maps, without which a geographer can never make them of much use to either a traveller or student.[60]

This statement by English cartographer John Green in 1717 emphasises the importance of roads, and additionally canals in eighteenth-century mapping. This section shall discuss Dublin's surveyors role in each, examining those who were involved in such projects, the specialised equipment and techniques they used and the differences between engineering surveying and traditional land surveying – primarily focused on levelling.

Road surveying

Roads create a skeletal network of a country along which trade, communication, art, war, diseases, fashion and science travel. Map detail is intrinsically focused on human activities and allows the reader to determine not only their place in the world, but also where the rest of the world is in relation to them. Roads answer the question 'where am I'?

> What can a man learn from a multitude of places, confusedly scatter'd? Like a traveller in a pathless wood, he is at a loss which way to guide himself. Wou'd it not look very odd to see a plan of London (if it can be so call'd) without the streets? And yet I wou'd be equally instructive, for it is as impossible to judge rightly of the situation of places in the map of a country without the roads, as it would of churches, palaces and all public buildings, in the plan of a city, without the streets.[61]

Roads are relevant to any study of eighteenth-century surveying in Ireland for many reasons. Road mapping was a distinct part of business for eighteenth-century surveyors and its presence in period surveying treatises indicates that there was a high possibility that a professional surveyor would undertake road surveying during his career.[62] The main principles of road surveys relate to orientation and distance. Given the linear nature of roads, surveys could be rapidly conducted between towns with only minimum detail of the surrounding countryside being included. Road maps were complex documents, with multiple layers of information such as town and village locations, geographic features and road type being included in addition to the main features of distance and direction. Stylistically simple, yet of relatively high surveying

[60] Green, *The construction of maps and globes in two parts*, p. 151.
[61] Ibid., p. 137.
[62] Wyld, *The practical surveyor*, p. 138.

complexity if trigonometrical methods were used, road surveys were a part of many surveyors' work loads as demonstrated by surviving maps and records.

Roads in eighteenth-century Ireland varied from broad thoroughfares suitable for large carriages and carts to virtual dirt tracks. Arthur Young described the poor condition of many of Ireland's roads on his journeys around the country in the late 1770s:

> This road is abominably bad, continually over hills, rough, stony, and cut up. It is a turnpike, which in Ireland is a synonymous term for a vile road, which is the more extraordinary, as the cross ones are the finest in the world. It is the effect of jobs and imposition which disgrace the kingdom; the presentment roads shew [sic] what may be done, and render these villainous turnpikes the more disgusting[63]

> I would often hear of roads being made over such quaking bogs, that they move under a carriage, but could scarcely credit it; I was, however, convinced now; for, in several places, every step the horse set, moved a full yard of the ground in perfect heaves.[64]

One author commented that many of the new roads constructed during the latter half of the eighteenth century were 'tolerable', but that they were too narrow and crooked compared to those found in other European countries. He saw the improvement of roads as a necessity to make the country 'capable of answering [its] natural purpose … promoting the extension and good trade.'[65] Semple's solution to Ireland's road network crisis was the suggested creation of a new road in a direct line between Derry and Cork to be one hundred feet wide with spur lines joining it with Dundalk, Drogheda, Dublin, Limerick, Galway, Castlebar and Armagh. Semple's plan, apart from being overly simplistic, proved unnecessary as the country already had a complex road network, albeit in a poor state of repair in many parts of the county.

One of the most detailed road surveys of Ireland conducted during the eighteenth century was that of George Taylor and Andrew Skinner in 1776. Taylor and Skinner were both military men, George being the brother of Alexander Taylor who conducted a survey of Irish post roads in 1805 and also worked with Gen. Charles

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[63] Young, *A tour of Ireland*, p. 128.
[64] Ibid., p. 206.
[65] George Semple, *Hibernia's free trade* (Dublin, 1780), p. 169.

Vallancey on his military survey of Ireland.[66] Prior to Taylor and Skinner's arrival in Ireland, they had produced a map book, *A survey and maps of the roads of North Britain, or Scotland* (London, 1776), which laid out each road as a linear design leading from one town directly to another, thus emphasising major roads individually. This was not a unique method of displaying road layouts, and it had been championed by Scottish surveyor John Ogilby during the seventeenth century, his work appearing as an example of aesthetic excellence in Hume's *Standard of taste* (London, 1757). Taylor and Skinner repeated this technique for their map of Ireland's roads.

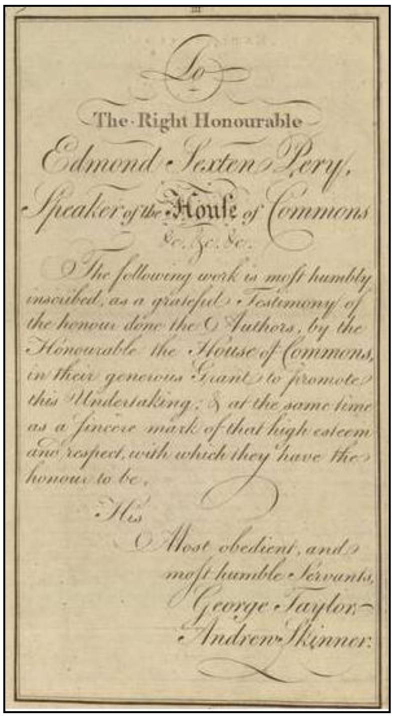

Figure 5.11 Dedication to Edmond Sexton Pery, Speaker of the Irish House of Commons, Taylor and Skinner, *Road maps of Ireland* (London, 1777).

Maps of Ireland's roads did exist prior to Taylor and Skinner's work in Ireland, with Scalé's *Hibernian atlas* (London, 1776) being one of the most extensive, if slightly too generalised to be classified as a specific road map. Work began on the project in early 1777 with the assistance of two other surveyors and sixteen assistants. J. H. Andrews speculated[67] that Taylor and Skinner used a theodolite instead of a circumferentor during their work, which may be true given the absence of magnetic north measurements in their final map and the popularity of the instrument in Britain compared to Ireland. Theodolites had been recommended for road surveying since at least the 1720s. Samuel Wyld recommend that a combination of theodolite and 'the wheel', or perambulator, be employed during road surveys.[68] Working from major town to major town, prominent features such as church steeples would be utilised to provide a trigonometrical control network using theodolite bearings. Such a linear network of control points would be relatively weak geometrically. However given the nature of the maps produced by Taylor and

[66] Francis Steer (ed.) *Dictionary of land surveyors and local map makers of Great Britain and Ireland 1530-1850*, ii, 502. There was also a third Taylor brother who was initially trained as a land surveyor but left the profession in 1773 and by 1781 was joint manager of an opera house in London.
[67] Preface to reprint of Taylor & Skinner, *Road maps of Ireland* (London, 1777, reprinted Dublin, 1968).
[68] Wyld, *The practical surveyor*, p. 138.

Skinner, where the necessity to show the relationship between different road networks would have been minimal, such survey reference point problems would not have had a major impact on their work. The series of maps created by the two men read like a physical journey being orientated from the town of origin to the town of destination, rather than being oriented based on a north point.

Distances were determined using the perambulator[69] and Taylor and Skinner paid particular attention to this issue. Their indices of the roads of Ireland list the distance of every market town from Dublin, in both English and Irish miles[70] and furlongs. All distances were measured from Dublin Castle. The importance of recording distances in maps was further highlighted by John Green, referring to historical cartographic pioneers, and highlighted the unfortunate absence of distances in their maps:

> Roads with the distances are of so great importance in maps, that should the journals from whence they were drawn happen to be lost, something of them would by that means be preserv'd, and some use might be made of them in another age. If Ptolemy had observ'd this method, his maps would have been abundantly more useful, and we might have been able not only to rectify them, but to improve the modern thereby …[71]

Subscribers to Taylor and Skinner's work included the lord lieutenant Earl Temple, the lord chancellor, the lord primate, Archbishops of Dublin and Tuam, the Duke of Leinster, the Duke of Devonshire and the Marquis of Rockingham. The two authors assured their subscribers that:

> … they have done their utmost endeavours to procure the proper names of places but if any mistakes are (tho' they wish them to be few and of little importance) entreat they may be ascribed to ye true cause … it is their utmost desire to give satisfaction in every particular, and will always consider it their highest honour, if they have in any measure succeeded.[72]

Despite the status of their subscribers, the two men encountered difficulties in finding adequate funding for their project. Finding a financial gap of £300, they petitioned parliament and were awarded the remainder of their funding, possibly explaining the dedication in their work to Edmond Sexton Pery, the Speaker of the House of Commons.

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[69] Ibid., p. 139.
[70] Eleven Irish miles were equal to fourteen English miles, Taylor & Skinner, *Road maps of Ireland*, p. iv.
[71] Green, *The construction of maps and globes in two parts*, p. 151.
[72] Taylor & Skinner, *Road maps of Ireland*, p. iv.

Taylor and Skinners road maps were relatively basic yet clear and informative (see figure 5.12). Avoiding unnecessary textual clutter each map linked two towns or cities, showing distance markers, stately homes[73] and points of interest. Natural features such as rivers and hills appear to have been sketched in, yet they add an element of realism to the work.

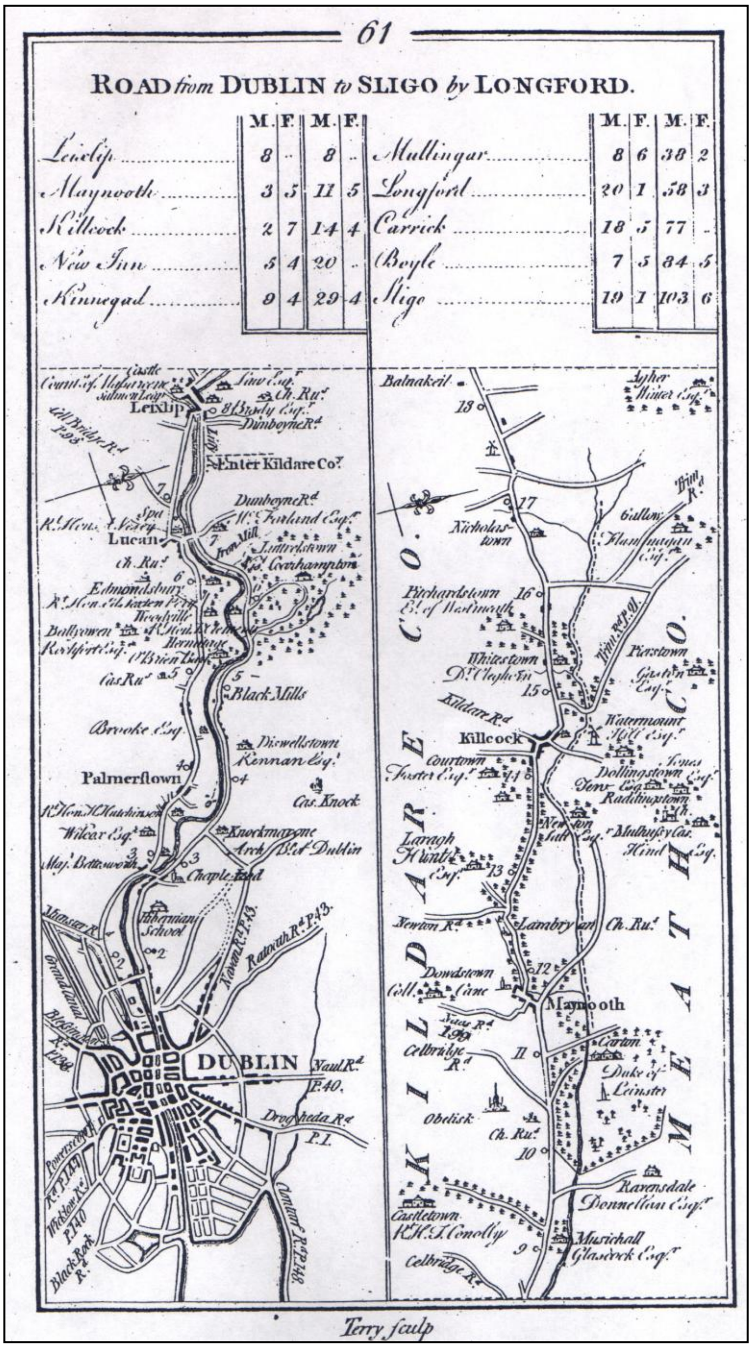

Figure 5.12 An example of the maps created by Taylor and Skinner showing the route from Dublin to Kilcock, Co. Kildare, Taylor and Skinner, *Road maps of Ireland* (London, 1778).

[73] Many of which were included because of their association with subscribers to the work.

After their work in Ireland, the two military men departed for the North American colonies in 1779, which were at the time embroiled in the American Revolutionary War (1775-83). Based out of the British strong-hold in New York,[74] Taylor and Skinner produced maps of New York harbour while serving as officers with Duke of Cumberland's Provincial Regiment of Foot,[75] this being at the expense of work they had originally planned to complete in England:

> Some years ago, Messrs. Taylor and Skinner published proposals, and got many subscribers, for taking a survey and making a large map of this county [Perth and Clackmannan], which has never been hitherto done. These surveyors neglected the scheme, for a more lucrative employ of publishing the roads of Ireland: since that was finished they have gained some office in the Army in America, and have quitted that project.[76]

Taylor and Skinner were not the only surveyors producing road maps. As previously discussed, Thomas Sherrard produced an excellent example, measuring over eight feet long, showing the length of road from Church Street to Glasnevin including a series of cross-sections of Constitution Hill, a feat not attempted by Taylor and Skinner in their series of maps.

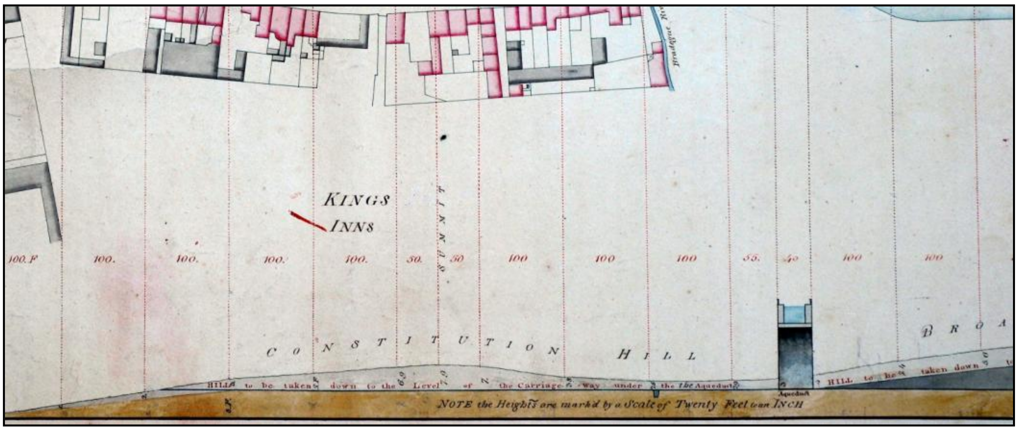

Figure 5.13 Elevation cross-sections. Portion of Thomas Sherrard, Church Street, Constitution Hill and Phibsboro Road, 1790 (DCA, WSC/Maps/263), showing cross-section of Constitution Hill.

Whether in dedicated road map publications such as Taylor and Skinner's work, or in engineer designs like Sherrard, roads were an inherent feature in eighteenth-century Irish cartography. As John Green wrote:

> … nor can a map be call'd a true representation of a county without [roads] …[77]

[74] New York has fallen to the British Army in the aftermath of the Battle of Long Island (1776) and was in British hands until the end of the war, David McCullough, *1776* (London, 2005), p. 201.
[75] R. H. Fairclough, 'Sketches of the Roads in Scotland, 1785; The manuscript road book of George Taylor' in *Imago Mundi*, xxvii (1975), pp 65-72.
[76] Richard Gough, *British Topography* (London, 1780), p. 710.
[77] Green, *The construction of maps and globes in two parts*, p. 152.

Canal Surveying (1751-1806)

> Commerce … is the most solid foundation of civil society, and the surest mans of uniting mankind, even the inhabitants of the most distant countries; by commerce, the whole world in a manner becomes one single family.[78]

The techniques of canal surveying and planning were on the cutting edge of eighteenth-century surveying and engineering. Surveying techniques, primarily levelling, were paramount to the success of any Irish canal scheme. Given the ease of transporting of goods by canal, there was great enthusiasm within Ireland for their construction:

> Again if we consider an enumerate the chief sources of employment for this intended navigation, such as the natural production of the counties that lie near the canal, the cultivated commodities and manufacture, the imported material and general commerce, all which are hereafter set forth, it must work up the imagination of every friend of Ireland, until he is wholly employed in projecting schemes to realise it, in the whole extent.[79]

Canal construction was highly dependent on accurate mapping and while the relative area affected by canal construction was confined to the immediate region surrounding the canal, it was vital that land through which the canal passed was correctly mapped and its owners identified. Some of the earliest ideas for canals in Dublin emanate from Andrew Yarranton who produced a map of Dublin in 1674 showing a series of canals crossing the city to the east of Dublin Castle. Yarranton's plans were not feasible due to the dense urban nature of the land in question however it demonstrates an interest in Irish canals dating back at least to the seventeenth century. Legislation for inland navigation projects was first introduced in 1715,[80] while the first operational canal was constructed in the 1730s from Newry to Coalisland. In 1729 engineer Thomas Bowen produced a map[81] showing details of two potential lines for a Dublin/Shannon Canal. By 1751 serious interest was being paid to a proposed canal between Dublin and the Shannon and the *Corporation for promoting and carrying on an inland navigation in Ireland* was formed.[82]

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[78] Vallancey, *A treatise on inland navigation*, p. i.
[79] Ibid., p. 12.
[80] Act 2 Geo. I, c. 12 [Ire.] (1715).
[81] Thomas Bowen, *A plan of the Grand Canal from the city of Dublin to the river Shannon* (Dublin, 1729).
[82] 25 Geo II, c. 10 [Ire.] (1751).

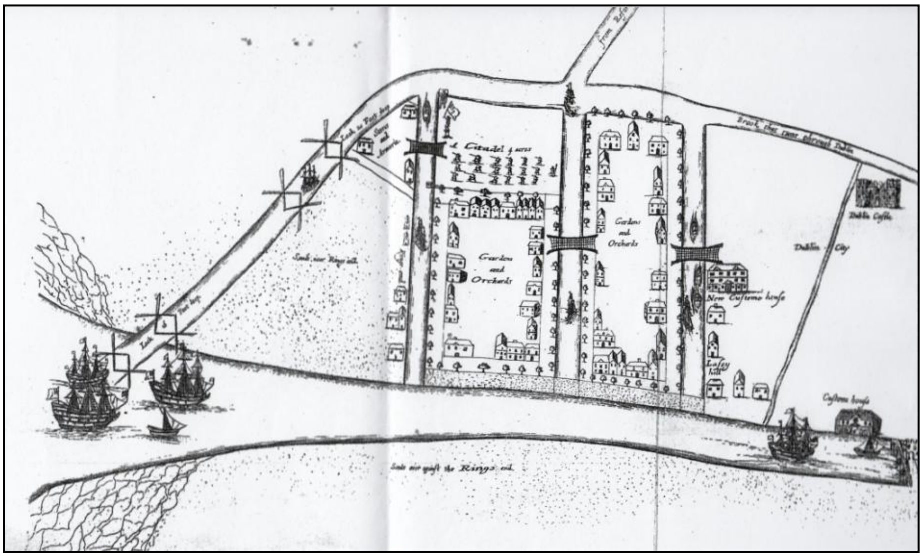

Figure 5.14 Proposed canal construction in Dublin city centre, Andrew Yarranton, *Dublin* (Dublin, 1674), in J. T. Gilbert (ed.), *Ancient records*, v, appendix.

George Semple was asked his opinion on the route any Dublin/Shannon canal should take. There were regular debates in parliament between concerned parties as to whether a northern or southern route would be best suited. Semple was indecisive on the matter:

> My private opinion was asked by those on both sides of the questions; but not having applied my thoughts to any thing of that nature, and not choosing to give a rash opinion, I set off, and took a cursory view of all the rivers worth my notice, between Dublin and Cork; then to Limerick and traced the course of the Shannon on the west side … And on my return, having compared the opinions of several gentlemen that were employed and had wrote on it ... I was not able to determine which of those lines ought to obtain the preference; nor do I to this day …[83]

Despite his lack of commitment to either proposed line, Semple understood the importance of artificial inland navigation and wrote about its potential impact on trade late in his life.[84]

By the mid-1750s the southern route had become favourite, with engineer Thomas Omer being placed in charge of the 'Grand' southern route.[85] There were serious doubts raised about Omer's plans for the Grand Canal, with at least one anonymous author suspecting at worst that fraudulent maps were produced by Omer or that Omer was incapable of producing adequate maps for such a scheme:

> … by considering what was Mr. Omer's opinion, before he viewed and traced the southern line, without reflecting on his motives for such a rash declaration, we may account for some extraordinary appearances in the plan he now offers … this map, produced by Mr. Omer, has no scale, it also has no latitudes, or bearing to any point

[83] Semple, *Treatise of building in water*, p. 1.
[84] Ibid., p. 162.
[85] Ruth Delany, *The grand canal of Ireland* (Dublin, 1973), p. 4.

of the compass, so, consequently, whether the rivers, that interest those lines, are properly placed, it is impossible to know from his map.[86]

One of the best authorities on canal surveying and engineering in Ireland was Lt. Gen. Charles Vallancey (1725-1812) who had previously copied the French version of the Down Survey (see chapter 3). Vallancey was born in England of French descent and his father was a classical scholar who helped educate his son 'with the best Greek and Roman writers'[87]. This early education in antiquities had mixed results for Vallancey later in life. Educated at Eton, Vallancey became close friends with the future Lord Lieutenant of Ireland, Marquis Townsend, and their friendship was said to have:

… grown with their growth, and strengthened with their strength.[88]

Figure 5.15 Lt. Gen. Charles Vallancey (1725-1812), *Walkers Hibernian Magazine*, Nov. 1804.

In the 1740s he joined the Royal Military Academy at Woolwich where he received his training as a surveyor and engineering. Assigned to the Tenth Regiment of Foot in 1747 he was stationed in Gibraltar in 1750. [89]

Vallancey's main skills lay in engineering and surveying.[90] In 1763 he published *A treatise on inland navigation* (Dublin, 1763) describing the main theories behind canal building and including canal building projects from antiquity and the eighteenth century. His understanding of the advantage that canals could bring to a country and the impact they could have on traditional means of transportation was stated from the very beginning of his work:

[86] Unknown, *Observations on a pamphlet lately published entitled a description of the rival lines for inland navigation &c.* (Dublin, 176), p. 7.
[87] *Walker's Hibernian Magazine*, Nov. 1804.
[88] Ibid.
[89] William O'Reilly, 'Charles Vallancey and the military itinerary of Ireland', in *Proceedings of the Royal Irish Academy*, 106*c* (Dublin, 2006), p. 127.
[90] In the late 1770s he conducted a military survey of Ireland which he presented in person to King George III in 1782. He was promoted to Colonel on the following day. *Walker's Hibernian Magazine*, Nov. 1804.

> Canals render carriages and beasts of burden less necessary … it is by them that traffic can animate all parts of a state and produce plenty and happiness to the people, and thus extend a sovereigns power.[91]

Apart from canal building techniques and discussions on improvements in engineering, period canal publications made clear the role that surveying played in such projects. Primary importance fell to levelling. It is not economically feasibly to build canals in a straight line between two termini as hills and valleys greatly increase cost. As such the importance of surveying in the initial laying out of a canal was paramount:

> The country thro' which it is to pass, must be most exactly surveyed, and levels taken the whole extent, without no judgement can be formed.[92]

As discussion of the importance of levelling in canal construction had previously been published in Ireland by Richard Castle in 1730 who gave a more a more detailed explanation[93] of levelling techniques, paying particular attention of the effect of earth curvature for long levelling runs.[94]

After the initial levelling run and survey of the surrounding areas, cross-sectional maps were required to analyse the amount of earth that required extraction in addition to the volume of material needed for cut and fill section of the works. Vallancey's understanding of cross-sectional maps and their production gives a better insight into his skill as an engineering surveyor, well versed in his science:

> Having determined the course of the canal according to the preceding consideration a map should be added on a large scale…to this map should be added a section or profile of the ground from one end of the canal proposed to the other, passing through the middle of it, making the bottom of the canal, the soil, risings and gallows of the ground; from this may be determined the sinkings, position of locks, back drains; aqueducts, bridges etc.[95]

Cross-sectional maps are relatively rare in eighteenth-century Irish map collections outside of canal maps. Road surveying was another engineering field with a definite need for this type of map[96] but they are seldom found in surviving map collections.

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[91] Vallancey, *A treatise on inland navigation*, p. iv.
[92] Ibid., p. 123.
[93] See Chapter 2 : The level.
[94] Castle, *Essay on artificial navigation*, p. 9.
[95] Vallancey, *A treatise on inland navigation*, p. 134.
[96] Unknown, Design of the Carlisle Bridge approaches, c. 1800 (NLI, Longfield papers, Ms. 21.F.87(101)).

In 1771 Vallancey, by request of the Commissioners of Inland Navigation, produced a report on the proposed route of the Grand Canal. Following his own advice, he produced detailed surveys and levelling results on two separate routes, Dublin to the Shannon via Tullamore and Dublin to the Shannon via Mullingar. In addition to the main lines, he surveyed several 'collateral branches',[97] all of which was presented to the commissioners in map form as part of his report. Within County Dublin, the presence of several rivers was deemed to be problematic but not overly difficult from an engineering perspective. The Liffey, which Vallancey described as 'difficult to be made navigable on account of … rapidity'[98] was crossed by the Grand Canal in County Kildare. The original crossing point was deemed to be too wide and deep and Vallancey was able to find a narrower crossing point only two hundred yards upstream with a water depth of only three feet.

Despite the benefit to commerce which would be enjoyed by the counties through which the canal would pass, there would inevitably be individuals who would lose land to the canal's construction. The purchasing of land was one of the highest expenses incurred with canal building as it would 'nearly show the expense of the whole design.'[99] Castle, writing in 1730, also advised that the establishment of land ownership should be high priority in any canal mapping procedure:

> … to the end that the damage done to every person may be obvious.[100]

Vallancey's investigation into the course of the Grand Canal established that fifty-six land owners in Dublin would be affected by its construction, with fifty-five in Kildare and thirty-one in King's County.

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[97] Charles Vallancey, *A report on the Grand Canal* (Dublin, 1771), p. 3.
[98] Ibid., p. 4.
[99] Ibid., p. 134.
[100] Richard Castle, *Essay on artificial navigation*, 1730, p. 7 (NLI, ms. 2737).

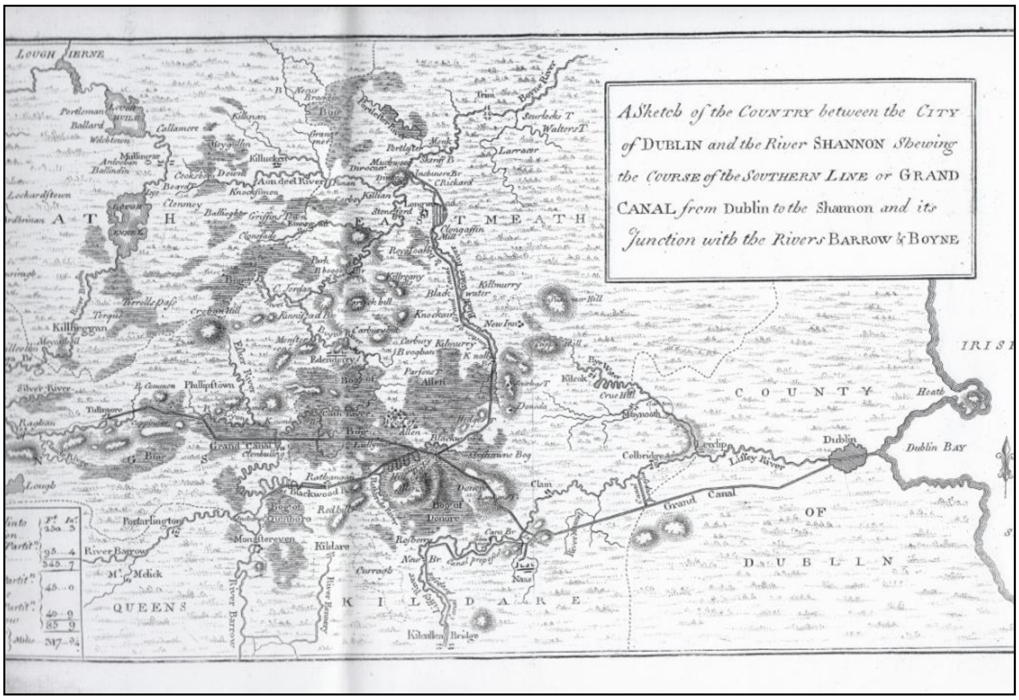

Figure 5.16 Charles Vallancey, A sketch of the country between the city of Dublin and the river Shannon. Charles Vallancey, *A report on the Grand Canal* (Dublin, 1771).

Vallancey's surveys allowed him to deduce the distance of the canal from Dublin to the Shannon,[101] the number of locks required[102] and the difference in height between the Dublin City basin terminus and the Shannon.[103] Determination of statistical data such as this was vital in the overall planning of the Grand Canal; however Vallancey had one major adjustment that he felt the commissioners should undertake for the canal's design. The original plan was for the Grand Canal's terminus in Dublin to be located at the city basin, near St. James's Street in the south west part of the city. He felt that this was too distant from 'the usual abodes of the merchants and traders' of the city. This additional road transportation of goods would add significantly to the final price, thus reducing the economic viability of Ireland as a whole and 'thereby defeat the good intention of this navigation.'[104] He proposed continuing the canal parallel to existing roads to a new termination point at St. Stephen's Green or Merrion Square:

> … from when there will be so many direct avenues from its banks to various parts of town, as to lower the price of town carriage very considerably, as well as a favourable opportunity of letting the canal down to the river, between Georges Quay and Ringsend, as may hereafter by found expedient.[105]

[101] 68 miles.
[102] 46 Locks.
[103] 59 feet.
[104] Vallancey, *A report on the Grand Canal,* p. 66.
[105] Ibid.

Vallancey's report was all encompassing covering a wide range of subjects in detail related to building a canal on the proposed route. However, a report published in the same year by Dublin Corporation engineer John Trail disagreed with Vallancey's choice of the location to cross the Liffey, preferring one selected by Omer that retained a straight line for the canal.[106] Trail suggested that an expert be brought in to settle the dispute and Redmond Morres, a member of the fledgling Grand Canal Company, wrote to engineer John Smeaton in Scotland who at the time was involved with the Forth and Clyde Canal. Smeaton was initially reluctant, with his responses often taking two or three months, however, the commissioners were determined to have his opinion due to:

> … the high character you have as to integrity, knowledge and experience in works of this kind.[107]

By August 1771 Smeaton was still fully occupied but was willing to review the commissioners' reports, although he warned them that he was not familiar enough with the country for a complete review of the project. Despite the repeated requests to visit the project in Ireland, Smeaton's engagements meant that his actual visit to the site was looking less and less likely. As a result he recommend that John Grundy, a Lincolnshire engineer, would be a suitable replacement for him in such a project.[108] Smeaton's letters to the commission throughout 1772/3 were much longer and more technically detailed than those that followed the initial enquiry into his availability, demonstrating his growing interest in the project. In a letter dated December 1772, he also suggested additional personnel that the project engineer would require around him, including a purveyor for material, a land valuer, pay clerk and a store keeper. Second on the list of Smeaton's personnel request was a land surveyor:

> To measure the lands staked out, or proposed for purchase, temporary drainages, &c. to measure the work of the artifices done by contract, &c. and to take levels occasionally by direction of the engineer, together with plans and section of hill, hollows, &c. through which the canal is to pass …[109]

An advertisement for a 'skilful engineer' published in 1787[110] by the Grand Canal Company emphasised many of Smeaton's recommendations for a surveyor,

[106] Delany, *The Grand Canal of Ireland*, p. 11.
[107] Redmond Morres, *Letters on the Grand Canal* (Dublin, 1773), p. 5.
[108] Ibid., p. 18.
[109] Ibid., p. 35.
[110] *Freeman's Journal*, 22 Sept. 1787.

highlighting the close ties between surveying and engineering in eighteenth-century Ireland.

John Brownrigg, former pupil of Bernard Scalé and onetime business partner of Thomas Sherrard, was an active surveyor for canal projects. Included in his work was the implementation of Vallancey's scheme for the extension of the Grand Canal further than the City Basin[111] and a recommendation to the Wide Streets Commissioners to construct a new street from Kevin Street to the canal dock at Portobello with an accompanying bridge.[112]

Of the landowners identified by Vallancey whose property would be affected by the building of the canal, Smeaton had the following advice:

> The owners and occupiers of land through which the canal is to pass (I mean chiefly the small ones) have their minds perpetually employed how to make the most of it, and are not only contriving every circumstance to exaggerate the purchase of the land …[113]

Smeaton eventually arrived to inspect the canal in September 1773 and suggested that Vallancey's Liffey crossing point was the most viable.[114]

The promise of economic prosperity was the key motivator behind road and canal construction but this was offset by the difficulties in purchasing land and the detailed and complicated surveying work that accompanied such large engineering work. The absolute importance of maps to transportation schemes and the necessity of levelling meant that surveyors and their work were vital to such projects before the first sod of earth had been turned. Transportation surveying also highlights the separation that existed between the two careers, with surveying still using inherently traditional techniques and instrumentation, while engineering was expanding into different technological realms and influences from abroad.

[111] Delany, *The Grand Canal of Ireland*, p. 51.
[112] 13 Jun. 1806 (DCA, WSC/Mins/20), p. 114.
[113] Morres, *Letters on the Grand Canal*, p. 35.
[114] Delany, *The Grand Canal of Ireland*, p. 15.

5.5 Summary

Engineering surveying played a clear and important role in the development of Dublin's transport infrastructure during the eighteenth and early nineteenth centuries.

George Semple's multi-facet career crossed the blurred line between that of engineer and land surveyor. His successful use of both professions and associated skill-sets allowed one of the most important Liffey crossing points during the mid-eighteenth century to be rebuilt to withstand the pressure of both the river passing below it and the traffic from above. Of particular note was his use of a deformation survey to determine the levels of the river bed in the bridges locale.

The repeated surveys of Dublin bay and harbour by many of the most prominent surveyors of the eighteenth century provides an expansive cross-section not only of cartographic styles employed, but also of the various engineering techniques used to map a continuously changing natural feature. The navigable passages of Dublin bay, from the mouth of the Liffey to the open sea, were the lifelines that kept Dublin alive and connected to the rest of the world. The fundamental role that surveyors played in charting these passages is undisputed. Through their work Irish goods could be traded abroad, letters and news could cross the sea and the movement of people and ships could continue both unhindered and in relative safety. Such movement of people and goods was further aided by Ireland's road network. Surveyors again supplied the necessary data so that not only roads were accurately mapped, but that distances could be calculated between important towns and centres of trade, thus helping the Irish economy.

The precision and accuracy associated with eighteenth-century engineering surveying is best demonstrated in canal construction. The important tasks of identifying the canal's path, establishment of property boundaries through which the canal would pass and setting out of levels and locks were filled by many of Dublin's surveyors. Surveyors who were associated with general land surveying, such as Charles Vallancey and John Brownrigg, found lucrative employment on the cutting edge of eighteenth-century innovation and technological development in the form of Ireland's emerging canal system.

Surveying and engineering shared a common professional ancestor. While they diverged technologically in the eighteenth century, they still maintained their core ethos of exactness and correctness in measurement.

Conclusions

The purpose of this research was to explore the land surveying industry in eighteenth and early nineteenth-century Dublin. From the research presented in the preceding chapters, it is possible to abstract the broader conclusions from the detailed research. These conclusions are set out following along the same course as a land survey: covering the profession of the land surveying industry of the period, land surveying technology and techniques and cartographic products.

Land surveyors

As has been shown in chapter one, the definition and regulation of land surveying was not a simple task. The lack of legislation surrounding the practice of land surveying meant that both professional and amateur could practice the art without the constraint from directives or guidelines. The lack of a centralised governing body for the industry, whether a guild or government department, added to the lack of clarity around the title ‘land surveyor’. The later decades of the eighteenth century, however, lead to a divergence within the profession, with the title of ‘civil engineer’ being used by many surveyors who moved away from traditional land-surveying towards the engineering-surveying opportunities brought about by the industrial revolution.

The number of land surveyors in Dublin was small compared to the population of the city. The industry was comprised of a core of highly-trained professionals, often dubbed ‘practical surveyors’, surrounded by a loose group of amateur or part-time practitioners.

Chapter 1 examined the tools and systems by which a practitioner of surveying performed his trade. Apart from the required knowledge of basic mathematics and geometry, there were many paths open to those who wished to become involved in the land surveying industry, whether at a professional or amateur level.[1] Having a formal apprenticeship with an established land surveyor, or being born into a land surveying family dynasty appear to have been two successful methods of joining the profession, however there were still opportunities for those who were self-educated. Also

[1] See section 1.3.

explored in chapter 1, land surveyors were capable of operating as individuals and also of forming both short and long-term strategic partnerships.[2]

Land surveying in Dublin during this period provided a livelihood for the men who practiced it. There were various employment opportunities available to those producing maps and surveying at the time, while also acknowledging that financial success or failure depended greatly on the surveyor's skill in measurement and business awareness.[3] The use of media to advertise a surveyor's strengths, and highlighting his opponent's weaknesses, could play a major role in ensuring a stable financial income.[4] The advertisement of new techniques and instrumentation had clear advantages in gaining employment to those who were flexible enough to adjust their business practices.

Land Surveying

As the title of land surveyor evolved over the course of the eighteenth century so did the instrumentation and associated techniques available to him. Chapter 2 examined the various instruments employed by Dublin-based surveyors in the course of their work. The eighteenth century began with survey instrumentation strongly resembling those used in the sixteenth and seventeenth centuries. The plain table, mentioned in many late seventeenth and early eighteenth-century surveying treatises, was archaic by the end of the period covered by this research. The circumferentor was the most popular instrument amongst Dublin's surveyors during this period. The introduction of the theodolite and level into mainstream Irish land surveying, for example in the work of John Rocque, also assisted in greatly increasing the accuracy of surveys. This instrument however met with mixed success as many practitioners were reluctant to move away from the more traditional circumferentor and chain combination.

The potential errors associated with surveying instruments available in eighteenth-century Dublin were as varied as the instruments themselves. Magnetic variation, and the associated understanding of this problem by the surveying practitioners of the

[2] See section 1.4.
[3] See section 1.5.
[4] See section 1.6.

time, was an important topic examined.[5] The metallurgical makeup of surveyor's chains and theodolites was also examined.[6] By understanding such errors and the depth of understanding Dublin land surveyors had of them, it was possible to comment on the potential errors and inaccurate results in contemporary surveys.

The production of mapping, whether in manuscript of printed form, was also investigated in chapter 2.[7] The original transfer of survey field notes to draft maps and then the justification of having a map engraved on copper plate for printing varied depending of the nature of a particular survey project. Copper plate printing was an expensive and time consuming affair and these associated difficulties are reflected in the historical record. Most period mapping examined for this research was in manuscript form showing that printed maps, despite being produced in larger numbers per map, occurred less frequently. The justification for a copper plate produced map (section 2.6) was strongly connected with consumer demand or civic support.

Mapping

Whether in copper plate or manuscript form, the cartographic products of the period were as varied as the surveyors who produced them. The eighteenth century represented a time of great individualism in the creation of maps, prior to the standardisation introduced by the Ordnance Survey from 1824 onwards.

The variation of cartouche and vignette design throughout the eighteenth century, particularly baroque designs, was the result of changes in consumer demand and fashions throughout this period.[8] The prevalence of baroque themes in high end cartographic works extended into many aspects of map design including features such as north arrows and the representation of buildings.[9]

One of the most influential surveying practitioners in eighteenth-century Dublin was John Rocque. His strong baroque themes executed to a high artistic level and measured with accurate survey techniques make his 1756 plan of Dublin one of most

[5] See section 2.4.3.
[6] See sections 2.4.2 and 2.4.4.
[7] See sections 2.5 to 2.7
[8] See section 3.2.
[9] See sections 3.3 and 3.5.

detailed maps of the city produced during this period.[10] Rocque's representation of the city however lacked the social element demonstrated by Charles Brooking's 1728 map of Dublin which included information on the industries active in the city at the time as well as civic boundaries and important public buildings. The work of both men demonstrates how different map elements can be combined to produce a successful product, but also how mapping techniques and cartographic fashions changed in the first half of the eighteenth century.

Private mapping endeavours like those of Brooking and Rocque could be commercially, as well as scientifically and artistically, most successful. There was however a large civic interest in land surveying and mapping during the eighteenth and early nineteenth century. Section 4.3 explored the role that the highest civic position a land surveyor could hold in the Dublin, that of city surveyor. While this position was primarily focused on rents and leases, the city surveyor's equivalent in the Wide Streets Commissioners had a greater effect on the physical layout of the city.[11] Employed to map existing street and building layouts, in addition to assisting architects and city officials in laying out new street designs and thoroughfares, the surveyor of the Wide Streets Commissioners was a vital role in helping transform Dublin from its medieval layout to that of a Georgian metropolis. The works conducted by engineering surveyors for transport infrastructure, shown in chapter 5, also assisted in the development, trade, communication and modernisation of the city.

In setting out the history, technology, methods, processes and cartographic style of eighteenth and early nineteenth-century Dublin land surveyors, this detailed research establishes the role of surveyors in the city at that time.

Surveyors played their own small, but highly influential, role in Dublin's development during the eighteenth and early nineteenth centuries. For all their financial successes and failures, their often distinct and occasionally clashing personalities, their professionalism, their precision, their accuracy; at the heart of this story lies a small group of men, often overlooked by history, but whose impact is felt everyday by the citizens of Dublin city.

[10] See section 3.8.
[11] See section 4.3.

Suggestions for future research

In the course of this research, several topics were highlighted as warranting further research while outside the parameters of this thesis. These included an examination of the influence of European cartography in Ireland during the eighteenth century, period instrument accuracies, the divergence of engineering and land surveying, the physical changes to the sea floor in Dublin bay during the eighteenth century and the 3d modelling of Dublin using eighteenth-century mapping.

Achievable accuracies of eighteenth century surveying instrumentation:

The quality of measurement was a common denominator in the majority of eighteenth-century surveying disputes in Ireland. Given the presence of several forms of distance[11] and area measurements,[12] combined with instrumentation that was manually manufactured and the lack of legislation requiring the calibration of such instruments at regular intervals, eighteenth-century survey measurements cannot always be relied on as being absolute. Using a series of common surveying measuring exercises with eighteenth-century surveying technology, it would be possible to compare and contrast their performance and their achievable accuracies using modern surveying equipment to establish a level of control. Of particular interest would be the effects of magnetism, both natural and artificial, on circumferentors and the effect of tension on eighteenth-century surveying chains.

Isopactyde comparison of eighteenth century soundings of Dublin Bay:

The main measurement information determined from eighteenth-century charts of Dublin bay was depth soundings. Using the levels determined from these sounding readings it would be possible to create several digital terrain models of Dublin bay during the eighteenth century. By comparing these models using an isopactyde analysis, it would be possible to determine not only the differences in each chart, but also the effect of engineering works, such as the Bull Wall, on Dublin bay throughout this period. The majority of the eighteenth-century charts of Dublin bay did not cover the entire bay with soundings, however, many were highly detailed particularly around the main shipping channels in and out of the River Liffey.

[11] Irish and English miles.

[12] Cunningham acre, plantation acre etc.

Development of three-dimensional digital model of Dublin city based on Rocque's, *Exact survey of Dublin* (Dublin, 1756):

Given the prevalence and accessibility of simple but highly effective and adaptable three dimensional software,[13] it is now possible to construct a realistic model of eighteenth-century Dublin through period maps. Rocque's *Exact survey of Dublin* (Dublin, 1756) would be the most appropriate background from which a digital model of the city could be created.

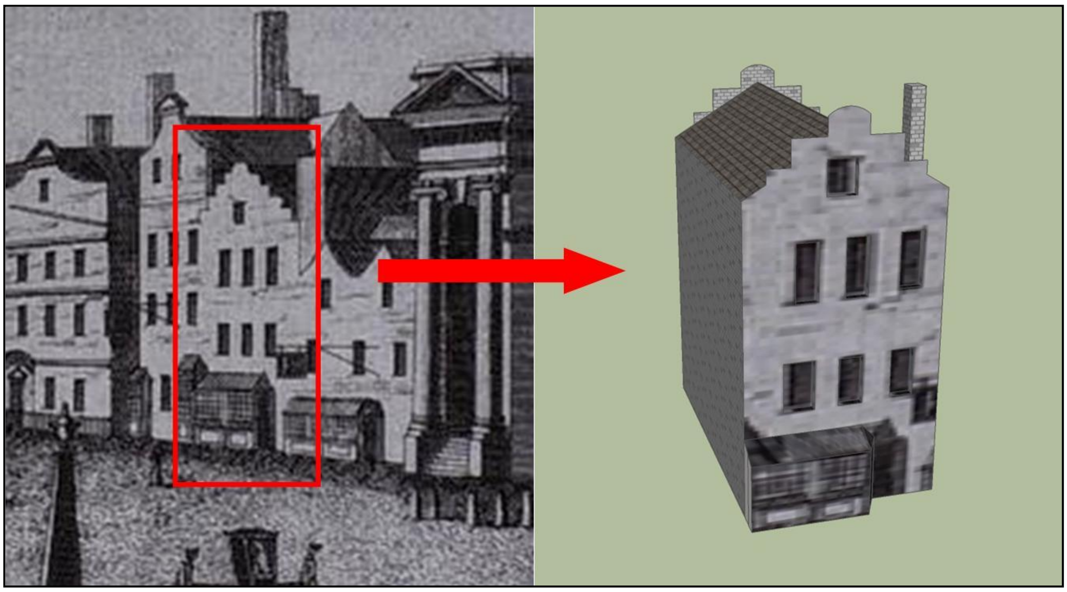

Figure 1: Building portrayed in Joseph Tudor's print of College Green looking towards Dame Street (Dublin, 1750) (L) and a 3D digital model of the same building using the original print as a textured surface (R) (created by F. Ó Cionnaith)

By taking the planimetric layouts for the individual buildings in Rocque's map, constructing three-dimensional models for each structure and applying a terrain model to the city as a whole, a lifelike digital model of the city in 1756 could be constructed. While much of the model would consist of generic building models determined through a study of the social geography and architectural inheritance of the city at the time using period business directories and other contemporary souces, there also exists the possibility of adding a high level of realism to the model. By using photo overlays of surviving eighteenth-century buildings, of which there are many, and by using paintings, drawings and engravings of eighteenth-century street scenes, a credible portrait of the city could be developed.

[13] Google SketchUp for example.

This story is, ultimately, about the men who mapped and measured Dublin, the skills and professional acumen they brought to the task. The city, in which they lived and were educated, where they brought up their families and made their homes, still bears the results of their work over two centuries later, much to the benefit to its current citizens.

Appendices

Appendix A

Original French versions of Charles Vallancey's correspondence with the officials of the Bibliothèque Royal, Paris.[1]

Paris 14 Mars 1789

Monseigner,
Je suis arrive ici, envoye de la part du Roi de la Grand Bretagne pour copier quelques anciennes cartes d'Irlande, sont son exec. Mr. le Due de Dorset m'a fait obtenir la permission de la Majesté tres Chrétienne. En consequence Mons. Le Noir m'a honor d'un ordre our le Bibliothécaire afin qu'il m'assistant autant qu'il serait en son pouvoir confor mement aux legless de la Biblioteque.
Je prends la liberté de vous representen Monseigner qu'il m'est tout à fait impossible deremplir l'objet de ma mission dans la Bibliotheque de Roi.
1: les cartes ne peuvent point se copier comme un manuscript, il faut tracer les lignes sur le papier à l'aide des rayones du soleil, ou d'un hamibean, sont la reflection se faut à travers un verre construie pour cet usage.
2: les cartes sont au number de 350: la Bibliotheque du Doi n'est ouverte que deux fois la semaine aux public depuis 9 juisque a midi, d'par une grace extraordinaire de Monsieur le Noir j'ai obtenu la permission de render tour les jour depuis neuf heurs jusques a midi expressement pour l'objet de ce travail: il ne sera impossible d'en completer la copier en douze mois ceque je pourrais fini en deux, si j'etáis place dans une situation convenable les circumstances soumises à votre consideration, Monseigneur, j'ose prendre la liberté de m'adresser à vous pour vous supplier de me dispenser des regles & usages de la Bibliotheque du Roi, dans cette occasion, & que je puisse avoir la permission de transporter ces cartes dans mon logement qui est pres de la Bibliotheque I ou j'ai toutes les commodites' necessaries pour hater l'execition de cette minum,

Je suis avec respect
Monseineur, Votres humble etrés obeisant serviteur
C.Vallancey

21 Mai 1789

Il ne pas possible Monsieur de vouz accordue la permission de transpostier dans vôtre logement les cartes de Ilrlande que voue êter charge de copier les Aeglemente de la Biblioteque I'll opposeer absolumen & je suis bien paché j'avoire a voul ammonieu quile ne permettens pas de vouz faire souir pour cette operation de plus grandee faultier que celler dans vour jouiner,

J'ain l'hommes j'ête
Leopold de Biretiue

---

[1] NLI MS.1614.

Appendix B: Timeline of surveyors active in Dublin, 1620 – 1870

The following chart represents a timeline of surveyors who worked or lived in Dublin from the seventeenth to mid-nineteenth centuries. It was compiled primarily from evidence contained in manuscript mapping of that era and should not be considered as an absolute record of the profession at that time. Those included in the list are known to have operated in or have resided in Dublin over several years. Thus surveyors who engaged in single survey projects in Dublin, like John Speed (1610) and Charles Brooking (1728), are not included. The timeline is based on the earliest and latest evidence of a surveyor's existence. In some cases, a surveyor's date of birth and death were available whilst in others only the years of his professional activity are known.

The objective of this appendix is to highlight what surveyors were active in the same period, who a surveyor could potentially be in competition or aligned with, and what biographical evidence is available to researchers on the lives of Dublin's eighteenth-century surveyors.

	William Petty, *b.1623 d.1687*	John Green, *active 1679-1724*	Gabriel Stokes, *b.1682 d.1768*	Joseph Moland, *active 1698 1718*	Peter Duff, *active 1700-1725*	George Semple, *b.1700 d.1782*	John Rocque, *b.1704 d.1762*	Thomas Reading, *b.1704 d.1779*	Alex Stewart, *active 1705-1724*	Thomas Cave, *active 1709-1749*	James Ramsey, *active 1718 - 1735*	Charles Vallancey, *b.1726 d.1812*	Roger Kendrick, *active1735 d.1778*	Bernard Scalé, *b.1739 active till 1790*	Alexander Taylor, *b.1746 d.1828*	John Brownrigg, *b.1748 d.1838*	Richard Brassington, *b.1749 d.1838*	Thomas Sherrard, *b.1750 d.1837*	Robert Gibson, *active1752-1760*	George Gibson, *active 1754-1765*
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	Jacob Neville, *active 1754-1782*	Joseph Jarret, *active 1760-1774*	Thomas Mathews, *active 1760-1782*	Andrew Skinner, *active 1760-1782*	William Purefield, *active 1762-1794*	Patrick Roe, *active 1763-1792*	William Cox, *active 1767-1780*	Francis Mathews, *active 1767-1800*	Thomas Fitzsimons, *active 1771-1774*	John Longfield, *active 1775-d.1833*	Thomas Logan, *active 1777-1820*	David Aher, *b.1780 d.1842*	John Ewing, *active 1781-1790*	Samuel Byron, *active 1782 d.1795*	John Williams, *active 1786-1788*	Arthur Neville, *active 1787-1837*	John Roe, *active 1789-1826*	John Byrne, *active 1789-1828*	D.B. Worthington, *active 1790-1801*	A.R. Neville, *active 1791-1828*	Clarges Green, *active 1813-1866*
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Appendix C: Thomas Burgh's method of area determination, Dublin, 1724.

'Let figure II [figure c1] represent a piece of ground whose area is sought. The surveyor is supposed to begin his work at any point of the land he pleases, but to go round with the sun, leaving the field to be surveyed always on his right-hand; and when the sides and angles are taken, his field-book is to be made in the manner before directed.[1] But because common surveyors may not readily comprehend that general method, and this table for determining the content of the second figure, as a model for any figure whatsoever, and by explaining how the several columns in that table are filled, the surveyor will easily perceive the uses of them, and how he is to compose tables for any survey he is to make.

Suppose then the first station to be "A", the second station "B" and so on, and let the angles and sides of the field work be as in the table annexed to the figure.

The angle at A, made by the meridian "L A" an the side "a, b" is 56 ¼ degrees N.E and the side "a, b" is 3 chains, 60 links.

To find the easting make this analogy – As Radius I: to the sine of 56 1.4 = 8314696 :: so is the side 3 chains 60 links to the easting = 2.993= 3 nearly.

The easting 3 this found I write in the column E against "B" the second station.
To find the northing make this analogy. As Radius I: to the co-sine of 56 ¼ = 5555702:: so is the side 3 chains 60 links to the northing = 2.000052 which north 2 I write in the column N answering to "B", the second station. In the same manner the four columns, N, S, E, W, might be completed, but the trouble of multiplying the given side, between every two stations, into the sine and co-sine of the angle, will be avoided by the tables of latitude and departure at the end of this tract; the uses whereof, in relation to surveys are there explained.

When the columns N,S, E, Q, are completed cast up the sums of the columns N and S, and if they are equal then cast up the sums of the columns E and W and if they also are equal you may conclude the fieldwork is accurate.

To form the column C, take the northing of "B", the second station, and enter it in the column C in a line with "B". The next station "C" having also a northern bearing 2, add that to the last number in C, which gives the number 4, to be placed in the column C, in a line with "C". The succeeding station 2D" having a southing 1, it is to be deducted from the last number 4, in the column C, and leaves 3 to be writ in C in a range with "D". This proceed adding the northing and subtracting the southing of each succeeding station to or from the number last set down in the column C; and so go on until you come to the station "F" where "O" is entered against it in the column C; which shows that this station hath no difference of northing or southing from the point "A", but lies in the same parallel latitude. The station from "F" to "G" having a

[1] Columns for station name, angle, distance and comment.

southing 1, it must be deducted from “O” which gives -1 which must be entered in C with its negative sign, and in a range with “G”; the next station “H” having also a southing -1 which together with the foregoing -1 makes -2, to be entered in C in a line with “H” and in this manner fill up the column C.

The column L is thus formed. Look in the column C for the greatest number with a negative sign which appears to be -5 standing against station “M” which shows that “M” is the most southern point of the survey. This number 5, with a positive sign, is the absolute northing of a station “A” and is accordingly to the entered in the column L in a range with “A”. The northing of the station “B” reckoned from “A” is 2, and this being added to 5 makes 7 to be entered against “B” in the column L for the absolute northing of that station.

Proceed in this manner to complete the column L by adding the northings and subducting the southings as was directed for making the column C.

The column T is formed out of the column L by adding every two numbers succeeding one another in L and writing their sum in T and in a range with the latter term in L. Thus 6 and 7, the two first number in L makes 12, to be written in T, opposite to 9, the latter number in L. Thus you proceed till you come to the last number in L which is to be added to the first in L. So the last number, added to the first number 5 in L makes 9 to be placed in T in a line with the first number in L.
The column TW is formed in like manner by multiplying each number in T by the number in W lying in the same line. When these columns are thus formed, cast up severally the products in the columns TE and TW subtract the latter from the former and half the remained is the content of the survey.

Note – The angles in the foregoing table are taken to the quarter of a degree nearest to the truth the common instruments used for observing angles in the field not being capable to take them to a greater nicety. And for that reason the tables of latitude and departure at the end of this tract are made to answer only to degree and quarters.’

Stat	Angles	Sides Ch. Link	N	S	E	W	C	L	T	TE	TW
1A	NW 63 ½	2.24	1			2		5	9		18
2B	NE 56 ¼	3.60	2		3		2	7	12	36	
3C	NE 26 ½	2.24	2		1		4	9	16	16	
4D	SE 71 ½	3.16		1	3		3	8	17	51	
5E	SE 26 ½	2.24		2	1		1	6	14	15	
6F	SW 71 ½	3.16		1		3	0	5	11		33
7G	SE 45	1.41		1	1		-1	4	9	9	
8H	SE 63 ½	2.24		1	2		-2	3	7	14	
9I	NE 45	1.41	1		1		-1	4	7	7	
10J	SE 26 ½	2.24		2	1		-3	2	6	6	
11K	SW 45	1.41		1		1	-4	1	3		3
12L	SW 63 ½	2.24		1		2	-5	0	1		2
13M	NW 45	2.83	2			2	-3	2	2		4
14N	SW63 1/2	2.24		1		1	-4	1	3		6
150	NW 26 1/2	3.16	3				-1	4	5		5
			11	11	13	13			153		71

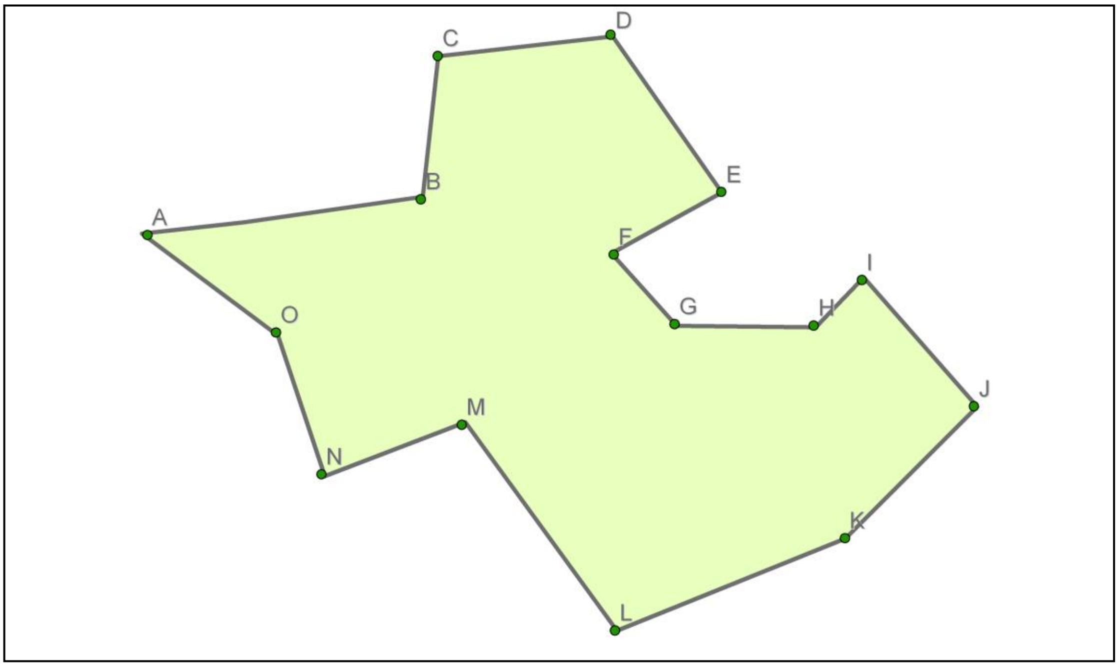


Figure c1: Reproduction of Burgh's 'piece of ground' (compiled by F. O'Cionnaith)

Appendix D: List of the works of John Rocque[1]

Year	Title
1734	Plan of house, gardens, park and hermitage of Their Majesties, with views and account of *Richmond Palace*
1735	Plan of *Wanstead house*, gardens, park and plantations, with 11 views
	Pan and view of buildings of the seat of the Duke of Kent. Contains plans of gardens and buildings and views
1736	*Chiswick*: Plan of garden and view of houses. Contains plan of grounds and views
	Kensington: Plan of the palace, gardens and town. Surveyed, drawn and engraved by John Rocque
1737	*Weybridge*: Plan of Gardens and House
	Esher: Plan of garden and view of buildings
	South Dalton: Plan of house
1738	*Claremount:* Plan with views
	Windsor: Plan of house and park with views
	Greenwich: View
1739	*Greenwich*: Prospect of hospital
1740	*Drumlangrig*: Plan of garden and plantation with 4 elevations
1741	*London*: Proposal for a new map of the country around
1743	*Bristol*: Plan of city, in 8 sheets, engraved by Pine
1744	*Exeter*: Plan of city with 9 views
	Putney: Plan of house and gardens
1745	*Berlin*: Plan of city, produced under the direction of Comte de Schmettau, in 4 sheets
	Hackney: Plan of parish
	Norwood and surrounding neighbourhood
1746	*London:* A new and accurate survey in 16 sheets engraved by R. Parr
	London: Plan on 24 sheets, engraved by Pine and Tinney
	Lyon: Plan, drawn by Seraucourt, with 18 views and elevations
1746	*Wilton*: Exact plan of gardens and park, contains plan of town and 5 views
	Shrewsbury: Plan, engraved by Parr, contains 3 views
1747	*London*: Alphabetical Index of street
	Berlin: Plan of city, produced under the direction of Comte de Schmettau, in 4 sheets
1748	A new plan of *Richmond Gardens*, etc. With alterations
	London: Map of the city and adjacent country reduced to 1 sheet
	Paris: Plan of city and adjoining country reduced to same scale as that of London
	London: A new and accurate survey in 16 sheets engraved by R. Parr
1750	*Claremount*: Survey of house, gardens and park, engraved by Aveline
	Claremount: View drawn by Rocque, engraved by Bonneau
	England and Wales: Containing cities, boroughs, market towns and villages
	Halifax: Map of the harbour of Chibuctoo and plan of the town
	Bristol: Survey of the city, and suburbs, contains plan of city, 6 views and 4 elevations

[1] The above list is mostly copied from John Varley 'John Rocque; engraver, surveyor, cartographer and map-seller', *Imago Mundi*, vol. 5 (1948), pp 83-91. However Varley neglected to include any of Rocque's Kildare maps, and he admitted that his list was not necessarily complete as 'there are a number of maps and plans which Rocque advertised for sale which have not been verified as either original and independent maps and plans or reproductions or revisions of existing works.'

Rome: Plan reduced to same scale as those of London and Paris, surveyed by G. B. Noble
York: Plan of city and environs, drawn by Chassereau
Constantinople: View of the Seraglio, drawn by Chatelain
Constantinople: Seraglio and gardens, engraved by L'Empereur
Constantinople: View taken from Hellespont, drawn by Chatelain and engraved by Mason
L'Orient and Prot Louis: Plan of city and harbours, drawn by the King's engineer

1751 *London*: A new and accurate survey in 16 sheets engraved by R. Parr
Montpellier: Plan of the town and citadel, engraved by Le Parmentier
Madras and Fort St. George: Plan, engraved by Benning
Mediterranean Sea: A new map, after Sanson, no date, but rendered into English, printed and sold by John Rocque
Nismes: Plan of city, ancient and modern

1752 *Nismes*: View of city
Shropshire: Actual survey of the county in 4 sheets
Berkshire: 1st and 2nd preliminary sheets of a survey, in colour
England: Quartermaster's map, copied from Saxton and engraved by Hollar in 1644, reproduced by Rocque

1753 *Minorca*: A new and accurate survey of the island, drawn and engraved by Lempriere
England and Wales: The small British atlas, a set of maps of the counties of England and Wales

1754 Exact plan of Royal gardens and park with views
London: Plan (on same scale as those of Paris, Dublin and Rome) engraved by Parr
Wilton: Exact plan of gardens and park, contains plan of town and 5 views
London: Alphabetical index of street
Paris: Plan of city and adjoining country reduced to same scale as that of London
Middlesex: Topographical map of the county in 4 sheets

1755 *London*: Plan reduced to 8 sheets
Lima: Scenographic plan of the capital of Peru
North America: Map of the British and French possessions, engraved by Thos. Kitchin
London: Before and after the fire in 1666

1756 *Dublin*: An exact survey of the city and suburbs in 4 sheets

1757 *Middlesex*: Topographical map of the county reduced in 1 sheet
Dublin: Survey of the city, harbour, bay and environs, on same scale as those of London, Paris and Rome
Dublin: Reduction of survey engraved by Halpin
Trichinoploy: Plan of the city and the country around
St. Martin's in the Island of Re, plan of the city drawn by the King's engineer

1758 *St. Malo*: Plan taken from de Beaurain
Gibraltar: Plan of the peninsula
Europe: Map of the post-roads
Kilkenny: Survey of the city on same scale as those of London, Dublin, Cork, Bristol and Exeter

1759 *Bristol*: New plan of city and suburbs
Cork: Survey of the city and suburbs
Dresden: Plan
North America: by Palairet, revised and improved by J. Rocque

1760 *Dublin*: Actual survey of the county on the same scale as those of Middlesex, Oxford, Berkshire and Buckinghamshire in 4 sheets
Armagh: Topographical map of the county in 4 sheets

Switzerland: Map by Rouvier, revised and improved by Rocque, engraved by Kitchin

1761 *London*: Plan (on same scale as those of Paris, Dublin and Rome) engraved by Parr

England and Wales: Containing cities, boroughs, market towns and villages

Berkshire: Actual survey in 18 sheets, with geographical and historical index

Berkshire: Topographical map of county in colours, 6 sheets

1762 *Berkshire*: Reduction of actual survey published by M. A. Rocque

North America: General map, taken from actual surveys and observations made in the army employed there between 1754 and 1761, drawn by J. Rocque, published by M. A. Rocque

Dublin: Reduction of map of county

England and Wales: The small British atlas, a set of maps of the counties of England and Wales

Cadiz: Plan of the city and environs with harbour, bay, etc., improved by Rocque, published by M. A. Rocque

1763 *London*: Plan on 24 sheets, engraved by Pine and Tinney

Post-roads of Great Britain and Ireland, published by M. A. Rocque

1764 *England and Wales*: The small british atlas, a set of maps of the counties of England and Wales

Surrey: Topographical map of the county in 8 sheets, surveyed by Rocque, published by M. A.

1768 Rocque

1769 *England and Wales*: The small British atlas, a set of maps of the counties of England and Wales

1771 *Europe*: Map of the post-roads

Post-roads of England and Wales, published by Robt. Sayer

1773 *Ireland*: Map of the Kingdom on 2 sheets, published by Robt. Sayer

Appendix E: Affine spatial adjustment of eighteenth-century maps of Dublin

Maps by their very nature need to be accurate. In order to establish planimetric accuracy levels of several eighteenth-century maps of Dublin, a comparison was made against a modern street plan of the city. The method used to perform this analysis is called a spatial adjustment or, more specifically, an affine polynomial transformation.

The spatial adjustment consisted of two data sets – a target vector[1] dataset of the modern street layout of Dublin in Irish National Grid coordinates, and sample raster maps of eighteenth century Dublin without an established projected coordinate system. An affine spatial adjustment uses a series of matching control points common to both the target and sample data sets and manipulates the sample data to match the target data's coordinate system using by connecting these control points. The sample data is then considered to be georeferenced. Due to the time difference of two to three hundred years between the modern target data set and the eighteenth century maps that made up the sample data, choosing appropriate control points common to both required its own analysis. The key to quality control points is time-invariance.[2] Initially surviving eighteenth century buildings were considered as control points. Steevens Hospital and Kilmainham Hospital are good examples of time-invariant control points and can be found in Brooking's 1728 map, the oldest map used in the spatial adjustment. These two buildings were found to be exceptional as the remainder of the city could not produce buildings that were isolated enough to take clear readings from.

An affine spatial adjustment requires a minimum of three control points spread throughout the area covered by the sample data. The more stable the geometry of the control points, the more accurate the adjustment throughout the georeferenced sample data. It was decided that road junctions would provide both the time invariance required for quality control points as well as being widely spread throughout the centre of the city covered by most eighteenth-century maps of Dublin.[3] Not every road junction within the city was suitable due to modification and development of the

[1] Vector - A one-dimensional array
[2] Time Invariance – unaffected by time
[3] Within the North and South Circular Roads

urban framework of the city; however there were enough suitable road junctions to allow several rounds of spatial adjustments to be performed using different control points in each round. A total of five control points were used for each eighteenth-century map with an optimum geometry of four control points in each corner with the fifth somewhere near the centre of the image. It should be noted that the greater the number of control points used does not necessarily improve the spatial adjustment – a balance must be maintained between the quality of control points, their geometry and the number of them used.

The affine spatial adjustment alters the image coordinates of the sample data to the projected coordinate system of the target data. The affine transformation shifts the scale and rotation of the sample data to match the target data. Unlike units of geographic reference used during the eighteenth century, i.e. latitude and longitude, the projected coordinate of the target data consists of constant lengths and distances in a two-dimensional framework. Given this, it was decided to ignore any original geographic referencing present in the eighteenth-century sample maps – none were found.

Four eighteenth-century maps of Dublin were chosen for spatial adjustment – Brooking (1728), Rocque (1754) and two city plans accompanying the 1779 and 1795 editions of *Wilson's directory*. A modern, unreferenced raster map of Dublin was used as a control. Figures 1 to 5 show the control point layouts of the five maps examined. Due to the development of the city over the eighteenth century, quality control points became more numerous in those maps produced late in the eighteenth century. In particular, the completion of the north and south circular roads provided high quality control points for the 1795 Wilson map whereas the earlier city layout and larger scale of Brooking's 1728 map made establishing control points difficult.

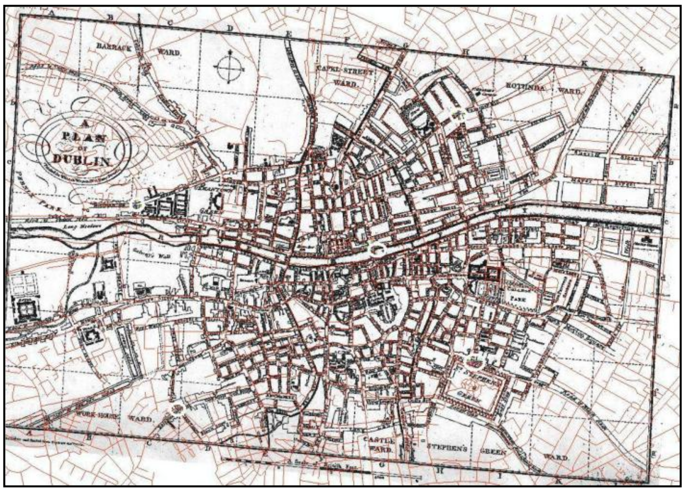


Figure E1: William Wilson, *Dublin* (Dublin, 1779)

Figure E2: William Wilson, *Dublin* (Dublin, 1795)

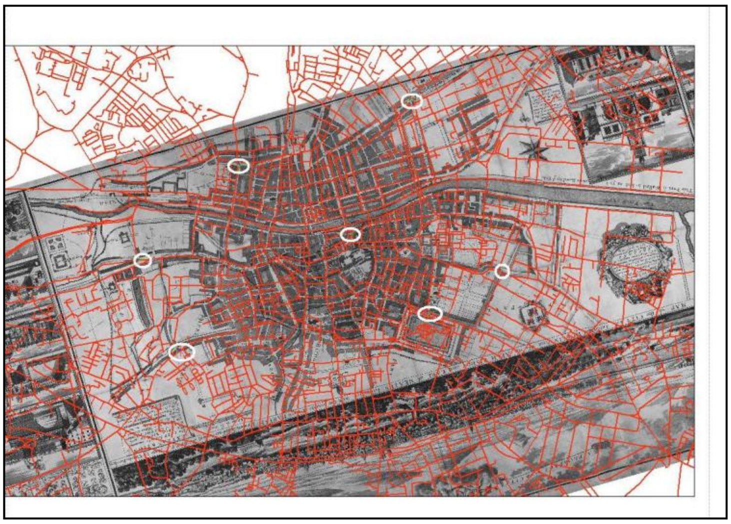


Figure E3: Charles Brooking, *A map of the city and suburbs of Dublin* (London, 1728)

Figure E4: John Rocque, *Exact survey of Dublin* (Dublin, 1756)

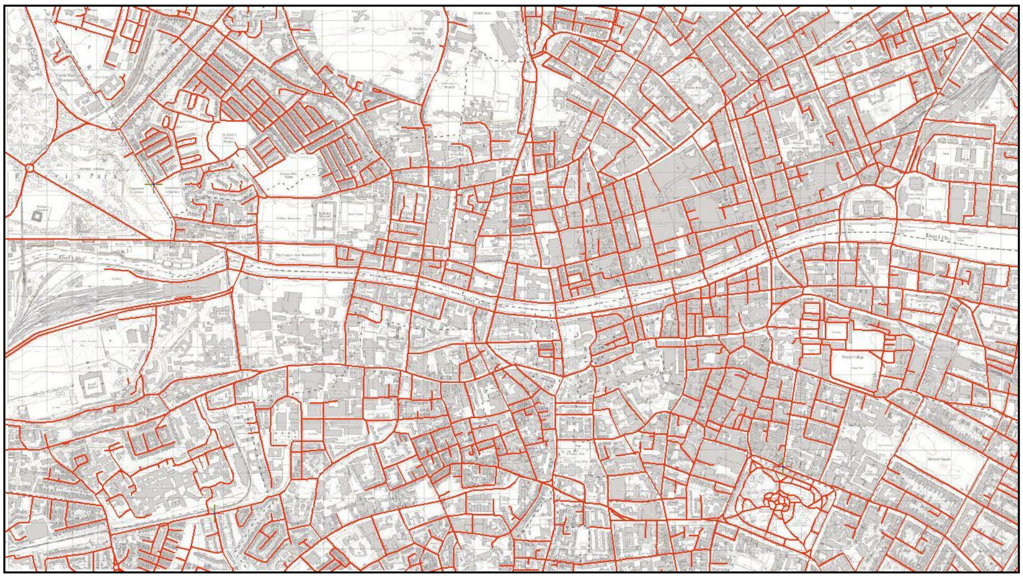


Figure E5: Ordnance Survey, 1:50,000, *c.* 2008

A total of four rounds of measurements were taken on each map and an average Root Mean Square Error (RMSE) was established for each. RMSE is a measurement of the difference between the target control points and their equivalent sample control points after the spatial adjustment. The RMSE is an indication of how accurate a spatial adjustment between the target and sample data was, thus giving the ability to analyse how well the sample eighteenth-century maps compared against a modern, correct, map of Dublin. Table 1 gives the RMSE of the sample maps.

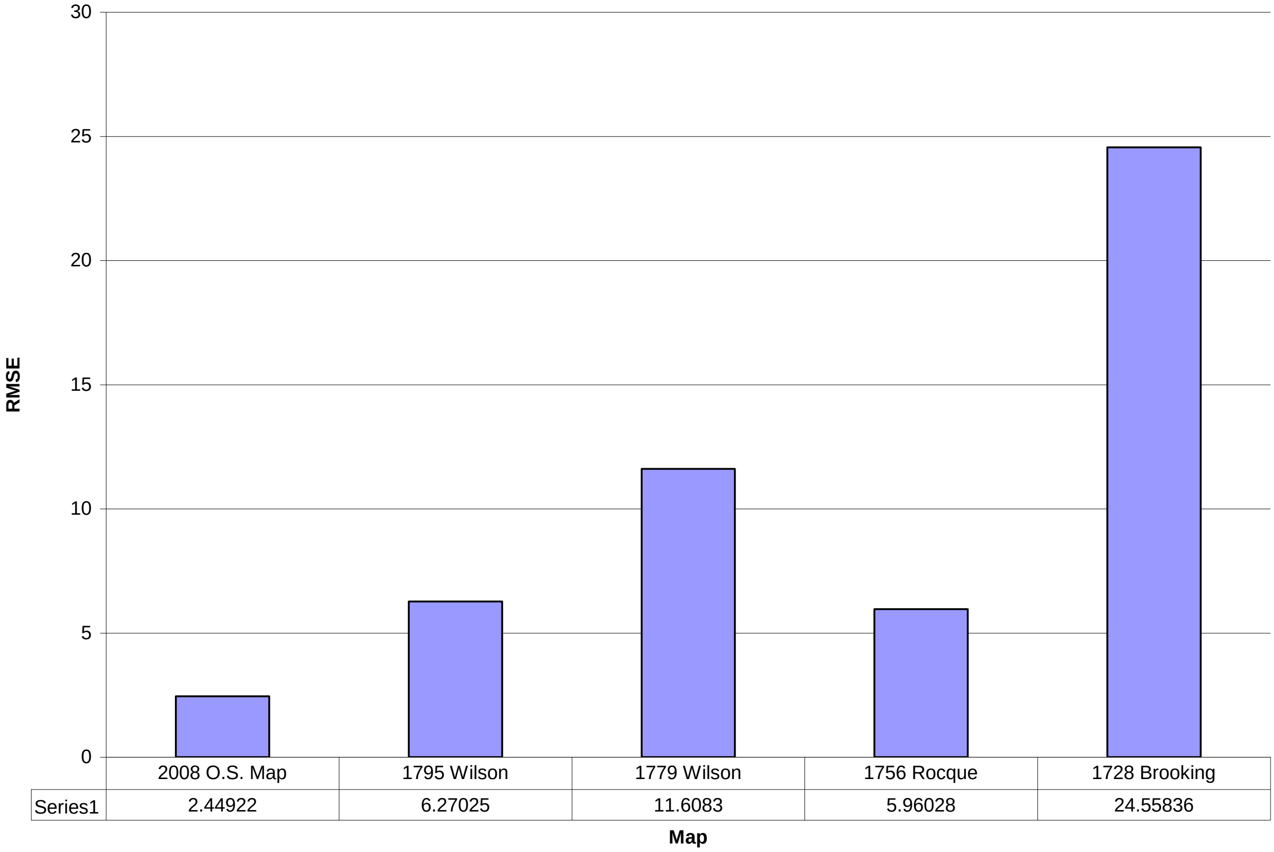


Table 1: RMSE for sample eighteenth century maps of Dublin and modern control map

Using the 2008 O.S. map as a control test, conclusions can be drawn about the accuracy of the eighteenth-century test maps. Rocque's 1756 map of Dublin has a far higher level of accuracy of all the eighteenth century maps tested. Such low levels of RMSE may further indicate that Rocque used a trigonometric method when he surveyed the city. Brooking's high level of RMSE may possibly be connected with a lower number of suitable control points and a less sophisticated survey method compared to those used later in the eighteenth century. The 1779 and 1795 Wilson maps both produced relatively low levels of RMSE however as the origin of their geographical data is uncertain, further comment would be speculative.

Appendix F: Compilation of maps from Wide Streets Commissioners records

In order to establish an overall picture of the work of the WSC during the period 1758 to 1810, it was useful to design and build a Geographic Information System (GIS) of the city of Dublin and to project positional information of WSC-produced maps onto it. Dublin City library and archives created a descriptive list of maps in the early twentieth century[1].

Listing 761 items, the majority of which are maps and to a lesser extent architectural drawings, the descriptive list includes, where possible, the map title, scale, surveyor and year in which a map was produced. The majority of the recorded maps do not include a surveyor's name or year produced with maps scales being present in approximately 50% of the records.[2] Each map's title was used as a reference to create a polygon over the relevant section of Dublin City using MapInfo GIS software. The map title obtained from the descriptive list could only be used for an approximate location of the map and as such should be considered a guide rather than an absolute positional source. Each polygon's attributes were copied from the descriptive list, thus allowing the GIS to be searched and relevant maps isolated and easily displayed.

A complete set of polygons representing maps produced between 1758 and 1810 would result in a cluttered map from which information would be difficult to ascertain. As such, a dot was placed at the centre of each polygon which allowed an easier visual assessment of data from the GIS. The resulting image corresponded with the work of the commissioners during the selected period, and due to the date being contained in the attributes of each dot, it was possible to isolate maps produced in particular decades.

[1]Dublin City libraries, Wide Street Commissioners, <http://www.dublincity.ie/RecreationandCulture/libraries/Heritage%20and%20History/Dublin%20City%20Archives/Collections%20Pre%201840/Pages/pre_1840_collection_III.aspx>

[2] The most commons scales used were 1:20ft, 1:40ft, 1:80f

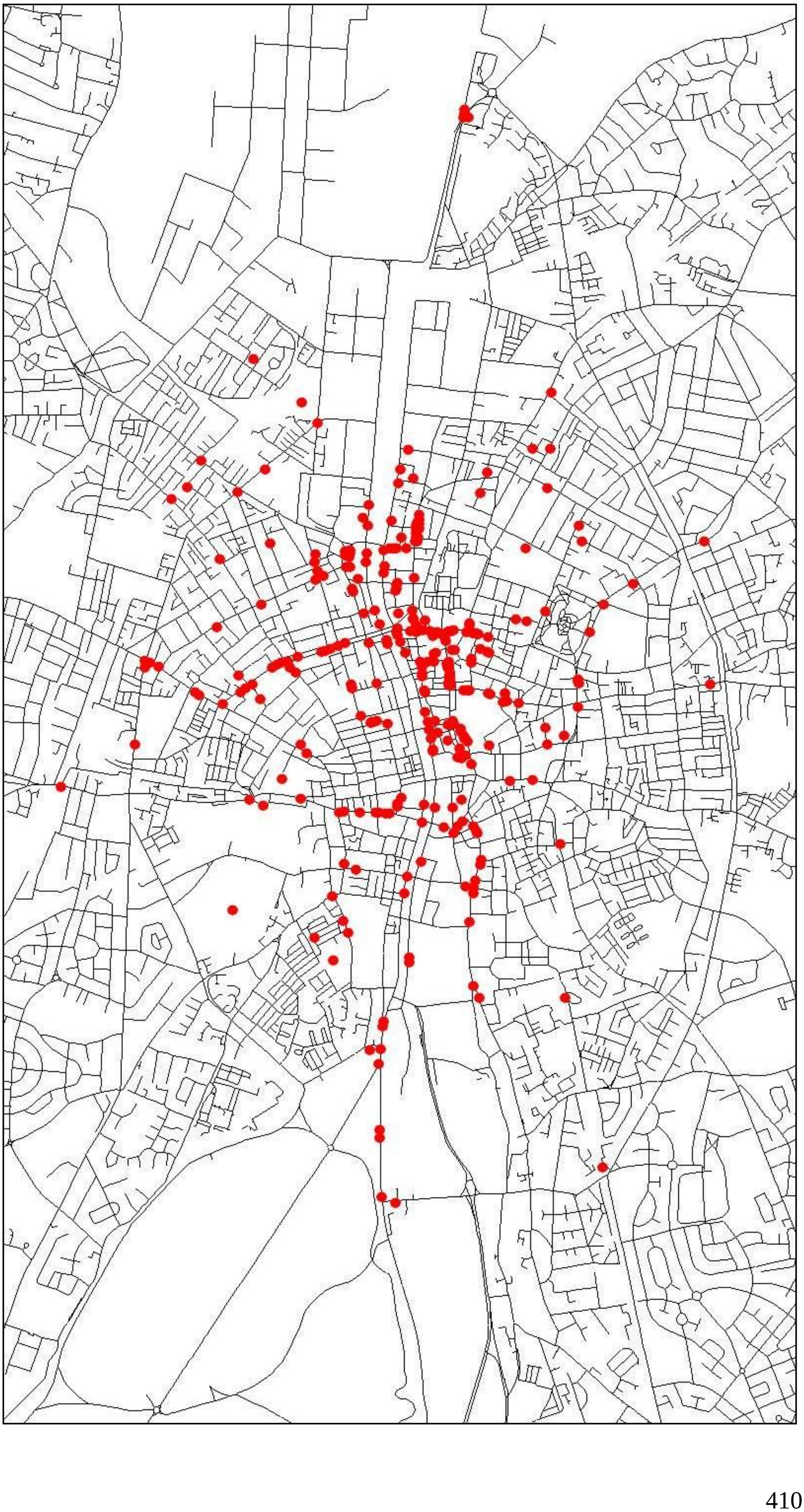


Figure F1: All dated maps produced by the WSC from 1758 to 1810 (compiled by F. O'Cionnaith)

Appendix G: Paving Board records re: dismissal of Thomas Owen, 1787

14 Feb. 1787, Corporation House PB/Mins/19 p. 258

Resolved that the board will on Wednesday next take into consideration the office of surveyor & making some allowance to the present possessor unless he shall happen to be otherwise provided for.

21 Feb. 1787, Corporation House PB/Mins/19 p. 272

A memorial of Thomas Owen surveyor was read setting forth that in November[1] last he acted in memorial his distressed situation from expenses he was at for assistance in the execution of his office, that he understands it is intended to consider discontinuing his office that he served this corporation thirteen years, and in that time formed the streets from the rude state that were in, that he has no provision for his family, that he educated his son to assist him in his business not thinking the board would discontinue the said office, that by sickness & loss is so situated that removing him would throw him into deep distress & throwing himself on the humanity of the board and submitting his case.

It appears that the said Thomas Own was thirteen years in office, his health being … represented to be much impaired & his circumstances were low.

Resolved that thirty pounds paid, during the pleasure of the board be allowed to the said Thomas Owen from the 25th of March next that the present salary of one hundred pounds of the said Thomas Owen do on that day cease & discontinue.

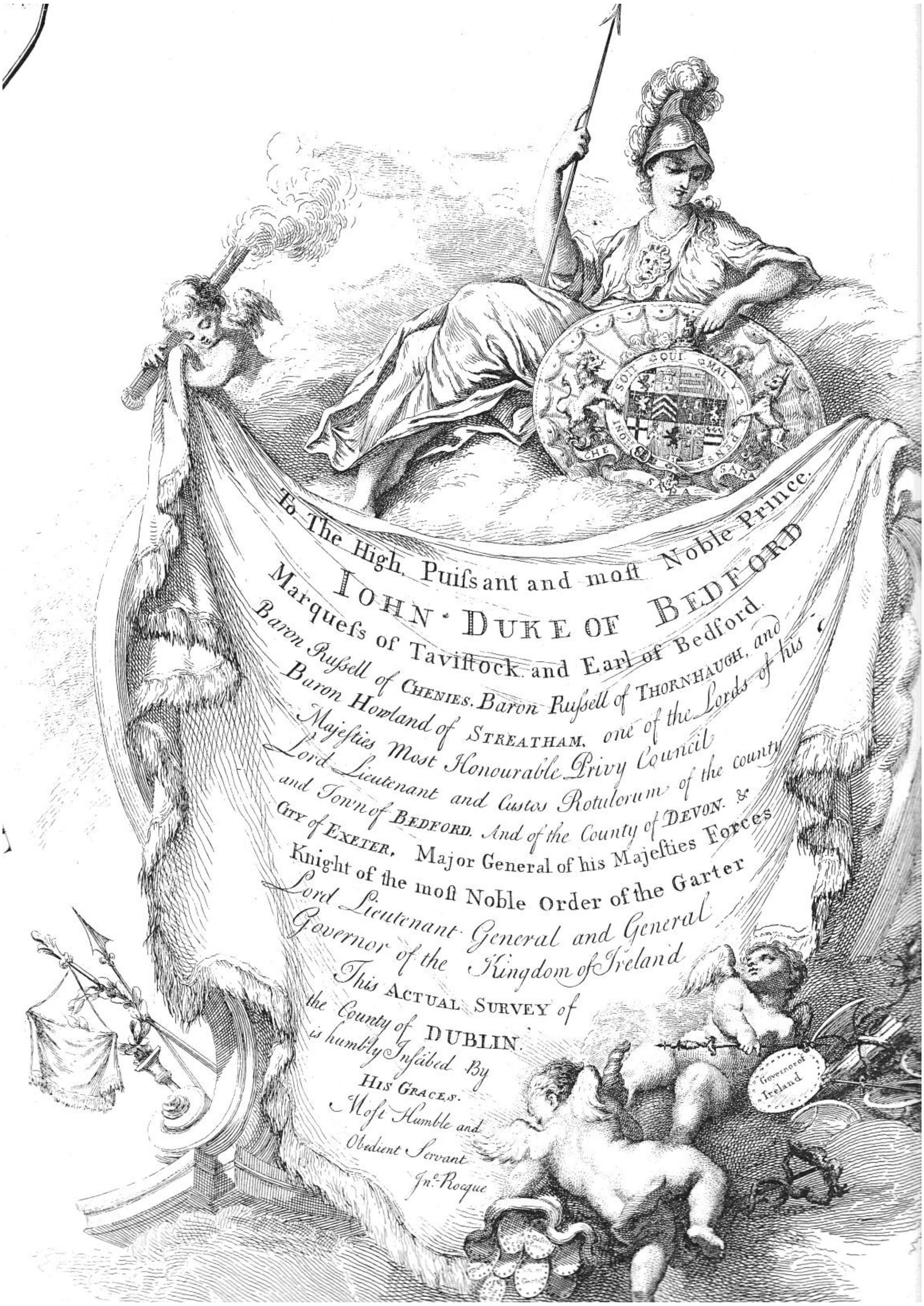
12th April 1787, Corporation House PB/Mins/19 p. 391

A letter from Mr. Thomas Owen, late surveyor of the corporation, was read setting forth that reports have been spread injurious to his reputation by his office being discontinued & praying to get a certificate to justify from unjust imputation.

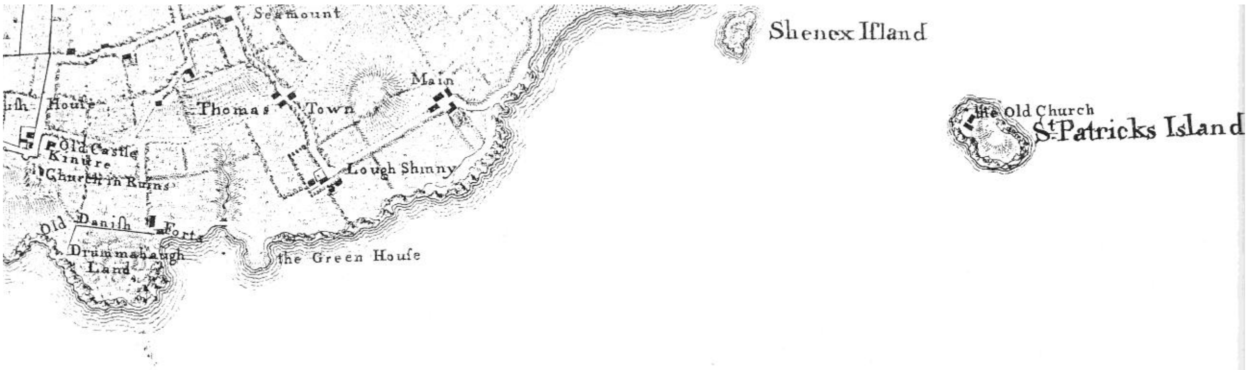
Ordered that Mr. Gladwell [the Paving Board clerk] do enclose to Mr. Owen the orders of the board respecting the transaction of his office being discontinued.

[1] Not recorded in Paving Board minute books

Appendix H: Examples of cartouche and vignettes designs of John Rocque and Bernard Scalé



Cartouche, John Rocque, *County Dublin* (Dublin, 1760) TCD Map Library



Vignette with scale bar, John Rocque, *County Dublin* (Dublin, 1760), TCD Map Library

Cartouche, Bernard Scalé, *A plan of Trinity College Dublin* (Dublin, 1761), TCD Map Library

Bibliography

1. Primary sources
I. Manuscript sources (including maps and views)

Maps and views
National Library of Ireland www.nli.ie
Brownrigg, John, A book of maps of the several estates of the Rt. Hon. and Rt. Rev. dean of and chapter of Christ Church, Dublin, 1800, ms. 2789
Kenny, Michael, Book of maps of the estate of Charles Domville, Dublin, 1778, ms. 21. F. 107.mon
Longfield, John, Book of maps of the estates of Christ Church, Dublin, 1812, ms. 2789-90.
Longfield, John, Map collection, ca.1770-1840, ms. 21. F. 32 – 21. F. 49.
Longfield, John, Maps and plans of estates, Dublin, 1724-1847, ms. 21. F. 86-90.
Orr, James, Map book of the estate of Edward Brice, 1751, ms. 19848.
Roe, John and Pat, W. Stokes, Manuscript maps of the estate of Lord Cloncurry in Dublin, 1795-1842, ms. 16. G. 50.
Scalé, Sherrard & Brownrigg, Essex Street, 1777, ms. 16. G. 16.
Various, Manuscript maps of the Domville estate in Dublin city, Dublin County and Meath, 1655-1816, ms. 11,937.
Various, Manuscript maps of the Hatch estate, ms. 21. F. 112.
Various, Palmer estate, county Dublin, 1766-1830, ms. 21. F. 141.

Dublin City Archives www.dublincity.ie
Dublin City Surveyors' book of maps, 1695-1827.
Wide Streets Commission maps, 1758-1851.

Marsh's Library www.marshlibrary.ie
Kendrick, Roger, Map book of the Liberty of Saint Patrick's, Dublin, 1741.

National Archives of Ireland www.nationalarchives.ie
Baker, Jonathan, Maps of Dundrum and all its subdivisions, 1762, 2011/2/2.

Minute books
Dublin City Archives
Minute books of the Paving Board of Dublin, vols 1-32 (1774-97).
Minute books of the Wide Streets Commission, vols 1-22 (1757-1812).

Diaries, letters and bills
National Library
Bannan, John, Bills for surveying, Rolleston estate, 1810-17, ms. 13794.
John Travers, Estate of earl of Mountrath in Roscommon, Leitrim and West Meath, 1770, ms. 2793
Letters of Robert Molesworth to his wife, 16 Oct. 1716. P. 3752
Longfield, John, Valuation reports for Dean of Raphoe, procat of Christ Church, 1823, ms. 21 F 33.
Vallancey, Charles, letters Paris, 14 March 1789, ms.1614.

Religious Society of Friends www.quakers-in-ireland.ie
Wight, Joshua, diary 1753/53.

Manuscript essays
National Library of Ireland
Castle, Richard, Essay on artificial navigation, 1730.
Unknown, Rules of the chancery side of the Court of Exchequer in Ireland Dublin, 1731.

Artifacts
National Science Museum, Stain Patrick's College/NUI Maynooth
www.nuim.ie/museum
Circumferentors
Circumferentor dial by Johannes Lewis (Dublin 1688).
Circumferentor signed Spicer (Dublin, *c*.1768-*c*.1772).
Circumferentor dial by Seacome Mason (Dublin, 1780-*c*.1804).
Circumferentor by Walker and Son (Dublin, *c*.1805-*c*.1818)
Circumferentor by Spear and Clarke (Dublin, *c*.1815-17).

Surveyor's chains
4 pole chain, link length 220 by J. C. Chesterman (Sheffield, late nineteenth century).
4 pole chain, link length 163 by J. C. Chesterman (Sheffield, late nineteenth century).
Cunningham chain, link length 213 by unknown (Unknown, 1790).

Levels
Level by unknown (Unknown, mid to late nineteenth century).
Telescopic level by Thomas Jones (London, *c*.1815-*c*.1850).

Theodolites
Plain theodolite by Thomas Heath (London, *c*.1725).
Simple telescopic theodolite by F. W. Breithaupt and Son (Unknown, *c*.1762).

II. Printed Sources

Surveying treatises (1577-1839)
National Library of Ireland
Burgh, Thomas, *A method to determine areas of right-lined figure universally* (London, 1724).
Callan, Peter, *A dissertation on the practice of land surveying in Ireland and an essay towards a general regulation therein* (Drogheda, 1758).
Gibson, Robert, *Treatise of practical surveying* (Dublin, 1763).
Hawney, William, *The complete measure or the whole art of measuring* (Dublin 1730).
Hood, John, *Tables of difference of latitude and departure for navigators and land surveyors* (Dublin, 1772).
Laurence, Edward, *The young surveyor's guide* (London, 1717).
Noble, Benjamin, *Geodaesia Hibernica* (Dublin, 1768).
Scalé, Bernard, *Tables for the easy valuing of estates* (Dublin, 1771).

Whipple Library, University of Cambridge www.hps.cam.ac.uk/library
Adams, George *Geometrical and graphical essays* (London, 1803).
Atwell, George, *The faithful surveyor* (London, 1662).
Douglas, James, *The surveyor's utmost desire fulfilled* (London, 1727).
Emerson,William, *The art of surveying* (London, 1770).
Gardiner, William, *Practical surveying improved* (London, 1737).
Gray, John, *The art of land-measuring explained* (Dublin, 1757).
Hammond, John, *The practical surveyor* (London, 1765).
Hopton, Arthur, *Speculum topographicum* (London, 1611).
Love, John, *Geodaesia* (London, 1688).
Martin, Benjamin, *The new art of surveying by the goniometer* (London, 1771).
Martindale, Adam, *The country-survey-book* (London, 1702).
Norden, John, *The surveyors dialogue* (London, 1607).

Russell Library, NUI Maynooth www.library.nuim.ie/russell-library
A Civil Engineer, *The present practice of surveying and levelling* (London, 1848).
Nesbit, A., *Treatise on practical land surveying* (York, 1824).

Trinity College library www.tcd.ie/Library
Dalrymple, Alexander, *Essay on the most commodious methods of marine surveying* (London, 1771).
Harding, Thomas, *Tables of latitude and departure* (Dublin, 1788).
Langley, Batty, *Practical geometry* (London, 1726).
Vaughan, J., *The gentleman and farmer's pocket assistant* (Shrewsbury, 1795).
Waddington, J., *A description of instruments used by surveyors* (London, 1773).
Whittell, Thomas, *A treatise upon the dendrometer* (London, 1768).

Royal Irish Academy
Harding, Thomas, *Observations on the variation of the needle* (Dublin, 1791).
Porter, Samuel, *The artificer's farmers and inland navigators assistant* (London, 1779).
Poussant, Louis, *Traité de topographie* (Paris, 1807).

Marsh's Library www.marshlibrary.ie
Leybourn, William, *The works of Edmund Gunther* (4th ed., London, 1662).
Valentine Leigh, *The most profitable and commendable science of surveying of London's tenements* (London, 1577).
Wing, Vincent, *Geodaetes practicus redivicus* (London, 1699).

Google Books www.books.google.com
Gibson, Robert, *The theory and practice of surveying* (Harvard, 1839).
Gibson, Robert, *Treatise of practical surveying* (9th ed., Philadelphia, 1808).

Centro Cartografico Interdipartimentale, Venice www.cirgeo.unipd.it
Grabit, Jean, *La géographie* (Lyon, 1789).

Irish Architectural Archives www.iarc.ie
Herisson, Eustache, *Atlas protatif contentant la géographie universelle ancienne et moderne* (Paris, 1806).

Reprinted Surveying treatises
Robertson, John, *Treatise of mathematical instruments* (London, 1775), 2002 reprint.
Wyld, Samuel, *The practical surveyor* (London 1725), reprint 2002.

Cartographic manuals and map books (1717-1851)
Arrowsmith, Aaron, *Memoir relative to the construction of the map of Scotland* (London, 1809).
Badeslade, Thomas *Chorographia Britanniæ*,(London, 1742).
Larcom, Thomas Aiskew, *The history of the survey of Ireland: commonly called the Down Survey* (Dublin 1851).
Gough, Richard, *British topography* (London, 1780).
Green, John, *The construction of maps and globes* (London, 1717).
Moll, Herman, *Ports of Great Britain* (Paris, 1714).
Moll, Herman, *A set of twenty new and correct maps of Ireland* (London, 1728).
Scalé, Bernard and Richards, William, *Directions for navigation into the bay of Dublin* (Dublin, 1765).
Scalé, Bernard *Five plates of the houses of parliament* (Dublin, 1767).
Scalé, Bernard, *Hibernian atlas* (London, 1776).
Taylor, Alexander & Skinner, Andrew, *Maps of the roads of Ireland* (Dublin, 1778).

Printing manuals
Smith, John, *The art of painting in oil* (London 1701).
Faithorne, William, *The art of graving and etching* (2nd ed., London, 1702).

Engineering manuals (1729-1780)
Bowen, Thomas, *A plan of the Grand Canal from the city of Dublin to the river Shannon* (Dublin, 1729).
Brooke, Henry, *The interests of Ireland, considering, stated and recommended, particularly with reference to inland navigation* (Dublin, 1759).
Semple, George, *Treatise of building in water* (Dublin, 1780).
Smith, William, *Observations on a pamphlet lately published entitled a description of the rival lines for inland navigation &c.* (Dublin, 1756).
Vallancey, Charles, *A report on the grand canal or southern line* (Dublin, 1771).
Vallancey, Charles, *A treatise on inland navigation* (London, 1763).

Newspapers
Belfast News Letter (1760).
Cork Evening Post (1767-83).
Drogheda Journal (1796).
Dublin Chronicle (1788-91).
Dublin Evening Post (1785-95).
Dublin Gazette (1729-60).
Dublin Journal (1750-1801).
Dublin Mercury (1767).
Dublin Weekly Journal (1729).
Exshaw's Magazine (1760).
Finn's Leinster Journal (1773-1801).
Freemans Journal (1769-88).
Hibernian Chronicle (1786).
London Daily Journal (1728).

Public Gazette (1760-67).
Saunders Newsletter (1792).
Strabane Journal (1786).
Universal Advertiser (1753-60).
Walker's Hibernian Magazine (1804).

Travel guides and business directories (1705-1852)

Campbell, R., *The London tradesman* (London, 1747),
Cash, John and Poole, Robert, *Views of the most remarkable public buildings, monuments and other edifices in the city of Dublin* (Dublin, 1780).
Chamberlyne, *Magnae Brittanniae nottia or the present state of Great Britain* (London, 1755).
Dupin, Charles, *Memoires sur la marine et les port et chausses de France et d'Angleterre* (Paris, 1818).
Granger, James, *Bibliographical history of England* (London, 1779).
Plot, Robert, *The natural history of Oxfordshire* (London, 1705).
Romans, Bernard, *A concise natural history of east and west Florida* (Unknown, 1775).
Semple, George, *Hibernia's free trade* (Dublin, 1780).
Thom's Irish almanac and official directory (Dublin, 1852).
Watson, John, *The gentleman and citizen's almanac* (Dublin, 1761).
Wilson's Dublin directory (Dublin 1739-1810).
Young, Arthur, *A tour of Ireland* (London, 1780).

Encyclopedias

Chambers, Ephraim, *Cyclopaedia* (Dublin, 1741).
Diderot, Denis *Encyclopédie, ou dictionnaire raissonné des sciences, des arts et des métiers* (Paris 1751-65).

Other contemporary printed sources

Elton, John, 'The description of a new quadrant for taking altitudes without a horizon, either at sea or land' in *Philosophical transactions of the Royal Society*, xxxvii, no. 423 (1731-32).
Gilbert, John (ed.) *Calendar of ancient records of Dublin* in the possession of the municipal corporation, ed. J. T. Gilbert and R. M. Gilbert (19 vols, Dublin, 1889-1944).
Morres and Smeaton; *Letter on Grand Canal* (Dublin, 1773).
Report from select committee on survey and valuation of Ireland, p. 100 [445], H. C. 1824, viii.78.
Sherrard, Thomas, *Extracts from the minutes of the commissioners* (Dublin, 1802).
Vallancey, Charles, *A grammar of the Iberno-Celtic* (Dublin, 1781).
Vallancey, Charles, *An essay towards illustrating the ancient history of the Britannic Isles* (London, 1786).
Vallancey, Charles, *Prospectus of a dictionary of the language of the Aire Coti, or, ancient Irish* (Dublin, 1802).

Published maps (1610-1805)

Brooking, Charles, *A map of the city and suburbs of Dublin* (London, 1728), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).

Burgh, Thomas and Perry, John, *Dublin Bay* (London, 1728).
de Gomme, Bernard, *The city and suburbs of Dublin* (London, 1673), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).
Gibson, George, *The bay and harbour of Dublin* (Dublin, 1756).
Moll, Herman, *Dublin* (London, 1714).
Philips, Thomas, *An exact survey of the city of Dublin and part of the harbour* (1685), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).
Porter, Robert, *City and suburbs of Londonderry* (Londonderry, 1799).
Pratt, Henry, *Dublin* (Dublin, 1708).
Rocque, John, *A plan of Kilkenny city* (Dublin, 1758).
Rocque, John, *A plan of the city of Dublin and the environs on the same scale of London, Paris and Rome* (Dublin, 1756), reproduced in Colm Lennon, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).
Rocque, John, *An exact survey of the city and suburbs of Dublin* (Dublin, 1756).
Scalé, Bernard, A *survey of the city harbour bay and environs of Dublin* (London, 1773).
Scalé, Bernard, *A plan of Trinity College Dublin* (Dublin, 1761).
Scalé, Bernard, *Five plates of the Houses of Parliament* (Dublin, 1767).
Semple, George, *Scheme for opening an approach to Dublin Castle* (Dublin, 1757).
Speed, John, *Dublin* (London, 1610).
Taylor, George and Skinner, Andrew, *Maps of the road of Ireland* (Dublin, 1777).
Unknown, *A modern plan of the city and environs of Dublin* (Dublin, 1805).
Unknown, *Design of the Carlisle Bridge approaches* (Dublin, c. 1800).
Unknown, *Dublin and its vicinity* (London, 1797).
Yarranton, Andrew, *Dublin* (Dublin, 1674).

2. Secondary sources

Encyclopedias and reference books

Bonar Law, Andrew, *The printed maps of Ireland, 1612-1850* (London, 1997).
Bryan, Michael *Dictionary of painters and engravers* (London, 1904).
Clark, Mary, *The book of maps of the Dublin city surveyors, 1695-1827* (Dublin, 1983).
Colley, Mary, 'A list of architects, builders, surveyors, measurers and engineers extracted from Wilson's Dublin directories, 1760-1837' in *Bulletin of the Irish Georgian Society*, xxxiv (Dublin 1991), pp 7-68.
Jose, A. W. et al. (ed.) *The Australian encyclopaedia* (Sydney, 1927).
Mosley, Charles (ed.), *Burke's peerage, baronetage & knightage,* (107th edition, 3 vols, 2003).
Pollard, M., *Dictionary of members of the Dublin book trade 1550-1800* (London, 2000).
Refaussé, Raymond and Clark, Mary, *A catalogue of the maps of the estates of the Archbishops of Dublin, 1654-1850* (Dublin, 2000).
Steer, Francis, *Dictionary of land surveyors and local map makers of Great Britain and Ireland, 1530-1850* (London, 1997).
Turner, Jane (ed.), *The dictionary of art* (34 vols, New York, 1996).

General
Ambrosoli, Mauro, *The wild and the sown: botany and agriculture in Western Europe, 1350-1850* (Cambridge, 1992).
Andrews, J. H., *Maps in those days* (Dublin, 2009).
Andrews, J. H., 'Mean piratical practices, the case of Charles Brooking' in *Irish Georgian Society*, xxiii, nos 3 & 4 (1980), pp 33-43.
Andrews, J. H., 'New light on three eighteenth-century cartographers: Herman Moll, Thomas Moland and Henry Pratt' in *Irish Georgian Society*, xxxv (1992), pp 17-24.
Andrews, J. H., *Two maps of eighteenth century Dublin and its surroundings by John Rocque* (Dublin, 1977).
Andrews, J. H., *Richard Bartlett: the Queen's last map maker* (Dublin, 2008).
Andrews, J. H., 'The French school of Dublin land surveyors' in *Quarterly Bulletin of the Irish Georgian Society*, xxii (Dublin, 1980), pp 275–292 .
Andrews, J. H., *Plantation acres* (Omagh, 1985).

Bacon, Edmund, *Design of cities* (London, 1982).
Bendall, Sarah, 'Draft town maps of John Speed's Theatre of the Empire of Great Britaine' in *Imago Mundi*, liv (2002), pp 30-45.
Black, Jeremy, *The Hanoverians* (London, 2004).
British Museum, *A guide to the processes and schools of engraving* (London, 1914).
Buckley, Samuel, 'A short start of the public encouragement five to printing and bookselling in France, Holland, Germany and at London' in S. Parks (ed), *English publishing, the struggle for copyright, and the freedom of the press, 1666-1774* (New York, 1975).
Buisseret, David, *Monarchs, ministers and maps* (Chicago, 1992).
Burrnett, J. E., *Vulgar and mechanick: the scientific instrument trade in Ireland, 1650-1921* (Dublin, 1989).

Casey, Christine, *The buildings of Ireland: Dublin* (London, 2005).
Chipman, Willis, *The life and times of Major Samuel Holland, Surveyor-General, 1764-1801* (Dublin, 1924).
Clark, Mary and Smeaton, Alastair (ed.), *The Georgian squares of Dublin* (Dublin, 2006).
Clarke, H. B. *Dublin part 1, to 1610* (Irish Historic Towns Atlas, no. 11, Dublin, 2002).
Clayton, Timothy, *The English print, 1688 – 1802* (Oxford, 1997).
Commons Journals, Ireland, ix.
Cosgrove, Art (ed.) *Dublin through the ages* (Dublin, 1988).
Craig, Maurice, *Dublin, 1660-1860: the shaping of a city* (Dublin, 2006).

Daly, Gerald, *Early maps from the Dublin port board collection*, (Dublin, n. d.).
Daly, Gerald, 'George Semple's chart of Dublin Bay (1762)' in *Proceedings of the Royal Irish Academy*, xciii, no. 3 (1993), pp 3-105.
Danson, Edwin, *Weighing the world* (Oxford, 2006).
de Courcy, John W., 'The Liffey banks in Dublin: the early works of the private developers' in *Dublin historical record*, lvii (Dublin, 2004), pp 146-51.
Delany, Ruth, *The Grand Canal of Ireland* (Dublin, 1973).

Engle, Bernice, ‘The use of Mercury’s Caduceus as a medical emblem’ in *The classical*, xv, no. 3 (1929), pp 204-08.
E. Evans, Historical and bibliographical account of almanacs, directories etc. etc. published in Ireland from the sixteenth century (Dublin, 1897).

Fairclough, R. H., ‘Sketches of the roads in Scotland, 1785'; the manuscript road book of George Taylor’ in *Imago Mundi*, xxvii (1975), pp 65-72.
Fagan, Patrick, ‘The population of Dublin in the eighteenth century’ in *Eighteenth-Century Ireland / Iris an dá chultúr*, vi (1991), pp 121-56.
Ferguson, Kenneth, ‘Rocque's map and the history of nonconformity in Dublin: a search for meeting houses’ in *Dublin Historical Record*, lvii (2005), pp 129-65.

Gebbie, J. H., *An introduction to the Abercorn letters as relating to Ireland, 1736-1816* (Omagh 1972).
Gerard Le Turner, *Scientific instruments, 1500-1900* (London, 1998).
Gilbert J. T., *A history of the city of Dublin, iii* (Dublin, 1854-59, reprinted 1978).
Gillespie, Raymond (ed.) *The first chapter act book of Christ Church cathedral, Dublin, 1574-1634* (Dublin, 1997).

Harley, J. B., Barbara Petchenik and Lawrence Towner, *Mapping the American revolutionary war* (Chicago 1977).
Heusser, Albery, *George Washington’s mapmaker: a biography of Robert Erkine Rutgers* (New York, 1966).
Horner, Arnold ‘Cartouches and vignettes on the Kildare estate maps of John Rocque’ in *Quarterly Bulletin of the Irish Georgian Society*, xiv, no. 4 (1971), pp 57-71.
Horner, Arnold, *Maynooth* (Irish Historic Towns Atlas, no. 7, Dublin, 1995).
Hough, Richard, *Captain James Cook* (London, 1994).

Kinane, Vincent, ‘Printers apprentices in eighteenth and nineteenth century Dublin’ in *The Linen Hall Review*, x (1993), pp 11-14.

Lawrence, Heather, ‘Permission to survey’ in *The map collector, xix* (London, 1982), pp 19-20.
Lennon, Colm, *Dublin part 2, 1610 to 1756* (Irish Historic Towns Atlas, no. 19, Dublin, 2008).
Lennon, Colm, *Dublin 1610 to 1756: the making of the early modern city* (Dublin, 2009).
Lennon, Colm and Montague, John, *John Rocque’s Dublin: a guide to the Georgian city* (Dublin, 2010).
Loeber, Rolf, ‘A portrait of the Irish surveyor-general, William Robinson’ in *Irish Georgian Society*, xxiii, nos. 3 & 4 (1980), pp 44-6.
Longfield, Ada, ‘A Co. Sligo estate map of 1768’ in *Irish Georgian Society*, xx, nos 3 & 4 (1977), pp 57-70.

Maxwell, Constantia, *Dublin under the Georges* (Dublin, 1936).
McCullough, David, *1776* (London, 2005).
McCullough, Niall, *Dublin, an urban history: the plan of the city* (Dublin, 2007).

general secondary sources contd.

McParland, Edward, 'The Wide Streets Commissioners: their importance for Dublin architecture in the late 18th-early 19th century' in *Bulletin of the Irish Georgian Society,* xv (1972), pp 1-31.
Murtagh, Harman, *Athlone* (Irish Historic Towns Atlas, no. 6, Dublin, 1994).

O'Brien, G., *The economic history of Ireland from the Union to the famine* (London, 1921).
O'Sullivan, Harold, *Dundalk* (Irish Historic Towns Atlas, no. 16, Dublin, 2006).

O'Dwyer, Frederick, 'Building empires: architecture, politics and the Board of Works 1760 – 1860' in *Bulletin of the Irish Georgian Society*, v (2002), pp 109-76.
O'Reilly, William, 'Charles Vallancey and the military itinerary of Ireland' in *Proceedings of the Royal Irish Academy*, cvi (Dublin, 2006), pp 125-217.

Prendergast, Frank, 'The Down Survey of Ireland' in *Survey Ireland xiv* (Dublin, 1997).
Prunty, Jacinta, *Maps and map-making in local history* (Dublin, 2004).

Ravenhill, William, 'Joel Gascoyne, a pioneer of large-scale county mapping' in *Imago Mundi*, xxvi (1972), pp 60-70.

Robinson, Alan, *Marine cartography in Britain* (Leicester 1962).

Severns, Kenneth, 'A new perspective on Georgian building practice: the rebuilding of St. Werburgh's church, Dublin (1754-1759)' in *Bulletin of the Irish Georgian Society*, xxxv (1992), pp 3-16.
Sheridan, Edel, 'Designing the capital city' in Brady & Simms (eds) *Dublin* c.*1660-1810* (Dublin, 2001) pp 136-58.
Skelton, R. A., 'Copyright and piracy in eighteenth-century chart publication' in *Mariners mirror*, lxxvii (1960), pp 139-48.
Skelton, R. A., 'The origins of the Ordnance Survey of Great Britain' in *Geographical*, cxxviii (1962).
Skelton, R.A., *County atlases of the British Isles* (London, 1970).
Smith, Clifford T., *An historical geography of Western Europe before 1800* (London, 1967).
Smyth, William, *Map-making, landscape and memory* (Cork, 2006).
Sponberg-Pedley, Mary, *Commerce of cartography* (Chicago 2005).
Sponberg-Pedley, Mary, 'The subscription list of the 1757 Atlas Universal: a study in cartographic dissemination' in *Imago Mundi*, xxxi (1979), pp 66-77.
Swift, Jonathan, *Gulliver's travels* (London, 1726).

Taylor, E.G.R., 'Robert Hooke and the cartographical projects of the late seventeenth century (1666 – 1696)' in *Geographical*, xc (1937), pp 529-40.
Thomas, Avril, *Derry* (Irish Historic Towns Atlas, no. 15, Dublin, 2006).

Varley, John, 'John Rocque; engraver, surveyor, cartographer and map-seller' in *Imago Mundi*, v (1948), pp 83-91.

general secondary sources contd.

Withers, Charles W. J., *Geography, science and national identity: Scotland since 1520* (Unknown, 2001).
Woodward, David, *Five centuries of map printing* (Chicago, 1975).

Unpublished theses

Hodge, Ann, A study of the rococo decoration of John Rocque's Irish maps and plans 1755-1760 (NCAD, 1994), B.A thesis.
Montague, John, 'John Rocque's 1756 Exact Survey of the city and suburbs Dublin, as evidence for the architecture of the mid-eighteenth century city' (TCD, 2009), PhD thesis.